

Acronyms and Abbreviations

ALF: August Low Flow

CBIC: Chesapeake Bay Impact Crater

CWA: Clean Water Act

CWS: Community Water System

DCR: Virginia Department of Conservation and Recreation

DEQ: Virginia Department of Environmental Quality

DGIF: Virginia Department of Game and Inland Fisheries

DHR: Virginia Department of Historic Resources

DMTF: Virginia Drought Monitoring Task Force

FERC: Federal Energy Regulatory Commission

GWMA: Groundwater Management Area

GWPP: Groundwater Withdrawal Permitting Program

HUC: Hydrologic Unit Code

ICPRB: Interstate Commission on the Potomac River Basin

MGD: Million Gallons per Day

MGY: Million Gallons per Year

NOAA: National Oceanic and Atmospheric Administration

NWS: National Weather Service

ORSANCO: Ohio River Valley Water Sanitation Commission

Rappahannock RBC: Rappahannock River Basin Commission

Rapidan RBC: Rapidan River Basin Commission

RRBBC: Roanoke River Bi-State Commission

SDWA: Safe Drinking Water Act

SSU: Self-Supplied Users

SWCB: State Water Control Board

SWMA: Surface Water Management Area

TMDL: Total Maximum Daily Load

USACE: United States Army Corp of Engineers

USEPA: United States Environmental Protection Agency

USFWS: United States Fish and Wildlife Service

USGS: United States Geological Survey

VDH: Virginia Department of Health

VDH-ODW: Virginia Department of Health Office of Drinking Water

VMRC: Virginia Marine Resources Commission

VPA: Virginia Pollution Abatement Program

WWPP: Virginia Water Protection Permit

VWUDS: Virginia Water Use Database System

VWWR: Virginia Water Withdrawal Reporting

WSP: Water Supply Plan

Glossary

7Q10 is the lowest seven-day average flow that occurs (on average) once every 10 years.

Aquifer as defined by 9VAC20-50-40 means a “water-bearing geologic formation, group of formations, or part of a formation that is capable of yielding a significant amount of groundwater to wells or springs. An aquifer is unconfined (water table) or confined (artesian) according to whether the upper surface of the water is at atmospheric pressure or at greater than atmospheric pressure.” Derived from the two Latin words *aqua*, or “water,” and *ferre*, meaning “to bear” or “to carry,” aquifers literally carry water underground. Aquifers may be comprised of a layer of sand or gravel, sandstone or cavernous limestone, a rubbly top or base of lava flows, or even a large body of massive rock such as fractured granite with sizable openings. Aquifers are replenished by the seepage or infiltration of precipitation falling on the land.

Assimilative capacity means the ability of a body of water to cleanse itself; its capacity to receive waste waters or toxic materials without harmful effects and without damage to aquatic life or humans.

August Low Flow (ALF) is a critical summer flow for fish. August is considered by aquatic biologists to be a critical month for many riverine species, with a high potential for negative impacts due to flow reductions during this time. Recent research support this hypothesis, showing evidence that decreases in flows as reflected in a stream’s ALF value may result in a measurable loss of biodiversity. The ALF statistic is a good metric for evaluating water supply impacts because it is sensitive to the most common water supply flow alteration: surface water withdrawals for off-stream consumptive use.

Baseflow, or groundwater seepage into a stream channel, means the portion of streamflow that comes from the sum of deep subsurface flow and delayed shallow subsurface flow. During most of the year, streamflow is composed of both groundwater discharge and surface water runoff. When groundwater provides the entire flow of a stream, baseflow conditions are said to exist. Perennial streams flow year-round because groundwater remains above the streambed throughout the year. Intermittent streams, those that flow only part of the year, generally from spring to mid-summer or only during wet periods, occur when the water table rises above or falls below the base of a stream channel in response to wet or dry weather conditions. The amount of baseflow a stream receives is closely linked to the permeability of rock or soil in the watershed.

Baseline Flow Budget is a critical tool in water supply engineering. This budget is estimated by constructing a model of flows through a river system without including withdrawals, discharges, or detainment of water by lakes or reservoirs. This budget reveals the quantity, quality, and timing of flows

through river systems and allows the determination of total capacity of the stream, assesses system stress due to water supply activities, and sets reasonable expectations for potential beneficial uses.

Beneficial use as defined by 9VAC25-780-30 relates to both in-stream and off-stream uses. In-stream beneficial uses include, but are not limited to, the protection of fish and wildlife habitat, maintenance of waste assimilation, recreation, navigation, and cultural and aesthetic values. Off-stream beneficial uses include, but are not limited to, domestic (including public water supply), agricultural, electric power generation, and commercial and industrial uses.

Community water system (CWS) as defined by 9VAC25-780-30 means a waterworks that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents, and is regulated by the Virginia Department of Health Waterworks Regulation (12VAC5-590). This definition for CWS is identical to that of “community waterworks,” one of the three types of “waterworks” regulated by the VDH (12VAC5-590-10).

Consumptive use refers to water withdrawn that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment.

Cumulative impact analysis means an assessment of the environmental impacts resulting from the incremental actions when added to other past, present, and reasonably foreseeable future actions.

Desalination means the process of removing salts, minerals, and dissolved solids from brackish, saline, or seawater.

Dendritic drainage patterns are the most common form of drainage system. In a dendritic system there are many contributing streams similar in form to the twigs of a tree, which are then joined together into the tributaries of the main river (the branches and trunk of the tree). Dendritic drainage patterns develop where the river channel follows the slope of the terrain, typically in V-shaped valleys, in areas of impervious and non-porous rock such as in the Appalachian Plateau Physiographic Province.

Estuary means a partly enclosed coastal body of brackish water with one or more rivers or streams flowing into it, and with a free connection to the open sea.

Evaporation is the process by which water changes from a liquid to a gas or vapor, representing the water loss from open bodies of water, such as lakes and reservoirs, wetlands, bare soil, and snow cover. Evaporation is the primary pathway water moves from a liquid state back into the water cycle as an atmospheric water vapor. Studies have shown that the oceans, seas, lakes, and rivers provide nearly 90 % of the moisture in the atmosphere via evaporation, with the remaining 10% being contributed by plant transpiration.

Evapotranspiration (ET) means the combined release of water from the earth's surface via evaporation plus transpiration from plants.

Groundwater as defined by 9VAC25-600-10 means "any water, except capillary moisture beneath the land surface in the zone of saturation or beneath the bed of any stream, lake, reservoir or other body of surface water within the boundaries of this state, whatever may be the subsurface geologic structure in which such water stands, flows, percolates or otherwise occurs."

Groundwater discharge means the movement of water out of an area of saturated soil. Groundwater discharges into streams when the water table, or the top of groundwater saturation, rises above the streambed.

Groundwater recharge is a hydrologic process where water moves downward from surface water to groundwater. This process occurs both naturally and through artificial processes where rainwater and/or reclaimed water is routed to the subsurface. Groundwater is recharged naturally by the infiltration of rain and snow melt and to a smaller extent by surface water. Recharge may be impeded by human activities such as paving, land development, or logging, which can result in loss of topsoil and reduced water infiltration.

Groundwater management area means a geographically defined groundwater area in which the Virginia State Water Control Board has deemed the levels, supply, or quality of groundwater to be adverse to public welfare, health, and safety.

Human consumption as defined by 9VAC25-610-10 means the use of water to support human survival and health, including drinking, bathing, showering, cooking, dishwashing, and maintaining hygiene.

Hydraulic fracturing means the fracturing of rock by a pressurized liquid, which can occur naturally, or be induced for other purposes including the release of natural gases contained in the rock. Induced hydraulic fracturing, known as hydrofracturing or fracking, is a technique in which water is mixed with sand and chemicals, and then injected at high pressure into a wellbore to create small fractures along which fluids such as gas, petroleum, uranium-bearing solution, and brine water may migrate to the well.

Hydrologic (or water) cycle means the natural sequence through which water is transferred across or beneath the earth's surface and between the earth and the atmosphere.

Hydrologic units are surface water drainage areas that are delineated so as to nest into a multi-level hierarchical drainage system. Aside from the surface waters that are collected within the boundary of a hydrologic unit, it may also accept water from one or more points outside of the unit's boundary. Hydrologic units may include associated surface areas whose drainages do not connect, thus resulting in

multiple outlet points. This is usually the case with coastal units such as those containing multiple outlets to the Chesapeake Bay or Atlantic Ocean.

Hydrologic Unit Code (HUC) refers to a unique code assigned to hydrologic units in a hierarchical system initially created by the USGS to provide a standardized method of cataloging watersheds in the United States. In 2006, new hydrologic unit delineation standards officially expanded the hierarchy from four to six levels with HUCs 2 to 12 digits in length. A HUC8 is classified as a “subbasin” level whose average unit size is 703 square miles. The HUC8 classification is used in this State Plan, as it is a convenient, reasonably-sized, and widely understood unit of watershed division for the purpose of reporting the cumulative impact analysis results that summarize resource availability, challenges, and strategies.

Hydrology means the study of the waters of the earth on and below the surface of the planet. Hydrology also involves the study of the various properties of water and their relationship with the living and nonliving environment.

Hydrogeology is the area of geology that deals with the distribution and movement of groundwater in and through the soil and rocks of the earth’s crust.

Infiltration means the process by which water on the surface enters the soil.

In-stream flow means the state in which water remains in its natural course (e.g., streams, creeks, or rivers) as opposed to water that has been diverted artificially for other purposes (e.g., irrigation, reservoirs, drinking water, etc.).

Karst topography as defined by 9VAC20-50-40 means a type of topography that may form over limestone, dolomite, or gypsum formations by dissolving or solution, and that is characterized by closed depressions or sinkholes, caves, and underground drainage.

Local government as defined by 9VAC25-780-30 means a city, incorporated town, or county.

Local water supply plan means a water supply plan developed by and pertaining to a single local government.

Minimum in-stream flow means the amount of water flow necessary to preserve stream values.

Non-consumptive use as defined by 9VAC25-220-10 means the use of water withdrawn from a stream in such a manner that it is returned to the stream without substantial diminution in quantity at or near the point from which it was taken and would not result in or exacerbate low flow conditions.

Nonpoint source pollution as defined by 9VAC25-870-10 means 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.

Off-stream use involves the withdrawal or diversion of water from a surface water or groundwater source for residential, industrial, agricultural, energy development, or other purposes.

Percolating water means water which seeps or filters through the ground without any definite channel and is not a part of the flow of any waterway.

Permeable refers to a rock or membrane that can be permeated, or penetrated, especially by liquids or gases.

Physiographic province means a region or area with similar landforms that are distinctly different from landforms found in adjacent areas. Virginia has five physiographic provinces: the Appalachian Plateau, Valley and Ridge, Blue Ridge, Piedmont, and the Coastal Plain.

Point source as defined by 9VAC25-31-10 means 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.

Potable water as defined by 9VAC25-740-10 means water fit for human consumption and domestic use that is sanitary and normally free of minerals, organic substances, and toxic agents in excess of reasonable amounts for domestic usage in the area served and normally adequate in quantity and quality for the minimum health requirements of the persons served.

Precipitation is water released from clouds in the form of rain, freezing rain, sleet, snow, or hail. Precipitation is the primary connection in the water cycle providing for the delivery of atmospheric water to the earth.

Planning period as defined by 9VAC25-780-30 means the 30- to 50-year time frame used by the locality or region to project future water demand in accordance with 9VAC 25-780-100 B.

Reclaimed water as defined by 9VAC25-740-10 means water resulting from the treatment of domestic, municipal, or industrial wastewater that is suitable for water reuse that would not otherwise occur.

Regional water plan as defined by 9VAC25-780-30 means a water plan developed and submitted by two or more cities or counties or both. A town and an adjacent county may develop a regional water plan. Two or more towns may develop and submit a regional plan where the plan results in the proposed development of future water supply projects that supply the water supply demands of the affected towns. Such plans developed by two or more towns may be included in regional water plans developed and submitted by counties or cities. Regional water plans shall be developed and submitted in conjunction with all public service authorities operating community water systems within the regional planning unit, if applicable.

Reuse or water reuse as defined by 9VAC25-740-10 means the use of reclaimed water for a direct beneficial use, an indirect potable reuse, an indirect non-potable reuse, or a controlled use.

Riparian area or zone is that area of land immediately adjacent to streams, lakes, or other surface waters.

Riparian land as defined by §62.1-104 means land which is contiguous to and touches a watercourse.

Riparian owner or landowner as defined by §62.1-104 means an owner of riparian land.

Riparian (water) rights refer to a system for allocating water among those who possess land adjacent to a body of water. Having its origins in English common law, under the riparian principle, landowners whose property adjoins a body of water such as a navigable river, bay, creek, or ocean, have the right to make reasonable use of it as it flows through or over their property.

Safe yield of public water supply means the highest volumetric rate of water that can be withdrawn by a surface water withdrawal during the Drought of Record since 1930, including specific operational conditions established in a Virginia Water Protection permit, when applicable.⁶

Self-supplied user (SSU) as defined by 9VAC25-780-30 means any person making a withdrawal of surface water or groundwater from an original source (e.g., a river, stream, lake, aquifer, or reservoir fed by any such water body) for his own use. Self-supplied users do not receive water from a community water system. Self-supplied users are further described in Section 9VAC25-780-70 of the Water Supply Plan Regulation as follows:

Agricultural self-supplied users (AG) are those agricultural operations that use more than 300,000 gallons of surface water or groundwater per month for irrigation or non-irrigation purposes.

⁶ Proposed definition February 2015

Large self-supplied users (SSU_LG) are those self-supplied users of more than 300,000 gallons per month of surface water or groundwater for nonagricultural uses, including but not limited to commercial, manufacturing, mining, and hydropower.

Small self-supplied users (SSU_SM) are those residences and businesses that are self-supplied by individual wells withdrawing less than 300,000 gallons of water per month.

Service area as defined by 9VAC25-780-30 means the geographical area served by a community water system.

Springs are water resources formed when the side of a hill, valley bottom, or other excavation intersects a flowing body of groundwater at or below the water table. Although they can be formed in any type of rock, springs are more prevalent in limestone and dolomite formations because of their fractal nature and their propensity to dissolve in rainfall that is weakly acidic. As the rock dissolves and fractures, spaces can form that allow water to flow. If the water flow is horizontal, it can reach the land surface and result in a spring.

Stormwater as defined by §62.1-44.15 means 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 runoff is generated when precipitation from rain and snow melt flows over land or impervious surfaces (sidewalks, parking lots, rooftops) and does not percolate into the ground. Traditional definitions of stormwater have characterized it as non-point source runoff; however, a great deal of urban and industrial stormwater is discharged into surface waters through storm sewers, ditches, channels, or other conveyances which are considered point sources. As stormwater runoff flows overland, it accumulates debris, chemicals, sediment, or other pollutants that could adversely affect water quality if it is discharged into surface water bodies untreated.

Streamflow refers to the amount of water flowing in a river. Streamflow and the water quality of a river are affected by whatever is happening in the land area “above” the point where a river flows out of a watershed. Natural mechanisms that cause changes in streamflow include runoff from rainfall and snowmelt, evaporation from soil and surface water bodies, transpiration, groundwater discharge, and sedimentation of lakes and wetlands. Human-induced mechanisms include surface water withdrawals and inter- or intra-basin diversions; river flow regulation for hydropower and navigation, construction, removal, and sedimentation of reservoirs and stormwater detention ponds; stream channelization and levee construction; drainage or restoration of wetlands; land use changes such as urbanization that alter erosion, infiltration, overland flow, or evapotranspiration rates; wastewater outfalls; irrigation wastewater return flow, etc.

Surface water as defined by 9VAC25-210-10 means any water in the Commonwealth, except

groundwater as defined in §62.1-254 of the Code of Virginia, which wholly or partially are within the Commonwealth or bordering the Commonwealth.

Surface water withdrawal as defined by 9VAC25-210-10 means a removal or diversion of surface water from a stream, spring, and/or lake/pond in Virginia or from the Potomac River.

Sustainability means using, developing, and protecting resources in a manner that enables people to meet current needs, and provides the ability for future generations to also meet future needs. Additionally, sustainability is defined in terms of maintaining the "beneficial uses" that are considered to be essential to the wellbeing of the Commonwealth's human and natural resources. These beneficial uses are protected by law and include the protection of fish and wildlife habitat, maintenance of waste assimilation, recreation, navigation, cultural and aesthetic values, public water supply, agricultural uses, electric power generation, and commercial and industrial uses.

Topography means the arrangement of the natural and artificial physical features of an area.

Transpiration is the release of water from living plant surfaces. Transpiration rates can vary widely depending upon weather conditions such as temperature, humidity, sunlight availability and intensity, precipitation, soil type and saturation, root depth, wind speed, density and type of vegetative cover, land slope, reflective land-surface characteristics, and the season of the year. During dry periods, transpiration can contribute to the loss of moisture in the upper soil zone which can effect vegetation and crops.

Water budget is an accounting of the flow of water into and out of a system. The water budget of a place or system, whether it is an agricultural field, a watershed, or a continent, can be determined by calculating the input, output, and storage changes of water at the earth's surface over a period of time.

Water demand management as defined by 9VAC25-780-30 means plans for water conservation, reuse, and reducing unaccounted for water losses contained in a local or regional water supply planning program.

Water resource management means the activity of planning, developing, distributing, and managing the optimum use of water resources.

Water sources as defined by 9VAC25-780-30 means wells, stream intakes, and reservoirs that serve as sources of water supplies.

Water supply planning area means the geographical area as defined by local government boundaries that is included in a local or regional water supply plan.

Watershed as defined by 4VAC5-15-10 means a drainage area or basin in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation.

Waterworks as defined by 12VAC5-590-10 means a system that serves piped water for drinking or domestic use to (i) the public, (ii) at least 15 connections, or (iii) an average of 25 individuals for at least 60 days out of the year. The term "waterworks" shall include all structures, equipment and appurtenances used in the storage, collection, purification, treatment and distribution of pure water except the piping and fixtures inside the building where such water is delivered (see Article 2 (§ [32.1-167](#) et seq.) of Chapter 6 of Title 32.1 of the Code of Virginia).

Well as defined by 9VAC25-610-10 means any artificial opening or artificially altered natural opening, however made, by which groundwater is sought or through which groundwater flows under natural pressure or is intended to be withdrawn.

Wetland means a transitional area on the landscape between dry land and open water or streams, often exhibiting characteristics of both terrestrial and aquatic habitats. State Water Control Law (§ 62.1-44.3) and Virginia Water Protection Permit (VWP) Program regulations (9VAC25-210-10) define "State waters" as "all water, on the surface and under the ground, wholly or partially within or bordering the Commonwealth or within its jurisdiction, including wetlands." Further, "wetlands" are defined as "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." The definition of "wetlands" in state law mirrors the definition in the federal Clean Water Act.