

Patrick County Comprehensive Plan – Natural Conditions

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NATURAL CONDITIONS

Introduction

This section of the Comprehensive Plan Update discusses the natural conditions and physical characteristics for the County. Air quality, climate, soils, slope or topography, water, floodplains, and geology are important factors in the physical development of a locality and can directly and indirectly affect economic growth and development. Patrick County has a very special natural environment in regards to geological structure, physiographics, soil types, topography, and mineral and water resources. Due to Patrick County's special natural environment, some types of potential land uses are limited in much of the County. The natural environment must always be considered in the determination of suitability for development of the land in order to avoid potential dangers or unexpected costs. Therefore, this update to the Patrick County Comprehensive Plan shall first examine the natural environment.

Land use, housing, and transportation planning are directly influenced by physical factors since, for example, intensive land use tends to proceed along patterns which first consume land which is the most problem free: smooth, low slope topography; good soil characteristics; away from floodplains; and good depth to bedrock.

Patrick County, twenty-seventh in size (area) among Virginia counties, is located in the south-central part of Virginia. The County is bounded on the north by Franklin County, on the east by Henry County, on the south by the state of North Carolina, and on the west by Carroll and Floyd Counties.

The Blue Ridge Mountains border the County on the west, and the Smith River and Philpott Lake bound the County in the northeast. In the southwest are the Ararat and Dan Rivers and in the southeast lies the Mayo River.

Natural Environment

A study of the physical characteristics of an area provides a clue as to its potential to adequately and safely support its economy and the desires of its people. In order to be truly realistic and functional, environmental studies for planning purposes must include analyses of those physical elements or characteristics which influence or bear upon the actual or potential utilization of the land in question. Likewise, there is a need for recognized interdependence of the various physical characteristics of the environment, including land, water, air quality, and the like, in order to understand how the alteration of any one factor might adversely affect the availability and quality of the other environmental elements. Properly considered and evaluated, sound understanding and analyses of the environment of an area can serve as an invaluable aid to guiding its future development and decisions regarding its utilization.

Climate

Patrick County is a temperate area located at a fairly high overall elevation. According to a Climate Summary Report for the period 1990 - 2020 by the National Weather Service, Patrick County (the Town of Stuart) has an average temperature of 37.5 degrees Fahrenheit in January and 75.6 degrees Fahrenheit in July. For January, the average maximum is 68.0 degrees Fahrenheit and the average minimum is 10 degrees Fahrenheit. For July, the average maximum is 94.0 degrees Fahrenheit and the average minimum is 56.0 degrees Fahrenheit. The County has an average annual precipitation of 51.9 inches and average snowfall of 5.9 inches.

Air Quality

Air pollution is the gross effect of the contribution of pollutants emitted by all sources in a given area. The concentration of a pollutant in the atmosphere at any given location will vary from one point of time to another even if the pollutant is discharged from its source at a uniform rate. This is due to local topography and changing weather conditions.

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The Virginia Department of Air Pollution Control and the U.S. Environmental Protection Agency have designated Patrick County as an attainment area for all criteria pollutants. Air quality in Patrick County is good, and the area is an attainment area respective to the Federal Clean Air Act. Most new or expanding industries have no problems in meeting air quality standards. Pursuant to the Federal Clean Air Act of 1977, the Patrick County area has been classified a Class II Attainment Area. This designation allows for unrestricted future industrial development in the area if it does not cause any "significant deterioration" of the area's existing air quality.

Water Resources

Patrick County is drained by several headwater tributaries of the Dan River Basin and is well supplied with surface water through numerous rivers and creeks. The main stream of the Dan River originates in the high Blue Ridge Mountain side west of Stuart, curves generally southeasterly across the County, enters North Carolina taking a looping route easterly, after which it reenters Virginia upstream from Danville. Other tributaries originating in Patrick County and constituting waters of the Dan River Basin are the Mayo River and the Smith River. All but a small portion of the extreme western section of the County is drained directly by the Dan River. At present, rather large supplies of water are available from the Dan River and its tributaries and fairly large supplies of water flow throughout the area. The water of the Dan River Basin is at present of extremely high quality and moderately hard due to the underlying limestone foundation.

Records of stream flow are valuable sources of hydrologic information. The factual data collected on the flow of water in streams is the best information available for the planning of a stream's capacity for use, for the maximum and minimum flows to be expected, and for the determination of physiographic and historical features affecting land-related problems. Accordingly, the United States Geological Survey (USGS) maintains and operates various gauging stations throughout the state and Dan River Basin for this very purpose. The USGS currently operates one gauging station in the County, which is located on the Mayo River near Nettleridge. Additionally, there are some historic records available from USGS for the Smith, Mayo, and Dan Rivers.

In addition, the Virginia Department of Environmental Quality (DEQ) from time to time has operated water quality surveillance monitoring stations throughout Patrick County. These stations, through monthly samplings, analyze such properties as temperature and dissolved oxygen and phosphorus content. Depending on the needs, however, checks may be made for nutrients, solids, alkalinity, settleable solids, hardness, chlorides, chromium, zinc, dissolved solids, sulfates, and conductivity. The quantitative results of the analysis of water at any such sampling station may be greatly influenced by weather conditions, stream flow, and the season of the year. In past years, the West Piedmont Planning District Commission, along with the Dan River Basin Association, DEQ, and other groups, took part in a TMDL (Total Maximum Daily Load) reduction program aimed at reducing fecal coliform bacteria in portions of the North Mayo and South Mayo Rivers in the County. With utilization of a DEQ grant, this project provided cost-share funds to help residents along these rivers to improve or replace their septic systems. Streambank management and pet waste education were also components of this project.

Within Patrick County there are numerous small lakes and various water impoundments to be found including the significantly large Philpott Reservoir on the upper reaches of the Smith River forming the boundary between Patrick, Franklin, and Henry Counties. Philpott Reservoir was constructed in approximately 1953 by the Army Corps of Engineers primarily as a flood control project with generation of electric power. It has a generating capacity of approximately 14,000 kilowatts of electric power and is part of the commercial electric grid operated by American Electric Power Company and Virginia Electric and Power Company. As a result of the project, approximately 40 miles of shoreline was cleared around the lake in the three counties. The Philpott Reservoir lake is 15 miles long and covers approximately 3,000 acres. In fall 2006, the Henry County Philpott Lake Water Protection Program was completed by a committee consisting of local, state, and federal government members to reduce the potential for contamination of the lake's water sources and to protect the public health. The plan was created as part of the planning process developed by the U.S. Environmental Protection Agency and the National Rural Water Association under the source water protection program of the Safe Drinking Water Act. Henry

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County recently developed a Source Water Protection Plan for the Philpott Lake watershed, some of which includes Patrick County. Henry County obtains a portion of its municipal water supply from the upper Smith River, three miles downstream from Philpott Reservoir.

The other impoundment within Patrick County of planning significance is that at Pinnacles of Dan in western Patrick County. The Pinnacles of Dan Hydro Plant in west central Patrick County has a generating capacity of 11,250 kilowatts and consists of two reservoirs--Townes and Talbott. They were constructed in the 1930's by the PWA (Public Works Administration). The plant is used primarily to meet peak power demands in the summer months and electric generating demands under high voltage lines to the City of Danville; the facility generates about 2.5 percent of the City's energy needs. In 2020, the City was in the process of selling this facility to Northbrook Energy, but planned to continue to purchase energy from Northbrook. Another significant water impoundment within the County is that owned and operated by the Town of Stuart for its municipal water supply. It is located west of the Town.

Smaller water impoundments are scattered throughout the County primarily on private lands serving conservation and erosion prevention purposes. The extreme slopes and high susceptibility to erosion of many of the areas in Patrick County suggest the need for additional construction measures to control the actual or potential danger of flooding and erosion prevalent in many portions of the County.

The susceptibility of certain areas to frequent flooding during periods of heavy or prolonged precipitation is an important factor in determining the locations of future development within Patrick County. The construction of permanent, inhabited public and private structures in floodplains presents the potential loss of lives and property. Furthermore, as the floodplain is developed, the normal flow of water is retarded and the area susceptible to flooding conditions is enlarged. Therefore, the future construction of residential, commercial, and industrial structures in flood prone areas should be discouraged.

The Federal Emergency Management Agency (FEMA) issues maps of the 100- and 500-year floodplains through its National Flood Insurance Program. These maps are available for Patrick County and should be consulted before any development of any public or private structures. The County building inspector is the normal contact person on floodplain issues. FEMA, the Virginia Department of Conservation and Recreation (DCR), and the *West Piedmont Multi-Jurisdictional Hazard Mitigation Plan* all serve as excellent resources for identifying flood-prone areas in the County and throughout the Region. Table 1 presents a list of critical facilities that are located within flood zones.

Table 1		
Critical Facilities within Flood Hazard Zones		
Dam	Cockram Mill	A
Dam	Fairystone	A
Dam	Talbott Dam/Pinnacles	A
Dam	Townes Dam/Pinnacles	A

Source: West Piedmont Multi-Jurisdictional Hazard Mitigation Plan

In 1979, the Town of Stuart and surrounding areas experienced a severe flood. Following this event, detailed studies were made by appropriate agencies and recommendations were made for preventative measures. In the 1980's, federal funds from the U.S. Army Corps of Engineers and from the Virginia Community Development Block Grant Program were coupled together to construct a flood mitigation structure in the industrial section of the Town of Stuart.

Patrick County, much like the other counties in the West Piedmont Planning District, is located on a geologic formation which is not conducive to a good subsurface water supply. This conclusion has been reinforced by the West Piedmont Planning District Commission's *Metropolitan/Regional Comprehensive Water and Wastewater Disposal Plan* and other studies over the years. Subsurface water, or groundwater, is that portion of precipitation that has penetrated the earth's surface either by direct infiltration or by seepage from surface water. The occurrence of groundwater is controlled by such factors

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as topography, lithology (character of rock formation), geologic structure, soils, vegetation, and certain works of man. Within Patrick County, geologic structure and topography, rather than lithology, are the principal factors that control groundwater occurrence. As described previously, Patrick County is underlain, primarily, by a complex formation of Precambrian crystalline rocks, such as gneiss, granite, schist, phyllite, quartzite, hornblende, and gabbro. This type of rock formation results in poor subsurface water production, except where fracturing or weathering has occurred. Actually, water is only found in fractured zones in the upper levels of the rock. Primarily, this is a result of faults or other subsurface structural movements and contact zones between the various rock strata. Contact zones between different rock types occur only in certain areas. The openings that provide for groundwater storage in these rocks usually occur within a few hundred feet of the surface. Due to the extremely limited supply of water in the fractured rock formations of the County, heavy pumping often results in dramatically fluctuating water levels.

Drilled wells in Patrick County are usually six to eight inches in diameter and generally reach water at depths of 100 to 350 feet. Below this depth, reliance is primarily on contact zones. Well yield is highly variable and is primarily from fractures. Well site selection is critical since a well must intersect fractures to be highly productive. Pumping rates are usually less than 20 gallons per minute (gpm) but yields up to 200 gpm are possible although they are the exception. Groundwater quality is generally good, but some local areas have high iron and acidity problems. This is typically through an area from Patrick Springs up through Fairy Stone.

The future economic, demographic, and industrial growth of Patrick County will depend directly on water in sufficient supply and of sufficient quality. Currently, in Patrick County, non-centralized public and private water facilities are primarily dependent on groundwater supplies and, as the unfortunate experience in the drought of the summer of 1976 conclusively proves, water supplies for the Town of Stuart and other, future systems must depend on surface water as an alternative to groundwater supplies when substantial quantities of water is needed.

The Patrick County Board of Supervisors adopted a countywide water and sewer plan in 1996; the document was developed with the assistance of a consulting firm and the West Piedmont Planning District Commission. This project was funded by an Environmental Protection Agency 604(b) grant through the Virginia Department of Environmental Quality's State Water Control Board. The plan addresses water resources and utilization within the County for residential, commercial, and industrial uses. The "Utilities" section of this plan includes recommendations from the plan.

Historic Preservation

The preservation of historic sites should be a concern to citizens within a community. Through the preservation of areas which have played a significant role in the early development of the locality, state, or nation, present and future generations will be able to visualize and respect the events of the past. If not identified and preserved, historic sites soon are lost to posterity. The area is fortunate in having several historic sites worthy of preservation. To date, several of these sites including but not limited to the Jack's Creek Covered Bridge in Woolwine, the Patrick County Courthouse at Main and Blue Ridge Streets in Stuart, and the Reynolds Homestead in Critz, the J.E.B. Stuart Birthplace, have been accorded listing in the Virginia Landmarks Register. Several have been included on the National Register of Historic Places maintained by the U.S. Department of Interior because of their architectural or historical significance. The National Register of Historic Places is the legal instrument to ensure that registered properties threatened by federal or federally-assisted projects will be the subject of comment and review in accordance with the procedures prescribed by the National Historic Preservation Act of 1966. Information on historic sites in Patrick County are listed in the Cultural Resources section of this plan and more detailed information may be obtained from the office of the Virginia Department of Historic Resources in Richmond.

In addition to being placed on the state and federal historic registers, historic sites in Virginia can be protected from subdivision and commercial development pressures by use of open space easements. In the Open Space Land Act of 1966, as amended, the General Assembly adapted the easement, a traditional device of the real property law, to serve the needs of such property owners while at the same

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time protecting the public interest in maintaining scenic and historic areas. An open space easement is a legal agreement between a landowner and either the Virginia Historic Landmarks Commission, the Commission of Outdoor Recreation, the National Trust for Historic Preservation, or the Virginia Outdoors Foundation. The rights and usages of private ownership remain unimpaired, subject only to the restrictions concerning the historic or scenic character of the property agreed to in the open space easement. In other words, all rights of private property defendable by the trespass laws are retained by the owner as well as all rights to enjoy the fruits of the land and the use of the property, with the exception of such rights of development as are mutually agreed to and specified in the deed of easement. However, registration makes property eligible for protection and financial incentives such as tax credits for rehabilitation and grant funds. Registration also serves as a way of honoring historic significance by collecting information that becomes a permanent record of the Virginia Department of Historic Resources' archives.

Natural Conditions Summary

- Based on a record of the County's climate from 1990 through 2020, Patrick County's average temperature was 37.5 degrees Fahrenheit, while the average July temperature was 75.6 degrees Fahrenheit. The average annual precipitation was 51.9 inches, while average annual snowfall was 5.9 inches.
- The air quality is excellent in the County. The Virginia Department of Air Pollution Control and the U.S. Environmental Protection Agency have designated Patrick County as attainment areas for all criteria pollutants. There has been no known exceedance of any standard.
- The main stream of the Dan River originates in the high Blue Ridge Mountain side west of Stuart, curves generally southeasterly across the County, enters North Carolina taking a looping route easterly, after which it re-enters Virginia upstream from Danville. Within Patrick County there are numerous small lakes and various water impoundments to be found including the significantly large Philpott Reservoir on the upper reaches of the Smith River forming the boundary between Patrick, Franklin, and Henry Counties; Pinnacles of Dan, in the western portion of the County is yet another impoundment.
- The County has a Flood Insurance Study and maps that should be consulted before land use/development changes take place on acreages near free-flowing or intermittent streams of the County. FEMA, the Virginia Department of Conservation and Recreation (DCR), and the *West Piedmont Multi-Jurisdictional Hazard Mitigation Plan* all serve as excellent resources for identifying flood-prone areas in the County and throughout the Region.
- Through the preservation of areas which have played a significant role in the early development of the locality, state, or nation, present and future generations will be able to visualize and respect the events of the past. The area is fortunate in having several historic sites worthy of preservation. To date, several of these sites including Jack's Creek Covered Bridge in Woolwine, the Patrick County Courthouse at Main and Ridge Streets in Stuart, the Reynolds Homestead in Critz, and the J.E.B. Stuart Birthplace, have been accorded listing in the Virginia Landmarks Register. Information on historic sites in Patrick County are listed in the Cultural Resources section of this plan and more detailed information may be obtained from the office of the Virginia Department of Historic Resources in Richmond. In addition to being placed on the state and federal historic registers, historic sites in Virginia can be protected from subdivision and commercial development pressures by use of open space easements. Registration also serves as a way of honoring historic significance by collecting information that becomes a permanent record of the Virginia Department of Historic Resources' archives.