Current Conditions

Frederick County's natural resources and geographic location has long influenced the County's history and settlement patterns. The last several decades has seen the community mature with a significant amount of residential and business growth. The greatest potential impact on our natural environment is the increasing population in the County which results in alteration of the land use. A step in managing this growth and guiding the community growth was the County's establishment of the Urban Development Area (UDA). In this chapter, Frederick County is taking steps toward establishing further means to protect its natural resources while accommodating anticipated future growth and to celebrate those unique natural resources. This Chapter is meant to apply to the County as a whole, but may be applied differently to the County's rural and urban areas as both of these distinct areas are subsets of the overall environment and are important for many reasons.

Conversion of land in the rural areas results in reduced open space and fragmentation of farm and forest lands. It can also disrupt natural and wildlife systems that help purify our air, recharge our groundwater and protect our local streams. Likewise, the denser growth in the UDA results in increased impervious surfaces which can impact natural resources. Lessening the impacts of development in both areas requires special and distinct considerations. A general goal for this chapter is to minimize further impacts to the natural resources in the rural areas of the County and to sensitively balance sustainable growth within the urban areas of the County.

Federal and State regulations are the primary management tools for the significant environmental considerations of air quality, water quality, stormwater management, and waste management practices. These levels of regulation provide the basis for a safe and healthy environment. Local regulations provide Frederick County the ability to tailor programs and regulations to meet the unique characteristics of the community and to further promote the protection of the County's natural resources. To address local environmental concerns the County may choose to require more than the standards set forth by the State government when permissible.

The priority local natural resource issues for Frederick County for the next two decades that are focused on in this chapter include:

-Water Supply and Water Quality
-Developmentally Sensitive Areas
-Agricultural and Forestal Areas
-Erosion and Sediment Control
-Green Infrastructure
-Light and Noise Pollution

Agencies and Committees Involved

Numerous County departments as well as Federal, State and local agencies and organizations are involved in the protection and monitoring of the natural resources in Frederick County. Currently, the United States Environmental Protection Agency, the U.S. Army Corps of Engineers, Virginia Departments of Environmental Quality, Conservation and Recreation, and Health are the lead governmental agencies providing compliance management, implementation and enforcement. Working together, they assure that timely standards are adopted and enforced. They include:

- Frederick County Planning Department
- Frederick County Department of Public Works
- Frederick-Winchester Service Authority
- Frederick County Sanitation Authority
- Frederick County Conservation Easement Authority
- US Geological Survey-VA Water Science Center
- The United States Environmental Protection Agency
- Virginia Department of Environmental Quality
- Virginia Department of Conservation and Recreation
- Virginia Department of Health
- Virginia Department of Game and Inland Fisheries
- Lord Fairfax Soil & Water Conservation District
- Frederick County Farm Bureau
- Virginia Cooperative Extension Service, Frederick Office
- The Opequon Watershed, Inc.
- Northern Shenandoah Valley Regional Commission
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service

Focus and Direction for the Future

The intent of this Chapter is to provide guidance that the future of the County's natural resources is sustainable. As the County continues to grow and develop we should ensure that the natural beauty is preserved, air and water qualities are protected, property values and quality of life are enhanced, and ecological diversity is maintained. This plan can be used to address natural resource issues by helping County representatives in the identification of significant local resources. With this information, County representatives can evaluate development proposals in their earliest stages. These strategies will also assist when developing ordinances and supporting compliance with local, state and federal regulations. With sound protection measures, such as those presented in this chapter, Frederick County's citizens will enjoy a healthy and beautiful environment for years to come. They will also be part of the solutions identified as we move forward.

Community Benefit

The preservation, maintenance and enhancement of the natural resources within Frederick County are important to the community for many reasons. Principal are those which help support the economic wealth, health of citizens, and the sustainability of the County. Others include the protection of the scenic quality residents and visitors enjoy, and that supports native habitat and wildlife and maintains biodiversity. Biodiversity is a term which simply means "the variety of life on earth", where variety can be measured on several different levels—genetics, species and ecosystem diversity. Communities of plants and animals, together with the physical characteristics of their environment within this county include their relationship to geology, soil and climate which interlink together as an 'ecosystem'. It is important to recognize the importance of protecting biodiversity in the County for the ecological, aesthetic, ethical and economic benefits to the community. The preservation of agricultural and forestal lands

("working lands") provide net economic benefits to the County because of lesser public service and infrastructure costs as compared to other land uses, especially residential.

On the land development side, good regulations on the part of the public and good practices on the part of the developer make for less costly public investment. New developments that protect the environment with quality systems present less cost to the County in the long term when maintenance may become a necessity. Recreational and aesthetic considerations are also part of our community resource management responsibilities.

Natural resources have few political or property boundaries. In identifying regional environmental concerns, it is more effective in the end that solutions be sought through a community-based process that is consistent with or part of a regional effort. Collaboration with neighboring communities in addressing our natural resources should be a priority.

One focus of this plan is to ensure that applications for development address environmental issues at the earliest planning phase. Projects that include components of green infrastructure can help foster community cohesiveness by engaging residents in the planning process. This chapter defines those areas of the County that are environmentally sensitive and need to be preserved. Environmental concerns that necessitate additional attention are also identified and it is encouraged that solutions be sought through a community-based process that is consistent with or part of a regional environmental policy.

Geophysical Characteristics

The County has three geophysical areas as shown on the Physical Characteristics and Geologic Formations map.

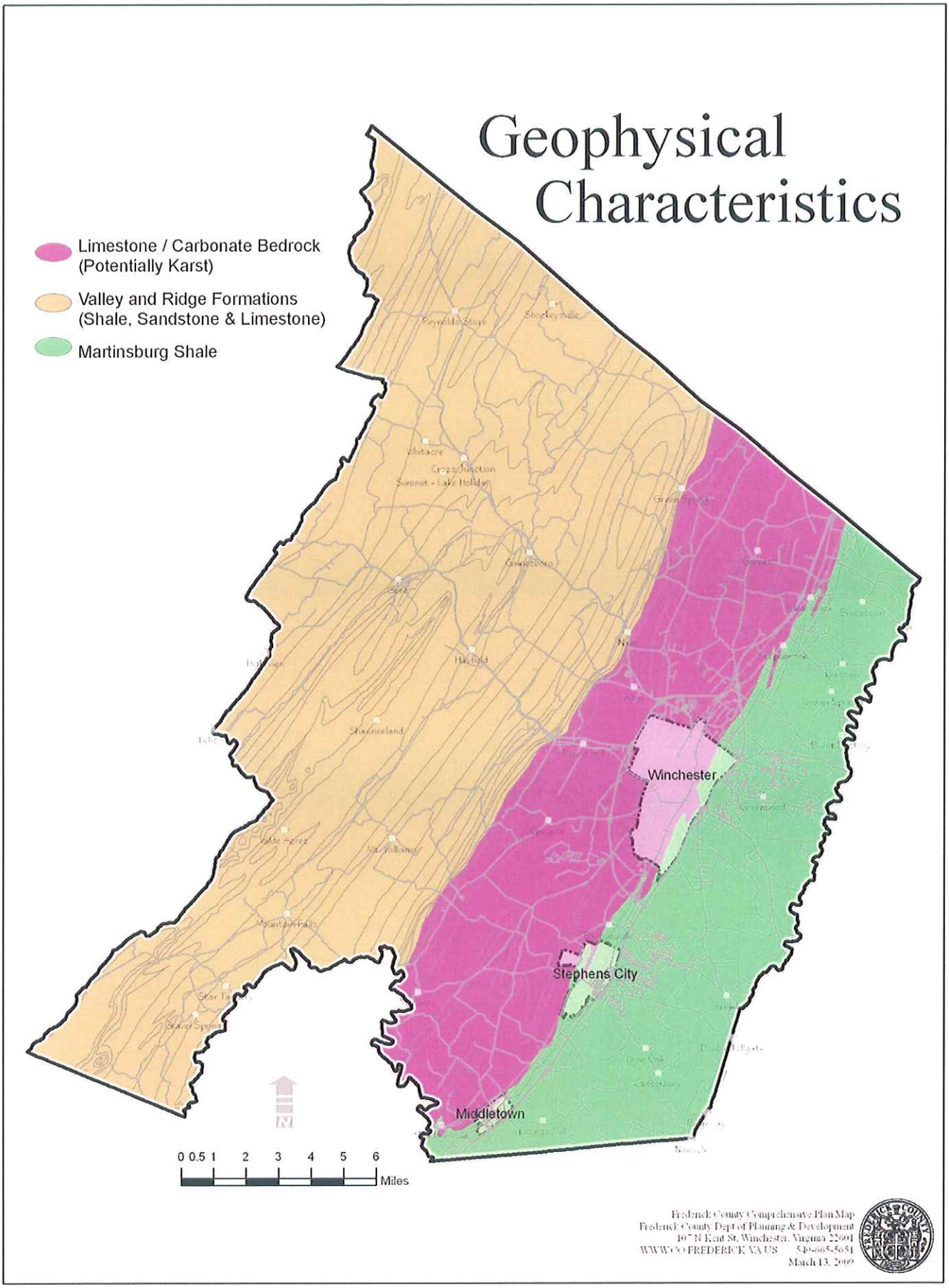
The eastern area of the County is underlain by the Martinsburg shale which consists of a band running north-south along the length of the County, generally east of Interstate 81. It consists of broad, level ridges separated by steep stream valleys. The soils derived from the shales tend to be thin, poorly fertile, and have high seasonal water tables. The soils are highly compacted and not well suited for intensive agriculture or onsite sewage disposal systems. Primarily the historical use of this land is pasture and has in recent years been developed for residential and urban uses. Substantial suburban development served by public water and sewer is located within this area.

The central area is located between Interstate 81 and Little North Mountain. It consists of a band approximately five miles wide that also trends southwest to northeast, is underlain by limestone/carbonate bedrock, and displays gently rolling karst topography. This area contains the bulk of the prime agricultural soils in the County and supports apple and other fruit production, beef cattle operations, and some crop production, primarily hay and corn.

The western area is the Ridge and Valley which is underlain by a variety of shale, sandstone, and limestone formations. This mostly forested area consists of alternating valleys and ridges that run southwest to northeast. Ridges are often very steep and are the highest elevations in the County. Some stress fractures are present along the fold lines of the highly folded vertical beds. The vertical bedrock layers provide a barrier to most groundwater movement across the beds. Groundwater moves laterally along the folded bedrock, with little movement through the fold system.

These three geographic regions can be further divided into four distinct drainage areas. The southern third of the county drains towards the south and east to Cedar Creek and Stephens Run and is in the Shenandoah River basin. The northern two-thirds of the County are divided north-south by Apple Pie Ridge, Round Hill and Little North Mountain forming the boundary between the Back Creek and Opequon Creek watersheds. These areas drain toward the north and the east, respectively, and are in the Potomac River Basin. The limestone-carbonate geology drains to the east, but includes random flow patterns throughout this topography, including some areas that are internally drained. Drainage areas provide a good basis for planning sewer and water service areas through gravity flow design. The movement of public sewage flow between the limestone-carbonate and the Ridge and Valley area requires pumping.

Regional geophysical characteristics influence suitability for more intensive forms of development. Urban development is predominant in the eastern shale belt and uses public sewer and water facilities. Rural residential development is predominantly in the limestone belt west of Winchester, Interstate 81 and Route 37. Despite the presence of prime soils, agricultural land use in this area has decreased due to development pressures. The relatively steep areas in the western portions of the County remain rural; however, development is increasing.


Geophysical Characteristics
Limestone / Carbonate Bedrock (Potentially Karst)
Valley and Ridge Formations (Shale, Sandstone & Limestone)
Martinsburg Shale
Winchester
Stephens City
Middletown
0 0.5 1 2 3 4 5 6
Miles
Frederick County Comprehensive Plan Map
Frederick County Dept of Planning & Development
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March 13, 2009

Water Supply and Water Quality

Water Supply

Water supply is critical to both the natural and built environment, and viable sources are essential for future economic development in the County. There are no major rivers flowing through the county. The majority of the County contains small springs, seeps and headwater streams that contribute to three watersheds: the Opequon, Back Creek, and Cedar Creek. The County is within the larger Potomac River watershed, and ultimately the Chesapeake Bay watershed. The average flows from these streams within the County are marginal, and only Cedar Creek has been considered as a supplemental source with the potential for withdrawals during peak flows. With the exception of water purchased from the City of Winchester, which comes from the North Fork of the Shenandoah River, the county is entirely dependent on groundwater sources.

The most productive aquifers in the County are the limestone/carbonate aquifers. Ninety percent of the recharge areas for groundwater in Frederick County are located in the limestone-carbonate topography or karst areas (see map). As development continues to occur in this region it is important to consider the impacts to both groundwater recharge and the pollution of groundwater from stormwater runoff. These are complex issues that also have a connection to surface water and will be referenced further in the water quality section. Groundwater studies in conjunction the USGS Virginia Water Science Center should continue, and participation in a regional water authority should be investigated to ensure adequate water supplies are available for the future.

POLICY: Protect groundwater sources and the areas that contribute recharge to ensure that adequate water supplies are maintained, and work toward developing increased water supplies to meet future needs.

Implementation:

- The Frederick County and Winchester City governments should evaluate the benefits of combined water resources and as deemed appropriate, address water supply issues as one regional entity to ensure common goals.

- Groundwater recharge areas should be identified and protected. Protecting recharge areas can be accomplished through both technology options and reduced land disturbance practices during building and construction activities.

- Water conservation and efficiency practices should be encouraged and practiced throughout the County. The use of rainwater harvesting practices should be encouraged to reduce the demand for potable water.

- Development within the limestone/carbonate geology should be limited and optimally these areas should be placed in conservation easements or their density credits could be used elsewhere in the county through Transfer or Purchase of Development Rights (TDR and PDR) programs.

Water Quality

Land use and development activities have the potential to impact the ecological quality of streams and water bodies through the direct transport of pathogens and pollutants. Hydrologic

changes can alter the character of flow in streams, resulting in alterations to stream morphology, such as increasing stream bank erosion, increased high-flow events and more critically low flows during low-flow periods.

Unlike point source pollution, which comes from a defined permitted source like industrial and sewage treatment plants, nonpoint source pollution (NPS) comes from many different and diffuse sources. NPS occurs when runoff from rainfall and snowmelt cause erosion and wash various pollutants from the land into our local waterways and potentially into our local waterways. In addition, these pollutants can also enter the groundwater via karst recharge, without the benefit of any natural filtration or dilution. This is a significant issue, as most of the surface streams and rivers in the region are dependent on groundwater recharge for their base flow, rather than surface runoff. The majority of the streams in Frederick County and the City of Winchester are on the state's impaired waters list and warrant efforts to improve water quality. Volunteer efforts are underway to correct such situations.

On-site sewage disposal systems are a potential source of water pollution when not properly maintained. These systems are regulated by the Virginia Health Department and by the Virginia Department of Environmental Quality. Package treatment plant sewer systems designed to serve particular developments should only be allowed in areas planned for more intensive residential development, such as in the Rural Community Centers. Where such systems are allowed, they should be dedicated to a public authority or sanitary district to insure that the facilities are properly operated.

POLICY: Protect ground and surface water quality.

Implementation:

- The ecological integrity of the streams within Frederick County needs to be protected and restored where impacts are evident. Watershed management throughout the County should encourage forested or vegetated streamside buffers to filter pollutants, stabilize streambanks and provide wildlife habitat.

- The types of onsite sewage disposal systems permitted in the county need to be managed to insure proper location, installation, operation, maintenance and inspection.

- Special emphasis should be placed on utilizing state and federal cost share programs specifically funded to address water quality in the Opequon Creek watershed and other environmentally sensitive areas. Work with local community and non-profit organizations to collaboratively promote agricultural best management practices.

- Work with the above to collaboratively develop and distribute public service information to educate rural and urban citizens on the role they play in protecting and improving local water quality through various efforts on individual lots.

Developmentally Sensitive Areas

Natural developmentally sensitive areas encompass various resources in the County, such as floodplains, steep slopes, karst terrain, and agricultural areas. This section describes the importance of these sensitive natural areas to Frederick County, and the need for protecting them. These resources are further identified and integrated into the small area land use plans contained within the Comprehensive Policy Plan. Development consistent with those small area plans should recognize these sensitive natural areas strive to preserve and protect them.

Floodplains

Floodplains provide a necessary interface between land and water. Floodplains by definition store water and accommodate fluctuations in stream volume during heavy rains and can become flooded. Floodplains provide essential environmental benefits such as reducing peak flows and improving water quality. Encroachment of development into floodplains removes those benefits as well as increasing the impact on life, health and property. Regulations to protect floodplains and waterways from disturbance are included in the County's Zoning Ordinance.

Floodplain areas have been generally identified in studies conducted by the Federal Emergency Management Administration (FEMA). Detailed maps produced by FEMA show floodways, as well as 100 and 500-year floodplains.

Steep Slopes

Areas of steep slopes are located throughout the County, predominately in the mountainous areas, stream valleys and drainage areas. Steep sloped areas are often susceptible to erosion. The amount that may occur varies according to the amount and intensity of precipitation, slope steepness and length, vegetated cover and the soil type and erodibility. Clearing steeply sloped areas can exacerbate erosion of soil and increase stormwater runoff resulting in increased siltation and sedimentation.

While there are provisions in the County's Zoning Ordinance which regulate the disturbance of actual steep slopes, careful consideration should also be given to avoid concentrated runoff when impervious surfaces are located close to steep slopes. Minimal disturbance of natural vegetative cover, in particular forest cover should be encouraged versus replant requirements. Appropriately located vegetative barriers assist in filtration of non-point discharges, in addition to reducing erosion and sedimentation.

Karst Terrain

The central geophysical area of Frederick County is underlain by a band of carbonate bedrock consisting of limestone and/or dolomite and is identified as karst terrain (see Geophysical Map, page 5). Karst terrain is characterized by the presence of sinkholes, surface depressions, caves, large springs, and a highly irregular, pinnacled bedrock-soil interface. Karst terrain is inherently unstable and susceptible to subsidence and surface collapse. As a result, the alteration of drainage patterns in these areas by the placement of impervious coverage, grade changes, or increased run-off from site changes can lead to sinking of land levels and sinkholes.

It is important to realize that the most of the water recharge area for the drinking water for the County is located in the karst terrain. Groundwater supplies in these areas are particularly susceptible to contamination from surface activities. Fractures, fissures and solution openings in

the bedrock may connect to public or private water supplies such as wells and springs, making those sources especially susceptible to groundwater contamination.

POLICY: Appropriately manage identified developmentally sensitive areas.

Implementation:

- Protect floodplains and steep slopes from unsuitable uses and recognize their value for stormwater management and ecological functions.

- Enhancement and management of floodplains and riparian buffers utilizing appropriate native species should be encouraged to improve stormwater management and reduce sedimentation.

- Development proposals should be adapted to fit the topography and natural setting of the County.

- Special consideration should be given in areas known for karst terrain prior to changes in land use. Preliminary site investigations should be performed to determine karst vulnerability and if warranted, additional detailed investigations should be considered.

- Prior to any development activities in areas known to have karst terrain, a geotechnical analysis should be performed by a certified geotechnical engineer and submitted to the Public Works Department for review.

- Stormwater design in karst areas should utilize small scale Low Impact Development practices. Special consideration must be afforded to stormwater hotspots and sinkholes. The use of regional detention practices with large drainage areas should be strongly discouraged.

- The current definition of steep slopes should be examined if any adjustment would assist in reducing erosion.

Agricultural and Forestal Areas

Agricultural and forestal lands in Frederick County contribute to the natural environment as well as add to the historic rural character and scenic quality associated with the community. Agricultural lands and forests provide economical benefits related to agriculture, forestry and tourism, and require minimal county services. In the rural areas, it is desirable that development be directed away from soils which are well suited for agricultural production.

Frederick County has an Agricultural and Forestal District program supported by the Code of Virginia. This program allows landowners to voluntarily enroll their lands in a district which limits development. These districts are renewed every five years but property owners can request that their land be removed at any time. The County has three separate agricultural and forestal districts which contain a total of 7,817 acres. The use of conservation easements for the protection of agricultural and forestry lands is increasingly becoming popular and encouraged, in addition to participation in the County's Agricultural and Forestal Districts.

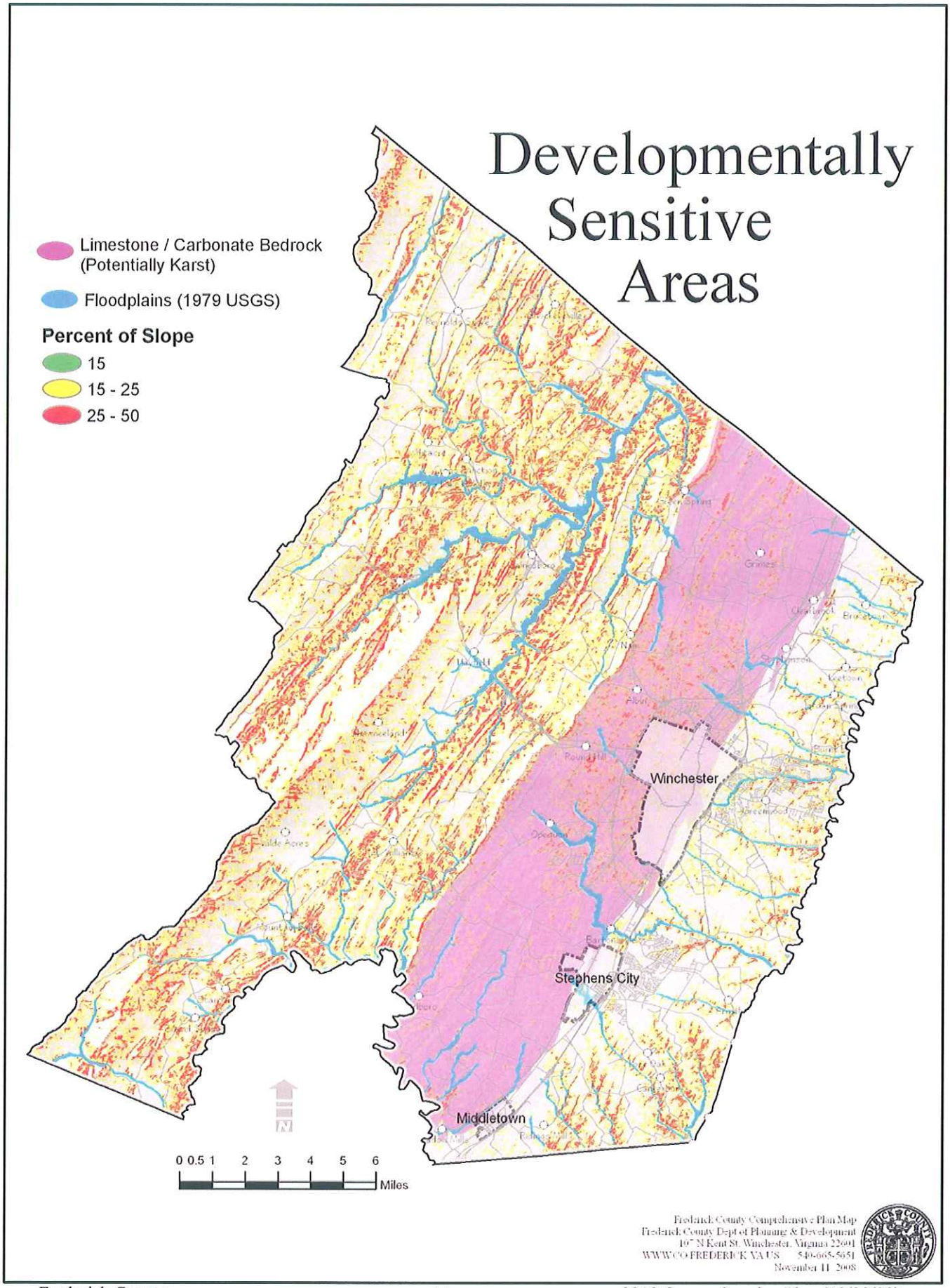
POLICY: Protect Frederick County's agricultural and forestal areas as a resource base its citizens.

Implementation:

- Evaluate the existing agricultural and forestal districts program for effectiveness in helping preserve agricultural and forestry resources.

- Encourage and promote opportunities that support the continued use of farmlands and the consumption of locally grown products.

- Develop, promote and support voluntary measures to protect agricultural and forestry resources such as conservation easements, purchase of development rights (PDR) or transfer of development rights (TDR).


Developmentally Sensitive Areas
Limestone / Carbonate Bedrock (Potentially Karst)
Floodplains (1979 USGS)
Percent of Slope
15
15 - 25
25 - 50
Winchester
Stephens City
Middletown
0 0.5 1 2 3 4 5 6
Miles
Frederick County Comprehensive Plan Map
Frederick County Dept of Planning & Development
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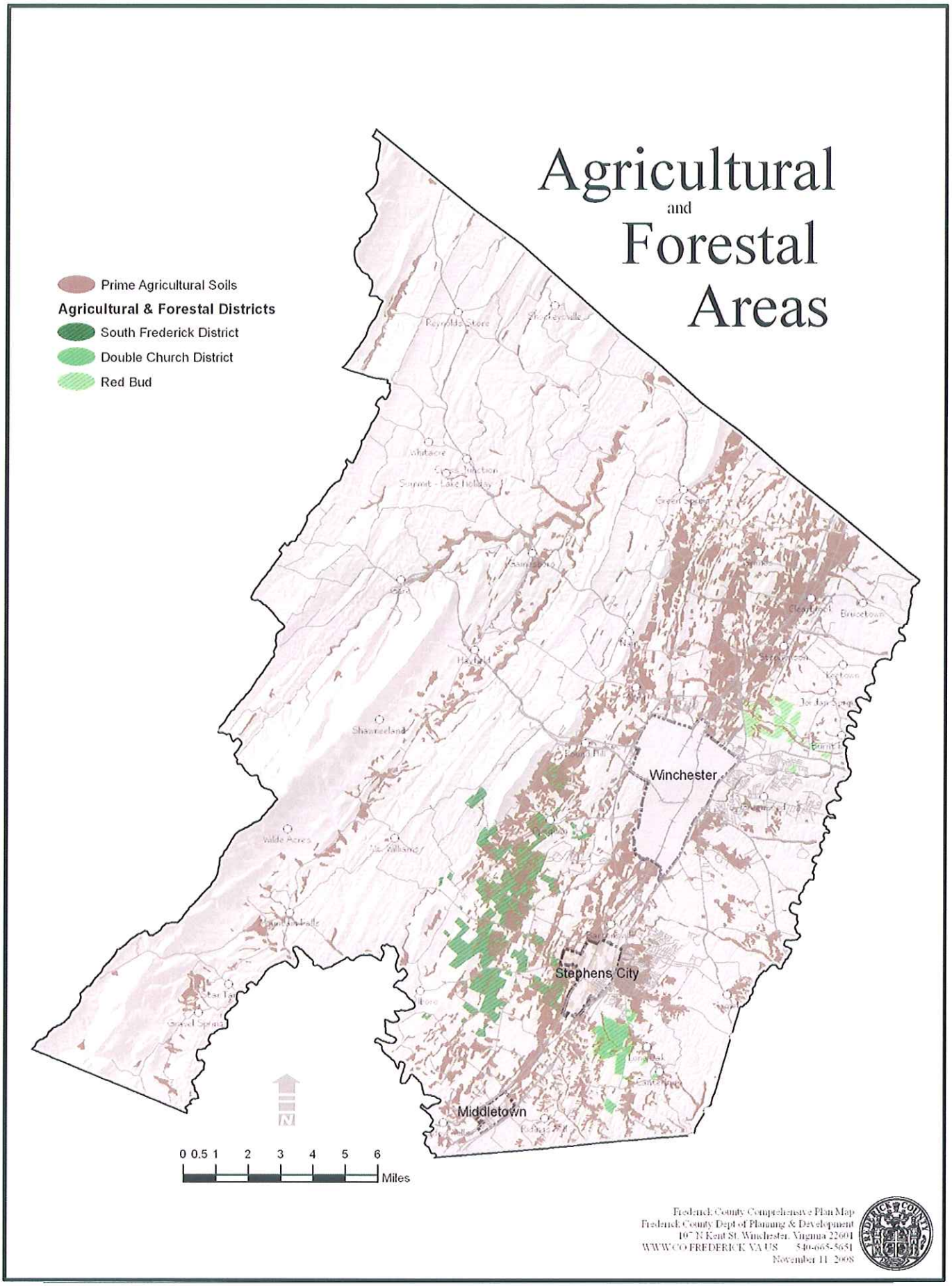
November 11 2008


Agricultural
and
Forestal
Areas
Prime Agricultural Soils
Agricultural & Forestal Districts
South Frederick District
Double Church District
Red Bud
Winchester
Stephens City
Middletown
N
0 0.5 1 2 3 4 5 6
Miles
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Erosion and Sediment Control

Soils are natural resources that require proper use and conservation. Bare soil is the single greatest source of sediment which can enter waterways through erosion. In many instances, the greatest controllable source of soil erosion is through managing construction activities to reduce exposing the soil to the elements.

It is important to realize that the use of the soil be related to its suitability and limitations. Improper use may result in accelerated soil erosion, ground and surface water pollution, flooding, drainage problems, failed septic systems, construction problems and unproductive agricultural and forestal lands. The most environmentally sensible approach is to consider and adapt to soil types the planning and design of developments.

The 1987 Soil Survey of Frederick County, Virginia by the U.S. Department of Agriculture and the Soil Conservation Service includes general and detailed soil maps, descriptions of the soils; and the suitability, limitations, and management of the soils for specified uses. The general soils map can be used to compare the suitability of large areas for general land use while the detailed soil maps along with soil unit descriptions can be used to plan and design a specific site.

The Virginia Erosion and Sediment Control Act and the Frederick County Code require that properties and waters be protected from soil erosion and sedimentation resulting from development activities. The Frederick County Public Works Department is responsible for the implementation and enforcement of these requirements.

POLICY: Incorporate soil types into land use planning for the design of developments to ensure proper use of this natural resource and guarantee that during development proper erosion and sediment control measures are maintained.

Implementation:

- Vegetative cover should be encouraged as the most important physical factor influencing soil erosion. The removal of topsoil and permeable soils should be discouraged and when removed, requirements to replace the soils should be enforced.

- Developments should be planned to fit the particular topography, soils, waterways, and natural vegetation on a site to ensure that structures and grading are designed to fit the site.

- Planning that requires the smallest practical area of land be exposed for the shortest period of time (through scheduling and staging project activities) is encouraged.

- Soil erosion prevention practices as a first line of defense against onsite damage should be applied.

Stormwater Management

Urban and suburban development changes the nature of streams and drainage. Areas once woodlands or pastures that are developed with roads, parking lots, and buildings, increase the impervious area or imperviousness of the watershed. This process brings changes to the runoff characteristics of surface water, both in quantity and quality.

Stormwater management is regulated by Chapter 79 of the Code of Frederick County "Erosion and Sediment Control Ordinance" as authorized by the Virginia Erosion and Sediment Control Law of Virginia. The Department of Public Works is the agency responsible for the implementation and enforcement of the Stormwater Management Ordinance as managed by the DCR. An essential component of this ordinance involves the approval of a detailed site plan prior to the development of any parcel. Frederick County should become an approved stormwater management program reviewing agency on behalf of the Department of Conservation and Recreation (DCR).

SWM's seeks to maintain post-development runoff at pre-development levels. Where necessary, stormwater storage systems, such as detention ponds, are required to accommodate a post-development storm with a twenty-five-year frequency. Detention ponds function either as individual facilities within a development or function as a regional facility serving several developments. Most detention ponds in the County are individual facilities, where routine maintenance is at the responsibility of the property owner or homeowner's association.

Stormwater management is currently handled through systems of storm drains and detention ponds. These conventional stormwater systems are designed to collect, convey and discharge runoff as efficiently as possible to prevent flooding and promote good drainage. A challenge with conventional stormwater systems are that they can lead to water quality degradation, stream erosion and a decrease in groundwater recharge. Catastrophic failure of SWM ponds in karst terrain due to sinkhole formation can lead to sudden influx of contaminants into the aquifer.

Low Impact Development (LID) is an alternative to conventional SWM. LID is a site design strategy with the goal of maintaining or replicating the pre-development hydrologic response through the use of design techniques to create a functionally equivalent hydrologic landscape. Some of the functions include water storage, infiltration, and groundwater recharge as well as management of the volume and frequency of water discharges. Elements of LID include minimizing land disturbance, limiting impervious surfaces, and utilizing runoff reduction practices such as bioretention, permeable pavements and grass swales.

Geology is an important consideration when considering the application of LID practices. In areas of karst terrain, infiltrating LID practices must be carefully planned due to the potential for sinkhole formation. Stormwater treatment and conveyance systems should be directed away from known sinkholes to prevent expansion or possible collapse. Other geologic issues involve the presence of shale which makes infiltration difficult to impossible. While the use of LID may not replace conventional SWM controls, a combination of the two measures makes for a better overall stormwater management program.

POLICY: Ensure that stormwater is managed in accordance with the county's Erosion and Sediment Control Ordinance and Virginia's stormwater requirements, and work to implement Low Impact Development (LID) measures where appropriate.

Implementation:

- Encourage the use of semi-pervious or pervious surfaces and other low impact development techniques, where appropriate. Shared parking areas and reduced parking requirements for developments should be utilized to reduce impervious areas.

- Encourage the use of bio-retention whenever possible. Large impervious areas should take advantage of bio-retention in their parking lots.

- Participate in regional efforts to integrate LID runoff reduction and pollution prevention practices in karst areas and areas with shale-derived soils.

- Frederick County should continue to serve as an approved stormwater management program reviewing agency by the Department of Conservation and Recreation (DCR) as the state updates its regulations.

Green Infrastructure

Green infrastructure is the strategically planned and managed networks of natural lands, agricultural and forestal lands, and other open spaces. As an interconnected system, green infrastructure provides greater environmental viability, value, and function than disconnected individual resources. In both rural and urban areas, the green infrastructure concept identifies critical areas for conservation and establishes priorities for protection. It encompasses aspects like greenways, scenic areas, open spaces, biodiversity, and environmental corridors as well as developmentally sensitive areas such as floodplains, karst areas and steep slopes. Green infrastructure provides environmental protection and a higher quality of life within communities as well as regulatory predictability for landowners and investors.

Urban and Rural Open Space Resources

Open space resources in urban areas should be designed and created during development. Their value to the community is determined by their configuration, attributes and relationship to the surrounding areas. Urban open spaces will increase in importance as the County's UDA is more densely developed. Development in the urban areas should consider specifically designed open spaces incorporated as amenities to offset the higher densities.

Wooded areas are an important resource and should be considered during planning and designing open spaces. The benefits of wooded include areas the maintenance of ground and surface water quality, groundwater recharge areas, habitat for biological resources, added oxygen to the air, and help protect environmentally sensitive areas. Urban wooded areas provide buffers and potential recreational opportunities. These areas help to preserve the natural scenery and can make the urban area a more attractive place to live. Rural open spaces of prime agricultural areas, forested areas, mountainous areas and stream valleys have particular value to the community; and they should be conserved. (See Agricultural and Forestal Lands, pages 9-10)

The use of aspects of Sustainable Sites design should be implemented in the County and encouraged for new developments. Sustainable Sites is a component of the United States Green Building Council's (USGBC) LEED® program and Green Building Initiative (Green Globes®) rating system programs. These programs give guidance that suggests inappropriate sites like prime farm land, floodplains, habitats for threatened or endangered species, wetlands and land near wetlands, land near bodies of water and designated park land should be avoided during site selection and development to reduce environmental impacts. These programs state that development should be channeled into urban areas with existing infrastructure which would help protect natural resources and that existing natural areas should be conserved and restored to provide habitats and to promote biodiversity.

POLICY: Open spaces in the urban and rural areas of the County are important and need to be recognized, delineated and protected.

Implementation:

- In urban areas, open spaces should be planned. All types of urban open spaces like greenways, squares, plazas, urban parks, playgrounds and street medians should be considered as part of urban development planning and implemented wherever reasonable.

- In rural areas, open spaces should be protected not only through conservation easements but also transfer development rights programs to ensure that agricultural, forested, and mountainous areas are protected.

- Sustainable sites considerations should be used to manage the development of property throughout the County.

Greenways

Greenways are areas of open space, usually linear in nature that form networks of trails. They are often located along streams, within utility easements, and along roadways, and can serve many different purposes. They can help link people to the area's natural, recreational and cultural resources, as well as provide a system of natural linkages for the areas wildlife to preserve biodiversity and protect habitats. When constructed along streams they can help preserve and protect buffers along the streams which can help protect biodiversity and help filter pollutants. Greenways can also provide recreational opportunities such as hiking or bicycling, provide nature studies such as plant and animal behavior, as well as simply raising awareness of the environment.

POLICY: Establish a network of greenway trails for conservation, recreation and transportation through the urban areas of Frederick County, and link with the trails network in the City of Winchester.

Implementation:

- Work with the Parks and Recreation Department, the City of Winchester and other organizations and community stakeholders to develop a greenway network plan that highlights the area's natural and historic resources.

- Ensure that when new developments are planned, connectivity of greenways is included through the project.

Habitat Fragmentation and Environmental Corridors

One reason for the loss of habitat and the fragmentation of habitat is the subdivision and development of land. Habitat fragmentation reduces available wildlife areas and changes migratory pathways through environmental corridors. Past development has created small separated pockets of open space that sometimes conflict with the needs of local wildlife and their adaptability to these changes. Fragmentation can hinder the safe movement or migration of many species because it forces them to travel over roads and through developments.

POLICY: Increase the connectivity of urban and rural natural areas to avoid fragmentation of habitats and migratory pathways.

Implementation:

- Environmental corridors should be planned with all development activities to ensure safe movement and protection of species.

- The County should seek to reduce habitat fragmentation by maintaining large contiguous areas of forests, meadows, wetlands and streams.

- Large scale clearing of mature woodlands should be avoided during development activities.

Light and Noise Pollution

Light

Cycles of daylight and darkness have ecological consequences. Obtrusive lighting, often referred to as light pollution, obscures our view of the sky and primarily comes from inefficient and misdirected lighting sources. Misdirected lighting causes urban sky glow and glare, is a source of energy waste and can be a nuisance. Simply defined, light pollution is excess or obtrusive light created mainly by humans. Increasing urbanization requires that care be taken to reduce unfocused emissions of light.

POLICY: Minimize light emissions to those necessary and consistent with general safety and recognize the nuisance aspect of unfocused light emissions.

Implementation:

- Evaluate current lighting ordinances to assess effectiveness in reducing light pollution caused by uplighting, excessive lighting, glare and light trespass.

- Light emissions need to be minimized to what is necessary and consistent with general safety. Recognition needs to be given to the nuisance aspect of unfocused light emission.

Noise

Noise pollution is unwanted noise, often described as a displeasing sound that disrupts the activity or balance of human or animal life. The source of most forms of noise pollution is from transportation systems like vehicles, aircraft or railroads. The daily activities of the Winchester Regional Airport are an example, and it is important that land developing around the Airport is respectful of this operation. The Airport Support Area helps designate what types of uses are appropriate in these developing areas to ensure the continued operation of the Airport.

Other sources of noise include industrial operations, highway traffic, car alarms, factory machinery and equipment, construction work, lawn care equipment, barking pets, car stereos, and power tools. Urban planning can play an important role in managing noise pollution, and the County must ensure that acceptable levels of noise are maintained. Currently the County only has maximum noise levels for industrially zoned property.

POLICY: Minimize human exposure to unhealthy levels of noise.

- Ensure that with new development, people are protected from unhealthy levels of noise.

- Examine types of noise generators and determine if additional ordinances are appropriate.

Supporting Materials/Resources

1. Soil Survey of Frederick County, Virginia
2. The Frederick County Zoning and Subdivision Ordinances.
3. The Frederick County Erosion and Sediment Control Ordinance
4. The Virginia Erosion and Sediment Control Act
5. U.S. Green Building Council - LEED® for New Construction and Major Renovations
6. Hydrogeology and Ground-Water Availability in the Carbonate Aquifer System of Frederick County, Virginia, U.S. Geological Survey
7. Chesapeake Stormwater Network Technical Bulletin-Stormwater Design Guidelines for Karst
8. FEMA Floodplain Maps