

# **CHAPTER 4**

## **NATURAL RESOURCES**

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### OVERVIEW

Natural resources strongly influence where and how land can be used and developed. This section examines the natural features in Charles City County, how these features influence land uses, and how land uses impact water quality and the environment. The section also includes a discussion of existing efforts to protect water quality and natural resources.

Forests and wetlands cover three quarters of the land area of Charles City County. The remaining land area is devoted to crop tillage, hay pasture and disturbed forest, with less than 2% devoted to developed urban land uses. In order to plan a future development strategy that adequately protects these resources while taking advantage of their benefits, it is important to identify and understand the benefits that natural resources provide to the environment and to the quality of life in the county.

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### LOCATION AND TOPOGRAPHY

Charles City County is located in the east-central portion of the Commonwealth. It is bounded to the north by New Kent County, to the east by James City County, to the south by the James River and Surry County, Prince George County, and City of Hopewell, and to the west by Henrico and Chesterfield Counties. The county has 184 square miles of land area and 20 square miles of surface water. The county lies entirely in the coastal plain physiographic region which runs along the Eastern Seaboard.

The topography of land is the configuration of its surface, including relief, and the position of natural features. Topography is important in that it affects the aesthetic qualities of an area, plant and animal habitat, climate, and the type and location of man's development activities.

Charles City County is generally flat with a gently rising and falling topography. Elevations in the county average less than 80 feet; the highest elevations are around 150 feet. In general, the higher elevations gently slope down from the west-northwest part of the county to the east-southeast to the confluence of the two major rivers. The lowest elevations are at sea level along the James River and part of the Chickahominy River.

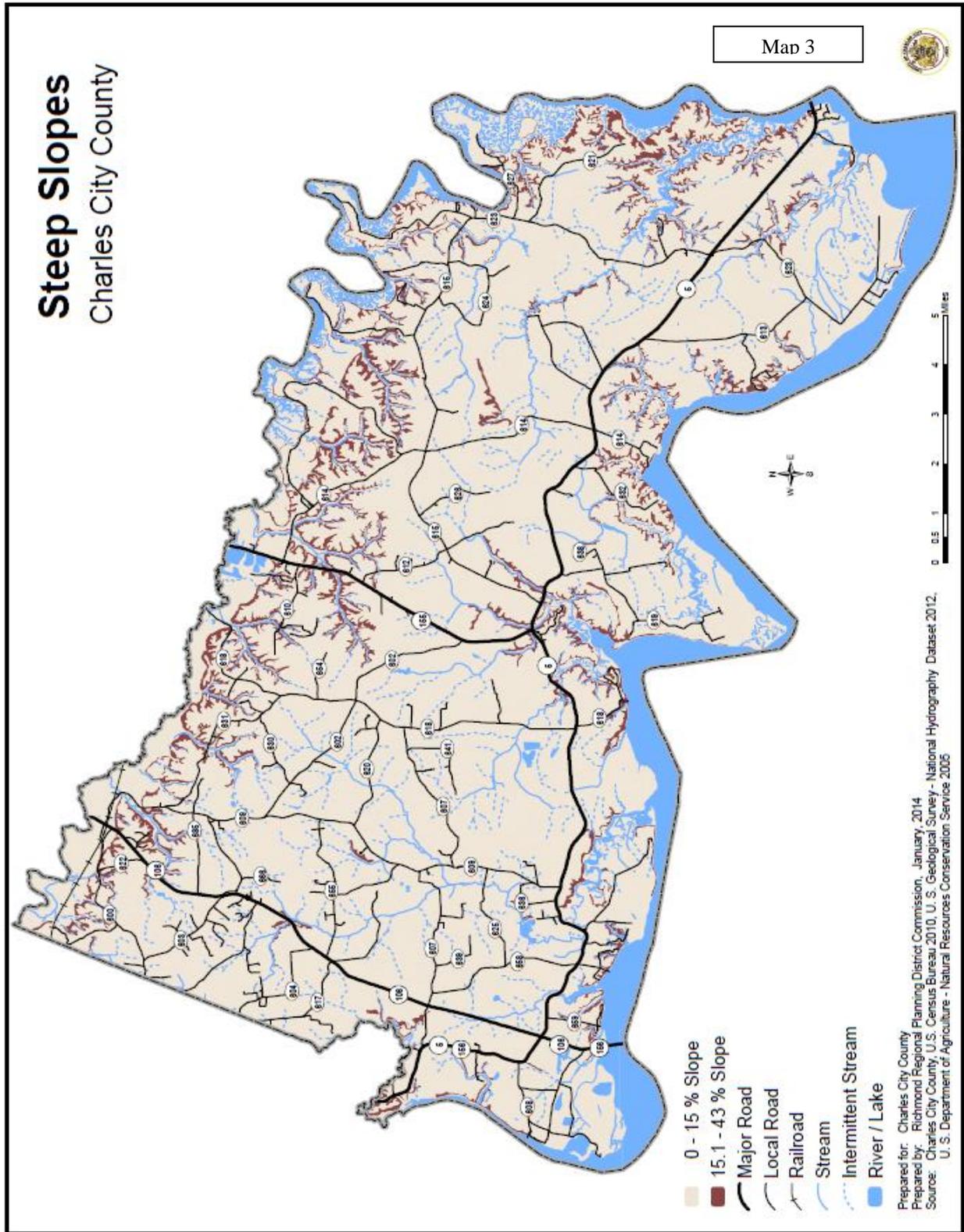
Natural features that constrain the scale and location of development include slope, soils, especially highly erodible and permeable soils, groundwater and surface water, wetlands, shoreland and floodplains. How these features interact and affect development is discussed in the following sections.

### SLOPE

Slope is a relationship between the elevation of the land to its distance. Slope is a measure of the change in vertical distance (height) over a horizontal distance (length) expressed as a percentage. For example, a change in height of 25 feet over a distance of 100 feet equals a slope of 25 percent.

A steep slope of 15 percent or more presents a constraint to many types of development. The disturbance of steep slopes can lead to erosion and contribute to added sedimentation and pollution of streams.

The majority of the county has slopes of 15 percent and less. Slopes of greater than 15% can be found along bluffs adjacent to the Chickahominy River and its tributaries, and in scattered areas along the James River as shown on **Map 3**.



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### SOILS

Development activities are affected to a large extent by soils. Understanding the types of soils in Charles City County is necessary to plan for the county's future development.

Soil surveys completed by the United States Department of Agriculture's Natural Resources Conservation Service (NRCS), mapped and delineated each of the soil types within Charles City County. NRCS provided information on physical and chemical properties of each soil type, as well as engineering properties and classifications, yields per acre of crops and pasture, and suitability for building site development, sanitary facilities and construction materials.

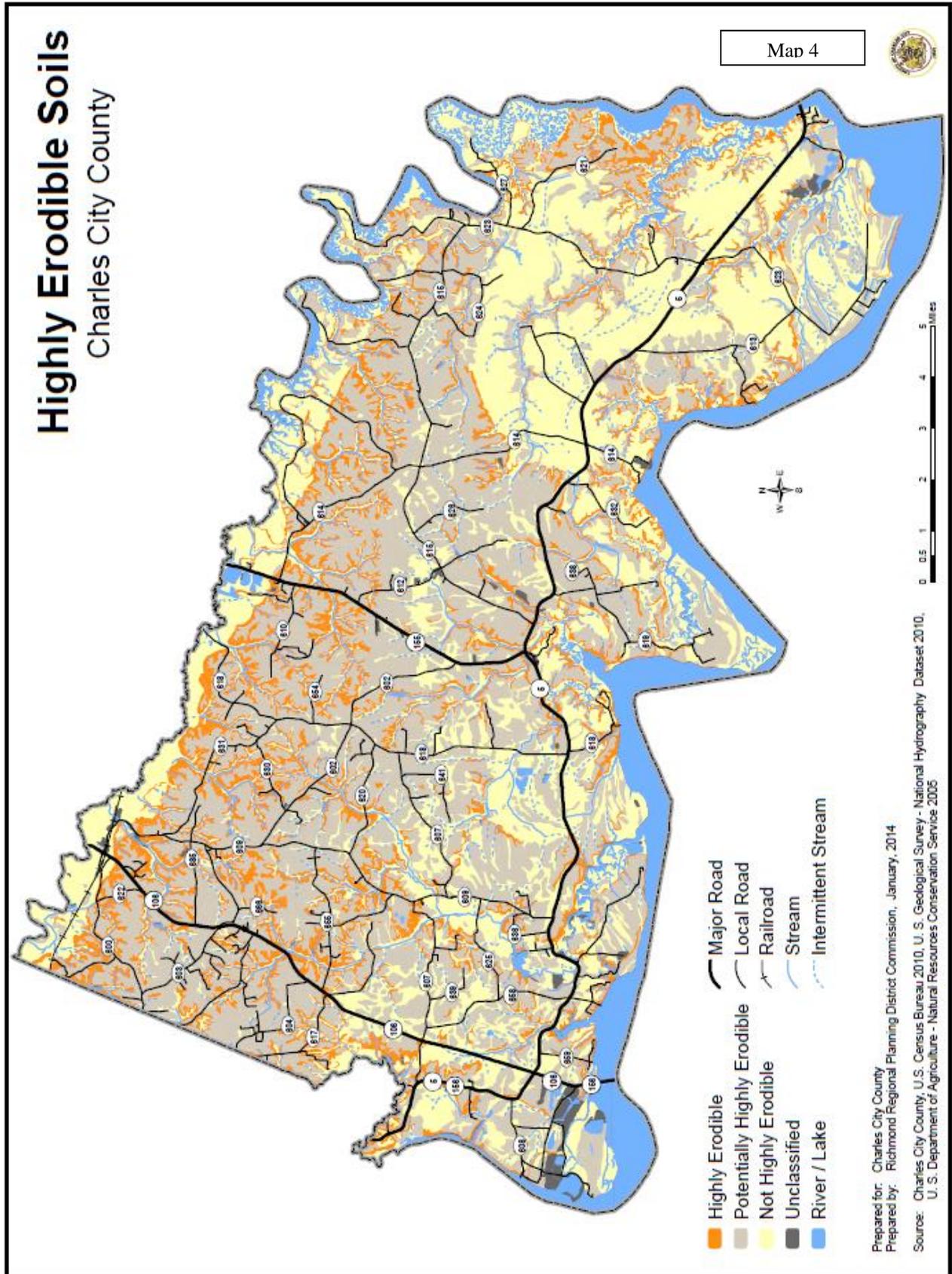
Soils information, when considered with other factors such as the percent of land slope, length of slope, position of the soil on the slope, water infiltration rates, depth to groundwater, and the amount of vegetative cover, can be used to identify which soils can erode and become a pollutant to surface water or to transmit pollutants through the soil to the groundwater system. How highly erodible and highly permeable soils function and how they affect development are described below:

#### **Highly Erodible Soils**

Highly erodible soils are of particular concern in Charles City County. These soil types have been documented as contributing sediments to the county's waterways and to the Chesapeake Bay and its tributaries such as the James River. Development on erodible soils must be carefully managed because of the potential for sedimentation to cause water pollution.

Soil erosion is the process by which the land's surface is worn away by the action of wind and water, ice or gravity. The Natural Resources Conservation Service classifies soils by their erodibility index. The erodibility index is the ratio between rainfall, runoff amounts, length of flow, steepness of slopes, susceptibility of erosion in the surface layer and a soil's tolerance to erosion. A high ratio or erodibility index indicates a highly erodible soil. Potentially highly erodible soils are found throughout Charles City County, where slopes are greater than 15 percent and where slope length is longer than 75 feet.

**Map 4** shows the locations of potential highly erodible soils in the county.



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### **Highly Permeable Soils**

Highly permeable soils transmit water at a rate of six inches per hour or more in any part of the soil profile to a depth of six feet. These types of soils are known to contribute to both surface and groundwater pollution. They are classified in the Natural Resources Conservation Service Field Office Technical Guide as being in either permeability group "rapid" or "very rapid." Development on highly permeable soils should include protective measures to insure the protection of groundwater from potential pollutants. **Map 5** shows the locations of highly permeable soils in the county.

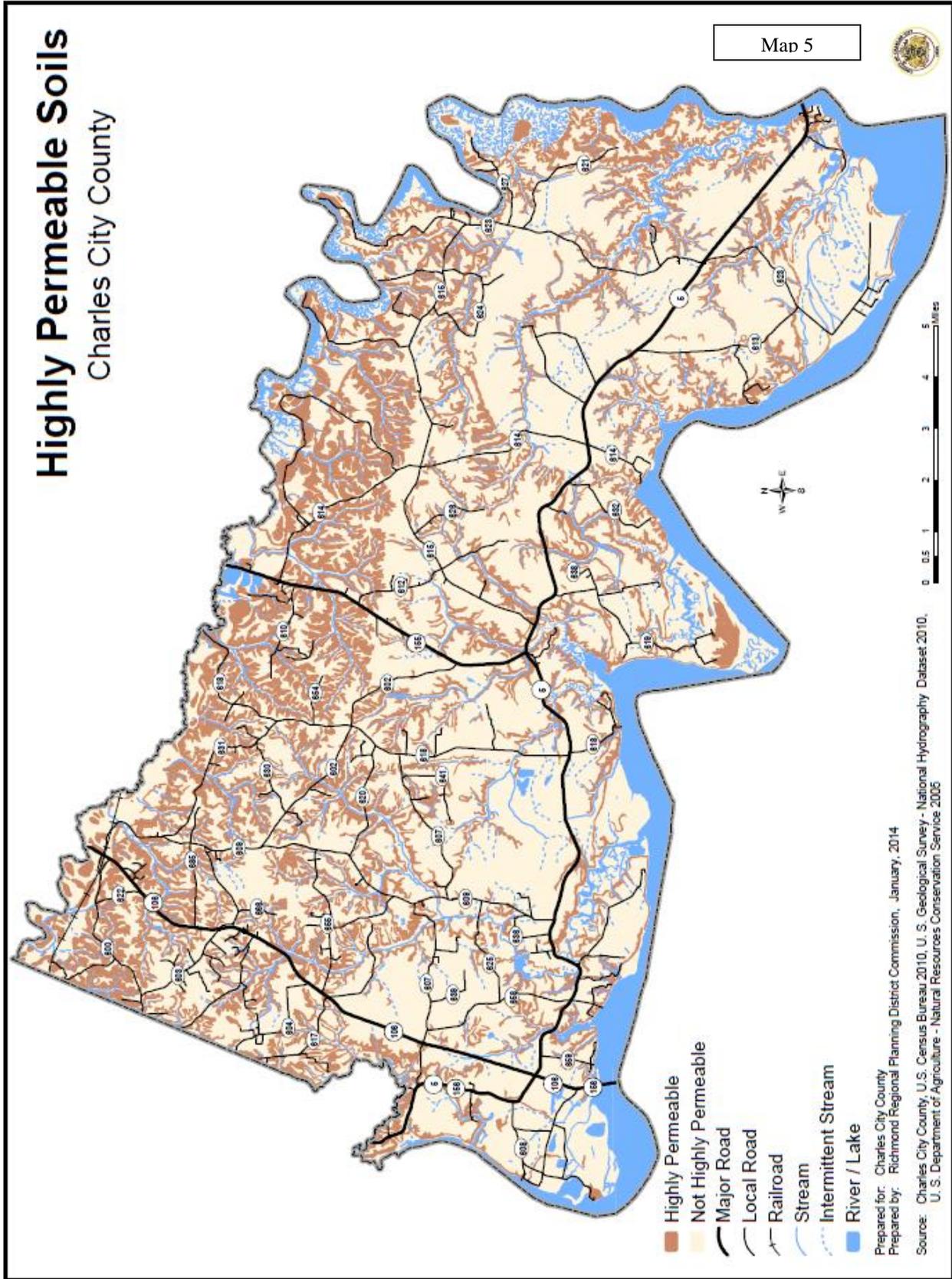
The threats to water quality are increased when highly erodible soils and highly permeable soils are found together. Awareness of soil properties and their relationship to land uses can help planners identify areas within the county that may be more susceptible to causing pollution. **Map 6** shows areas of the county where highly erodible and highly permeable soils are found together. This information as well as the information represented in the two previous maps was taken from the soil's report for Charles City County as prepared by the Natural Resources Conservation Service in collaboration with the Virginia Polytechnic Institute and State University. The issue of soil suitability for on-site sewage treatment in Charles City County is related to the presence of highly erodible soils and highly permeable soils.

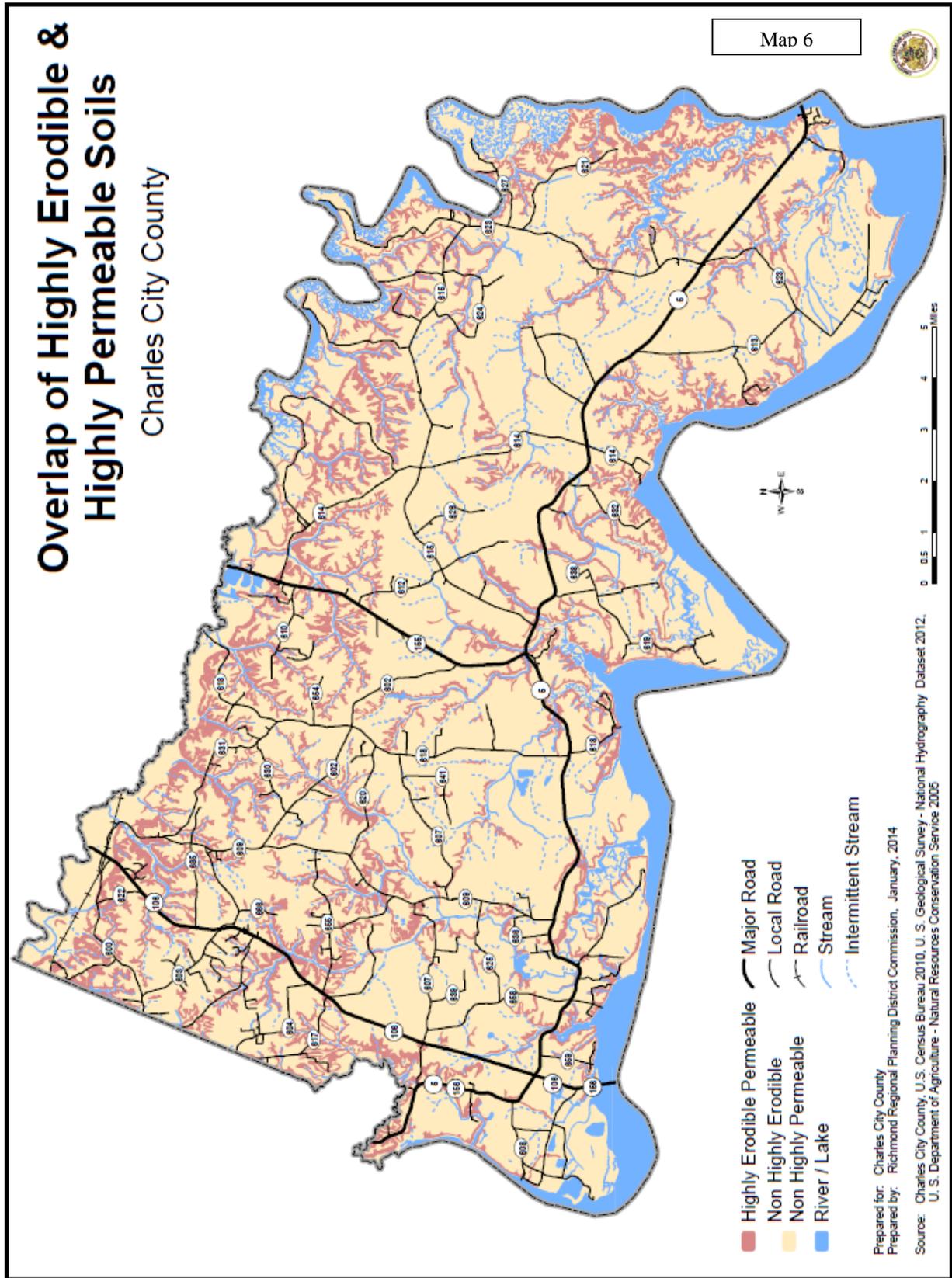
### **Suitability for On-site Sewage Treatment**

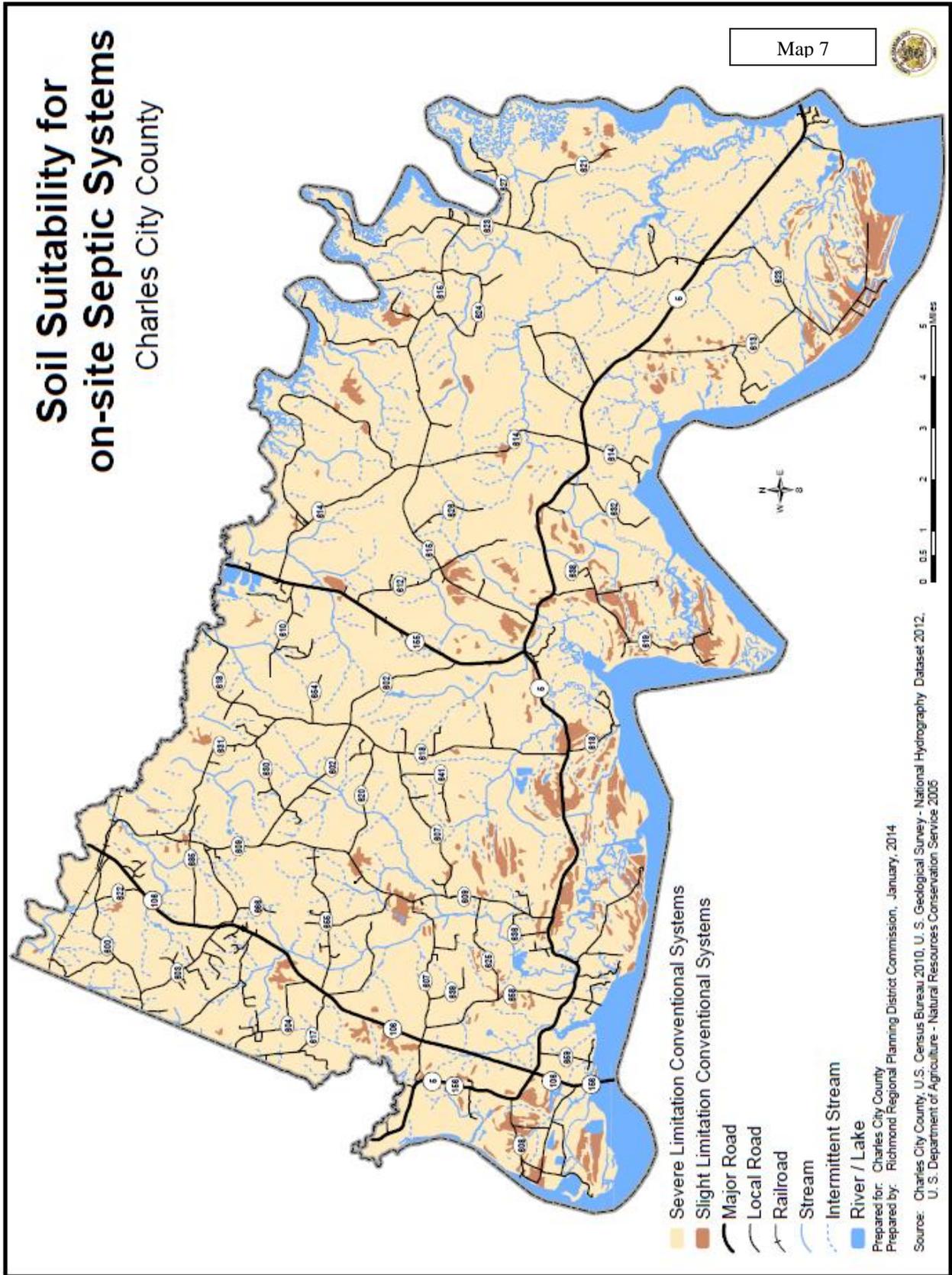
Most of the county's land is made up of soils that are unsuitable for traditional on-site septic systems for the treatment of solid waste from a house or business. Based on soils data information, approximately five percent of the land area in Charles City County is suitable for traditional on-site septic installation. **Map 7** shows the areas of soil suitability for traditional onsite sewage treatment in Charles City County. New systems that are engineered differently from the traditional gravity flow drainfield system may be suitable for otherwise limiting soils.

**Map 7** is based on information from the US Department of Agriculture Natural Resource Conservation Service. Soil surveys identifying the location of types of soils and information on soil characteristics such as permeability, depth to water table and slope are used to develop a suitability rating for the installation of traditional on-site systems. (Note: this is generalized information and cannot substitute for a site specific analysis of soils.)

Improperly designed, located, constructed, or maintained systems can be a source of many categories of contaminants, including bacteria, viruses, nitrates, and organic compounds. Misuse of these systems for disposal of anything other than domestic or sanitary waste may pose a substantial threat to groundwater.







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### WETLANDS

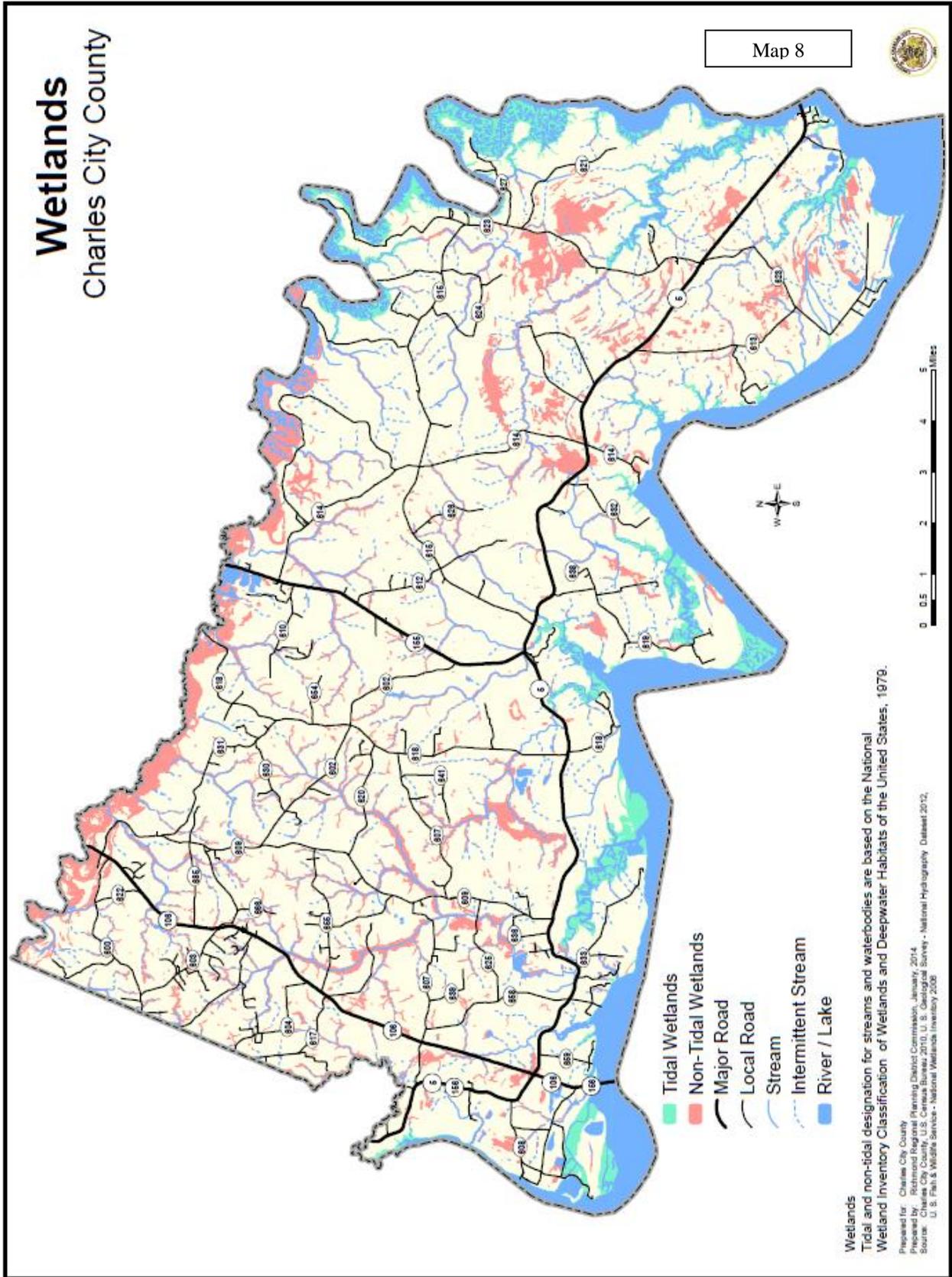
Wetlands are low-lying areas with water saturated soil that can support certain types of vegetation. The source of water may come from rainfall, groundwater or river tides. Marshes, swamps and mud flats are more obvious examples of wetlands; however, there are other types that are not as readily identified, such as forested wetlands with seasonally saturated soils. Wetlands are defined according to soil type, vegetation and hydrology. Wetland soils do not normally support structures, roads or waste disposal facilities.

Wetlands perform several important functions. Wetlands improve water quality by slowing the flow of water and allowing excess suspended solids, nutrients, and toxic substances to settle. Wetlands also act as natural buffers against flood waters by slowing the velocity of the flow. Wetlands prevent erosion by binding together soil through their extensive root systems. Wetlands serve as discharge points for groundwater which helps to maintain stream flow during drought conditions. Wetlands serve as a habitat for many important commercial and recreational birds, fish and mammals by providing food, nesting areas, shelter and protection.



Charles City County has extensive areas of both tidal and nontidal wetlands as seen on **Map 8**. Tidal wetlands are influenced by the ebb and flow of lunar tides. These wetlands are found along the James River and Chickahominy River and their tidal tributaries. Nontidal wetlands are isolated from tidal influences. Nontidal wetlands are found along nontidal portions of stream tributaries to the James River and Chickahominy River, and that portion of the Chickahominy upriver from Walker's Dam.

In addition, through a program known as wetland banking, wetlands are created and restored in Charles City County. As of June 2013, 981 acres of wetlands had been created, restored, or were available for creation and restoration in Charles City County under the wetlands banking program, according to the US Army Corps of Engineers, Norfolk District Branch. The program, a result of federal wetlands policy, requires that unavoidable impacts to wetlands be compensated by the creation or restoration of wetlands. Charles City County is one of many counties that have sites available for compensatory mitigation for impacts to wetlands in the county or for impacts that may be outside of the county. The newly created or restored wetlands are located in areas throughout the county. Wetland banks may be considered as wetland farm, where restored wetlands are harvested for economic gain. Wetland banks produce income for lands that may be otherwise undevelopable.



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### FLOODPLAINS

A floodplain is land lying adjacent to a river or stream that may become submerged by flood waters. Floodplains are formed by silt and sediment deposited by a stream. The 100-year floodplain is that area of land that would be inundated by a flood that statistically has a one-percent chance of being flooded in any given year in a 100-year period. This is commonly referred to as the 100-year floodplain.

The Federal Emergency Management Agency (FEMA) has developed floodplain maps under authority of the National Flood Insurance Act. These maps, known as Flood Insurance Rate Maps (FIRM), define those areas that are eligible for inclusion under the National Flood Insurance Program.

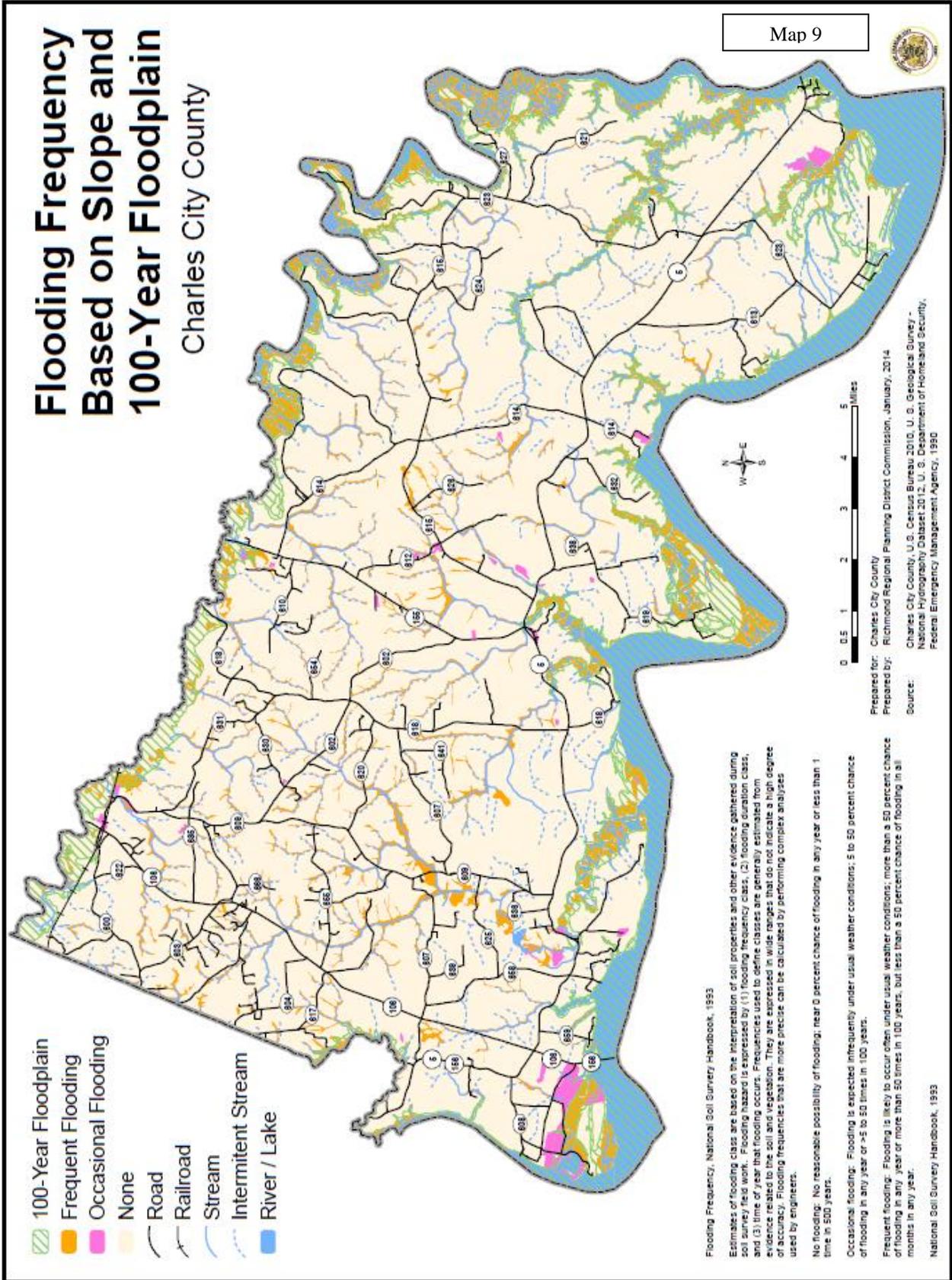
**Map 9** shows the location of the 100-year floodplain in Charles City County and the areas that are subject to frequent flooding. This map was created by using a computer to draw flood areas determined by FEMA. The map illustrates both 100-year floodplains and areas of occasional and frequent flooding. Frequent flooding means that flooding is likely to occur under usual weather conditions, more than a 50 percent chance in any year.

The FEMA maps are approximations of floodplain areas. The actual location of floodplains should be determined through field inspection. The floodplain map indicates, generally, where the 100-year floodplain is located. The map indicates where caution should be exercised when deciding where to locate development.

### SHORELAND

Charles City County is bounded to the north and east by the Chickahominy River. The county is bounded to the south and west by the James River. There are only seven miles along the western boundary of Charles City County where neither the James nor Chickahominy Rivers are its boundary. Within Charles City County all of the James River and two-thirds of the Chickahominy River are tidal. The *1976 Shoreline Situation Report for Charles City County* prepared by the Virginia Institute of Marine Science states that there are 121.2 miles of tidal shoreline in Charles City County. The *Report* does not address the non-tidal shoreline. The county's non-tidal shoreline includes the portion of the Chickahominy River upstream of Walkers' Dam and the shoreline along perennial streams such as Herring Creek and Courthouse Creek.

For the purposes of the land use plan, shoreland is defined as the tidal shore zone and the fastland. The tidal shore zone is the area of shores, beaches, and vegetated and non-vegetated wetlands along the tidal portions of the James and Chickahominy Rivers. (The most landward extent of the tidal shore zone is a point equal to the mean low water elevation plus 150 percent of the range or difference between mean low tide and mean high tide.) The *Shoreline Report* provides a general description of the county's tidal shore zones: Eighty-four percent of the tidal shore zone is marsh; 15 percent of the tidal shore zone is thin beach unsuitable for recreation; and, 1 percent of the tidal shore zone has been artificially stabilized.



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The fastland is defined as low shore, moderately low shore, high shore and high shore with bluff. The fastland is located 400 feet beyond and landward of the shore zone. The fastland begins at the point where the shore zone ends. (The shore zone ends at 1.5 times the tidal range plus mean low water). The fastland is the area most commonly used for development. The fastland is about 137 measured miles in length as measured from the county line along the



James River to the mouth of the Chickahominy River and westward to Walkers Dam. The county's fastland has 45 percent low shore (20-feet of relief or less with or without cliff), 49 percent moderately low shore (20 to 40-feet of relief with or without cliff), 2 percent moderately high shore (40 to 60-feet of relief with or without cliff), 1 percent moderate high shore with bluff, and 2 percent high shore (60-feet or more of relief with or without cliff). There are no areas classified as high shore with bluff.

According to the *1976 Shoreline Report*, there was no point along the county's shoreland where erosion is or was considered to be a critical problem. Several areas in the county were identified, however, as having moderate erosion (one to three feet loss annually). In 1976, there were no areas identified with severe erosion (greater than three feet annually). However, in 1996, County staff with assistance from the Richmond Regional Planning District Commission staff identified two land parcels where moderate erosion had reached a critical stage possibly to result in the eventual loss of dwellings should protective measures not be taken. The *Shoreline Report* also classifies land use along river corridors in Charles City County. A review of both pertinent literature and a physical review of the 1996 conditions suggest that the 1976 land use classification remains valid. **Table 21** shows the development trends within the fastland.

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**TABLE 21**

<b>Charles City County Fastland Area Inventory 1976 and 1996</b>				
	<b>1976</b>		<b>1996</b>	
<b>Land Use</b>	<b>Percent of Total</b>	<b>Linear Miles</b>	<b>Percent of Total</b>	<b>Linear Miles</b>
Agriculture	32	44.3	30	41.8
Forest	64	88.3	54	74.2
Rural Residential	2	3	6	8.4
Commercial	< 1	0.1	< 1	0.1
Industrial, Light and Heavy	< 1	0.1	<1	0.1
Public/ Semi-Public	1	0.9	9	12.1
<b>TOTAL</b>	<b>100%</b>	<b>136.7 miles</b>	<b>100 %</b>	<b>136.7 miles</b>
Sources: 1976 VIMS Shoreline Situation Report of Charles City County. The information was field validated in 1996 by staffs of Charles City County and the Richmond Regional Planning District Commission.				

### **Factors Affecting Shoreland Erosion**

Each segment of shoreland, regardless of its location in the county, is being constantly affected by wave action caused by the wind and boating activities, stormwater runoff from rainfall (a detailed discussion of stormwater is found in the section “Threats to Water Quality”), and removal of vegetation. Each segment of shoreland may also react differently to the erosive forces of wind and water. For example, shoreland segments located within the bends of the river are more susceptible to river erosion, because more of a wave’s energy is released at the bend. The physical characteristics of the shoreland, such as slope and soil type, also affect the rate of erosion. The amount of vegetative cover in an area and along the shore helps to reduce the potential for erosion. The amount of marsh vegetation found in an area also helps to buffer wave action and to reduce the impact of the waves.

Another factor which can dynamically affect the shoreland erosion rate is the loss of vegetation that occurs when land is developed. The current shoreland areas in Charles City County are essentially undeveloped. There are, however, a few developed areas. As areas develop, individual access points to the rivers are usually added as part of the development such as when a house is built with a pier. When vegetation in shoreland

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areas is removed for new construction or to improve pedestrian access to the river, the potential for shoreland erosion also increases.

### **Public and Private Access**

The majority of access to the water in Charles City County is privately owned. This includes residential home sites with associated boat ramps, piers and boating structures. It is estimated that there are between 50 and 100 privately owned piers in Charles City County. On the Chickahominy River where pier density is the greatest, nearly every parcel has its own pier. Each parcel of land on the river usually has an average frontage of several hundred feet. The combination of large river frontage on single parcels limits the total numbers of piers. Although direct access to the river is relatively small in this scenario, access still impacts the environment. In addition to providing access, piers are often used for long term boat mooring. The cumulative impact of low pier densities with long term boat mooring can result in reduced water quality from added pollution. This is a situation that is expected to intensify as currently undeveloped areas are subdivided and more piers are built.

The only commercial ramp accessing the Chickahominy River in the county, the Rivers Rest Marina (formerly the Hideaway Marina), is located in the northeastern part of the county. The marina consists of a boat ramp, 60 floating docks, field boat storage, a convenience store, restaurant, and motel. The Marina hosts the Freedom Boat Club, an organization that rents boats to members under contract. Overnight mooring is available, and a free pump-out station is available. The new facility was designed and built to minimize impacts to the Chickahominy River by incorporating an extensive French drain system, floating docks, and maintaining shoreline vegetation whenever possible.



In addition to the commercial facility, a public boat ramp with pier is located within the Chickahominy Wildlife Management Area along Morris Creek. This facility caters to the recreational day fisherman. This facility does not permit overnight mooring. No pump-out facilities are available or required at this location.

Public access to the James River is provided at the county's fishing pier and public boat ramp at the end of Wilcox Wharf Road (Route 618) at Lawrence Lewis, Jr. Park. The Lawrence Lewis, Jr. Park boat ramp was a public-private project that was completed and opened in May 2013.

Two barge ports are also found on the James River. One port is associated with the sand and gravel operation at Sandy Point. The second port, Port Tobacco, is located

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near Shirley Plantation. The facility handles barges bringing a variety of commodities to the local area.

### **Submerged Aquatic Vegetation (SAV)**

Submerged aquatic vegetation (SAV) is those grasses that exist below the surface in fresh water and low-salinity tidal waters. Their presence is vital to the Chesapeake Bay ecosystem. The grasses provide lodging and food for various small organisms, while also generating oxygen. Sediment is collected by SAV, which leaves the water less cloudy and reduces the likelihood of sediment crushing bottom dwelling life forms.

Unfortunately, today there is less than half of the submerged aquatic vegetation in the Chesapeake Bay and its tributaries than existed before 1960. The main reason for the downturn of this vegetation is due to light reduction caused by excessive stormwater runoff from farms, construction, and other developments.

A 1998 study, *Analysis of the Distribution of Submerged Aquatic Vegetation in the James River* by Virginia Institute of Marine Science, found numerous small beds of SAV along the Chickahominy River in Charles City County. These grasses were mainly fringing various marsh channels and small creeks. However, along the James River, only a few scattered beds now occur and are found within tributary creeks.

In addition, the water quality report on streams, estuaries and lakes with water quality impairments, the 2006 Water Quality Assessment Integrated Report, created every two years by the Commonwealth of Virginia's Department of Environmental Quality identifies a shortage of SAV in the James River through Charles City County in its assessment of impairments to the estuarine sections of the rivers.

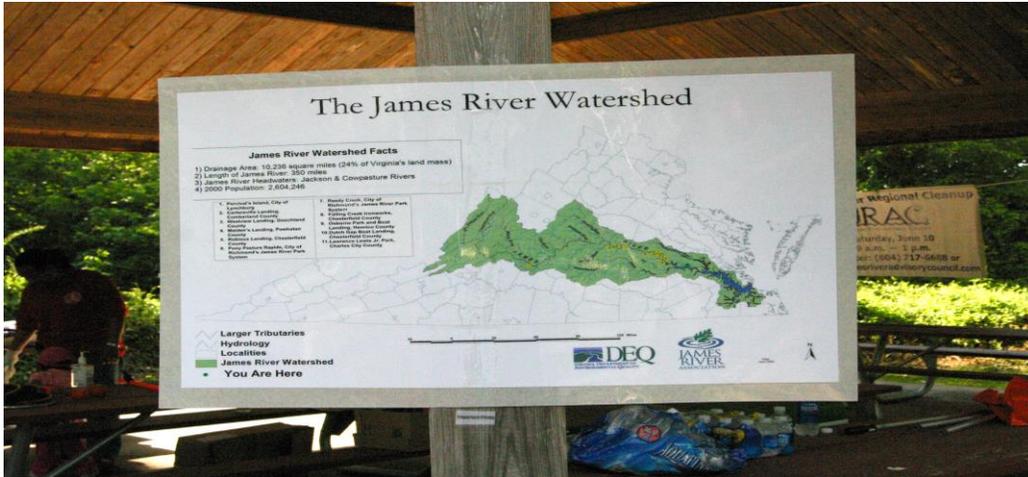
The Harrison Lake National Fish Hatchery in Charles City County has become a planting area to create donor beds of such species as wild celery. The grasses are raised for restoration programs for planting throughout the Chesapeake Bay.

## **SURFACE WATER**

The many rivers and streams that flow through Charles City County have played a significant role in the development and history of the county. The locations and general characteristics of the rivers and streams will greatly impact future development.

The entire county is within the James River watershed. This means that all of the streams eventually flow into the James River, which flows into the Chesapeake Bay.

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The county's two major rivers are described below.

### **James River**

The James River is an estuary in Charles City County and is influenced by the ebb and flow of lunar tidal cycles. Fresh water flowing down from the upper basin to the west mixes with the salty waters moving up from the Chesapeake Bay in the east. The concentration of salt water is greatest at the mouth of the river near Norfolk and gradually decreases upriver towards the City of Richmond. The salinity of the James as it passes through the county varies from season to season.



Approximately 15 major municipal and industrial sewage treatment plants are located upstream on the James River. These plants affect the water quality of the river downstream through the discharge of pollutants contained in their effluents. Also, the extensive growth and urbanization of these upstream localities make for conditions that create stormwater runoff which also pollutes the river.

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### Chickahominy River

The Chickahominy River along the eastern side of Charles City County is estuarine from Walkers Dam to the James River. This tidal portion is saline with concentrations similar to that of the James River. Above Walkers Dam, located 22 river miles upstream from James River, the Chickahominy is nontidal fresh water.

The City of Newport News utilizes the water impounded by Walker's Dam, Chickahominy Lake, as a raw water supply. This water is used to supply a portion of the water needs of the City of Newport News and other localities served by that city's water works. The State Water Control Board has developed strict standards for water quality and effluent discharges into the Chickahominy River from its headwaters to Walker's dam. There are several industrial and municipal sewage treatment plants up river in Hanover, Henrico, and New Kent Counties.



### **GROUNDWATER**

#### **General Information on Groundwater**

Groundwater begins as surface water such as melting snow, rain, ponds, creeks, lakes and rivers. Overtime, large amounts of surface water are slowly absorbed in the ground. The specific locations where surface water filters into the ground are referred to as the saturated zone – the point where surface water becomes groundwater. The point where the surface water actually begins to collect and to pool underground is commonly referred to as the water table. Knowing the location of the water table is important in locating wells for both residential and non-residential purposes, especially in areas where public water and sewer service is not readily available.

Groundwater is found underground between the cracks and spaces in soil, clay and rocks. These spaces (or collection areas) are referred to as aquifers. Aquifers are made of varying natural materials that allow the water to flow at different rates. For example, aquifers made primarily from large clay deposits will hold water for longer periods of time than aquifers consisting primarily of soil. The actual location of the aquifer may vary considerably. The aquifer may be only a few feet below the ground or it may be hundreds of feet below the surface.

The speed of the flow of groundwater depends on the size of the spaces in the soil or rock and on how well the spaces are connected. Because groundwater moves slowly through the cracks and spaces between rocks and other non-porous materials, it can take long periods of time for it to move; often as long as a day just to move a couple of inches.

Recharge is the process that allows surface water to replenish an aquifer. This process may occur naturally or artificially. The process occurs naturally when rain falls, springs and streams filter down through the ground into an aquifer. The land area where recharge occurs naturally is called the recharge area or recharge zone. Artificial recharge is achieved by injecting water into a well or by spreading water over the surface where it can seep into the ground.

Per the State's 1992 Ground Water Management Act, the county is located within the Eastern Virginia Ground Water Management Area. This legislation aims to restrict the use of ground water and reduce the possible sources of ground water pollution in the management area. Uses that require large withdrawals of water, exceeding 300,000 gallons per month, are required to obtain a Ground Water Withdrawal Permit from the State. The Act also requires that there be a Ground Water Plan in place for those locales that fall within the management area.

#### **Aquifers in Charles City**

There are several confined aquifers in Charles City County. These aquifers are "confined" because they are separated from each other by thick layers of clay. These

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clay layers hold the water, only allowing water to be transferred between the aquifers very slowly. The clay layers also add pressure to the water because the water wants to move faster than the clay allows. When the confined aquifers are tapped by a deep well, the pressure can force the water to spring upward as an artesian well.

Throughout Charles City, there is also an unconfined aquifer. This aquifer is found between the ground and the first confined aquifer. Rain, creeks and rivers supply the water to this shallow aquifer. The unconfined aquifer provides water for shallow wells. Because the aquifer is shallow and receives water directly from the surface, it is very susceptible to contamination. Substances that can filter through the ground can quickly reach the shallow aquifer.

In a study by the United States Geological Survey, *Groundwater Resources of the York James Peninsula of Virginia*, in 1989, there were several important issues identified in the executive summary including:

- Groundwater withdrawal has lowered water levels throughout the multi-aquifer system.
- Cones of depression are centered at, and are expanding outward from areas of concentrated groundwater use.
- Groundwater withdrawal is expected to increase. This will lower water levels and cause the possible movement of salty water into freshwater parts of aquifers.
- The availability of groundwater for meeting future water needs has become a matter of local and regional concern.

Residents and businesses in the county are served entirely by groundwater at this time. The county anticipates that groundwater will continue to be the sole source of drinking water for the foreseeable future. Section 62.1-44.15 of the Code of Virginia requires localities to develop a long-term water supply plan that identifies the quantity and potential of threats to the quality of the county's water supply system.

### **THREATS TO WATER QUALITY AND QUANTITY**

Water quality is an important issue for Charles City County. The protection of groundwater and surface water is important in the short and long term both as a source of drinking water and for recreation and for fish and wildlife habitat. Pollutants generally affect water quality in two ways: stormwater runoff and leaching. Stormwater runoff refers to water which is not absorbed in the soil but instead flows overland. This excess water eventually collects and flows into either natural channels or manmade drainage courses such as a ditch or swale. As the water flows, part of it is absorbed into the ground, eventually helping to recharge the groundwater supply; the remainder is carried away to help recharge a surface water body.

Managing water quantity is also an important issue. Undeveloped or "pervious" surfaces, such as woodlands and meadows, absorb and filter rainfall and reduce runoff. Conversely, "impervious" surfaces, such as pavement and/or rooftops, increase the amount of runoff that occurs when it rains. This increase in runoff can overwhelm waterways causing erosion, localized flooding and property damage.

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### **Stormwater**

If too much stormwater flows too quickly over the ground, soil erosion may occur. Soil erosion occurs when great volumes of stormwater, sometimes also flowing at great speeds, washes away soil and debris. The soil eroded from the site carries nutrients, such as nitrogen and phosphorus, and the additional nutrients pollute the county's waterways. The debris and litter carried by stormwater runoff is also considered pollution, and should also be prevented from entering county waterways.

Also, land that is covered with buildings, parking areas and other built structures does not allow water to be absorbed into the ground and downstream flooding may occur if preventative measures are not taken. Excess runoff from development sites can cause channel erosion, flooding, and have adverse impacts on the hydrology of streams and wetlands. Preventative measures include stormwater detention and retention ponds or basins, also known as BMPS or Best Management Practices, and underground stormwater drainage systems.

The preservation of vegetation on development sites increases the opportunity for stormwater to be absorbed into the ground. The maintenance of a vegetative cover also reduces stormwater runoff from the site.



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### **Leaching**

Leaching refers to the action of water and the particles it carries being absorbed and filtered by soil layers beneath the ground. Soil overlying the water table provides the primary protection against groundwater pollution. Bacteria, sediment and other insoluble forms of contamination become trapped within the soil. Some chemicals are absorbed or react with various soil constituents, thereby preventing or slowing the migration of pollutants into the groundwater. In addition, plants and soil microorganisms use some potential pollutants, such as nitrogen, as nutrients for growth, thereby depleting the amount (of nutrients) that reaches the groundwater. Eventually the leached materials that are not filtered out in the soil layers enter the groundwater supply.

Highly permeable soils allow water and the particles it carries to more readily move through the soil layers. Because the water filters through highly permeable soil at a faster rate than non-highly permeable soils, chances are much greater that pollutants will not be filtered out and will enter the groundwater supply. Unconfined aquifers that do not have a thick cover of soil are more susceptible to contamination. Confined, deep aquifers tend to be better protected with a dense layer of clay material.

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Most of the contaminants that commonly cause concern originate above ground, often as the direct result of human activities. More often than not the primary force involved is gravity, as wastes are washed, poured, spilled or flushed into pathways that lead into the ground. Opportunities for direct pathways to the aquifers which are used by Charles City County residents and businesses include open and abandoned wells, drain tiles or drainage wells, surface depressions where water ponds, septic tanks and drainfields, cesspools, rudimentary bored wells, pipe trenches, and mining excavations.

### **Erosion and Sediment Control**

The county adopted its erosion and sediment control ordinance in 1980 and later modified it to become consistent with the state requirements. The purpose of this ordinance is to insure that no drainage from a construction site will cause damage to adjacent properties or waters due to sedimentation and stormwater runoff. All land disturbing activities over 2,500 square feet in areas designated as covered by the Chesapeake Bay Preservation



Act in Charles City County are regulated. In 2014, the Charles City County CBPA Ordinance was combined with the county's erosion and sediment control ordinance and a new stormwater management ordinance to provide for the integration of these programs to better protect water quantity and quality.

### **Stormwater Management**

The state Stormwater Management Act regulates the impacts to water quality and water quantity due to stormwater runoff from disturbance of land under development. In accordance with state law requirements adopted in 2012 by the General Assembly, Charles City County adopted and began administering a Virginia Stormwater Management Program (VSMP) to regulate certain land disturbing activities of greater than an acre (or less than acre where part of a common plan of development), and greater than 2,500 sq. feet when located in a Chesapeake Bay Preservation Area. The County's Stormwater Management Ordinance was combined with its then existing CBPA Ordinance and its Erosion and Sediment Ordinance now called the "Combined Water Quality Protection Ordinance of Charles City County" to integrate these programs to the betterment of water quality and quantity, and to provide a "one stop-shop" for developers. The "one stop-shop" benefits local developers and citizens by streamlining the permitting process for qualifying land disturbance projects. That is, the county now serves as the contact, instead of the Department of Environmental Quality, for the permitting process.

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### **Floodplains**

The county's floodplain overlay district was designed to protect persons and property from the negative impacts of floods. Citizens cannot build within the 100-year floodplain without providing assurances that damage is unlikely to occur to their property or the property of others due to floods. In addition, adoption and implementation of the county's Combined Water Quality Protection Ordinance will minimize stormwater runoff impacts to the county's flood prone areas.

### **Impaired Waters in Charles City County**

Every two years, the Virginia Department of Environmental Quality develops a list of impaired waters in the state's lakes, rivers and tidal waters based on the presence of certain types of pollutants. A water body is considered impaired if it is determined through the monitoring of pollutants that the water is not suitable for swimming, fishing or drinking. Most rivers, lakes and estuaries in Virginia do meet standards as described in the biennial 305(b) Water Quality Assessment Reports, which is a requirement of the Clean Water Act. Waters that do not meet standards are reported in the 303(d) Impaired Waters Report. If a lake, river or tidal waters are considered to be impaired, DEQ develops plans, with public input, to restore and maintain the water quality for the impaired waters. These plans are called "Total Maximum Daily Loads," or TMDL implementation plans. TMDL is a term that represents the total pollutant a water body can assimilate and still meet standards.

In Charles City County, portions of the James River, Chickahominy River, Turkey Island Creek, Harrison Lake, Chickahominy Lake, Possum Run, West Run, Morris Creek, Gunn's Run and Collins Run were classified as being impaired according to the 2012 Impaired Waters report. Depending on the section of the river or creek, reasons for impairment include the presence of fecal coliform, ph deficiencies and the open water 30-day summer dissolved oxygen criteria. Sources of the pollutants could include agriculture, atmospheric deposition of nitrogen, natural conditions, loss of riparian habitat, wet weather discharges from point sources, and stormwater from urbanized areas. Many of these potential sources are located upstream and outside of Charles City County.

All major county land uses (agriculture, residential, and business and industry) have the potential to introduce contaminants to ground or surface water through either direct pathway, leaching or stormwater runoff. Below is a summary of the various ways these land use types may contribute to ground or surface water pollution.

### **Agriculture**

#### ***Nutrient Management***

Agricultural activities can introduce nutrients, toxicants and sediments into streams, waterways and groundwater and can have a negative affect on water quality. According to Colonial Soil and Water Conservation District records, there are about 17,800 acres of farmland in Charles City County under active cultivation. (This represents about 16

## CHAPTER 4 – NATURAL RESOURCES

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percent of the county.) These lands are used for growing small grains and cotton. The activities for each farm are regulated by a management plan prepared for them by the local soil and water conservation district office. These plans are developed to meet the standard of the United States Department of Agriculture's Food Security Act (FSA), and include standards for tillage practices, application rates for pesticides, fertilizers, herbicides, and other nutrients. These plans are designed in part to prevent surface and groundwater pollution by minimizing erosion and possible excessive chemical application. If the farmers meet standards established in the plan, they are eligible for cash subsidies provided through the USDA program. The cash subsidies provide the incentive for the farmer to follow the plan.

### ***Biosolids Application***

Biosolids are applied to approximately 10,000 acres of farmland in Charles City County. Biosolids (or treated sewage sludge) contain organic and inorganic nitrogen and can be applied to non-edible plants as a fertilizer to dramatically accelerate plant growth. Not all lands considered for biosolids application is suitable. Land features such as topography, soil characteristics, location of groundwater and surface waters, and proximity to residences, operational accessibility, proximity to a biosolids supply, intended land use, economic viability, and application time need to be evaluated.

Farms that apply biosolids to crops and trees are required to follow strict, approved nutrient management plans that consider plant needs and soil nutrient levels. These plans outline the amount of nitrogen the plants can utilize from the application of the biosolids. The Virginia Department of Environmental Quality closely restricts sludge application to sites where surface runoff can be minimized, and prohibits biosolids from reaching surface water bodies, drainage ditches, and other impoundments. Application of biosolids within 100 foot of wells is strictly prohibited to reduce the potential waste contaminants to move from soil into groundwater. Regardless of how restrictive local or state regulations are, or how reasonable it is to use biosolids as a soil additive on agricultural lands, it remains the ultimate responsibility of the farmer to properly apply biosolids in strict accordance with the rules that are designed to protect. Safe and effective application of biosolids will fail if the farmer is not knowledgeable of appropriate agronomic practices and soil types.

### **Residential**

#### ***Use of Lawn, Garden and Household Chemicals by Homeowners and Small-scale Farmers***

Small scale farmers, gardeners, and homeowners however do not typically have the assistance of the local soil and water conservation district and may not be familiar with USDA requirements. The lawn and garden chemicals may be misapplied potentially contaminating groundwater unless application instructions are carefully followed. Groundwater contamination may also occur when these chemicals are stored in uncovered areas, unprotected from wind and rain, or are stored in locations near wells or drains.

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Many sources of groundwater contamination can originate from the home. Improperly stored or disposed household chemicals such as paints, synthetic detergents, solvents, oils, medicines, disinfectants, pool chemicals, pesticides, batteries, gasoline and diesel fuel can lead to groundwater pollution. When chemicals are stored in garages or basements with floor drains, accidental spills or flooding may wash chemicals away to contaminate groundwater. Similarly, wastes dumped or buried in the ground can contaminate the soil and leach into the groundwater. Hazardous products that could not be reused (i.e. agricultural chemicals etc.) were often disposed in the landfill.

In 2000, a county-wide program sponsored by Waste Management Incorporated and Charles City County began that assists the local residents with the proper disposal of hazardous household and agricultural chemicals waste. Prior to 2000, residents would depend on local vendors (i.e. service stations, etc.) to accept their waste.

### ***Open Wells***

Open wells can easily become contaminated from simple daily operation or by accidental spills near the well opening. The lubricating fluids used to help the pumps operate, such as grease and oil from the pump can contaminate open wells. Open wells can also be contaminated from the surface if the well cap is not tight or if the casing lining the well is cracked or corroded. In addition, many older wells were merely dug as shallow holes in the ground. These wells can easily be contaminated and are also a safety hazard to children and animals.

The Virginia Department of Health (VDH) and Charles City are working closely together to identify open wells. It is the intent of both agents that once these open wells are located that the owners will be identified and proper well abandonment procedures followed. The state's Wellhead Protection Plan Development Program is based on community involvement, wherein a local committee works with VDH to create a plan for wellhead protection which can be used by a locality's waterworks for implementation to protect groundwater.

### ***On-site Sewage Treatment***

The majority of Charles City County is served by individual onsite wastewater systems (septic systems). These systems are designed for safe use by homes, offices or businesses not connected to a community sewer system. These systems work by collecting human waste in underground vats, allowing it to decompose through natural processes, and draining away at a slow, harmless rate. The county's soil's survey indicates that most of the county soils have such severe limitations that they are unsuitable for individual on-site septic systems.

The average lifespan for well-designed and maintained systems is about 30 years. The county estimates that the majority of the on-site systems built before 1980 may need to be repaired or replaced based on information gathered from Virginia Department of Health records for Charles City County. Generally, systems designed and installed after

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1990 should be in good operating order because they were developed with water quality issues and appropriate VDH regulations in place. However, there are questions about the integrity of systems installed before then. Health department records kept on septic system permits issued before 1990 are not complete, and therefore many of the records are not reliable. Review of records issued before 1990 indicates that approximately 1,228 records are reliable, and the remaining 1,800 records are not. Of the reliable records, about 800 were recorded before 1980. Of those 800 records, more than 500 (at least 63 percent) are for systems located on areas of unsuitable soils. Therefore, the assumption is made that for the systems with unreliable records, 63 percent are located on unsuitable soils. In addition, these systems are at best, over 20 years old and are nearing their life expectancy.

In addition to those within the county who have on-site systems, there are many homes within the county that still have no indoor plumbing. The 2010 census identified 38 homes without complete indoor plumbing. The lack of indoor plumbing and the existence of these large numbers of septic systems failing in the county is an important issue for the County Board of Supervisors. The county is actively seeking resources to provide adequate and safe wastewater disposal for all citizens, regardless of income.

### **Business and Industry**

#### ***Disposal of Waste***

Some businesses and home occupations, without access to sometimes expensive alternative types of disposal technology, treat their wastewater with residential-styled septic systems. Businesses that use harsh chemical or solvents such as automobile repair service, electrical component or machine manufacturers, photo processors, and metal platers or fabricators are of particular concern because the waste they generate is likely to contain toxic chemicals. Septic systems are not designed to treat these types of industrial wastes. Other industrial sources of contamination include cleaning of holding tanks or spraying equipment on the open ground. Some of this material can be lost through spillage, leakage, or improper handling. Even the cleanup of spills may pose a threat to groundwater when the spills are flushed with water rather than cleaned up with absorbent substances.

Although businesses may run a "clean shop", even small amounts of waste fluids can end up on the shop floor and be washed down floor drains that are not designed to handle industrial chemicals. These relatively small amounts of chemicals accumulate over time, and may create severe water pollution problems.

Education of these business owners in the identification of their hazardous wastewater management practices and insuring that there is available a resource in eliminating these hazardous products is the key to reducing the amount of hazardous waste inadequately disposed of in this county.

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### ***Leaking Underground Storage Tanks***

A major source of petroleum products entering groundwater is leaking underground storage tanks. Leaking underground storage tanks (LUST) can pollute both ground and surface waters. The Virginia Department of Environmental Quality maintains a program for tracking and assisting owners with the clean-up of leaking underground storage tanks. In March 2006, there were five identified LUST in Charles City County. The location of these sites is shown on **Map 10**, which shows existing and potential water pollution sources.

### ***Point Source Pollution***

The regulation of point source pollution, as a result of industrial or municipal wastewater or stormwater, is controlled by the Department of Environmental Quality through its permitting known as Virginia Pollutant Discharge Elimination Systems (VPDES). In order to protect water quality, the discharge from wastewater systems is monitored and regulated through an annual permit specifying the allowed level of nitrogen, phosphorous and other chemicals which are harmful to water quality.

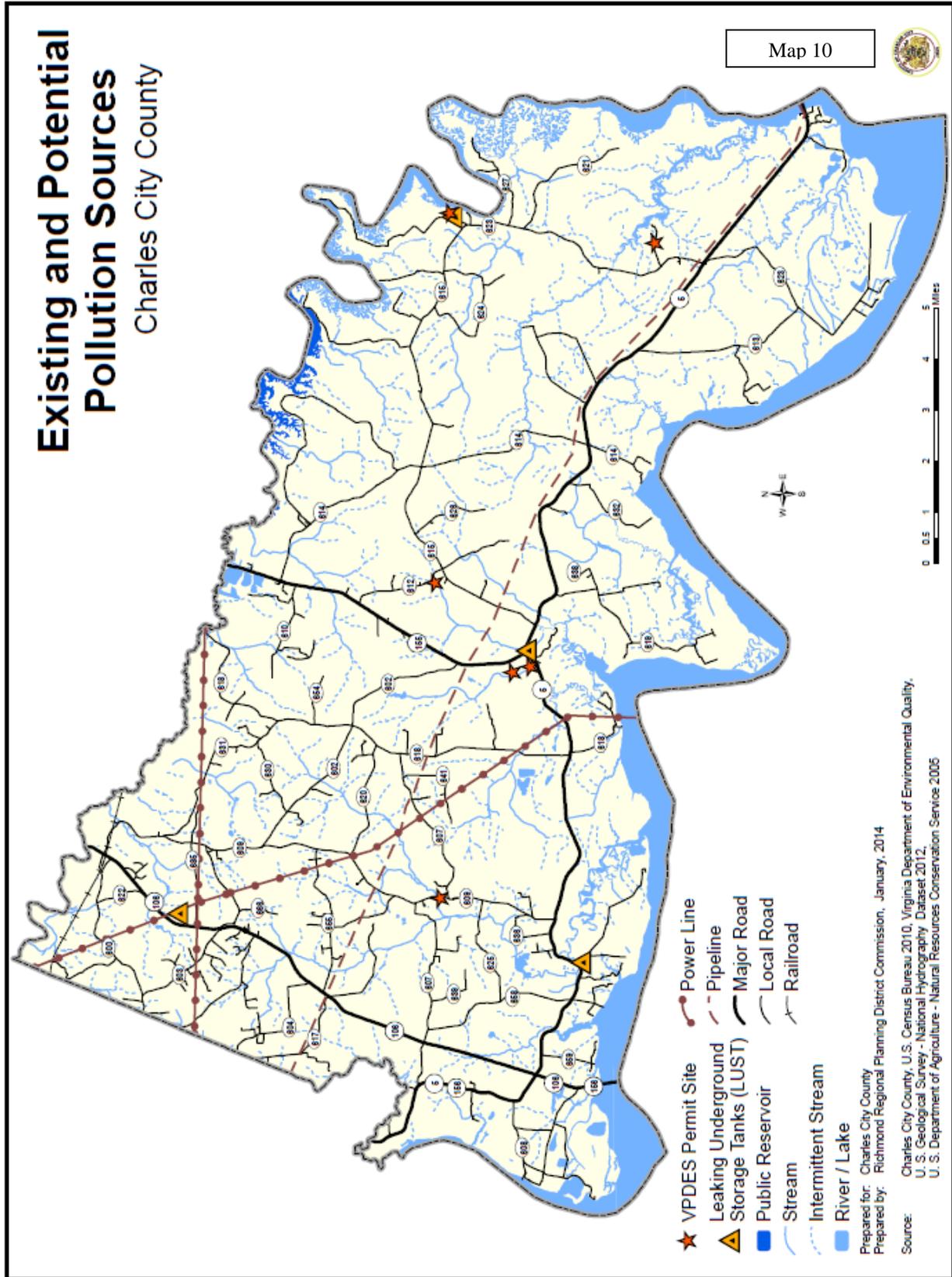
## **STATE AND LOCAL POLICY FOR WATER QUALITY PROTECTION**

### **State Policy for Water Quality Protection**

Under state law, each local government must clearly indicate local policy on land use issues relative to water quality protection within its comprehensive plan. The Chesapeake Bay Preservation Act requires that each locality within the Tidewater area designates the area of sensitive lands for the Chesapeake Bay Preservation Areas in its comprehensive plan.

### **Local Policy for Water Quality Protection**

The county has a comprehensive environmental control program which addresses the riparian management strategies and policies described in this section. These include adoption of ordinances consistent with state legislation. The permits required by the ordinances and programs below are consolidated to one application to help the local citizen.



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### ***Chesapeake Bay and Tributaries***

In 1988, the General Assembly adopted the Chesapeake Bay Preservation Act. The Act's purpose is to protect and improve water quality in the Chesapeake Bay and its tributaries by regulating the use and development of land. Charles City County first adopted the Bay Ordinance in October of 1993 that directly supports the Chesapeake Bay Preservation Act and the regulations. This ordinance designates Chesapeake Bay Preservation Areas and provides regulations for the use and development of land within these areas. Chesapeake Bay Preservation Areas consist of Resource Protection Areas and Resource Management Areas. They are described below and are shown in **Map 11**.

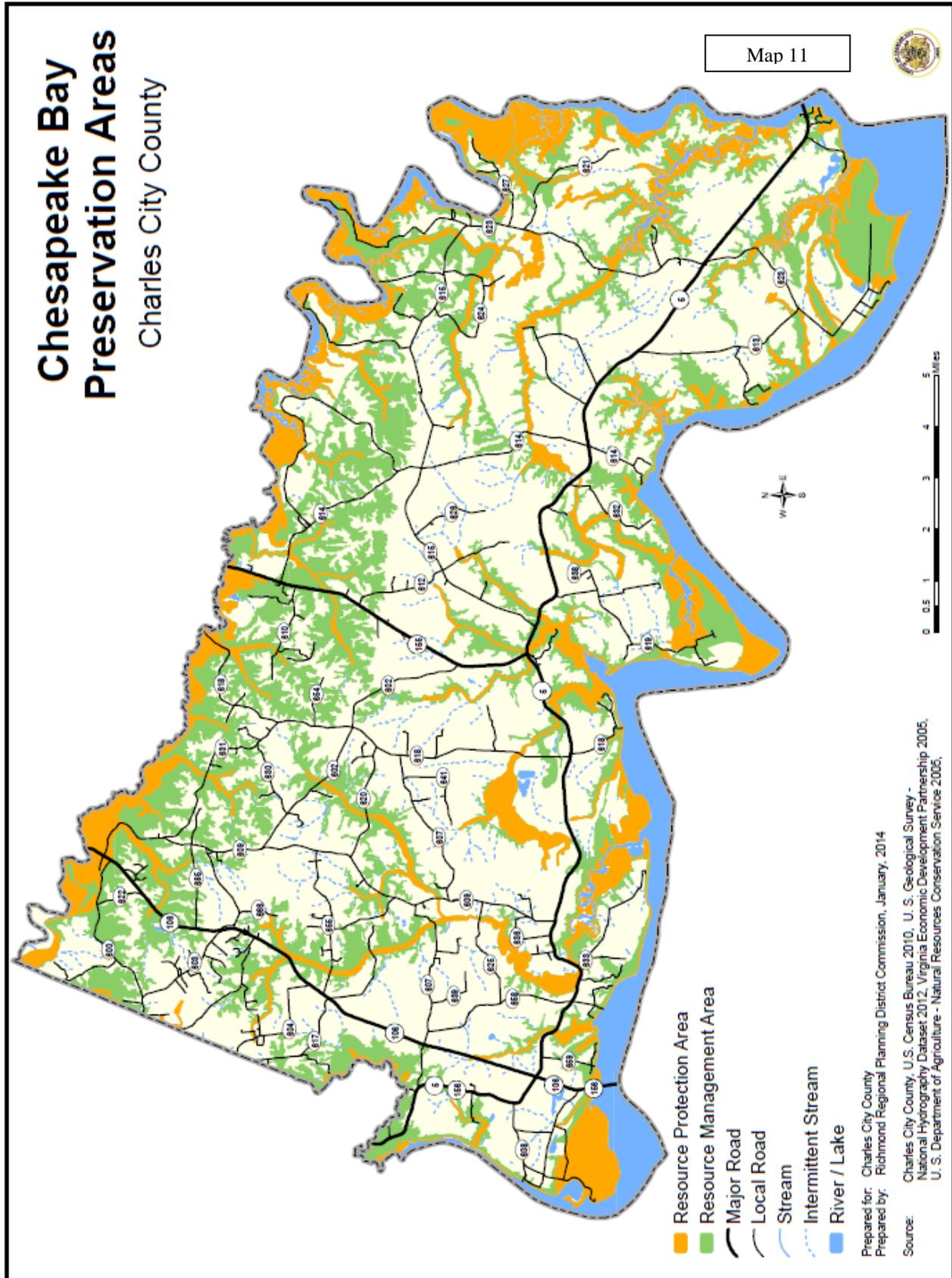
Resource Protection Areas (RPAs) are highly sensitive land types at or near the shoreline, that in their natural condition are essential to the protection of the water quality of state waters. RPAs include tidal wetlands, nontidal wetlands connected by surface flow and adjoining to tidal wetlands or tributary streams, tidal shores, and a 100-foot width vegetated buffer area landward of the first three components and along both sides of tributary streams. Types of development within these areas are limited to water dependent uses and redevelopment. In addition, additional construction standards are applied to all development in RPAs.

Resource Management Areas (RMAs) are land types that if improperly used or developed have the potential for causing significant threats to water quality or diminishing the functional value of the Resource Protection Area. Resource Management Areas include those areas adjoining to any Resource Protection Area where there is an overlap of soils delineated as highly erodible and soils delineated as highly permeable, those areas adjacent to any Resource Protection Area delineated as a 100-year floodplain and an area 25 feet in width landward and adjoining to the entire inland boundary of the Resource Protection Area. Types of development within these areas are not limited. Additional construction standards are applied to all development in an RMA.

### ***Wetlands***

The Tidal Wetlands Act regulates both vegetated and non-vegetated wetlands as defined in Section 28.2-1300 of the Code of Virginia. Permits are required for piers, boat ramps, revetments, bulkheads, marinas etc. when portions of these structures impact wetlands jurisdiction associated with the shore zone. The county Wetlands Board uses information from the Virginia Marine Resources Commission in regulating wetlands impacts for piers, structural and nonstructural methods of shoreland management, marinas, and facilities for river access.

In 2011, the Virginia Assembly passed legislation to amend §28.2-1100 and §28.2-104.1 of the Code of Virginia and added section §15.2-2223.2, to codify a new directive for shoreline management in Tidewater Virginia. In accordance with section §15.2-2223.2, all local governments shall include in the next revision of their comprehensive



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plan beginning in 2013, 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.

This guidance, found within the Comprehensive Coastal Resource Management Portal, is being prepared by VIMS for localities within the Tidewater region of Virginia. It explicitly outlines where and what new shoreline best management practices should be considered where coastal modifications are necessary to reduce shoreline erosion and protect our fragile coastal ecosystems. This guidance will include a full spectrum of appropriate management options which can be used by local governments for site-specific application and consideration of cumulative shoreline impacts. The guidance applies a decision-tree method using a based resource mapping database that will be updated from time to time, and a digital geographic information system model created by VIMS.

### ***Erosion and Sediment Control***

The county adopted its erosion and sediment control ordinance in 1980 and later modified it to become consistent with the state requirements. The purpose of this ordinance is to insure that no drainage from a construction site will cause damage to adjacent properties or waters due to stormwater runoff. All land disturbing activities over 2,500 square feet in riparian areas in Charles City County are regulated.

### ***Stormwater Management***

The state act regulates the impacts on water quality due to stormwater runoff from disturbance of land under development. Localities have the ability to administer stormwater programs and to review stormwater plans for projects in excess of one acre in size. As of 2013, Charles City County does not administer its own stormwater program. However, beginning on July 1, 2014, changes to state law will require Tidewater localities such as Charles City to administer a stormwater program to regulate impacts from land development.

### ***Floodplains***

The county's floodplain overlay district was designed to protect persons and property from the negative impacts of floods. Citizens cannot build within the 100-year floodplain without providing assurances that damage is unlikely to occur to their property or the property of others due to floods.

### ***Site Plan Ordinance***

The county adopted its site plan ordinance in 1994. The current ordinance requires a site plan be submitted for any land disturbance over 2,500 square feet to comply.

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### ***Wastewater***

The majority of Charles City County is served by individual onsite wastewater systems (septic systems). The severity of the wastewater problems was identified in a 1994-1995 ad-hoc survey prepared by Virginia Department of Health (VDH) staff. Through Community Development and the Indoor Plumbing and Rehabilitation programs, 19 households were provided indoor plumbing and rehabilitated houses. During the last several years, however it became obvious that due to size of the lots or other site conditions, some properties would not allow for the installation of conventional systems. A planning grant was awarded by the DHCD in fall of 2001 to the county to assess the use of generic decentralized wastewater treatment systems for designated clusters. Central to the DHCD support was for Charles City County and the Virginia Department of Health to execute a Memorandum of Agreement (MOA) that established a protocol that allows for improved permitting procedures together with improved operation and maintenance procedures for the installed systems. It is expected by the DHCD that this protocol could be used by other locales in Virginia that are facing the same issues with poor soils and a number of existing houses without indoor plumbing. Key however to the MOA being created was the guarantee that should the project proceed Charles City would own and operate these systems. The County Board of Supervisors took the critical step of endorsing the Memorandum of Understanding. This is a unique action among rural locales in that it obligates the county to future operation and maintenance of this type of system. This endorsement indicates the level of political will the county has in providing service to houses without indoor plumbing.

### ***Agriculture-No-Till Farming***

Charles City has received prominence for its farming methods. It is part of the Innovative Cropping Systems (ICS) partnership which utilizes innovative technologies to avoid soil tillage while benefiting farmers financially. Tilling the land requires loosening soil in order to mix fertilizer in with the land, which can result in soil erosion. Many Charles City farmers have avoided this harmful practice by becoming known for their no-till farming, which also can reduce pollutants released into the air after the soil is manipulated. An impressive 90 percent of its farmland is in the never-till category. This practice controls for runoff, and during a recent hurricane the county revealed almost no signs of erosion. This program is funded in part by a grant from the Virginia Department of Conservation and Recreation. Other benefits of reduced tillage include improved water quality, lessened production costs, and larger crop production.

## **SAND AND GRAVEL**

Charles City County is in the Coastal Plain Province and is underlain principally by sand, gravel, clay and marl strata. Alluvial deposits of these materials were placed here over a large span of geologic time by the James and Chickahominy Rivers.

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Charles City County has abundant sand and gravel resources. This is evidenced by the several large-scale mining operations located throughout the county. During 2004, 1,833,458 tons of sand and gravel were produced in the county by the following active operations:

Henry S. Branscome, Incorporated  
Howard Brothers Contractor Incorporated  
Vulcan Construction Materials LP

Bardon, Incorporated (Brett)  
Sturgeon Point, LLC

The Virginia Department of Mines, Minerals and Energy also reports four inactive operations in addition to the active operations. These operations are as follows:

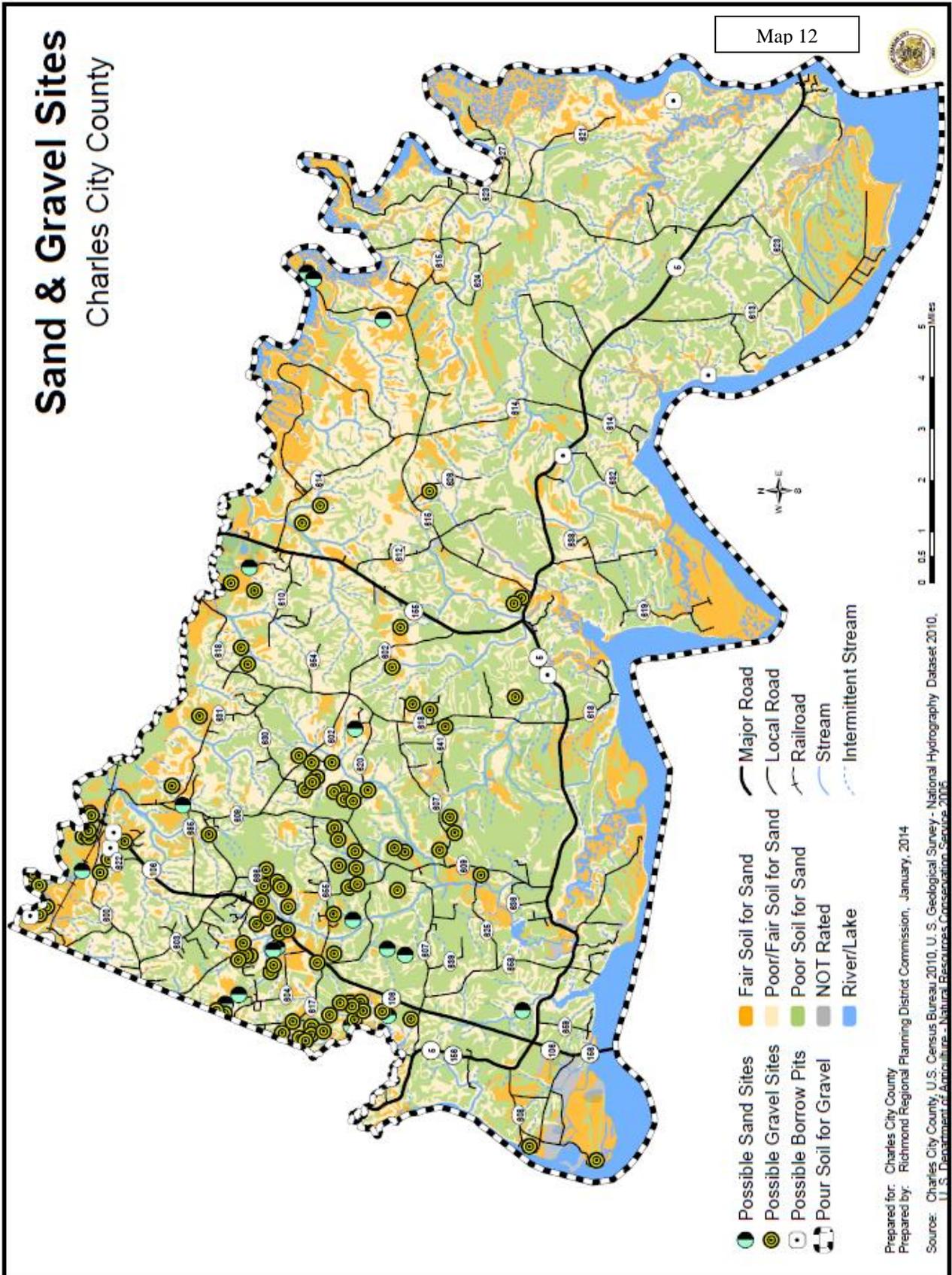
American Materials  
J. R. Parker

Eureka Brick Company  
Tarmac America, Inc. (Lone Star)

In the past, sand and gravel have been produced near Holdcroft, in the northeastern portion of the county near the Chickahominy River. Sand and gravel has also been produced at other locations in the county. Clay was formerly mined near Oldfield and Sturgeon Point, in the southeastern portions of the county near the James River, for use in the manufacture of brick. Samples of clay from selected locations in the county have been tested and found potentially suitable for use in the manufacture of brick, tile, quarry tile, sewer pipe and stoneware. Calcareous or shell marl and glauconitic marl are found in the county but no commercial mining of these materials has been reported to the Virginia Department of Mines Minerals and Energy.

**Map 12**, Sand and Gravel Sites, shows those areas in Charles City County that most likely contain or may contain significant sand and gravel deposits. The ancestral river beds of the James and Chickahominy make up most of those areas. This map was produced using information provided by Natural Resource Conservation Service. Detailed, site specific analysis is necessary to make accurate decisions.





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### FISHERIES

Rivers and lakes of Charles City County support recreational fisheries that are nationally known. The tidal Chickahominy along the eastern side of the county has supported a largemouth bass fishery for many decades. Anglers also fish for catfish, especially blue catfish, river herring, striped bass, and Hickory and American shad. In addition to access at the Chickahominy Wildlife Management area on Morris Creek and the Rivers Rest marina in Charles City, there is also public access to the river in James City County and New Kent County.



The Chickahominy Reservoir, a 1,230-acre fresh water lake formed by Walker's Dam, is along the northern side of the county. According to the Department of Game and Inland Fisheries, the lake is considered to be one of the "best all round fisheries in Virginia." The habitat created by bald cypress trees, water lilies and underwater vegetation is credited with providing consistently good fishing at this lake. In addition to chain pickerel, bowfin, largemouth bass, bluegill, black crappie, yellow perch, gar and others, there are twin fish ladders next to the dam which allow for the passage of blueback herring and striped bass. There is no public access to the Chickahominy Reservoir in Charles City County. Access is from either private or commercial landings in New Kent County.

The tidal James River also supports a nationally recognized largemouth bass fishery and has been the location of many recreational fishing tournaments including the Bass Master Classics.

The Harrison Lake National Fish Hatchery next to Harrison Lake is owned and managed by the US Fish and Wildlife Service. Since 1994, the hatchery has stocked millions of American shad larvae into rivers in Maryland and Virginia, including the James River.

### FORESTS

Forests are a benefit to Charles City County both economically and environmentally. Economically, forestry ranks second behind agriculture in contribution to the county's economy. Forests benefit the environment by improving water quality and regulating water supply. Water quality is improved through the reduction of erosion and sedimentation entering our lakes and streams. Water supply is regulated by the forest's ability to prevent the rapid runoff of precipitation from the land. Forests clean the air by acting as a filter. Oxygen is exchanged for carbon dioxide during the process of photosynthesis (the process of converting light energy into useable energy), thus keeping these two constituents in balance. Forests make up habitat that is used by many animals for shelter, food, and nesting sites. Forests are aesthetically pleasing and provide attractive home sites and recreational areas.

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According to the Virginia Department of Forestry, forests cover approximately 80,000 acres or about 73 percent of the county's land area. The major forest types in the county are: loblolly pine; oak-pine; oak-hickory and oak-gum-cypress.



The majority of the forests, 75 percent or about 60,000 acres, is owned by private landowners. The forest industry owns another 25 percent or about 20,000 acres. The remaining 6% is owned by the government. The forests of Charles City County have long been a substantial contributor to the livelihood of its residents. In Charles City County, the forested land is used for a variety of purposes: protecting the county's water from pollution; cleaning the air and producing oxygen; providing homes for wildlife; providing recreation for the

county's citizens; providing jobs through the harvesting of wood products; and, income for landowners through the marketing of forest products.

Forests are the best land use for protecting water from pollution and for helping to maintain a good water supply. Streams and rivers can be polluted when rain flows into them carrying dirt and debris from the land. Rain needs time to absorb into the ground so that pollutants can be filtered out. Leaves and branches help to slow the rain as it falls from the sky. This slowing process helps to reduce the rain's pounding action and the potential for soil erosion caused when rain falls on the ground. Trunks and roots also help to slow the rain as it flows across the ground. When tree trunks and roots are in place, the rain water must flow around them. It takes the rain water longer to flow around the trees than it does to flow over smooth ground. As the water flows around, it tends to form small pools and puddles that allow the dirt and debris to settle to the bottom. In these ways, forests help prevent soil loss that may otherwise occur.

The roots of trees found below the ground also help reduce the amount of dirt and debris that might reach the county's groundwater. As the water slowly soaks down through the root systems, the tree roots act as a filter much like a coffee filter. The loose soil and debris are trapped in the tree root systems and are kept from getting into the groundwater. Forests, in particular stream side forests, also trap and utilize excess nutrient in runoff.

Forests also clean the air by acting as an air filter. Oxygen that is breathed by humans and animals is created from trees and other plants through the process of photosynthesis. Photosynthesis is a natural process that occurs when trees breathe in carbon dioxide in the air and breathe out oxygen. Forests are home to many different types of animals and insects. The forests provide many different types of animal homes such as a tree limb for a bird nest, tree trunks for squirrels, hollows for rabbits, dens for

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raccoons, and decaying logs for snakes, ants and beetles. Forests also provide food such as berries, seeds, nuts, and leaves, and nesting sites for wildlife.

Forests also provide the natural beauty of the county. The forests are an important part of the county's rural character. Historically, the county's forests have been hunted and combed by the Native American Indians for thousands of years, and later by colonial settlers. Presently, the forests provide a good place for recreation such as nature appreciation, bird-watching, hiking and hunting.

The economic value of the forests in Charles City County is noteworthy. Nearly all the forested land in the county is capable of producing quality trees of commercial value. Forest management assistance for private landowners is available to all the residents of Charles City County through the Virginia Department of Forestry.

To support the county's forestry industry, there are two stationary wood-using mills and another wood yard in the county. In addition, Weanac Inc. built a port on the James River that can be used to export forest products.

### **Resources**

The Virginia Department of Forestry (VDOF) has historically provided many forest management services for landowners ranging from outreach education to forest stewardship management plans. Recently, VDOF has begun a land conservation program in an important effort to conserve Virginia's forest land base. VDOF has identified forested areas throughout the state that offer relatively high conservation values as related to protecting water quality, providing wildlife habitat, or the production of forest products. Many localities are also making an effort to conserve their natural resources as well as their rural character, and are setting goals in their comprehensive plan to address these needs. VDOF can work with localities to identify these valuable forest lands and focus forest conservation efforts on these areas that will provide the greatest benefits.

Land conservation can be attained through a variety of tools such as land use taxation, agriculture-forestal districts, and in special cases conservation easements. In Virginia, easements can be donated, or sometimes sold to a number of public and private entities. In addition to the Department of Forestry, other state agency conservation easement holders include the Virginia Outdoors Foundation (VOF), the Department of Conservation and Recreation (DCR), the Department of Game and Inland Fisheries (DGIF), and the Department of Historic Resources (DHR). Easements may also be held by certain qualified nonprofit conservation organizations.

### AGRICULTURAL LAND

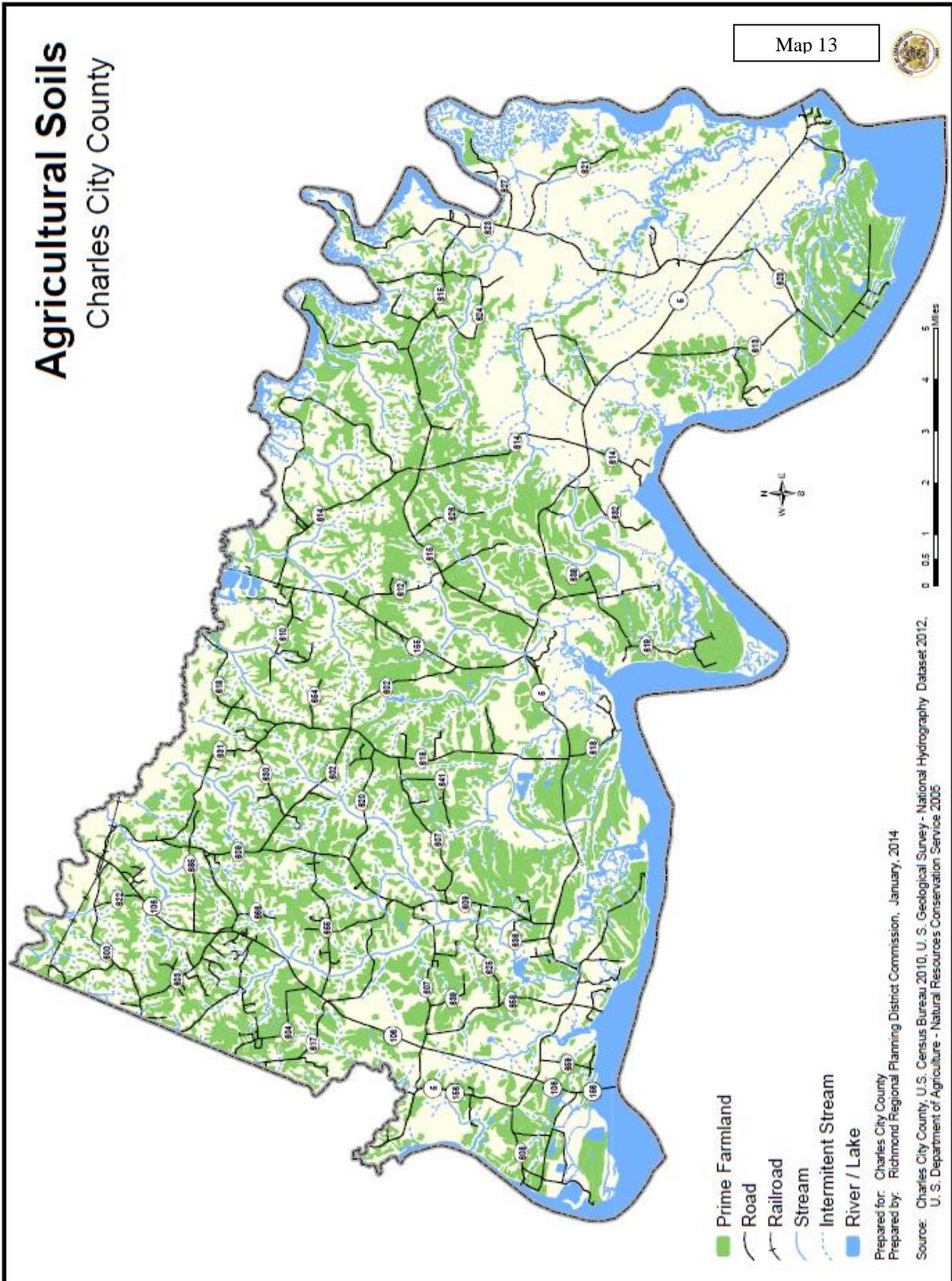
According to U.S. Department of Agriculture (USDA) as reported in the 2002 census data, there are 27,489 acres, or about 24 percent, of land used for farming in Charles City County. Generally, the amount of land available for farming in the county is getting smaller each passing year. The far eastern portion of the county contains the fewest acres of farmland, with the rest of the county's farmland being evenly distributed throughout the remainder of the county to the west. The county's farmland significantly contributes to the county's healthy economy.

#### Prime Agricultural Land

It is important to identify prime farmland within the county to ensure that this land is promoted for use as a farm. **Map 13** identifies the location of prime agricultural lands in the county. The U.S. Department of Agriculture has defined prime farmland soils as soils that are best suited to producing food, feed, and oilseed crops. In addition, prime soils are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season must be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland is determined by the characteristics of the soil. The characteristics include acceptable acidity or alkalinity level, few or no rocks, permeable to water and air, not excessively erodible or saturated with water for long periods, not flooded during the growing season, and the slope is relatively flat, ranging mainly from 0 to 6 percent. In addition, prime farm soils usually get an adequate and dependable supply of moisture from rain or irrigation, and the temperature and growing season are favorable. Soils that have a high water table may qualify as prime farmland soils if the limitation is overcome by good drainage. On-site evaluation is necessary to determine the effectiveness of drainage corrective measures.





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### WILDLIFE RESOURCES

Charles City County maintains a large forest cover. The county's forests are dominated by extensive loblolly pine plantations. The county also has elements of the typical Virginia Coastal Plain mixed hardwood forests. These upland forests include as dominant members the American beech (*Fagus grandifolia*), tulip tree or tulip popular (*Liriodendron tulipifera*). Also common to these forests are the white oak, northern red oak, mockernut hickory (*Carya tomentosa*) and sweet gum. Lowland forests in Charles City typically contain red maple, American hornbeam and willow oak. Typically, wetland areas in the county contain species such as the river birch, swamp tupelo, bald or pond cypress, green ash and swamp oak. One will also find common herbaceous understory plants such as the bay berry, dogwood, vine honeysuckle and fringe tree in both wetland and upland areas.

The county's forests, open agricultural fields, and wetlands provide excellent habitat value to game species such as the white tailed deer, wild turkey, fox and grey squirrel, eastern cottontail, bobwhite and mourning dove. Waterfowl of several species are also found. These include the wood duck, mallard, merganser and Canada goose. Also found in the county are other diverse species such as the red tailed hawk, eastern box turtle, Carolina wren, chickadee, barred owl, northern black racer, rough green snake and common bullfrog.



Within the streams and rivers of the county, fish species such as the largemouth bass, black and white crappie, perch, various sunfish species and catfish are common. Anadromous species such as the blueback herring and striped bass are also common in the appropriate season of the year. It is also not unusual to find the blue crab in the waters around Charles City County.



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### Rare, Endangered and Threatened Species

Rare species are plants and animals that, because of their low numbers or the scarcity of the habitat in which they live, are in danger of extinction. Endangered species are those in imminent danger of extinction throughout their range. Another category, threatened species, is for those that appear to be approaching endangered status.

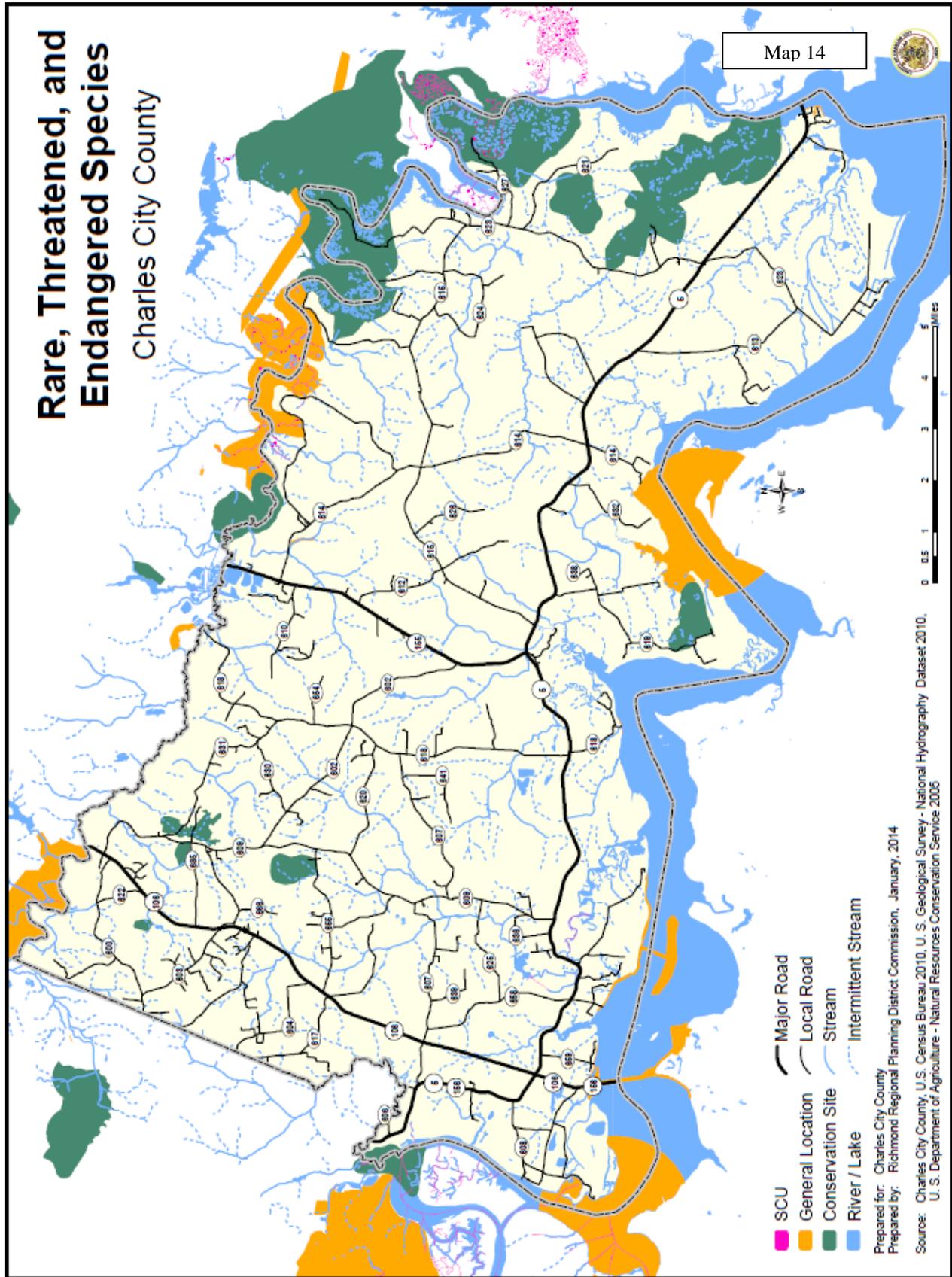
The extinction of many species of plants and animals has occurred through the ages from both natural and manmade causes. Climate changes, over competition from other species for habitat, and predation are examples of natural causes. Pollution, illegal hunting and changing landscapes due to urbanization are some examples of manmade causes that have accelerated the rate at which species are lost.



In Virginia, there are three agencies that oversee rare, endangered and threatened species. The Department of Game and Inland Fisheries (DGIF), under Title 29.1 of the *Code of Virginia*, has regulatory authority for all federally or state listed threatened or endangered wildlife, excluding insects. DGIF is mostly known for issuing hunting and fishing licenses and regulatory oversight of these sports. The Department of Agriculture and Consumer Services (DACCS), under Title 3.2 of the *Code of Virginia*, has regulatory and management authority over all federally or state listed endangered or threatened plants and insects. Both agencies are available to provide information and support to regional and local governments regarding land management issues and potential impacts on listed species.

In addition to the regulatory agencies, the Virginia Natural Heritage Program (VNHP) under the Virginia Department of Conservation and Recreation maintains a comprehensive listing of all rare, endangered and threatened species (plant, animal and insect) as well as a list of unique significant natural communities or geologic sites, and similar features of scientific interest.

**Map 14** shows those areas in Charles City County that contain rare and endangered species. This information on the general location of rare, endangered and threatened species and their habitats in the county was obtained from the VNHP. Some historic locations were found through the review of research literature by the VNHP. Those reported and historical rare, endangered and threatened species and habitats include: birds such as the bald eagle and peregrine falcon; plants such as *flexuose peatmoss*, trailing loosestrife, Nuttall's micranthemum, sensitive joint-vetch, New Jersey rush, Carolina fanwort, water-purslane, narrow-leaved spatterdock, spiral pondweed, Parker's pipewort, hazel dodder, round-leaved water-hyssop, tropical water-hyssop, Virginia least trillium; and, natural communities such as tidal bald cypress forest/woodland and tidal freshwater marsh.



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### Resources

The Department of Game and Inland Fisheries has a variety of programs supporting game and sport fish management, non-game and endangered species management, habitat restoration, and recreational access development and maintenance. In support of these responsibilities, the DGIF has developed a statewide computer database that contains thousands of records about wildlife and associated habitats. This database has been compiled from a number of sources, including field collection, museum records, and peer-reviewed scientific literature. Information sources include the Virginia Institute of Marine Science, Virginia Marine Science Museum, George Mason University, U.S. Fish and Wildlife Service, James Madison University, Christopher Newport University, College of William and Mary, Virginia Polytechnic Institute and State University, and naturalist Bill Portlock.

Anyone needing information about species distribution and ecology can contact the following sources:

### SPECIES DISTRIBUTION AND ECOLOGY:

Department of Game and Inland Fisheries  
<http://www.dgif.virginia.gov/>  
(804)367-1000

Department of Agriculture and Consumer Services  
<http://www.vdacs.virginia.gov/>  
(804)786-3515.

Department of Conservation and Recreation  
Natural Heritage Program  
<http://www.dcr.state.va.us/>  
(804)786-7951

Information about anadromous fish, waterfowl, and wildlife viewing areas can be obtained from the following sources:

### ANADROMOUS FISH:

George Mason University  
<http://www.gmu.edu>  
Biology Program  
Room 3005, David King Hall  
4400 University Drive, MSN 3E1  
Fairfax, VA 22030  
(109)993-1061

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Virginia Institute of Marine Science  
College of William and Mary  
School of Marine Science  
Gloucester Point, Virginia 23062  
<http://www.fisheries.vims.edu/>  
(804)642-7000 (7334)

Virginia Department of Game and Inland Fisheries  
<http://www.dgif.virginia.gov/>  
4010 West Broad Street  
Richmond, VA 23230  
(804)752-5503

### WATERFOWL:

Virginia Department of Game and Inland Fisheries  
<http://www.dgif.virginia.gov/>  
4010 West Broad Street  
Richmond, VA 23230  
(804)752-5503

U.S. Fish and Wildlife Service  
<http://www.fws.gov/chesapeakebay/>  
Chesapeake Bay Field Office  
177 Admiral Cochrane Drive  
Annapolis, Maryland 21401  
410-573-4560

Mr. Bill Portlock  
Chesapeake Bay Foundation  
23195 Mount Cloud Road  
Bowling Green, Virginia 22427  
(804)633-7249

### WILDLIFE VIEWING AREAS:

Responsive Management  
130 Franklin Street  
Harrisonburg, Virginia 22801  
(540)432-1888

Virginia Wildlife Viewing Guides  
[http://gorp.away.com/gorp/activity/wildlife/wild\\_va.htm](http://gorp.away.com/gorp/activity/wildlife/wild_va.htm)