



Stormwater Management for Homeowners Fact Sheet 6: Buffers

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This fact sheet is part of a series. Please refer to definitions in the glossary at the end of this fact sheet. Glossary terms are italicized on first mention in the text.

Introduction

When rain falls on *pervious surfaces*, like soil, mulch, and vegetative groundcovers, it soaks in through a process called *infiltration*. The water can be used by plants, or it can recharge underground water storage areas called *aquifers*.

When rain falls on *impervious surfaces*, like roads, driveways, and rooftops, it does not infiltrate. Instead, water quickly collects and flows off these surfaces to the nearest stream, river, pond, lake, reservoir, bay, sound, or ocean. Water that moves in this way is called *runoff* or *stormwater*. It carries *pollutants* with it, including fertilizer, pesticides, fluids from cars, *sediment* from bare soil areas, bacteria from animal waste, plant debris like leaves and grass clippings, and trash like plastic bottles and cigarette butts. The more area covered in impervious surfaces, the greater the amount of pollution and volume of runoff, which increases the likelihood of flooding, stream *erosion*, harm to wildlife and the environment, and degradation of water quality.

Stormwater best management practices, or *BMPs*, are tools for managing runoff. They reduce the speed and volume of runoff and clean up the pollutants in it. Homeowners can use different practices, like *rooftop redirection*, *rain barrels*, *permeable pavement*, *grass swales*, *rain gardens*, and *buffers*, in their landscapes to manage runoff at the source. This prevents large volumes of polluted

runoff from going into storm drains that flow directly into nearby water bodies. Some additional benefits of BMPs include improved drainage, a healthier and more attractive landscape, increased property value, wildlife food and habitat, improved water quality, and a cleaner environment.

What Is a Buffer?

Buffers are a simple and inexpensive way of managing stormwater and the pollutants it carries. A buffer is an area of vegetation next to the water's edge that protects water quality by slowing runoff and filtering out pollutants and sediment (see figure 1). The terms "vegetated," "conservation," and "riparian" are often used to describe buffers. Buffers can also be called "buffer zones" or "strips."

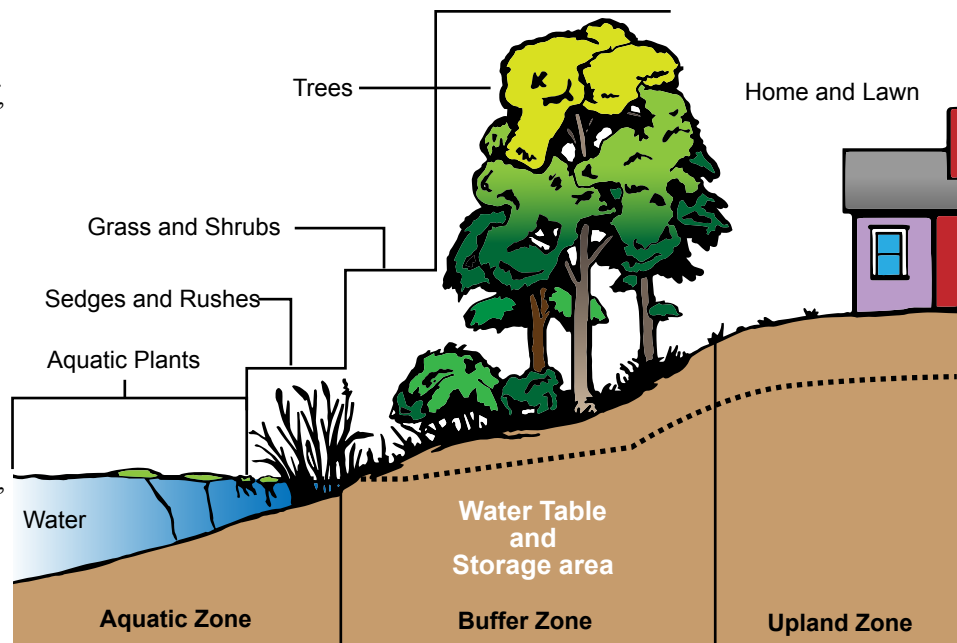


Figure 1. Cross section of a buffer.

Where Can a Buffer Be Used?

Buffers are very adaptable and can be used next to any water body, including ditches, streams, rivers, lakes, reservoirs, *stormwater ponds*, the Chesapeake Bay, sounds, or the ocean. They can be formally landscaped or they can be natural — or anywhere in between — and should be designed to blend with the surrounding landscape. They can be used in flat or sloped areas, sun or shade, sandy or clayey soil, and next to fresh or brackish/salt water. Buffers can be part of a *living shoreline* system and can be connected to *wetlands*. Each site is different, so a site evaluation is recommended to make sure the right plants are selected and installed correctly so the buffer will work properly.

A site evaluation should include:

- Uses of the water and adjacent land.
- Type of water (fresh or brackish/salt).
- Steepness of slope.
- Erosion on the slope or at the water's edge.
- Existing plants, if any.
- Amount of sun or shade.
- Amount of wind (this is important for bay or ocean sites).
- Amount of runoff flowing into the buffer area.

How Do Buffers Work?

Buffers protect water quality by managing runoff from impervious surfaces and disturbed areas in surrounding and upslope lands. Activities like tilling, construction, and fertilizer or pesticide applications increase the potential for pollutants in runoff. Buffers slow down and spread out runoff, filter pollutants, and trap sediment. They have naturally occurring or planted vegetation, including perennials, grasses, shrubs, and trees. The plants, soil, and microorganisms in the soil serve as a biofilter; they use pollutants or break them down into harmless components. The thick plant canopies and root systems trap sediment. The overall runoff amount is reduced, and the runoff is cleaner when it flows into the receiving water body.

Buffers do many other things, including:

- Stabilize the shoreline and prevent erosion.
- Provide food and habitat for wildlife, and create green corridors for wildlife movement.
- Add visual and plant diversity to the landscape.

- Reduce and moderate flooding.
- Create shade to lower water temperature.

Buffers are unique to each site. They can range in width from 5 feet to 300 feet. The wider the buffer, the more effective it is, but any size buffer is better than none.

Sometimes an entire property can be considered part of the buffer. Buffer width is usually determined by property use(s) or by a delineating feature such as the top of the slope or the edge of a turf area. Buffer width often varies as it follows along or around a water body and especially if it crosses property lines, for example, homes around a stormwater pond. Buffers are frequently designed with views or pathways through them. They have the biggest impact on improving water quality for the least amount of money, effort, and long-term maintenance.

Plants for Buffers

A planting list should include:

- Plants that tolerate wet and dry conditions. Plants closer to the water's edge will need to tolerate wet or periodically wet conditions, while plants farther upslope will need to tolerate dryer conditions. Plants in buffers adjacent to brackish water should also be tolerant of salt from the air and water, for example: buffers along tidal wetlands, the Chesapeake Bay, or the Atlantic Ocean.
- Plants that have wildlife food or habitat value: flowers for pollinators; berries for birds and other animals; different canopy heights; leaves, bark, and branches for nesting.
- A mix of *herbaceous* and *evergreen* plants, groundcovers, perennials, shrubs, and trees. A variety is important for seasonal interest, to support wildlife, and because different plants filter pollutants differently.
- Native and/or non-native plants that are adapted to the local environment and the specific site conditions. Pick the best non-invasive plant for the location.

Space and install plants according to their mature size. Groundcovers and perennials should be spaced so that their canopies will grow together and cover the ground to minimize weeds — usually 18 to 24 inches apart. Shrubs should be planted so their canopies touch but do not compete with each other. For example, inkberry shrubs that grow 4 feet wide should be planted 4 feet apart on center. Several of the resources listed include plant lists.

Spread a 3-inch layer of organic mulch (pine bark, shredded hardwood, or pine straw) around plants when they are first planted. Mulch provides organic matter that supports beneficial microorganisms and improves water infiltration so plant roots establish quickly. It also prevents weeds from competing with the desirable plants.

Cost

Costs for buffers are generally very low unless modifications such as grading or shoreline stabilization are needed. A buffer could be as easy and inexpensive as not mowing to the water's edge and letting existing plants grow and fill in on their own. Or it can be quite expensive, requiring permits, engineers, and labor for site modifications such as grading, terracing, erosion correction, or coir log (coconut fiber) installation for erosion prevention. Each buffer is unique to the specific site, and many different factors can influence the final price. They include:

- Permits cost time and money and are usually necessary if the buffer is above a certain size; requires tree removal; includes a bulkhead, riprap, or pier; or is in a protected area (Resource Protection Area [RPA] or Chesapeake Bay Preservation Area [CBPA]). Check local jurisdictions and regulations.
- Design costs to blend the buffer with the surrounding landscape style or to address site-specific conditions.
- Fresh or brackish water changes the plant selection. Salt-tolerant plants require very specific planting locations and are often harder to find or more expensive.
- Length and width of the buffer; larger could mean more plants or maintenance.
- Labor for slope modifications like grading, terracing, coir log installation, and planting.
- Plant species and numbers of plants.
- Maintenance like mowing and managing invasive species.

Many homeowners like to install their own buffers, which significantly reduces the cost. Using plants that are propagated out of the surrounding landscape or that are purchased at local gardening organization sales can also help reduce overall costs. Numerous resources are available (see Resources section), including design guides, plant lists, places to see different buffers, and, in some areas, Virginia Cooperative Extension or other groups that offer buffer classes or workshops.

Some cities and counties offer incentive programs that encourage residential stormwater management practices. The incentives could include rebates, utility bill credits, or cost sharing for installation. Homeowners should contact their local stormwater, public works, or soil and water conservation office to find out about these programs.

Maintenance

Once established, buffers are considered low-maintenance parts of the landscape. Maintenance is done on an as-needed basis and includes:

- Plant in fall when plants are dormant so they will establish healthy roots over the winter for quick spring growth.
- Water plants when they are first planted if possible and in any long dry periods during establishment (usually once a week for the first six weeks).
- Remove weeds around newly planted plants to prevent competition and remove any invasive or undesirable species (see state or local invasive species lists).
- If it is a meadow-style buffer, mow at 6 to 12 inches high once a year in February or March to prevent tree seedlings and to maintain a dense plant cover.
- Periodically check for erosion, especially on slopes and at the water's edge, and correct the problem quickly.

Resources

Chesapeake Bay Foundation, "Forested Buffers: The Key to Clean Streams" – www.cbf.org/document-library/federal-affairs/Buffers-fact-sheet-stroud-0bb8.pdf

Chesapeake Bay Program, "How-To's and Tips" – www.chesapeakebay.net/action/howtotips

Chesapeake Conservation Landscaping Council, "The Eight Elements of Conservation Landscaping" – www.ChesapeakeLandscape.org

Chesapeake Stormwater Network, "Homeowner BMP Guide" – <https://chesapeakestormwater.net/homeowner-bmp-guide/>

Lynnhaven River NOW, "Lynnhaven River Buffer Restoration" – <https://lynnhavenrivernow.org/wp-content/uploads/2020/03/buffers.pdf>

Maryland Department of Natural Resources, "The Green Book for the Buffer" – http://dnr.maryland.gov/criticalarea/Documents/GreenBook_Buffer.pdf

National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, “What Is a Living Shoreline?” – <https://oceanservice.noaa.gov/facts/living-shoreline.html>

Virginia Cooperative Extension, “Best Management Practice” fact sheet series on urban stormwater management practices, 426-119 – 426-134, by D. Sample – <http://pubs.ext.vt.edu/>

Virginia Cooperative Extension, “Stormwater Management for Homeowners” fact sheet series, HORT-293P–HORT-298P, by L. Fox – <http://pubs.ext.vt.edu/>

Virginia Department of Conservation & Recreation, “Native Plants for Conservation, Restoration & Landscaping” – www.dcr.virginia.gov/natural-heritage/document/riparian-nat-plants.pdf

Virginia Institute of Marine Science, Center for Coastal Resources Management, “Living Shorelines” – www.vims.edu/ccrm/outreach/living_shorelines/index.php

“Field Guide to Virginia Salt and Brackish Marsh Plants” – <http://ccrm.vims.edu/publications/pubs/8x11brochureannotated2rh.pdf>

Glossary

Aquifer – A natural underground storage area for water.

BMP (best management practice) – An action or device meant to manage runoff.

Buffer – An area of vegetation next to the water’s edge that protects water quality by slowing runoff, filtering pollutants and sediment, providing infiltration, and stabilizing shorelines. Buffers also add plant diversity to the landscape and provide wildlife with food, habitat, and movement corridors.

Erosion – The loss of soil on property, often due to water flow.

Evergreen – A plant that keeps leaves throughout the year.

Grass swale – A graded, linear, shallow, open channel covered with plants, usually grass; used to slow down, spread out, and filter stormwater.

Herbaceous – Plants that have no woody stems and generally die back and are dormant over the winter.

Impervious surface – A surface that does not allow water to flow through it.

Infiltration – The process by which water enters the soil or other materials.

Living shoreline – A protected and stabilized shoreline that is made of natural materials such as plants, sand, or rock.

Permeable pavement – Pavement with a top layer that allows water to infiltrate due to spaces in the paving material or spaces between the pavers.

Pervious surface – A surface that allows water to flow through it.

Pollutants – Materials that have a negative impact on human or environmental health.

Rain barrel – A small collection tank installed at the end of a downspout to collect and temporarily store rainwater runoff from a roof for later use.

Rain garden – A planted shallow depression that temporarily holds runoff from impervious areas until it evaporates, is absorbed by plants, or infiltrates into the ground.

Rooftop redirection (disconnection) – A stormwater management practice that moves the runoff collected from rooftops through gutters and downspouts into the landscape where it can spread out, slow down, and infiltrate instead of moving the runoff directly into a storm drain system.

Runoff – Water that runs off impervious surfaces during rain events, often associated with urban areas. Runoff can also occur from pervious surfaces if the precipitation rate is greater than the infiltration rate. Also called “stormwater.”

Sediment – Soil, rock, or biological material particles formed by weathering, decomposition, and erosion.

Stormwater – Water that runs off impervious surfaces during rain events, often associated with urban areas. Also called “runoff.”

Stormwater pond – A pond that is used to temporarily hold and treat water pollution; used in residential developments to manage runoff from roads, driveways, and roofs.

Wetlands – Areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year. Also referred to as “marshes,” “bogs,” or “swamps.”

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