Chapter 1

INTRODUCTION

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1.0. PURPOSE

The purpose of this Handbook is to provide guidance on the measures necessary to comply with the Virginia Stormwater Management Law and Virginia Stormwater Management Permit (VSMP) Regulations and protect the waters of the Commonwealth of Virginia from the adverse impacts of post-construction stormwater runoff. The guidance provided in this Handbook is applicable to new development, redevelopment, and upgrades to existing development. The Handbook focuses on environmental site planning and design, pollution source control and prevention, runoff volume reduction, stormwater treatment, stream channel protection, and flood protection. Related topics such as erosion and sediment control and watershed management are addressed in the Handbook as secondary considerations. The Handbook does not address agricultural runoff.

1.1. WHAT IS NEW IN THIS HANDBOOK?

The last edition of this Handbook was released in 1999. It has been referred to as the "Blue Book" because of the blue plastic binders that contain the two volumes of information. That Handbook was much more basic, addressing only the most basic and important considerations of stormwater management in Virginia.

This edition not only reflects updated stormwater management regulations, but it also covers the topic of stormwater management more comprehensively. DEQ staff incorporated the best information available on each subject area from recent leading state and local stormwater management manuals and other resources from around the country. DEQ also incorporated the work of leading researchers and journalistic contributors. As a result, the DEQ considers this Handbook to be on the cutting edge of guidance about this subject.

The Handbook provides an expanded Glossary of Terms in **Appendix 1-A** of this chapter. Also, the reader will see more photographs and graphics to illustrate points being made in the text. Most chapters include appendices additional helpful information or "tools," such as checklists, reference tables, etc. Furthermore, each chapter includes a list of helpful reference documents.

The reader will note that some of the charts and cost data are outdated. However, these were borrowed from some of the best stormwater management resources available, and the information included in the older reference charts is still reliable. Older cost data can be updated using standard indices such as the Consumer Price Index provided by the U.S. Bureau of Labor and Statistics, or the Building and Construction Cost Indices provided by *Engineering News-Record* (http://www.enr.com).

Chapter 2 presents the current Virginia Stormwater Management Act and the Virginia Stormwater Management Regulations. The text for each of these documents is provided in its own Appendix to the chapter.

Chapter 3 describes what a locality must do to implement a qualifying stormwater management program (in compliance with the regulations). A Model Local Stormwater

Management Ordinance is no longer included in the Handbook. However, a Model Ordinance is available on the DEQ website at:

http://www.deq.virginia.gov/Programs/Water/LawsRegulationsGuidance/Guidance/StormwaterManagementGuidance.aspx

Several new Appendices have been added, providing useful resources for local programs, as follows.

Appendix 3-A discusses the potential elements of a comprehensive local stormwater management program and how to synchronize independent but related local requirements into a more cohesive and efficient program delivery system.

Appendix 3-B discusses the considerations involved in developing a local Virginia stormwater management permit (VSMP) program. By the time this edition of the Handbook is released, most Virginia localities will be well on the way to developing their local ordinances and structuring their local program elements. This appendix may still provide helpful advice, and it will be particularly useful to localities, such as independent towns, which are not required at this time to develop a VSMP program but may, in the future, decide to do so.

Appendix 3-C discusses various information technology tools, such as databases and GIS, which can be useful in administering a local stormwater management program.

Appendix 3-D discusses the value of internal local code and ordinance reviews to ensure that they reinforce one another and do not present internal conflicts to effective implementation of stormwater management requirements. This Appendix also provides checklists that can be used locally to review related codes and ordinances.

Appendix 3-E presents a case study of the City of Staunton's creation of a local Stormwater Utility.

Appendix 3-F presents sample Site Plan Review Checklists that local staff can use or adapt for that purpose.

Appendix 3-G provides useful information about the construction inspection process and the need for verified As-Built drawings of permanent BMPs and other key permanent features, which are important references for long-term inspection and maintenance of these facilities.

Chapter 4 provides a primer about stormwater, covering important topics such as the hydrologic cycle, the growing scarcity of water, the potential effects of changing precipitation patterns on water availability, and the concept of rainwater harvesting. Other topics covered include the consequences of population growth and development on the hydrologic cycle, stormwater runoff, and our freshwater stream and river systems. Taken together, this collection of information describes why our society should care about managing stormwater effectively and what can happen if we don't.

Chapter 5 provides a comprehensive set of recommendations regarding how to manage stormwater effectively. The recommendations in this chapter extend beyond managing stormwater on land development sites to the more systemic needs of localities with state/federal permits to manage Municipal Separate Storm Sewer Systems (MS4s). This chapter advocates thinking of natural drainage system in the same way we think of constructed drainageways, as *infrastructure* – but *Green* Infrastructure.

The new regulations represent a paradigm shift in the approach to managing stormwater runoff from land development projects. Most notably, this approach reflects the thinking of a panel of national experts on the subject of stormwater management, as represented in their 2008 report to the USEPA recommending better ways to manage stormwater (NRC, 2008).

This shift involves focusing primarily on reducing the *volume* of stormwater runoff *on* the development site, rather than focusing on merely *treating* the pollution in the runoff. Runoff volume reduction accomplishes the full range of stormwater management goals more effectively and efficiently than in the past. This chapter includes two new Appendices.

Appendix 5-A provides updated documentation of the Center for Watershed Protection's Impervious Cover Model, which can be used as the basis of local stormwater management requirements beyond the basic state regulatory criteria. This model can also be used in watershed planning exercises.

Appendix 5-B discusses the process of developing watershed-scale stormwater management plans, providing several local case studies as examples for other localities.

Appendix 5-C discusses special stormwater management considerations for redevelopment projects. These typically occur in denser urban areas where there is little or no spare space for LID-type practices to be employed. In addition, redevelopment sites are typically constrained by a high percentage of existing impervious cover and utilities or other infrastructure that may interfere with stormwater management practices. Thus, such sites are tricky, but it is certainly possible to achieve stormwater management goals with the proper approach.

Finally, **Appendix 5-D** discusses the process of stormwater benchmarking, the identification of potential hotspot areas or other issues that can be addressed by special stormwater management practices or "good housekeeping" practices which can prevent toxic pollutants from ever entering runoff and the drainage system. Benchmarking is especially for municipal facilities and large industrial or institutional sites where the same owner owns and operates facilities on large tracts of land.

Chapter 6 discusses environmental site design as one of the keys to effectively implementing the new approach of integrating stormwater management into the development site's actual layout by protecting and using the soils and drainageways on the site to capture and infiltrate runoff instead of merely transporting the water off-site. With this new approach, the stormwater designer should be part of the original development team and be involved in determining how to most effectively manage stormwater on the site *before* the site plan is completed, platted and

recorded. When done effectively, this approach will not only result in better runoff management, but it can also significantly reduce site development costs.

This chapter includes multiple Appendices, all new to this Handbook, which elaborate on particular issues or guidance discussed in the chapter.

Appendix 6-A provides in-depth guidance about the preparation of site plans.

Appendix 6-B discusses special considerations for stormwater management in areas where karst geology occurs. This Appendix replaces the old Virginia DCR *Technical Bulletin 2: Hydrologic Modeling and Design in Karst*.

Appendix 6-C discusses special considerations for stormwater management in coastal settings, where there is little topographical relief and the groundwater table is high.

Finally, **Appendix 6-D** discusses the 2009 release of the Sustainable Sites Initiative™ (SSI), an interdisciplinary partnership of the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center at the University of Texas at Austin, and the National Botanic Garden. The SSI is an incentive-based program providing credits for the use of sustainable site design techniques, similar to LEED program credits. The various practices explained in the body of Chapter 6 refer to various SSI credits.

Chapter 7 provides information about how to retrofit stormwater controls to existing developments that previously had no controls, and how to upgrade older stormwater control measures to make them function more effectively. This information is very important for those who are redeveloping urban sites that already have drainage infrastructure in place. The information will also be useful to MS4 localities, which may need to accomplish greater pollution treatment on previously developed lands. This chapter has two Appendices, both new to this Handbook.

Appendix 7-A provides a case study regarding the development of the City of Charlottesville's program to retrofit stormwater management BMPs on public lands there.

Appendix 7-B provides Retrofit Reconnaissance Investigation Checklists that local communities can use to identify potential retrofit sites.

Appendix 7-C explains the derivation of the Retrofit Pollution Removal Adjustor Curves recommended in the chapter. These curves can be used to determine an appropriate pollution removal amount for retrofit BMPs.

Chapter 8 provides a broad overview of all the kinds of BMPs applicable to managing stormwater, starting with the hierarchical order of implementing BMPs, from the planning stage pollution prevention/source control, through environmental site design, through concepts of E&S Control, to the sequential classes of post-construction BMPs, etc. There is also a discussion of various manufactured BMPs, their testing and BMP pollutant removal mechanisms. The other categories of BMPS under the MS4 permits (Good Housekeeping, Source Control, Illicit

Connection Detection, etc.) are described. Also discussed are other applicable measures, such as buffers and stream restoration. The 15 post-construction, non-proprietary BMPs for which we provide specs on the Clearinghouse web site are described briefly, with photos.

Additionally, there is a discussion of the categories of information in each of the design specs posted on the Clearinghouse web site, followed by a thorough discussion of BMP selection criteria, based on the following categories:

- Land use;
- Physical feasibility
- Cold climate and winter conditions;
- Critical nearby water resources;
- Stormwater management capability;
- Pollutant removal;
- Community and environmental factors
- Other regulatory restrictions and setbacks; and
- Spatial scale at which the practices are applied

One significant change in the new Handbook is that the design specifications for the various BMPs are *not* incorporated within the Handbook. The BMP specifications have been moved to the **Virginia Stormwater BMP Clearinghouse Web Site**, in order to accomplish several goals:

- To provide easier access to the design specifications
- To allow the Commonwealth to update specifications more quickly and easily
- To allow the Commonwealth to more effectively evaluate and manage the approval of manufactured treatment devices (MTDs) for use in treating stormwater runoff in Virginia

The BMP Clearinghouse web site can be found at http://www.vwrrc.vt.edu/swc/. The new design specifications were developed collaboratively by staffs of the Center for Watershed Protection and the Chesapeake Stormwater Network. They reflect the most recent research on BMPs and the best and most current thinking about BMP sizing, design and performance. There are a number of new specifications included that reflect the Low Impact Development (LID) approach to managing stormwater, including specifications for Vegetated Roofs, Bioretention, and Rainwater Harvesting (with a very sophisticated design spreadsheet).

Appendix 8-A provides a comprehensive BMP design and plan review checklist for each BMP. These can be used by both project designers and local plan review staff to ensure that selected BMPs have been properly designed.

Chapter 9 provides extensive information about effective inspection and maintenance of stormwater control measures, including the following:

- The importance of an effective BMP inspection and maintenance program
- A general overview of how to implement an effective program
- The various entities responsible for implementation (public, private, or a combination, etc.)

- The consequences of incorrect implementation
- A step-by-step guide to setting up an effective local inspection and maintenance program element (step-by-step)
- Tracking inspection and maintenance activities
- A summary of typical maintenance tasks that must not be overlooked
- A brief discussion of monitoring associated with maintenance

Just as with an automobile, a power tool, or a major appliance, stormwater control measures must be maintained if they are to continue to function effectively over time. Regular preventive maintenance of stormwater controls can prevent major failures and repair expenses at some later date. However, it is commonly found that needed maintenance has not been performed after BMP construction has been completed, resulting in failure of these devices to perform. Thus, the controls that were intended to protect our local stream systems and drinking water supplies, by managing both the amount and quality of site runoff, do *not* accomplish those purposes.

Additionally, this chapter provides graphic examples of typical results when specific practices are not maintained, as well as describing the most common maintenance mistakes. Finally, this chapter provides a number of new Appendices that provide more guidance on specific aspects of BMP inspection and maintenance.

Appendix 9A provides the results of a field survey of BMPs in various regions of the James River watershed, conducted by the James River Association and the Center for Watershed Protection in 2009. This Appendix points out the results of careless design and construction, as well as neglect of BMP maintenance.

Appendix 9B provides numerous examples of BMP Maintenance Agreements from a number of localities.

Appendix 9C provides a generic BMP Inspection and Maintenance Checklist as well as individual checklists for each non-proprietary BMP provided on the BMP Clearinghouse web site.

Appendix 9D provides guidance on how to design BMPs in ways that reduce the risk of failure and the need for maintenance.

Appendix 9E provides a method that can be used to estimate sediment accumulation in BMPs such as wet ponds or forebays, so a locality will understand when and how often to schedule sediment removal activities.

Chapter 10 is an expansion and update of a section of the old Handbook setting forth *Uniform Stormwater BMP Sizing Criteria*.

The material in this chapter was embedded in Chapter 4 or 5 of the 1999 Handbook. However, most states provide this material as a separate chapter. The chapter covers the five standard sizing issues that typically apply to stormwater management and, more specifically, the three sizing criteria that apply in the Virginia regulations: treatment volume, receiving stream channel

protection criteria, and overbank flooding protection criteria. The chapter provides the scientific reasoning for the specific criteria selected for inclusion in the regulations.

These criteria are based on the new Stormwater Management Regulations, so there are some changes. For example, the water quality treatment sizing is now based on the 1-inch *rainfall* over the entire development site, rather than the old "Water Quality Volume" of 0.5 inches of *runoff* from only the impervious area of the site. Also, stream channel protection is now more flexible because it is based on the type and condition of the receiving channel.

DEQ has chosen to NOT include groundwater recharge criteria in the regulations, despite the requests of a number of stakeholders. Several other states in the Bay region do have groundwater recharge criteria. Given that this criterion is a subject of debate here in Virginia, **Appendix 10-A** provides an optional approach to developing a criterion for *recharge volume*, should a locality want to do this under the auspices of more stringent local criteria, which is allowed in the state regulations.

Appendix 10-A provides guidance for establishing an optional recharge volume requirement to local stormwater management rules, should the local government decide they want to enact this more stringent requirement into their local program. Currently the state regulations do not include a recharge volume requirement, in deference to the runoff volume reductions achieved by using many of the newer LID-type BMPs. However, several other Chesapeake Bay region states are including recharge volume reduction in their regulations, and the stormwater volume reduction approach is being strongly supported by the USEPA and the National Research Council of the National Academies of Science.

Appendix 10-B provides an explanation of why Virginia changed from the 2-year storm to the 1-year storm as the basic sizing criteria for stream channel protection for natural receiving streams.

Chapter 11 discusses the hydrologic calculations needed to apply the Runoff Reduction Method. The bulk of the text in this chapter appears to still apply, as basic hydrologic methods have not changed. The chapter includes several Appendices.

Appendix 11-A covers the Hydrologic Soil Groups assigned to all the Virginia soils. This information reflects the most current update from the USDA-NRCS state office in Virginia.

Appendix 11-B provides the 24-hour rainfall depths for Virginia, based on the new NOAA Atlas 14 rainfall data. For a county that has more than one rainfall depth occurring within its jurisdiction, maps have been clipped from the NOAA website to show where the boundaries are for each different annual rainfall depth.

Appendix 11-C provides all the rainfall-runoff tables for selected runoff curve numbers. These tables have also reflected the most current data from the USDA-NRCS state office.

Appendix 11-D discusses various stormwater computer models that can be used to assist with stormwater management designs. The models discussed apply to hydrologic, hydraulic, and water quality computations.

Chapter 12 explains the new Virginia Runoff Reduction Method spreadsheet. In the 1999 Handbook, the water quality design equation (*the Simple Method*) was discussed with examples in Chapter 5, along with all the hydraulic equations. However, given that the Runoff Reduction Method (and Spreadsheet) are involves a substantial expansion and improvement of the *Simple Method* equation, the Department believes the explanation of how to use this methodology merits a separate chapter of its own. The text is a step-by-step explanation of how to use the spreadsheet.

Chapter 13 provides a number of example site plan designs, with explanations about the design decisions and associated calculations involved with these designs. The five examples provided represent institutional, residential, commercial/office, and two redevelopment projects.

Important Note

The Department will retain links to Chapters 3 through 6 of the 1999 Virginia Stormwater Handbook (Blue Book) from the Stormwater Management section of the agency's website. We are doing this for two reasons. First, provisions of the revised (September, 2011) Virginia Stormwater Management Regulations allow "grandfathered" development site plans to use the older regulatory criteria and BMP designs reflected in the Blue Book. So there will be a continued need to reference that material. Second, Chapters 4-6 provide an excellent tutorial on the necessary hydrologic and hydraulic calculation procedures and example site designs using those procedures. Rather than repeat that information in the new Handbook, we have decided to keep the old text as legacy guidance.

1.2. HOW TO USE THIS HANDBOOK

The new Handbook is organized in a logical progression. Therefore, the Handbook can be used in an academic approach to methodically gain an understanding of the subject matter. Even so, each chapter is self-contained, so the reader can turn to specific topics independently, depending upon the type of information or guidance needed. There are comprehensive indexes at the beginning of each chapter showing the location of specific topics, figures and tables and appendices.

Part I includes chapters 1-3. These chapters introduce the Handbook and provide copies of the law and regulations, the model ordinance, and guidance about how to implement an effective local stormwater management program. Part II, including chapters 4-7, provides information to help the reader develop a conceptual understanding of why stormwater management is important and what is involved. Part III, including chapters 8-13, provides more specific tools, methods and examples for designers, local program staffs, etc., to enable them to translate the concepts into specific plans that will result in control measures on the ground, including their long-term inspection and maintenance.

This Handbook focuses on information that supports implementation of and compliance with Virginia's stormwater management law and regulations. However, the BMP design specifications on the BMP Clearinghouse web site, have been designed to apply throughout the Chesapeake Bay/Mid-Atlantic region.

1.3. REFERENCES

NRC, 2008. Water and Science Technology Board, Division of Earth and Life Studies. *Urban Stormwater Management in the United States*. Washington, DC: National Academies Press, 109+. http://www.nap.edu/catalog.php?record_id=12465#toc

Appendix 1-A

GLOSSARY OF TERMS AND ACRONYMS

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APPENDIX SECTION HEADINGS

1-A.1.0 INTRODUCTION

In an effort to not "reinvent the wheel," this Glossary is largely a representation of the work of others. Overlapping terms that are defined in the Virginia Stormwater Management Act and Regulations (4VAC50-60-10 et seq.), the Virginia Erosion and Sediment Control Law and Regulations (4VAC50-30-10 et seq.), the Virginia Erosion and Sediment Control Certification Regulations (4VAC50-50-10 et seq.), and the Virginia Chesapeake Bay Preservation Act and Regulations (4VAC50-90-10 et seq.) are defined identically in this Glossary. Otherwise, DEQ relied to a great extent on the *Environmental Management Glossary* published by the Soil and Water Conservation Society. Other sources of terminology include the following:

- Center for Watershed Protection
- Chesapeake Stormwater Network's *Stormwater Design Guidelines for Karst Terrain in the Chesapeake Bay Watershed, Version 2* (2009)
- CNMI/Guam *Stormwater Management Manual – Draft Volume I* (2006)
- EnviroCert International, Inc.'s *Certified Professional in Stormwater Water Quality (CPSWQ) Exam Review Study Guide* Glossary (2008)
- Maryland *Stormwater Design Manual* (2000)
- Minnesota *Stormwater Management Handbook* (2006)
- Northern Shenandoah Valley *Regional Urban Manual for Low Impact Site Design* (2005)
- Pennsylvania *Stormwater Best Management Practices Manual* (2006)
- Puget Sound Action Team's *Low Impact Development: Technical Guidance Manual for Puget Sound* (2005)
- Vermont *Stormwater Management Manual – Volume I* (2002)

Please note that with merger of the Department of Conservation and Recreation's associated stormwater management programs (VSMP, ESC and CBPA) into the Virginia Department of Environmental Quality (DEQ) effective July 1, 2013, sections of the applicable Acts in the Code of Virginia and applicable regulations in the Virginia Administrative Code will be recodified (renumbered) to fit into the DEQ's Code and VAC numbering schemes. In that regard, all such affected Code and VAC references that appear in this glossary have been highlighted in yellow to denote potential changes in the near future. These references will be corrected in this document at an appropriate time.

Also, please note that a small number of the definitions that are *not* included in the regulations have been blended from several sources in an effort to achieve greater clarity of meaning.

Key:

Terms shown in italics (e.g., ***Adequate channel***) are Virginia legal or regulatory definitions.

1-A.2.0 DEFINITIONS OF TERMS AND ACRONYMS

A

AASHTO	The American Association of State and Highway Transportation Officials.
AASHTO classification	The official classification of soil materials and soil aggregate mixtures for highway construction used by the members of AASHTO.
Abutment	The part of the valley side against which a dam is constructed. An artificial abutment is sometimes constructed, as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment. The left and right abutments of dams are defined with the observer viewing the dam looking in the downstream direction, unless otherwise indicated.
Access street	The lowest order street in the hierarchy of streets, conducting traffic between individual dwelling units and higher order streets (such as collector and sub-collector streets). Access streets convey the lowest traffic volume and are prime candidates for reduced street widths.
Accretion	Outward growth of a bank or shore by sedimentation; an increase or extension of boundaries of land by the action of natural forces.
Acid soil	A soil with a preponderance of hydrogen ions, and probably of aluminum in proportion to hydroxyl ions. Specifically, soil with a pH value less than 7.0 but, for most practical purposes, with a pH value less than 6.6.
Acre-foot	The volume of water that will cover one (1) acre to a depth of one (1) foot, equal to 43,560 cubic feet or 325,853 gallons.
Act (in the context of stormwater management)	The Virginia Stormwater Management Act: Article 2.3 (§ 62.1-44.15:24 et seq.) of Chapter 3.1 of Title 62.1 of the Code of Virginia..
Act (in the context of erosion and sediment control)	The Virginia Erosion and Sediment Control Law, Article 2.4 (§62.1-44.15:51 et seq.) of Chapter 3.1 Title 62.1 of the Code of Virginia.
Active construction area	During the winter season, the area where the contractor intends to be actively involved in soil disturbing work during the ensuing 20 day period. This may include areas where soils have been disturbed as well as areas where soil disturbance has not yet occurred.
Adequate channel	A channel that will convey the designated frequency storm event without overtopping the channel bank or causing erosive damage to the channel bed or banks.

Administrator	The Administrator of the United States Environmental Protection Agency or an authorized representative or, in the context of a local stormwater management program, the staff person or department responsible for administering the program or that person's or department's designated agent.
Adsorption	The adhesion of a substance to the surface of a solid or liquid (e.g., phosphorus adsorbing to soil particles); often used to extract pollutants by causing them to be attached to such adsorbents (e.g., activated carbon or silica gel).
ADT	Average Daily Traffic Volume.
Advection	The transfer or change of a property of the atmosphere (e.g., humidity) by the horizontal movement of a mass of fluid (e.g., air current).
Aggradation	The process of building up a stream bed or other surface by deposition of sediment. This is a long-term or geologic trend in sedimentation, a modification of the earth's surface in the direction of uniformity of grade, or slope.
Aggressive	Refers to the corrosive properties of soil and water.
Agreement in lieu of a plan	A contract between the VESCP authority and the owner that specifies conservation measures that must be implemented in the construction of a single-family residence; this contract may be executed by the VESCP authority in lieu of an erosion and sediment control plan.
Alkalinity	A measure of the capacity of water to neutralize acids because of the presence of one or more of the following bases in the water: carbonates, bicarbonates, hydroxides, borates, silicates, or phosphates; the quality or state of being alkaline; the concentration of OH negative ions.
Allelopathic	The suppression of growth of one plant species as a result of the release of a toxic substance by another plant species.
Alluvial	Pertaining to silts, sands, gravels and similar detrital material that is transported and deposited by running water.
Alluvial land	Areas of unconsolidated alluvium, generally stratified and varying widely in texture, recently deposited by streams, and subject to flooding.
Alluvial soils	Soils developed from transported and relatively recently deposited material (alluvium) characterized by a weak modification (or none) of the original material by soil-forming processes.

Alluvium	A general term for all detrital material deposited or in transit by streams, including gravel, sand, silt, clay and all variations and mixtures of these. Unless otherwise noted, alluvium is unconsolidated.
Ammonia	The gaseous compound of nitrogen and hydrogen (NH_3), commonly known as anhydrous ammonia in the fertilizer industry.
Ammonia nitrogen (NH_4-N)	A reduced form of nitrogen produced as a by-product of organic matter decomposition and synthesized from oxidized nitrogen by biological and physical processes.
Ammonification	The process in which organic forms of nitrogen (e.g., nitrogen present in dead plant material compounds) are converted to ammonium ($NH4^+$) by decomposing bacteria.
Anaerobic	The absence of molecular oxygen; growing in the absence of molecular oxygen (such as anaerobic bacteria); occurring in the absence of molecular oxygen (as a biochemical process).
Annual flood	The highest peak discharge that can be expected in any given year (e.g., a water year).
Annual load	The quantity of pollutants, sediment, or nutrients carried by a water body over the period of a year.
Antecedent (Soil) Moisture Conditions or **AMC**	The degree of wetness or water content held by a soil prior to a storm event, expressed as an index or as total inches of soil water. This has an effect on the amount of water that will become runoff during that storm event.
Antecedent Precipitation Index or **API**	An indicator of the amount of water (in inches) present in the soil at any given time. The calculation of the API is based on the assumption that, during time periods during which no precipitation occurs, the soil moisture decreases logarithmically with time.
Anti-seep collar	A device constructed around a pipe or other conduit and placed into a dam, levee, or dike for the purpose of reducing seepage losses and piping failures along the conduit it surrounds.
Anti-vortex device	A device placed at the entrance to a pipe conduit structure, such as a drop inlet spillway or hood inlet spillway, to prevent air from entering the structure when the pipe is flowing full, which can create swirling action and cavitation, reducing the flow capacity of the conduit system.

Applicable standards and limitations	All state, interstate, and federal standards and limitations to which a discharge or a related activity is subject under the Clean Water Act (CWA) (33 USC §1251 et seq.) and the [Virginia Stormwater Management] Act, including effluent limitations, water quality standards, standards of performance, toxic effluent standards or prohibitions, best management practices, and standards for sewage sludge use or disposal under §§301, 302, 303, 304, 306, 307, 308, 403 and 405 of CWA.
Applicant (in the context of stormwater management)	Any person submitting an application for a permit or requesting issuance of a permit under [§ 10.1-603.1 et seq. of the Code of Virginia].
Applicant (in the context of erosion and sediment control)	Any person submitting an erosion and sediment control plan or an agreement in lieu of a plan for approval or requesting the issuance of a permit, when required, authorizing land-disturbing activities to commence.
Applicant (in the context of permission to test a BMP pursuant to the VTAP process)	The person that is seeking approval for the permitted use of a technology through the VTAP or other Board authorized process. The applicant may be the manufacturer or the vendor.
Approval authority	The Virginia State Water Control Board or its designee.
Approved program *or* ***approved state***	A state or interstate program that has been approved or authorized by EPA under 40 CFR Part 123 (2000).
Appurtenant structure	An ancillary feature of a stormwater management facility (e.g., a wet pond), such as an outlet, spillways, etc.
Apron	A lining of the bed of the channel upstream or downstream from a lined or restricted waterway; a floor or lining, of concrete, rock, tec., to protect a surface from erosion such as the pavement below chutes, spillways, at the toes of dams, or along the toe of bank protection.
Aquatic bench	A 10- to 15-foot wide bench around the inside perimeter of a permanent pool that ranges in depth from zero to 12 inches. Vegetated with emergent plants, the bench augments pollutant removal, provides habitats, conceals trash and water level fluctuations, and enhances safety.
Aqueduct	(1) A major conduit. (2) The entire transmission main for a municipal water supply, which may consist of a succession of canals, pipes, tunnels, etc. (3) Any conduit for water, especially one for a large quantity of flowing water. (4) A structure for conveying a canal over a river or hollow.

Aquifer	An underground porous, water-bearing geologic formation that permits the movement of groundwater in sufficient quantity to supply the needs for a water development; usually saturated sands, gravel, fractures, and cavernous and vesicular rock. The term is generally restricted to materials capable of yielding an appreciable supply of water. The term *water bearing* is sometimes used synonymously with aquifer when a stratum furnishes water for a specific use.
Arid area	Any area receiving less than 10 inches of rainfall per year.
Armor	Artificial surfacing of the bed, banks, shore or an embankment to resist erosion or scour.
Arroyo	The waterway of an ephemeral stream deeply carved in rock or ancient alluvium.
Arterial street	A street that provides a direct route for long distance travel within a region and to different parts of the city. Traffic on an arterial street is given preference at intersections, and some access control may be considered in order to maintain capacity to carry high volumes of traffic. No residences are allowed along busy arterial streets.
Artesian waters	Percolating waters confined below impermeable formations with sufficient pressure to spring or well up to the surface.
Articulated	Made flexible by hinging, particularly of small rigid slabs adapted to a revetment.
Artificial recharge	The addition of water to the groundwater reservoir by activities of man, such as irrigation or induced infiltration from streams, wells or spreading basins.
As-built (drawing)	A drawing or certification of conditions as they were actually constructed, rather than as they were originally planned.
Aspect ratio	The ratio of length to width (e.g., in a constructed wetland cell).
ASTM	The American Society for Testing and Materials.
Atmospheric Deposition	The transfer of substances (e.g., pollutants) from the air to the surface of the Earth, either as dissolved or particulate matter contained in precipitation (e.g., rain, fog, snow, dew, frost, hail, etc.) or in dry form (e.g., gases, aerosols, solid particles).
Average daily traffic (ADT)	The average total number of vehicles that traverse a street, road or highway on a typical day. The ADT is often used to classify and design roadway systems.

Average land cover condition A measure of the average amount of impervious surfaces within a watershed, assumed to be 16% or a calculated watershed-specific value for the average land cover condition as approved by the Chesapeake Bay Local Assistance Board prior to September 13, 2011.

Average monthly discharge limitation The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average weekly discharge limitation The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Avulsion (1) A forcible separation; also, a part torn off. (2) The sudden removal of land from the estate of one person to that of another, as by a sudden change in a river. (3) A sudden shift in channel location.

Axis of dam The vertical plane or curved surface, chosen by the designer, appearing as a line, in plan or in cross-section, to which the horizontal dimensions of the dam are referenced.

B

Backfill Earth used to fill a trench or excavation.

Backing layer A layer of graded rock between rock riprap and the underlying engineering fabric or filter layer to prevent extrusion of the soil or filter layer material through the riprap.

Backshore The zone of the shore or beach lying between the foreshore and the coastline and acted upon by waves only during severe storms, especially when combined with exceptionally high water.

Backwater An unnaturally high stage in a stream caused by an obstruction or confinement of flow, as by a dam, a bridge, or a levee. Its measure is the excess of unnatural over natural stage, not the difference in stage upstream and downstream from its cause.

Backwater curve The longitudinal profile of the water surface in an open channel where the depth of flow has been increased by an obstruction, an increase in channel roughness, a decrease in channel width, or a flattening of the bed slope.

Baffle	A pier, vane, guide, sill, fence, grid, grating, wall, mound or similar device placed in a conduit or impoundment, built on the bed of a stream, or floated on the surface to parry, deflect, check, disturb cross currents or waves or regulate flow and create a longer flow path from the inlet to the outlet structure or effect a more uniform distribution of velocities.
Baffle block	A block, usually of concrete, constructed in a channel or stilling basin to dissipate the energy of water flowing at high velocity.
Bank	The lateral boundary of a stream confining water flow. The bank on the left side of a channel looking downstream is called the left bank, etc.
Bank protection	A revetment or other armor protecting a bank of a stream from erosion, including devices used to deflect the forces of erosion away from the bank.
Bankfull	An established stream or river stage at a given location, which is intended to represent the maximum safe water level that will not overflow the river banks or cause any significant damage within the stream or river reach.
Bankfull discharge	A stream discharge that fills the channel to the top of the banks and just begins to spread onto the floodplain. Bankfull discharges occur on average every 1 to 1.5 years in undisturbed watersheds and are primarily responsible for controlling the shape and form of natural channels.
Bar	An elongated deposit of alluvium within a channel or across its mouth.
Barrel	In the context of stormwater management, a closed conduit used to convey water under or through an embankment; part of the principal spillway.
Barrier	A low dam or rack built to control flow of debris.
Base flood	The flood or tide having a 1 percent chance of being exceeded in any given year (i.e., the 100-year flood). The "base flood" is commonly used as the "standard flood" in Federal flood insurance studies. (also see **Regulatory Flood**)
Base floodplain	The area subject to flooding by the base flood.
Base flow	The flow contribution to a stream from groundwater sources independent from surface runoff conditions, and sometimes considered to include flows from regulated lakes and reservoirs. During dry periods, based flow constitutes the majority of stream flow. Base flow fluctuates much less than stormwater runoff.

Base thickness or **base width**	The maximum thickness or width of the dam, as measured horizontally between the upstream and downstream faces and normal to the axis of the dam, but excluding projections for outlets or other appurtenant structures.
Basin	In the context of hydrology, the surface area draining to a stream, river or lake (similar to watershed or drainage basin) and is the largest single watershed management unit for water planning, often with a total area of more than a thousand square miles and combining a series of sub-basins; in the context of stormwater management, a facility designed to impound stormwater runoff. Also, space above or below ground capable of retaining or detaining water or debris.
Bay	An indentation of bank or shore, including erosional cuts and slipouts, not necessarily large.
Beach	The zone of sedimentary material that extends landward from the low water line to the place where there is marked change in material or form, or to the line of permanent vegetation (usually the effective limit of storm waves). The seaward limit of a beach, unless otherwise specified, is the mean low water line. A beach includes a foreshore and a backshore.
Bearing capacity	The maximum load that a material can support before failing.
Bed	The earth below any body of water, limited laterally by the banks or shore.
Bed load	The sediment particles that are transported as a result of shear stress created by flowing water, and which move along by sliding, rolling, or skipping (saltation) and are in frequent contact with the streambed; sediment moved mainly by tractive or gravitational forces or both, but at velocities less than the surrounding flow.
Bedding	The foundation under a drainage structure.
Bedrock	Any sedimentary, igneous, or metamorphic material represented as a unit in geology; being a sound and solid mass, layer, or ledge of mineral matter; and with shear wave threshold velocities greater than 2,500 feet/second, over which lies an overburden of loose soil and unconsolidated, weathered rock (regolith). It may be soft, medium or hard and have a smooth or irregular surface, with depths ranging from zero (where exposed by erosion) to several hundred feet.
Beneficial uses	As referred to in State Water Quality Standards, activities that range from recreational to agricultural uses, depending on the source of the water.
Benthic	Occurring on or in the bottom sediment of wetland and aquatic ecosystems (e.g., benthic organisms).

Benthic region	The bottom of a body of water that supports the benthos.
Benthos	The plant and animal life whose habitat is the bottom of a sea, lake, river or stream.
Bentonite	A highly plastic clay, consisting of the minerals montmorillonite and beidellite, that swells extensively when wet.
Berm	A narrow bench, terrace, shelf, flat area (step) or dike, typically composed of soil or stone, that breaks the continuity of a slope. Also, a nearly horizontal part of the beach or backshore formed at the high water line by waves depositing material. Some beaches have no berms; others have one or several.
Best management practice or BMP	Schedules of activities, prohibitions of practices, including both structural or nonstructural practices, maintenance procedures, and other management practices to prevent or reduce the pollution of surface waters and groundwater systems from the impacts of land-disturbing activities. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. (also see **Stormwater control measure** and **Stormwater treatment practice**.)
Better site design or **BSD**	The application of design decisions and non-structural practices at residential and commercial sites to reduce impervious cover, conserve natural areas, and use pervious areas to more effectively treat stormwater runoff.
Biochemical Oxygen Demand or **BOD**	A measure of the oxygen used in meeting the metabolic needs of aerobic microorganisms in water rich in organic matter; also, an indirect measure of the concentration of biologically degradable material present in organic wastes; also called *biological oxygen demand*. It usually reflects the amount of oxygen consumed in five days by biological processes breaking down organic waste (BOD5).
Biological process	A pollutant removal pathway in which microbes break down organic pollutants and transform nutrients.
Bioretention	A practice that uses landscaping and soils to treat urban stormwater runoff by collecting it in shallow depressions, before filtering it through a fabricated planting soil media, allowing infiltration of runoff into the ground and transpiration by plants as well as evaporation. The plants provide additional pollutant removal and filtering functions while infiltration allows the temperature of the runoff to be cooled. Also referred to as a Biofilter or Rain Garden.

Bioretention basin	A water quality BMP engineered to filter the water quality volume through an engineered planting bed, consisting of a vegetated surface layer (vegetation, mulch, ground cover), planting soil, and sand bed, and into the in-situ material.
Bioretention filter	A bioretention basin with the addition of a sand filter collector pipe system beneath the planting bed.
Biotic integrity	The condition where the biologic or living community of an aquatic or terrestrial system is unimpaired and the natural species diversity and richness expected for that system are present.
Block	A precast prismatic unit for a riprap structure.
Bluff	A high, steep bank composed of erodible materials.
Board	The Virginia State Water Control Board.
BOD_5	The amount of dissolved oxygen needed or consumed in five days by biological processes that break down the organic matter in an effluent.
Bog	A poorly drained, acidic wetland area rich in plant residues, usually surrounded by an area of open water, and having characteristic flora.
Boil	A turbulent break in a water surface by an upwelling.
Bole	The trunk of a tree.
Boom	A floating log or similar element designed to dampen surface waves or control the movement of drift.
Bore	A transient solitary wave in a narrow or converging channel, advancing with a steep turbulent front; a product of flash floods or incoming tides.
Borrow area	The area from which natural materials (e.g., rock, gravel or soil) are excavated used for earth fill, embankments or other construction purposes.
Boulder	The largest rock transported by a stream or rolled in the surf; arbitrarily heavier than 12 kg and larger than 200mm.
Braided stream	A stream in which flow is divided at the normal stage by small islands. This type of stream has the aspect of a single large channel with which there are subordinate channels.
Breaker	A wave meeting a shore, reef, sandbar, or rock and collapsing.
Breakwater	A fixed or floating structure that protects a shore area, harbor, anchorage, or basin by intercepting waves.

Buffer or **buffer zone**	A vegetative setback or physical barrier between development and a protected resource (e.g., a water body), a critical habitat or a natural feature, the purpose of which is to physically protect and separate the resource, habitat or feature from the negative effects of future land disturbance, development or other encroachment.
Buffer averaging	A technique for delineating the width of a buffer such that the buffer boundary can be narrower at some points along the stream as long as its average width meets the minimum regulatory criteria. Buffer averaging allows for greater flexibility to allow for existing structures or planned lots without destroying the integrity of the buffer network.
Buffer expansion	An increase in the base width of the stream buffer to incorporate floodplains, steep slopes and adjacent wetlands, or to protect higher order streams and rivers.
Building footprint	The area of the ground that a building covers.
Bulkhead	A steep or vertical partition or structure constructed on a bank, bluff, or embankment to retain or prevent sliding of the land, hold back water, separate compartments or protect an inland area against damage.
Bulking	The increase in volume of flow due to air entrainment, debris, bedload, or suspended sediment.
Buoyancy	Uplift force on a submerged body equal to the mass of water displaced times the acceleration of gravity.
Bypass	The intentional diversion of waste streams from any portion of a treatment facility.

C

California Bearing Ratio or **CBR**	The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio and multiplied by 100. For example, a soil with a ratio of 16 will support 16 percent of the load that would be supported by the standard crushed limestone per unit area and with the same degree of distortion. Also a test, first standardized in California, using a plunger of a specific area to penetrate a soil sample to determine the load bearing strength of a road subgrade.
Camber	An upward adjustment of the profile of a drainage facility under a heavy loading (usually a high embankment) and poor soil conditions, so that as the drainage facility settles, it approaches the design profile.

Canal	An artificial open channel.
Canyon	A large deep valley; also the submarine counterpart.
Cap	The top layer of stone protective works.
Capacity	The effective carrying ability of a drainage structure; generally measured in cubic meters per second.
Capillarity	The attraction between water and soil particles that cause water to move in any direction through the soil mass regardless of gravitational forces.
Capillary action	In the context of hydrology, the movement of water through very small spaces due to molecular forces called capillary forces; the tendency of dry soil particles to attract moisture from wetter portions of the soil.
Capillary water	Water that clings to soil particles by capillary action. It is normally associated with fine sand, silt, or clay, but not normally with coarse sand and gravel.
Carbonate bedrock	Rock that consists of one or more carbonate minerals. Carbonate rock successions (or sequences) are those in which carbonate rock is dominant, but which also contain rocks of other lithology. Typical carbonate rocks are limestone, dolomite and marble.
Castellated	Built or formed like a castle, with “battlements.”
Catch basin	A drainage structure, chamber or well, usually built at the curb line of a street that collects surface runoff through the side or a grate on top and admits it into a sewer or subdrain. A catch basin commonly has a sediment sump at its base, below the sewer or subdrain discharge elevation, designed to retain solids below the point of overflow.
Catch basin insert	A device that attaches to the entrance of a catch basin or mounts inside the catch basin and is designed to improve stormwater quality by either preventing debris or pollutants from entering the basin, or by retaining or treating the water in the basin.
Catchment	A surface drainage area, typically the smallest watershed management unit and usually defined as the area of a development site to its first intersection with a stream, usually as a pipe or open channel outfall; also, a reservoir or basin developed for flood control or water management for livestock and/or wildlife.
Cation exchange capacity or **CEC**	The amount of exchangeable cations that a soil can adsorb at pH 7.0, expressed in terms of millequivalents per 100 grams of soil (me/100g).

Causeway	A temporary structural span constructed across a flowing watercourse or wetland to allow construction traffic to access the area without causing erosion damage.
Cave	A natural opening formed in the rocks below the surface of the ground large enough for a man to enter; it may consist of a single connected opening or a series of small or large chambers connected by galleries.
Cavitation	Erosion by suction, especially in the partial vacuum of a diverging jet.
CBLAD	The Chesapeake Bay Local Assistance Department (previously an independent Virginia state agency, now a program within the Virginia Department of Environmental Quality).
Celerity	The velocity of a moving wave, as distinguished from the velocity of particles oscillating in the wave.
CFR	The Code of Federal Regulations.
Certification	The process whereby the [State Water Control] Board, on behalf of the Commonwealth, issues a certificate to persons who have completed Board-approved training programs and met any additional eligibility requirements of 4VAC50-50-50 related to the specified classifications (4VAC50-50-40) within the areas of ESC or SWM or in other ways demonstrated adequate knowledge and experience in accordance with the eligibility requirements of 4VAC50-50-50 in the specified classifications ithin the areas of ESC or SWM.
Certified combined administrator for ESC	An employee or agent of a VESCP authority who holds a certificate of competence from the [State Water Control] Board in the combined ESC classifications of program administrator, plan reviewer, and project inspector in the area of ESC.
Certified combined administrator for SWM	An employee or agent of a VSMP authority who holds a certificate of competence from the [State Water Control] Board in the combined classifications of program administrator, plan reviewer, and project inspector in the area of SWM.
Certified project inspector for ESC	An employee or agent of a VESCP authority who holds a certificate of competence from the [State Water Control] Board in the classification of project inspector in the area of ESC.
Certified project inspector for SWM	An employee or agent of a VSMP authority who holds a certificate of competence from the [State Water Control] Board in the classification of project inspector in the area of SWM.

Certified plan reviewer for ESC	An employee or agent of a VESCP authority who: (i) holds a certificate of competence from the [State Water Control] Board in the classification of plan reviewer in the area of ESC; (ii) is licensed as a professional engineer, architect, landscape architect, or land surveyor pursuant to Article 1 (§ 54.1-400 et seq.) of Chapter 4 of Title 54.1 of the Code of Virginia; or (iii) is a professional soil scientist as defined in Chapter 22 (§ 54.1-2200 et seq.) of Title 54.1 of the Code of Virginia..
Certified plan reviewer for SWM	An employee or agent of a VSMP authority who holds a certificate of competence from the [State Water Control] Board in the classification of plan reviewer in the area of SWM.
Certified program administrator for ESC	An employee or agent of a VESCP authority who holds a certificate of competence from the [State Water Control] Board in the classification of program administrator in the area of ESC.
Certified program administrator for SWM	An employee or agent of a VSMP authority who holds a certificate of competence from the [State Water Control] Board in the classification of program administrator in the area of SWM.
Channel	A natural or manmade waterway.
Channel capacity	The flow rate of a ditch, canal, or natural or man-made channel when flowing full or at design flow.
Channel improvement	The making the flow characteristics of a channel better by clearing, excavation, realignment, lining, or other means in order to increase its capacity, ideally using natural channel design concepts; sometimes used to connote channel stabilization.
Channel protection	Actions taken to prevent habitat degradation and erosion that may cause downstream enlargement and incision in urban streams due to an increased frequency of bankfull and sub-bankfull stormwater flows.
Channel Protection Volume or **CP_v**	The volume of stormwater from a site that must be managed or detained in order to meet receiving channel protection criteria of the Virginia Stormwater Management Regulations (4VAC50-60-66).
Channel stabilization	The introduction of natural or manmade materials placed within a channel so as to prevent or minimize the erosion of the channel bed and/or banks and stabilize the flow velocity distribution in the channel, using drops, revetments, vegetation and other measures.
Channel storage	Water temporarily stored within channels while en route to an outlet.

Channelization	The formation or alteration of a stream channel by widening, deepening, straightening, cleaning, or paving certain areas to improve flow characteristics and reduce hydraulic residence time, resulting in less contact between the water and solid surfaces in the water body.
Check or **Check dam**	A small sill, weir or dam constructed in gully, steep ditch or other small channel to decrease stage or flow velocity, minimize channel scour, and promote sediment deposition.
Chemical Oxygen Demand or **COD**	A measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water. The COD test, like the BOD test, is used to determine the degree of pollution in an effluent.
Chesapeake Bay Preservation Act land-disturbing activity	A land-disturbing activity including clearing, grading, or excavation that results in a land disturbance equal to or greater than 2,500 square feet and less than one acre in all areas of jurisdictions designated as subject to the Chesapeake Bay Preservation Area Designation and Management Regulations (4VAC50-90) adopted pursuant to the Chesapeake Bay Preservation Act (Code of Virginia §10.1-2100 et seq.)
Chesapeake Bay Preservation Area	Any land designated by a local government pursuant to Part III (4VAC 50-90-70 et seq.) of the Chesapeake Bay Preservation Area Designation and Management Regulations and §10.1-2107 of the [Chesapeake Bay Preservation] Act; a Chesapeake Bay Preservation Area consists of a Resource Protection Area [RPA] and a Resource Management Area [RMA].
Chesapeake Bay watershed	All land areas draining to the following Virginia river basins: Potomac River Basin, James River Basin, Rappahannock River Basin, Chesapeake Bay and small coastal basins, and York River Basin.
Chute	A high velocity, open channel for conveying water to a lower level without erosion.
Cienega	A swamp formed by water rising to the surface at a fault.
Cistern	In the context of stormwater management, a tank or other receptacle for capturing and holding rain water for slow release or reuse on the site.
Classification	Refers to the four specific certificate of competence classifications within the areas of ESC or SWM that make up activities being performed (program administrator, plan reviewer, project inspector, and combined administrator.

Clay (soil)	(1) In the context of agronomy, a mineral soil separate consisting of particles less than 0.002 millimeter in equivalent diameter; (2) a mineral soil textural class; (3) in the context of engineering and according to the Unified Soil Classification System, a fine-grained soil (more than 50 percent passing the No. 200 sieve) that has a high plasticity index in relation to the liquid limit.
Clean Water Act *or* ***CWA***	The federal Clean Water Act (33 U.S.C. §1251 et seq.), formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500, as amended by Public Law 95-217, Public Law 95-576, Public Law 96-483, and Public Law 97-117, or any subsequent revisions thereto.
Cleanout	An access opening to a roadway drainage system, usually consisting of a manhole shaft, a special chamber or opening into a shallow culvert or drain.
Cliff	A high, steep face of rock; a precipice.
Closed drain	A subsurface drain, tile, or perforated pipe that receives surface water through surface inlets.
Cloudburst	A rain storm of great intensity, usually over a small area for a short duration.
Clustering or **cluster development**	A development pattern that arranges the layout of buildings on a compact area of a site, so as to reserve a portion of the site for common open space or green space that is typically protected in perpetuity. Such a plan generally maintains the same overall relative density as the conventional subdivision design.
Coast	(1) The strip of land, of indefinite width (up to several kilometers), that extends from the shoreline inland to the first major change in terrain features. (2) As a combining form, upcoast is northerly and downcoast is southerly.
Cobble	A rock smaller than a boulder and larger than gravel; arbitrarily, 0.5 to 12 kg, or 75 to 200 mm in diameter.
COE	The United States Army Corps of Engineers.
Coefficient of Runoff	The percentage of gross rainfall that appears as runoff.
Cofferdam	A watertight temporary structure in a river, lake, etc., for keeping the water from an enclosed area that has been pumped dry so that bridge foundations, dams, etc., may be constructed.

Cohesion	Holding together; a force holding a solid or liquid together, owing to attraction between like molecules; also, the capacity of a soil to resist shearing stress, exclusive of functional resistance. Cohesive force decreases as temperature rises.
Cohesive soil	Predominantly clay and silt soil, composed of fine-grained particles that stick together whether wet or dry. A soil that, when unconfined, has considerable strength when air-dried and significant cohesion when submerged.
Coincident peak	The upstream peak discharge arriving at the same time a downstream structure releases its peak discharge, thus increasing the total discharge to well above what it was on the pre-development hydrograph or what the stormwater design intended for the site.
Cold water stream or **cold water fishery**	A stream that supports cold water fish, usually including trout, which require relatively cool water for survival; typically the water temperature is 20 degrees C (68 degrees F) or less.
Collector street	The primary traffic route within a residential or commercial area, which funnels a high traffic volume from a busy arterial street into lower order streets (access and sub-collectors).
Combined administrator for ESC	Anyone who is responsible for performing the combined duties of a program administrator, plan reviewer and project inspector of a VESCP authority.
Combined administrator for SWM	Anyone who is responsible for performing the combined duties of a program administrator, plan reviewer and project inspector of a VSMP authority.
Combined Sewer Overflow or **CSO**	The exceedence of the hydraulic capacity of a sewer system that collects both stormwater runoff and sanitary sewage in the same pipe(s) and normally conveys these wastes to a wastewater treatment plant. Such overflows, typically occurring in extreme wet weather events, result in untreated human and industrial waste, toxic materials and debris being discharged directly to nearby streams, rivers, lakes or estuaries, causing impairments of water quality and aquatic habitat and often causing beach closings, shellfishing restrictions and other water body impairments.
Commencement of construction	The initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities (e.g., stockpiling of fill material).
Common Plan of Development or Sale	A contiguous area where separate and distinct construction activities may be taking place at different times on different schedules.

Compaction	In the context of soil engineering, the process (usually mechanical) by which soil grains are rearranged so as to decrease void space and bring them in closer contact with one another, thereby reducing the permeability and increasing the soils unit weight and shear and bearing strength.
Composite hydrograph	A plot of the mean daily discharges for a number of years of record on a single year time base for the purpose of showing the occurrence of high and low flows.
Compost	Organic residue, or a mixture of organic residues and soil, that has been piled and undergone biological decomposition until it has become relatively stable humus.
Compost maturity	A term used to define the effect that compost has on plant growth. Mature compost will enhance plant growth; immature compost can inhibit plant growth.
Compost stability	The level of microbial activity in compost that is measured by the amount of carbon dioxide produced by a sample in a sealed container over a given period of time.
Composting	A controlled process of degrading organic matter by micro-organisms. Present-day composting is the aerobic, thermophilic decomposing of organic waste to relatively stable humus (e.g., with no more than 25 percent dead or living organisms, which is stable enough not to reheat or cause odor or fly problems), which can undergo further, slower decay.
Comprehensive planning	A continuing process that includes research on the conditions and trends in physical, social, and economic development, accounting for all aspects of water, air and land resources and their uses and limits; preparation and adoption of a comprehensive plan; programming of capital improvements; and initiation of the regulatory and administrative measures for implementation and maintenance of the plan.
Comprehensive stormwater management plan	A plan, which may be integrated with other land use plans or regulations, that specifies how the water quality components, quantity components, or both of stormwater are to be managed on the basis of an entire watershed or a portion thereof. The plan may also provide for the remediation of erosion, flooding, and water quality and quantity problems caused by prior development.
Concentrated flow	Flowing water that has been accumulated into a single fairly narrow stream.
Concentration	In addition to its general sense, also the unnatural collection or convergence of waters so as to discharge in a norrower width, and at greater depth or velocity.

Concurrent floods	Flood flows expected at a point on the river system below a dam at the same time a flood inflow occurs above the dam.
Conditional use designation** or **CUD	A designation given to MTDs that have undergone rigorous field testing in at least one location using a Board-approved protocol for testing pollutant removal from post-construction stormwater runoff.
Conduit	Any pipe, arch, box, drain tile or channel, whether open or closed, through which water is conveyed. Also, in the context of karst geology, relatively large dissolutional voids, including enlarged subsurface fissures and tubular tunnels (in some usage the term is restricted to voids that are water-filled). Subsurface conduits may include all voids greater than 10mm in diameter, but another classification scheme places them between arbitrary limits of 100mm to 10m – whichever value is accepted in a particular context, smaller voids are commonly termed sub-conduits.
Cone	The physiographic form of a sediment deposit washed from a gorge channel onto an open plain; a debris cone, also called an alluvial fan.
Cone of depression	A roughly cone-shaped depression in the water table or piezometric surface, created by pumping from a well.
Confluence	A junction of streams.
Conservation	The protection, improvement and use of natural resources according to principles that assure their highest economic or social benefits.
Conservation easement or **open space easement**	A restriction placed on a piece of property to protect its conservation values. The easement is voluntarily donated or sold by the landowner and constitutes a legally binding agreement that prevents development of the land and/or limits certain types of uses in perpetuity. A private organization or public agency agrees to enforce the landowner's promise not to exercise certain rights associated with ownership of the property – usually the right to subdivide or develop the land. The easement essentially extinguishes those rights, so they no longer exist.
Constriction	An obstruction narrowing a waterway.
Constructed wetlands	Areas intentionally designed and created to emulate the water quality improvement function of wetlands for the primary purpose of removing pollutants from stormwater.
Construction activity	Any clearing, grading, or excavation associated with large construction activity or associated with small construction activity.
Construction sequencing	A specified work schedule that coordinates the timing of land-disturbing and site development activities.

Construction site	The area involved in a construction project as a whole.
Contiguous zone	The entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone (37 FR 11906 June 15, 1972).
Continuous discharge	A discharge which occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities.
Contraction	The reduction in cross-sectional area of flow.
Contractor	The party responsible for carrying out the contract consistent with the plans and specifications.
Control	(1) a section or reach of an open conduit or stream channel that maintains a stable relationship between stage and discharge. (2) For flood, erosion, debris, etc., the remedial means or procedure restricting damage to a tolerable level.
Control measure	Any best management practice or other method used to prevent or reduce the discharge of pollutants to surface waters.
Contour	An imaginary line on the surface of the earth connecting points of the same elevation; also, a line on a map connecting points of the same elevation.
Contributing drainage area or **CDA**	The area in a drainage basin or sub-basin that contributes water to streamflow or recharge to an aquifer; also, the area on a site that contributes water to a specific stormwater control measure or sequence of control measures.
Control measure	Any BMP stormwater facility, or other method used to minimize the discharge of pollutants to state waters.
Conveyance	Any natural or man-made structure or feature used for transferring concentrated water from one location to another. Also, a measure of the water carrying capacity of a stream or channel.
Co-operator	An operator of a state permit that is only responsible for state permit conditions relating to the discharge for which it is the operator.
Cool season grasses	In Virginia, a grass which experiences most of its growth in the spring and fall, but may remain green all year long. Cool season grasses tend to turn brown and become dormant during mid-summer.
Core	The central zone of low permeability material in a dike, levee, rock groin, jetty or dam embankment. The core is sometimes referred to as the central core, inclined core, puddle clay core, rolled clay core, or impervious core.

Core trench or **cutoff trench**	Excavation for a core wall in the construction of an earth embankment; also, a trench, filled with relatively impervious material intended to prevent seepage of water through porous strata.
Core wall or **cutoff wall**	A wall built of relatively impervious material, such as masonry, concrete, asphaltic concrete, sheet piling, appropriate metal, or compacted earth placed near the center of a dam or embankment to prevent seepage.
Corrasion	Erosion or scour by abrasion in flowing water.
Corrosion	Erosion by chemical action.
Cradle	A structure usually of concrete shaped to fit around the bottom and sides of a conduit to support a conduit, increase its strength and, in dams, to fill all voids between the underside of the conduit and soil. The cradle is constructed to line and grade. The conduit rides on the cradle as it is worked through the given material by jacking and tunneling methods. Also serves as bedding for pipes in trenches in special conditions.
Creek	A small stream, usually active.
Crest	The top of a levee, dam, dike, spillway or weir or other water barrier or control structure, frequently restricted to the overflow portion. Also, the peak of a wave or a flood.
Crest length	The measured length of the dam along the crest or top of the dam.
Crib	An open-frame structure loaded with earth or stone ballast to act as a baffle for bank protection.
Critical depth	The depth of flow in a conduit or channel of specified dimensions at which the specific energy is a minimum for a given discharge rate or, under certain other conditions, the maximum flow will occur (e.g., the conduit is on the critical slope with water flowing at its critical velocity when there is an adequate supply of water). Also, the depth of water flowing in an open channel or a conduit partially filled, for which the velocity head equals one-half the hydraulic mean depth.
Critical flow	The flow in open channels at which the energy content of the fluid is at a minimum. Also, that flow for which the Froude number = 1.
Critical shear stress	The lift and drag forces that move sediment particles. Forces are created as faster moving water flows past slower water.

Critical slope	That slope at which the maximum flow will occur at the minimum velocity. The slope or grade that is exactly equal to the loss of head per meter resulting from flow at a depth that will give uniform flow at critical depth; the slope of a conduit that will produce critical flow.
Critical velocity	The mean velocity of flow when flow is at the critical depth.
Crushed stone	Aggregate consisting of angular particles produced by mechanically crushing rock.
Cul-de-sac	A circular section located at the end of an access street that permits vehicles to turn around.
Culvert	A closed conduit, other than a bridge, that allows water to pass under a highway. A culvert has a span of less than 6.1 meters, or if multispan, the individual spans are 3.0 meters or less.
Curb or **Curb and gutter**	A concrete barrier at the edge of a street used to intercept and quickly convey storm water runoff from the street and adjacent areas to a storm drain inlet and to protect pavement, lawns and sidewalks from vehicle damage.
Current	The flow of water, both as a phenomenon and as a vector. It is usually qualified by adjectives like downward, littoral, tidal, etc. to show the relation to a pattern of movement.
Current meter	An instrument for measuring the velocity of a current. It is usually operated by a wheel equipped with vanes or cups that is rotated by the action of the impinging current. An indicating or recording device is provided to indicate the speed of rotation, which is correlated with the velocity of the current.
Curve number or **runoff curve number** or **CN**	A numerical representation of a given area's runoff potential (reflecting the hydrologic soil group, plant cover, impervious cover, interception and surface storage) derived in accordance with Natural Resource Conservation Service methods. This number is used to convert rainfall depth into runoff volume. The larger the runoff curve number, the greater the percentage of rainfall that will appear as runoff.
Cut	In the context of a grading operation, the portion of the land surface or area from which earth has been removed or will be removed by excavation; the depth below the original ground surface to the excavated surface.
Cut and fill	The process of earth moving by excavating part of an area and using the excavated material to build up nearby areas (e.g., adjacent embankments or fill areas).

Cutoff trench — A long, narrow excavation constructed along the center line of a dam, dike, levee or embankment and filled with relatively impervious material intended to reduce seepage of water through porous strata.

Cutoff wall — A wall at the end of a drainage structure, the top of which is an integral part of the drainage structure. This wall is usually buried, and its function is to prevent undermining of the drainage structure if the natural material at the outlet of the structure is scoured by the water discharging from the end of the structure. Cutoff walls are sometimes used at the upstream end of a structure when there is a possibility of erosion at this point.

Cutting — A leaf, stem or branch cut from a plant to establish a new plant.

CWA — The federal Clean Water Act (33 U.S.C. § 1251 et seq.), formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500, as amended by Public Law 95-217, Public Law 95-576, Public Law 96-483, and Public Law 97-117, or any subsequent revisions thereto.

D

Daily discharge — The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the day.

Dam or **impounding structure** — A barrier to confine or raise water for storage or diversion, to create a hydraulic head, to prevent gully erosion, or to retain soil, rock or other debris.

Dam safety — The art and science of ensuring the integrity and viability of dams such that they do not present unacceptable risks to the public, property, and the environment. It requires the collective application of engineering principles and experience, and a philosophy of risk management that recognizes that a dam is a structure whose safe function is not explicitly determined by its original design and construction. It also includes all actions taken to identify or predict deficiencies and consequences related to failure, and to document, publicize, and reduce, eliminate, or remediate to the extent reasonably possible, any unacceptable risks.

Darcy's Law	A volume of water passing through a porous medium in unit time is proportional to the cross-sectional area and to the difference in hydraulic head and inversely proportional to the thickness of the medium. The proportionality constant is called the hydraulic conductivity.
Debris	Any material, including floating woody materials and other trash, suspended sediment, or bed load, moved by a flowing stream.
Debris dam	A barrier built across a stream channel to retain rock, sand, gravel, silt or other material.
Debris barrier or **debris guard**	A deflector screen or grate at the entrance of a channel or culvert or the intake of a drainage or pump structure for the purpose of deflecting heavy floating debris or boulders away from the channel or structure during high-velocity flows.
Debris basin	Any area upstream from a drainage structure used for the purpose of retaining debris in order to prevent clogging of drainage structures downstream.
Debris Rack	A straight barrier that, when placed across the stream channel, tends to separate light and medium floating debris from stream flow and prevent the debris from reaching the culvert entrance.
Dead storage	The permanent storage volume of a pond.
Dedication	The deliberate appropriation of property by its owner for general public use.
Degradation	General and progressive lowering of the water quality characteristics and/or the longitudinal profile of a stream channel by erosion and runoff pollution.
Degrading watershed	An urban stream classification for a sub-watershed with 11-25% ultimate impervious cover, where the level of urbanization is expected to lead to some degradation in stream quality.
Delta	A system of channels through an alluvial plain at the mouth of a stream or river.
Denitrification	The removal of nitrate ions from soil or water by the chemical or biochemical (microbial) reduction of oxidized nitrate- or nitrite-nitrogen to gaseous nitrogen, either as molecular nitrogen or as an oxide of nitrogen.
Dense-graded material	A granular mixture characterized by a large range in particle sizes. Dense graded materials have better structural properties than open-graded materials, but they are less permeable.

Density	The number of dwelling units per gross acre for residential and commercial uses.
Density compensation	Granting credit to allow higher density elsewhere on a site in order to compensate for loss of land rendered unbuildable due to the presence of wetlands, floodplain, stream buffer, steep slopes or other environmental requirements.
Denuded	A term applied to land that has been physically disturbed and no longer supports vegetative cover.
Department or ***DEQ***	The Virginia Department of Environmental Quality.
Deposit	An earth mass of particles settled or stranded from moving water or wind.
Deposition	The accumulation of material dropped because of a slackening movement of the transporting agency (e.g., water or wind).
Depression storage	Water stored in surface depressions (e.g., puddles, ditches, etc.) or on foliage and therefore not available for producing surface runoff.
Depth	The vertical distance, (1) from surface to bed of a body of water, or (2) from crest or crown to invert of a conduit.
DEQ	The Virginia Department of Environmental Quality.
Design discharge	The quantity of flow that is expected at a certain point as a result of a design storm. This is usually expressed as a rate of flow in cubic feet or meters per second.
Design flood	The peak discharge (when appropriate, the volume, stage, or wave crest elevation) of the flood associated with the probability of exceedance selected for the design of an encroachment in a FEMA flood plain.
Design frequency	The recurrence interval for hydrologic events used for design purposes. As an example, a design frequency of 50 years means a storm of a magnitude that would be expected to recur on the average of every 50 years. (also see **Probability of Exceedance**)
Design high water	The flood stage or tide crest elevation adopted for design of drainage and bank protection structures (also see **Design Flood**).
Design life	The period of time for which a facility is expected to perform its intended function.

Design storm	A selected rainfall pattern of specified amount, intensity, duration and frequency that is used as a basis for design, selected on the basis of its probability of exceedence or average recurrence interval (e.g., 1-year, 2-year, 10-year, or 100-year storm, etc.). Also, the particular storm event that contributes runoff that the drainage facilities were designed to handle.
Design water level	The maximum water elevation, including the flood surcharge, that a dam is designed to withstand. *(*also see **Design flood** and **Design high water***)*
Desilting area	An area of grass, shrubs, or other vegetation used for inducing deposition of silt and other debris from flowing water; located above a stock tank, pond, field or other area needing protection from sediment accumulation.
Desorb	To remove (a sorbed substance) by the reverse of adsorption or absorption.
Detection limit	The lowest limit to which a concentration or substance can be distinguished from a blank to a 95 percent level of confidence within a specified analytical method.
Detention or **stormwater detention**	The process of temporarily collecting and holding back runoff for later release through a hydraulic outlet structure to downstream receiving waters.
Detention basin or **Stormwater detention basin** or **detention facility**	A stormwater management facility that temporarily impounds runoff and discharges it through a hydraulic outlet structure to a downstream conveyance system. While a certain amount of outflow may also occur via infiltration through the surrounding soil, such amounts are negligible when compared to the outlet structure discharge rates and, therefore, are not considered in the facility's design. Since a detention basin impounds runoff only temporarily, it is normally dry during non-rainfall periods.
Detention dam	A dam constructed for the purpose of detention.
Detention storage	Surface water moving over the land is in detention storage. Surface water allowed to temporarily accumulate in ponds, basins, reservoirs or other types of holding facilities and that is ultimately returned to a watercourse or other drainage system as runoff is also in detention storage. (also see **Retention storage**)
Detention time	The theoretical calculated time required for a specific amount of water to pass through a basin, tank or other storage unit at a given rate of discharge (volume divided by rate of discharge).
Detritus	Loose material (soil and organic particles) that results from the disintegration, destruction or wearing away of the earth's surface.

Developer	A person who undertakes land disturbance activities or the refurbishment of existing properties.
Development (in the context of stormwater management)	Land disturbance and the resulting landform associated with the construction of residential, commercial, industrial, institutional, recreation, transportation or utility facilities or structures or the clearing of land for nonagricultural or non-silvicultural purposes.
Development (in the context of erosion and sediment control)	A tract or parcel of land developed or to be developed as a single unit under single ownership or unified control which is to be used for any business or industrial purpose or is to contain three or more residential dwelling units.
Development (in the context of grandfathering provision of the Virginia Stormwater Management Regulations: 4VAC50-60-93.1 et seq.)	A tract of land developed or to be developed as a unit under single ownership or unified control which is to be used for any business or industrial purpose or is to contain three or more residential dwelling units.
Dewpoint or **dewpoint temperature**	The temperature at which dew begins to form or vapor begins to condense into a liquid; the temperature at which the atmosphere can no longer hold water in its vapor form.
Dibble bar	A heavy metal tool with a blade and a foot pedal used to open holes for planting seeds or small seedlings.
Dike	An earthen embankment constructed to confine or control water, especially one built along the banks of a river to prevent overflow of lowlands; a levee.
Finger dike	One or more relatively short embankments constructed normal to a larger embankment, such as an approach fill to a bridge, whose purpose is to impede flow and direct it away from the major embankment.
Spur dike	One or more relatively short embankments constructed at the upstream side of a bridge end for the purpose of aligning flow with the waterway opening and to move scour away from the bridge abutment(s).
Toe dike	An embankment constructed to prevent lateral flow from scouring the corner of the downstream side of an abutment embankment; sometimes referred to as a training dike.
Training dike	An embankment constructed to provide a transition from the natural stream channel or floodplain, both to and from a constricting bridge crossing.
Discharge	A volume of water flowing out of a drainage structure or facility, measured in cubic feet or meters per second.

Direct discharge	The discharge of a pollutant.
Director	The Director of the Department of Environmental Quality or his designee.
Discharge	When used without qualification, means the release a pollutant. [also, see ***Direct discharge***]
Discharge coefficient	In the context of hydraulics, the ratio of actual rate of flow to the theoretical rate of flow through orifices, weirs or other hydraulic structures.
Discharge of a pollutant	(1) Any addition of any pollutant or combination of pollutants to surface waters from any point source; or (2) any addition of any pollutant or combination of pollutants to the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This definition includes additions of pollutants into surface waters from: surface runoff that is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a state, municipality, or other person that do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any indirect discharger.
Discharge Monitoring Report *or* ***DMR***	The form supplied by the department, or an equivalent form developed by the operator and approved by the [State Water Control] Board, for the reporting of self-monitoring results by operators.
Disconnection	To direct stormwater runoff generated from rooftops or other impervious surfaces into rain tanks or cisterns, where the water can be used on site, or over adjacent pervious areas, where it can be filtered and infiltrated, rather than directed to (or "connected" with) the stormwater drainage system and ultimately discharged from the site.
Dissipate	Expend or scatter harmlessly, as of the energy of moving water.
Dissolved Oxygen or **DO**	The amount of gaseous oxygen dissolved in a liquid, usually water; form of oxygen found in water that is essential to the life of aquatic species.
District *or* ***soil and water conservation district***	A political subdivision of the Commonwealth organized in accordance with the provisions of Article 3 (§10.1-506 et seq.) of Chapter 5 of Title 10.1 of the Code of Virginia.

Disturbed area	An area in which the natural vegetative soil cover or existing surface treatment has been removed or altered by clearing, grubbing, excavation, or grading and, therefore, is susceptible to erosion, and where topsoil, spoil, and processed waste is placed. A ground surface that has been disrupted by construction activities, including construction access/roads, staging, and storage sites producing significant areas of exposed soil and soil piles.
Ditch	A small artificial channel, usually unlined.
Diurnal oxygen fluctuation	A fluctuation in dissolved oxygen in water as photosynthetic activity increases during the day and decreases during the night.
Diversion or **diversion channel**	A channel with a supporting earthen ridge on the lower side constructed across or at the bottom of a slope for the purpose of intercepting surface runoff.
Diversion dam	A barrier built to divert part or all of the water from a stream into a different course (typically only temporarily during construction).
Divide or **drainage divide**	A ridge or high area of land that functions as a boundary separating one watershed or drainage area from another.
D-Load or **Cracking D-Load**	A term used in expressing the strength of concrete pipe. The cracking D-load represents the test load required to produce a 0.3 mm crack for a length of 300 mm.
Dormant	Refers to denuded land that is not actively being brought to a desired grade or condition.
Downdrain	A prefabricated drainage facility assembled and installed in the field for the purpose of transporting water down steep slopes.
Downdrift	The direction of predominant movement of littoral materials.
Draft state permit	A document indicating the [State Water Control] Board's tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a state permit. A notice of intent to terminate a state permit, and a notice of intent to deny a state permit are types of draft state permits. A denial of a request for modification, revocation and reissuance, or termination is not a draft state permit. A proposed state permit is not a draft state permit.
Drain	A buried pipe or other conduit (closed drain) or a channel or ditch (open drain) for carrying off surplus surface water or groundwater.
Drain tile	Pipe made of burned clay, concrete, or similar material, in short lengths, usually laid with open joints to collect and carry excess water from the soil.

Drainage	The removal of excess surface water or groundwater from land by artificial means (e.g., surface or subsurface drains). The system by which the waters of an area are removed. The area from which waters are drained (e.g., a drainage basin). Also, soil characteristics that affect natural drainage.
Drainage area	A land area, water area, or both from which runoff flows to a common point.
Drainage basin	A geographical area or region where the earth's surface is so sloped and contoured that surface runoff from streams and other natural watercourses flows by gravity to a given location or common outlet at some point along a stream channel (also, see ***Drainage area*** and ***Watershed***).
Drainage channel	A designed channel used to convey stormwater runoff that may be lined with grass, rip-rap, or concrete and has a cross-sectional capacity that can accommodate the peak discharge associated with 10-25 year design storm events. Drainage channels by themselves seldom provide reliable pollutant removal.
Drainage course	Any path along which water flows when acted upon by gravitational forces.
Drainage density	The length of stream channels per unit area in the landscape.
Drainage divide	The rim of a drainage basin. A series of high points from which water flows in two directions, to the basin and away from the basin.
Drainage easement	A specified land area on private property containing drainage channels and stormwater management structures to which the local government or another entity has established and maintains legal access for the purpose of maintaining the drainage system to assure its continued proper functioning. (also see **Easement**)
Drainage system	Usually a system of underground conduits and collector structures that flows to a single point of discharge.
Drawdown	The difference in elevation between the water surface elevation at a constriction in a stream or conduit and the elevation that would exist if the constriction were absent. Drawdown also occurs at changes from mild to steep channel slopes and weirs or vertical spillways. Also, the difference between a water level and a lower water level in a reservoir within a particular time. Used as a verb, it is 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. The term often refers to the draining away of water detained during a storm after the storm is over.
Drift	(1) Floating or non-mineral burden of a stream. (2) Deviation from a normal course in a cross current, as in littoral drift.

Dripline or **tree canopy dripline**	The outermost perimeter of a tree canopy. It is defined on the ground by a vertical line from the perimeter of the leaves of a tree canopy to the ground directly below. The dripline is typically the lateral limit of the tree's root system.
Drop	A controlled fall in a stream to dissipate energy.
Drop inlet spillway	Structure in which water drops through a vertical riser connected to a discharge conduit.
Drop spillway	Structure in which water drops over a vertical wall onto an apron at a lower elevation.
Drop structure	Structure for dropping water to a lower level and dissipating its surplus energy. A drop may be vertical or inclined.
Dry storage	Volume within a basin (e.g., a sediment basin) which is allotted for temporary ponding of stormwater runoff. It will undergo drawdown over a period of time, reestablishing the initial storage volume.
Dry swale	An open drainage channel explicitly designed to detain and promote the filtration of stormwater runoff through an underlying fabricated soil media (essentially a linear bioretention facility).
Dry weather flow	Flow that exists in streams during dry seasons. Also, the combination of sanitary sewage and industrial and commercial wastes normally found in sanitary sewers during the dry weather season of the year.
Dry well	A deep hole, covered and usually lined or filled with rocks, that holds drainage water until it soaks into the ground.
Dune	A sand wave of approximately triangular cross-section (in a vertical plane in the direction of flow) formed by moving water or wind, with a gentle upstream slope and a steep downstream slope and deposition on the downstream slope.
Duration	The length of time over which precipitation occurs.
Dwelling unit	An individual structure or a room or group of rooms within a structure that provides living quarters for a single family.

E

Earth dam or **earthen dam** — An embankment dam in which more than 50% of the total volume is formed of compacted earth material generally smaller than 3-inch size. Seepage through the dam is controlled by the designed use of upstream blankets and/or internal cores constructed using compacted soil of very low permeability.

Easement — A limited right to use land owned by someone else. An easement may be for a certain number of years or be perpetual in duration. An affirmative easement gives the owner of the easement the right to use the land for a stated purpose. A negative easement is an agreement with a private property owner to limit the development of his land in specific ways.

Ebb — The falling stage or outward flow, especially of tides.

Ecology — The study of interrelationships of organisms to one another and to their environment.

Ecosystem — A community, including all the component organisms, together with the environment, forming an interacting system.

Eddy — Rotational flow around a vertical axis.

Eddy Loss — The energy lost (converted into heat) by swirls, eddies, and impact, as distinguished from friction loss.

Effective impervious area (EIA) or **directly connected impervious area** — A subset of total impervious area that is hydrologically connected via sheet flow or discrete conveyance to a drainage system or receiving body of water. Some regulatory authorities consider impervious areas in residential development to be *ineffective* if the runoff is dispersed through at least 100 feet of native vegetation using approved dispersion techniques.

Effective precipitation — That portion of total precipitation that becomes available for plant growth. It does not include precipitation lost to deep percolation below the root zone or to surface runoff.

Effluent — Solid, liquid, or gaseous wastes which enter the environment as a byproduct of man-oriented processes; also, the discharge or outflow of water from ground or subsurface storage.

Effluent limitation — Any restriction imposed by the [State Water Control] Board on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into surface waters, the waters of the contiguous zone, or the ocean.

Effluent limitations guidelines — A regulation published by the administrator under §304(b) of the CWA to adopt or revise effluent limitations.

Elevation	The variation in the height of the earth's surface; the measure of vertical distance from a known datum plane, which on most maps is mean sea level.
Eligibility criteria	The design factors – such as sizing, pretreatment, flow path geometry, vegetative condition, treatment processes, etc. – that allow a stormwater control measure to achieve the runoff reduction and pollution reduction rates required in the Virginia stormwater management regulations.
Embankment	An artificial deposit of earth or other material that is raised above the natural surface of the land and used to contain, divert, or store water, support roads or railways, or accomplish other similar purposes.
Embayment	Indentation of a bank or shore, particularly as caused by progressive erosion.
Emergency gate	A standby or reserve gate used only when the normal means of water level control is not available for use.
Emergency spillway	A vegetated earthen channel constructed adjacent to a dam to safely convey flood discharges in excess of the design capacity of the principal spillway.
Emergent vegetation	Erect, rooted, herbaceous vascular plants that grow in periodically or permanently flooded areas and has parts of the plant (stems and leaves) extending through and above the water plane.
Encroachment	Extending beyond the original or customary limits, such as by occupancy of the river and/or flood plain by an earth fill embankment or buildings.
Endocrine disruptors	Substances that stop the production or block the transmission of hormones in the body.
Endwall	A wall placed at the end of a culvert. It may serve three purposes: (1) to hold the embankment away from the pipe and prevent sloughing into the pipe outlet channel; (2) to provide a wall that will prevent erosion of the roadway fill; and (3) to prevent flotation of the pipe.
Energy	Potential or kinetic, the latter being expressed in the same unit (meters) as the former.
Energy balance	A detailed accounting of all energy flowing into and out of a volume or surface (e.g., the energy in the discharge from a land development site that affects the formation and stability of a receiving channel or stream).

Energy dissipater	A non-erodible structure which reduces the velocity of concentrated flow to reduce its erosive effects.
Energy grade line	The line that represents the total energy gradient along the channel. It is established by adding together the potential energy expressed as the water surface elevation referenced to a datum and the kinetic energy (usually expressed as velocity head) at points along the stream bed or channel floor.
Energy head	The elevation of the hydraulic grade line at any section plus the velocity head of the mean velocity of the water in that section.
Enrichment	The addition of nutrients (e.g., nitrogen, phosphorus and carbon compounds) into a lake or waterway to the point that the trophic state is greatly increased because of the stimulation of the growth of algae and other aquatic plants.
Entrance	The upstream approach transition to a constricted waterway.
Entrance head	The hydraulic head required to cause flow into a conduit or other structure, including both the entrance loss and the velocity head.
Entrance loss	The hydraulic head lost in eddies and friction at the inlet to a conduit or structure.
Environment	The sum total of all the external conditions that may act upon an emergency or community to influence its development or existence.
Environmental Protection Agency *or* ***EPA***	The United States Environmental Protection Agency.
Environmental Site Design or **ESD**	Using small-scale stormwater management practices, non-structural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources.
Ephemeral stream	A stream or portion of a stream that flows only briefly in direct response to precipitation, and receives little or no water from springs or no long continued supply from snow or other sources, and its channel is at all times above the water table.
Epikarst	A relatively thick portion of bedrock (the thickness may vary significantly, but 15 to 30 meters thick is a good generalization) that extends from the base of the soil zone and is characterized by extreme fracturing and enhanced solution. It is separated from the phreatic zone by an inactive, relatively waterless interval of bedrock that is locally breached by vados percolation. Significant water storage and transport are known to occur in this zone.

Equalizer	A drainage structure similar to a culvert but different in that it is not intended to pass a design flow in a given direction. Instead it is often placed level so as to permit passage o water in either direction. It is used where there is no place for the water to go. Its purpose is to maintain the same water surface elevation on both sides of an embankment.
Erodible	Susceptible to erosion.
Erosion or **soil erosion**	The detachment or wearing away of the natural land surface (soil or rock fragments) and unnatural surfaces (embankment, slope protection, structure, etc.) and the movement away by the action of external forces, such as running water, wind, ice, or other geological agents, including such processes as gravitation creep. The following terms are used to describe different types of water erosion:
Accelerated erosion	Erosion much more rapid than naturally occurring levels of geologic erosion, primarily as a result of human activities or, in some cases, of animals or natural catastrophes that expose bare land surfaces (e.g., fires).
Channel erosion or streambank erosion	The scouring of material and cutting of a well-defined channel bed and banks by the volume and velocity of concentrated water flow.
Geological erosion	The normal or natural erosion caused by geological processes acting over long geologic periods and resulting in the wearing away of mountains, the building up of floodplains, coastal plains, etc.; synonymous with natural erosion.
Gully erosion	The erosion process whereby water accumulates in narrow channels and, over short periods, removes the soil from this narrow area to considerable depths ranging from a few inches to 1 or 2 feet to as much as 75 to 100 feet.
Natural erosion	The wearing away of the earth's surface by water, ice or other natural agents under natural environmental conditions of climate, vegetation, etc., undisturbed by man; synonymous to geological erosion.
Normal erosion	The gradual erosion of land used by man which does not greatly exceed natural erosion.
Rill erosion	An erosion process in which numerous small, closely spaced channels (streamlets) only several inches deep are formed due to uneven detachment of surface soils by runoff on slopes; occurs mainly on recently disturbed and exposed soils.
Raindrop erosion or splash erosion	The spattering of small soil particles caused by the impact of raindrops on wet soils; the loosened and spattered particles may or may not be subsequently removed by surface runoff.

Sheet erosion	The removal of a thin, fairly uniform layer of soil from the land surface by sheets of runoff water.
Shore erosion	Removal of soil, sand or rock from the land adjacent to a body of water due to wave action.
Erosion and Accretion	Loss and gain of land, respectively, by the gradual action of a stream in shifting its channel by cutting one bank while it builds on the opposite bank. Property is lost by erosion and gained by accretion, but not by *avulsion* when the shift from one channel to another is sudden. Property is gained by *reliction* when a lake recedes.
Erosion and Scour	The cutting or wearing away by the forces of water of the banks and bed of a channel in horizontal and vertical directions, respectively.
Erosion and Sediment Control Law or **Law**	Article 4 of Chapter 5 of Title 10.1 (§10.1-560 et seq.) of the Code of Virginia, created to prevent erosion and sedimentation from land disturbing activities.
Erosion and Sediment Control Plan [*or* ***E&S Control Plan,*** *or* ***ESC Plan,]***	A document containing material for the conservation of soil and water resources of a unit or group of units of land. It may include appropriate maps, an appropriate soil and water plan inventory and management information with the needed interpretations, and a record of decisions contributing to conservation treatment. The plan shall contain all major conservation decisions to ensure that the entire unit or units of land will be so treated to achieve the conservation objective.
Erosion classes	In the context of a soil survey, a grouping of erosion conditions based on the degree of erosion or on characteristic patterns and applied only to accelerated erosion, not to normal, natural, or geological erosion . Four erosion classes are recognized for water erosion and three for wind erosion.
Erosion control	Any efforts to prevent the wearing or washing away of the soil or land surface.
Erosion impact area	An area of land not associated with current land-disturbing activity but subject to persistent soil erosion resulting in the delivery of sediment onto neighboring properties or into state waters. This definition shall not apply to any lot or parcel of land of 10,000 square feet or less used for residential purposes or to shorelines where the erosion results from wave action or other coastal processes.
Erosive velocity	A velocity of water flow that is fast enough to wear away the land surface. Exposed soil will generally erode faster than stabilized soils. Erosive velocities will vary according to the soil type, slope, and structural or vegetative stabilization used to protect the soil.
ESC	Erosion and sediment control

ESC Act	The Erosion and Sediment Control Law, Article 2.4 (§ 62.1-44.15:51 et seq.) of Chapter 3.1 of Title 62.1 of the Code of Virginia.
Escherichia coli or **E. coli**	One of the species of bacteria in the coliform group, the presence of which is considered indicative of fresh fecal contamination.
Estravelle	An intermittent resurgence or exsurgence, active only in wet seasons, which may act alternatively as a swallow hole and as a spring according to groundwater conditions.
Estuary	An area where fresh water meets and mixes with salt water, where the tide meets the river current (e.g., bays, mouths of rivers, salt marshes and lagoons), and where the water usually has brackish characteristics. Estuaries serve as nurseries and spawning and feeding grounds for large groups of marine life and provide shelter and food for birds and wildlife.
Eutrophication	The process of aging of lakes, whereby aquatic plants are abundant and waters are deficient in oxygen. The process is usually accelerated by the enrichment of waters with surface runoff containing nutrients (nitrogen and phosphorus) and organic materials, often typified by the presence of algal blooms.
Evaporation	The process by which a liquid (e.g., water) is changed to a vapor/gas, typically through heat supplied by the sun.
Evapotranspiration	The combined loss of water to the atmosphere from a given area and during a specific period of time, as a result of interception and evaporation from the soil and plant surfaces and by transpiration through plant leaves.
Event mean concentration *or* ***EMC***	The total mass load of a pollutant parameter divided by the total runoff water volume discharged during an individual storm event.
Excavation	The process of removing earth and stone.
Excess parking	Parking spaces that are constructed over and above the number required or predicted based on the parking demand ratio for a particular land use or activity.
Exception	A waiver or one or more stipulated provisions of the applicable regulations, as granted by the regulatory authority, allowing the applicant to proceed with the regulated activity without having to fully comply with the applicable requirements.
Excess rainfall	Direct runoff at the place where it originates.
Exfiltration	The downward movement of runoff through the bottom of a stormwater management facility into the surrounding soil.

Existing state permit	For the purposes of [the [Virginia Stormwater Management] Regulations], a state permit issued by the [State Water Control] Board and currently held by a state permit applicant.
Existing source	Any source that is not a new source or a new discharger.
Existing vegetation	Any vegetated area that has not already been cleared and grubbed.
Exotic species or **invasive species**	A plant or animal species that has been intentionally or accidentally introduced is not native to the region in which it is found and, typically, may proliferate due to the lack of natural predators or controls.
Extended detention basin or **ED basin**	A stormwater management facility, which temporarily impounds runoff and discharges it through a hydraulic outlet structure over a specified period of time to a downstream conveyance system for the purpose of water quality enhancement or stream channel erosion control. While a certain amount of outflow may also occur via infiltration through the surrounding soil, such amounts are negligible when compared to the outlet structure discharge rates and, therefore, are not considered in the facility's design. Since an extended detention basin impounds runoff only temporarily, it is normally dry during non-rainfall periods.
Extensive vegetated roof or **extensive green roof**	Xeriscape type plantings in a shallow, droughty growing medium on the roof of a building (typically a flat roof in an urban area).
Extreme event	A 100-year 24-hour rainfall event or a 100-year 10-day snowmelt event, or greater.
Exudates	Substances exuded from plant roots that can alter the chemical, physical and biological structure of the surrounding soil.

F

Face	The outer layer of a slope revetment.
Facilities or equipment	Buildings, structures, process or production equipment or machinery that form a permanent part of a new source and that will be used in its operation, if these facilities or equipment are of such value as to represent a substantial commitment to construct. It excludes facilities or equipment used in connection with feasibility, engineering, and design studies regarding the new source or water pollution treatment for the new source.
Facility or activity	Any point source or treatment works treating domestic sewage or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the VSMP.

Fair market value	That value that would induce a willing seller to sell and a willing buyer to buy; usually applied to real estate in cases where the right of eminent domain is being exercised.
Fair weather prediction	When there is no precipitation in the forecast between the current calendar day and the next working day.
Fan	A portion of a cone, but sometimes used to emphasize definition of radial channels. Also reference to spreading out of water or soils associated with waters leaving a confined channel.
Fauna	The animal life of a region.
Feasible	Economically achievable or cost-effective measures that reflect a reasonable degree of pollutant reduction achievable through the application of available nonpoint pollution control practices, technologies, processes, site criteria, operating methods, or other alternatives.
Fecal bacteria	Microscopic single-celled organisms (primarily fecal coliforms and fecal streptococci) found in the wastes of warm-blooded animals. Their presence in water is used to assess the sanitary quality of water for consumption or body-contact recreation. Their presence indicates contamination by the wastes of warm-blooded animals and the possible presence of pathogenic (disease producing) organisms.
Fecal coliform	A group of bacteria normally present in large numbers in the intestinal tracts of humans and other warm-blooded animals.
Fee in Lieu	A payment of money in place of meeting all or part of stormwater management or other regulatory requirements (also see **Offset fee**).
Fen	A peat accumulating wetland that receives some drainage from surrounding mineral soils and usually supports marsh-like vegetation; typically richer in nutrients and less acidic than a bog, due to ground water inflows.
Ferrocyanide	An anti-caking additive to road salt which, when converted to its free cyanide form (FCN), becomes extremely toxic to aquatic life.
Fetch	The straight-line, unobstructed distance across a body of water in which waves are generated by wind of relatively constant direction and speed. The fetch is one of the factors used in calculating wave heights in a reservoir.
Fill	A material (e.g., soil or stone) that has been placed by mechanical equipment in the process of a grading operation; also, a site on which earth is moved to raise elevation.

Filter A porous article or mass (as of fabric or even-graded mineral aggregate) through which water will freely pass but that will block the passage of soil particles.

Filter bed The section of a constructed filtration device that houses the filtering media.

Filter blanket A layer of sand and/or gravel designed to prevent the movement of fine-grained soils.

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

Filter layer A layer of even-graded rock between stone riprap and the underlying soil to prevent extrusion of the soil through the riprap.

Filter media The sand, soil, or other organic material in a filtering or bioretention device used to provide a permeable surface for pollutant and sediment removal.

Filter strip A stormwater control measure consisting of a densely vegetated section of land (may be grass or forest) engineered to accept runoff as overland sheet flow from upstream development (or interflow from croplands), in order to remove sediment and other pollutants from the runoff. Filter strips conform to the natural vegetated form of the area, from grassy meadow to small forest. The vegetative cover facilitates pollutant removal through filtration, sediment deposition, infiltration and absorption. Filter strips may be used to treat shallow concentrated storm flows over very short contributing distances in urban areas.

Final Stabilization Means that one of the following situations has occurred:

1. All soil disturbing activities at the site have been completed and a permanent vegetative cover has been established on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be considered established until a ground cover is achieved that is uniform (e.g., evenly distributed), mature enough to survive, and will inhibit erosion.
2. For individual lots in residential construction, final stabilization can occur by either:
    a. The homebuilder completing final stabilization as specified in subdivision 1 of this definition; or
    b. The homebuilder establishing temporary stabilization, including perimeter controls for an individual lot prior to occupation of the home by the homeowner, and informing the homeowner of the need for, and benefits of, final stabilization.
3. For construction projects on land used for agricultural purposes (e.g., pipelines across crop or range land), final

stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to surface waters, and areas that are not being returned to their preconstruction agricultural use must meet the final stabilization criteria specified in subdivision 1 or 2 of this definition.

Fines Minute particulates, generally the silt and clay size particles in soil.

Finished grade The elevation or surface of the earth after all earthwork has been completed; the final grade required by design specifications.

First flush The first portion of runoff generated by a rainfall event and containing the main portion of the pollutant load resulting from the storm.

Flag lot An irregular lot shape that only has enough frontage on the street to provide driveway access. Flag lots resemble a "flag" since most of the lot is located well away from the street. They are often configured to squeeze in extra lots within a subdivision.

Flap gate A form of valve that is designed so that a minimum force is required to push it open but when a greater water pressure is present on the outside of the valve, it remains shut so as to prevent water from flowing in the wrong direction. Construction is simple with a metal cover hanging from an overhead rod or pinion at the end of a culvert or drain.

Flashboards Structural members of timber, concrete, or steel placed in channels or on the crest of a spillway to raise the reservoir water level, but intended to be quickly removed or tripped in the event of a flood.

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

Flood or ***Flooding*** A volume of water that is too great to be confined within the banks or walls of the stream, water body, or conveyance system and that overflows onto adjacent lands, thereby causing or threatening damage.

Flood control Methods or facilities for reducing flood flows.

Flood frequency	Also referred to as exceedance interval, recurrence interval or return period; the average time interval between actual occurrences of a hydrological event of a given or greater magnitude; the percent chance of occurrence is the reciprocal of flood frequency (e.g., a 2 percent chance of occurrence is the reciprocal statement of a 50-year flood). (also see **Probability of exceedence**)
Flood fringe	The portion of the floodplain outside the floodway that is usually covered by water from the 100-year flood or storm event. This includes, but is not limited to, the flood or floodway fringe designated by the Federal Emergency Management Agency.
Flood gate	A gate placed in a channel or closed conduit to keep out floodwater or tidal backwater.
Flood hydrograph	A graph showing, for a given point on a stream, the discharge, height, or other characteristic of a flood with respect to time (Also see **Hydrograph**).
Flood peak	The highest value of the stage or discharge attained by a flood, thus, the peak stage or peak discharge.
Flood plane	The position occupied by the water surface of a stream during a particular flood; also, loosely, the elevation of the water surface at various points along the stream during a particular flood.
Flood-prone area	The component of a natural or restored stormwater conveyance system that is outside the main channel. Flood-prone areas may include, but are not limited to, the floodplain, the floodway, the flood fringe, wetlands, riparian buffers or other areas adjacent to the main channel.
Flood routing	A process of determining progressively over time the amplitude of a flood wave (the changes in the rise and fall of floodwater) as it moves past a dam or proceeds downstream to successive points along a river or stream.
Flood stage	The elevation at which overflow of the natural banks of a stream begins to cause damage in the reach in which the elevation is measured.
Flood storage	The retention of water or delay of runoff either by planned operation, as in a reservoir, or by temporary filling of overflow areas, as in the progression of a flood wave through a natural stream channel.
Flood waters	Former stream waters that have escaped from a watercourse (and its overflow channel) and flow or stand over adjoining lands. They remain as such until they disappear from the surface by infiltration, evaporation, or return to a natural watercourse. They do not become surface waters by mingling with such waters, nor stream waters by eroding a temporary channel.

Floodplain	The area adjacent to a channel, river, stream, or other water body that is susceptible to being inundated by water normally associated with the 100-year flood or storm event. This includes, but is not limited to, the floodplain designated by the Federal Emergency Management Agency.
Floodplain encroachment	An action within the limits of the base floodplain.
Floodproof	To design and construct individual buildings, facilities, and their sites to protect against structural failure, to keep water out or reduce the effects of water entry.
Floodwater retarding structure	A structure providing for temporary storage of floodwater and for its controlled release.
Floodway	The channel of a river or other watercourse and the adjacent land areas, usually associated with flowing water, that must be reserved in order to discharge the 100-year flood or storm event without cumulatively increasing the water surface elevation more than one foot. This includes, but is not limited to, the floodway designated by the Federal Emergency Management Agency.
Flora	The plant life of a region.
Floor-to-area ratio	A planning ratio that is derived by dividing the total floor space of a building by the site area. Communities use the ratio to restrict the height or form of residential and commercial buildings with a zoning category.
Flow	The movement of water, silt, sand, etc.; discharge; total quantity carried by a stream.
Flow line	The line connecting the low points in a watercourse.
Flow regime	The system or order characteristic of streamflow with respect to velocity, depth, and specific energy.
Gradually varied flow	In this type of flow, changes in depth and velocity take place slowly over large distances, resistance to flow dominates, and acceleration forces are neglected.
Rapidly varied flow	In this type of flow, changes in depth and velocity take place over short distances, acceleration forces dominate, and energy loss due to friction is minor.
Steady flow	Flow at constant discharge.
Unsteady flow	Flow in which the velocity changes with respect to time.

Varied flow	Flow in a channel with variable section.
Flow splitter	An engineered hydraulic structure designed to divert a portion of storm flow to a BMP located out of the primary channel, or to direct stormwater to a parallel pipe system, or to bypass a portion of baseflow around a BMP.
Flume	A constructed device lined with erosion-resistant materials intended to convey water on steep grades.
Fluvial processes	All processes and events by which the configuration of a stream channel is changed; especially processes by which sediment is transferred along the stream channel by the force of flowing water.
Fluvial sediment	Sediment deposits produced y stream or river action.
Forebay or **sediment forebay**	A small impoundment, located in the flow path before the inlet of a stormwater BMP, which serves to trap incoming coarse sediments before they accumulate in the main treatment area.
Forest cover	Forest stands consisting of a plant community made up of trees and other woody vegetation, growing more or less closely together.
Foreshore	The part of the shore lying between the ordinary high water mark or upper limit of wave wash, traversed by the runup and return of waves, and the water's edge at the low water.
Foundation drain	A pipe or series of pipes which collects groundwater from the foundation or footing of structures and discharges this water into sewers or other points of disposal.
Fragipan	A natural subsurface soil horizon with high bulk density relative to the solum above, seemingly cemented when dry but showing a moderate to weak brittleness when moist. The layer is low in organic matter, mottled, slowly or very slowly permeable to water, and usually shows occasional or frequent bleached cracks forming polygons. It may be found in profiles of either cultivated or virgin soils, but not in calcareous material.
Free outlet	A condition under which water discharges with no interference, such as a pipe discharging into open air.
Free water	Water that can move through the soil by force of gravity.

Freeboard	The vertical distance between the elevation of the water surface usually corresponding to the design flow and a point of interest such as a bridge beam, levee top or specific location on a roadway grade, provided to prevent overtopping because of unforeseen conditions. Also, the distance between the normal operating level and the top of the sides of an open conduit, the crest of a dam, etc., designed to allow for wave action, floating debris, or any other condition or emergency, without overtopping the structure.
Freeze-thaw cycle	The alternation between freezing and thawing in the snowpack or ice. This cycle changes the composition and characteristics of the snowpack or ice and can affect its pollutant carrying ability and the amount of runoff generated. It can also result in pavement buckling, when moisture gets into the pavement sub-base and then freezes (expands) or goes through successive freeze-thaw cycles.
French drain	A type of drain consisting of an excavated trench loosely backfilled with pervious material such as coarse sand, gravel or crushed stone – with the size of the fill material decreasing towards the top – through whose voids water percolates and exfiltrates into the soil.
Frequency or **design storm frequency**	The anticipated period of time that will elapse, based on average probability of storms in the design region, before a storm of a given intensity and/or total volume will recur; thus a 10-year storm can be expected to occur on the average of once every 10 years. Conveyance systems designed to handle flows that occur under such storm conditions would be expected to be surcharged by any storms of great amount or intensity. The frequency of a specified design storm can be expressed either in terms of exceedence probability or return period.
Exceedence probability	The probability that an event having a specified volume and duration will be exceeded in one time period, usually assumed to be one year. If a storm has a one percent chance of occurring in any given year, than it has an exceedence probability of 0.01.
Return period	The average length of time between events having the same volume and duration. If a storm has a one percent chance of occurring in any given year, than it has a return period of 100 years.
Friction	Energy-dissipating conflict among turbulent water particles disturbed by irregularities of the channel surface.
Frontage requirement	A mandate in the local subdivision code that each lot within a particular zoning category have a minimum length that faces the street.
Frost heave	The raising of a surface due to the accumulation and expansion of ice in the underlying soil or subgrade.

Frost line The lowest depth that frost will reach in the soil.

Froude number (F) A dimensionless expression of the ratio of inertia forces to gravity forces, used as an index to characterize the type of flow in a hydraulic structure in which gravity is the force producing motion and inertia is the resisting force. It is equal to a characteristic flow velocity (mean, surface, or maximum) of the system divided by the square root of the product of a characteristic dimension (as diameter of depth) and the gravity constant (acceleration due to gravity), all expressed in consistent units $F_r = V/(gy)^{1/2}$. A calculated number used to classify water flow as critical (F=1), supercritical (F>1) or subcritical (F<1).

Full density transfer cluster or **FTD** The least restrictive form of clustering to reduce impervious cover at a development site. In this option, gross site density is equal to net site density, so the designer can increase density in one portion of the development to compensate for loss of land rendered unbuildable due to the presence of wetlands, floodplain, stream buffer, steep slopes or other environmental requirements. The FDT option helps to reduce impervious cover, but it is primarily intended to support stream buffer and other requirements.

G

Gabion A rectangular or cylindrical wire mesh basket or cage filled with stone and placed as, or as part of, a bank protecting apron, channel lining, retaining wall, revetment, etc., to prevent erosion.

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

Gaging station A location on a stream where measurements of stage or discharge or routinely made. The location includes a reach of channel through which the flow is uniform, a control downstream from this reach, and usually a small building to house the recording instruments.

Gate A barrier for the control of water.

General permit The "General Permit for Discharges of Stormwater from Construction Activities" found at 4VAC50-60-1170 authorizing a category of discharges under the CWA and the Act within a geographical area of the Commonwealth of Virginia.

General Use Designation *or* ***GUD*** A designation given to MTDs that confers a general acceptance for the stormwater MTD based on MTD pollutant removal performance and factors that influence the performance. Upon approval by the Director, such permitted MTD shall be listed on the Virginia Stormwater BMP Clearinghouse website with its conditions for use.

Geographic Information System or **GIS**	An information system that can input, manipulate, and analyze geographically referenced data to support the decision-making processes of an organization. GIS is used by many localities to map utilities and sewer lines, to delineate zoning areas, and to evaluate land for comprehensive planning purposes.
Geomorphology	The branch of both physiography and geology that deals with the form of the earth, the general configuration of its surface, and the changes that take place in the evolution of land forms.
Geotextile	A fabric manufactured from synthetic fiber that is designed to achieve specific engineering objectives, including seepage control, media separation (e.g., between sand and soil), filtration, or the protection of other construction elements such as geomembranes.
Global warming or **climate change**	The progressive, gradual rise of the Earth's surface temperature, thought to be caused by the greenhouse effect, which may be responsible for changes in global climate and precipitation patterns.
Gorge	A narrow deep valley with steep or vertical banks.
Grab sample	A single sample collected at a particular time and place that represents the composition of the water, air, or soil only at that time and place.
Gradation	In the context of geology, the bringing of a surface or a stream bed to grade, by running water. In the context of an engineering evaluation of sedimentation and fragmental products, the term refers to the frequency distribution of the various sized particles that constitute sediment, soil or other material.
Grade	The slope of a road, the bed or invert of a channel, or the natural ground surface. The finished surface of a canal bed, roadbed, top of embankment, or bottom of excavation. Any surface prepared for the support of construction, such as paving or the laying of a conduit. As a verb, to finish the surface of a channel or road bed, top of embankment or bottom of an excavation.
Grade to drain	A construction note often inserted on a plan for the purpose of directing the contractor to slope a certain area in a specific direction, so that the surface waters will flow to a designated location.
Graded stream	A stream in which, over a period of years, the slope is delicately adjusted to provide, with available discharge and with prevailing channel characteristics, just the velocity required for transportation of the load of sediment delivered from the drainage basin.
Graded stabilization structure	A structure for the purpose of stabilizing the grade of a gully or other watercourse, thereby preventing further head-cutting or lowering of the channel grade.

Gradient	Slope. In the context of stormwater management, the change of elevation or slope per unit length (rate of ascent or descent) of a specific surface of interest such as a road, channel bed or bank, top of embankment, bottom of excavation, or natural ground; any surface prepared for the support of construction, such as paving or the laying of pipe or conduit. Gradient is commonly measured in decimal or percent as determined by the ratio of the change in elevation to the length (unit of measurement per one hundred units) or a ratio of horizontal to vertical distance.
Grading	Any stripping, cutting, filling, stockpiling or any combination thereof, including the land in its cut-and-filled condition.
Grass	A member of the botanical family Gramineae, characterized by bladelike leaves arranged on the culm or stem in two ranks.
Grass channel	A broad, shallow, natural or constructed earthen conveyance system that is vegetated with erosion resistant and flood tolerant grasses; sometimes has periodic check dams installed and is engineered to convey runoff from large storm events at a reduced flow rate and remove pollutants from stormwater runoff by filtration through grass and infiltration into the soil.
Grassed swale	An earthen conveyance system which is broad and shallow with erosion resistant grasses and check dams, engineered to remove pollutants from stormwater runoff by filtration through grass and infiltration into the soil.
Gravel	(1) Aggregate larger than sand and smaller than cobbles, consisting of mixed sizes of ¼-inch to 2-inch (5 to 50mm) particles that normally occur in or near old streambeds and have been worn smooth by the action of water; (2) a soil having particle sizes, according to the Unified Soil Classification System, ranging from the No. 4 sieve size and angular in shape, as produced by mechanical crushing.
Gravel diaphragm or **diaphragm**	In the context of stormwater management, a stone trench filled with small, washed, rounded limestone aggregate used for pretreatment and inflow regulation in stormwater filtering systems.
Gravitational water	Water that moves into, through, or out of the soil under the influence of gravity.
Gray water	Domestic wastewater composed of wash water from kitchen, bathroom, and laundry sinks, tubs, and washers.

Green Infrastructure	Natural systems that capture, cleanse and reduce stormwater runoff using plants, soils and microbes. On the regional scale, green infrastructure consists of the interconnected network of open spaces and natural areas (such as forested areas, floodplains and wetlands) that improve water quality while providing recreational opportunities, wildlife habitat, air quality and urban heat island benefits, and other community benefits. At the site scale, green infrastructure consists of site-specific management practices (such as interconnected natural areas) that are designed to maintain natural hydrologic functions by absorbing and infiltrating precipitation where it falls.
Green space	The proportion of open space in a cluster development that is retained in an undisturbed vegetative condition.
Greenway or **greenbelt**	A strip of land that typically includes both upland and riparian areas kept in its natural or relatively undeveloped state or in agricultural use and which serves to break up the continuous pattern of urban development, frequently planned around the periphery of urban settlements. Greenways are often used for public recreation, as a land use buffer, or to provide a corridor and habitat for wildlife.
Grike	A solutionally enlarged vertical or steeply inclined joint in the surface of a karstland, extending for up to a few meters into the limestone.
Groin	A fingerlike barrier structure, usually built perpendicular to the shoreline or oblique to the primary motion of water, to trap littoral drift, retard erosion of the shore, or control movement of bed material.
Gross density	The maximum number of dwelling units allowed with a particular zoning class, expressed in terms of dwelling units per acre.
Gross floor area or **GFA**	A term that describes the total square footage of office or commercial space within a building and is often used to determine parking requirements.
Ground cover	Grasses or other plants that are low growing and provide a thick growth that keeps the soil from being blown or washed away as well as providing beautification of the area occupied.
Groundwater	The phreatic water or subsurface water in the zone of saturation, irrespective of its source and transient status. The supply of fresh water found beneath the earth's surface in subterranean streams (and aquifers) parallel to and adjoining stream waters, and usually determined to be integral parts of the visible streams, that provide base flow to springs, streams and rivers and water supply for wells.
Groundwater infiltration	Seepage of groundwater into an opening in a sewer.

Groundwater mounding	The localized rise in the water table or potentiometric surface caused by the addition or injection of water.
Groundwater recharge	Infiltration or inflow of water replenishing the groundwater reservoir in the soil and underlying geology (also see **Recharge**).
Groundwater runoff	That part of groundwater that is discharged into a stream channel as spring or seepage water.
Groundwater table	The free surface of the groundwater. It is seldom static, generally rising and falling with the season, subject to atmospheric pressure under the ground surface, the rate of withdrawal, the rate of restoration, and other conditions.
Grout	A fluidized material that is injected into soil, rock, concrete, or other construction material to seal openings and to lower the permeability and/or provide additional structural strength. There are four major types of grouting materials: chemical; cement; clay; and bitumen.
Grouted	Bonded together with an inlay or overlay of grout.
Gulch	A relatively young, well-defined and sharply cut erosional channel.
Gully	A channel or miniature valley cut by concentrated runoff but through which water commonly flows only during and immediately after heavy rains or during the melting of snow; it may be dendritic (i.e., branching) or linear (i.e., rather long, narrow and of uniform width). The distinction between a gully and a *rill* is one of depth: a gully is sufficiently deep that it would not be obliterated by normal tillage operations, whereas a rill is of lesser depth and would be smoothed by ordinary tillage. A diminutive of *gulch*. (Also see **Rill**)

H

Habitat	The environment in which the life needs of a plant or animal organism, population, or community are supplied.
Hammerhead	A "T"-shaped turnaround option for lightly travelled residential streets that results in less impervious cover, as compared to a circular cul-de-sac.
Hazardous substance	Any substance designated under the Code of Virginia and 40 CFR Part 116 (2000) pursuant to §311 of the CWA.

Head or **hydraulic head**	The height of water above any point or plane of reference; the kinetic or potential energy possessed by each unit weight of a liquid, expressed as the vertical height (measured in feet) through which a unit weight would have to fall to release the average energy it possessed (i.e., an available force equivalent to a certain depth of water – the motivating force in effecting the movement of water). The internal pressure expressed in "feet" or pounds per square inch of an enclosed conduit. Used also in various compound terms, such as entrance head, energy head, friction head, static head, pressure head, velocity head, and lost head or head loss.
Head gate	Water control structure at the entrance to a conduit.
Head loss	Energy loss due to friction, eddies, changes in velocity or direction of flow.
Headcutting	Progressive scouring and degrading of a streambed at a relatively rapid rate in the upstream direction, usually characterized by one or a series of vertical falls.
Headwall	A wall of stone, metal, concrete, or wood at the end of a culvert or drain to protect fill from scour or undermining, increase hydraulic efficiency of conduit, divert flow, retard disjointing of short sectional pipe, or serve as a retaining wall.
Headwater	The source of a stream; also, the water upstream from a structure or point of interest on a stream.
Headwater stream	A smaller first and second order tributary stream in a drainage network.
Heavy metals	Metallic elements having atomic weights above 21 on the periodic table, often toxic in sufficient quantities or concentrations; metals present in municipal and industrial wastes that pose long term environmental hazards, including boron, cadmium, cobalt, chromium, copper, mercury, nickel, lead, and zinc.
HEC-1	Hydraulic Engineering Circular 1, describing a rainfall-runoff event simulation computer model developed by the U.S. Corps of Engineers.
HEC-2	Hydraulic Engineering Circular 2, describing a more complex rainfall-runoff event simulation model developed by the U.S. Army Corps of Engineers that can compute steady–state water surface elevation profiles in natural and constructed channels.
Heel	The junction of the upstream face of a gravity or arch dam with the ground surface. For an embankment dam, the junction is referred to as the *upstream toe* of the dam.

Hemic peat	An organic material usually derived from wetland vegetation that is moderately decomposed and has a moderate bulk density and modest porosity.
Herbaceous	A vascular plant that does not development woody tissue.
Herbicide	A chemical substance used for killing plants, especially weeds.
High marsh	A pondscaping zone within a stormwater wetland that exists from the surface of the normal pool to a six-inch depth and typically contains the greatest density and diversity of emergent wetland plants.
High water	The maximum flood stage of a stream or lake; the periodic crest stage of a tide. The historic HW is stage-recorded or otherwise unknown.
Hotspot	An area where the land use or activities (e.g., gas station, chemical storage facility, industrial facility, etc) are considered to generate runoff with concentrations of pollutants in excess of those typically found in normal stormwater or have a higher risk of spills, leaks, or illicit dischargers.
Humus	The more or less stable fraction of the soil organic matter remaining after the major portion or added plant and animal residues have decomposed, usually amorphous and dark colored; includes the F and H layers in undisturbed forest soils.
Hydraulic	Pertaining to water (or other fluid) in motion and the mechanics of the motion.
Hydraulic conductivity (K)	An expression of the readiness with which a liquid such as water flows through a soil in response to a given gradient. It can be expressed as the volume of fluid that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow. Hydraulic conductivity is a constant physical property of soil or rock, one of several components responsible for the dynamic phenomenon of flow. (also see **Permeability**).
Hydraulic gradient	The slope of the free surface of water flowing in an open channel. A line that represents the relative force available due to the potential energy available. This is a combination of energy due to the height of the water and the internal pressure. In any open channel, this line corresponds to the water surface. In a closed conduit, if several openings were placed along the top of the pipe and open tubes inserted, a line connecting the water surface in each of these tubes would represent the hydraulic grade line.

Hydraulic jump	Transition flow from the rapid to the tranquil state. A varied flow phenomenon producing a rise in elevation of the water surface. A sudden turbulent rise in the water level from a flow stage below critical depth of a flow stage above critical depth, during which the velocity passes from supercritical to subcritical, conserving momentum and dissipating energy.
Hydraulic mean depth	The area of the flow cross-section divided by the water surface width.
Hydraulic radius	The cross sectional area of a stream of water divided by the length of that part of its periphery in contact with its containing conduit; the ratio of area to wetted perimeter (the "*r*" in Manning's equation).
Hydraulics	The branch of science that deals with the practical applications of the static and dynamic behavior (e.g., the transmission of energy or effects of flow) of water or other fluid in motion.
Hydric	Characterized by, relating to or requiring an abundance of moisture.
Hydric soil	A soil that is saturated , flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part.
Hydrodynamic structure	An engineered flow through structure which uses gravitational settling to separate sediments and oils from stormwater runoff.
Hydrograph	A graph, for a given point on a stream, showing variation in stage (depth), flow, velocity, discharge or other property of the water over a period of time.
Hydrographic	Pertaining to the measurement or study of bodies of water and associated terrain.
Hydrography	Water surveys. The art of measuring, recording and analyzing the flow of water and of measuring and mapping watercourses, shore lines, and navigable waters.
Hydrologic	Pertaining to the cyclic phenomena of waters of the earth; successively as precipitation, runoff, storage and evaporation, and quantitatively as to distribution and concentration.
Hydrologic cycle	The circuit of water movement from the atmosphere to the earth and return to the atmosphere through various stages or processes such as precipitation, interception, runoff, infiltration, percolation, storage, evaporation and transpiration.

Hydrologic Soil Group or **HSG**	Classification of soils by their reference to the rate of infiltration of water, which is influenced by texture, organic matter content, stability of the soil aggregates, and soil horizon development; the USDA-NRCS soil classification system based on the permeability and infiltration rates of the soils. The groups range from "*A*" soils, which are primarily sandy in nature with a high permeability and little runoff production, to "*D*" soils, which are primarily clayey in nature with a low permeability rates and higher runoff production.
Hydrologic Unit Code *or* ***HUC***	A watershed unit established in the most recent version of Virginia's 6th Order National Watershed Boundary Dataset.
Hydrologically functional landscape	A term used to describe a design approach for the built environment that attempts to more closely mimic the overland and subsurface flow, infiltration, storage, evapotranspiration, and time of concentration characteristics of the native landscape of the area.
Hydrology	The earth science dealing with the occurrence, properties, distribution, movement and environmental relationships of water and snow in the atmosphere, on the surface of the earth, and underground. Overlaps and includes portions of other sciences such as meteorology and geology. The particular branch of Hydrology that a design engineer is generally interested in is surface runoff that is the result of excessive precipitation.
Hydroperiod	A seasonal occurrence of flooding and/or soil saturation that encompasses the depth, frequency, duration, and seasonal pattern of inundation.
Hydrophyte	A perennial vascular aquatic plant having its overwintering buds under water; a plant growing in water or in soil too waterlogged for most plants to survive.
Hydrostatic	Pertaining to pressure by and within water due to gravitation acting through depth.
Hyetograph	A graphical representation of rainfall intensity over time.
Hypoxia	A condition where there isn't enough oxygen in the water, forcing fish and other aquatic organisms to either swim away or die and resulting in suffocation of aquatic plants; typically occurring where there are too many nutrients in the water, and a symptom of eutrophication.

I

IC	Impervious cover.
Illicit discharge	Any discharge to a municipal separate storm sewer that is not composed entirely of stormwater, except discharges pursuant to a VPDES or VSMP permit (other than the VSMP permit for discharges from the municipal separate storm sewer), discharges resulting from fire fighting activities, and discharges identified by and in compliance with 4VAC50-60-1220 C 2.
Impact basin	A device used to dissipate the energy of flowing water; generally constructed of concrete in the form of a partially depressed or partially submerged vessel; may incorporate baffles to dissipate velocities.
Impaired waters	State waters or waters of the United States that do not meet their designated uses because of excess pollutants or identified stressors.
Impervious	Not allowing infiltration. A surface that cannot be easily penetrated (e.g., rain does not readily penetrate asphalt or concrete surfaces).
Impervious cover or **impervious surface**	A surface composed of material that significantly impedes or prevents natural infiltration of water into soil.
Imperviousness	The percentage of impervious cover within a development site or watershed.
Impinge	To strike and attack directly, as in curvilinear flow where the current does not follow the curve but continues on tangent into the bank on the outside of the bend in the channel.
Impoundment	An artificial collection or storage of water, as a pond, reservoir, pit, dugout, sump, etc.
Improved sinkhole	Any sinkhole which has been remediated or fitted with engineering improvements to ensure the groundwater quality and recharge rate; also, any sinkhole which has been designated as a stormwater outlet at internally-drained sites and, as such, falls under UIC permitting requirements.
In situ	In place; rocks, soil, and fossils that are situated in the place where they were originally formed or deposited.
In-line bioretention	A bioretention area that has a separate inlet and outlet.

Incised channel	A channel that has been cut relatively deep into the underlying formation by natural processes. Characteristics include relatively straight alignment and high, steep banks, such that overflow rarely occurs, if ever.
Incorporated place	A city, town, township, or village that is incorporated under the Code of Virginia.
Indian country	(i) All land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation; (ii) all dependent Indian communities with the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and (iii) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.
Indicator bacteria	Nonpathogenic bacteria whose presence in water indicates the possibility of pathogenic species in the water.
Indigenous	Born, growing, or produced naturally in a region or country; native.
Indirect discharger	A nondomestic discharger introducing "pollutants" to a "publicly owned treatment works (POTW)."
Indirect runoff	That portion of runoff that contributes to the runoff pollution that enters receiving water as point discharges from separate storm sewer systems and as general surface runoff.
Individual permit	A type of permit that is necessary if the regulated activity is not covered under a general permit provision.
Industrial Stormwater Permit	A NPDES permit issued to a commercial industry or group of industries which regulates the pollutant levels associated with industrial stormwater discharges and may specify on-site pollution control strategies.
Infill development or **infill development site**	A site that is (1) currently undeveloped and predominately pervious; (2) surrounded (on at least three sides) by existing development; (3) served by a network of existing infrastructure and does not require the extension of utility lines (construction of a main-line water, sewer, gas, or other utility, and does not include individual service connections for the subject project) or new public road construction to serve the property; and (4) is ten (10) acres or less, if residential (including single family and multifamily) or five (5) acres or less, if commercial, industrial or multi-use.
Infiltration	The gradual downward percolation of water from the surface into the ground, through soil to groundwater and water table reservoirs.

Infiltration/inflow	A combination of illicit, unaccounted for inputs of water volumes into a storm sewer or sanitary sewer line, usurping part of the conveyance system design carrying capacity.
Infiltration facility	A stormwater management facility that temporarily impounds runoff and discharges it via infiltration through the surrounding soil. While an infiltration facility may also be equipped with an outlet structure to discharge impounded runoff, such discharge is normally reserved for overflow and other emergency conditions. Since an infiltration facility impounds runoff only temporarily, it is normally dry during non-rainfall periods. Infiltration basins, infiltration trenches, infiltration dry wells, and porous pavements are considered infiltration facilities.
Infiltration percolation	An approach to wastewater treatment in which large volumes of wastewater are applied to the land and, subsequently, infiltrating the surface and percolating through the soil pores.
Infiltration rate	A soil characteristic determining or describing the maximum rate at which water can percolate into the soil under specified conditions, including the presence of an excess of water; usually measured in inches per hour.
Inflow	The entry of extraneous rain water into a sewer system from sources other than infiltration, such as basement drains, manholes, storm drains, and street washing.
Initial abstraction	The initial precipitation loss, including interception and depression storage, without producing runoff; also called *initial losses*.
Inlet	An entrance or surface connection to a ditch, storm drain or other water conveyance system. A structure at the diversion end of a conduit. The upstream end of any structure through which water may flow.
Inlet protection	The preservation of the integrity and protection from erosion of the area where water enters into a treatment facility or area, usually by vegetation or armoring.
Inlet time	The time required for storm runoff to flow from the most remote point, in flow time, of a drainage area to the point where it enters a drain or culvert.
Inlet transition	A special entrance to a box or pipe culvert that is shaped in such a manner that in passing from one flow condition to another, the minimum turbulence or interference with flow is permitted.
Inorganic compounds	Molecules that consist of chemical combinations of two or more elements that are not carbon, hydrogen, oxygen, or nitrogen.

Insecticide	A substance or mixture of substances intended to destroy or repel insects.
Inspection	An on-site review of the project's compliance with the permit or the state permit, the VSMP, and any applicable design criteria, or an on-site review to obtain information or conduct surveys or investigations necessary in the implementation or enforcement of [the Virginia Stormwater Management Regulations].
Instantaneous discharge	The volume of water that passes a point at a particular instant of time.
Insurgence	A point where surface water flows into subsurface conduits.
Intake	Placed at the beginning of an outlet-works waterway (power conduit, water supply conduit), the intake establishes the ultimate drawdown level of the reservoir by the position and size of its opening(s) to the outlet works. The intake may be vertical or inclined towers, drop inlets, or submerged, box-shaped structures. Intake elevations are determined by the head needed for discharge capacity, storage reservation to allow for siltation, the required amount and rate of withdrawal, and the desired extreme drawdown level.
Integrated Management Practices or **IMPs**	Small-scale structural stormwater control measures distributed throughout a site or drainage area for the purpose of managing or influencing the site hydrology.
Intensely Developed Area	Those areas designated by the local government pursuant to 4VAC50-90-100 [of the Chesapeake Bay Preservation Area Designation and Management Regulations].
Intensity	In the context of hydrology, the depth of rainfall divided by its duration.
Intensity-Duration-Frequency curves or **IDF curves**	A graphical representation of the intensity, duration, and frequency of a differing rainfall amounts over time.
Intensive vegetated roof or **intensive green roof**	A rooftop system, including earth-bermed structures, which is planted with vegetation reliant on rich, deep soil or other growing media and may include shrubs or trees.
Intercepted surface runoff	That portion of surface runoff that enters either a storm sewer or a combined sewer directly through catch basins, inlets, etc.
Interception	In the context of hydraulics, the process by which precipitation is caught and held by foliage, twigs and branches of trees, shrubs and other vegetation. Often used for “interception loss” or the amount of water evaporated from the precipitation intercepted.

Interception channel	A channel excavated at the top of earth cuts, at the foot of slopes or at other critical places to intercept surface flow.
Interflow	The portion of rainfall that infiltrates into the soil and moves laterally (horizontally) through the upper soil horizons (aeration zone) during or immediately after a precipitation event until intercepted by a stream channel or until it returns to the surface at some point downslope from its point of infiltration.
Intermittent stream	A body of water flowing in a natural or man-made channel that contains water for only part of the year. During the dry season and periods of drought, these streams will not exhibit flow. Geomorphological characteristics are not well defined and are often inconspicuous. In the absence of external limiting factors (pollution, thermal modifications, etc), biology is scarce and adapted to the wet and dry conditions of the fluctuating water level.
Internal soil drainage	The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure and other characteristics of the soil profile and underlying layers and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are: none, very slow, slow, medium, rapid, and very rapid.
Interstate agency	An agency of two or more states established by or under an agreement or compact approved by Congress, or any other agency of two or more states having substantial powers or duties pertaining to the control of pollution as determined and approved by the administrator under the CWA and regulations.
Interstitial flow	The portion of surface water that infiltrates the streambed and moves through pores in the subsurface soil or rock.
Intertidal or **intertidal zone**	The area of the shore between mean high water and mean low water.
Inundate	To cover with a flood.
Invasive species	Plant or animal species that were absent in undisturbed portions of the original plant and animal community and will invade and proliferate under disturbance or continued overuse; commonly termed *invasives*.
Invert	The lowest elevation on the inside of a lined channel, sewer, weir or other conduit, typically at the discharge point. The bottom of a drainage facility along which the lowest flows would pass.
Invert paving	Generally applies to metal pipes where it is desirable to improve flow characteristics or prevent corrosion at low flows. The bottom portion of the pipe is paved with an asphaltic material, concrete, or air-blown mortar.

Inverted siphon — A pipe for conducting water beneath a depressed place. A true inverted siphon is a culvert that has the middle portion at a lower elevation than either the inlet or the outlet and in which a vacuum is created at some point in the pipe. A sag culvert is similar, but the vacuum is not essential to its operation.

Isohyet or **Isohyetal Line** — A line drawn on a map or chart joining points that receive the same amount of precipitation.

Isohyetal map — A map containing isohyetal lines and showing rainfall intensities.

Isovel — A line on a diagram of a channel or channel section connecting points of equal velocity.

J

Jack or **Jack straw** — A bank protection element consisting of wire or cable strung on three mutually perpendicular struts connected at their centers.

Jacking operations — A means of constructing a pipeline under a highway without open excavation. A cutting edge is placed on the first section of pipe and the pipe is forced ahead by hydraulic jacks. As the leading edge pushes ahead, the material inside the pipe is dug out and transported outside the pipe for disposal.

Jam — A wedged collection of drift in a constriction of a channel, such as a gorge or a bridge opening.

Jet — An effluent stream from a restricted channel, including a fast current through a slower stream.

Jetty — An elongated, artificial obstruction projecting into a stream or the sea from the bank or shore to control shoaling and scour by deflection of the strength of currents or waves.

Jump — A sudden transition from supercritical flow to the complementary subcritical flow, conserving momentum and dissipating energy; the hydraulic jump.

Junction — For rivers, the point of connection of two upstream stretches or segments. In some estuary models, a junction is a segment of the estuary.

Jurisdictional wetland — An area that is 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, commonly known as hydrophytic vegetation.

K

Karst or **karst topography** — Any landscape or terrain generally underlain by soluble bedrock (e.g., limestone, dolostone, marble, or gypsum) at the surface or in the shallow subsurface (less than 50 feet), and characterized by (1)storage and transport of water in voids and conduits produced by bedrock dissolution, (2) such features as sinkholes, caves, closed depressions, sinking and losing streams, large flow springs, and other subsurface drainage, and (3) a relative lack of surface streams.

Karst area — Any land area predominantly underlain at the surface or shallow subsurface by limestone, dolomite, or other soluble bedrock regardless of any obvious surface karst features.

Karst features — Sinkholes, sinking and losing streams, caves, large flow springs, and other such landscape features found in karst areas.

Karst swale — A wide, shallow, linear parabolic-shaped depression located in a karst area, centered on the drainageway or swale with a maximum width of 300 feet and a minimum width of 50 feet and lacking a defined channel bed or banks, that may hold water only briefly during extreme storm events and exhibits significant infiltration capacity (SEA, 2000).

Kjeldahl Nitrogen (TKN) — A measure of the ammonia and organic nitrogen present in a water sample.

Kolk — A rotational flow about a horizontal axis, induced by a reef and breaking the surface in a boil.

L

Lacustrine — Pertaining to a lake; also, the deep-water zone of a lake or reservoir.

Lag or **Lag time** — In the context of stormwater management, the time interval between the beginning (center of mass) of the rainfall and the peak flow (center of mass) of the resultant runoff.

Lake — A water-filled basin with a restricted outlet or no outlet; includes reservoirs, tidal ponds and playas.

Laminar flow — That type of flow in which each particle moves in a direction parallel to every other particle and in which the head loss is approximately proportional to the velocity (as opposed to turbulent flow).

Land capability	The suitability of land for use without permanent damage. Land capability, as ordinarily used in the United States, is an expression of the effect of physical land conditions, including climate, on the total suitability for use without damage for crops that require regular tillage, for grazing, for woodland and for wildlife. Land capability involves consideration of (1) the risks of land damage from erosion and other causes and (2) the difficulties in land use owing to physical land characteristics, including climate.
Land capability classification	A grouping of kinds of soils into special units, classes, and subclasses according to their capability for intensive use and the treatments required for sustained use; prepared by the USDA-Natural Resource Conservation Service.
Land capability map	A map showing land capability units, classes and subclasses, or a soil survey map colored to show land capability classes.
Land development	A manmade change to, or construction on, the land surface that changes its runoff characteristics. Certain types of land development are exempted from stormwater management requirements as provided in the Stormwater Management Law (§ 10.1-603.8 B of the Code of Virginia).
Land disturbance *or* ***land-disturbing activity*** (in the context of stormwater management)	A manmade change to the land surface that potentially changes its runoff characteristics including clearing, grading, or excavation except that the term shall not include those exemptions specified in § 10.1-603.8 of the Code of Virginia.
Land disturbance *or* ***land-disturbing activity*** (in the context of erosion and sediment control)	Any man-made change to the land surface that may result in soil erosion from water or wind and the movement of sediments into state waters or onto lands in the Commonwealth, including, but not limited to, clearing, grading, excavating, transporting and filling of land, except that the term shall not include: 1. Minor land-disturbing activities such as home gardens and individual home landscaping, repairs and maintenance work; 2. Individual service connections; 3. Installation, maintenance, or repair of any underground public utility lines when such activity occurs on an existing hard surfaced road, street or sidewalk, provided the land-disturbing activity is confined to the area of the road, street or sidewalk that is hard surfaced; 4. Septic tank lines or drainage fields unless included in an overall plan for land-disturbing activity relating to construction of the building to be served by the septic tank system; 5. Permitted surface or deep mining operations and projects, or oil and gas operations and projects conducted pursuant to Title 45.1 [of the Code of Virginia]; 6. Tilling, planting, or harvesting of agricultural, horticultural, or forest crops, livestock feedlot operations, or as additionally set forth by the [State Water Control] Board in regulation, including engineering operations as follows: construction of

terraces, terrace outlets, check dams, desilting basins, dikes, ponds, ditches, strip cropping, lister furrowing, contour cultivating, contour furrowing, land drainage and land irrigation; however, this exception shall not apply to harvesting of forest crops unless the area on which harvesting occurs is reforested artificially or naturally in accordance with the provisions of Chapter 11 (§10.1-1100 et seq.) [of the Code of Virginia] or is converted to bona fide agricultural or improved pasture use as described in subsection B of § 10.1-1163.

7. Repair or rebuilding of the tracks, right-of-way, bridges, communication facilities and other related structures and facilities of a railroad company;
8. Agricultural engineering operations including but not limited to the construction of terraces, terrace outlets, check dams, desilting basins, dikes, ponds not required to comply with the provisions of the Dam Safety Act, Article 2 (§ 10.1-604 et seq.) of Chapter 6, ditches, strip cropping, lister furrowing, contour cultivating, contour furrowing, land drainage and land irrigation;
9. Disturbed land areas of less than 10,000 square feet in size or 2,500 square feet in all areas of the jurisdictions designated as subject to the Chesapeake Bay Preservation Area Designation and Management Regulations adopted pursuant to the Chesapeake Bay Preservation Act (§ 62.1-44.15:67 et seq. of the Code of Virginia); however, the governing body of the program authority may reduce this exception to a smaller area of disturbed land or qualify the conditions under which this exception shall apply;
10. Installation of fence and sign posts or telephone and electric poles and other kinds of posts or poles;
11. Shoreline erosion control projects on tidal waters when all of the land-disturbing activities are within the regulatory authority of and approved by local wetlands boards, the Marine Resources Commission or the United States Army Corps of Engineers; however, any associated land that is disturbed outside of this exempted area shall remain subject to this article and the regulations adopted pursuant thereto; and
12. Emergency work to protect life, limb or property, and emergency repairs; however, if the land-disturbing activity would have required an approved erosion and sediment control plan, if the activity were not an emergency, then the land area disturbed shall be shaped and stabilized in accordance with the requirements of the VESCP authority.

Land use The primary or primary and secondary use(s) of land, such as cropland, woodland, pastureland, residential development, commercial development, etc.

Land use controls Methods for regulating the uses to which a given land area may be put, including such things as zoning, subdivision regulation and floodplain regulation.

Land use plan — The key element of a comprehensive plan; describes the recommended location and intensity of development for public and private land uses such as residential, commercial, industrial, recreational, and agricultural.

Landscaping — In the context of stormwater management, the placement of vegetation in and around stormwater control measures.

Large construction activity — Construction activity including clearing, grading and excavation, except operations that result in the disturbance of less than five acres of total land area. Large construction activity also includes the disturbance of less than five acres of total land area that is a part of a larger common plan of development or sale if the larger common plan will ultimately disturb five acres or more. Large construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility.

Large municipal separate storm sewer system — All municipal separate storm sewers that are either: .

1 Located in an incorporated place with a population of 250,000 or more as determined by the 1990 decennial census by the Bureau of Census (40 CFR Part 122 Appendix F (2000));

2. Located in the counties listed in 40 CFR Part 122 Appendix H (2000), except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties;

3. Owned or operated by a municipality other than those described in subdivision 1 or 2 of this definition and that are designated by the [State Water Control] Board as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers described under subdivision 1 or 2 of this definition. In making this determination the Board may consider the following factors:

a. Physical interconnections between the municipal separate storm sewers;
b. The location of discharges from the designated municipal separate storm sewer relative to discharges from municipal separate storm sewers described in subdivision 1 of this definition;
c. The quantity and nature of pollutants discharged to surface waters;
d. The nature of the receiving waters; and
e. Other relevant factors; or

4. The Board may, upon petition, designate as a large municipal separate storm sewer system, municipal separate storm sewers located within the boundaries of a region defined by a stormwater management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in this definition.

Lateral	In a drainage system, a drainage conduit transporting water from an inlet point to the main drain trunk line.
Lattice blocks or **lattice pavers**	A type of permeable pavers consisting of interlocking components that have a grid-type bearing surface with open spaces between the bearing surfaces for vegetation or gravel.
Law (in the context of Erosion and Sediment Control)	The Virginia Erosion and Sediment Control Law: Article 2.4 of Chapter 3.1 of Title 62.1 (§62.1-44.15:51 et seq.) of the Code of Virginia, created to prevent erosion and sedimentation from land disturbing activities.
Layout	A conceptual drawing sufficient to provide for the specified stormwater management facilities required at the time of approval.
Leach	To remove components from soil by the action of water trickling through the soil.
Leachate	Liquids that has percolated through a soil and that contains substances in solution or suspension that were previously in the soil profile.
Legume	A member of the legume or pulse family, Leguminosae, one of the most important and widely distributed plant families. The fruit is a "legume" or pod that opens along two sutures when ripe. The flowers are usually papilionaceous (butterfly-like). Leaves are alternate, have stipules, and are usually compound. Includes many valuable food and forage species, such as peas, beans, peanuts, clovers, alfalfas, sweet clovers, lespedezas, vetches and kudzu. Practically all legumes are nitrogen-fixing plants.
Levee	An embankment to prevent inundation, usually on or along the bank of a stream or lake to protect outer lowlands. (also see **Dike**)
Level Spreader	A type of linear device designed to convert concentrated runoff into sheet flow and disperse it uniformly across a vegetated slope to prevent concentrated, erosive flows and promote infiltration.
Linear development project	A land-disturbing activity that is linear in nature such as, but not limited to, (i) the construction of electric and telephone utility lines, and natural gas pipelines; (ii) construction of tracks, rights-of-way, bridges, communication facilities and other related structures of a railroad company; (iii) highway construction projects; (iv) construction of stormwater channels and stream restoration activities; and (v) water and sewer lines. Private subdivision roads or streets shall not be considered linear development projects.
Lining	The protective cover of the surface of a channel.

Liquefaction	The temporary transformation of a soil mass of soil or sediment into a fluid mass. Liquefaction occurs when the cohesion of particles in the soil or sediment is lost.
Spontaneous liquefaction	The sudden, large decrease of the shearing resistance of a cohesionless soil caused by a collapse of the structure from shock or other type of strain and associated with a sudden but temporary increase in the pore-fluid pressure.
Liquid limit	The moisture content at which the soil passes from plastic to a liquid state. In engineering, a high liquid limit indicates the soil has a high content of clay and low capacity for supporting loads.
Littoral	Pertaining to or along the shore, particularly to describe currents, deposits, and drift.
Littoral drift	The sedimentary material (sand) moved along the shoreline under the influence of waves and currents.
Littoral transport	The movement of littoral drift along the shoreline by waves and currents; includes movement parallel (longshore transport) and perpendicular (on-offshore transport) to the shore.
Littoral zone	The zone or strip of land along the shoreline between the high and low water elevations; that portion of a body of fresh water extending from the shoreline lakeward to the limit of occupancy of rooted plants (the area where water is shallow enough for emergent vegetation to dominate).
Live storage	The portion of an impoundment that is at or above the outlet elevation and used for temporary water storage.
Live watercourse	A definite channel with bed and banks within which concentrated water flows continuously.
Loading	The total amount of material entering a system from all sources.
Local depression	A low area in the pavement or in the gutter established for the special purpose of collecting surface waters on a street and directing these waters into a drainage inlet.
Local program adoption date	The date a local government meets the requirements of subdivisions 1 and 2 of 4VAC50-90-60 [of the Chesapeake Bay Preservation Area Designation and Management Regulations].
Locality	A county, city, or town.
Localized flooding	Refers to smaller scale flooding that may occur outside of a stormwater conveyance system. This may include high water, ponding or standing water from stormwater runoff, which is likely to cause property damage or unsafe conditions.

Longshore	Parallel to and near the shoreline.
Losing stream	A surface stream or stream reach in which water flows from the stream bed into the ground, losing a significant portion (but usually not all) of its flow to subsurface flow through fractures or open sinkholes; typically found in karst areas.
Lot	A parcel of land undivided by any street that is has one occupied building and associated open space and yard.
Low Impact Development *or* ***LID***	A design strategy with the goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques to create a functionally equivalent hydrologic site design. Hydrologic functions of storage, infiltration and ground water recharge, as well as the volume and frequency of discharges are maintained through the use of integrated and distributed micro-scale stormwater retention and detention areas, reduction of impervious surfaces, and the lengthening of runoff flow paths and flow time. Other strategies include the preservation/protection of environmentally sensitive site features such as riparian buffers, wetlands, steep slopes, valuable (mature) trees, floodplains, woodlands, and highly permeable soils.
Low level outlet or **bottom outlet**	An opening at a low level from an impoundment generally used for emptying or for scouring sediment and sometimes for irrigation releases.

M

Main channel	The portion of the stormwater conveyance system that contains the base flow and small frequent storm events.
Maintenance agreement	A legally recorded document that acts as a property deed restriction, and which provides for long-term maintenance of stormwater management practices.
Major facility	Any facility or activity classified as such by the regional administrator in conjunction with the [State Water Control] Board.
Major modification	For the purposes of [the Virginia Stormwater Management Regulations], the modification or amendment of an existing permit before its expiration that is not a minor modification as defined in this regulation.

Major municipal separate storm sewer outfall *or* ***major outfall***

A municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive stormwater from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), with an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of two acres or more).

Man-made

Constructed by man.

Man-made stormwater conveyance system

A pipe, ditch, vegetated swale, or other conveyance constructed by man.

Manning's equation or **Manning's formula**

An equation, used to predict the velocity of water flow in an open channel or pipeline, as follows:

$$V = \frac{1.486 * r^{2/3} * S^{1/2}}{n}$$

where:

V = the mean velocity of flow in feet per second;
R = the hydraulic radius;
S = the slope of the energy gradient or, for assumed uniform flow, the slope of the channel in feet per foot;
n = the roughness coefficient or retardance factor of the channel lining.

Manufactured treatment device or **MTD**

A fabricated BMP used to remove pollutants from stormwater runoff. MTD designs may involve proprietary components or processes. MTDs may not be installed in Virginia for the treatment of stormwater runoff quality control credit unless they are approved by the Director in accordance with Section 1 of [4VAC50-1300 et seq.] and the VTAP process and are listed for permitted use on the [Virginia Stormwater BMP Clearinghouse] website. (also see **Proprietary treatment device**)

Map scale

A ratio of the units measured on the ground to each unit measured on the map; (small scale = little detail, large area, small value of ratio, such as 1:250,000); (large scale = much detail, small area, large value of ratio, such as 1:24,000).

Marginal

Within a borderland area; more general and extensive than riparian.

Marsh	An area of land that is soft, wet or periodically inundated, where the surface is not deeply submerged; generally treeless and covered dominantly with grasses, sedges, cattails, rushes, or other hydrophytic plants. Subclasses include freshwater and saltwater marshes.
Mature	A classification for streams that have established flat gradients not subject to further scour.
Maximum daily discharge limitation	The highest allowable daily discharge.
Maximum extent practicable (MEP)	The technology-based discharge standard for municipal separate storm sewer systems established by CWA §402(p). MEP is achieved, in part, by selecting and implementing effective structural and nonstructural best management practices (BMPs) and rejecting ineffective BMPs and replacing them with effective best management practices (BMPs). MEP is an iterative standard, which evolves over time as urban runoff management knowledge increases. As such, the operator's MS4 program must continually be assessed and modified to incorporate improved programs, control measures, BMPs, etc., to attain compliance with water quality standards.
Maximum historical flood	The maximum flood that has been recorded or experienced at any particular highway location.
Mean annual flood	The flood discharge with a recurrence interval of 2.33 years.
Mean depth	In the context of hydraulics, the average depth; for a stream at any stage, the wetted normal section divided by the surface width. The hydraulic mean depth.
Mean discharge	The arithmetic average of individual daily discharges during a specific period, usually daily, monthly, or annually.
Mean velocity	The average velocity of a stream flowing in a channel or conduit at a given cross-section or in a given reach. It is equal to the discharge divided by the cross-sectional area of the reach.
Meander	In connection with streams, a winding channel, usually in an erodible, alluvial valley. A reverse or S-shaped curve or series of curves formed by erosion of the concave bank, especially at the downstream end, characterized by curved flow and alternating shoals and bank erosion. Meandering is a stage in the migratory movement of the channel, as a whole, down the valley.
Meander plug or **clay plug**	A deposit of cohesive materials in old channel bend-ways. These plugs are sufficiently resistant to erosion to serve as essentially semi-permanent geological controls to advancing channel migrations.

Meander scroll

Evidence of historical meander patterns in the form of lines visible on the inside of meander bends (particularly on aerial photographs) that resemble a spiral or convoluted form in an ornamental design. These lines are concentric and regular forms in high-sinuosity channels and are largely absent in poorly developed braided channels.

Media filters

A variety of different filtering materials, for which the purpose of each is to remove pollution from stormwater runoff.

Medium municipal separate storm sewer system

All municipal separate storm sewers that are either:

1. Located in an incorporated place with a population of 100,000 or more but less than 250,000 as determined by the 1990 decennial census by the Bureau of Census (40 CFR Part 122 Appendix G (2000));

2. Located in the counties listed in 40 CFR Part 122 Appendix I (2000), except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties;

3. Owned or operated by a municipality other than those described in subdivision 1 or 2 of this definition and that are designated by the [State Water Control] Board as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers described under subdivision 1 or 2 of this definition. In making this determination the Board may consider the following factors:

   a. Physical interconnections between the municipal separate storm sewers;
   b. The location of discharges from the designated municipal separate storm sewer relative to discharges from municipal separate storm sewers described in subdivision 1 of this definition;
   c. The quantity and nature of pollutants discharged to surface waters;
   d. The nature of the receiving waters; or
   e. Other relevant factors.

4. The Board may, upon petition, designate as a medium municipal separate storm sewer system, municipal separate storm sewers located within the boundaries of a region defined by a stormwater management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in subdivisions 1, 2 and 3 of this definition.

Merlon

In a castellated concrete grid pavement unit, one of the protruding portions which alternate with depressed portions (crenels) to form the surface geometry of the unit.

Mesh

Woven wire or other filaments used alone as a revetment, or as a retainer or container of masses of gravel or cobble.

Mesotrophic waters	Reservoirs and lakes that contain moderate quantities of nutrients and are moderately productive in terms of aquatic animal and plant life.
Micropool	A smaller permanent pool which is incorporated into the design of a larger stormwater pond to avoid resuspension of particles, provide varying depth zones, and minimize impacts to adjacent natural features.
Microtopography	In the context of stormwater management, the complex contours along the bottom of a constructed wetland system to provide greater depth variation, which increases the wetland plant diversity and increases the wetland's ratio of surface area to volume.
Minimize	To prevent, reduce, or eliminate using practicable control measures to meet the conditions of the state permit.
Minimum lot size	The minimum area or dimension of an individual lot within a particular zoning category, as specified within the local subdivision code.
Minor modification	(For the purposes of Virginia Stormwater Management Regulations) An amendment of an existing state permit before its expiration [as specified in 4VAC50-60-640] not requiring extensive review and evaluation including, but not limited to, changes in EPA promulgated test protocols, increasing monitoring frequency requirements, changes in sampling locations, and changes to compliance dates within the overall compliance schedules. A minor state permit modification or amendment does not substantially alter state permit conditions, substantially increase or decrease the amount of surface water impacts, increase the size of the operation, or reduce the capacity of the facility to protect human health or the environment.
Mitigation	The replacement of functional values lost when an ecosystem is altered, and can include replacement, restoration, and enhancement of functional values.
Mobilization	The release and movement of bound chemicals, nutrients, or pollutants into the environment.
Modified Rational Method	A variation of the rational method used to calculate the critical storage volume whereby the storm duration can vary and does not necessarily equal the time of concentration.
Mottled	A soil characteristic denoting spots or blotches of different colors.
Mud flow	A well-mixed mass of water and alluvium that, because of its high viscosity and low fluidity as compared with water, moves at a much slower rate, usually piling up and spreading out like a sheet of wet mortar or concrete.

Mulch	A natural or artificial layer of plant residue or other materials, such as sand, paper, straw, sawdust, leaves, plastic film, loose soil, wood chips, pine tags, etc. that is spread or formed upon the surface of the soil to protect the soil and/or plant roots from the effects of raindrops, soil crusting, freezing, evaporation, etc. in order to conserve moisture, hold soil in place, aid in establishing vegetation, and reduce temperature fluctuations.
Municipal separate storm sewer	A conveyance or system of conveyances otherwise known as a municipal separate storm sewer system, including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains: 1. Owned or operated by a federal, state, city, town, county, district, association, or other public body, created by or pursuant to state law, having jurisdiction or delegated authority for erosion and sediment control and stormwater management, or a designated and approved management agency under §208 of the CWA that discharges to surface waters; 2. Designed or used for collecting or conveying stormwater; 3. That is not a combined sewer; and 4. That is not part of a publicly owned treatment works.
Municipal separate storm sewer system *or* ***MS4***	All separate storm sewers that are defined as "large" or "medium" or "small" municipal separate storm sewer systems or designated under 4VAC50-60-380 A 1.
Municipal Separate Storm Sewer System Management Program *or* ***MS4 Program***	A management program covering the duration of a state permit for a municipal separate storm sewer system that includes a comprehensive planning process that involves public participation and intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the CWA and regulations and the [Virginia Stormwater Management] Act and attendant regulations, using management practices, control techniques, and system, design and engineering methods, and such other provisions that are appropriate.
Municipal Stormwater Permit	A NPDES or VPDES permit issued to municipalities to regulate discharges from municipal separate storm sewers for compliance with EPA regulations and specify stormwater control strategies.
Municipality	A city, town, county, district, association, or other public body created by or under state law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under §208 of the CWA.

N

"n" value — The roughness coefficient in Manning's equation for determination of the discharge coefficient in the Chezy equation: $V = C(RS)^{1/2}$, where $C = (1/n)R^{1/6}$.

National Pollutant Discharge Elimination System *or* ***NPDES*** — The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under §§307, 402, 318, and 405 of the CWA. The term includes an approved program.

Native species — A species that is a part of an area's original fauna and flora.

Native vegetation or **native plants** — Plants that are adapted to and occur naturally in a specific location.

Natural and beneficial floodplain values — Include, but are not limited to fish, wildlife, natural vegetation, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.

Natural area conservation — The identification and protection of natural resources and features that maintain the pre-development hydrology at a site by reducing runoff, promoting infiltration, and preventing soil erosion.

Natural channel design concepts — The use of engineering analysis based on fluvial geomorphic processes to create, rehabilitate, restore, or stabilize an open conveyance system for the purpose of creating or recreating a stream that conveys its bankfull storm event within its banks and allows larger flows to access its floodplain.

Natural drainage — The flow patterns of stormwater runoff over the land in its pre-development state. Elements of natural drainage include overland flow, swales, depressions, rills, gullies, natural watercourses, etc.

Natural stormwater conveyance system — The main channel of a natural stream, in combination with the floodway and flood fringe, which compose the floodplain.

Natural stream — A tidal or nontidal watercourse that is part of the natural topography. It usually maintains a continuous or seasonal flow during the year and is characterized as being irregular in cross-section with a meandering course. Constructed channels such as drainage ditches or swales shall not be considered natural streams; however, channels designed using natural channel design concepts may be considered natural streams.

Navigable waters	Those stream waters lawfully declared or actually used as such. Navigable Waters of the United States are those determined by the Corps of Engineers or the U.S. Coast Guard to be so used in interstate or international commerce. Other streams have been held as navigable by courts under the common law that navigability in fact is navigability in law.
Negative projecting conduit	A structure installed in a trench with the top below the top of the trench, then covered with backfill and embankment material. (also see **Positive projecting conduit**)
Net site density	The maximum number of dwelling units in a cluster development, after subtracting out all unbuildable land areas.
New development	The construction of new impervious surface and activities defined as *development* on a tract or tracts of land where no impervious surface or development previously existed.
New discharger	Any building, structure, facility, or installation: 1. From which there is or may be a discharge of pollutants; 2. That did not commence the discharge of pollutants at a particular site prior to August 13, 1979; 3. Which is not a new source; and 4. Which has never received a finally effective VPDES or state permit for discharges at that site. This definition includes an indirect discharger that commences discharging into surface waters after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a site for which it does not have a VPDES or state permit; and any offshore or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979.
New permit	For the purposes of [the Virginia Stormwater Management Regulations], a state permit issued by the [State Water Control] Board to a state permit applicant that does not currently hold and has never held a state permit of that type, for that activity, at that location.
New source	Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced: 1. After promulgation of standards of performance under §306 of the CWA that are applicable to such source; or 2. After proposal of standards of performance in accordance with §306 of the CWA that are applicable to such source, but only if the standards are promulgated in accordance with §306 of the CWA within 120 days of their proposal.

Nitrate or **NO_3**	The most highly oxidized phase in the nitrogen cycle, which normally reaches important concentrations in the final stages of biologic oxidation.
Nitrate reduction	The chemical or biochemical reduction of nitrates to the nitrite form.
Nitric oxide	A gas formed in great part from atmospheric nitrogen and oxygen when combustion takes place under high temperature and pressure; while not itself a pollutant, it converts to nitrogen dioxide, which is a major constituent of photochemical smog.
Nitrite	An intermediate stage in the nitrogen cycle, which may occur in water as a result of the biological decomposition of proteinaceous materials.
Nitrification	The biological process (oxidation) through which ammonium is converted to nitrite and then nitrate by specialized bacteria.
Nitrogen or **N**	The gaseous, essential element for plant growth, composing 78 percent of the atmosphere, which is quite inert and unavailable to most plants in its natural form.
Nitrogen dioxide or **NO_2**	A gas resulting from the internal combustion engine and other sources that is significant as an air pollutant due to its role in smog formation.
Nitrogen fixation	The conversion of elemental nitrogen (N_2) to organic combinations or to forms readily useable in biological processes.
Nitrogen oxide or **No_x**	Formed as a result of photochemical reactions of nitric oxide in ambient air; a major component of photochemical smog; the product of combustion from transportation and stationary sources and a major contributor to the formulation of ozone in the troposphere and to acid deposition in rain.
NOI	Notice of Intent.
Nonactive construction area	Any area not considered to be an active construction area. Typically, active construction areas become nonactive construction areas whenever construction activities are expected to be discontinued for a period of 20 or more days during the winter season.
Nonerodible	A material (e.g., riprap, concrete, plastic, etc.) that will not experience surface wear due to natural forces.
Nonpoint source pollutant runoff load or ***pollutant discharge***	The average amount of a particular pollutant, measured in pounds per year, delivered in a diffuse manner by stormwater runoff.

Nonpoint source pollution *[or* ***nonpoint pollution*** *or* ***NPS pollution****]*	Pollution such as sediment, nitrogen, phosphorous, hydrocarbons, heavy metals, and toxics whose sources cannot be pinpointed but rather are washed from the land surface in a diffuse manner by stormwater runoff.
Non-proprietary BMP	Any stormwater BMP used to remediate stormwater that was developed in the public domain; is not patented, and for which design specifications are publicly available; and installation of which is not limited by licensing or royalty considerations.
Non-sewered urban runoff	Surface runoff in an urban drainage area which drains into a receiving stream without passing through a sewer system.
Non-structural BMP	The use of natural features or directed activities specifically for the purpose of managing or influencing the site hydrology and/or improving water quality (e.g., pollution prevention, preservation of open space and natural flow paths, street sweeping, etc.). Non-structural BMPs are used in lieu of or to supplement structural BMPs. "Non-structural BMP" is a generic term for many of the techniques referred to as "green infrastructure," "low impact development" and "environmental site design" practices, and it can also refer to program elements aimed at changing behaviors that cause pollution (e.g, education/outreach, storm drain stenciling,etc.)
Non-supporting sub-watershed	An urban stream classification for a sub-watershed with more than 25% ultimate impervious cover. As a result of this development, poor channel stability and water quality lead to a sharp loss of stream biodiversity.
Nonuniform flow	A flow in which the velocities vary from point to point along the stream or conduit, due to variations in cross-section, slope, etc.
Normal depth	In an open conduit, the depth at which flow is steady and hydraulic characteristics are uniform for the given conditions.
Normal water surface or **natural water surface**	The free surface associated with flow in natural streams.
Notice of Intent or **NOI**	A formal notice to the EPA or a state agency having delegated NPDES authority that a construction project seeking coverage under a General Permit is about to begin. The NOI provides information on the owner, location, and type of project, and certifies that the permittee will comply with conditions of the Construction General Permit. The NOI is *not* a permit application and no approval is required. Some local permits may require submittal of a Notice of New Construction (NONC) in lieu of filing a NOI with the state or the EPA.
Notice of Termination or **NOT**	A formal notice to the EPA or a state agency having delegated NPDES authority that a site is terminating coverage under the General Permit.

Nourishment The process of replenishing a beach. It may be brought about naturally, by accretion due to the longshore transport, or artificially, by the deposition of dredged materials.

NRCS The Natural Resource Conservation Service, a branch of the U.S. Department of Agriculture.

Nutrient(s) A substance essential as raw material necessary for the growth and reproduction of organisms. In water, those substances that promote growth of algae and bacteria; chiefly nitrates and phosphates.

Nutrient credit *or* ***credit*** A nutrient reduction that is certified pursuant to [§ 10.1-603.15:1 et seq., Code of Virginia] and expressed in pounds of phosphorus or nitrogen either (i) delivered to tidal waters when the credit is generated within the Chesapeake Bay Watershed or (ii) as otherwise specified when generated in the Southern Rivers watersheds.

Nutrient pollution Contamination of water resources by excessive inputs of nutrients, principally nitrogen and phosphorus, often resulting in excess algae production in surface waters.

O

Off-line A stormwater management system designed to manage (e.g., temporary detention, pollution treatment, etc.) a portion of the stormwater which has been diverted from the flow of a stream or storm drain. A flow splitter is typically used to divert the desired portion of the flow.

Off-line bioretention A bioretention area where water enters and exits through the same location.

Off-site Land within a project's drainage area that is not characterized as being part of the development site.

Off-site drainage Flow of water that originates outside the property.

Offset fee A monetary compensation paid to a local government or other permitting authority to satisfy pollutant load reduction or other regulatory requirements. (Also see **Fee in lieu**).

Offset or **Offset project** or **Offsite facility** A state- or locally-permitted action, project or stormwater control measure (BMP) that is located away from the development site, intended to compensate for the difference in required pollutant removal when the on-site facilities are insufficient to achieve full compliance with stormwater pollutant removal requirements.

Oligotrophic waters	Water bodies or habitats with low concentrations of nutrients and, thus, support very little organic production. Dissolved oxygen is present at or near saturation throughout the water body during all seasons of the year.
On-line	Stormwater management system designed to manage stormwater in its original stream or drainage channel.
On-site disposal system or **OSDS**	A method of treating wastewater (e.g. septic system) on a residential site for which public sanitary sewer is not accessible.
On-site drainage	Flow of water that originates inside the property.
One hundred (100) year storm (Q_{100})	An extreme rainfall-flood event that occurs, on average, once every 100 years or statistically has a 1% chance of occurring in any given year.
One (1) year storm (Q_1)	A rainfall event that occurs, on average, once every year or statistically has a 100% chance of occurring in any given year.
Open channel or **open drain**	Any conveyance in which water flows with a free surface. An open-section drainage channel (e.g., swales, grass channels, and biofilters, as well as stone- or concrete-lined channels) used for the conveyance, detention/retention, infiltration and filtration of stormwater runoff.
Open graded material	A uniform granular mixture with a narrow distribution of grain sizes. Open graded material has higher permeability than dense graded material, but it is not as strong structurally.
Open space	A portion of a developed site that is set aside for public or private use and is not developed with homes. The space may be used for active or passive recreation or may be reserved to protect or buffer natural areas (similar to *green space*).
Operator	The owner or operator of any facility or activity subject to regulation under the [Virginia Stormwater Management] Act and [Virginia Stormwater Management Regulations]. In the context of stormwater associated with a large or small construction activity, operator means any person associated with a construction project that meets either of the following two criteria: (i) the person has direct operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications or (ii) the person has day-to-day operational control of those activities at a project that are necessary to ensure compliance with a stormwater pollution prevention plan for the site or other state permit or VSMP authority permit conditions (i.e., they are authorized to direct workers at a site to carry out activities required by the stormwater pollution prevention plan or comply with other permit conditions). In the context of stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s), operator means the operator of the regulated MS4 system.

Ordinary high water mark	The line on the shore established by the fluctuation of water and physically indicated on the bank (1.5+ year return period).
Orifice	A single-stage or multi-stage inlet to the principal spillway of an impoundment facility.
Ornamental or **ornamental plant**	A plant grown for the beauty of its form, foliage, flowers, or fruit, rather than for food, fiber, or other productive uses.
Outfall	When used in reference to municipal separate storm sewers, a point source at the point where a municipal separate storm sewer discharges to surface waters and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other surface waters and are used to convey surface waters. (also see **Outlet**).
Outlet	The point, location or structure at which water discharges from a conduit, drain, stream, impoundment, water body, or drainage area to a receiving body of water. (also see **Outfall**).
Outlet Channel	A waterway constructed or altered primarily to carry water from man-made structures such as terraces, subsurface drains, terraces, tile lines, diversions and impoundments.
Outlet control structure or **outlet protection**	A hydraulic structure or other armoring material placed at the outlet of a channel, spillway, pond, etc., for the purpose of dissipating energy, providing a transition to the receiving channel or pipe downstream while achieving the discharge rates for specified designs.
Outwash	Debris transported from a restricted channel to an unrestricted area where it is deposited to form an alluvial or debris cone or fan.
Overburden	Any material of any nature, consolidated or unconsolidated, that overlies a mineral deposit, excluding topsoil or similar naturally occurring surface materials that are not disturbed by mining operations.
Overflow	Discharge of a stream outside its banks; the parallel channels carrying such discharge. Also, a pipeline or conduit device, together 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 which can be handled by interceptor sewer lines and pumping and treatment facilities to be carried by and to such water pollution control structures.
Overland flow	Water that travels over the ground surface to a point of concentration where turbulent flow occurs; also called *surface runoff*.

Overland flow irrigation A process of land application of wastewater that provides spray distribution onto gently sloping soil of relatively impervious nature, such as clays, for the purpose of attaining aerobic bio-treatment of the exposed flow in contact with ground cover vegetation, followed by the collection of runoff waters in interception ditches or channels and the return of the wastewater back to the spray system or its discharge into receiving waters; sometimes called *spray runoff*.

Overland flow path The lateral distance from a high point, ridge top or watershed divide to a stream or open channel.

Overtopping flood The flood described by the probability of exceedance and water surface elevation at which flow occurs over a hydraulic structure, highway, watershed divide, or through a structure(s) provided for emergency relief.

Owner The Commonwealth or any of its political subdivisions including, but not limited to, sanitation district commissions and authorities, and any public or private institution, corporation, association, firm or company organized or existing under the laws of this or any other state or country, or any officer or agency of the United States, or any person or group of persons acting individually or as a group that owns, operates, charters, rents, or otherwise exercises control over or is responsible for any actual or potential discharge of sewage, industrial wastes, or other wastes or pollutants to state waters, or any facility or operation that has the capability to alter the physical, chemical, or biological properties of state waters in contravention of §62.1-44.5 of the Code of Virginia, the [Virginia Stormwater Management] Act and [the Virginia Stormwater Management Regulations].

Ozone or **O_3** A pungent, colorless, toxic gas; one component of photochemical smog.

P

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

Parking aisle The lane along which vehicles travel within a parking lot, which may be one-way or two-way.

Parking ratio The required parking spaces that must be provided for a particular land use, often stated as a ratio of *x* spaces per *y* units (e.g., square footage of space, number of dwelling units, persons, seats, etc.).

Parking space	The total impervious area created by each parking stall, obtained by dividing the total parking lot area by the number of parking stalls provided. The impervious area created per parking space can be twice as great as the area of an individual parking stall.
Parking stall	The dimensions and total area needed to accommodate the parking of a single vehicle, extending outward from the curb and between the painted strips delineating one space from the next.
Partial density transfer cluster option or **PDT**	The most restrictive cluster option used to reduce impervious cover, where the land area considered unbuildable for physical and environmental reasons is subtracted from the gross density allowed from the site, in order to arrive at a net site density. Therefore, the allowable number of lots is *reduced*, and the developer is *not* compensated for them. However, this option results in the greatest reduction of impervious cover.
Particle size distribution or **PSD**	A list of values or a mathematical function that defines the relative amounts of particles (such as soil or sediment particles) present, sorted according to size; also known as grain size distribution.
Peak flow rate or **Peak flow**	The maximum instantaneous flow from a prescribed design storm at a particular location. [NOTE: It is coincident with the peak of a flood hydrograph.]
Pebble	A stone 10 to 75mm in diameter, including coarse gravel and small cobbles.
Perched water or **Perched water table**	The surface of a local zone of saturation held above the main body of groundwater by an impermeable layer or stratum, usually clay, and separated from the main body of groundwater by an unsaturated zone.
Percent impervious	The impervious area within the site divided by the area of the site multiplied by 100.
Percolation	The downward movement of water through the interstices of the rock or soil under the influence of gravity and hydrostatic pressure, especially the downward flow of water in saturated or nearly saturated soil at hydraulic gradients of the order of 1.0 or l.
Percolation rate	The rate, usually expressed as a velocity, at which water moves through saturated granular material, such as soil.
Percolation test	A determination of the rate of percolation or seepage of water through natural soils, expressed as time in minutes for a 1-inch fall of water in a test hole.

Percolating waters

Waters that have infiltrated the surface of the land and move slowly downward and outward through devious channels (aquifers) unrelated to stream waters, until they reach an underground lake or regain and spring from the land surface at a lower point.

Perennial stream *or* ***water body with perennial flow***

A body of water flowing in a natural or man-made channel year-round, except during periods of drought. The term "water body with perennial flow" includes perennial streams, estuaries, and tidal embayments. Lakes and ponds that form the source of a perennial stream, or through which the perennial stream flows, are a part of the perennial stream. Generally, the water table is located above the streambed for most of the year and groundwater is the primary source for stream flow. In the absence of pollution or other manmade disturbances, a perennial stream is capable of supporting aquatic life.

Performance standards

Technical standards that govern the development process that are based on meeting general objectives for design, rather than prescribing rigid, uniform and detailed design requirements. Performance standards generally allow the designer greater flexibility in determining what measures to use to achieve the standard's objectives.

Permanent storage pool

The volume in a pond or reservoir below the lowest outlet level, designed for water quality purposes to settle out trash, sediment and nutrients.

Permeability or **soil permeability**

The capacity for transmitting a fluid, as measured by the rate at which a fluid of standard viscosity can move through material in a given interval of time under a given hydraulic gradient. In the context of hydrology, the property of a soil to transmit water or any other fluid under a gradient, as measured by the quantity of water passing through a unit cross section, in a unit time, under a hydraulic gradient. Permeability depends on grain size, void ratio, shape and arrangement of pores. The permeability of a soil may be limited by the presence of one nearly impermeable horizon, even though the others are permeable.

Permeability coefficient

The volume of water, in cubic feet, under a head of one foot, that will pass through a square foot of porous surface in one day.

Permeability rate

The velocity at which water will move through a saturated soil. Permeability rates are classified as follows:

Very slow: less than 0.06 inches per hour
Slow: 0.06 to 0.20 inches per hour
Moderately Slow: 0.20 to 0.63 inches per hour
Moderate: 0.63 to 2.0 inches per hour
Moderately Rapid: 2.0 to 6.3 inches per hour
Rapid: 6.3 to 20.0 inches per hour
Very Rapid: More than 20.0 inches per hour

Permeable	Open to the passage of fluids, as for (1) pervious soils and (2) bank protection structures.
Permeable pavement or **porous pavement**	A pavement or paving material that enables some fraction of rainfall to be infiltrated into a sub-base underneath the paver, often at a significant rate.
Permissible velocity	In the context of hydraulics, the highest average velocity at which water may be carried safely in a channel or other conduit, or the highest velocity that can exist through a substantial length of a conduit and not cause scour of the channel; also, a safe, non-eroding or allowable velocity.
Permit* or *VSMP authority permit	An approval to conduct a land-disturbing activity issued by the VSMP authority for the initiation of a land-disturbing activity after evidence of state VSMP general permit coverage has been provided where applicable.
Permittee	The person to which the state permit or VSMP authority permit is issued, including any owner or operator whose construction site is covered under a state construction general permit.
Person	Any individual, corporation, partnership, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, county, city, town or other political subdivision of the Commonwealth, governmental body, including a federal or state entity as applicable, any interstate body or any other legal entity.
Pervious	Allowing the movement of water or other fluids through a material. (also see **Permeability**)
Pervious cover	A vegetated area of the urban landscape where rainfall is intercepted by vegetation and infiltrates into the soil or a humus layer.
Pesticide	Any chemical agent (e.g., insecticides, herbicides, algaecides, rodenticides, nematicides, fungicides, growth inhibitors, etc.) used for control of specific organisms (e.g., undesirable plants, animals or insects, etc.).
pH	A numerical measure of acidity (or hydrogen ion activity) and of alkalinity of a liquid. The neutral point is a pH of 7.0. All pH values below 7.0 are acid and all above 7.0 are alkaline. Natural waters usually have a pH range between 6.5 and 8.5.
Phosphorus	An element found in fertilizers and sediment runoff that is essential for life and growth but can contribute to the eutrophication of water bodies. It is designated in the Virginia Stormwater Management Regulations as the keystone pollutant in determining pollutant removal requirements for land development and redevelopment projects and pollutant removal efficiencies for various BMP's.

Available phosphorus	Inorganic phosphorus that is readily available for plant growth.
Photosynthesis	The basic process of plant life, by which chlorophyll, in the presence of sunlight and nutrients, converts carbon dioxide and water to carbohydrates, with oxygen as a by-product.
Physiographic province or **physiographic region**	A region, all parts of which are similar in geologic structure and climate, which consequently has a unified geomorphic history and pattern of landforms different from those of adjacent regions.
Physiography	A description of the surface features of the Earth, with an emphasis on the origin of landforms.
Phytoremediation	The use of vascular plants, algae and fungi to control, break down, or remove wastes, or to encourage degradation of contaminants in the rhizosphere (the region surrounding the root of the plant).
Pier	A vertical support of a structure standing in a stream or other body of water. The term is used in a general sense to include bents and abutments.
Piezometer	An instrument used to measure water levels or water pressures in embankments, foundations, abutments, soil, rock, or concrete.
Pile	A long, heavy timber or section of concrete or metal that is driven or jetted into the earth or bottom of a water body to serve as a structural support or protection.
Pilot use designation *or* ***PUD***	A designation given to MTDs for the purpose of collecting field performance data according to the VTAP when the performance data do not meet the standards of applying for a CUD or GUD.
Piping	The action of water passing through or under an embankment and progressively developing internal erosion by seepage, carrying some of the finer material with it to the surface at the downstream face.
Plan approving authority (in the context of stormwater management)	The [State Water Control] Board, the program authority, or a department of a program authority responsible for determining the adequacy of a submitted stormwater management plan, a conservation plan or other document(s) submitted for land disturbing activities on a unit or units of land and for approving plans, stipulating the methods of compliance with regulatory requirements.
Plan reviewer	Anyone who is responsible for determining the accuracy of ESC plans and supporting documents or SWM plans and supporting documents for approval by a VESCP authority or a VSMP authority as may be applicable in the areas of ESC or SWM.

Planned unit development or **PUD**	A special classification authorized in some zoning ordinances, where a unit of land under control of a single developer may be used for a variety of uses and densities, subject to review and approval by the local governing body. The locations of the zones are usually decided on a case-by-case basis.
Planning area	A designated portion of the parcel on which the land development project is located. Planning areas shall be established by delineation on a master plan. Once established, planning areas shall be applied consistently for all future projects.
Plasticity index	The numerical difference between the liquid limit and the plastic limit of soil; the range of moisture content within which the soil remains plastic.
Plastic limit	The moisture content at which a soil changes from a semisolid to a plastic state.
Plug flow	Linear flow along the length of a wetland cell that, ideally, does not involve the dispersion or diffusion of constituents. The flow can be perceived as a series of independent "packets" of water that do not interact with each other.
Plunge	Flow with a strong downward component, as in outfall drops, overbank falls, and surf attack on a beach.
Plunge pool	A small, permanent, natural or artificially created pool at either the BMP's inlet or outfall, with the primary purpose of dissipating the energy/velocity of free falling water. These facilities may be protected by various lining materials.
Point of concentration	That point at which the water flowing from a given drainage area concentrates.
Point of discharge	A location at which concentrated stormwater runoff is released.
Point source or **point source pollution**	Any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
Poised stream	A term used by river engineers apply to a stream that over a period of time is neither degrading nor aggrading its channel, and is nearly in equilibrium as to sediment transport and supply.

Pollutant	Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 USC §2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean: 1. Sewage from vessels; or 2. Water, gas, or other material that is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well if the well used either to facilitate production or for disposal purposes is approved by the [State Water Control] Board and if the Board determines that the injection or disposal will not result in the degradation of ground or surface water resources.
Pollutant discharge	The average amount of a particular pollutant measured in pounds per year or other standard reportable unit as appropriate, delivered by stormwater runoff.
Pollutant load or **pollution load**	A calculated quantity that is the result of a flow rate and pollutant concentration applied over a given amount of time.
Pollutant removal **(PR)**	The reduction by the MTD of one or more pollutants including, but not limited to, phosphorus, sediment, or nitrogen in stormwater. Data collected on pollutant removal efficiency is utilized to establish the pollutant removal credit for TP, TSS, or TN or other pollutants, respectively for the BMP or MTD.
Pollutant removal credit	The percent reduction in the load or EMC of a pollutant as runoff flows into and out of a BMP or MTD, also referred to as the pollutant removal efficiency.
Pollution	Such alteration of the physical, chemical or biological properties of any state waters as will or is likely to create a nuisance or render such waters (a) harmful or detrimental or injurious to the public health, safety or welfare, or to the health of animals, fish or aquatic life; (b) unsuitable with reasonable treatment for use as present or possible future sources of public water supply; or (c) unsuitable for recreational, commercial, industrial, agricultural, or other reasonable uses, provided that (i) an alteration of the physical, chemical, or biological property of state waters, or a discharge or deposit of sewage, industrial wastes or other wastes to state waters by any owner which by itself is not sufficient to cause pollution, but which, in combination with such alteration of or discharge or deposit to state waters by other owners, is sufficient to cause pollution; (ii) the discharge of untreated sewage by any owner into state waters; and (iii) contributing to the contravention of standards of water quality duly established by the State Water Control Board, are "pollution" for the terms and purposes of [the Virginia Stormwater Management Regulations].

Pollution prevention	Pro-active activities and strategies instituted to prevent introducing pollution into the environment.
Polychlorinated byphenyls or **PCBs**	A group of organic compounds used in the manufacture of plastics. They are toxic, persistent, and bioaccumulate in the environment, and they are frequently confused with a pesticide.
Polycyclic aromatic hydrocarbon or **PAH**	A class of organic compounds with a fused-ring aromatic structure that result from incomplete combustion of organic carbon (including wood), municipal solid waste, and fossil fuels, as well as from natural or anthropogenic introduction of uncombusted coal and oil. PAHs include benzo(a)pyrene, fluoranthene, and pyrene.
Porosity	The volume of pore space in a rock; the ratio of pore or open space volume to total solids volume; the degree to which the total volume of a soil, sediment, or rock is permeated with pores or cavities, generally expressed as a percentage of the whole volume.
Positive projecting conduit	A structure installed in a shallow trench with the top of the conduit projecting above the top of the trench and then covered with embankment. (also see **Negative projecting conduit**)
Post-construction stormwater management	A term used to distinguish stormwater practices used during site construction (otherwise known as "construction stormwater management" or "erosion and sediment control") from those that are used to achieve permanent control of stormwater runoff once construction is complete. "Construction stormwater management" is minimum measure #4 in the Phase II MS4 permit program, and "post-construction stormwater management" is minimum measure #5.
Post-development	Refers to conditions that reasonably may be expected or anticipated to exist after completion of the land development activity on a specific site.
Potomology	The hydrology of streams.
Practicable	A discharge of atmospheric moisture as rain, snow or hail, measured in depth of fall or in terms of intensity of fall in unit time.
Pre-development	Refers to the conditions that exist at the time plans for development of a tract of land are submitted to the VESCP or VSMP authority. Where phased development or plan approval occurs (preliminary grading, demolition of existing structures, roads and utilities, etc.), the existing conditions at the time prior to the first item being submitted shall establish pre-development conditions.
Precipitation	Generally, all forms of atmospheric moisture falling on the earth, including mist, rain, hail, sleet or snow, measured in depth of fall or in terms of intensity of fall in unit time.

Prescriptive rights	The operation of the law whereby rights may be established by long exercise of their corresponding powers or extinguished by prolonged failure to exercise such powers.
Preserve	To avoid modification to the functions of the natural floodplain environment or to maintain it, as closely as practicable, in its natural state.
Pretreatment	In the context of stormwater management, any process used to reduce pollution of stormwater (especially sediment and other particulate matter) before it is introduced into a stormwater BMP for a substantial reduction of pollution load. Pretreatment is required on some BMPs to help avoid costly maintenance.
Principal spillway	The primary spillway or conduit for the discharge of water from an impoundment facility; generally constructed of permanent material and designed to regulate normal water level and rate of discharge, provide flood protection and reduce the need for operation of the emergency spillway.
Prior developed lands	Land that has been previously used for residential, commercial, industrial, institutional, recreation, transportation or utility facilities or structures, and that will have the impervious areas associated with those uses altered during a land disturbing activity.
Privately owned treatment works *or* ***PVOTW***	Any device or system that is (i) used to treat wastes from any facility whose operator is not the operator of the treatment works and (ii) not a POTW.
Probability	The chance of occurrence or recurrence of a specified event within a unit of time, commonly expressed in three ways. Thus a 10-year flood has a chance of 0.1 per year and is also called a 10%-chance flood.
Probability of exceedance	The statistical probability, expressed as a percentage, of a hydrologic event occurring or being exceeded in any given year. The probability (p) of a storm or flood is the reciprocal of the average recurrence interval (N).
Probable Maximum Flood or **PMF**	The flood discharge that may be expected from the most severe combination of critical meteorological and hydrological conditions that are reasonably possible in the region.
Program administrator	The person or persons responsible for administering and enforcing the VESCP or VSMP of a VESCP or VSMP authority as may be applicable in the area of ESC or SWM..

Project inspector Anyone who is a representative of a VESCP authority or a VSMP authority, is responsible for periodically examining the ESC or SWM activities and premises of a land-disturbing activity for compliance with the ESC Act and Regulations or the SWM Adct and Regulations as may be applicable.

Proposed state permit A state permit prepared after the close of the public comment period (and, when applicable, any public hearing and administrative appeals) that is sent to EPA for review before final issuance. A proposed state permit is not a draft state permit.

Proprietary treatment devices or **proprietary BMPs** Manufactured commercial products that provide stormwater treatment (also see **Manufactured treatment devices**).

Publicly owned treatment works *or* ***POTW*** A treatment works as defined by §212 of the CWA that is owned by a state or municipality (as defined by §502(4) of the CWA). This definition includes any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a POTW treatment plant. The term also means the municipality as defined in §502(4) of the CWA, that has jurisdiction over the indirect discharges to and the discharges from such a treatment works.

Pumping plant A complete pumping installation, including a storage box, pump or pumps, standby pumps, connecting pipes, electrical equipment, pumphouse, and outlet chamber.

Q

Qualified personnel A person knowledgeable in the principles and practices of erosion and sediment and stormwater management controls who possesses the skills to assess conditions at the construction site for the operator that could impact stormwater quality and quantity and to assess the effectiveness of any erosion and sediment control measures or stormwater management facilities selected to control the quality and quantity of stormwater discharges from the construction activity. For VSMP authorities this requires the use of a person who holds a certificate of competency from the [State Water Control] Board in the area of project inspection for ESC and combined administrator for SWM as defined in 4VAC50-50-10 or a combination of ESC and SWM qualifications from these two areas.

Qualifying storm event (for the purpose of VTAP testing) A rainfall event greater than 0.1 inches, separated in time from previous rainfall events by six hours or more.

Quality assurance project plan *or* ***QAPP*** A document that describes the objectives of a project, and the processes and activities necessary to develop data that will support

those objectives.

R

Rack An open upright structure, such as a debris rack.

Rain barrel A container used to collect and store rooftop runoff that is usually placed below the downspout of a roof gutter. The collected water is used for domestic purposes (e.g., watering the landscape, car washing, etc.).

Rain garden A small-scale bioretention practice that is planted with native perennial plants and is used to manage stormwater runoff from impervious surfaces such as roofs, sidewalks, and parking lots, typically on a residential lot.

Rainfall Point precipitation – that which registers at a single gauge. Area precipitation – adjusted point rainfall for area size.

Rainfall distribution A tabular listing or graphical depiction of the typical timing of rainfall quantities over a specific period of time in a given location (e.g., a 1-hour distribution, 6-hour distribution, 24-hour distribution, etc.).

Rainfall frequency The frequency, usually expressed in years, at which a given rainfall intensity and duration can be expected to be equaled or exceeded.

Rainfall frequency spectrum A tabular listing or graphical depiction of the average frequency of the depth of precipitation events (adjusted for snowfall), as a percentage of total annual rainfall events.

Rainfall intensity The rate at which rain is falling at any given instant, usually expressed in inches per hour.

Rainwash The creep of soil lubricated by rain.

Range The difference between extremes, as for stream or tide stage.

Rapids Swift, turbulent flow in a rough, steep reach.

Rational method An equation (Q = CIA) for computing the peak storm drainage flow rate (Q) based on a coefficient representing the characteristics of the physical drainage area (C), mean rainfall intensity (I), and area draining to the point of discharge (A).

Rating curve A graphic or, sometimes, tabular representation of performance or output under a stated series of conditions (e.g., a rating curve for a flume shows volume of flow per unit time at various stages or depths of flow).

Ravine	A valley larger than a gulch, smaller than a canyon, and less bold in relief than a gulch or arroyo.
Reach or **stream reach**	Generally, any length of a river or drainage course. A continuous part of a stream between two specified points. A discrete portion of a river, stream or channel; the smallest subdivision of the drainage system, consisting of a length of open channel or underground conduit uniform with respect to discharge, depth, area, and slope. For modeling purposes, a reach is somewhat homogeneous in its physical characteristics.
Receiving stream	The body of water such as a stream, river, lake or ocean into which runoff or effluent is discharged.
Recession	The retreat of a shore or bank by progressive erosion.
Recessional limb	The portion of the hydrograph after the peak where flows are returning to lower or baseflow levels.
Recharge	The means by which water is added to the zone of saturation or replenishes groundwater reservoirs by infiltration and transmission of water through the outcrop of a permeable soil or an aquifer. (also see **Groundwater recharge**)
Recharge basin	A basin provided to increase infiltration for the purpose of replenishing the groundwater supply.
Recharge rate	The quantity of water per unit of time that replenishes or refills an aquifer; the annual amount of rainfall that infiltrates the soil to become groundwater (a function of hydrologic soil group).
Recommencing discharger	A source that recommences discharge after terminating operations.
Recurrence interval	The average time interval between actual occurrences of a storm event at a given or greater magnitude. (also see **Storm frequency**)
Redevelopment	Any reconstruction, alteration, improvement or replacement of existing development.
Reef	Generally, any solid projection from the bed of a stream or other body of water.
Regime	The system or order characteristic of a stream: its behavior with respect to velocity and volume, form of and changes in channel, capacity to transport sediment, amount of material supplied for transportation, etc.
Regimen	The characteristic behavior of a stream during ordinary cycles of flow.

Regional administrator	The Regional Administrator of Region III of the Environmental Protection Agency or the authorized representative of the regional administrator.
Regional stormwater management facility or **regional facility**	A facility or series of facilities designed to control stormwater runoff from an entire specific watershed or other large defined development area, although only portions of the watershed or development area may experience land development at any given time.
Regional stormwater management plan or **regional plan**	A document containing material describing how stormwater runoff from open space, existing development and future planned development areas within a watershed or other large development area will be controlled by coordinated design and implementation of regional stormwater management facilities.
Regulations	The Virginia Stormwater Management Program (VSMP) Permit Regulations, 4VAC50-60-10 et seq., as amended.
Regulatory floodway	The open floodplain area that is constrained by Federal, State, or local requirements, i.e., unconfined or unobstructed either horizontally or vertically, to provide for the discharge of the base flood so that the cumulative increase in water surface elevation is no more than a designated amount (not to exceed 0.3048 meter) as established by the Federal Emergency Management Agency (FEMA) for administering the National Flood Insurance Program (NFIP).
Regulatory framework	A particular set of laws, rules, procedures, and agencies designed to govern a particular type of activity or solve a particular program.
Reliction	Pertaining to being left behind – for example, the area of land that is left behind by reliction when the water surface of a lake is lowered.
Reporting limit	The practical quantification limit and is defined as five times the detection limit within a specific analytical method. The reporting limit is a higher limit sufficient to distinguish measurements from background noise.
Repose	The stable slope of a bank or embankment, expressed as an angle or the ratio of horizontal to vertical projection.
Reservoir	A body of water impounded by a dam and in which water can be stored.
Restore	To reestablish a setting or environment in which the functions of the natural and beneficial floodplain values adversely impacted by a development can continue to operate.
Restored stormwater conveyance system	A stormwater conveyance system that has been designed and constructed using natural channel design concepts, including the main channel, floodway, and flood fringe.

Restriction	Artificial or natural control against widening of a channel, with or without construction.
Resurgence	The re-emergence of karst groundwater, a part or all of which is derived from surface inflow into fractures and/or sinkholes at a higher level; the point at which an underground stream reaches the surface and becomes a surface stream.
Retard	A bank-protection structure designed to check the riparian velocity and induce silting or accretion.
Retarding basin	Either a natural or man-made basin with the specific function of delaying the flow of water from one point to another. This tends to increase the time that it takes all the water falling on the extremities of the drainage basin to reach a common point, resulting in a reduced peak flow at that point.
Retention	In the context of stormwater management, the permanent storage of stormwater. The holding of stormwater runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.
Retention basin or stormwater retention basin	A stormwater management facility that includes a permanent impoundment, or normal pool of water, for the purpose of enhancing water quality and, therefore, is normally wet, even during non-rainfall periods. Stormwater runoff inflows may be temporarily stored above this permanent impoundment for the purpose of reducing flooding, stream channel erosion, or both.
Retention storage	Water that accumulates and ponds in natural or excavated depressions in the soil surface with no possibility for escape as runoff. (also see **Detention storage**)
Retrofit	The introduction of a new or improved stormwater control measure where it either never existed or where the existing stormwater control measure did not operate adequately to meet the stormwater management requirements of the site.
Retrogression	Reversal of stream grading (i.e., aggradation after degradation, or vice versa).
Return interval or **return period** or **recurrence interval**	The average period of time between the occurrences of storms of equal or greater magnitude over a period of record. The probability that such a storm will occur in any given year is equal to the reciprocal of the return period (e.g. there is a 50% or 1/2 chance that a 2-year storm event will occur in any given year, but only a 10% or 1/10 chance that a 10-year storm event will occur. (also see **Storm frequency***)*

Revegetation	Planting of indigenous plants to replace natural vegetation that is damaged or removed as a result of construction projects or permit requirements.
Reverse slope pipe	A pipe which draws water from below the top of a permanent pool extending in a reverse angle up to the riser and which determines the water elevation of the permanent pool.
Revetment	Bank protection to prevent erosion.
Revoked state permit	For the purposes of [the Virginia Stormwater Management Regulations], an existing state permit that is terminated by the [State Water Control] Board before its expiration.
Rhizome	A modified plant stem that grows horizontally underground.
Rhizosphere	The chemical sphere of influence of plant roots growing in flooded soils. Depending on the overall oxygen balance (availability and consumption), the rhizosphere can be oxidized, resulting in the presence of aerobic soil properties in an otherwise anaerobic soil environment.
Riffles	Fast sections of a stream where shallow water races over stones and gravel; they usually support a wider variety of bottom-dwelling organisms than other stream sections.
Right-of-way *or* ***ROW***	The right of passage, as over another's property; a route that is lawful to use; a strip of land acquired for transport or utility construction.
Rill	A small intermittent watercourse with steep sides, usually only a few inches deep and typically formed by soil erosion.
Riparian	Pertaining to the banks of streams. Refers to the interface between freshwater habitats and the terrestrial landscape; pertaining to a stream or river; also, plant communities occurring in association with any spring, lake, river, stream, or creek through which waters flow at least periodically.
Riparian area or **riparian land**	An area adjacent to a water body acting as a transition zone between terrestrial and aquatic systems; .land situated along the bank of a stream or other body of water.
Riparian corridor	A narrow strip of land, centered on a stream that includes the floodplain as well as related riparian habitats adjacent to the floodplain.

Riparian forest buffer or **riparian buffer** or **stream buffer**	An area of trees and other vegetation located adjoining and upgradient from either or both sides of surface water bodies and designed to intercept surface runoff, wastewater, subsurface flow and deeper groundwater flows from upland sources for the purpose of removing or buffering the effects of associated nutrients, sediment, organic matter, pesticides or other pollutants prior to entry into surface waters and groundwater recharge areas. (USDA-Forest Service definition)
Riparian rights	A principle of common law which requires that any user of waters adjoining or flowing through his lands must use and protect the waters in manner that will enable his neighbor to use the same waters, undiminished in quantity and undefiled in quality.
Ripple	(1) The light fretting or ruffling of water caused by a breeze. (2) Undulating ridges and furrows, or crests and troughs formed by the action of the flow.
Riprap	A layer, facing or protective mound of large rock, uncoursed stone, rubble, precast blocks, broken concrete, bags of cement, or other suitable material, randomly placed on the slope of an embankment or along a watercourse as protection against wave action, erosion, scour or sloughing of a structure or embankment. Also, the stone used for this purpose. Riprap is usually placed by dumping or other mechanical methods, and in some cases it is hand-placed. It consists of pieces of relatively large size, as distinguished from a gravel blanket.
Riser	A vertical structure which extends to the surface elevation from the barrel of the discharge pipe at the bottom of an impoundment facility and houses the control devices (weirs/orifices) to achieve the desired rates of discharge for specific designs. The riser may be increased in height as the need occurs.
Risk	The consequences associated with the probability of flooding attributable to an encroachment. It includes the potential for property loss and hazard to life during the service life of the structure or project.
Risk analysis	An economic comparison of design alternatives using expected total costs (construction costs plus risk costs) to determine the alternative with the least expected cost to the public.
River	A large stream, usually active when any streams are flowing in the region.
River basin	One of the 20 major water resource regions into which the U.S. has been divided (also see **Drainage basin** and **Watershed**).
Rock	(1) Cobble, boulder or quarry stone as a construction material. (2) Hard, natural mineral in formation, as in piles of talus.

Rock pinnacles	A particularly mature form of karren that forms sharp edges and peaks that can reach several meters in height; generally, pinnacles need a long period of time to form. Regionally, they are nearly always covered by surface soil and form the uppermost portion of the epikarst.
Roof leader	A downspout or other conveyance for runoff that has been collected from rooftops routing stormwater down to the ground surface or into a sewer system.
Roughness coefficient	In the context of hydraulics, a factor in velocity and discharge formulas representing the effect of channel roughness on energy losses in flowing water. Manning's '*n*' is a commonly used roughness coefficient.
Rounded inlet	The edges of a culvert entrance that are rounded for smooth transition that reduces turbulence and increases capacity.
Routing	A method of measuring the inflow and outflow from an impoundment structure while considering the change in storage volume over time. As a verb, the storing, regulating, diverting, or otherwise controlling the peak flows of runoff or wastewater through a collection system, according to some predetermined plan.
RSP fabric	(see **Filter fabric**)
Rubble	Rough, irregular fragments of rock or concrete.
Runoff *or* ***stormwater runoff or surface runoff***	That portion of precipitation that is discharged across the land surface or through conveyances to one or more waterways.
Runoff characteristics	Includes maximum velocity, peak flow rate, volume, and flow duration.
Runoff coefficient	The fraction of total rainfall that will appear at a conveyance as runoff.
Runoff Reduction (RR)	The total annual runoff volume reduced through canopy interception, soil infiltration, evaporation, transpiration, rainfall harvesting, engineered infiltration, or extended filtration, also, the spreadsheet calculation method used to compute, determine and demonstrate compliance with the water quality requirements in the Virginia Stormwater Management Regulations (4VAC50-60 et seq.)
Runoff volume	The volume of water that runs off the site from a prescribed storm event.

Runup The rush of water up a beach or structure, associated with the breaking of a wave. The amount of runup is measured according to the vertical height above the still water level that the rush of water reaches.

S

Safety bench A flat area above the permanent pool and surrounding a stormwater pond designed to provide a separation to adjacent slopes.

Sag culvert or **sag pipe** A pipeline with a dip in its grade line crossing over a depression or under a highway, railroad, canal, etc. The term "inverted siphon" is a commonly used alternative, but inappropriate, since no siphon action is involved.

Salinity The concentration of dissolved salt in water.

Sand (1) in the context of agronomy, a soil textural class consisting of particles between 0.05 and 2.0 millimeters in diameter; (2) in the context of engineering and according to the Unified Soil Classification System, a soil particle larger than the No. 200 sieve (0.074mm) and passing the No. 4 sieve (approximately 1/4 inch).

Sand filter A contained bed of sand that acts to filter the first flush of runoff. The runoff is then collected beneath the sand bed and conveyed to an adequate discharge point or infiltrated into the in-situ soils.

Saturated hydraulic conductivity The ability of fluid to flow through a porous medium under saturated conditions, as determined by the size and shape of the pore spaces in the medium, their degree of interconnection, and by the viscosity of the fluid (also see **Hydraulic conductivity**).

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

Saturated zone The area below the water table where all open spaces are filled with water under pressure equal to or greater than that of the atmosphere.

Saturation point In the context of soils, the point at which a soil or an aquifer will no longer absorb any amount of water without losing an equal amount.

Scale The relationship existing between map or photo distances and ground distances. This may be expressed (1) in like units as a representative fraction (e.g., 1:20,000, which means that one unit of measurement on the map equals 20,000 of the same units on the ground), or (2) in unlike units (e.g., one inch = one mile), or (3) graphically (e.g., a bar scale).

Schedule of compliance	A schedule of remedial measures included in a state permit, including an enforceable sequence of interim requirements (for example, actions, operations, or milestone events) leading to compliance with the [Virginia Stormwater Management] Act, the CWA and regulations.
Scour	Wearing away by the abrasive action of flowing air or water, especially the downward erosion caused by stream water in sweeping away mud and silt from the receiving channel bed or bank at a pipe discharge point or from the outside bank of a curved channel.
General scour	The removal of material from the bed and banks across all or most of the width of a channel, as a result of a flow contraction that causes increased velocities and bed shear stress.
Local scour	The removal of material from the channel bed or banks that is restricted to a minor part of the width of a channel. This scour occurs around piers and embankments and is caused by the actions of vortex systems induced by the obstruction to the flow.
Natural scour	The removal of material from the channel bed or banks that occurs in streams with the migration of bed forms, shifting of the thalweg and at bends and natural contractions.
SCS	The Soil Conservation Service (now called Natural Resource Conservation Service, or NRCS), a former branch of the U.S. Department of Agriculture.
Sea	An ocean or other body of water larger than a lake. A state of agitation of any large body of water.
Seasonally high water table	A shallow water table associated with periods of recent high levels of precipitation and/or low levels of evapotranspiration that frequently occur in the spring.
Seawall	A structure separating land and water areas, primarily designed to prevent erosion and other damage due to wave action. (also see **Bulkhead**)
Secondary pollutants	Those pollutants that result from the chemical reactions involving primary pollutants or related atmospheric contaminants (e.g., oxidants from photochemical activity).
Secretary	The Secretary of the Army, acting through the Chief of Engineers.

Sediment	Solid fragmentary material, both mineral and organic, that is transported by, suspended in, or deposited by air, water, wind or ice and has come to rest on the earth's surface, either above or below the water level. Sediment piles up in reservoirs, rivers and harbors, destroying wildlife habitat and clouding water so that sunlight cannot reach aquatic plants.
Sediment basin	A temporary impoundment built to retain sediment and debris with a controlled stormwater release structure.
Sediment delivery ratio	The fraction of the soil eroded from upland sources that actually reaches a continuous stream channel or storage reservoir.
Sediment discharge	The quantity of sediment, measured by dry weight or by volume, transported through a stream cross-section in a given time. Sediment discharge consists of both suspended load and bedload.
Sediment forebay	A settling basin or plunge pool constructed at the incoming discharge points of a stormwater facility. (Also see **Forebay**)
Sediment grade	Measurements of sediment and soil particles that can be separated by screening. A committee on sedimentation of the National Research Council has established a classification of textural grade sizes for standard use.
Sediment pool	The reservoir space allotted to the accumulation of submerged sediment during the life of the structure.
Sediment trap	A temporary impoundment built to retain sediment and debris which is formed by constructing an earthen embankment with a stone outlet.
Sedimentation or **siltation** or **settling**	The gravitational deposit of transported material in flowing or standing water. A pollutant removal method to treat stormwater runoff. As the water flow slows or stills, pollutants are removed from the stormwater as sediment settles or falls out of the water column. An example of a BMP utilizing sedimentation is a detention basin.
Seedbed	The soil prepared by natural or artificial means to promote the germination of seed and the growth of seedlings.
Seedling	A young plant grown from seed.
Seepage	Water escaping through or emerging from the ground along an extensive line or surface, as contrasted with a spring where the water emerges from a localized spot; (*percolation*) the slow movement of gravitational water through the soil.

Seiche	A standing wave oscillation of an enclosed water body that continues, pendulum fashion, after the cessation of the originating force, which may have been either seismic or atmospheric.
Seismic wave	A gravity wave caused by an earthquake.
Semi-arid area	An area receiving between 10 and 20 inches of rainfall per year.
Sensitive sub-watershed	An urban stream classification for a sub-watershed with less than 10% impervious cover, which is still capable of supporting stable channels and good-to-excellent biodiversity.
Septic tank	An underground tank used for the deposition of domestic wastes. Bacteria in the wastes decompose the organic matter, and the sludge settles to the bottom of the tank. The effluent flows through drains into the ground, where it is filtered by soil, and sludge is pumped out at regular intervals to replenish the tank's storage capacity. Sludge is pumped out at regular intervals.
Settlement	The vertical downward movement of a structure or its foundation.
Severe property damage	Substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
Shallow marsh	A zone within a stormwater extended detention basin that exists from the surface of the normal pool to a depth of six to 18 inches, and has a large surface area and, therefore, requires a reliable source of baseflow, groundwater supply, or a sizeable drainage area, to maintain the desired water surface elevations to support emergent vegetation.
Shared parking	A parking strategy designed to reduce the total number of parking spaces needed within an area by allowing adjacent users to share parking spaces during non-competing hours of operation (e.g., a shared lot for a church or theater and an office building).
Sheet flow *or* ***overland flow***	Shallow, unconcentrated, unconfined and irregular flow down a slope or across a flat open field. The length of strip for overland flow usually does not exceed 200 feet long under natural conditions.
Sheet pile	A pile with a generally slender, flat cross-section that is driven into the ground or the bottom of a water body and meshed or interlocked with like members to form a wall or bulkhead.
Shoal	A shallow region in flowing or standing water, especially if made shallow by deposition.

Shoaling	Deposition of alluvial material resulting in areas with relatively shallow depth.
Shoot	The above-ground portion of a plant.
Shore	The narrow strip of land in immediate contact with the water, including the zone between high and low water lines. (also see **backshore**, **foreshore**, **onshore**, **offshore**, **longshore**, and **nearshore**)
Shore erosion control project	An erosion control project approved by local wetlands boards, the Virginia Marine Resources Commission, the Virginia Department of Environmental Quality or the United States Army Corps of Engineers and located on tidal waters and within nonvegetated or vegetated wetlands as defined in Title 28.2 of the Code of Virginia.
Short-circuit	A faster (i.e., short-cut) route of water flow that results in a lower actual hydraulic residence time than the theoretical or designed hydraulic residence time, potentially reducing the effectiveness of a BMP.
Significant materials	Means, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under §101(14) of CERCLA (42 USC §9601(14)); any chemical the facility is required to report pursuant to §313 of Title III of SARA (42 USC §11023); fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with stormwater discharges.
Silt (soil)	(1) Water-borne sediment. Detritus carried in suspension or deposited by flowing water. (2) In the context of agronomy, a soil textural class consisting of particles between 0.05 and 0.002 millimeter in equivalent diameter; (2) in the context of engineering and according to the Unified Soil Classification System, a fine-grained soil (more than 50 percent passing the No. 200 sieve) that has a low plasticity index in relation to the liquid limit. The term is generally confined to fine earth, sand or mud, but is sometimes both suspended and bedload. Also, deposits of water-borne material, as in a reservoir, on a delta, or on a floodplain.
Silt loam	A soil textural class containing a large amount of silt and small quantities of sand and clay.
Silty clay	A soil textural class containing a relatively large amount of silt and clay and a small amount of sand.
Silty clay loam	A soil textural class containing a relatively large amount of silt, a lesser quantity of clay, and a still smaller quantity of sand.

Silviculture	The management, cultivation and care of forest trees.
Simple Method	A former technique for estimating storm pollutant export delivered from urban development sites.
Single jurisdiction	For the purposes of [the Virginia Stormwater Management Regulations], a single county or city. The term county includes incorporated towns which are part of the county.
Sink	A depression in the land surface.
S**inkhole**	A closed topographic depression in the earth's surface caused by movement of surface material into underlying voids the dissolution of the underlying bedrock; most common in karst areas. Drainage is through underground channels, and the depression may be enlarged by collapse of a cavern roof (see *karst*). A sinkhole may be a basin, funnel, or cylindrically shaped and is formed by both soil raveling (cover collapse) and cavern roof failure (vault collapse).
Sinking stream or **disappearing stream**	A surface stream whose entire flow disappears over a short area into the underlying groundwater system; typically found in karst areas.
Sinuosity	The ratio of the length of the river thalweg to the length of the valley proper.
Site	The land or water area where any facility or land disturbing activity is physically located or conducted, including adjacent land used or preserved in connection with the facility or land-disturbing activity. Areas channelward of mean low water in tidal Virginia shall not be considered part of a site.
Site constraints	Conditions unique to the site that that serve to restrain, restrict, or prevent the implementation of proposed or desired design features.
Site hydrology	The movement of water on, across, through and off the site as determined by parameters including, but not limited to, soil types, soil permeability, vegetative cover, seasonal water tables, slopes, land cover, and impervious cover.
Site plan	A scale drawing of an area, showing existing site conditions and proposed improvements or development.
Skew	When a drainage structure is not normal (perpendicular) to the longitudinal axis of the highway, it is said to be on a skew. The skew angle is the smallest angle between the perpendicular and the axis of the structure.
Slide	Gravitational movement of an unstable mass of earth from its natural position.

Slipout Gravitational movement of an unstable mass of earth from its constructed position; applied to embankments and other man-made earthworks.

Slope Gradient. The degree of deviation or inclination of a surface from horizontal, measured in a numerical ratio, percent, or degrees. Expressed as a ratio or percentage, the first number is the vertical distance (rise) and the second is the horizontal distance (run), as in 2:1 (200% percent slope). Expressed in degrees, it is the angle of the slope from the horizontal plane, with a 90 degree slope being vertical (maximum) and a 45 degree slope being 1:1 or 100 percent slope. Also, the face of an inclined embankment or cut slope.

Slope drain Tubing or conduit made of nonerosive material extending from the top to the bottom of a cut or fill slope with an energy dissipater at the outlet end.

Slough (1 – pronounced SLU) A side or oveflow channel in which water is continually present. It is stagnant or slack; also a waterway in a tidal marsh. (2 – pronounced SLUFF) a slide or slipout of a thin mantle of earth, especially in a series of small movements.

Slugflow Flow in a culvert or drainage structure that alternates between full and partly full. A pulsating flow – mixed water and air.

Small construction activity 1. Construction activities including clearing, grading, and excavating that results in land disturbance of equal to or greater than one acre, or equal to or greater than 2,500 square feet in all areas of the jurisdictions designated as subject to the Chesapeake Bay Preservation Area Designation and Management Regulations adopted pursuant to the Chesapeake Bay Preservation Act, and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one and less than five acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. The [State Water Control] Board may waive the otherwise applicable requirements in a general permit for a stormwater discharge from construction activities that disturb less than five acres where stormwater controls are not needed based on a "total maximum daily load" (TMDL) approved or established by EPA that addresses the pollutant(s) of concern or, for nonimpaired waters that do not require TMDLs, an equivalent analysis that determines allocations for small construction sites for the pollutant(s) of concern or that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. For the purpose of this subdivision, the pollutant(s) of concern include sediment or a parameter that addresses sediment (such as

	total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator must certify to the[State Water Control] Board that the construction activity will take place, and stormwater discharges will occur, within the drainage area addressed by the TMDL or equivalent analysis. 2. Any other construction activity designated by the either the Board or the EPA regional administrator, based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to surface waters.
Small municipal separate storm sewer system *or* ***small MS4***	All separate storm sewers that are (i) owned or operated by the United States, a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under §208 of the CWA that discharges to surface waters and (ii) not defined as "large" or "medium" municipal separate storm sewer systems or designated under 4VAC50-60-380 A 1. This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highway and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.
Smart growth	Coordinated planning to support long-term, sustainable economic, community and environmental goals. It focuses on planning where development is located in relationship to urban infrastructure and environmental features. It is a big-picture way to manage the overall footprint of impervious surfaces at the neighborhood, watershed and community scales. Smart growth encourages infill and redevelopment within designated areas as a way to keep the development footprint from expanding across important rural and natural resource areas. It encourages the coordination of comprehensive land use plans, utility plans, transportation plans, economic development plans, zoning codes, subdivision codes, stormwater codes, design guidelines, and other policies to achieve the best outcomes for the economy and the environment.
Smog	A polluted atmosphere in which products of combustion, such as hydrocarbons, soot, and sulfur compounds, etc., occur in concentrations detrimental to human beings and other organisms, especially during foggy weather.
Soffit	The bottom of the top – (1) With reference to a bridge, the low point on the underside of the suspended portion of the structure. (2) In a culvert, the uppermost point on the inside of the structure.

Soil	The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of vegetation.
Soil and Water Conservation District or District	A political subdivision of the Commonwealth organized in accordance with the provisions of Article 3 (§ 10.1-506 et seq.) of the Code of Virginia, created as a special-purpose district to develop and carry out a program of soil, water, and related resource conservation, use, and development within its boundaries.
Soil bulk density	The ratio of the mass of a given soil sample to the bulk volume of the sample.
Soil compost amendment	Tilling and composting of new lawns and open spaces within a development site to recover soil porosity and bulk density, reduce runoff, and make the soil more amenable to plant growth.
Soil conservation	Using the soil within the limits of its physical characteristics and protecting it from unalterable limitations of climate and topography.
Soil dispersion	The breaking down of soil aggregates into individual particles, resulting in single-grain structure. Ease of dispersion is an important factor influencing the erodibility of soils. Generally speaking, the more easily dispersed the soil, the more erodible it is.
Soil drainage	Refers to the natural frequency and duration of periods when the soil is free of saturation; for example, 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; 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 the steep slopes or low 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 and 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 of 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 of the 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 horizon	A layer of soil or soil material, approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics, such as color, structure, texture, consistence, kinds and numbers of organisms present, degree of acidity or alkalinity, etc.
Soil map	A map showing the distribution of soil types or other soil mapping units in relation to the prominent physical and cultural features of the Earth's surface. The following kinds of soil maps are recognized in the United States: (1) detailed, (2) detailed reconnaissance, (3) reconnaissance, (4) generalized, and (5) schematic.
Soil mapping unit	A kind of soil, a combination of kinds of soil, or miscellaneous land type or types that can be shown at the scale of mapping for the defined purposes and objectives of the survey. [Combination of kinds of soil includes (1) soil association, (2) complexes, (3) undifferentiated soils, or any class or combination of classes at the family level or higher categories of the soil classification system.) Soil mapping units are the basis for the delineations of a soil survey map. A soil survey identification legend lists all mapping units for the survey of an area (any size area from a small plot to a county, a nation, or the world). Mapping units normally contain inclusions of soils outside the limits of the taxonomic name, or names, uses as the name for the mapping unit. Mapping units are generally designed to reflect significant differences in use and management.
Soil moisture	Water diffused in the soil, in the upper part of the zone of aeration, where water is discharged by transpiration from plants or by soil evaporation.
Soil profile	A vertical section of the soil from the surface through all horizons, including the C and D horizons.
Soil science	Science dealing with soils as a natural resource on the surface of the earth including soil formation, classification, mapping; physical, chemical, biological, and fertility properties of soils per se; and these properties in relation to the use and management of soils.
Soil stratigraphy	The sequence, spacing, composition, and spatial distribution of sedimentary deposits and soil strata (layers).
Soil structure	The relation of particles or groups of particles which impart to the whole soil a characteristic manner of breaking (e.g., crumb structure, block structure, platy structure, and columnar structure).

Soil survey	Generally, the systematic examination of soils in the field and in laboratories; their description and classification; the mapping of kinds of soil; the interpretation of soils according to their adaptability for various crops, grasses, and trees; their behavior under use or treatment for plant production or for other purposes; and their productivity under different management systems.
Soil test	A chemical analysis of soil to determine the need for fertilizers or amendments for species of plant being grown.
Soil texture	The physical structure or character of a soil determined by the relative proportions of the separate physical components (sand, silt and clay) of which the soil is composed, as described by the classes of soil texture (e.g., the texture called "clay": is defined as soil having >40% clay, <45% sand and <40% silt).
Sorption	Generally, the interaction (binding or association) of a solute ion or molecule with a solid, as in sorption of a pollutant (a sorbed pollutant).
Source	Any building, structure, facility, or installation from which there is or may be a discharge of pollutants.
Source control BMP	An effort to prevent or limit the exposure of significant materials to stormwater at the source.
Source reduction	The design, manufacture, or use of products that in some way reduces the amount of waste and pollution that must be disposed of or treated; examples include reuse of by-products, reducing consumption, extending the useful life of a product, minimizing materials used in production, and confining loose materials to prevent wash-off.
Source water protection area	An identified area with restricted or modified land use practices designed to protect the public drinking water supply from the introduction of contaminants.
Spatial data	Data that has a geographic relationship or that can be mapped, whether or not it is geo-referenced.
Species	A group of organisms that resemble each other closely and that interbreed freely.
Species diversity	Refers to an ecological concept that incorporates both the number of species in a particular sampling area and the evenness with which individuals are distributed among the various species.
Specific energy	The energy contained in a stream of water, expressed in terms of hydraulic head, referred to the bed of a stream. It is equal to the mean depth of water plus the velocity head of the mean velocity.

Specimen plant	An ornamental plant that, in appearance, approaches the optimum form and density characteristics for the particular species and variety; in landscape usage, any plant that is displayed to its best advantage, either singly or in multiple plantings; also, a typical or distinctly different form or density established by pruning or other manipulation.
Spillway	A structure over or through which flow is discharged in a controlled manner from an impounding structure into a receiving channel or downstream area. It may contain gates, either manually or automatically controlled, to regulate the discharge of excess water.
Spur dike	A structure or embankment projecting a short distance into a stream from the bank and at an angle to deflect flowing water away from critical areas.
Stable	In the context of channels, a channel that has developed an established dimension, pattern and profile such that over time, these features are maintained.
Stabilized	Land that has been treated to withstand normal exposure to natural forces without incurring erosion damage.
Stage	In the context of hydraulics, the variable water surface elevation above its minimum or any other chosen datum (or "low water" plane; gage height.
Stage-area curve	A line graph showing the relationship between the depth of water and the surface area of a pond, wetland, or lake.
Stage-discharge curve	A line graph showing the relationship between water depth and outflow from a body of water.
Stage excursion	A departure or change in the pre-development water depth (either higher or lower) that occurs after development takes place.
Standing wave	(1) The motion of swiftly flowing stream water that resembles a wave but is formed by decelerating or diverging flow that does not quite produce a hydraulic jump. (2) A term that, when used to describe the upper flow regime in alluvial channels, means a vertical oscillation of the water surface between fixed nodes without appreciable progression in either an upstream or downstream direction. To maintain the fixed position, the wave must have a celerity (velocity) equal to the approach velocity in the channel, but in the opposite direction.
State	The Commonwealth of Virginia.
State application *or* ***application***	The standard form or forms, including any additions, revisions, or modifications to the forms, approved by the administrator and the [State Water Control] Board for applying for a state permit.

State/EPA agreement	An agreement between the regional administrator and the state that coordinates EPA and state activities, responsibilities and programs including those under the CWA and the Act.
State permit	An approval to conduct a land-disturbing activity issued by the [State Water Control] Board in the form of a state stormwater individual permit or coverage issued under a state general permit or an approval issued by the Board for stormwater discharges from an MS4. Under these state permits, the Commonwealth imposes and enforces requirements pursuant to the federal Clean Water Act and regulations, the [Stormwater Management] Act and the [Virginia Stormwater Management] Regulations. State permit does not include any state permit that has not yet been the subject of final Board action, such as a draft state permit or a proposed state permit.
State project	Any land development project that is undertaken by any state agency, board, commission, authority or any branch of state government, including state-supported institutions of higher learning.
State Water Control Law	Chapter 3.1 (§62.1-44.2 et seq.) of Title 62.1 of the Code of Virginia.
State waters	All water, on the surface and under the ground, wholly or partially within or bordering the Commonwealth or within its jurisdiction, including wetlands.
Steady flow	A flow in which the flow rate or quantity of fluid passing a given point per unit of time remains constant.
Steep slope	An area of a site that is too steep to (a) safely build on, or (b) has a high potential for severe soil erosion during construction.
Stilling basin	An open structure or excavation at the foot of an outfall, conduit, chute, drop, or spillway to dissipate the energy of the rapidly flowing water and protect the riverbed from erosion.
Stone	Rock or rock-like material; a particle of such material, in any size from a pebble to the largest quarried blocks.
Stop work order	An order issued by a regulatory authority requiring that all permitted or otherwise regulated activity on a site be stopped pending an enforcement review or action.
Storage	Detention or retention of water for future flow, naturally in channels and marginal soils or artificially in reservoirs.
Storage basin	Natural or artificially created space for detention or retention of water.

Storm	A disturbance of the ordinary, average conditions of the atmosphere that, unless specifically qualified, may include any or all meteorological disturbances, such as wind, rain, snow, hail, or thunder.
Storm distribution	A measure of how the intensity of rainfall varies over a given period of time.
Storm drain	That portion of a drainage system expressly for collecting and conveying former surface water in an enclosed conduit. Often referred to as "storm sewers," storm drains include inlet structures, conduit, junctions, manholes, outfalls, and other appurtenances.
Storm frequency or **storm return interval**	The time interval (e.g., 5-year, 10-year, 25-year, etc.) between major storms of predetermined intensity and volumes of runoff which storm and combined sewers and such appurtenant structures as swirl concentrator chambers are designed and constructed to handle hydraulically without surcharging and backflooding.
Storm sewer or **storm drain**	A system of pipes, open channels or both that carries stormwater runoff and other surface drainage but excludes sewage and industrial wastes, which are carried in sanitary sewers or combined sewers.
Storm sewer inlet	A structure through which stormwater is introduced into an underground conveyance system.
Stormwater	Precipitation that is discharged across the land surface or through conveyances to one or more waterways and that may include stormwater runoff, snow melt runoff, and surface runoff and drainage.
Stormwater BMP	Refers to a "best management practice." It is a generic term that has been used interchangeably with stormwater practice or stormwater treatment practice (STP) or stormwater control measure (SCM). Stormwater BMPs can be either "structural" or "non-structural."
Stormwater control measure or **SCM**	A technique, measure, or structural control that is used for a given set of conditions to manage the quantity and improve the quality of stormwater runoff (in the most cost-effective manner). (also see **Best management practice**, **stormwater management practice**, and **stormwater treatment practice**)
Stormwater conveyance system	A combination of drainage components that are used to convey stormwater discharge, either within or downstream of the land-disturbing activity. This includes: (i) "Manmade stormwater conveyance system" means a pipe, ditch, vegetated swale, or other stormwater conveyance system constructed by man except for restored stormwater conveyance systems; (ii) "Natural stormwater conveyance system" means the main channel of a natural stream and the flood-prone area adjacent to the main channel; or

	(iii) "Restored stormwater conveyance system" means a stormwater conveyance system that has been designed and constructed using natural channel design concepts. Restored stormwater conveyance systems include the main channel and the flood-prone area adjacent to the main channel.
Stormwater detention	The process of temporarily impounding runoff and discharging it through a hydraulic outlet structure to a downstream conveyance system.
Stormwater detention basin or ***detention basin***	A stormwater management facility that temporarily impounds runoff and discharges it through a hydraulic outlet structure to a downstream conveyance system. While a certain amount of outflow may also occur via infiltration through the surrounding soil, such amounts are negligible when compared to the outlet structure discharge rates and are, therefore, not considered in the facility's design. Since a detention facility impounds runoff only temporarily, it is normally dry during non-rainfall periods.
Stormwater discharge associated with construction activity	A discharge of stormwater runoff from areas where land-disturbing activities (e.g., clearing, grading, or excavation); construction materials or equipment storage or maintenance (e.g., fill piles, borrow area, concrete truck washout, fueling); or other industrial stormwater directly related to the construction process (e.g., concrete or asphalt batch plants) are located.
Stormwater discharge associated with large construction activity	The discharge of stormwater from large construction activities.
Stormwater discharge associated with small construction activity	The discharge of stormwater from small construction activities.
Stormwater extended detention basin or ***extended detention basin***	A stormwater management facility that temporarily impounds runoff and discharges it through a hydraulic outlet structure over a specified period of time to a downstream conveyance system for the purpose of water quality enhancement or stream channel erosion control. While a certain amount of outflow may also occur via infiltration through the surrounding soil, such amounts are negligible when compared to the outlet structure discharge rates and, therefore, are not considered in the facility's design. Since an extended detention basin impounds runoff only temporarily, it is normally dry during non-rainfall periods.

Stormwater extended detention basin-enhanced or ***extended detention basin-enhanced***	An extended detention basin modified to increase pollutant removal by providing a shallow marsh in the lower stage of the basin.
Stormwater filtering (or filtration)	A pollutant removal method to treat stormwater runoff in which stormwater is passed through a filter media such as sand, peat, grass, compost, or other materials to strain or filter pollutants out of the stormwater.
Stormwater infiltration	The illicit and unplanned entrance (leakage) of stormwater into a sanitary sewer. (also, see **Infiltration/inflow**)
Stormwater management	(1) The recognition of adverse drainage resulting from altered runoff and the solutions resulting from the cooperative efforts of public agencies and the private sector to mitigate, abate, or reverse those adverse results; (2) the control, regulation, or treatment of stormwater runoff, especially relating to the effects of land development on the natural hydrology; and (3) a program that deals with the quantity and quality of stormwater runoff.
Stormwater Management Act *or* ***Act***	Article 1.1 of Chapter 6 of Subtitle I or Title 10.1 (§10.1-603.1 et seq.) of the Code of Virginia, created to regulate stormwater runoff from land development.
Stormwater management facility	A control measure that controls stormwater runoff and changes the characteristics of that runoff including, but not limited to, the quantity and quality, the period of release or the velocity of flow.
Storm Water Management Model or **SWMM**	A dynamic rainfall-runoff simulation model developed by the U.S. Environmental Protection Agency in 1971 for analysis of quantity and quality problems associated with urban runoff.
Stormwater management plan *or* ***SWM plan***	A document containing material describing methods for complying with the requirements of a VSMP and the SWM Act and its attendant regulations.
Stormwater management practice or **SMP**	(1) A measure that is implemented to protect water quality and reduce the potential for pollution associated with stormwater runoff. (2) Any program, technology, process, siting criteria, operating method, measure, or device that controls, prevents, removes, or reduces pollution. (also see **Best management practice**, **stormwater control measure**, and **stormwater treatment practice**)
Stormwater management standards	The minimum criteria for stormwater management programs and land-disturbing activities as set out in Part II of [the Virginia Stormwater Management] Regulations.
Stormwater planter	A self-contained landscaping area which captures and temporarily stores a fraction of the rooftop runoff and filters it through soil media.

Stormwater Pollution Prevention Plan *or* ***SWPPP***	A document that is prepared in accordance with good engineering practices and that identifies potential sources of pollutants that may reasonably be expected to affect the quality of stormwater discharges from the construction site. In addition the document shall identify and require the implementation of control measures, and shall include, but not be limited to the inclusion or the incorporation by reference, of an erosion and sediment control plan, an approved stormwater management plan, and a pollution prevention plan.
Stormwater Program Administrative Authority	A local stormwater management program or the department, as the permit-issuing authority, in the absence of a local stormwater management program, which administers the Virginia Stormwater Management Program.
Stormwater retention basin or ***retention basin***	A stormwater management facility that includes a permanent impoundment, or normal pool of water, for the purpose of enhancing water quality and, therefore, is normally wet, even during non-rainfall periods. Storm runoff inflows may be temporarily stored above this permanent impoundment for the purpose of reducing flooding or stream channel erosion.
Stormwater retention basin I or ***retention basin I***	A retention basin with the volume of the permanent pool equal to three times the water quality volume.
Stormwater retention basin II or ***retention basin II***	A retention basin with the volume of the permanent pool equal to four times the water quality volume.
Stormwater retention basin III or ***retention basin III***	A retention basin with the volume of the permanent pool equal to four times the water quality volume with the addition of an aquatic bench.
Stormwater treatment practice or **STP**	A measure, either structural or nonstructural, that is determined to be the most effective, practical means of preventing or reducing point source or nonpoint source pollution inputs to stormwater runoff and water bodies.
Strand	(1) To lodge on bars, banks, or overflow plain, as for drift. (2) A bar of sediment connecting two regions of higher ground.
Stream	Water flowing in a channel or conduit, ranging in size from small creeks to large rivers.
Stream buffer	A variable-width area of vegetation located along both sides of a stream. (also see **Riparian forest buffer**)
Stream gaging	The quantitative determination of stream flow using gages, current meters, weirs or other measuring instruments at selected locations. (also, see **Gaging station**)

Stream order	A method of classifying streams according to their relative position in the stream network. The smallest stream that has no tributaries or branches is considered a first-order stream. When two first order streams combine together, they form a second order, stream, and so on.
Stream power	An expression used in predicting bed forms and hence bed load transport in alluvial channels. It is the product of the mean velocity, the specific weight of the water-sediment mixture, the normal depth of flow, and the slope.
Stream response	Changes in the dynamic equilibrium of a stream by any one, or combination of, various causes.
Stream waters	Former surface waters that have entered and now flow in a well-defined natural watercourse, together with other waters reaching the stream by direct precipitation or rising from springs in the bed or banks of the watercourse. They continue as stream waters as long as they flow in the watercourse, including overflow and multiple channels, as well as the ordinary or low-water channel.
Streambanks	The usual bank-full boundaries, not the flood boundaries, of a stream channel. The right and left banks are named while facing downstream.
Streambank stabilization or **bank stabilization**	Activities or techniques employed to maintain the integrity or stop the degradation of a streambank or river bank to protect it from erosion and slumping.
Stream protection cluster	A form of cluster development that is explicitly designed to minimize impervious cover and protect green space.
Structural BMP	Any man-made stormwater control measure or feature that requires routine maintenance in order to function or provide the hydrologic, hydraulic, or water quality benefit as designed. Structural practices include, but are not limited to bioretention, infiltration facilities, wet ponds, extended detention, wet and dry swales, permeable pavement, rainwater harvesting, vegetated roofs, underground or surface chambers or filters, and other manufactured treatment devices (MTDs).
Strutting	Elongation of the vertical axis of a pipe prior to installing it in a trench. After backfill has been placed around the pipe and compacted, the wires and rods holding the pipe in its distorted shape are removed. Greater side support from the earth is developed when the pipe tends to return to its original shape. Generally used on pipes that, because of size or the thinness of the metal, would tend to deform during construction operations. Arches are strutted diagonally based on a standard or special plan.

Sub-basin	A large watershed management unit (generally 100 to 1,000 square miles in area) – a physical division of an even larger basin – that combines the drainage area from a number of watersheds together, usually draining to a specific receiving water such as a lake, river or estuary.
Sub-catchment	A physical division of unspecified size of a larger storm drainage system or watershed, typically associated with one reach of the system and generally determined by topography and the pipe network configuration.
Subcritical flow	In this state, gravity forces are dominant, so that the flow has a low velocity and is often described as tranquil and streaming. Also defined as flow that has a Froude number less than one.
Subdivision	Means the same as defined in § 15.2-2240 of the Code of Virginia.
Subdivision code or **subdivision ordinance**	A set of local requirements that govern the geometric dimensions of a particular zoning category and also specifies the nature of roads, drainage, waste disposal and other community services that must be constructed to serve the development.
Subdrain	A conduit for collecting and disposing of underground water. It generally consists of a pipe, with perforations in the bottom through which water can enter.
Subgrade	The soil prepared and compacted to support a structure or a pavement system.
Submerged aquatic vegetation or **SAV**	Vegetation that lives at or below the water surface; an important habitat for young fish and other aquatic organisms.
Subsidence	A general lowering of the land surface by consolidation or removal of underlying soil.
Subsoil	The B horizons of soils with distinct profiles. In soils with weak profile development, the subsoil can be defined as the soil below the plowed soil (or its equivalent of surface soil), in which roots normally grow. Although a common term, it cannot be defined precisely. It has been carried over from early days, when "soil" was conceived only as the plowed soil and that under it was called the "subsoil."
Substrate	In the context of hydrology, the bottom material of a waterway. Also, the layer of earth or rock that lies immediately below the surface soil.

Sub-watershed	A watershed management unit of unspecified size that forms a convenient natural unit and the boundaries of which are typically defined as all of the land draining to the point where two second order streams combine together to form a third order stream. A sub-watershed may be a few square miles in area and is often the key geographic unit for urban stream classification and watershed-based zoning.
Sump	In drainage, any low area that does not permit the escape of water by gravity flow.
Supercritical flow	In this state, inertia forces are dominant, so that flow has a high velocity and is usually described as rapid, shooting and torrential. Also defined as flow that has a Froude number greater than one.
Support base floodplain development	To encourage, allow, serve, or otherwise facilitate additional base floodplain development. Direct support results from an encroachment, while indirect support results from an action out of the base floodplain.
Surcharge	A flow condition occurring in an impoundment or closed conduit when the maximum water level exceeds the controlled retention level or the hydraulic grade line is above the crown of the sewer. This condition usually results in localized flooding or stormwater flowing out of the top of inlet structures and manholes.
Surf	Waves and swells breaking on the foreshore and offshore shoals.
Surface runoff	The movement of water on the earth's surface, whether flow is over the surface of the ground or concentrated in channels.
Surface waters	1. All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; 2. All interstate waters, including interstate wetlands; 3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters: a. That are or could be used by interstate or foreign travelers for recreational or other purposes; b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or c. That are used or could be used for industrial purposes by industries in interstate commerce; 4. All impoundments of waters otherwise defined as surface waters under this definition; 5. Tributaries of waters identified in subdivisions 1 through 4 of this definition; 6. The territorial sea; and

	7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in subdivisions 1 through 6 of this definition. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA and the law, are not surface waters. Surface waters do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other agency, for the purposes of the Clean Water Act, the final authority regarding the Clean Water Act jurisdiction remains with the EPA.
Surge	(1) A sudden swelling of discharge in unsteady flow. (2) A large mass of moving water, such as a wave or swell. Also a heavy, violent swelling motion, such as a surge of water through a storm drain during a heavy rain.
Suspended load	Sediment that is supported by the upward components of turbulent currents in a stream and that stay in suspension for an appreciable amount of time.
Suspended sediment	The very fine soil particles that remain in suspension in water for a considerable period of time, either maintained in suspension by the upward components of turbulent currents or may be fine enough to form a colloidal suspension.
Suspended sediment concentration *or* ***SSC***	The ratio of the mass of dry sediment in a water-sediment mixture to the volume of the water-sediment mixture, typically expressed in milligrams of dry sediment per liter of water-sediment mixture. Dry sediment is measured by first filtering the sample, using a filter of known weight, drying the residue to remove all water, and reweighing it. SSC differs from TSS in that it is a whole volume sampling procedure.
Suspended solids	Any organic or inorganic particles suspended in and carried by water in an undissolved state, usually contributing directly to turbidity. The term includes sand, mud, and clay particles as well as solids in wastewater.
Sustainable site design	Design, construction, operations and maintenance practices that meet the needs of the present without compromising the ability of future generations to meet their own needs.
Swale	A shallow, gentle, elongated open depression or drainage channel in the earth's surface (e.g., a wide shallow ditch) that is usually vegetated, intermittently contains or conveys stormwater runoff, and typically provides some groundwater recharge. Swales are considered drainage courses, although waters in a swale are not considered stream waters.

Swallet A place where water disappears underground in a limestone region. A swallow hole generally implies water loss in a closed depression or blind valley, whereas a swallet may refer to water loss into alluvium at a streambed, even though there is no depression.

Swamp An area of shallow ponding or saturated surface, the water being fresh or acidic and the area usually covered with rank vegetation.

SWM Stormwater management.

SWM Act The Virginia Stormwater Management Act, Article 2.3 (§ 62.1-44.15:24 et seq.) of Chapter 3.1 of Title 62.1 of the Code of Virginia.

Swell A wave generated by a distant storm, usually regular and fully harmonic.

T

Tailwater In the context of hydraulics, water in a river or channel, immediately downstream from a dam or other discharge structure. The water surface elevation varies due to fluctuations in the outflow from the structures and due to downstream influences of other structures. Tailwater monitoring is an important consideration because a failure of dam will cause a rapid rise in the level of the tailwater.

Tailwater depth The depth of flow in the receiving water body immediately downstream from a discharge structure.

Talus Loose rocks and debris disintegrated from a steep hill or cliff standing at repose along the toe.

Tapered inlet A transition to direct the flow of water into a channel or culvert. A smooth transition to increase hydraulic efficiency of an inlet structure.

Technical Evaluator The department or its designee that is responsible for reviewing a MTD application and associated materials and based on this review for developing recommendations regarding use-designation and pollutant removal credit for the committee's and director's consideration.

Technical Release No. 20 (TR-20) The publication entitled *Project Formulation – Hydrology*, a NRCS watershed hydrology computer model that is used to compute runoff volumes and route storm events through stream valleys and/or impoundments.

Technical Release No. 55 (TR-55) The publication entitled *Urban Hydrology for Small Watersheds* a NRCS watershed hydrology computation model that is used to calculate runoff volumes and provide a simplified routing for storm

	events through stream valleys and/or ponds.
Technology Assessment Protocol – Ecology *or* ***TAPE***	The assessment process for evaluating and approving stormwater MTDs, originally developed and implemented by the Washington Department of Ecology in 2002 and subsequently amended in 2004, 2008 and 2011.
Technology Acceptance Reciprocity Partnership *or* ***TARP***	An agreement among a number of states, including Virginia, establishing a set of uniform criteria for demonstrating stormwater technologies and developing test quality assurance (QA) plans for certification or verification of MTD performance claims. The agreement provides for reciprocal acceptance of performance tests and data and approval results of partner states, in order to reduce duplicative or overlapping demonstration and performance testing of technologies; maximize research and development dollars; and certify or verify the technology in accordance with performance claims and state regulatory standards.
Technology Evaluation Report *or* ***TER***	A document providing information regarding performance testing and data that have been validated and analyzed, and that is submitted to the department as part of the application for MTDs seeking a PUD, CUD or GUD in Virginia.
Temporary construction site BMPs	BMPs that are required only temporarily to address a short-term stormwater contamination threat. For example, silt fences are located near the base of newly graded slopes that have a substantial area of exposed soil. Then, during rainfall, the silt fences filter and collect sediment from runoff flowing off the slope.
Temporary vehicular stream crossing	A temporary non-erodible structural span installed across a flowing watercourse for use by construction traffic. Structures may include bridges, round pipes or pipe arches constructed on or through non-erodible material.
Ten-year storm	A storm that is capable of producing rainfall expected to be equaled or exceeded on the average of once in 10 years. It may also be expressed as an exceedence probability with a 10% chance of being equaled or exceeded in any given year.
Terrace	A berm or bench-like earth 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.
Terrace interval	The distance measured either vertically or horizontally between corresponding points on two adjacent terraces.
Terrace outlet channel	A channel, usually having a vegetative cover, into which the flow from one or more terraces is discharged and conveyed from the terrace system.

Terrace system	A series of terraces occupying a slope and discharging runoff into one or more outlet channels.
Tetrahedron	A bank protection element, basically composed of 6 steel or concrete struts joined like the edges of a triangular pyramid, together with subdividing struts and tie wires or cables.
Tetrapod	A bank protection element, precast of concrete, consisting of four (4) legs joined at a central block, each leg making an angle of 109.5 degrees with the other three, like rays from the center of a tetrahedron to the center of each face.
Texture	The arrangement and interconnection of surface and near-surface particles of terrain or a channel perimeter.
Thalweg	The line following the lowest part of a valley, whether under water or not. Usually the line following the deepest part of the bed or channel of a river.
Thermal impact or thermal pollution	The change of natural temperatures of streams and water bodies resulting from addition of warmer water, typically stormwater runoff (the temperature of which is higher than the ambient stream or water body temperature), causing stress to or the death of temperature-sensitive organisms, such as trout.
Thermophile	Of, or relating to, an organism growing at high temperatures.
Thread	The central element of a current, continuous along a stream.
Threshold discharge area	An on-site area draining to a single natural discharge location or to multiple natural discharge locations that combine within one-quarter mile downstream (as determined by the shortest flow path).
Throat	An opening into the subsurface at the base of a sinkhole, through which soil and water is conducted underground. Sinkhole throats can be soil- or rock-bounded, but most often they form conduits in the bedrock.
Tide	The periodic rising and falling of the ocean and connecting bodies of water that results from gravitational attraction of the moon and sun acting on the rotating earth.
Tile drainage	Land drainage by means of a series of drain tile lines laid at a specified depth and grade.
Time of concentration	The time required for storm runoff to flow from the most hydraulically distant point (in time of flow) of the drainage area to the point of analysis (outlet). This time will vary, generally depending on the slope and character of the surfaces and the selected design storm.

Toe drain	A drainage system constructed in the downstream portion of an earth dam or levee to prevent excessive hydrostatic pressure.
Topography	Generally, the relative positions and elevations of natural or man-made features of an area (e.g., buildings, roads, plains, hills, mountains, degree of relief, steepness of slopes and other physiographic features) related to the contours and configuration of the earth's surface.
Topping	The top layer on horizontal revetments or rock structures; also capping or cap stones.
Topsoil	Earthy material used as top dressing for house lots, grounds for large buildings, gardens, road cuts, or similar areas because it has favorable characteristics for production of desired kinds of vegetation or can be made favorable; also, the surface plow layer of a soil, also called surface soil; the original or present dark colored upper soil that ranges from a mere fraction of an inch to two or three feet thick on different kinds of soil; the original or present A horizon, varying widely among different kinds of soil. Applied to soils in the field, the term has no precise meaning unless defined as to depth or productivity in relation to a specific kind of soil.
Total dissolved solids	The total dissolved (filterable) solids as determined by use of the method specified in 40 CFR Part 136 (2000).
Total impervious area or **TIA**	The total area of surfaces on a developed site that inhibit infiltration of stormwater. The surfaces include, but are not limited to, conventional asphalt or concrete roads, driveways, parking lots, sidewalks or alleys, and rooftops.
Total maximum daily load *or* ***TMDL***	The sum of the individual wasteload allocations for point sources, load allocations (LAs) for nonpoint sources, natural background loading and a margin of safety. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. The TMDL process provides for point versus nonpoint source trade-offs.
Total nitrogen *or* ***TN***	A measure of all organic and inorganic forms of nitrogen in a water sample, sediment sample or where applicable, in plant or animal tissue.
Total phosphorus *or* ***TP***	A measure of all phosphorus, including organic and inorganic phosphorous in particulate and soluble forms, in a water sample, sediment sample or where applicable, in plant or animal tissue.
Total removal or **TR**	The pollutant mass load reduction, which is the product of both runoff volume reduction (RR) and pollutant concentration reduction (PR).

Total suspended solids *or* ***TSS***	That portion of the solids, organic or inorganic particles including sand, mud, and clay particles and associated pollutants, carried by stormwater that can be captured on a standard glass fiber filter.
Town	An incorporated town.
Toxic pollutant	Any pollutant listed as toxic under §307(a)(1) of the CWA or, in the case of sludge use or disposal practices, any pollutant identified in regulations implementing §405(d) of the CWA.
Toxicity	The characteristic of being poisonous or harmful to plant or animal life; also, the relative degree or severity of this characteristic.
Training	Control of the direction of currents.
Transition	A relatively short reach or conduit leading from one waterway section to another of different width, shape, or slope.
Transmissivity	A term that relates to movement of water through an aquifer. Transmissivity is equal to the product of the aquifer's permeability and thickness (m^2/sec).
Transpiration	The photosynthetic and physiological process by which living plants release water from their vascular systems (e.g., leaf pores) into the atmosphere in the form of water vapor.
Transport	To carry solid material in a stream in solution, suspension, saltation, or entrainment.
Trash rack or **debris guard**	A structural device (e.g., a screen or grate) used to prevent debris from entering a spillway or other hydraulic structure. Also, a grid or screen across a stream designed to catch floating debris.
Travel time	The time required for water to flow from the outlet of a drainage sub-basin to the outlet of the entire drainage basin being analyzed. Travel time is normally concentrated flow through an open or closed channel.
Treatment Train or **stormwater treatment train**	Multiple BMPs or natural features installed in series, each designated to treat runoff and implemented together to maximize pollutant removal effectiveness.
Treatment Volume or $\mathbf{T_v}$	The volume of rainfall or stormwater runoff that is required by the Virginia Stormwater Management Regulations (4VAC50-60-65 – Virginia Runoff Reduction Method) to be treated by one or more BMPs. In Virginia, this amount is based on a rainfall depth of 1-inch (generally, the 90th percentile rainstorm).
Tree well	A device constructed to maintain the original grade around an existing tree and allow air to and protection of the roots, especially within a sidewalk or paved area.

Tributary	A river or stream that flows into a larger river or stream.
Trip generation rate	A statistic that indicates the number of vehicular trips that are taken from an average dwelling unit in a particular land use category on a typical day (e.g., studies have shown that one single-family home generates about 10 trips per day).
Trough	The space between waver crests and the water surface below it.
Trunk or **trunk link**	In a drainage system, the main conduit for transporting stormwater. This main line is generally quite deep in the ground, so that laterals coming from fairly long distances can drain by gravity into the trunk line.
Tsunami	A gravity wave caused by an underwater seismic disturbance (such as sudden faulting, land sliding or volcanic activity).
Turbidity	A measure of the amount of suspended solids in water; also, the cloudiness of water, caused by suspended silt or organic matter in the water column. High levels of turbidity are harmful to aquatic life.
Turbulence	The state of flow wherein the water is agitated by cross-currents and eddies, as opposed to a condition of flow that is quiet and laminar.
Turbulent flow	That type of flow in which any particle may move in any direction with respect to any other particle, and in which the head loss is approximately proportional to the square of the velocity.
Turlough	A karst depression that may be dry or flooded according to the season or prevailing weather conditions; derived from the Irish term for "dry lake." Oscillations in the general groundwater level, including variations in the response to local or more distant tidal effects, are the probable mechanism for water level changes in true turloughs.
Twenty-five year storm	A storm that is capable of producing rainfall expected to be equaled or exceeded on the average of once in twenty-five years. It may also be expressed as the exceedence probability with a 4% chance of being equaled or exceeded in any given year.
Two-year storm	A storm that is capable of producing rainfall expected to be equaled or exceeded on the average of once in two years. It may also be expressed as the exceedence probability with a 50% chance of being equaled or exceeded in any given year.
Type II rainfall distribution	A standard NRCS 24-hour rainfall distribution which applies to the Commonwealth of Virginia. The distribution allocates rainfall as a percentage of total rainfall over discrete time intervals.

U

UIC	Underground injection control.
Ultimate condition	Complete build-out of a watershed or other area of interest, based on existing zoning.
Ultra-urban	Densely developed urban areas in which little pervious surface exists.
Unbuildable lands	The portions of a development site where structures may not be located for physical or environmental reasons (e.g., easements, open water, steep slopes, floodplains, wetlands and stream buffers), used to compute net density in cluster developments.
Undercut	Erosion of the low part of a steep bank so as to compromise the stability of the upper part.
Underdrain	An underground drain or trench with openings through which the water may percolate from the soil or ground above.
Underflow	The downstream flow of water through the permeable deposits that underlie a stream. (1) Movement of water through a pervious subsurface stratum, the flow of percolating water; of water under ice, or under a structure. (2) The rate of flow or discharge of subsurface water.
Undertow	Current outward from a wave-swept shore carrying solid particles swept or scoured from the beach or foreshore.
Unified Soil Classification System	In the context of engineering, a classification system based on identification of soils according to their particle size range, gradation, plasticity index and liquid limit.
Uniform flow	A state of steady flow when the mean velocity and cross-sectional area remain constant in all sections of a reach.
Unit hydrograph	A hydrograph with a volume of one inch (2.5 cm) of direct runoff resulting from a storm occurring uniformly on a basin pr or other specified area at a uniform rate over a specified duration. Hydrographs from other storms of the same duration and distribution are assumed to have the same time base but with ordinates of flow in proportion to the runoff volumes. (also, see **Hydrograph**)
Unsaturated zone	The area above the water table where soil pores are not fully saturated, although some water may be present there.
Unstable	In the context of channels, a channel that is not stable.

Updrift	The direction opposite that of the predominant movement of littoral materials.
Upland	An area that is not an aquatic, wetland, or riparian habitat; an area that does not have the hydrologic regime necessary to support hydrophytic vegetation.
Uplift	Upward hydrostatic pressure on the base of an impervious structure.
Upset	An exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the operator. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
Urban area	An area whose character is urban in nature; towns with a population of over 2,500 are defined as *urban* by the U.S. Bureau of Census.
Urban development area or **UDA**	As defined by §15.2-2223.1 of the Code of Virginia, an area designated by a locality that is appropriate for higher density development due to proximity to transportation facilities, the availability of a public or community water and sewer system, or proximity to a city, town, or other developed area.
Urban runoff	Water or other substances such as precipitation, melted snow, or landscape irrigation flowing from city streets and adjacent domestic or commercial properties in excess of the amount absorbed by the surfaces (usually the ground) that may carry nonpoint source pollutants of various kinds into a sewer system or receiving water body, adding to degradation in the watershed. Increases in impervious surfaces usually result in increased urban runoff. (also, see **Runoff**)
Urban vegetative treatment system	The use of the outer and middle zone of the stream buffer to treat stormwater runoff from adjacent pervious or impervious surfaces.
Urbanized area	Central city, or cities, and surrounding closely-settled territory.

V

Variance Any mechanism or provision under §301 or §316 of the CWA or under 40 CFR Part 125 (2000), or in the applicable effluent limitations guidelines that allows modification to or waiver of the generally applicable effluent limitation requirements or time deadlines of the CWA. This includes provisions that allow the establishment of alternative limitations based on fundamentally different factors or on §301(c), §301(g), §301(h), §301(i), or §316(a) of the CWA.

VDOT The Virginia Department of Transportation.

Vegetated filter strip A densely vegetated section of land engineered to accept runoff as overland sheet flow from upstream development. It shall adopt any natural vegetated form, from grassy meadow to small forest. The vegetative cover facilitates pollutant removal through filtration, sediment deposition, infiltration and absorption, and is dedicated for that purpose.

Vegetated roof or **green roof** A rooftop treatment practice where a thin planting media is established on roof surfaces and then planted with hardy, low-growing, low-maintenance vegetation. Intensive green roofs have thick layers of soil (6 to 12 inches, or more) that can support a broad variety of plant or even tree species. Extensive roofs are simpler, with a soil layer of 6 inches or less to support turf, grass, or other ground cover.

Vegetative protection Stabilization of erosion and sediment-producing areas by covering the soil with (a) permanent seeding, producing long-term vegetative cover; (b) short-term seeding, producing temporary vegetative cover; or (c) sodding, producing areas covered with a turf of perennial sod-forming grass.

Velocity The rate of motion of objects or particles, or of a stream of particles.

Velocity head A term used in hydraulics to represent the kinetic energy of flowing water. This "head" is represented by a column of standing water equivalent in potential energy to the kinetic energy of the moving water, calculated as $V^2/2g$, where V represents the velocity in meters per second and g represents the potential acceleration due to gravity, in meters per second per second.

Vernal pools Seasonally flooded landscape depressions that support distinctive (and many times rare) plant and animal species adapted to periodic or continuous inundation during the wet season, and the absence of either ponded water or wet soil during the dry season.

Virginia Erosion and Sediment Control Program *or* ***VESCP***	A program approved by the [State Water Control] Board that has been established by a VESCP authority for the effective control of soil erosion, sediment deposition, and nonagricultural runoff associated with a land-disturbing activity to prevent the unreasonable degradation of properties, stream channels, waters, and other natural resources and shall include such items where applicable as local ordinances, rules, permit requirements, annual standards and specifications, policies and guidelines, technical materials, and requirements for plan review, inspection, enforcement where authorized in the ESC Act and its attendant [ESC and ESC Certification] regulations, and evaluation consistent with the requirements of the ESC Act and its attendant [ESC and ESC Certification] regulations.
Virginia Erosion and Sediment Control Program authority *or* ***VESCP authority***	An authority approved by the [State Water Control] Board to operate a Virginia Erosion and Sediment Control Program. An authority may include a state entity, including the Department; a federal entity; a district, county, city, or town; or for linear projects subject to annual standards and specifications, electric, natural gas and telephone utility companies, interstate and intrastate natural gas pipeline companies, railroad companies, or authorities created pursuant to § 15.2-5102 of the Code of Virginia.
VESCH	The Virginia Erosion and Sediment Control Handbook, latest edition.
Virginia Pollutant Discharge Elimination System (VPDES) permit *or* ***VPDES permit***	A document issued by the State Water Control Board pursuant to the State Water Control Law authorizing, under prescribed conditions, the potential or actual discharge of pollutants from a point source to surface waters and the use or disposal of sewage sludge.
VSWCB	The Virginia Soil and Water Conservation Board
Virginia Stormwater BMP Clearinghouse Committee *or* ***Committee***	A permanent stakeholder advisory group established by the department to establish procedures for board approval for evaluating BMPs for permitted use in Virginia and the conditions under which they may be permitted; for providing recommendations to the director regarding design specifications, use-designation levels, and pollutant removal credits for applicant requested BMPs; and for conducting such other activities related to BMP evaluation as may be assigned by the department.
Virginia Stormwater BMP Clearinghouse website	As is defined in 4VAC50-60-10 and for the purposes of this Part may be referred to as "Website" and is located at http://www.vwrrc.vt.edu/swc.

Virginia Stormwater Management Act or **Act**	Article 2.3 (§ 62.1-44.15:24 et seq.) of Chapter 3.1 of Title 62.1 of the Code of Virginia.
Virginia Stormwater BMP Clearinghouse website	A website that contains detailed design standards and specifications for control measures that may be used in Virginia to comply with requirements of the Virginia Stormwater Management Act and associated regulations and that is jointly created by the department and the Virginia Water Resources Research Center, subject to advice from a permanent stakeholder advisory committee.
Virginia Stormwater Management Handbook	A collection of pertinent information that provides general guidance for compliance with the [Virginia Stormwater Management] Act and associated regulations and is developed by the department with advice from a stakeholder advisory committee.
Virginia Stormwater Management Program *or* ***VSMP***	A program approved by the [State Water Control] Board after September 13, 2011, that has been established by a VSMP authority to manage the quality and quantity of runoff resulting from land-disturbing activities and shall include such items as local ordinances, rules, permit requirements, annual standards and specifications, policies and guidelines, technical materials, and requirements for plan review, inspection, enforcement, where authorized in the SWM Act and associated regulations, and evaluation consistent with the requirements of the SWM Act and associated regulations.
Virginia Stormwater Management Program authority *or* ***VSMP authority***	An authority approved by the [State Water Control] Board after September 13, 2011, to operate a Virginia Stormwater Management Program or, until such approval is given, the Department. An authority may include a locality; state entity, including the Department; federal entity; or, for linear projects subject to annual standards and specifications in accordance with subsection B of § 62.1-44.15:31 of the Code of Virginia, electric, natural gas and telephone utility companies, interstate and intrastate natural gas pipeline companies, railroad companies, or authorities created pursuant to § 15.2-5102 of the Code of Virginia. Prior to approval, the Board must find that the ordinances adopted by the locality's VSMP authority are consistent with the Act and the [Virginia Stormwater Management Regulations] including the General Permit for Discharges of Stormwater from Construction Activities [Part XIV (4VAC50-60-1100 et seq.) of the [Virginia Stormwater Management Regulations].
Virginia Stormwater Management Regulations	Section 4VAC50-60 et seq. of the Virginia Administrative Code.

Virginia Technology Assessment Protocol for Evaluating Stormwater Manufactured Treatment Devices *or* ***VTAP***

The assessment process for approving and listing MTDs on the Virginia Stormwater BMP Clearinghouse website. The testing protocol is intended for volume-based and flow-rate based stormwater MTDs and is not suitable for all stormwater treatment practices. This testing protocol does not apply to non-proprietary BMPs, and the protocol is not for use in the evaluation of erosion and sediment control technologies or products.

VSMP application *or* ***application***

The standard form or forms, including any additions, revisions or modifications to the forms, approved by the administrator and the [State Water Control] Board for applying for a VSMP permit.

W

Warm season grasses

In Virginia, a grass which experiences most of its growth during the warm summer months (June, July and August) of the year. The onset of freezing temperatures turns warm season grasses brown and they remain dormant until late spring. They are significantly more heat and drought tolerant than cool season grasses.

Warm water stream or **warm water fishery**

A stream that supports a warm water fishery, usually including largemouth bass and sunfish; spawning temperatures usually are in excess of 21 degrees C (70 degrees F).

Wash

Flood plain or active channel of an ephemeral stream, usually in recent alluvium.

Wasteload allocation or wasteload or WLA

The portion of a receiving surface water's loading or assimilative capacity allocated to one of its existing or future point sources of pollution. WLAs are a type of water quality-based effluent limitation.

Water balance or **water budget**

A determination of water surpluses and deficits in a given area or through a given facility. Includes inputs such as precipitation; outputs such as evapotranspiration, infiltration, and runoff; and storage within the system.

Water quality

A term used to describe the chemical, physical and biological characteristics of water released to a beneficial use (usually pertaining to its suitability for a particular purpose).

Water quality standards *or* ***WQS***

Provisions of state or federal law that consist of a designated use or uses for the waters of the Commonwealth and water quality criteria for such waters based on such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water, and serve the purposes of the State Water Control Law (§ 62.1-44.2 et seq. of the Code of Virginia), the [Virginia Stormwater Management] Act (§ 62.1-44.15:24 et seq. of the Code of Virginia), and the CWA (33 USC § 1251 et seq.).

Water quality volume	The volume equal to the first one-half inch of runoff multiplied by the impervious surface of the land development project.
Water resources	The supply of groundwater and surface water in a given area.
Water surface profile	Longitudinal profile assumed by the surface of a stream flowing in an open channel; hydraulic grade line.
Water table	The upper surface of free groundwater or that level below which the soil is completely saturated with water; the locus of points in soil water at which the hydraulic pressure is equal to atmospheric pressure.
Water year	The 12-month period, October 1 through September 30, designated by the calendar year in which it ends (used with streamflow data and analyses).
Watercourse	A natural channel with well-defined bed and banks within which concentrated water flows, either continuously or intermittently. A watercourse is continuous in the direction of flow and may extend laterally beyond the definite banks to include overflow channels contiguous to the ordinary channel. The term does not include artificial channels such as canals and drains, except natural channels trained or restrained by the works of man. Neither does it include depressions or swales through which surface or errant waters pass.
Waters of the United States	(a) All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate wetlands; (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) that are or could be used by interstate or foreign travelers for recreational or other purposes; (2) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) that are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial sea; and (g) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waster treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11 (m) that also meet the criteria of this definition) are no waters of the United States. This exclusion applies only to manmade bodies of water that neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States.

Watershed	A defined land area drained by a river or stream, karst system, or system of connecting rivers or streams such that all surface water within the area flows through a single outlet. In karst areas, the karst feature to which the water drains may be considered the single outlet for the watershed. (also see **Drainage basin**)
Watershed area	All land and water within the confines of a drainage divide. Also, a land area, water area, or both from which runoff flows to a common point.
Watershed-based zoning	An alternative zoning technique, whereby the intensity of development within a watershed or sub-watershed is at least partially based on the ultimate percentage of impervious cover and the desired level of stream protection.
Watershed lag or **watershed lag time**	The time from the center of mass of effective rainfall to the peak of the hydrograph for that rainfall event.
Watershed management or **watershed management plan**	The use, regulation and treatment of water and land resources of a watershed to accomplish stated objectives. It typically involves coordination of land development goals with water quantity/quality management goals, and it may involve multi-jurisdictional collaboration to identify and address cross-boundary flooding and water quality problems.
Watershed planning	Formulation of a comprehensive plan to use and treat water and land resources efficiently throughout a watershed.
Waterway	(1) That portion of a watercourse that is actually occupied by water. (2) A navigable inland body of water.
Wave	(1) An oscillating movement of water on or near the surface of standing water in which a succession of crests and troughs advance while particles of water follow cyclic paths without advancing. (2) The motion of water in a flowing stream so as to develop the surficial appearance of a wave.
Wave height	The vertical distance between a wave crest and the preceding trough.
Wave length	The horizontal distance between similar points on two successive waves (e.g., crest to crest or trough to trough), measured in the direction of wave travel.
Wave period	The time in which a wave crest travels a distance equal to one wave length. This can be measured as the time for two successive wave crests to pass a fixed point.
Weephole	A hole in a wall, invert, apron, lining, or other solid structure to relive the pressure of groundwater.

Weir	A low overflow dam, sill or other device placed in an open channel to regulate or measure the flow of water.
Weir notch	The opening in a weir for the passage of water.
Well	(1) An artificial excavation for withdrawal of water from underground storage. (2) The upward component of velocity in a stream.
Wellhead protection area	An identified area with restricted or modified land use practices designed to protect the well water supply area from the introduction of contaminants.
Wet pond	A stormwater impoundment designed to always contain water, providing both water quantity management and water quality improvement. (also see **Retention basin**)
Wet storage	The volume with a basin or impoundment (e.g., an extended detention basin) that is allotted for pooling or ponding stormwater runoff.
Wet swale	An open drainage channel or depression, explicitly designed to retain water or intercept groundwater for water quality treatment; a linear constructed wetland.
Wet weather flow	A combination of dry weather flows, storm sewer infiltration and inflow, and stormwater runoff occurring as a result of rainstorms.
Wetlands	Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.
Wetted perimeter	The length of the wetted contact between a liquid and its containing conduit, measured along a plane at right angles to the direction of flow; the length of the wetted surface of a natural or manmade channel.
Whole effluent toxicity	The aggregate toxic effect of an effluent measured directly by a toxicity test.
Windbreak	(1) A barrier fence or line of trees to break or deflect the velocity of wind. (2) Any device designed to block wind flow and intended for protection against any ill effects of wind, particularly wind erosion.
Windwave	A wave generated and propelled by wind blowing along the water surface.

X

Xeriscaping — Environmental design and landscaping using various methods for minimizing the need for water use.

Y

Young — Immature, said of a stream on a steep gradient actively scouring its bed toward a more stable grade.

Z

Zero lot line — The location of a structure on a lot in such a manner that one or more sides of the structure rests directly on a lot line.

Zero order streams or **zero order channels** — Channels with defined banks that emanate from a hollow or ravine with convergent contour lines and represent the uppermost definable channels that possess temporary or intermittent flow.

Zoning or **zoning ordinance** — An ordinance based on the police power of government to protect the public health, safety and general welfare of the population. It may regulate the type of use and intensity of development of land and structures to the extent necessary for a public purpose. Requirements may vary among various geographically defined areas called zones. Regulations generally cover such items as height and bulk of buildings, density of dwelling units, off-street parking, control of signs and used of land for residential, commercial, industrial, institutional or agricultural purposes. A zoning ordinance is one of the major methods of implementation of a local comprehensive plan.

A.3.0. REFERENCES

CNMI Division of Environmental Quality (DEQ) and the Guam Environmental Protection Agency (GEPA). 2000. *CNMI/Guam Stormwater Management Manual, Volume I (Draft)*. Prepared by the Horsley Witten Group, Inc. for the Commonwealth of the Northern Mariana Islands and the Territory of Guam.

Chesapeake Stormwater Network. 2009. *Stormwater Design Guidelines for Karst Terrain in the Chesapeake Bay Watershed, Version 2*. Baltimore, MD.

Code of Virginia. *Virginia Erosion and Sediment Control Law.* Article 4 (§62.1-44.15:51 et seq.) of Chapter 5 of Title 10.1. http://www.dcr.virginia.gov/soil_and_water/documents/eslawrgs.pdf

Code of Virginia. *Virginia Stormwater Management Act.* Article 2.3 (§ 62.1-44.15:24 et seq.) of Chapter 3.1 of Title 62.1. http://www.dcr.virginia.gov/soil_and_water/documents/vaswmlaw.pdf

EnviroCert International, Inc. *Certified Professional in Stormwater Water Quality (CPSWQ) Exam Review Study Guide*. (2008)

Maryland Department of the Environment (MDE). 2000. *Maryland Stormwater Design Manual*. Baltimore, MD.

Minnesota Pollution Control Agency (MPCA). 2006. *Minnesota Stormwater Manual, Version 1.1*. Prepared by the Minnesota Stormwater Steering Committee. St. Paul, MN.

Northern Shenandoah Valley Regional Commission (NSVRC). 2005. *Northern Shenandoah Valley Regional LID Manual*. Prepared by Engineering Concepts, Inc. for the NSVRC. Front Royal, VA.

Pennsylvania Department of Environmental Protection (PA DEP). 2006. *Pennsylvania Stormwater Best Management Practices Manual*. Bureau of Watershed Management. Harrisburg, PA.

Puget Sound Action Team. May 2005. *Low Impact Development: Technical Guidance Manual for Puget Sound.* Olympia, WA.

Soil and Water Conservation Society. 2006. *Environmental Management Glossary, Fourth Edition*. Ankeny, Iowa.

Vermont Agency of Natural Resources. 2002. *Vermont Stormwater Management Manual*. Waterbury, VT.

Virginia Administrative Code (of Regulations). *Virginia Erosion and Sediment Control Regulations.* 4VAC50-30-10 et seq.
http://www.dcr.virginia.gov/soil_and_water/documents/eslawrgs.pdf

Virginia Administrative Code (of Regulations). *Virginia Stormwater Management Regulations.* 4VAC50-60-10 et seq. http://www.dcr.virginia.gov/soil_and_water/documents/vaswmregs.pdf

Virginia Department of Conservation and Recreation (DCR). 1999. *Virginia Stormwater Management Handbook.* Richmond, VA.

Virginia Department of Conservation and Recreation (DCR). 1992. *Virginia Erosion and Sediment Control Handbook* (Third Edition). Richmond, VA.