



## ENVIRONMENT + RESILIENCY

Draft Text (July 10, 2023)

### Goal

Hanover County is a community that strategically preserves critical natural resources for the health and enjoyment of its current residents and future generations, creating a resilient community.

### Why It Matters

Protecting forests, streams, wetlands, riparian buffers, prime agricultural soils, and critical wildlife habitat provides significant benefits to the community. Appropriate stewardship practices provide clean air, potable water, and a safe food supply for residents, contributing to Hanover County's high quality of life and helping create a resilient community.

### Quick Facts

- Hanover County is located along the Fall Line, which separates the Coastal Plain from the Piedmont Plateau. The Fall Line generally follows the right-of-way of the Richmond, Fredericksburg, and Potomac Railroad, with areas east of the Fall Line within the Coastal Plain and areas to the west in the Piedmont Plateau. Soil types, geology, and landscapes vary from the Coastal Plain to the Piedmont Plateau.
- Elevations in the County range from about sea level along eastern portions of the Pamunkey River to about 370 feet above sea level on the highest ridges to the west. Most areas with steep slopes occur along streams and rivers, especially near the Fall Line.
- Hanover County is within the Humid Subtropical Climate Zone, which is characterized by hot, humid summers and cool winters. Average temperatures vary from 36.2 degrees in January to 76.5 degrees in July, with an average precipitation of 42.05 inches. February tends to be the driest month, with August being the wettest.
- All of Hanover County is within the Chesapeake Bay watershed. There are two major drainage areas. About 15% of the County drains southward to the Chickahominy River, which eventually drains into the James River. The remaining area drains to the Pamunkey River Basin, which is a tributary of the York River. Most wetland areas are along stream corridors, particularly along portions of the Chickahominy River, Pamunkey River, Newfound River, Totopotomy Creek, Beaverdam Creek, and Mechumps Creek.
- The Chickahominy River from U.S. Route 360 to the terminus of the Henrico County/Hanover County border is designated a State Scenic River (Code of Virginia § 10.1-410.1).

- Areas east of Interstate 95 are within the Eastern Virginia Groundwater Management Area.
- There are 31 unique natural heritage sites (per the Virginia Department of Conservation and Recreation). These sites include rare, threatened, or endangered plant and animal species and/or unique natural communities.
- Approximately 63% of the County (over 180,000 acres) is forested (per U.S. Forest Service: Forest Inventory and Analysis Application "EVALIDator").

### **Measuring Our Progress**

- Percentage of County Forested
- Number of High Ozone Days

### **Chapter Content**

This chapter of the plan is divided into different sections that address environmental resources and resiliency:

- **Inventory of Environmental Resources**
  - Land Resources
  - Water Resources
  - Air Resources
  - Natural Heritage Resources
- **Environmental Policies: Current Policies, Plans, and Regulations**
  - Hanover-Caroline Soil and Water Conservation District (H-CSWCD)
  - Long-Range Water Resources Plan
  - Federal Clean Water Act: National Pollutant Discharge Elimination System (NPDES)
  - Total Maximum Daily Loads (TMDLs)
  - Chesapeake Bay Preservation Act (CBPA) Program
  - Stormwater Management + Erosion/Sediment Control
  - Floodplain Management
  - Dam Inundation Zones
  - Comprehensive Coastal Resource Management
- **Resiliency**
  - Hazard Mitigation
  - Renewable Energy
  - Efficient Resource Management
  - Historic and Culturally-Sensitive Communities
- **Objectives and Strategies**

## **Inventory of Environmental Resources**

Due to its location along the Fall Line, Hanover County has unique topography, landscapes, and ecosystems that contribute to its scenic beauty and overall rural character. These resources are described on the following pages.

### **Land Resources**

- **Physiography**

Hanover County lies astride the Fall Line, which generally runs along the right-of-way of the Richmond, Fredericksburg and Potomac Railroad. The Coastal Plain is to the east of the Fall Line and the Piedmont Plateau is to the west. Therefore, Hanover County and the Town of Ashland are within both the Coastal Plain and Piedmont Plateau physiographic provinces.

Within Hanover County, elevation ranges from about sea level on the eastern end of the Pamunkey River to about 370 feet above sea level on the highest ridges (Hanover County Soil Survey, 1980). Most of the steep slopes are found along rivers and streams. Around the Fall Line, the banks of several rivers (particularly the South Anna River) have fairly steep bluffs characterized by exposed rock. Further to the east, there are some steep slopes along tributaries to the Pamunkey River.

- **Climate**

Hanover County is within the Humid Subtropical Climate Zone, which is characterized by hot, humid summers and cool winters. Significant amounts of precipitation occur in all seasons within this zone. Precipitation in the winter months is associated with large storms that the westerlies steer from west to east. Most precipitation in the summer months occurs during thunderstorms or the occasional hurricane or tropical storm.

The average temperature for Hanover County varies from 36.2 degrees Fahrenheit in January to 76.5 degrees Fahrenheit in July. The average annual precipitation for Hanover County is 42.05 inches. On average, February is the driest month with an average precipitation of 2.87 inches and August is the wettest month with an average precipitation of 4.34 inches. In terms of snowfall, January and February are nearly even with averages of 4.8 and 4.7 inches of snowfall, respectively. Annually, Hanover County receives approximately 14.6 inches of snowfall (Southeast Regional Climate Center, 2010).

A changing climate may result in more extreme weather events. According to the Georgetown Climate Center, Virginia has experienced a 33% increase in heavy rainstorms and snowstorms over the past 60 years, with an 11% increase in precipitation from the largest storms. There are more instances of extreme heat, with 2000 – 2010 being the hottest decade on record. Some of the strategies listed in this chapter can be implemented to help mitigate potential climate changes and improve resiliency.

- **Soils**

Hanover County is characterized by gently rolling hills that are heavily wooded (in undeveloped areas) and bisected by streams and small rivers. There are two distinct geologic and hydrogeologic settings in Hanover County: the eastern portion of the County is located within the Coastal Plain Physiographic Province and the western portion of the County is in the Piedmont Physiographic Province. The Coastal Plan Physiographic Province is comprised of unconsolidated marine and non-marine sediments overlying a crystalline rock complex. A major fault zone, the Fall Line, separates the Coastal Plan Physiographic Province from the Piedmont Physiographic Province. The Piedmont Physiographic Province is comprised of massive igneous and metamorphic rocks.

The western third and eastern third of the County have significant areas of highly-erodible soils (soils that have an Erodibility Index of 8.0 or higher). Most areas with steep slopes occur along streams and rivers, especially where these watercourses traverse the Fall Line. At the Fall Line, the banks of several rivers, particularly the South Anna River, have relatively steep bluffs formed of exposed rock. In the eastern part of the County, steep slopes are concentrated along tributaries that feed the Pamunkey River (Totopotomoy Creek, Mechumps Creek, Crump Creek and Parsleys Creek).

- **Mineral Extraction**

There are active sand, clay, and granite mines in the County. Martin Marietta's Verdon Quarry (granite) and U.S. Silica's Rockville Quarry (aplite) are two of the larger operations.

While mineral extraction can provide economic benefits, it is important to regulate impacts related to noise, vibration, and dust on neighboring land uses.

- **Septic Suitability**

Much of the County will not be served by public sewer, so many homes and businesses (especially in rural areas) use septic systems for on-site wastewater treatment. The Virginia Department of Health (VDH) issues permits for these systems. Since 2015, the median number of septic permit applications submitted per year is 365. On average, 75% of applications (282 per year) are intended to serve new construction, and 12% of applications (44 per year) are for alternative systems. VDH estimates there are approximately 21,000 septic systems in the County, with 959 of those being alternative systems.

Physical features of the site, along with soil characteristics, affect the ability of septic systems to treat and disperse wastewater. Some soils present in Hanover County are more suitable for septic systems than others. The soils most suitable for septic systems are generally located along the ridges and high points of the County, with soils with less suitability located near rivers and streams.

## Water Resources

- **Watersheds**

All of Hanover County is within the Chesapeake Bay watershed. Most of the County drains to the Pamunkey River Basin, which is a tributary of the York River. About 15% of the County drains southward to the Chickahominy River, which eventually drains into the James River. Although small by comparison to the Pamunkey River Basin, this southern drainage areas contains a majority of the Suburban Service Area (SSA).

- **Scenic Rivers**

The Chickahominy River from U.S. Route 360 to the terminus of the Henrico County/Hanover County border is designated a State Scenic River (Code of Virginia §10.1-410.1). Other rivers and streams may be eligible for designation as a State Scenic River, including segments of the North Anna, South Anna, and Pamunkey rivers. Waterways may be eligible for this designation if there are scenic landscapes along the river corridor with minimal development; historic features; unique flora and fauna; high water quality; strong fisheries; public access to the river; and overall aesthetic appeal. After designation of a scenic river, no dam or other structure that impedes natural flow may be constructed unless authorized by the General Assembly.

- **Wetlands**

Wetlands are transitional areas between dry uplands and bodies of water. Local wetland complexes, whether tidal or non-tidal, consist of vegetated marshes, swamps, bogs, bottomlands, shallow open waters, non-vegetated beaches, sandflats, and mudflats. Wetlands provide a multitude of benefits, including:

- Filtering pollutants and sediment;
- Serving as a barrier and a means to absorb floodwaters;
- Buffering and stabilizing shorelines and stream banks from erosion;
- Recharging groundwater resources; and
- Serving as breeding and nesting grounds for plants and wildlife.

Most of the County's wetlands exist along stream corridors. The majority of the wetlands are found along the middle and lower Pamunkey, Newfound River, Totopotomy Creek, Beaverdam Creek, and Mechumps Creek, with wide expanses of wetlands along lower portions of the Chickahominy River. Additional wetlands are found in concentrated areas in the center of the County.

In general, wetlands cannot be disturbed without receiving necessary permits. These permits are regulated by the Virginia Department of Environmental Quality (DEQ).

- **Floodplains**

Floodplains are located along many of Hanover County's major rivers and streams. These important areas help reduce the impacts of flooding by slowing and temporarily storing

floodwaters during large storm events. They also serve as important wildlife habitats and migratory corridors. Local regulations aimed at managing development in floodplains are described later in this chapter.

- **Groundwater**

The quality and availability of groundwater resources varies between the western part of the County (within the Piedmont) and the eastern part of the County (Coastal Plain):

- Groundwater sources vary widely in the Piedmont for water quality and quantity. High iron levels and acidity are the two most common problems. Due to these variances, well monitoring and well site evaluation are two important actions to ensure the water source is available and not contaminated.
- There are both shallow and deep water aquifers in the Coastal Plain. The shallow aquifers have more interaction with surface water and contaminants. The deep aquifers are recharged miles away and present a much more complex problem when contaminated (College of William and Mary, Department of Geology, Coastal Plain Province: The Geology of Virginia, 2010). Areas east of Interstate 95 are within the Eastern Virginia Groundwater Management Area, which establishes additional permitting requirements for certain types of groundwater withdrawals.

Small diameter wells have been drilled to a depth of as much as 200 feet into the Piedmont and as much as 350 feet into the Coastal Plain. Some of these wells yield as much as 50 gallons per minute. Several wells in the eastern part of the County yield more than 100 gallons per minute (Hanover County Soil Survey, 1980).

Large diameter wells, generally larger than six inches, have been dug or drilled into the soil and weathered rock of the Piedmont, and into the fluviomarine sediments of the Coastal Plain. These wells are commonly less than 60 feet deep. They yield small quantities of groundwater that is moderately soft, sometimes slightly turbid, and are susceptible to contamination. Maps showing the depth to the water table in Hanover County, the available water supply in Hanover County, and the groundwater withdrawals by county in Virginia can be found in the Long-Range Water Resources Plan (LRWRP).

### Air Resources

The Clean Air Act is a federal law that provides for the protection of human health and the environment. The original Clean Air Act was passed in 1963, and the 1970 version of the law resulted in the creation of the U.S. Environmental Protection Agency (EPA), which was charged with setting and enforcing ambient air quality standards. The law was amended in 1977, and most recently in 1990. Most of the activities of the Virginia Department of Environmental Quality's Air Division come from mandates of the Clean Air Act and are overseen by the EPA.

The Virginia Department of Environmental Quality (DEQ) monitors air pollution at many locations throughout the state and the Richmond region. At high levels, ground level ozone and particle pollution may raise health concerns in some people. According to the American Lung Association's latest State of the Air report (2023), Hanover County had no high ozone

days in 2019 through 2021, with the organization providing Hanover County with a grade of A for its air quality. Hanover County's air quality has improved significantly since the 1990s; since 1996, there are (on average) 45.7 fewer days with high ozone annually.

### Natural Heritage Resources

Natural heritage resources, as defined by the Virginia Department of Conservation and Recreation – Division of Natural Heritage (DCR –DNH), include the habitat of documented occurrences of rare, threatened, or endangered plant and animal species; unique or exemplary natural communities; and significant geologic formations, such as caves and karst features. Hanover County is currently home to 31 unique natural heritage resources. In addition, DCR has identified 23 terrestrial and aquatic conservation sites as areas within the County necessary for their survival. These conservation sites are recommended for protection because of the natural heritage resources and habitat they support. Some of the plant and animal species that are listed as natural heritage resources include:

- Yellow Lampmussel (*Lampsilis cariosa*)
- Eastern Lampmussel (*Lampsilis radiata*)
- Dwarf Wedgemussel (*Alasmidonta heterodon*)
- Yellow Lance (*Elliptio lanceolate*)
- Virginia Piedmont Water Boatman (*Sigara depressa*)
- Green Floater (*Lasmigona subviridis*)
- Barrens Dagger Moth (*Acronicta albarufa*)
- Tiger Salamander (*Ambystoma tigrinum*)
- Lesser Siren (*Siren intermedia*)
- Little-Leaf Sensitive-Brier (*Mimosa microphylla*)
- Lesser Marsh St. John's-Wort (*Triadenum tubulosum*)
- Squarehead (*Tetragonotheca helianthoides*)
- Small Whorled Pogonia (*Isotria medeoloides*)
- Purple Pitcher Plant (*Sarracenia purpurea*)
- Short-Leaf Sneezeweed (*Helenium brevifolium*)

Many of the conservation sites where these species are located can be found along the County's major waterways and include the following areas:

- North Anna Bluffs
- Vontay Bottomlands
- Vontay Forest
- Millwood Landing
- South Anna Bluffs
- Normans Bridge Floodplain

- Upper Pamunkey Wetlands: Macon Creek Marshes
- Totopotomoy
- Bloody Run
- Grapevine Bridge
- Elder Swamp
- Chickahominy Flats

A number of species have been classified by either the Virginia Department of Wildlife Resources (VDWR) through the Biota of Virginia (BOVA) survey or VDCR-DNH as a rare, threatened, or endangered species meriting special concern to ensure their long-term health. A Wildlife Action Plan has been prepared by VDWR for a number of these species.

### **Environmental Policies: Current Policies, Plans, and Regulations**

Hanover County, in partnership with other local and state agencies, has implemented different policies and programs aimed at protecting critical natural resources. These initiatives are described on the following pages.

- **Hanover-Caroline Soil and Water Conservation District (H-CWCD)**

The Hanover-Caroline Soil and Water Conservation District (H-CWCD), which is a political subdivision of state government, is responsible for developing programs to conserve soil, water, and related natural resources within its boundaries. A Board of Directors, composed of four elected directors and two appointed directors, governs the business and activities of the District. H-CWCD administers the following programs:

- **Chesapeake Bay Preservation Act, TMDL and Tributary Strategies Implementation**

The District administers the agricultural regulations of the state-mandated Chesapeake Bay Preservation Act (CBPA). This is accomplished by helping agricultural landowners and operators install and maintain riparian buffers, manage fertilizer and chemical use through the implementation of Soil and Water Quality Conservation Plans, and reduce sediment to waterways through the implementation of Best Management Practices (BMPs).

- **Virginia Agriculture BMP Cost-Share and Tax-Credit Program**

The District receives funds from the Virginia Department of Conservation and Recreation to administer the Virginia Agriculture BMP Cost-Share and Tax-Credit Program (VACS) Program in Hanover and Caroline counties. The program provides incentives to agricultural landowners and producers to apply BMPs to their land. Through this program, farmers have been able to install waste management systems for dairy and poultry manure, grazing systems for cattle, permanent vegetation on cropland, stabilization of critical erosion areas, nutrient management on cropland, and riparian and field buffers.



- **Agricultural Technical Assistance**

The District works closely with Hanover County Public Works to address Erosion and Sediment (E & S) Control on properties undertaking land conversions from forestry to agricultural uses. The District also provides conservation planning assistance on new farms/farmettes in Hanover and Caroline counties.

- **Agricultural Stewardship Act Implementation**

The H-CSWCD works closely with the Virginia Department of Agriculture and Consumer Services (VDACS), who administers the Act, on local water quality problems, including the investigation and resolution of both formal and informal water quality complaints.

- **Long-Range Water Resources Plan**

In July 2011, the County (in conjunction with the Town of Ashland) adopted a Long-Range Water Resources Plan (LRWRP) to identify existing and future water resources. A regional planning effort is underway to update this plan.

- **Federal Clean Water Act: National Pollutant Discharge Elimination System (NPDES) Requirements**

Hanover County and the Town of Ashland are subject to the requirements of the federally-mandated NPDES program related to discharges from publicly-owned and operated municipal separate storm sewer systems (MS-4). State oversight responsibility for the program rests with the Virginia Department of Environmental Quality (DEQ). To comply with this mandate, the County has maintained its coverage under the State's MS-4 general discharge permit regulations in five-year periods since 2003. The current permit expires in October 2023, with the County working with DEQ to renew the permit for another five-year period.

The County maintains a Program Plan, which is updated in accordance with requirements of the State's MS-4 general plan (Latest Program Plan Revision: October 2022). This MS-4 Program Plan contains the EPA's required six minimum control measures, along with specific measurable goals and interim milestone completion dates for each. It also identifies who is responsible for their implementation. In addition to the minimum control measures, the County is required to address a number of other pollution reduction requirements, including new provisions for addressing Total Maximum Daily Loads (TMDLs).

- **Total Maximum Daily Loads (TMDLs)**

When water quality monitoring data shows that rivers, streams, and other waterways do not meet water quality standards, clean-up plans called Total Maximum Daily Loads (TMDLs) or TMDL alternatives are developed by DEQ to determine the total amount of a pollutant that a waterbody can receive and still meet water quality standards. These waters are called "impaired" and are listed in the Virginia Water Quality Assessment Integrated Report.

The overall goal of a clean-up plan is to restore and maintain water quality standards. Following development of a clean-up plan, pollutant reductions from point sources are implemented through the Water Permit programs. Pollutant reductions from nonpoint sources are implemented through TMDL Implementation Plans and nonpoint source grant programs that fund voluntary practices.

There are current TMDL Implementation Plans for the Chesapeake Bay (October 2019), Chickahominy River (April 2020), and the Pamunkey River (April 2021), all of which include policies and programs implemented by Hanover County. Example implementation strategies include:

- Septic System Pump-Out Program
- Pet Waste Educational Program
- Stormwater Management Projects (including stream restoration projects)
- Commercial Site Stormwater Inspections

H-CWCD administers the agricultural regulations of the state-mandated Chesapeake Bay Preservation Act (CBPA). This is accomplished by helping agricultural landowners and operators install and maintain riparian buffers, manage fertilizer and chemical use through the implementation of Soil and Water Quality Conservation Plans, and reduce sediment to waterways through the implementation of Best Management Practices (BMPs).

- **Chesapeake Bay Preservation Act (CBPA) Program**

The Virginia General Assembly enacted the Chesapeake Bay Preservation Act in 1988, requiring local governments to include water quality protection measures in their development-related ordinances and within their comprehensive plans. Local programs were adopted by the Town of Ashland in 1990 and Hanover County in 1992. This program was a precursor to the requirements of MS-4 and includes other environmental requirements; however, there are some overlapping elements. This Program has been revised a number of times in response to state law changes.

Chesapeake Bay Preservation Areas consist of the following:

- **Resource Protection Areas** are buffers adjacent to waterways which are intended to help protect water quality. Resource Protection Areas (RPA) include tidal wetlands, tidal shores, nontidal wetlands (connected by surface flow and contiguous to tidal wetlands or to perennial streams), and a 100-foot buffer adjacent to and landward of other RPA components. All existing vegetation within the RPA is to remain in its natural undisturbed state, except vegetation weakened by age, storm, fire, or other natural causes. Development within RPAs is limited to water-dependent uses and redevelopment. Although localities have an option to designate Intensely Developed Areas (IDAs) in locations where development has severely altered the natural state of the RPA, Hanover County has not identified any areas where IDAs are appropriate.  
  
Site-specific locations of RPAs are verified during the development review process.

- **Resource Management Areas (RMA)** include areas with highly-erodible soils, highly-permeable soils, flood plains, and nontidal wetlands not included in RPAs. If these components are not adjacent to RPAs, the Resource Management Areas (RMA) consists of an area 150 feet contiguous to and landward of the RPA. Development within an RMA is allowed provided that certain development standards, as set forth in the Hanover County Code, are followed to ensure water quality is protected.

The Chesapeake Bay Act regulations require that new development and redevelopment minimize non-point source pollution from stormwater runoff, erosion and sedimentation, as well as maximize rainwater infiltration. This is addressed in eleven (11) management measures and is accomplished by use of a variety of Best Management Practices (BMPs), such as:

- Minimizing land disturbance
- Preserving indigenous vegetation
- Minimization of impervious cover
- Erosion and sedimentation control measures
- Control of stormwater run-off and quality

The CBPA also requires localities address nonpoint source pollution related to agricultural and forestry in their ordinances. Hanover County partners with the Hanover Caroline Soil and Water Conservation District, U.S.D.A. Natural Resource Conservation Service, Virginia Cooperative Extension, and the Virginia Department of Forestry to implement these requirements.

There are some CBPA implementation measures that affect existing development. For example, there is a requirement to pump out septic tanks once every five (5) years when located within Chesapeake Bay Preservation Areas. Alternatively, residents can have a sewage handler inspect the tank and certify it does not need to be pumped or a filter approved by the Virginia Department of Health may be installed. The Hanover County Department of Public Works is required under the Act to monitor and enforce these requirements.

- **Stormwater Management + Erosion/Sediment Control**

The Department of Public Works enforces regulations set forth in Chapter 10 of the County Code related to stormwater management and erosion/sediment control. These regulations are intended to mitigate the impacts of development on water quality. The *Hanover County Drainage Design Handbook* prescribes certain design standards and specifications regarding measures that should be taken to manage stormwater runoff and erosion.

- *Erosion and Sediment Control*: Most land disturbing activities, such as clearing and construction, require an erosion and sediment control plan, which must be approved by the Department of Public Works. These regulations are intended to minimize the

amount of sediment that leaves construction sites, protecting downstream properties and waterways.

- **Stormwater Management:** Stormwater occurs after precipitation and consists of runoff from streets, lawns, parking lots, construction sites, and other impervious surfaces. New development must be designed with features that control the amount of stormwater flowing from a site. These regulations are intended to protect water quality and prevent downstream flooding. Managing stormwater runoff also helps prevent shoreline and streambank erosion problems.

The Department of Public Works will continue working collaboratively with the Planning Department and other local and state entities to enforce these regulations.

- **Floodplain Management**

Floodplain areas are protected from development and other activities that would compromise their usefulness as a flood conveyance system. The primary way this is accomplished is through the County's floodplain management regulations, which are included in Chapter 12 of the County Code and require additional review and permitting for development that occurs in floodplains. Floodplains are identified in Flood Insurance Rate Maps (FIRMs) developed by FEMA. These maps illustrate local flood risk to help keep people and property safe from flooding.

Hanover County has participated in the National Flood Insurance Program (NFIP) since the 1980s. This program enables property owners to purchase flood insurance, provided that the County adopts and implements local floodplain management regulations.

Hanover County has four existing public boat ramps and water access points located within floodplain areas along the North Anna, South Anna, and Pamunkey rivers. Due to their limited size and number, public access points have a limited impact on water quality or flooding, and many of these sites are located adjacent to major roadways and bridges.

- **Dam Inundation Zones**

The Virginia Department of Conservation and Recreation (DCR) regulates most dams statewide to help ensure that these facilities are safely designed, built, and maintained. For certain types of dams, owners must conduct a dam break analysis. That analysis identifies areas downstream from a dam that would be inundated (flooded) if the dam fails.

Significant dam break inundation zones identified by DCR include the following areas:

- Portions of the South Anna River and Mill Creek in the southwestern part of the County downstream from Springfield Lake and South Anna River Site #52B Dam;
- Portions of Dog Branch downstream from Lakeview Lake;
- Portions of Opposum Creek downstream from Rutland;
- Portions of Totopotomoy Creek downstream from Charter Lake (west of U.S. Route 301);
- Portions of Beaverdam Creek downstream from Cherrydale Dam;

- Portions of Totopotomoy Creek and its tributaries downstream from the Hartford Lake Dam and Mattawan Dam;
- Portions of Kersey Creek downstream of Forest Lake Hills;
- Portions of Kersey Creek downstream of Carter’s and Walden’s Ponds;
- Portions of an unnamed tributary downstream of Rose Hill;
- Portions of a unnamed tributary downstream of Dabney Lake;
- Portions of an unnamed tributary downstream of Honey Meadows; and
- Portions of an unnamed tributary downstream of Pebble Creek.

The zoning ordinance generally requires that dam break inundation zones be mapped as part of zoning requests and master plan documents.

- **Comprehensive Coastal Resource Management**

Coastal ecosystems reside at the interface between the land and water, and are naturally very complex. They perform a vast array of functions by way of shoreline stabilization, improved water quality, and habitat for fishes; from which humans derive direct and indirect benefits. While Hanover County is not located directly on the Chesapeake Bay or Atlantic Ocean, its tidal rivers (found east of the Fall Line) are considered coastal resources.

The science behind coastal ecosystem resource management has revealed that traditional resource management practices limit the ability of the coastal ecosystem to perform many of these essential functions. The loss of these services has already been noted throughout coastal communities in Virginia as a result of development in coastal zone areas coupled with common erosion control practices. Beaches and dunes are diminishing due to a reduction in a natural sediment supply. Wetlands are drowning in place as sea level rises and barriers to inland migration have been created by construction of bulkheads and revetments. There is great concern on the part of the Commonwealth that the continued armoring of shorelines and construction within the coastal area will threaten the long-term sustainability of coastal ecosystems under current and projected sea level rise.

In the 1980s, interest arose in the use of planted wetlands to provide natural shoreline erosion control. Today, living shoreline design options are available to address the various energy settings and erosion problems found. Depending on the site characteristics, they range from marsh plantings to the use of rock sills in combination with beach nourishment.

Research continues to support that these approaches combat shoreline erosion, minimize impacts to the natural coastal ecosystem, and reinforce the principle that an integrated approach for managing tidal shorelines enhances the probability that the resources will be sustained. Therefore, adoption of new guidance and shoreline best management practices for coastal communities is now necessary to insure that functions performed by coastal ecosystems will be preserved and the benefits derived by humans from coastal ecosystems will be maintained into the future.

In 2011, the Virginia Assembly passed legislation to codify a new directive for shoreline management in Tidewater Virginia. In accordance with §15.2-2223.2 of the Code of Virginia, all local governments must consider guidance prepared by the Virginia Institute of Marine Science (VIMS) regarding coastal resource management and, more specifically, guidance for the appropriate selection of living shoreline management practices. The legislation establishes the policy that living shorelines are the preferred alternative for stabilizing eroding shorelines.

Guidance has been developed by VIMS: Center for Coastal Resources Management for localities within the Tidewater region of Virginia (which includes Hanover County). A variety of different tools are available to advise local governments and landowners:

- The *Shoreline Decision Support Tool* is an interactive guidance system that provides users with a recommended shoreline erosion control strategy within coastal areas.
- The *Shoreline Management Model*, which is run in ArcGIS, also provides a recommended approach for shoreline erosion control based upon current conditions. It is best used for desktop reviews, regulatory compliance, and comprehensive planning.

In 2017, VIMS completed a Shoreline Inventory Report. That inventory includes a survey of 102 miles of shoreline along the North Anna, South Anna, and Pamunkey rivers. The majority of the shoreline along these rivers (64 miles) is forested, with 22 miles of the shoreline used for agriculture. In most instances, when there is land cover other than forests along these rivers, there almost always tends to be at least a line of trees along the shoreline. There are relatively few docks along the shoreline, with 18 docks and 3 boathouses surveyed along the 102 miles of riverfront.

## Resiliency

Reducing the County's vulnerability to natural and manmade disasters where possible will improve residents' safety and quality of life. Creating a resilient community requires collaboration and coordination among different stakeholders and community members.

- **Hazard Mitigation**

Mitigation is commonly defined as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. Mitigation planning involves identifying specific actions a community intends to follow to reduce vulnerability and exposure to future hazards.

Hanover County participates in regional hazard mitigation planning and has adopted the *2022 Richmond-Crater Multi-Region Hazard Mitigation Plan* as a participating local government. That plan identifies and analyzes key environmental and other hazards, then lists actions regional and local entities can take to minimize those hazards to protect public safety.

- **Renewable Energy**

The rapid deployment of Solar Photovoltaic Electric Power Generation facilities (Solar), Battery Energy Storage Systems (BESS) and other alternative energy-producing technologies in Virginia is a direct result of federal and state government responses to climate change and the goal of reducing harmful greenhouse gases. The General Assembly passed the Clean Economy Act in 2020, which was signed into law by Governor Northam on April 11, 2020. This legislation requires 100 percent of Virginia's electricity to come from carbon-free sources by 2050, which include solar, wind, hydro, waste to energy/landfill gas, and biomass fired facilities. That transition is well underway.

The 2020 Virginia Clean Economy Act ("VCEA") (Va. Code § 56-585.5) requires Dominion Energy and Appalachian Power Company to construct or acquire significant solar and storage resources by 2035. Importantly, the statute requires that the majority of these new resources must be located in the Commonwealth.

One of the greatest challenges with solar energy production is that it is very land-intensive, requiring approximately 5-10 acres to produce one megawatt of electricity. A 25-megawatt solar generating installation requires between 125 and 250 acres. By contrast, Dominion's Greenville Power Station, which uses natural gas to generate electricity, has a rated capacity of 1,588 megawatts and a footprint of approximately 55 acres. Due to the impacts to land use, local policies must balance the future need for solar facilities with the County's desire to maintain its largely rural and agricultural character.

On           , 2023, the County adopted its first *Solar and Energy Storage Policy*, which provides recommendations regarding the classification, siting, and design of renewable energy facilities (along with applicable fiscal policies). While that document is the primary reference document regarding local policies applicable to these facilities, the Comprehensive Plan provides complementary guidance as it relates to the review of

utility-scale, community-scale, and small-scale solar facilities that generate and distribute electricity to off-site users, as those types of facilities have greatest impact on future growth and development. Those facility types are classified as follows:

- Utility-Scale Solar: Greater than 20 megawatts (MW)
- Community-Scale Solar: Greater than 5 MW but no greater than 20 MW
- Small-Scale Solar: 5 MW or less

Certain recommendations are applicable to all facility types, while others are more general.

<b>Solar Energy Facility: Utility Scale Standards</b>	
<b>Megawatts</b>	Greater than 20 megawatts
<b>Comprehensive Plan Designation</b>	Use may be considered on properties designated as Agricultural on the Comprehensive Plan
<b>Zoning</b>	May only be permitted in the A-1, Agricultural District, and requires a conditional use permit
<b>Maximum Size</b>	No facility shall be larger than 1,000 acres (within the fenced area)
<b>Distance Separation</b>	To avoid clustering of principal solar facilities, special consideration should be given to providing adequate spacing between solar energy facilities
<b>Farmland Preservation</b>	Site should be evaluated to determine the impacts to Prime Agricultural Lands and/or Lands of Statewide Significance. Solar energy facilities should limit the amount of facilities in these locations
<b>Locations</b>	Alternative and innovative locations are encouraged. Locating on less desirable lands such as closed landfills or other constrained sites are encouraged.

<b>Solar Energy Facility: Community Scale Standards</b>	
<b>Megawatts</b>	Greater than five megawatts but less than 20 megawatts
<b>Comprehensive Plan Designation</b>	Use may be considered throughout the County except for areas designations intended primarily for commercial and industrial uses in the Suburban Service Area.
<b>Zoning</b>	May only be permitted in the A-1, Agricultural District and requires a conditional use permit
<b>Distance Separation</b>	To avoid clustering of principal solar facilities, special consideration should be given to providing adequate spacing between solar energy facilities
<b>Locations</b>	Alternative and innovative locations are encouraged. Locating on less desirable lands such as closed landfills or other constrained sites are encouraged.



<b>Solar Energy Facility: Small Scale Standards</b>	
<b>Megawatts</b>	Five megawatts or less
<b>Comprehensive Plan Designation</b>	Use may be considered throughout the County except for areas designations intended primarily for commercial and industrial uses in the Suburban Service Area.
<b>Zoning</b>	May only be permitted in the A-1, Agricultural District, and requires a conditional use permit
<b>Distance Separation</b>	To avoid clustering of principal solar facilities, special consideration should be given to providing adequate spacing between solar energy facilities
<b>Locations</b>	Alternative and innovative locations are encouraged. Locating on less desirable lands such as closed landfills or other constrained sites are encouraged.

<b>Site Design Standards Utility, Community, and Small-Scale Solar Energy Facilities</b>	
<b>Setbacks</b>	To minimize impacts to existing residential properties and environmental features, solar facilities should have greater setbacks recommended as follows: <ul style="list-style-type: none"> <li>• 150' from any property with an existing residence</li> <li>• 100' from any other property or road</li> <li>• 100' from wetlands, rivers, streams or other environmentally sensitive features</li> <li>• 25' from any required buffer</li> </ul>
<b>Buffers and Landscaping</b>	To minimize visual impacts to the surrounding community, buffers at least 100 feet in width should be provided along the perimeter of the site. Within the buffer areas, it is recommended that the site design: <ul style="list-style-type: none"> <li>• Minimize clearing or grading</li> <li>• Maintain existing healthy vegetation</li> <li>• Include existing vegetation and supplementary plantings to that includes a mix of large trees, understory trees, and shrubs planted in a naturalistic pattern, with a mix of evergreen and deciduous species.</li> <li>• Incorporate pollinators and other ecologically-friendly and beneficial ground covers that promote wildlife habitats and forage on at least 30 percent of the total site area.</li> </ul>
<b>Access</b>	Access should be provided throughout the site to allow for the passage of emergency vehicles.
<b>Underground Utilities</b>	All new transmission and distribution lines should generally be placed underground, except for lines which are solely the subject of the State Corporation Commission jurisdiction or otherwise

	required by the Commission, and except where necessary to connect to the existing utility lines.
Security Fencing	Fencing should generally be located on the inner edge of the buffer (edge furthest from the property line) when possible and include wildlife-friendly design where appropriate.
Lighting	Lighting should be designed to minimize impacts to the surrounding property and the character of the area, with the use of full cutoff lighting recommended and off-site light trespass minimized.
Phasing	Solar applications should include a phasing plan if the project is to be phased.
Decommissioning	A Decommissioning Plan and Performance Agreement should be prepared in accordance with County policies.

- **Efficient Resource Management**

Promoting efficient resource management will help ensure that the County has ample resources to support a growing population and economic base. Energy and water are limited resources, and the supply can be strained during extreme weather conditions, such as drought or extreme heat. To create a resilient and fiscally-responsible community, efforts could be made to implement energy- and water-efficiency measures to decrease the use of electricity and water. Decreasing water use could extend the time needed before public improvements to water and wastewater systems are needed, decreasing costs. It also results in lower operating costs for building users. There are voluntary efforts and programs that the private and public sectors are already taking advantage of to improve energy efficiency. For examples, builders and developers can participate in green certification programs, such as EarthCraft, LEED (Leadership in Energy and Environmental Design), and National Green Building Standards (NGBS).

The County offers opportunities for household recycling, which helps reduce the amount of waste sent to landfills:

- Drop-off recycling containers are located at all county convenience centers and the transfer station.
- Certain subdivisions (primarily in the Atlee area) have been approved and established as a service district for curbside recycling.

### **Historic and Culturally-Sensitive Communities**

Due to historic racial disparities and segregation, some communities were disproportionately impacted (in a negative way) by public policies and decisionmaking. Decisions related to land use, transportation, public investment, and other issues may have caused some communities to experience decreased air quality, decreased water quality, increased noise, and other harm to a greater extent than other communities, limiting residents' opportunities and degrading their quality of life.

The areas are some of the local communities that have been significantly impacted by public policy decisions:

- **Brown Grove:** This community was divided by construction of Interstate 95 and has been impacted by industrial encroachment.
- **Cobbs Road (Stoney Run to U.S. Route 1):** This community has been impacted by industrial encroachment.
- **Pleasant Grove Road:** This community has been impacted by construction of I-295, commercial encroachment, and construction of a regional medical facility.

Encouraging collaboration and public involvement from all communities, including those that have historically been underrepresented in public decisionmaking, could help create a more resilient and innovative community. As policy decisions are made, there should be efforts to ensure that all people are treated fairly and given the opportunity to participate in public processes. When policy decisions have a localized impact on a historic and/or culturally-sensitive communities, additional focus should be given to potential environmental and quality-of-life impacts. With increased participation, collaboration, and consideration of potential impacts, communities will have the tools needed to be informed and involved in the future of their area, resulting in more collaboration with decisionmakers and sound policy decisions.

## **Objectives and Strategies**

### ***Objective EN.1: Protect and improve water quality.***

- **Strategy EN.1a:** Continue to require the protection of Chesapeake Bay Resource Protection Areas (RPAs) as new development occurs.
- **Strategy EN.1b:** Continue to review, update, and enforce Chapter 10 (Environmental Management) of the County Code, which includes local requirements regarding erosion and sediment control, stormwater management, Chesapeake Bay preservation, and the municipal separate storm sewer system (MS-4) management program.
- **Strategy EN.1c:** Promote forestland conservation and sustainable forest management, especially along waterbodies.
- **Strategy EN.1d:** Ensure land use regulations and development proposals are designed to protect the potable water supply from existing and potential pollution sources. Measures should be taken to protect existing and proposed water sources shown in Chapter 9: Community Facilities and groundwater resources.
- **Strategy EN.1e:** Plan a community clean-up event, where community volunteers help pick up trash to beautify the community and prevent debris from washing into (and polluting) local waterways.

### ***Objective EN.2: Protect tidal rivers and streams in accordance with statewide shoreline management guidance.***

- **Strategy EN.2a:** Refer to the guidance presented in the locality's Comprehensive Coastal Resource Management Portal (CCRMP) prepared by VIMS to guide regulation and policy decisions regarding shoreline erosion control.
- **Strategy EN.2b:** Utilize VIMS' CCRMP Shoreline Best Management Practices for management recommendation for all tidal shorelines.
- **Strategy EN.2c:** Consider a policy where the above Shoreline Best Management Practices become the recommended adaptation strategy for erosion control, and where a departure from these recommendations by an applicant wishing to alter the shoreline must be justified at a hearing of the board(s).
- **Strategy EN.2d:** Encourage staff training on decisionmaking tools developed by the Center for Coastal Resources Management at VIMS.
- **Strategy EN.2e:** Follow the development of the state-wide General Permit being developed by Virginia Marine Resources Commission (VMRC).
- **Strategy EN.2f:** Ensure that local policies are consistent with the provisions of the permit.
- **Strategy EN.2g:** Evaluate and consider a locality-wide permit to expedite shoreline applications that request actions consistent with the VIMS recommendation.
- **Strategy EN.2h:** Seek public outreach opportunities to educate citizens and stakeholders on new shoreline management strategies including Living Shorelines.
- **Strategy EN.2i:** Follow the development of integrated shoreline guidance under development by VMRC.

- Strategy EN.2j: Evaluate and consider a locality-wide regulatory structure that encourages a more integrated approach to shoreline management.
- Strategy EN.2k: Consider preserving available open spaces adjacent to marsh lands to allow for inland retreat of the marshes under rising sea level.
- Strategy EN.2l: Evaluate and consider cost share opportunities for construction of living shorelines.

*Objective EN.3: Work collaboratively with public and private entities to protect natural habitats in order to protect and enhance air and water quality.*

- Strategy EN.3a: Encourage the protection of healthy mature trees within new development and as part of capital projects.
- Strategy EN.3b: Encourage the use of native plant species within new development and as part of capital projects.
- Strategy EN.3c: Investigate ways to reforest public property (including roadway medians) to create wildlife habitat, limit the urban heat island affect, and provide green space for residents (Example Program: Henrico County, Henrico County Public Schools, and Capital Trees Partnership).
- Strategy EN.3d: Encourage the preservation of wildlife corridors within larger-scale development proposals that exceed 250 acres in area.
- Strategy EN.3e: Encourage the protection of natural heritage resources identified by the Virginia Department of Conservation and Recreation (DCR) as part of the development review process.
- Strategy EN.3f: Support the work of conservation organizations in acquiring conservation easements or purchasing property in areas with critical environmental resources.

*Objective EN.4: Minimize light pollution.*

- Strategy EN.4a: Continue to pursue measures to reduce light pollution in the County caused by uplighting and excessive lighting, such as maintaining requirements that outdoor light at commercial, industrial, and institutional development sites use *full cut-off* fixtures.

*Objective EN.5: Help protect residents and businesses from potential hazards.*

- Strategy EN.5a: Implement recommendations within the 2022 Richmond-Crater Multi-Region Hazard Mitigation Plan (and any subsequent hazard mitigation plans adopted by the Board of Supervisors).

*Objective EN.6: Promote efficient resource management, including energy, water, and solid waste.*

- Strategy EN.6a: Encourage the implementation of environmentally-sustainable certification programs, such as LEED or Earthcraft, within development projects.
- Strategy EN.6b: Investigate the feasibility of designing public facilities to meet LEED standards.

- Strategy EN.6c: Consider incorporating design features into public facilities that reduce the amount of treated water needed for irrigation, such as the use of drought-tolerant native plantings and rainwater recycling techniques.
- Strategy EN.6d: Investigate ways the County could partner with non-profits to support weatherization assistance programs and other efficiency-related initiatives that assist residents with energy improvements to their homes.
- Strategy EN.6e: Consider a property tax exemption or partial rebate to encourage owners of existing commercial and residential buildings to make energy-efficiency improvements.
- Strategy EN.6f: Promote different recycling-related programs and events.

*Objective EN.7: Consider continued development of appropriate alternative energy production.*

- Strategy EN.7a: Regularly evaluate policies regarding renewable energy facilities (including land use and fiscal policies) to address the latest technology and ensure these facilities have a positive impact on residents' quality of life.
- Strategy EN.7b: Work collaboratively with the private sector to improve access to electric vehicle charging stations.

*Objective EN.8: Consider the impacts that County policies, programs, capital investments, and land use decisions may have on historic and culturally-sensitive communities, including (but not limited to) Brown Grove, Pleasant Grove Road, and Cobbs Road.*

- Strategy EN.8a: Create trust within these communities for ongoing advocacy and accountability in County policies.
- Strategy EN.8b: Provide easily-accessible information on community and public services.
- Strategy EN.8c: Prioritize capital investment (including infrastructure improvements) in these areas.