

Chapter 12

Natural Resources

GEOLOGY

Washington Township and Waynesboro Borough are located in Southeastern Franklin County within the national physiographic region known as the Appalachian Highlands Region. The Appalachian Highlands Region is one of eight physiographic regions found in the United States. The U.S. Physiographic regions are: Canadian Shield, Atlantic Plain, Appalachian Highlands, Interior Plains, Interior Highlands, Rocky Mountain System, Intermontaine Plateaus, and Pacific Mountain System. These geomorphic or physiographic regions are broad-scale subdivisions based on features such as terrain, rock type, and geologic structure and history. These Regions are further broken down into provinces and then into sections based on their geologic formations.

Washington Township and Waynesboro Borough are located in the Ridge and Valley Province. More specifically, the Region is part of the Great Valley (known locally as the Cumberland Valley) and South Mountain Sections. The South Mountain Section is composed of intercalated, sub-aerial rhyolites and basalts and is predominantly metamorphic bedrock or quartzite. This area is characterized by a series of ridges separated by stream valleys. These mountains are characterized by long, even ridges, with long, continuous valleys in between. The elevation is typically between 800-1200 feet above sea level but can be as high as 2,000 feet. The streams are often very steep. The bed materials are generally large boulders. The banks of streams are often made up of silts and clays with some larger material mixed in, held together by lush vegetation. The South Mountain Section is bordered on the North by the Great Valley Section. The Great Valley is characterized by carbonate bedrock in the southeastern part of the valley and shale in the northwestern part of the valley.

Most of the Region is underlaid by limestone formations and many of the rocks in the Township reveal varying degrees of iron, manganese and many non-metallic resources. In the area immediately adjacent to the South Mountains there are numerous quartz veins.

WATER RESOURCES

Streams, creeks, and lakes provide scenic resources, aquatic habitat, and recreational opportunities. Water is used daily for residential, agricultural, industrial and commercial use. It is of critical importance to protect our water resources and our watershed areas from pollution. Rivers, creeks, and streams typically flow through several municipal entities so protection of these resources has often been managed on a watershed basis. A watershed is the area of land that drains into a stream, river, ocean, pond, or lake.

Washington Township and the Borough of Waynesboro are in the Antietam Creek Watershed in the Potomac Basin. The Antietam Creek Watershed covers an area of 60,000 acres. The land uses within the watershed include farming, recreation, state gamelands, forested areas, residential, commercial, and manufacturing.

The Antietam Creek Watershed includes:

- Borough of Waynesboro
- Washington Township
- Rouzerville
- Zullinger
- Quincy/Mont Alto
- Michaux State Forest
- Marsh Run
- Village of South Mountain
- Waynesboro Reservoir
- Waynesboro Sewer Treatment Plant
- Washington Township Sewer Treatment Plant
- Quincy Township Sewer Treatment Plant
- Mont Alto Sewer Treatment Plant

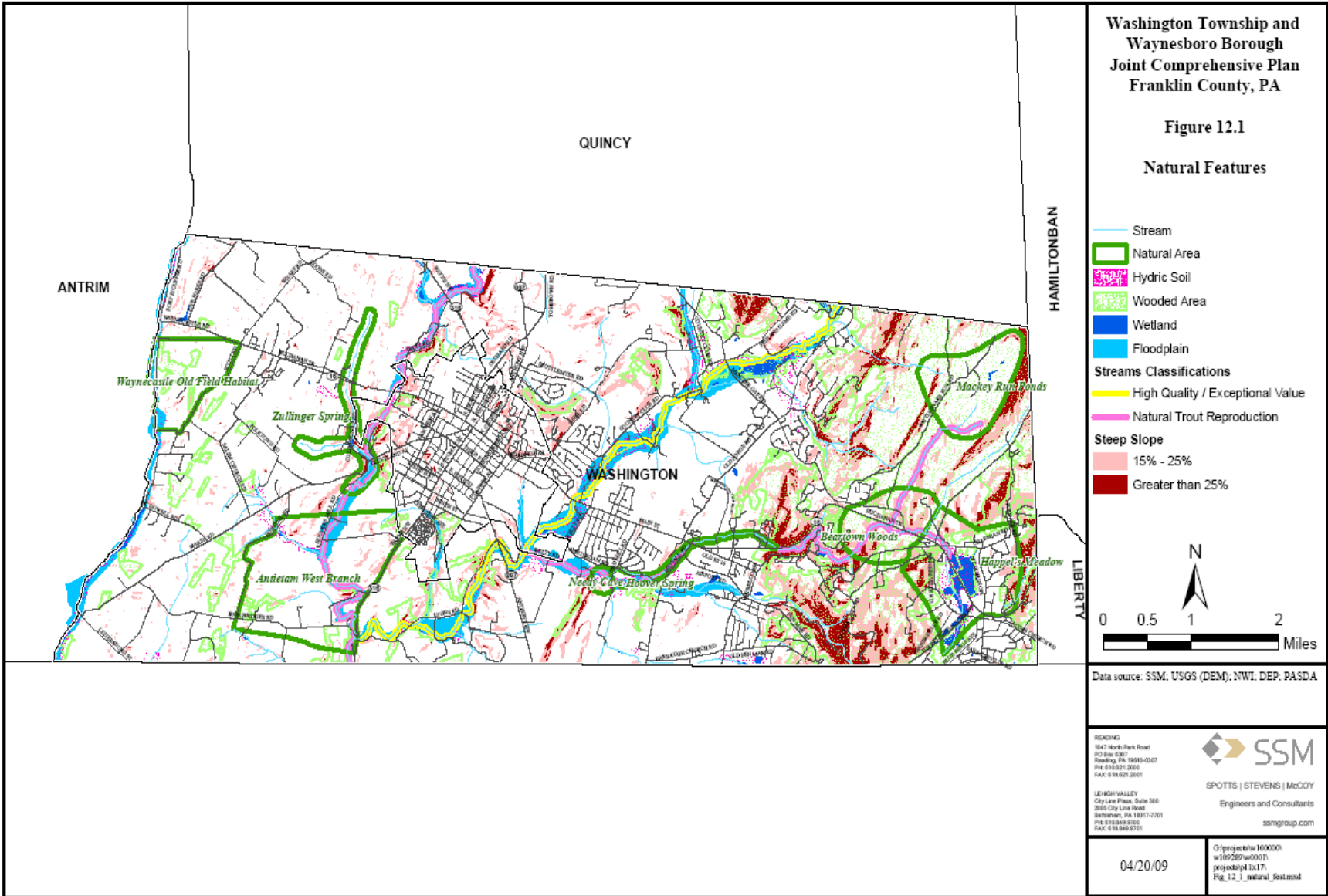
The Planning Region has several waterways including:

- East Branch of Antietam Creek
- West Branch of Antietam Creek
- Red Run
- Mackey Run
- Devils Run
- Deer Lick Run
- Vineyard Run
- Biesecker Run

The major streams found in the Region include the East and West branch of Antietam Creek, and Red Run.

The East Branch of the Antietam Creek is identified by Pennsylvania Code as High-Quality Cold Water Fisheries (HQ-CWF), which is defined as “maintenance and propagation of fish species and additional flora and fauna which are indigenous to a cold water habitat.” Three creeks, Red Run, East Branch and West Branch of Antietam Creek, have been proven to support natural trout reproductions.

Water resources are shown on Figure 12.1, the Natural Features Map.



FLOODPLAINS

Floodplains are areas adjacent to rivers and streams which are subject to flooding during periods of excessive precipitation. The floodplain holds the excess water allowing it to seep into the groundwater and slowly drain back into the waterway. A 100-year floodplain is the area adjacent to a river or stream which has a one percent chance of being flooded during any one year, and is typically used for regulatory purposes. Floodplains should not be developed, due to the potential for damage to persons and property. If development occurs within the floodplain, it may limit the floodway, resulting in increased damage downstream because of resulting increased velocities of the floodwater downstream. Outdoor storage of materials within floodplains is not desirable because of the possibility of the materials being swept into the stream when flooding of the banks occurs. One hundred-year floodplains are shown from Federal Emergency Management Agency (FEMA) Maps. Detailed studies and calculations have not been performed to establish the extent of the 100-year floodplains for all watercourses. Any development proposed in the vicinity of watercourses would require the developer to obtain a calculated study of the 100-year floodplain if such studies have not been performed by FEMA. The 100 Year Floodplain for the Region is depicted on Figure 12.1.

Care must be taken in disturbing areas along watercourses because increased sedimentation within the stream (increased depositing of soil within the stream) can occur. Increased impervious cover along watercourses typically increases the volume of storm water runoff into the streams. This additional runoff can erode stream banks and channels. If sedimentation increases, streambeds may fill, causing floodwaters to affect a larger area.

Wet (or “hydric”) soils and floodplains along watercourses should be preserved from development in the interest of environmental preservation. These hydric soils areas act like a sponge when floodwaters rise and when coupled with established wetlands, they filter out nutrients and other pollutants. Hydric soils protect the quality of the groundwater and slow the storm runoff into local surface waters, all of which ultimately flow into the Potomac River. Impervious surfaces should be restricted from stream bank areas in order to facilitate absorption of storm runoff into the ground. Such increased absorption can help to replenish groundwater and to decrease flood peaks, as less runoff will flow directly into the stream. Inadequate supply of groundwater may result in reduced flows of water in a stream during dry months, and the inability to sustain stream flow can mean a greater concentration of pollutants at periods of low flow.

WETLANDS

Wetlands are generally found along rivers and streams or in other areas subject to frequent flooding, and are characterized by soil type and the presence of hydrophytic (“water-loving”) vegetation, in addition to the presence of visible surface water. Wetlands are typically rich in plant growth and provide habitat for a variety of animals. Furthermore, wetlands can protect water sources by acting as a natural filter, removing pollutants such as bacteria and sediment from surface water before it enters the ground. Development activity, including the placement of fill material, is regulated by the Pennsylvania Department of Environmental Protection and the U.S. Army Corps of Engineers.

The wetlands depicted on Figure 12.1 are from the National Wetlands Inventory, prepared by the Office of Biological Services, U.S. Fish and Wildlife Service. The wetlands inventory was prepared by stereoscopic analysis of high altitude aerial photographs, with the wetlands identified based on vegetation, visible hydrology, and geography. A detailed ground level analysis of any site may result in a revision of the wetland boundaries, and it is possible that small wetlands and those obscured by dense forest cover may not be identified.

The majority of the wetlands in the Region are located in Washington Township, with the most prevalent wetland being Happel’s Meadow. The balance of the wetlands generally occur in the central and eastern part of the Region, near hydric soils.

Ephemeral or vernal pools are also wetlands. These fill in with water during precipitation, surface water runoff, or rising groundwater. These types of Wetlands are found in Washington Township in Michaux State Forest at Glen Forney.

HYDRIC SOILS

Hydric soils are soils that are flooded, ponded or saturated long enough during the growing season to develop anaerobic (without oxygen) conditions. They are typically poorly drained and have a shallow water table. Lack of oxygen in the soil leads to certain characteristics of wetlands soil such as: non-decomposed plant material, oxidized root channels, and concentrations and depletions of iron and other elements. These soils, if undrained, may exhibit wetland vegetation and be an indicator of wetlands. Hydric Soils are noted on the Natural Features Map.

FORESTED AREAS

The majority of forests in Franklin County are Upland Forest Communities. Washington Township and Borough of Waynesboro also contain Oak/Hickory/Pine Forests as part of Deciduous, and Mixed Forests. These are generally Hickory, Virginia Pine, Pitch Pine,

White Oak, Scarlet Oak, Chestnut Oak, and Black Oak. Deciduous forests are characterized by shedding of leaves in the fall, 30-60 inches of annual rainfall, and the presence of seasons. Mixed forests have both deciduous and evergreen trees. Examples of Deciduous trees are: Maple, Oak, Elm, and Birch. Pine and fir trees are examples of evergreen trees. Forested areas provide shade, reduce pollution, act as noise barriers, prevent erosion, provide recreational and scenic enjoyment, produce oxygen and provide a habitat for birds and animals. Forested areas are shown on the Natural Features Map.

Washington Township has a significant forest area located in the South Mountain region. The wooded area in Washington Township is partially owned by private citizens and the rest is owned by the Commonwealth of Pennsylvania. The portion of forest land which is State owned is part of Michaux State Forest, which was originated in 1902.

The main recreational attributes of the forest are hiking and hunting. Michaux State Forest has many trails.

STEEP SLOPES

The topographic features of the landscape derive from the structure and weathering characteristics of the underlying bedrock. The more weather-resistant rock is responsible for areas of higher elevation, while less resistant rock, such as limestone, tends to erode to form low-lying valleys.

Slope is measured by the change in vertical elevation (the “rise”) over some horizontal distance (the “run”). This measurement is then expressed as a percentage. For example, if the ground rises two feet over a distance of twenty feet, then the slope is 2/20, or 10 percent. Areas that have slopes greater than 15 percent are deemed to have severe limitations to development. In general, development of such land can result in hazardous winter road conditions, costly excavation, erosion and sedimentation issues (a particular concern where the land may be cultivated), and accelerated velocity of stormwater runoff. Furthermore, conventional on-lot sewage disposal systems will not function properly where slope exceeds 15 percent. While specially designed systems will work in such areas, even custom installations will not function when the slope exceeds 25 percent. In steep areas, development should be controlled such that natural vegetative cover is maintained to the greatest extent possible, and erosion controls instituted. Without such cover, stormwater runoff can rapidly erode the slopes. The steep slopes for the Region, including the 15 to 25 percent, and the greater than 25 percent slopes, are shown on Figure 12.1, the Natural Features Map. The steep slopes are located predominately in the eastern portion of Washington Township with a few additional areas outside the Borough of Waynesboro. The western portion of Washington Township contains some rolling hills with some steep slopes as well.

GROUND WATER SUPPLIES

Groundwater exists below the surface in moisture contained within the soils and the water table. This is the source of water for public and private wells and replenishes rivers and streams. Precipitation recharges groundwater as it infiltrates downward through soil and rock openings to the water table.

Groundwater that exists below the land in the water table is located within an aquifer. An aquifer is a geologic formation within the saturated zone which contains enough permeability to store and transmit usable amounts of water.

Washington Township and Waynesboro Borough are part of the Potomac River Basin which is part of the larger Chesapeake Bay Watershed. This can be further broken down to the Antietam Creek Watershed which includes Quincy Township and Michaux State Forest.

SIGNIFICANCE OF NATURAL AREAS

The importance of natural resource protection is summarized below:

Floodplains	Floodplains Importance
Areas adjacent to rivers and streams which are covered by flood water during excessive precipitation.	<ul style="list-style-type: none"> • Development can constrict floodwater flow, increasing the potential for flood damage • Wildlife habitats can be harmed or destroyed • Development poses a risk to people and property • Outdoor storage can be washed downstream during flooding. This can have a multitude of problems ranging from polluting the water and surrounding areas with either chemical pollutants or debris. • Development can detract from the aesthetic and recreational value • On-site sewage disposal can contaminate ground and surface water. • Preservation of wet or “hydric” soils
Water Courses	Water Courses Importance
Watersheds of streams are important for planning and management of stream conservation and protection, water supply budgeting planning, watershed based zoning, stormwater management, and integrated resource planning.	<ul style="list-style-type: none"> • Scenic resources • Aquatic habitats • Recreational resources • Protected status limits the effluent from a point source discharge
Wetlands	Wetlands Importance
Areas that are subject to frequent flooding or saturated by surface or groundwater at a frequency and duration sufficient to support vegetation typically adapted for life in saturated soil conditions.	<ul style="list-style-type: none"> • Plant and animal habitats • Plants act as natural filters of pollutants from waters • Unsuitable for development and on-site sewage disposal

	<ul style="list-style-type: none"> • Reduce flooding by detaining stormwater • Replenishes groundwater and surface water through stored water
Steep Slopes	Steep Slopes Importance
Steep Slopes are measured by the change in vertical distance over the change in horizontal distance. This number is then shown as a percentage. A steep slope of 15% will have 15 feet of vertical change in elevation over 100 feet of horizontal distance.	<ul style="list-style-type: none"> • Stormwater runoff can rapidly erode the slopes • Can result in hazardous driving conditions in the winter from development of roads and driveways • Difficulty in road maintenance • Increased building costs due to excavating, and consideration of erosion controls • Stormwater runoff problems and erosion issues, especially in the absence of vegetative cover • Conventional on-site sewage disposal systems will not work properly with slopes greater than 15%
Forested Areas	Forested Areas Importance
Woodlands are areas that are covered by woods or trees.	<ul style="list-style-type: none"> • Stabilize soil against erosion • Scenic Resources • Wildlife habitats • Provide visual relief • Birding and hunting areas • Buffer development • Air purification • Absorb stormwater runoff • Hiking
Hydric Soils	Hydric Soils Importance
Soils that have shallow depth to seasonally high water table. Potential wetlands, with need for further analysis.	<ul style="list-style-type: none"> • Unsuitable for development and on-lot sewage disposal • Flooded basements and poor foundation stability (if built upon) • Natural recharge areas which can reduce flooding and manage stormwater runoff • Filter surface water
Groundwater Supplies	Groundwater Supplies Importance
Groundwater enters through soil and creeks.	<ul style="list-style-type: none"> • Public water systems and private wells are usually dependent upon groundwater supplies • Groundwater supplies are affected by development which reduces recharge and pollutes groundwater • High water withdrawals can affect other water supplies

UNIQUE NATURAL AREAS

Franklin County Natural Areas Inventory

The Franklin County Natural Areas Inventory (NAI) is a document compiled and written by the Pennsylvania Science Office (PSO) of the Nature Conservancy in 2004. It contains information on the locations of rare, threatened, and endangered species and of the highest quality natural areas in the County. Each site description contained in the Inventory is accompanied by general management recommendations that would help to ensure the protection and continued existence of these rare plants, animals, and natural communities.

There are nine recognized NAI sites in Washington Township: Antietam West Branch, Beartown Woods, Glen Forney Vernal, Happel's Meadow (locally significant), Hoover Spring, Mackey Run Ponds, Needy Cave, Waynecastle Old Field and Zullinger Spring.

<i>Site Name</i>	<i>Location</i>	<i>Special Species/ Community Type</i>	<i>Threats and Disturbances</i>	<i>Conservation Recommendations</i>
Antietam West Branch	Washington Township	Animal: Loggerhead Shrike (endangered bird species)	Conversion of land use from farm or open space grasslands to development or row crop agriculture. The use of pesticides on farm pests, such as mice, succession into forest, potential development and encroachment of roads and suburbanization.	Keep area at an early successional stage with scattered trees, adequate patch size, short grasses, adequate hunting perches and nest sites. Limited pesticides by nearby farms
Beartown Woods	Washington Township – (most of the valley bottom along Red Run)	Natural Community: Rich hemlock-mesic hardwoods forest	Route 16, recreational hiking on Appalachian Trail and Bicentennial Tree Trail.	Could potentially develop into an undisturbed old-growth stand. Conservation efforts and protection need to be observed
Glen Forney Vernal	Washington Township/Quincy Township	Natural Community: 30 vernal ponds that make up an Ephemeral /Fluctuating Natural Pool Community Plant: Lance-leaved Looses strife	Logging, proximity to residential development (dumping of household waste, lawn clippings, debris) ATVs	Logging should be avoided – 200 acre area with numerous ponds; an undisturbed forested buffer between nearby residences and the ponds should be established. Monitor ATV traffic.
Hoover Spring	Washington Township	Animal:	Changes to hydrology and warming water temperatures, water pollution	Protection of spring, replanting of critical buffers along stream to prevent warming and maintain population
Mackey Run Ponds	Washington Township	Natural Community: Ephemeral/Fluctuating Pools Plant: Northeaster Bulrush	Logging, foot traffic, deer, pesticides	Logging should be avoided due to the numerous pools, undisturbed forested buffer should be established
Needy Cave	Washington Township	Animal Species: 3 types in a complex cave system	Hydrologic changes	Forested buffers around cave opening to help protect from non-point source pollution
Waynecastle Old Field Habitat	Washington Township/Antrim Township	Plant: Lance-leave Buckthorn; Sedge	Spread of exotic plant species	Infrequent mowing, forested buffer strips, reduce invasive species
Zullinger Spring	Washington Township	Animal: water animal	Herbicides, pesticides, disturbances from stream bank erosion and channelization	Protection from pollution, replant buffers along stream to prevent warming.

Happel's Meadow is a locally significant site. It is located along PA Route 16 and is a shrub swamp with meadows. There were no species of concern listed at this site during the 2004 survey but the potential to have plant species of concern at this site exists. The site is listed as locally significant due to the limited shrub swamps in Franklin County and the plant diversity.

Approximate locations of these NAI sites are found on the Natural Features Map.

Riparian Buffers

Riparian buffers are particularly important to protect water resources because of the number of resources along watercourses, including floodplains, wetlands, hydric soils, woodlands, and steep slopes. A riparian buffer is an area of vegetation that is maintained along the shore of a water body to protect stream water quality and stabilize stream channels and banks. Riparian buffers should be maintained along the Antietam East and West branches, Red Run and their tributaries. Requirements for such buffers should be incorporated into zoning and subdivision and land development ordinances.

Buffers provide the following benefits:

- Filter runoff – Rain that runs off the land can be slowed and infiltrated in the buffer, settling out sediment, nutrients and pesticides (nonpoint source pollution) before they reach streams.
- Take up nutrients – Fertilizers and other pollutants that originate on the upslope land are taken up by tree roots. Nutrients are stored in leaves, limbs and roots instead of reaching the stream. Through a process called “denitrification,” bacteria in the forest floor convert nitrate to nitrogen gas, which is released into the air.
- Provide shade – The leaf canopy’s shade keeps the water cool, allowing it to retain more dissolved oxygen, and encouraging growth of plants and aquatic insects that provide food for fish.
- Contribute leaf food – Leaves that fall into the stream are trapped on fallen trees and rocks where they provide food and habitat for organisms critical to the aquatic food chain.
- Provide habitat – Streams that travel through woodlands provide more habitat for fish and wildlife. Woody debris provides cover for fish while stabilizing stream bottoms.
 - Provide migration corridors for wildlife.

- Safeguard water supplies by protecting groundwater recharge areas.
- Provide flood control.
- Provide stormwater management potential – natural vegetation provides a basis for innovative stormwater management systems. Stormwater flows from retention basins can be directed to, and allowed to flow through, buffers to reduce nutrient and sediment loads.
- Improve water and air quality.
- Stimulate economic opportunities such as by providing valuable open space which may increase land values and, therefore, the tax base.
- Provide some federal tax incentives to landowners (depending on a landowner's financial situation) willing and able to place some of their lands under conservation easement.
- Reduce grounds maintenance.
- Provide recreational opportunities, and associated economic benefits for recreation-related businesses.
- Provide educational and research opportunities for local schools and colleges.
- Provide windbreak, shade and visual buffer.

Planning Implications

Utilization of riparian buffers will help protect the watercourses within the Region. Major streams include the East and West Branches of Antietam Creek and Red Run.

There are natural areas in the Region in need of protection, particularly Happel's Meadow.

A significant wooded area, including Michaux State Forest, is included in the eastern portion of Washington Township. Most of the steep slopes in the Region are located in this area.