

Vegetated Buffers

Roads, parking lots, rooftops and other impervious surfaces, even mowed lawns, can prevent stormwater from infiltrating into the ground and increase surface runoff. This runoff often contains road salt, motor vehicle fluids, fertilizers, pesticides, and other pollutants.

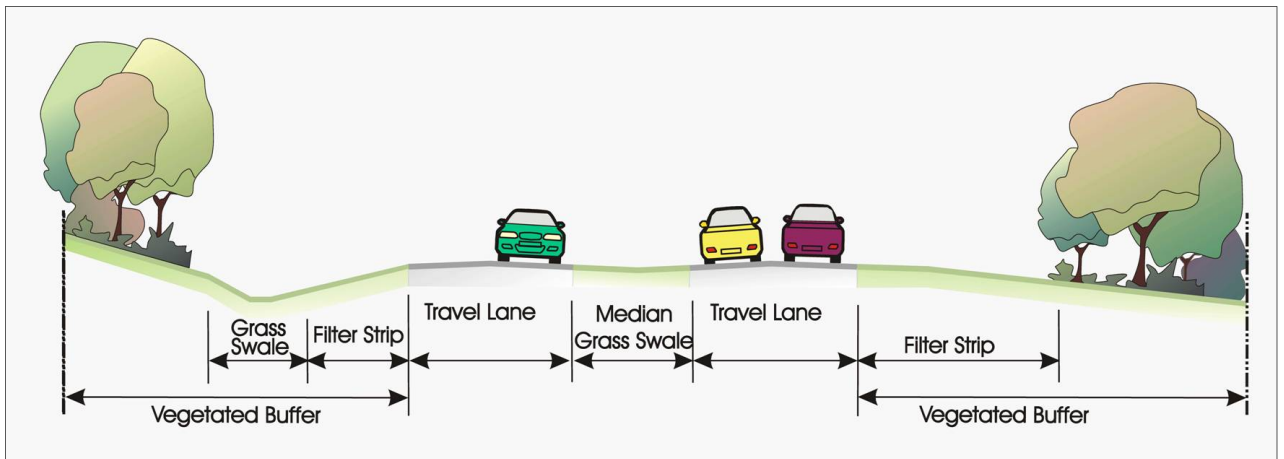
Traditionally, grass swales, filter strips, tree groves, and other types of vegetated buffers have been considered simple means to convey storm water. Recent research by the American Association of State Highway Transportation Officials (AASHTO), the Transportation Research Board, and others demonstrate that vegetated buffers are extremely effective as primary storm water treatment mechanisms. According to AASHTO, most roadway designs can support vegetated buffers.

Vegetated buffers provide a transition zone between water - streams, lakes, wetlands - and other human land use activities, including

roads, residential subdivisions, and commercial areas. Buffers are also complex ecosystems that serve as "living filters" by physically filtering pollutants from surface runoff. They help collect trash, trap animal waste, and filter and trap sediments by slowing down the velocity of stormwater runoff. Vegetative buffers also work underground, filtering pollutants through soil and root systems and allowing for more constant water level and temperature through groundwater recharge.

How do Vegetated Buffers Work?

Sediment Filter. Several pollutants are known to bond to sediment particles, so capturing them is especially important. Particulates are a major conduit for pollutants such as phosphorous, bacteria, petrochemicals, and heavy metals. In addition, phosphorus and nitrogen from fertilizer, detergents, and animal waste can become pollutants in excessive amounts. Sediment can also scour stream banks, causing



Existing or constructed vegetated buffers can help control runoff pollution from roadways

Source: American Association of State Highway Transportation Officials

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erosion and more sediment in the water column. Sediment deposits can also smother habitat and developing fish eggs, and build up to a point where they lower flood storage capacity.

Nutrient Transformer and Sink. As much as 80-85 percent of phosphorous in runoff can be captured when sediment is trapped in a buffer. This includes capturing sediment on the surface, filtering the water as it percolates through the soil, and absorbing soluble phosphorous through root systems.

Water Level. Trees along the buffer zone cast their shade over the water and keep it cool for fish and other aquatic species, which is crucial in maintaining cooler water temperatures. Higher temperatures cannot hold oxygen as well as lower temperatures, and this harms fish and other aquatic species. A few degrees difference in water temperature can have a major effect on fish survival.

Temperature Regulator. By slowing the velocity of runoff and aiding infiltration through the soil, vegetative buffers also help reduce flooding and recharge subsurface and groundwater flow. This allows for a more gradual recharge of the water body, helping maintain water levels during the driest times of the year. Also, because water flows through the ground more slowly, it is cooled by the soil, reaching the water body at a more natural temperature as opposed to surface runoff.

Stabilize Eroding Banks. Vegetative buffers help stabilize stream banks and prevent erosion. Tree roots and other vegetation help

keep the bank soil together. Vegetation on the bank minimizes the effects of flooding as well.

Contribute to the Natural Aquatic Food Chain. Leaves, twigs, and other organic matter from streamside vegetation can provide both food and a breeding ground for instream invertebrates.

Provide Habitat and Travel Corridors for Wildlife. Buffers along rivers, lakes, and wetlands provide habitat to a distinct number of plant and animal species, including some that are rarely found outside the narrow region of a vegetated buffer zone, such as muskrat, otter, and beaver. Ducks, eagles, cormorants, and gulls may also call vegetative buffers home. Some animal species, such as several kinds of turtles and frogs, need a combination of water and land to live and breed. Continuous stretches of buffer zone serve as wildlife travel corridors for these and several other types of animals. In addition, birds and butterflies need shrubs, and the lower branches of trees to provide them with cover and a place to escape predators.

Provide Privacy to Landowners. Vegetated buffers can provide privacy to a homeowner's property, while at the same time be beneficial to wildlife and water quality. Vegetated buffers can be designed to meet the needs of the property owner - a mowed path through the buffer can maintain access to the water and vista pruning of tree limbs can maintain views of the water.

Deter Canada Geese. In unnaturally large numbers, Canada Geese can be a source of

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high bacterial counts. They love succulent green grass, but will not travel through tall grasses or dense vegetation to get to it. Planting a mix of shrubs and trees can act as a barrier between the water and a lawn.

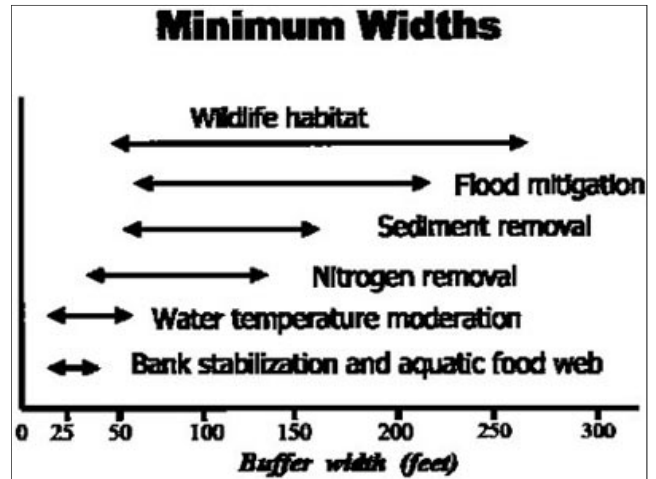
How Wide Should a Buffer Be?

One size does not fit all. In general, at least a 100-foot vegetated buffer is best. However, it depends on what human activity is being buffered from the water body (development, agriculture, or industry) and on the site specifications (soil type, slope, and mix of vegetation within the buffer).

However, even a small buffer is better than no buffer. Effective, consistent pollution removal typically can be measured within 26 feet of a roadway. A 35-foot buffer can function well along a residential property under the right conditions.

Buffer width also depends on what the buffer is designed to accomplish (sediment filter and/or capture, nutrient sink, water level/temperature regulator, wildlife habitat, bank stabilization, etc.). For instance, some wildlife species require 200-600 feet of vegetation to flourish and breed successfully, while sediment and nutrient control requires 100-150 feet of buffer, and bank stabilization will require much less of a buffer.

Please note that these are general guidelines; the optimal width of a buffer will depend on site specifics.



The optimal buffer width depends on its intended purpose. Ideally, a buffer should incorporate sensitive landscape features such as wetlands and floodplains (Source: Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers, www.chesapeakebay.net/content/publications/cbp_13019.pdf).

Tools for Municipal Officials

Few areas of the country have more water bodies, waterways, and waterfronts than the Genesee-Finger Lakes Region. We depend on this water for drinking, agriculture, industry, recreation, tourism, trade, and travel. Water, in fact, defines many of our communities. Here are a few tools to help municipal officials use vegetated buffers as a cost-effective method of protecting our water resources from the impact of roads, homes, and other land uses.

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DPW personnel stop mowing the grass along water bodies to encourage a natural buffer. A mowed path could maintain access.

Site Plan Review. The site plan review process for reviewing and approving commercial, industrial, and other large development proposals is an opportunity to require developers to minimize negative environmental impacts by creating or maintaining vegetated buffers.

Overlay District. A special district can be placed over existing zoning districts around specific water bodies, wetlands, and roadway corridors which supersedes requirements of the underlying zones. Certain uses can be prohibited and extra protection measures, such as vegetated buffer requirements, can be created.

Education and Outreach. When homeowners understand the many environmental and aesthetic benefits that can be derived from vegetated buffers, they are often more receptive to the idea of creating buffers on their own property. Communities can create pamphlets or host informational workshops to spread the word.

Resources

Stormwater Treatment with Vegetated Buffers, American Association of State Highway and Transportation Officials, 2009. http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25%2853%29_FR.pdf



Buffers along waterways can provide beauty and water quality benefits.

(PowerPoint presentation: http://environment.transportation.org/pdf/research_news/nchrp25-25-53presentation.pdf)

Highway Maintenance Guidelines, Chapter 6, Drainage, New York State Department of Transportation (2009). www.nysdot.gov/divisions/operating/oom/transportation-maintenance/transportation-maintenance-general/highway-guidelines

Environmental Handbook for Transportation Operations, New York State Department of Transportation, 2006. www.nysdot.gov/programs/envi-init/files/oprhbook.pdf

- *Genesee Transportation Council - September 2010*
(Adapted from materials published by the Berkshire Regional Planning Commission)