

GLOSSARY OF TERMS

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Glossary of Terms

A

alignment Horizontal and vertical geometric elements that define the location of a roadway.

anadromous fish species Fish that are born and reared in freshwater, migrate to the ocean to grow to maturity, and return to freshwater to reproduce (such as salmon and steelhead).

anoxic Devoid of oxygen.

antecedent moisture conditions The degree of wetness of a watershed or the soil at the beginning of a storm.

antiseepage collar A device constructed around a pipe or other conduit and placed through a dam, levee, or dike for the purpose of reducing seepage losses and piping failures.

aquifer A geological stratum containing groundwater that can be withdrawn and used for human purposes.

arid Excessively dry; having insufficient rainfall to support agriculture without irrigation.

arterial A road or street intended to move high volumes of traffic over long distances at high speed, with partial control of access, having some intersections at grade. A *major arterial* connects an interstate highway 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.

as-built drawings Engineering plans that have been revised to reflect all changes to the plans that occurred during construction.

average daily traffic (ADT) The volume of traffic passing a point on a highway in both directions during an average day of the year (or design year). ADT counts must be estimated using *Trip Generation*, published by the Institute of Transportation Engineers, or using a traffic study prepared by a professional engineer or transportation specialist with expertise in traffic volume estimation. ADT counts can be used to forecast future volumes for the design life of a particular project. For project sites with seasonal or varied use, the highest period of expected traffic impacts is evaluated.

B

backwater Water upstream from an obstruction that is deeper than it would normally be without the obstruction.

baffle A device to check, deflect, or regulate flow.

base flood A flood having a 1% chance of being equaled or exceeded in any given year (also called the 100-year flood).

base flow The portion of stream flow that is not attributable to storm runoff and is supported by groundwater seepage into a channel.

basic (water quality) treatment (*versus enhanced water quality treatment*) The Washington State Department of Ecology's performance goal is to achieve 80% removal of total suspended solids for influent concentrations that are greater than 100mg/l, but less than 200mg/l. For influent concentrations greater than 200mg/l, a higher treatment goal may be appropriate. For influent concentrations less than 100mg/l, the facilities are intended to achieve an effluent goal of 20mg/l total suspended solids.

basin The area of land drained by a river and its tributaries that drains water, organic matter, dissolved nutrients, and sediments into a lake or stream (see *watershed*). Basins typically range in size from 1 to 50 square miles.

basin plan A plan that assesses, evaluates, and proposes solutions to existing and potential future impacts on the physical, chemical, and biological properties and beneficial uses of waters of the state within a drainage basin. A plan should include but not be limited to recommendations for the following elements:

- Stormwater requirements for new development and redevelopment
- Capital improvement projects
- Land use management through identification and protection of critical areas, comprehensive land use and transportation plans, zoning regulations, site development standards, and conservation areas
- Source control activities, including public education and involvement, and business programs
- Other targeted stormwater programs and activities, such as maintenance, inspections, and enforcement
- Monitoring
- An implementation schedule and funding strategy

A basin plan that is adopted and implemented must have the following characteristics:

- Adoption by legislative or regulatory action of jurisdictions with responsibilities under the plan
- Recommended ordinances, regulations, programs, and procedures that are in effect or scheduled to go into effect
- An implementation schedule and funding strategy in progress

bench A relatively level step excavated into earth material on which fill is to be placed.

beneficial uses Those water uses identified in state water quality standards that must be achieved and maintained as required under the federal Clean Water Act. “Beneficial use” and “designated use” are often used interchangeably.

berm A constructed barrier of compacted earth, rock, or gravel. In a stormwater facility, a berm may serve as a vertical divider, typically built up from the bottom.

best available science The best available scientific knowledge and practices.

best management practices (BMPs) The structural devices, maintenance procedures, managerial practices, prohibitions of practices, and schedules of activities that are used singly or in combination to prevent or reduce the detrimental impacts of stormwater, such as pollution of water, degradation of channels, damage to structures, and flooding.

biodegradable Capable of being readily broken down by biological means, especially by microbial action. Microbial action includes the combined effects of bacteria, fungi, flagellates, amoebae, ciliates, and nematodes. Degradation can be rapid or may take many years, depending on such factors as available oxygen and moisture.

bioengineering The combination of biological, mechanical, and ecological concepts (and methods) to control erosion and stabilize soil through the use of vegetation alone or in combination with construction materials.

biofilter A designed treatment facility using a combined soil and vegetation system for 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. The former mechanism is probably the most important in western Washington, where the period of major runoff coincides with the period of lowest biological activity.

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.

biological assessment A document prepared under the direction of a federal agency to determine whether a proposed action involving major construction activities is likely to (1) adversely affect species protected under the Endangered Species Act or their designated critical habitats, (2) jeopardize the continued existence of species that are proposed for listing as threatened or endangered, or (3) adversely modify proposed critical habitat.

biological evaluation A document that contains exactly the same information as a biological assessment, evaluating the impacts of a proposed action on listed and proposed species and habitat. In the case of projects without federal involvement, the biological evaluation determines whether the proposed action would violate Section 9 of the Endangered Species Act. The biological evaluation can evolve into a biological assessment if formal or informal consultation is required with the federal agencies.

bioretention The removal of stormwater runoff pollutants using the chemical, biological, and physical properties afforded by a natural terrestrial community of plants, microbes, and soil. The typical bioretention system is set in a depression area and consists of plantings, mulch, and an amended planting soil layer underlain with more freely draining granular material.

bituminous surface treatment (BST) A thin, protective wearing surface that is applied to a pavement or base course (also known as a seal coat or chip seal).

bollard A post (which may or may not be removable) used to prevent vehicular access.

borings Cylindrical samples of a soil profile used for analysis of soils or determination of infiltration capacity.

borrow area A source of earth fill material used in the construction of embankments or other earth fill structures.

buffer The zone contiguous with a sensitive area that is required for the continued maintenance, function, and structural stability of the sensitive area. The critical functions of a riparian buffer (those associated with an aquatic system) include shading; input of organic debris and coarse sediments; uptake of nutrients; stabilization of banks; interception of fine sediments; overflow during high water events; protection from disturbance by humans and domestic animals; maintenance of wildlife habitat; and room for variation of aquatic system boundaries over time due to hydrologic or climatic effects. The critical functions of terrestrial buffers include protection of slope stability, attenuation of surface water flows from stormwater runoff and precipitation, and erosion control.

bypass A channel or conveyance constructed to divert water around a stormwater facility or series of stormwater facilities.

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.

capital improvement project or program (CIP) A project prioritized and scheduled as a part of an overall construction program or the actual construction program.

catch basin A chamber or well, usually built at the curb line of a street, for the admission of surface water to a sewer or subdrain, having at its base a sediment sump designed to retain grit and detritus below the point of overflow.

catch basin insert (CBI) A device installed under a storm drain grate to provide runoff treatment through filtration, settling, or adsorption (also called *inlet protection*).

catchment Surface area associated with pavement drainage design.

cation exchange capacity (CEC) The amount of exchangeable cations that a soil can adsorb at pH 7.0, typically expressed in units of milliequivalents per 100 grams of dry soil.

channel A feature that conveys surface water and is open to the air.

channel erosion The widening, deepening, and headward cutting of small channels and waterways resulting from erosion caused by moderate-to-large floods.

channel stabilization Erosion prevention and stabilization of velocity distribution in a channel using vegetation, jetties, drops, revetments, or other measures.

check dam A small dam constructed in a ditch, gully, grass swale, or other small watercourse to decrease the stream flow velocity, enhance infiltration, minimize channel scour, and promote deposition of sediment; or a log or gabion structure placed perpendicular to a stream to enhance aquatic habitat.

clearing The removal and disposal of all unwanted natural material from the ground surface such as trees, brush, and downed timber by manual, mechanical, or chemical methods.

closed depression A low-lying area that has either no surface water outlet or such a limited surface water outlet that, during storm events, the area acts as a retention basin.

coir Coconut fiber used for erosion control blankets and wattles.

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. Compaction may also refer to the densification of a fill by mechanical means.

compost Organic residue, or a mixture of organic residues and soil, that has undergone biological decomposition until it has become relatively stable humus. The Washington State Department of Ecology's *Interim Guidelines for Compost Quality* (1994) defines compost as "the product of composting; it has undergone an initial, rapid stage of decomposition and is in the process of humification (curing)." Compost to be used should meet specifications shown in Standard Specification 9-14.4(8).

concentrated flow Water flowing in a channel as opposed to a thin sheet.

constructed stormwater treatment wetland A wetland intentionally created on a site that is not a wetland, for the primary purpose of wastewater or stormwater treatment. Constructed wetlands are normally considered part of the stormwater collection and treatment system.

Construction Contract Information System (CCIS) A WSDOT database managed by the HQ Construction Office to track contract costs.

construction staging area A site used temporarily during construction for materials or equipment storage, assembly, or other temporary construction activities.

context sensitive design (CSD) A collaborative, interdisciplinary approach that involves all stakeholders in developing a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources while maintaining safety and mobility (also known as “context sensitive solutions” and “thinking beyond the pavement”).

converted pervious surface Land cover changed from native vegetation to lawn, landscape, or pasture areas. (See also *pollution-generating impervious surface*.)

conveyance A mechanism for transporting water from one point to another, including pipes, ditches, and channels.

conveyance system The drainage facilities, both natural and constructed, that collect, contain, and provide for the flow of surface water and stormwater from the highest points on the land down to a receiving water. The natural elements of the conveyance system include swales and small drainage courses, streams, rivers, lakes, and wetlands. Constructed elements of the conveyance system include gutters, ditches, pipes, channels, and most retention/ detention facilities.

critical areas At a minimum: areas that include wetlands; areas with a critical recharging effect on aquifers used for potable water; fish and wildlife habitat conservation areas; frequently flooded areas; geologically hazardous areas, including unstable slopes; and associated areas and ecosystems.

culvert A pipe or concrete box structure that drains open channels, swales, or ditches under a roadway or embankment. Typically, a culvert is not connected to a catch basin or manhole along its length. Various types of culverts are listed in the [Hydraulics Manual](#).

cut-and-fill The process of moving earth by excavating part of an area and using the excavated material for adjacent embankments or fill areas.

cut slope A slope formed by excavating overlying material to connect the original ground surface with a lower ground surface created by the excavation. A cut slope is distinguished from a bermed slope, which is constructed by importing soil to create the slope.

D

dangerous waste Any discarded, useless, unwanted, or abandoned substances, including (but not limited to) certain pesticides, or any residues or containers of such substances that are disposed of in such quantity or concentration as to pose a substantial current or potential hazard to human health, wildlife, or the environment ([RCW 70.105.010](#)). These wastes may have short-lived, toxic properties that may cause death, injury, or illness; may have mutagenic, teratogenic, or carcinogenic properties; may be corrosive, explosive, or flammable; or may generate pressure through decomposition or other means. (See also *hazardous waste*.)

dead storage The volume of water in a pond, reservoir, or infiltration facility that is stored below the elevation of the lowest outlet or operating level of the structure; the volume available in a depression in the ground below any conveyance system, surface drainage pathway, or outlet invert elevation that could allow the discharge of surface and stormwater runoff.

demonstrative approach (versus *presumptive approach*) See [Sections 1-2.2](#) and [5-3.6.3](#).

depression storage The amount of precipitation trapped in depressions on the surface of the ground.

design flow rate The maximum flow rate to which certain runoff treatment BMPs are designed for required pollutant removal. Biofiltration swales, vegetated filter strips, and oil/water separators are some of the runoff treatment BMPs that are sized based on a design flow rate.

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. A prescribed hyetograph and total precipitation amount (for a specific duration recurrence frequency) are used to estimate runoff for a hypothetical storm for the purposes of analyzing existing drainage, designing new drainage facilities, or assessing other impacts of a proposed project on the flow of surface water. (A hyetograph is a graph of percentages of total precipitation for a series of time steps representing the total time during which the precipitation occurs.)

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. Facilities designed to handle flows that occur under such storm conditions would be expected to be surcharged by any storms of greater amount or intensity.

design volume For western Washington, the water quality design volume is the 91st percentile, 24-hour runoff volume indicated by MGSFlood or an approved continuous runoff model (see [Table 3-3](#)). In eastern Washington, the water quality design volume is the volume of runoff predicted from a 24-hour storm with a 6-month return frequency (see [Table 3-4](#)).

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; the release of stormwater runoff from the site at a slower rate than it is collected by the stormwater facility system, with the difference held in temporary storage.

detention facility An aboveground or below-grade ground facility, such as a pond or tank, that temporarily stores stormwater runoff and subsequently releases it at a slower rate than it is collected by the drainage facility system. There is little or no infiltration of stored stormwater.

dewatering Removing water by pumping, drainage, or evaporation.

discharge Runoff leaving a new development or redevelopment via overland flow, built conveyance systems, or infiltration facilities; a hydraulic rate of flow, specifically fluid flow; or a volume of fluid passing a point per unit of time, commonly expressed in cubic feet per second, cubic meters per second, gallons per minute, gallons per day, or millions of gallons per day.

dispersion Release of surface water and stormwater runoff in such a way that the flow spreads over a wide area and is located so as not to allow flow to concentrate anywhere upstream of a drainage channel with erodible underlying granular soils.

displacement A property encroachment that requires full acquisition of a parcel in order to build and operate public transportation facilities.

ditch A long, narrow excavation dug in the earth for drainage, having a top width less than 10 feet at design flow.

drainage easement A legal encumbrance placed against a property's title to reserve specified privileges for the users and beneficiaries of the drainage facilities contained within the boundaries of the easement.

drawdown The gradual reduction in water level in a pond due to the combined effects of infiltration and evaporation; the lowering of the water surface (in open-channel flow), the water table, or the piezometric surface (in groundwater flow) resulting from a withdrawal of water.

drop structure A structure for dropping water to a lower level and dissipating its surplus energy (a fall). A drop may be vertical or inclined.

dry pond A facility that provides stormwater quantity control by containing excess runoff in a detention basin, then releasing the runoff at allowable levels.

dry vault or tank A facility that provides stormwater quantity control by detaining runoff in underground storage units and then releasing reduced flows at established standards.

drywell A well completed above the water table so that its bottom and sides are typically dry except when receiving fluids. Drywells are designed to disperse water below the land surface and are commonly used for stormwater management in eastern Washington. (See also *underground injection control [UIC] well*.)

duff The naturally-occurring layer of dead and decaying plant material that develops on the ground surface under established plant communities.

E

easement The legal right to use a parcel of land for a particular purpose. It does not include fee ownership, but may restrict the owner's use of the land.

eastern Washington high-use road Eastern Washington roadways with ADT >30,000.

Ecology Washington State Department of Ecology.

ecology embankment See *media filter drain*.

effective impervious surface For determining whether a particular TDA has exceeded [Minimum Requirement 6](#) (Flow Control), the net-new impervious surfaces plus any applicable replaced impervious surfaces minus those new and applicable replaced impervious surfaces that are flowing into an existing dispersion area (noneffective new impervious surfaces and noneffective replaced impervious surfaces).

effective impervious surface = net new impervious surface + applicable replaced impervious surface – noneffective new impervious surface – noneffective replaced impervious surface

effective pollution-generating impervious surface (PGIS) For determining whether a particular TDA has exceeded [Minimum Requirement 5](#) (Runoff Treatment), the new PGIS plus applicable replaced PGIS minus those new PGIS areas and applicable replaced PGIS areas that are flowing into an existing dispersion area (noneffective new PGIS and noneffective replaced PGIS).

effective PGIS = new PGIS + applicable replaced PGIS – noneffective new PGIS – noneffective replaced PGIS

embankment A structure of earth, gravel, or similar material raised to form a pond bank or foundation for a road.

emergency overflow spillway A vegetated earth or rock-lined channel used to safely convey flood discharges in excess of the capacity of the principal spillway.

emergent plants Aquatic plants that are rooted in the sediment but whose leaves are at or above the water surface. These wetland plants often have high habitat value for wildlife and waterfowl and can aid in pollutant uptake.

emerging BMP technologies BMP technologies that have not been evaluated using approved protocols, but for which preliminary data indicate they may provide a desirable level of stormwater pollutant removal. In some instances, an emerging technology may have already received a *pilot use* or *conditional use designation* from the Washington State Department of Ecology, but does not have a *general use designation*.

endangered species Any species in danger of extinction throughout all or a significant portion of its range (other than pest insects).

Endangered Species Act (ESA) of 1973 An act “*To provide for the conservation of endangered and threatened species of fish, wildlife, and plants, and for other purposes.*”

energy dissipater A means by which the total energy of flowing water is reduced, such as rock splash pads, drop manholes, concrete stilling basins or baffles, and check dams. In stormwater design, an energy dissipater is usually a mechanism that reduces velocity prior to or at discharge from an outfall in order to prevent erosion.

engineering and economic feasibility (EEF) An assessment of whether a project will experience practical limitations in fully meeting certain minimum requirements, particularly runoff treatment and flow control, within the project right of way. Limitations may be infrastructural, geographical, geotechnical, hydraulic, environmental, or benefit/cost-related. ([Chapter 2](#) provides further discussion of EEF, and [Appendix 2A](#) includes the EEF Checklist, which is designed to identify the critical limiting factors that may inhibit or preclude construction of stormwater management facilities in a project right of way).

enhanced runoff treatment, enhanced water quality treatment (versus *basic water quality treatment*) The use of runoff treatment BMPs designed to capture dissolved metals at a higher rate than basic treatment BMPs.

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 (also known as a seasonal stream).

equivalent area An impervious surface area equal in size, located in the same drainage basin (threshold discharge area), and having similar use characteristics (for example, similar average daily traffic) to the impervious surface. The equivalent area concept generally applies to *engineered dispersion* areas and may apply to *natural dispersion* areas, as described in the following: The existing site currently collects runoff in a ditch or pipe and discharges to a surface water. By changing this condition to natural dispersion ([BMP FC.01](#)), a surface discharge is eliminated, resulting in a flow control improvement. Equivalent area trades for natural dispersion are allowed for this specific case.

erosion The detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

erosion control blanket A blanket made of natural plant material or synthetic fibers that is rolled out and fastened to the soil surface to protect soil from raindrop and sheet erosion.

erosion and sedimentation control (ESC) Any temporary or permanent measures taken to reduce erosion, trap sediment, and ensure sediment-laden water does not leave the site.

estuarine wetland Generally, an eelgrass bed, salt marsh, or rocky sand flat or mudflat intertidal area where freshwater and saltwater mix (specifically, a tidal wetland with salinity greater than 0.5 parts per thousand, usually partially enclosed by land, but with partially obstructed or sporadic access to the open ocean).

eutrophication The 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.

evapotranspiration The collective term for the processes of evaporation and plant transpiration by which water is returned to the atmosphere.

exfiltration The downward movement of runoff through the bottom of an infiltration facility into the soil layer, or the downward movement of water through soil.

existing land cover/existing site conditions The conditions (ground cover, slope, drainage patterns) of a site as they existed on the first day the project entered the design phase.

existing roadway prism The limit of embankment or excavation work required to construct the roadway. This limit is further defined as the catch point of a cut or fill with the existing ground.

F

feasibility See *engineering and economic feasibility*.

fill slope An embankment made of earthen material placed by artificial means that is especially vulnerable to erosion.

filter berm A berm of compost, mulch, or gravel to detain and filter sediment from sheet flow.

filter fabric A woven or nonwoven water-permeable material, typically made of synthetic products such as polypropylene, used in stormwater management and erosion and sediment control applications to trap sediment or to prevent fine soil particles from clogging the aggregates.

filter strip A grassy area with gentle slopes that treats stormwater runoff from adjacent paved areas before it can concentrate into a discrete channel.

fish-bearing stream According to [WAC 222-16-030](#): Type S, F, and Np waters are fish habitat streams. Until fish habitat water type maps are available, an interim water-typing system applies (see [WAC 222-16-031](#)). Type 1, 2, 3, and 4 waters are fish habitat streams.

flood An overflow or inundation that comes from a river or any other source, including but not limited to streams, tides, wave action, storm drains, or excess rainfall; any relatively high stream flow overtopping the natural or artificial banks in any reach of a stream.

flood control project A structural system installed to protect land and improvements from floods by the construction of dikes, river embankments, channels, or dams.

flood frequency The frequency at which the flood of interest may be expected to occur.

flood peak The highest value of the stage or discharge attained by a flood; thus, peak stage or peak discharge.

floodplain The total area subject to inundation by a flood, including the flood fringe and floodway.

flood stage The stage at which overflow of the natural banks of a stream begins.

floodway The channel of the river or stream and those portions of the adjoining floodplains that are reasonably required to carry and discharge the base flood flow. The "reasonably required" portion of the adjoining floodplains is defined by flood hazard regulations.

flow control (formerly called *water quantity treatment or detention*)

flow control facility A drainage facility (BMP) designed to mitigate the impacts of increased surface water and stormwater runoff flow rates generated by development. Flow control facilities are designed to either hold water for a considerable length of time and then release it by evaporation, plant transpiration, or infiltration into the ground, or to hold runoff for a short period of time and then release it to the conveyance system at a controlled rate.

flow duration The aggregate time that peak flows are equal to or above a particular flow rate of interest. For example, the amount of time that peak flows are equal to or above 50% of the 2-year peak flow rate for a period of record.

flow frequency The inverse of the probability that the flow will be equaled or exceeded in any given year (the exceedance probability). For example, if the exceedance probability is 0.01 or 1 in 100, that flow is referred to as the 100-year flow.

flow path The route that stormwater runoff follows between two points of interest.

flow rate The amount of a fluid passing a certain point in a given amount of time. In stormwater applications it is usually expressed in cubic feet per second or gallons per minute.

flow splitter A device with multiple outlets, each sized to pass a specific flow rate at a given head.

flow spreader A device with a wide enough outlet to efficiently distribute concentrated flows evenly over a large area, having common components such as trenches, perforated pipes, and berms.

forebay An easily maintained extra storage area provided near an inlet of a stormwater facility to trap incoming sediments before they accumulate in a pond or wetland.

freeboard The vertical distance between the design water surface elevation and the elevation of the barrier that contains the water.

functions, wetland The ecological (physical, chemical, and biological) processes or attributes of wetlands without regard for their importance to society. Wetland functions include food chain support; provision of ecosystem diversity and fish and wildlife habitat; flood flow alteration; groundwater recharge and discharge; water quality improvement; and soil stabilization.

G

gabion A rectangular or cylindrical wire mesh cage (a chicken wire basket) filled with rock and used as a protection or revetment against erosion. Soft gabions, often used in streams and ponds to stabilize banks or change flow patterns, are made of geotextiles filled with soil, with cuttings placed between.

gage or gauge A device for registering precipitation, water level, discharge, velocity, pressure, or temperature. Also, a measure of the thickness of metal (for example, diameter of wire or wall thickness of steel pipe).

geologically hazardous areas Areas that, because of their susceptibility to erosion, sliding, earthquakes, or other geological events, are not suited to the siting of commercial, residential, or industrial development consistent with public health or safety concerns.

geologist A person who has earned a degree in geology from an accredited college or university (or who has equivalent educational training) and has at least five years of experience as a practicing geologist or four years of experience in practice and at least two years of post-graduate study, research, or teaching. The practical experience must include at least three years working in applied geology and landslide evaluation, in close association with qualified practicing geologists or geotechnical professional/civil engineers.

geotextile Durable synthetic fabrics used to reinforce soils and construct temporary sediment control BMPs for detaining runoff and trapping sediment.

GIS Workbench An ArcView geographic information system tool maintained by the WSDOT HQ Geographic Services Office and the HQ Office of Information Technology to provide staff with access to comprehensive, current, and detailed environmental and natural resource management data.

gore area The tapering paved area between two lanes, on which travel is not allowed.

grade The slope of a road, channel, or natural ground; the finished surface of a canal bed, roadbed, top of embankment, or bottom of excavation; or any surface prepared for the support of construction such as paving or the laying of a conduit.

gradient terrace A terrace cut horizontally into a slope, designed according to criteria that consider slope, length, and height.

groundwater Water in a saturated zone or stratum beneath the land surface or a surface water body.

groundwater recharge Inflow to a groundwater reservoir.

groundwater table The free surface of the groundwater, which is subject to atmospheric pressure under the ground and is seldom static, generally rising and falling with the season, the rate of withdrawal, the rate of restoration, and other conditions.

grubbing The removal and disposal of all unwanted vegetative matter from underground, such as sod, stumps, roots, buried logs, or other debris.

gully A channel caused by the concentrated flow of surface and stormwater runoff over unprotected erodible land.

H

habitat The specific area or environment in which a particular type of plant or animal lives. An organism's habitat must provide all the basic requirements for life and should be protected from harmful biological, chemical, and physical alterations.

hardpan A cemented or compacted and often clay-like layer of soil that is impenetrable by roots (also known as glacial till).

hazardous substance Any liquid, solid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any of the characteristics or criteria of hazardous waste ([RCW 70.105.010](#)). (See also *dangerous waste*.)

hazardous waste All dangerous and extremely hazardous waste, including substances having radioactive or hazardous components ([RCW 70.105.010](#)). (See also *dangerous waste*.)

head (hydraulic) The height of water above any plane of reference; the energy, either kinetic or potential, possessed by each unit weight of a liquid, expressed as the vertical height through which a unit weight would have to fall to release the average energy possessed; used in various compound terms such as pressure head, velocity head, and head loss.

heavy metals Metals of high specific gravity, present in municipal and industrial wastes, that pose long-term environmental hazards. Such metals include cadmium, chromium, cobalt, copper, lead, mercury, nickel, and zinc.

high-use roadway and parking area Roadways and parking areas that the Washington State Department of Ecology presumes will generate concentrations of oil that need to be managed. With respect to oil control, absorptive BMPs (CAVFS, bioinfiltration pond) should be used on these high-use roads and parking areas. Examples of high-use roadways and parking areas include the following:

- Rest areas with an expected trip end count greater than or equal to 300 vehicles per day
- Eastern Washington roads with ADT > 30,000

high-use site, high-use intersection A site that the Washington State Department of Ecology presumes will generate high concentrations of oil due to high traffic turnover or the frequent transfer of oil. Examples of high-use sites include the following:

- An intersection where either $\geq 15,000$ vehicles (ADT) must stop to cross a roadway with $\geq 25,000$ vehicles (ADT) or vice versa
- Maintenance facilities that park, store, or maintain 25 or more vehicles (trucks or heavy equipment) that exceed 10 tons gross weight each

highway A main public road connecting towns and cities.

historic land cover The native vegetation and soils that existed at a site prior to the influence of Euro-American settlement. The predeveloped condition shall be assumed to be forested land cover unless reasonable historic information is provided that indicates the site was prairie prior to settlement.

hog fuel Wood residues processed through a chipper or mill to produce coarse chips. Residues may include bark, sawdust, planer shavings, wood chunks, and small amounts of mineral material.

hydraulic conductivity The quality of saturated soil that enables water or air to move through it (also known as permeability coefficient).

hydraulic gradient Slope of the potential head relative to a fixed datum.

hydraulic residence time The time required for a slug of water to move through a system. In the most simplistic situation, once inflows to a water body cease, the hydraulic residence time is equal to the volume of the water body divided by the discharge rate (assuming no short-circuiting of the system).

hydrograph A graph of runoff rate, inflow rate, or discharge rate past a specific point over time.

Hydrological Simulation Program–Fortran (HSPF) A continuous simulation hydrologic model that transforms an uninterrupted rainfall record into a concurrent series of runoff or flow data by means of a set of mathematical algorithms that represent the rainfall-runoff process at some conceptual level.

hydrologic cycle The circuit of water movement from the atmosphere to the earth and returning to the atmosphere through various stages or processes such as precipitation, interception, runoff, infiltration, percolation, storage, evaporation, and transpiration.

hydrologic soil groups A soil characteristic classification system defined by the U.S. Soil Conservation Service in which a soil may be categorized into one of four soil groups (A, B, C, or D) based upon infiltration rate and other properties (based on *Water Quality Prevention, Identification, and Management of Diffuse Pollution* by Vladimir Novotny and Harvey Olem; Van Nostrand Reinhold, New York, 1994, page 109). Soil groups include:

- **Type A** – Low runoff potential. Soils having high infiltration rates, even when thoroughly wetted and consisting chiefly of deep, well-drained to excessively-drained sands or gravels. These soils have a high rate of water transmission.
- **Type B** – Moderately low runoff potential. Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.
- **Type C** – Moderately high runoff potential. Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine textures. These soils have a slow rate of water transmission.
- **Type D** – High runoff potential. Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential; soils with a permanent high water table; soils with a hardpan, till, or clay layer at or near the surface; soils with a compacted subgrade at or near the surface; and shallow soils or nearly impervious material. These soils have a very slow rate of water transmission.

hydrology The science of the behavior of water in the atmosphere, on the surface of the earth, and below ground.

hydroperiod A seasonal occurrence of flooding or soil saturation; it encompasses the depth, frequency, duration, and seasonal pattern of inundation.

hyetograph A graph of percentages of total precipitation for a series of time steps representing the total time during which the precipitation occurs.

I

illicit discharge All nonstormwater discharges to stormwater drainage systems that cause or contribute to a violation of state water quality, sediment quality, or groundwater quality standards, including but not limited to sanitary sewer connections, industrial process water, interior floor drains, car washing, and gray-water systems.

impaired waters Water bodies not fully supporting their beneficial uses, as defined under the federal Clean Water Act, Section 303(d). (See the Washington State Department of Ecology 303(d) list at: www.ecy.wa.gov/programs/wq/303d/.)

impervious surface A hard surface area that either prevents or retards the entry of water into the soil mantle as occurs under natural conditions (prior to development) and from which water runs off at an increased rate of flow or in increased volumes. Common impervious surfaces include but are not limited to rooftops, walkways, patios, driveways, parking lots, storage areas, concrete or asphalt paving, gravel roads, packed earthen materials (such as compact dirt), and oiled or macadam surfaces. Open, uncovered retention/detention facilities are not considered impervious surfaces for the purpose of determining whether the thresholds for application of minimum requirements are exceeded. Open, uncovered retention/detention facilities are considered impervious surfaces for the purpose of runoff modeling. For Minimum Requirement determination, permeable pavement is considered an impervious surface.

Implementing Agreement The Implementing Agreement between the Washington State Department of Ecology and the Washington State Department of Transportation Regarding Compliance with the State of Washington Surface Water Quality Standards (also abbreviated as WQIA: Water Quality Implementing Agreement).

impoundment A natural or constructed containment for surface water.

improvement Streets (with or without curbs or gutters), sidewalks, crosswalks, parking lots, water mains, sanitary and storm sewers, drainage facilities, street trees, and other appropriate items.

infiltration The downward movement of water from the surface to the subsoil.

infiltration facility or system A drainage facility designed to use the hydrologic process of surface and stormwater runoff soaking into the ground (commonly called percolation), to dispose of surface and stormwater runoff.

infiltration pond A facility that provides stormwater quantity control by containing excess runoff in a detention facility, then percolating that runoff into the surrounding soil.

infiltration rate The rate, usually expressed in inches per hour, at which water moves downward (percolates) through the soil profile. Short-term infiltration rates may be inferred from soil analysis or texture or derived from field measurements. Long-term infiltration rates are affected by variability in soils and subsurface conditions at the site, the effectiveness of pretreatment or influent control, and the degree of long-term maintenance of the infiltration facility.

inlet A form of connection between the surface of the ground and a drain or sewer for the admission of surface and stormwater runoff.

interception (hydraulic) The process by which precipitation is caught and held by foliage, twigs, and branches of trees, shrubs, and other vegetation. Often used to mean interception loss or the amount of water evaporated from the precipitation intercepted.

interceptor dike A soil berm used to intercept and redirect stormwater runoff to a treatment facility.

interflow That portion of rainfall that infiltrates into the soil and moves laterally through the upper soil horizons until intercepted by a stream channel or until it returns to the surface; for example, in a roadside ditch, wetland, spring, or seep. Interflow is a function of soil system depth, permeability, and water-holding capacity.

intermittent stream or channel A stream or portion of a stream that flows only in direct response to precipitation; receives little or no water from springs and no continual supply from melting snow or other sources; and is dry for a large part of the year, ordinarily more than three months.

invert The lowest point on the inside of a sewer or other conduit.

invert elevation The vertical elevation of a pipe or orifice in a pond that defines the water level.

isopluvial map A map with lines representing constant depth of total precipitation for a given return frequency.

L

lake An area permanently inundated by water in excess of two meters deep and greater than 20 acres in size as measured at the ordinary high water marks.

land-disturbing activity Any activity that results in a movement of earth or a change in the existing soil cover (both vegetative and nonvegetative) or the existing soil topography, including but not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction is also considered a land-disturbing activity. Vegetation maintenance practices are not considered land-disturbing activities.

landslide hazard areas Those areas subject to a severe risk of landslide.

leachate Liquid that has percolated through soil and contains substances in solution or suspension.

level pool routing The basic technique of storage routing used for sizing and analyzing detention storage and determining water levels for ponding water bodies. The level pool routing technique is based on the continuity equation: inflow – outflow = change in storage.

level spreader A temporary erosion and sedimentation control device used to distribute stormwater runoff uniformly over the ground surface as sheet flow (not through channels), in order to enhance infiltration and prevent concentrated, erosive flows.

live storage The volume of the flow control BMP that is released over a long period of time.

local government, local jurisdiction Any county, city, town, or special-purpose district having its own incorporated government for local affairs.

low-impact development (LID) An evolving approach to land development and stormwater management that uses a site's natural features and specially designed BMPs to manage stormwater; it involves assessing and understanding the site, protecting native vegetation and soils, and minimizing and managing stormwater at the source. Low-impact development practices are appropriate for a variety of development types.

low-permeability liner A layer of compacted till or clay or a geomembrane.

M

Manning's equation An equation used to predict the velocity of water flow in a pipeline or an open channel:

$$V = (1.486(R^{2/3})(S^{1/2}))/n$$

where:

V = the mean velocity of flow in feet per second

R = the hydraulic radius in feet

S = the slope of the energy gradient or, for assumed uniform flow, the slope of the channel in feet per foot

n = Manning's roughness coefficient or retardance factor of the channel lining

media filter A filter that includes material for removing pollutants (such as compost, gypsum, perlite, zeolite, or activated carbon).

media filter drain (previously known as the ecology embankment) A stormwater treatment facility typically constructed in the pervious shoulder area of a highway, consisting of a no-vegetation zone, a grass strip, a filter media mix, and a drain component that keeps the facility free draining.

mitigated area The drainage area from which stormwater runoff is to be detained or treated.

mitigation Measures to reduce adverse impacts on the environment, in the following order of preference:

1. Avoid the impact altogether by not taking a certain action or part of an action.
2. Minimize the impact by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts.
3. Rectify the impact by repairing, rehabilitating, or restoring the affected environment.
4. Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action.
5. Compensate for the impact by replacing, enhancing, or providing substitute resources or environments.

mitigation wetland A wetland that is created, enhanced, restored, or preserved to offset the unavoidable environmental impacts of development actions on natural wetlands.

monitoring The collection of data by various methods for the purposes of understanding natural systems and features, evaluating the impacts of development proposals on such systems, and assessing the performance of mitigation measures imposed as conditions of development.

N

National Pollutant Discharge Elimination System (NPDES) The part of the federal Clean Water Act that requires point source dischargers to obtain permits, called NPDES permits, which in Washington State are administered by the Washington State Department of Ecology.

native growth protection easement (NGPE) An easement granted for the protection of native vegetation within a sensitive area or its associated buffer. The easement should be recorded on the appropriate documents of title and filed with the county records division.

native vegetation Vegetation consisting of plant species other than noxious weeds that are indigenous to the region and that could be reasonably expected to occur naturally on the site.

Natural Resources Conservation Service (NRCS) curve number A number that describes the runoff characteristics of a particular soil type.

new impervious surfaces Those surfaces that receive direct, run-on, or blow-in of rainfall and (1) expand the existing roadway prism or (2) are upgraded from gravel to bituminous surface treatment (BST), asphalt, or concrete pavement. Note that existing gravel surfaces are considered impervious surfaces. However, a gravel surface that is upgraded to a more impervious surface (gravel to BST, ACP, or PCCP) is defined as a new impervious surface. Also note that for Minimum Requirement determination, permeable pavement is considered an impervious surface.

net-new impervious surface The total area of new impervious surface being added to the TDA minus the total area of existing impervious surface being removed from the TDA. In order to use this concept, the existing impervious surface removal area must fully revert to a natural condition as specified in [Section 4-3.5.1](#). The concept of net-new impervious surface applies only to [Minimum Requirement 6](#) (Flow Control) and is applied at the threshold discharge area level. (See the definition for *effective impervious surface* and [Figure 3.3](#), Step 8.)

NOAA Fisheries National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Noneffective impervious surfaces Those new, applicable replaced, or existing impervious surfaces that are being managed by existing natural dispersion areas meeting the natural dispersion BMP criteria in [Section 5-4.1.2](#).

Noneffective pollution-generating impervious surface (PGIS) Those new, applicable replaced, or existing PGIS surfaces that are being managed by existing natural dispersion areas meeting the natural dispersion BMP criteria in [Section 5-4.1.2](#).

Non-fish-bearing stream According to [WAC 222-16-030](#): type Ns waters are non-fish-habitat streams. Until the fish habitat water type maps are available, an interim water-typing system applies (see [WAC 222-16-031](#)). Type 5 waters are non-fish-habitat streams. (See fish-bearing stream definition for more details.)

nonmitigated area The area not included as part of the stormwater treatment.

Non-pollution-generating surface (NPGS) A surface that, based on its use, is an insignificant or low source of pollutants in stormwater runoff. For example, roofs that are subject only to atmospheric deposition or have normal heating, ventilation, and air conditioning vents; paved bicycle pathways and pedestrian sidewalks that are separated from roads used by motor vehicles; fenced fire lanes; infrequently used maintenance access roads; and in-slope areas of roads. Sidewalks that are regularly treated with salt or other deicing chemicals are considered pollution-generating impervious surfaces.

Non-road-related project A project involving structures, including rest areas, maintenance facilities, and ferry terminal buildings.

no-vegetation zone (NVZ) A shallow gravel trench located directly adjacent to the highway pavement.

O

off-line facilities Runoff treatment facilities to which stormwater runoff is restricted to some maximum flow rate or volume by a flow-splitter.

off-site Any area lying upstream of the project site that drains onto the site and any area lying downstream of the site to which the site drains.

oil control The treatment of stormwater runoff with BMPs to remove oil, grease, and total petroleum hydrocarbons (TPH).

oil/water separator A vault, usually underground, designed to provide a quiescent environment to separate oil from water.

on-line facilities Runoff treatment facilities that receive all the stormwater runoff from a drainage area. Flows above the runoff treatment design flow rate or volume are passed through at a lower-percentage removal efficiency.

on-site The entire property that includes the proposed development.

operational BMP A type of source control BMP that includes schedules of activities, prohibition of practices, and other managerial actions to prevent or reduce pollutants entering stormwater. Operational BMPs include formation of a pollution prevention team; good housekeeping; preventive maintenance procedures; spill prevention and cleanup; employee training; inspections of pollutant sources and BMPs; recordkeeping; process changes; raw material and product changes; and recycling of wastes.

ordinary high water mark (OHWM) The line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of soil destruction on terrestrial vegetation; the presence of litter and debris; or other appropriate means that consider the characteristics of the surrounding area. The ordinary high water mark is found by examining the bed and banks of a stream and ascertaining where the presence and action of waters are so common and usual, and so long maintained in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation. In any area where the ordinary high water mark cannot be found, the line of mean high water is substituted. In any area where neither can be found, the channel bank is substituted. In braided channels and alluvial fans, the ordinary high water mark or substitute must be measured to include the entire stream feature.

organic matter Decomposed animal or vegetable matter, measured by ASTM D 2974. Organic matter is an important reservoir of carbon and a dynamic component of soil and the carbon cycle. It improves soil and plant efficiency by improving soil physical properties including drainage, aeration, and other structural characteristics. It contains the nutrients, microbes, and higher-form soil food web organisms necessary for plant growth. The maturity of organic matter is a measure of its beneficial properties. Raw organic matter can release water-soluble nutrients (similar to chemical fertilizer). Beneficial organic matter has undergone a humification process either naturally in the environment or through a composting process.

orifice An opening with closed perimeter, usually sharp-edged, and of regular form in a plate, wall, or partition through which water may flow; generally used for the purpose of measurement or control of water.

outfall Point source as defined by 40 CFR 122.2 at the point where a discharge leaves the permittee's MS4 and enters a receiving water body or receiving waters. Outfall also includes the permittee's MS4 facilities/BMPs designed to infiltrate stormwater.

outlet The point of water disposal from a stream, river, lake, tidewater, or artificial drain.

outlet channel A waterway constructed or altered primarily to carry water from manufactured structures, such as terraces, tile lines, and diversions.

outlet protection A protective barrier of rock, erosion control blankets, vegetation, or sod constructed at a conveyance outlet.

outwash soils Soils formed from highly permeable sands and gravels.

overflow A pipeline or conduit device with an outlet pipe that provides for the discharge of portions of combined sewer flows into receiving waters or other points of disposal, after a regular device has allowed the portion of the flow that can be handled by interceptor sewer lines and pumping and treatment facilities to be carried by and to such water pollution control structures.

P

PAM A large class of polymers (polyacrylamides), some of which have applications in highway construction. PAM products are used as soil stabilizers to prevent erosion, flocculants to remove sediments from stormwater, drilling lubricants, and soil moisture retention enhancers.

particle size The effective diameter of a particle as measured by sedimentation, sieving, or micrometric methods.

peak discharge, peak flow The maximum instantaneous rate of flow during a storm, usually in reference to a specific design storm event.

percolation The movement of water through soil.

percolation rate The rate, often expressed in minutes per inch, at which clear water maintained at a relatively constant depth seeps out of a standardized test hole that has been previously saturated—often used synonymously with *infiltration rate* (short-term infiltration rate).

permeable pavement A permeable surface that readily transmits fluids into the underlying base material. The pavement may be permeable concrete, permeable asphalt, or manufactured systems such as interlocking brick or a combination of sand and brick lattice. Note that for Minimum Requirement determination, permeable pavement is considered an impervious surface. Permeable pavement is also considered a pollution-generating impervious surface if subjected to vehicular use and is used regularly by motor vehicles.

permeable soils Soil materials having a sufficiently rapid infiltration rate so as to greatly reduce or eliminate surface and stormwater runoff; generally classified as Soil Conservation Service hydrologic soil types A and B.

pervious pavement See *permeable pavement*.

pH A measure of the alkalinity or acidity of a substance that is determined by measuring the concentration of hydrogen ions in the substance. A pH of 7.0 indicates neutral water. A 6.5 reading is slightly acidic.

pipe slope drain A pipe extending from the top to the bottom of a cut or fill slope and discharging into a stabilized water course, a sediment-trapping device, or a stabilized outfall.

point of compliance The location at which compliance with a discharge performance standard or a receiving water quality standard is measured.

point source A general classification of the origin of an air or water pollutant, usually characterized as smokestacks or outfalls.

pollution-generating impervious surface (PGIS) An impervious surface that is considered a significant source of pollutants in stormwater runoff, including surfaces that receive direct rainfall (or run-on or blow-in of rainfall) and are subject to vehicular use; industrial activities; or storage of erodible or leachable materials, wastes, or chemicals. Erodeable or leachable materials, wastes, or chemicals are substances that, when exposed to rainfall, measurably alter the physical or chemical characteristics of the rainfall runoff. Examples include erodible soils that are stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage container leakage. Metal roofs are also considered pollution-generating impervious surfaces unless they are coated with an inert, nonleachable material (such as a baked-on enamel coating). A surface, whether paved or not, is considered subject to vehicular use if it is regularly used by motor vehicles.

The following are considered regularly used surfaces: roads, permeable pavement, unvegetated road shoulders, bicycle lanes within the travel lane of a roadway, driveways, parking lots, unfenced fire lanes, vehicular equipment storage yards, and airport runways. The following are not considered regularly used surfaces: paved bicycle pathways separated from roads for motor vehicles, fenced fire lanes, and infrequently used maintenance access roads.

pollution-generating pervious surface (PGPS) Any nonimpervious surface subject to the ongoing use of pesticides and fertilizers or loss of soil, such as lawns, landscaped areas, golf courses, parks, cemeteries, and sports fields. Grass highway shoulders and medians are not subject to such intensive landscape maintenance practices and are not considered pollution-generating pervious surfaces. It is WSDOT policy to create self-sustaining, native plant communities that require no fertilizer and little to no weed control after they are established. During the plant establishment period, usually the first three years after planting, WSDOT revegetation and mitigation projects are intensely managed to aid plant establishment. However, throughout the life of the project, WSDOT practices integrated vegetation management (IVM), which recognizes herbicides as tools in maintaining planting are as (one of many tools available). Questions regarding whether a specific area may be considered a pollution-generating pervious surface should be directed to the local maintenance area superintendent or the region landscape architect.

porous pavement See *permeable pavement*.

postproject Description of project site conditions after development.

predeveloped condition The modeled site conditions prior to development to which postdevelopment runoff flow rates are matched. (See [Minimum Requirement 6](#) in [Chapter 3](#).)

preproject Description of project site conditions prior to development.

presumptive approach (versus *demonstrative approach*) See [Section 1-2.2](#).

pretreatment The removal of material such as solids, grit, grease, and scum from flows to improve treatability prior to biological or physical treatment processes; may include screening, grit removal, settling, oil/water separation, or application of a basic treatment BMP prior to infiltration.

project Any proposed action to alter or develop a site; the proposed action of a permit application or an approval, which requires drainage review.

project limits For road projects, the beginning project station to the end project station and from right of way line to right of way line. For nonroad projects, the legal boundaries of land parcels that are subject to project development (also called the project area perimeter).

project site The portion of a site to undergo development or redevelopment. For road projects, it is the area between the beginning and ending mileposts within WSDOT right of way. It is defined in the formal project definition agreed upon by the region and Headquarters as to the work to be done, the estimated cost, and the project schedule. For nonroad projects, refer to the definitions for *project limits*.

Puget Sound basin Puget Sound south of Admiralty Inlet (including Hood Canal and Saratoga Passage); the waters north to the Canadian border, including portions of the Strait of Georgia; the Strait of Juan de Fuca south of the Canadian border; and all the lands draining into these waters, as mapped in water resource inventory areas (WRIAs) 1 through 19, set forth in [WAC 173-500-040](#).

R

rational method A means of computing storm drainage flow rates (Q) by using the formula $Q = CIA$, where C is a coefficient describing the physical drainage area, I is the rainfall intensity, and A is the area. (This method is no longer used in the Washington State Department of Ecology technical manual.)

reach A length of channel with uniform characteristics.

receiving waters or receiving water body Naturally and/or reconstructed naturally occurring surface water bodies, such as creeks, streams, rivers, lakes, wetlands, estuaries, and marine waters, to which a discharge occurs via an outfall or via sheet/dispersed flow. Receiving waters may also include ground water to which a discharge occurs via facilities/BMPs designed to infiltrate stormwater.

recharge The addition of water to the zone of saturation (that is, an aquifer).

redevelopment On a site that is already substantially developed (has 35% or more of existing impervious surface coverage): the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development, including construction, installation, or expansion of a building or other structure; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities.

regional detention facility A stormwater quantity control structure designed to correct surface water runoff problems within a drainage basin or subbasin, such as regional flooding or erosion problems; a detention facility sited to detain stormwater runoff from a number of new developments or areas within a catchment.

release rate The computed peak discharge rate in volume per unit time of surface and stormwater runoff from a site.

replaced impervious surface Those roadway areas that are excavated to a depth at or below the top of the subgrade (pavement repair work excluded) and replaced in kind. The subgrade is taken to be the crushed surfacing directly below the pavement layer (ACP, PCCP, BST). If the removal and replacement of existing pavement does not go below the pavement layer, as with typical PCCP grinding, ACP planing, or “paver” projects, the new surfacing is not considered “replaced impervious surface.” Certain situations that do not include excavation of the existing roadway are also considered replaced impervious surface. (See the [HRM Revisions website’s FAQs](#) for a discussion of these situations.)

replaced PGIS Those PGIS areas that are removed and replaced in kind by the project, or for roadway areas that are excavated to a depth at or below the top of the subgrade (pavement repair work excluded) and replaced in kind. The subgrade is taken to be the crushed surfacing directly below the pavement layer (ACP, PCCP, BST). If the removal and replacement of existing pavement does not go below the pavement layer, as with typical PCCP grinding, ACP planing, or “paver” projects, the new surfacing is not considered “replaced PGIS.” Certain situations that do not include excavation of the existing roadway are also considered replaced PGIS. (See the [HRM Revisions website’s FAQs](#) for a discussion of these situations.)

restoration In an area that no longer meets wetland criteria, actions performed to reestablish wetland functional characteristics and processes that have been lost through alterations, land uses, or catastrophic events.

retention The process of collecting and holding surface and stormwater runoff with no surface outflow.

retention/detention facility (R/D) A type of drainage facility designed either to hold water for a considerable length of time and then release it by evaporation, plant transpiration, or infiltration; or to hold surface and stormwater runoff for a short period of time and then release it to the surface and stormwater management system.

retrofit The renovation of an existing structure or facility to meet changed conditions or to improve performance.

return frequency (recurrence interval) A statistical representation of the average time between storm events of a given intensity or size (for example, a stormwater flow that occurs every two years on average).

reversion of existing impervious surfaces Removing an existing impervious surface and restoring that area to a pervious state using the methods shown in [Section 4-3.5.1](#). The flow control benefits for reversion of an existing impervious surface will depend on the level of reversion (Step 1 or Step 2). At this time, the reversion of an existing impervious surface only applies to meeting flow control thresholds. It does not apply to runoff treatment thresholds.

right of way (ROW) Public land devoted to the passage of people and goods. State highway rights of way include state limited access highways inside or outside cities or towns, but not city or town streets forming part of state highway routes that are not limited access highways. The term does not include state property under WSDOT jurisdiction that is outside the right of way lines of a state highway ([RCW 90.03.520](#)).

rill A small, intermittent watercourse with steep sides, usually only a few inches deep; often caused by an increase in surface water flow where soil is cleared of vegetation.

riparian Pertaining to the banks of streams, wetlands, lakes, or tidewater.

riprap A facing layer or protective mound of rocks placed to prevent erosion or sloughing of a structure or embankment due to flow of surface and stormwater runoff.

riser A vertical pipe extending from the bottom of a pond that is used to control the discharge rate from a stormwater facility for a specified design storm.

runoff Rainwater or snowmelt that directly leaves an area as a surface drainage.

runoff treatment Pollutant removal to a specified level via engineered or natural stormwater management systems.

runoff treatment BMP A BMP specifically designed for pollutant removal.

S

salmonid A member of the fish family Salmonidae, including Chinook, coho, chum, sockeye and pink salmon; cutthroat, brook, brown, rainbow, and steelhead trout; and Dolly Varden, kokanee, and char species.

sand filter A constructed depression or basin with a layer of sand that treats stormwater as it percolates through the sand and is discharged via a central collector pipe.

Sanitary Control Areas (SCAs) Well protection buffers.

Santa Barbara Urban Hydrograph method (SBUH) A single-event hydrologic analysis technique for estimating runoff based on the curve number method. The curve numbers are published by the Natural Resources Conservation Service (NRCS) in *Urban Hydrology for Small Watersheds*, 55 TR, June 1976. Updated curve numbers are provided in [Appendix 4-B](#).

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

SCS Soil Conservation Service (now the Natural Resources Conservation Service), U.S. Department of Agriculture.

SCS method A single-event hydrologic analysis technique for estimating runoff based on the curve number method. The curve numbers are published by the Natural Resources Conservation Service (NRCS) in *Urban Hydrology for Small Watersheds*, 55 TR, June 1976. With the change in name from Soil Conservation Service (SCS) to Natural Resources Conservation Service, the method may be referred to as the NRCS method.

seasonal stream An ephemeral stream.

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

semiarid Description of a geographical area characterized by light rainfall and having about 10 to 20 inches of annual precipitation.

sensitive area Any area designated by a federal, state, or local government as having unique or important environmental characteristics that may require additional protective measures (also see *critical areas*). These areas include but are not limited to:

- “Critical habitat” as defined in Section 3 of the federal Endangered Species Act of 1973.
- Designated “critical water resources” as defined in [33 CFR Part 330](#), Nationwide Permit Program.
- Water bodies designated as “impaired” under the provision of Section 303d of the federal Clean Water Act enacted by [Public Law 92-500](#).
- Sole-source aquifers as defined under the federal Safe Drinking Water Act, Public Law 93-523.
- Wellhead protection zones as defined under [WAC 246-290](#), Public Water Supplies.
- Areas identified in local critical area ordinances or in an approved basin plan.

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.

shotcrete Concrete that is placed by means of a spray nozzle, pneumatically applied.

silt fence A temporary sediment barrier consisting of a geotextile fabric stretched across and attached to supporting posts, which are entrenched. Adding rigid wire fence backing can strengthen silt fence.

site The area within the legal boundaries of a parcel (or parcels) of land that is subject to the development project. For road projects, the site is defined by the length of the project and the right of way boundaries.

slope Degree of deviation of a surface from the horizontal, measured as a numerical ratio, percent, or in degrees. Expressed as a ratio, the first number is the horizontal distance (run) and the second is the vertical distance (rise); for example, 2H:1V. A 2H:1V slope is a 50% slope. Expressed in degrees, the slope is the angle from the horizontal plane, so that a 90° slope is vertical (maximum), and a 45° slope is 1H:1V (a 100% slope).

soil The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. (See also *topsoil*.)

soil amendments Materials that improve soil fertility for establishing vegetation or permeability for infiltrating runoff.

soil drainage As a natural condition of the soil, the frequency and duration of periods when the soil is free of saturation. In well-drained soils, the water is removed readily, but not rapidly; in poorly drained soils, the root zone is waterlogged for long periods unless artificially drained, and the roots of ordinary crop plants cannot get enough oxygen; and in excessively drained soils, the water is removed so completely that most crop plants suffer from lack of water. Strictly speaking, excessively drained soils are a result of excessive runoff due to steep slopes or low available water-holding capacity due to small amounts of silt and clay in the soil material. The following classes are used to express soil drainage:

- Well drained – Excess water drains away rapidly; no mottling occurs within 36 inches of the surface.
- Moderately well drained – Water is removed from the soil somewhat slowly, resulting in small but significant periods of wetness; mottling occurs between 18 and 36 inches.
- Somewhat poorly drained – Water is removed from the soil slowly enough to keep it wet for significant periods but not all the time; mottling occurs between 8 and 18 inches.
- Poorly drained – Water is removed so slowly that the soil is wet for a large part of the time; mottling occurs between 0 and 8 inches.
- Very poorly drained – Water is removed so slowly that the water table remains at or near the surface for a greater part of the time. There may also be periods of surface ponding. The soil has a black-to-gray surface layer with mottles up to the surface.

soil permeability The ease with which gases, liquids, or plant roots penetrate or pass through a layer of soil.

soil stabilization The use of measures such as rock lining, vegetation, or other engineering structures to prevent the movement of soil when loads are applied to the soil.

sole-source aquifer An aquifer or aquifer system that supplies 50% or more of the drinking water for a given service area and for which there are no reasonably available alternative sources should the aquifer become contaminated, and the possibility of contamination exists. The U.S. Environmental Protection Agency designates sole-source aquifers, and Section 1424(e) of the Safe Drinking Water Act is the statutory authority for the Sole-Source Aquifer Protection Program.

source control A structure or operation intended to prevent pollutants from coming into contact with stormwater, either through physical separation of areas or through careful management of activities that are sources of pollutants.

- *Structural source control BMPs* are physical, structural, or mechanical devices or facilities intended to prevent pollutants from entering stormwater.
- *Operational BMPs* are nonstructural practices that prevent or reduce pollutants entering stormwater.

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.

spill prevention, control, and countermeasures (SPCC) plan A plan prepared by a construction contractor, as required in Standard Specification 1-07.15(1), to prevent sediment and other pollutants associated with construction activity from affecting soil, air, and water quality.

spillway A passage, such as a paved apron or channel carrying surplus water over or around a dam or similar obstruction, or an open or closed channel used to convey excess water from a reservoir. A spillway may contain gates, either manually or automatically controlled, to regulate the discharge of excess water.

stabilized construction entrance A construction site entrance that is reinforced or finished with media such as riprap, gravel, or hog fuel to minimize the tracking of sediment onto adjacent streets.

staging area (construction) A site used temporarily during construction for materials or equipment storage, assembly, or other temporary construction activities.

stairstep grading A technique of grading slopes to minimize erosion, in which continuous slopes are replaced with a series of terraces.

Standard Plans WSDOT *Standard Plans for Road, Bridge, and Municipal Construction*. Standardized design drawings for commonly used structures that can be referenced in contracts. The Headquarters Design Office maintains the *Standard Plans*.

Standard Specifications WSDOT *Standard Specifications for Road, Bridge, and Municipal Construction*. Construction requirements for commonly used structures that can be referenced in contracts. The Headquarters Construction Office maintains the *Standard Specifications*.

State Environmental Policy Act (SEPA) The Washington State law ([RCW 43.21C](#)) intended to minimize environmental damage; modeled after the National Environmental Policy Act (NEPA). SEPA requires that state agencies and local governments consider environmental factors when making decisions on development proposals over a certain size, comprehensive plans and zoning requirements, and other programmatic proposals. As part of this process, environmental documents are prepared and opportunities for public comment are provided.

steep slope A slope of 40% gradient or steeper within a vertical elevation change of at least 10 feet.

stoloniferous Description of a type of plant having a long shoot that grows from the central rosette and droops to the ground, where it roots to form a new plant.

storm frequency The time interval between major storms of predetermined intensity and volumes of runoff that storm sewers and other structures are designed to handle hydraulically without surcharging and backflooding (for example, a 2-year, 10-year, or 100-year storm).

storm sewer system A sewer that carries stormwater and surface water, street wash, and other washwaters or drainage, but excludes sewage and industrial wastes (also called a storm drain).

stormwater That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body or a constructed infiltration facility.

stormwater facility A constructed component of a stormwater drainage system, designed or constructed to perform a particular function or multiple functions. Stormwater facilities include but are not limited to pipes, swales, ditches, culverts, street gutters, detention ponds, retention ponds, constructed wetlands, infiltration devices, catch basins, oil/water separators, and biofiltration swales.

Stormwater Management Manual for Eastern Washington (SMMEW) A technical manual prepared by the Washington State Department of Ecology containing BMPs intended to prevent, control, and treat pollution in stormwater and to reduce other stormwater-related impacts on waters of the state. The stormwater manual provides guidance on measures necessary in eastern Washington to control the quantity and quality of stormwater runoff from new development and redevelopment.

Stormwater Management Manual for Western Washington (SWMMWW) A technical manual prepared by the Washington State Department of Ecology containing BMPs intended to prevent, control, and treat pollution in stormwater and to reduce other stormwater-related impacts on waters of the state. The stormwater manual provides guidance on measures necessary in western Washington to control the quantity and quality of stormwater runoff from new development and redevelopment.

stormwater outfall Any location where concentrated stormwater runoff leaves WSDOT right of way. Outfalls may discharge to surface waters or groundwater.

stream An area where surface waters flow sufficiently to produce a defined channel or bed. A defined channel or bed is an area that demonstrates clear evidence of the passage of water, indicated by hydraulically sorted sediments or the removal of vegetative litter or loosely rooted vegetation by the action of moving water. The channel or bed need not contain water year-round. This definition does not include irrigation ditches, canals, stormwater runoff devices, or other entirely artificial watercourses unless they are used to convey streams naturally occurring prior to construction. Topographic features that resemble streams but have no defined channels (swales) are considered streams when hydrologic and hydraulic analyses performed pursuant to a development proposal predict formation of a defined channel after development.

streambanks The usual boundaries, not the flood boundaries, of a stream channel. Right and left banks are named facing downstream.

structural BMPs Physical, structural, or mechanical devices or facilities intended to prevent pollutants from entering stormwater.

subgrade A layer of stone or soil used as the underlying base for a BMP.

substrate The natural soil base underlying a BMP measure.

swale A natural depression or shallow drainage conveyance with relatively gentle side slopes, generally with flow depths less than 1 foot, used to temporarily store, route, or filter runoff.

T

tackifier A plant-based or synthetic polymer used to help hydroseed mixes stick together and adhere to the soil. Some tackifiers directly stabilize soil.

take Defined under the federal Endangered Species Act as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct,” including modification to a species habitat. The habitat could be a riparian area, spawning bed, or a rearing area. Changing the hydraulic characteristics of a stream system may result in a habitat alteration and could be considered a *take*. Release of physical, chemical, or biological pollutants into a stream system may result in a *take*.

Technology Assessment Protocol – Ecology (TAPE) A Washington State Department of Ecology process for reviewing and approving new stormwater treatment technologies.

temporary erosion and sedimentation control (TESC) plan A plan that includes all physical and procedural BMPs for preventing erosion and turbid discharges throughout a project and during construction.

terrace An embankment or combination of an embankment and channel across a slope to control erosion by diverting or storing surface runoff instead of permitting it to flow uninterrupted down the slope.

threatened species Any species (other than pest insects) likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

threshold discharge area (TDA) An on-site area draining to a single natural discharge location or multiple natural discharge locations that combine within ¼ mile downstream (as determined by the shortest flow path).

tight-line A continuous length of aboveground pipe that conveys water from one point to another (typically down a steep slope) with no inlets or collection points in between.

till A layer of poorly sorted soil deposited by glacial action that generally has very low infiltration rates.

time of concentration The time necessary for surface runoff to reach the outlet of a subbasin from the hydraulically most remote point in the tributary drainage area.

tire wash A facility for washing mud off vehicles to prevent track-out of sediment.

topsoil Surface soil presumed to be fertile and used to cover planting areas. Topsoil must meet ASTM D 5268 Standard Specification, and water permeability must be 0.6 inches per hour or greater. Organic matter must have no more than 10% of nutrients in mineralized water-soluble forms. Topsoil must not have phytotoxic characteristics.

total maximum daily load (TMDL) – Water Cleanup Plan A calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards and an allocation of that amount to the pollutant's sources. A TMDL (also known as a Water Cleanup Plan) is the sum of allowable loads of a single pollutant from all contributing point sources and nonpoint sources. The calculation must include a margin of safety to ensure the water body can be used for the purposes the state has designated. The calculation must also account for seasonal variation in water quality. Water quality standards are set by states, territories, and tribes. They identify the uses for each water body; for example, drinking water supply, contact recreation (such as swimming), and aquatic support (such as fishing) and the scientific criteria to support each use. The federal Clean Water Act, Section 303, establishes the water quality standards and TMDL programs.

total petroleum hydrocarbons (TPH) TPH-Gx: the qualitative and quantitative method (extended) for volatile (gasoline) petroleum products in water; and TPH-Dx: the qualitative and quantitative method (extended) for semivolatile (diesel) petroleum products in water.

total suspended solids (TSS) That portion of the solids carried by stormwater that can be captured on a standard glass filter.

toxic Poisonous, carcinogenic, or otherwise directly harmful to life.

track walking A technique for roughening soils on slopes to reduce erosion, involving systematically covering soils with cleat marks that run perpendicular to the slope, for detaining and infiltrating runoff.

trash rack A structural device used to prevent debris from entering a spillway or other hydraulic structure.

travel time The estimated time for surface water to flow between two points of interest.

treatment liner A layer of soil designed to slow the rate of infiltration and provide sufficient pollutant removal to protect groundwater quality.

treatment train A combination of two or more treatment facilities connected in series.

triangular silt dike A geotextile-encased foam check dam.

trip end The expected number of vehicles using a parking area, represented by the projected trip end counts for the parking area associated with a proposed land use. Trip end counts are estimated using either *Trip Generation* (published by the Institute of Transportation Engineers) or a traffic study prepared by a professional engineer or transportation specialist with expertise in traffic volume estimation. Trip end counts must be made for the design life of the project. For project sites with seasonal or varied use, the highest period of expected traffic impacts is evaluated.

turbidity Dispersion or scattering of light in a liquid, caused by suspended solids and other factors; commonly used as a measure of suspended solids in a liquid. Turbidity is a state-regulated parameter. Turbidity can be measured in the field with a hand-held meter and is recorded in nephelometric turbidity units (NTU).

U

underdrain Plastic pipes with holes drilled through the top, installed on the bottom of an infiltration facility, that are used to collect and remove excess runoff.

underground injection control (UIC) well A bored, drilled, or driven shaft whose depth is greater than the largest surface dimension; a dug hole whose depth is greater than the largest surface dimension; an improved sinkhole; a subsurface fluid distribution system that includes an assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids below the surface of the ground. Examples of UIC wells or subsurface infiltration systems are drywells, drainfields, and french drains that include pipes and other similar devices that discharge to ground. Underground Injection Control is a federal regulatory program established to protect underground sources of drinking water from UIC well discharges.

unstable slope A sloping area of land that at any time exhibits mass movement of earth.

upgrade The replacement of paved areas with a better surface or in a way that enhances the traffic capacity of the road.

urban growth area (UGA) Those areas designated by a county according to [RCW 36.70A.110](#).

urbanized area An area designated and identified by the U.S. Bureau of Census according to the following criteria: a densely settled area that has a minimum residential population of 50,000 people and a minimum average density of 1,000 people per square mile.

V

Vector truck A vacuum truck used to remove the waste material found in the bottom of a catch basin.

vault See *dry vault or tank* and *wet vault or tank*.

vegetated filter strip A facility designed to provide runoff treatment of conventional pollutants (but not nutrients) through the process of biofiltration.

vertical curve The up and down component of a roadway curve.

W

water bar A small ditch cut perpendicular to the flow of water in roads or hillsides. A cross-sectional view reveals a ditch with the excavated material placed on the downslope side.

water body Surface waters including rivers, streams, lakes, marine waters, estuaries, and wetlands.

Water Cleanup Plan See *total maximum daily load*.

water quality A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

water quality standards The minimum requirements for water purity for uses like drinking water supply, contact recreation (such as swimming), and aquatic support (such as fishing). The Washington State Department of Ecology sets water quality standards for Washington State. Surface water and groundwater standards are established in [WAC 173-201A](#) and [WAC 173-200](#), respectively.

water quality treatment See *runoff treatment*.

water resource inventory area (WRIA) A geographic area within which water drains into a particular river, stream, or receiving water body, identified and numbered by the state of Washington (defined in [WAC 173-500](#)).

watershed A geographic region within which water drains into a particular river, stream, or body of water. Watersheds can be as large as those identified and numbered by the state of Washington as water resource inventory areas (WRIAs), defined in [WAC 173-500](#).

waters of the state All surface waters and watercourses within the jurisdiction of the state of Washington, including lakes, rivers, ponds, streams, inland waters, undergroundwaters, saltwaters, and wetlands.

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

wattle Temporary erosion and sediment control barriers consisting of any plant material that is wrapped in biodegradable fiber, tubular plastic, or similar encasing material. Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length.

weir A device for measuring or regulating the flow of water.

wetland functions See *functions/wetland*.

wetlands Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. They do not include artificial wetlands intentionally created from nonwetland sites, including but not limited to irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities; or wetlands unintentionally created after July 1, 1990, as a result of construction of a road, street, or highway. Wetlands may include artificial wetlands intentionally created from nonwetland areas to mitigate adverse impacts resulting from the conversion of wetlands. (Water bodies not included in this definition of wetlands, as well as those mentioned in the definition, are still waters of the state.)

wet pond A facility that provides water quality treatment for stormwater by using a permanent pool of water to remove conventional pollutants from runoff through sedimentation, biological uptake, and plant filtration. Wet ponds are designed to (1) optimize water quality by providing retention time in order to settle out particles of fine sediment to which pollutants such as heavy metals absorb and (2) to allow biological activity to occur that metabolizes nutrients and organic pollutants.

wet vault or tank Underground storage facility that treats stormwater for water quality through the use of a permanent pool of water that acts as a settling basin. It is designed (1) to optimize water quality by providing retention time in order to settle out particles of fine sediment that absorb pollutants such as heavy metals and (2) to allow biological activity to occur that metabolizes nutrients and organic pollutants.