As the County continues to grow, environmental issues will become increasingly critical. The environmental issues in the County are concerned with natural resources and their protection. These issues exist in the rural and urban portions of the County.

Physical Characteristics

The County can be viewed in terms of three physical areas. The eastern portion of the County, contains a band running north-south along the length of the County, generally east of Interstate 81, which is underlain by Martinsburg shale. This area consists of broad, relatively level ridges separated by steep stream valleys. The soils tend to be dense and not well suited for intensive agriculture or septic drainfields. Much of the land is used either as pastureland or is developed for residential or urban uses. Much of the sewered suburban development in the County is in this area.

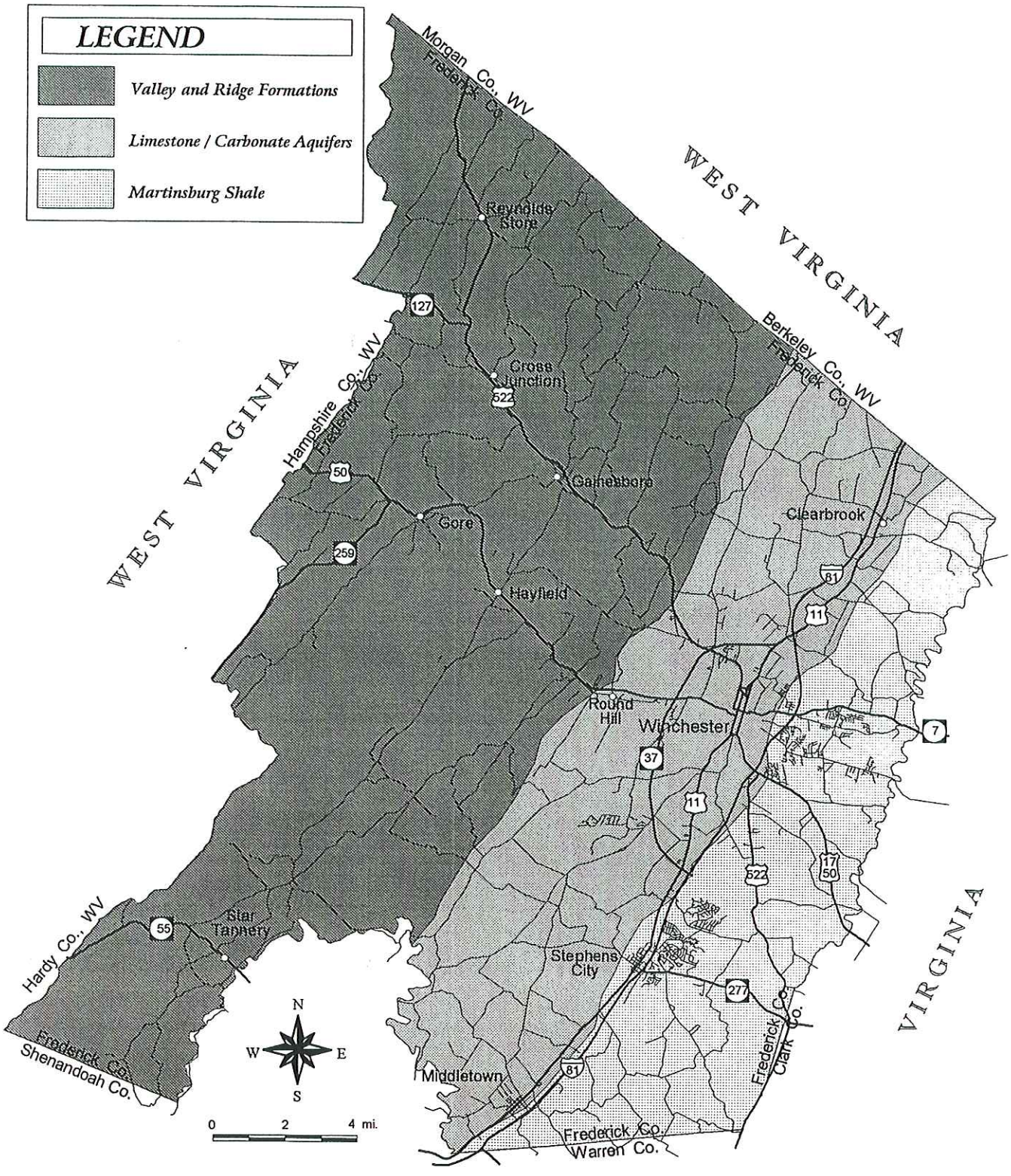
The second area is underlain by limestone-carbonate bedrock and consists of a band that runs north-south through the County between Interstate 81 and Little North Mountain. The terrain here tends to be gently rolling. Outside of the City of Winchester, much of this area is currently used for agriculture and contains the bulk of prime agriculture soil in the county. Most of the orchards in the County are located in this area. Soils in this area tend to be well suited for septic drainfields, except where the soils are thin.

The third area is the large western Valley and Ridge area that is underlain by a variety of shale, sandstone, and limestone formations. This area consists of alternating valleys and ridges that run north-south through the County. Most of the area is forested. The ridges tend to be very steep, and the highest elevations in the County are in this area. Soils are varied, although most tend not to be well suited for septic drainfields.

An evaluation has been done to determine the suitability of various areas of the County for development by mapping the location of three characteristics: steep slopes, floodplains, and prime agricultural soils.

These three areas can be further divided into drainage areas. These drainage areas are separated by divides and drain into different streams. The eastern half of the County tends to drain toward the east to Opequon or Cedar Creek. The valley and ridge area tends to drain north toward creeks such as Back Creek. These drainage areas can provide a good basis for planning sewer and water service areas because such service can be provided through the use of gravity flow within a drainage area. The movement of flows between drainage areas requires pumping.

This information can be used to evaluate land to determine general suitability for more intensive forms of development. In general, the pattern of development that seems to be occurring involves development in the eastern shale belt using public sewer and water facilities. Lesser amounts of



GIS Frederick County Planning & Development
Winchester, Virginia

Geologic Formations and Aquifers

12-10-97

development have occurred in the limestone belt west of Winchester and Interstate 81. The relatively steep areas in the western portions of the County remain predominantly rural.

Water Supply

Issues concerning quality, quantity, use, and protection of water resources are directly related to land development issues. Water supplies are needed to support development, while surface and groundwater are potentially affected by development activities.

Major sources of water used in the County are groundwater and the North Fork of the Shenandoah River. The Frederick County Sanitation Authority's James H. Diehl Water Filtration Plant will have a capacity of 6 MGD by 2001. The plant will be supplied by the Stephens City quarries and Bartonsville well field. These sources have a current combined sustainable capacity of 4 MGD.

In 2000, the Authority entered a seventy-year lease with Global Stone Chemstone Corporation (Global). Global owns quarries at Clearbrook, Middletown, and Strasburg. The lease provides the water from these quarries as a source of supply and transfers title of the quarries to the Authority when the mining operations are complete. The agreement has provided a viable long-term source of water for the County.

By 2003, the Authority will have in operation the Northern Water Treatment Plant at Clearbrook. This plant will have an initial capacity of 4 MGD and is expandable to 6 MGD. The plant will be supplied by the Clearbrook quarries, supplemented by wells. The current sustainable yield is a minimum of 2.20 MGD. Utilization of the full potential of the Northern Water Treatment Plant will require construction of a transmission main from the plant to existing lines in the Stonewall Industrial Park. The existing ten-inch diameter waterline along Route 11 from Welltown Pike to Clearbrook has a capacity of 1.5 MGD.

The Stephens City and Clearbrook quarries, with supplemental wells, provide an adequate water source supply to meet the projected demand through 2025. During this period, the Authority will develop additional sources of water supply utilizing the Middletown and Strasburg quarries to store high flows stripped from Cedar Creek. This source has the potential of about 10 MGD.

The County will have the United States Geological Survey conduct a study of the carbonate aquifer system that will be the source of supply of potable water. This study will be complected in 2004. It will provide relevant hydrogeologic information that can be used to guide the development and management of this important water resource.

Groundwater is the major source of water supply in the rural portions of the County and provides a potential alternative source for urban areas. In all, over half of the population of the County relies

on groundwater as the sole source of water supply. The most productive aquifers in the County are the limestone-carbonate aquifers.

There is a need to protect groundwater resources from potential sources of pollution including sewage disposal, hazardous materials users, landfills, underground storage tanks, and urban. Special standards should be developed to control uses which potentially pollute groundwater. Particular care should be taken to protect the limestone areas.

On-site sewage disposal systems are a particularly widespread potential source of water pollution. These systems are regulated by the Virginia Health Department and by the Virginia Department of Environmental Quality. Measures should be implemented to insure that such systems are properly located, installed, operated, and maintained. In addition, the County needs to monitor the density of development utilizing on-site disposal to insure that problem are not created.

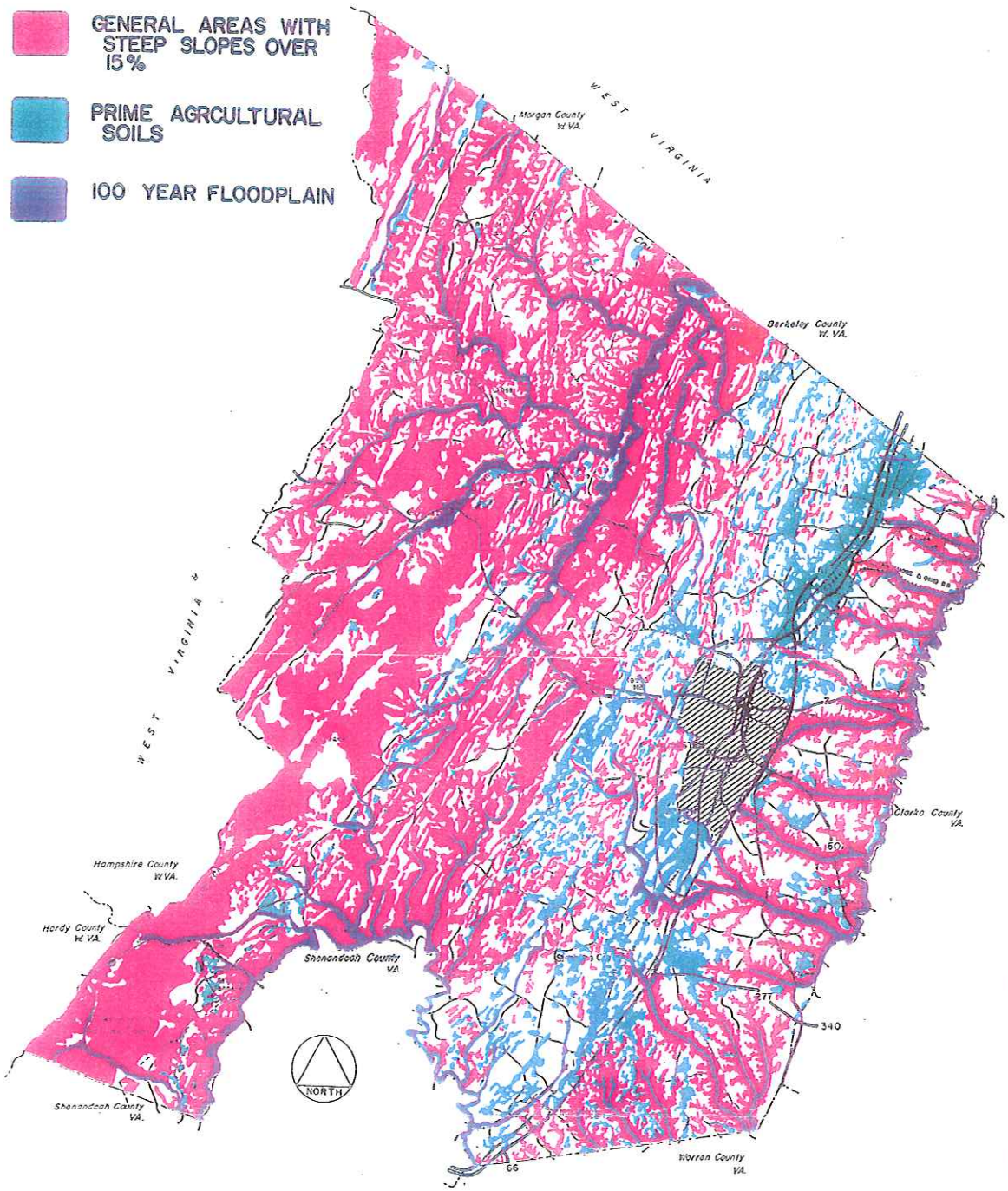
Package treatment plant sewer systems designed to serve particular developments, should not be allowed in areas where high density development is not expected to eventually occur. Where such systems are allowed, they should be dedicated to a public authority or sanitary district to insure that the facilities are properly operated. Private package treatment plant sewer systems should be prohibited from serving industrial and commercial land uses; as well as residential land use developments serving more than one lot or one unit.

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 current standards require that increased stormwater created by development be conveyed to an adequate channel, capable of carrying the maximum storm that will occur on the average once every two years.

Stormwater Management

Growth and development bring along with it changes in the natural condition of the land. Areas which were once woodlands or pastures have been developed with roads, parking lots, and buildings. This process brings changes to the runoff characteristics of surface water, both in quantity and quality. The County recognizes the need to develop ordinances and standards relating to stormwater runoff. The Department of Public Works prepared a stormwater ordinance for Frederick County in July 1999. This ordinance was enacted to ensure local compliance with the Stormwater Management Act (Section 10.1-603 et seq. of the Code of Virginia, 1950, as amended).

The Department of Public Works is the agency that is responsible for the implementation and enforcement of the Stormwater Management Ordinance. An essential component of this ordinance involves the approval of a detailed site plan prior to the development of any parcel that is adjacent to drainage easements, structures, stormwater detention ponds, drainageways or steep slopes.



CENTIMETERS 0 1 2 3 4 5 MAP 0 1/2 1 2 INCHES
METERS 0 1200 2400 3600 4800 6000 GROUND 0 5000 10000 20,000 FEET

FREDERICK COUNTY, VIRGINIA
DEPARTMENT OF PLANNING AND DEVELOPMENT

PHYSICAL CHARACTERISTICS

Carrying Capacity

The carrying capacity of land refers to the maximum population density that can be supported by an area without degrading the natural environment or without threatening public health, safety, and welfare. Local land use regulations typically establish maximum densities and intensities at which development can occur. Densities should be set based upon judgements concerning the capacity of the land to sustain such development.

The capacity of the land to carry development in rural areas will depend upon a number of factors, including the following:

- Natural constraints on development, including steep slopes and floodplains;
- The ability of an area to accommodate sewage disposal;
- The need to protect natural resources, including groundwater aquifers and significant agricultural and forestal areas; and,
- The capacity of rural roads.

The capacity of the land to carry development in urban areas will depend upon a number of factors, including the following:

- Natural constraints on development, including steep slopes and floodplains;
- The need to protect natural resources, including stream valleys, mature woodland, and other open space resources;
- The need to provide protection from impacts of development, such as increased stormwater runoff; and,
- The capacity of roads, sewerage systems, and other facilities to accommodate development.

Information on such factors is available through a variety of sources and through on-site investigations. Such information should be considered in land use planning and incorporated into the development review process.

Environmental Protection

Current zoning district regulations limit the amount of steep slopes, wetlands, floodplains, mature woodlands, sinkholes, and natural stormwater detention areas that can be disturbed at the time of development. Other requirements can be developed to protect groundwater from urban sources of pollution.

Environmental Policy

A number of environmental issues have been identified.

Issues:

- *The need to identify and protect important resources.*
- *The need to identify the carrying capacity of land and to plan land use according to that capacity.*

The following are the policies proposed to address these environmental issues.

GOAL *- Protect the natural environment from damage due to development activity.*

Strategy 1 - Use performance standards to protect natural features and avoid environmental constraints.

Implementation Methods:

1. Maintain and review environmental protection requirements in the Frederick County Code.

2. Avoid development in identified environmentally sensitive areas.

3. Review ordinances to develop performance standards for various uses which may threaten groundwater or surface water quality.

4. Undertake a comprehensive watershed management plan for urban areas to deal with existing drainage problems and to develop sufficient stormwater management standards for new development.

5. Strongly encourage and work with state agencies to develop sufficient standards to insure that on-site sewage disposal systems are properly located, installed, operated, and maintained.

6. When allowed, require that small community sewage systems in rural developments be dedicated to a public authority. Such systems should not be allowed in areas intended to remain rural into the indefinite future, including rural areas west of Interstate 81.

7. Prohibit uses that damage or pollute the environment.

GOAL *- Provide for development according to the capacity of the natural environment to carry that development.*

Strategy 1 - Use concepts of carrying capacity in general land use planning.

Strategy 2 - Incorporate concepts of carrying capacity in the development review process.

Implementation Methods:

1. Continue to develop an environmental database and use that database in making general land use planning and zoning decisions. Use the database to monitor environmental impacts.

2. Continue to require that information on carrying capacity be included with development proposals and use that information to evaluate the impacts of the proposals.

3. Undertake an effort to establish appropriate development densities based on carrying capacity factors.

GOAL *- Identify and protect important natural resources.*

Strategy 1 - Identify which natural resources are important and undertake efforts to locate and protect those resources.

Implementation Methods:

1. Identify alternate sources of water supply and methods for protecting those resources.

2. Encourage significant agricultural and forestal areas to be included in agricultural and forestal districts.