Environment

The natural features of the town and its physiographic location not only make it an attractive place to live and work, they also impact how and where the town develops and can be informative with regard to emergency response or hazard mitigation planning. The activities of people within the town have an impact on the environment not only within the town, but also within the region and state-wide. Knowledge of the town's environment will enable decision-makers to take proper steps for its protection, preservation and enhancement, keeping the town healthy and pleasant for residents and visitors alike.

Figure 1. Winter at Coiner's Pond (photo courtesy of Jeff Poole, 2006).

Natural Town Features

Climate

Warm, humid summers and mild winters generally characterize the climate of Gordonsville, which is located in the Piedmont climate region of the state. The Atlantic Ocean and Chesapeake Bay to the east and the Blue Ridge Mountains to the west help to control the climate in the area. Weather patterns generally flow from west to east; occasionally storms form off the coast of Virginia, bringing precipitation to the area from the northeast. Summer storms are generally mild; however, the number of severe storms that produce strong winds, heavy rain, hail and occasional tornadic activity has increased in recent years.

The average rainfall for the Gordonsville area is 43 inches per year, with an average of 2 - 4 inches per month. The average winter snowfall is 19 inches per year, averaged over the previous five-year period.

The earliest freeze is usually before the end of October and the latest is the end of April. The average spring temperature is highs in the 60's with lows around 40°. The average high temperature of the summer is 88°-96°; in the fall, temperatures range from the 50's to the low 70's. Winter temperatures range from 30° to 46°. Temperatures lower than 15° or higher than 95° are unusual.

The growing season generally lasts approximately 210 days and occurs between the last spring freeze in late April and the first fall freeze in early November. However, because of the mild climate, gardening and other outdoor activities generally occur year-round.

Forests

There are few forested tracts within the Gordonsville corporate limits. Most streets in town are trellised and there are old-growth trees in private yards. In recent years, additional trees have been added to the streetscapes of Gordonsville through donation of private funds.

Hydrology

Gordonsville is situated within the York River watershed, the northern boundary of which runs from Cowherd Mountain east to the ridge north of Cameron Mountain, and on to Merry Mountain. Cameron Mountain is completely within the York River watershed; streams within the watershed flow generally from northwest to southeast toward the Chesapeake Bay.

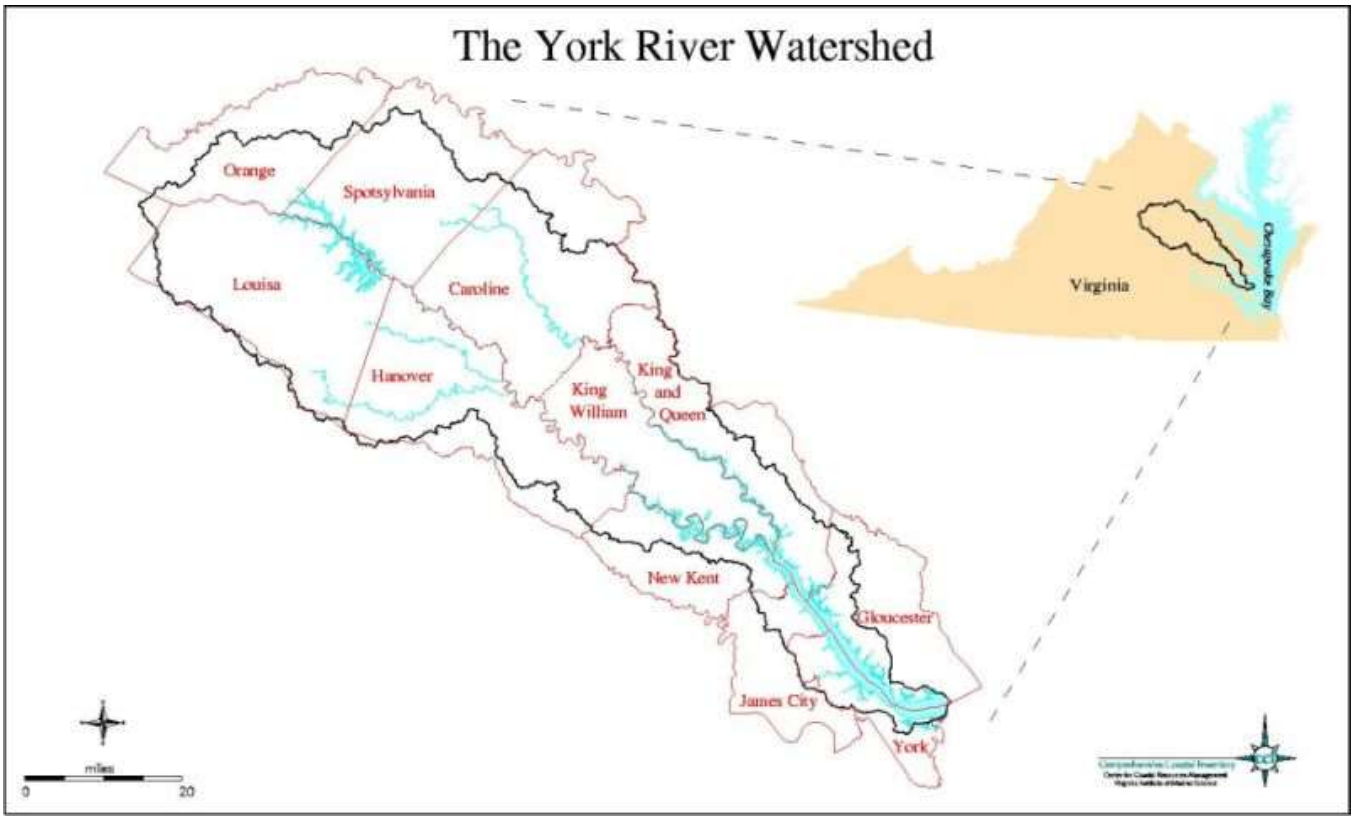


Figure 2. York River Watershed. Map Source: Center for Coastal Resources Management, York River Watershed Map Gallery, 2000. Comprehensive Coastal Inventory Program, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia, 23062.

Within Town, a fall line that generally follows Main Street and Routes 15 and 33 splits drainage of surface water within the watershed. This causes surface water within the town to flow either southwest to the South Anna River or southeast to the North Anna River, both of which flow into the Pamunkey River, then the York River, and eventually into the Chesapeake Bay.

Floodplain

The South Anna River and Mountain Run, as well as some low spots within the Town, occasionally flood. Secondary and tertiary streams rarely flood. The photos below show the approximate location of those areas within the Town that are within the 100-year floodplain as defined by the Federal Emergency Management Agency (FEMA).

East Baker Street and Linney Street

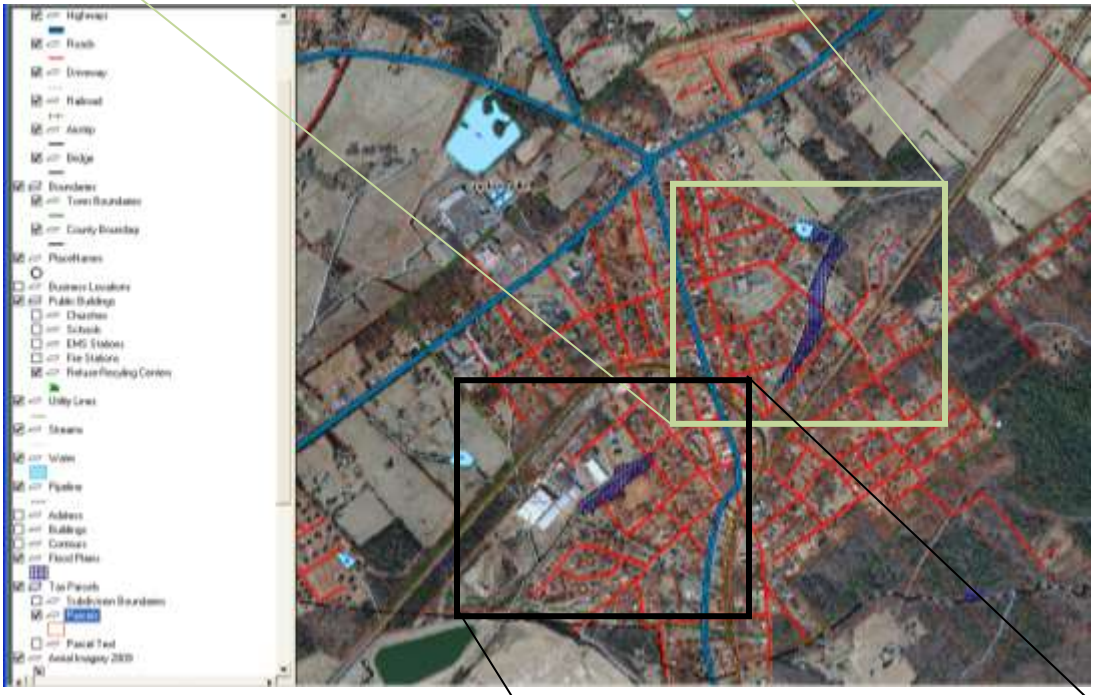
Town of Gordonsville
Floodplain Locations

Showing areas located within the 100-year Floodplain

Map Source: MSAG Data Consultants, Inc., 2012.

Floodplain boundaries are approximate according to the Federal Emergency Management Agency (FEMA).

Not to scale.



Orange Avenue in proximity to Green Applications

The areas of floodplain within the town as shown are located generally along intermittent streams or low-lying drainage swales that traverse the town; some structures and roadways are located within these areas.

Current town ordinances prohibit the building of new structures within the 100-year floodplain so as not to increase the level of

flooding in those areas. Often, flooding within the town is the result of storm water runoff that has no place to outlet quickly. Low-lying areas and areas of drainage within the town are more susceptible to flooding. These areas should be observed during significant rain events to determine what remedies are needed to reduce flooding through better storm water management and improved drainage.

Topography (slope)

Slope refers to the steepness of the land, which can be a constraint on land use suitability for development. It is measured as rise (or change in elevation per hundred feet) over run (horizontal distance) and is expressed as a percentage. The greater the percentage of slope, the steeper the land in question. The following is a breakdown of slopes and their corresponding land characteristics:

0% to 3%	Flat Land
3% to 10%	Rolling
10% to 25%	Hillside
25% and above	Steep, Critical Slope

The Gordonsville area lies in the Piedmont Plateau physiographical province at the foot of the Blue Ridge Province and is characterized by gently rolling terrain with elevations ranging from 400 to 600 feet, with some ridges surrounding town rising 800 to 1200 feet above sea level. The few critical slopes located within the Gordonsville area are along stream banks and to the north of Town along the ridge from Cameron Mountain. The town itself is generally flat with elevations ranging from 480 to 540 feet above sea level.

Soils

Surface and subsurface soil can greatly affect the form and structure of a development by imposing engineering limitations or restrictions on construction. Developers should consider soils and their specific characteristics as they design their projects. Soil associations as mentioned here are extremely general and useful as an overview; however, this level of information is not suitable for specific site planning and an engineer should be consulted for specific project design.

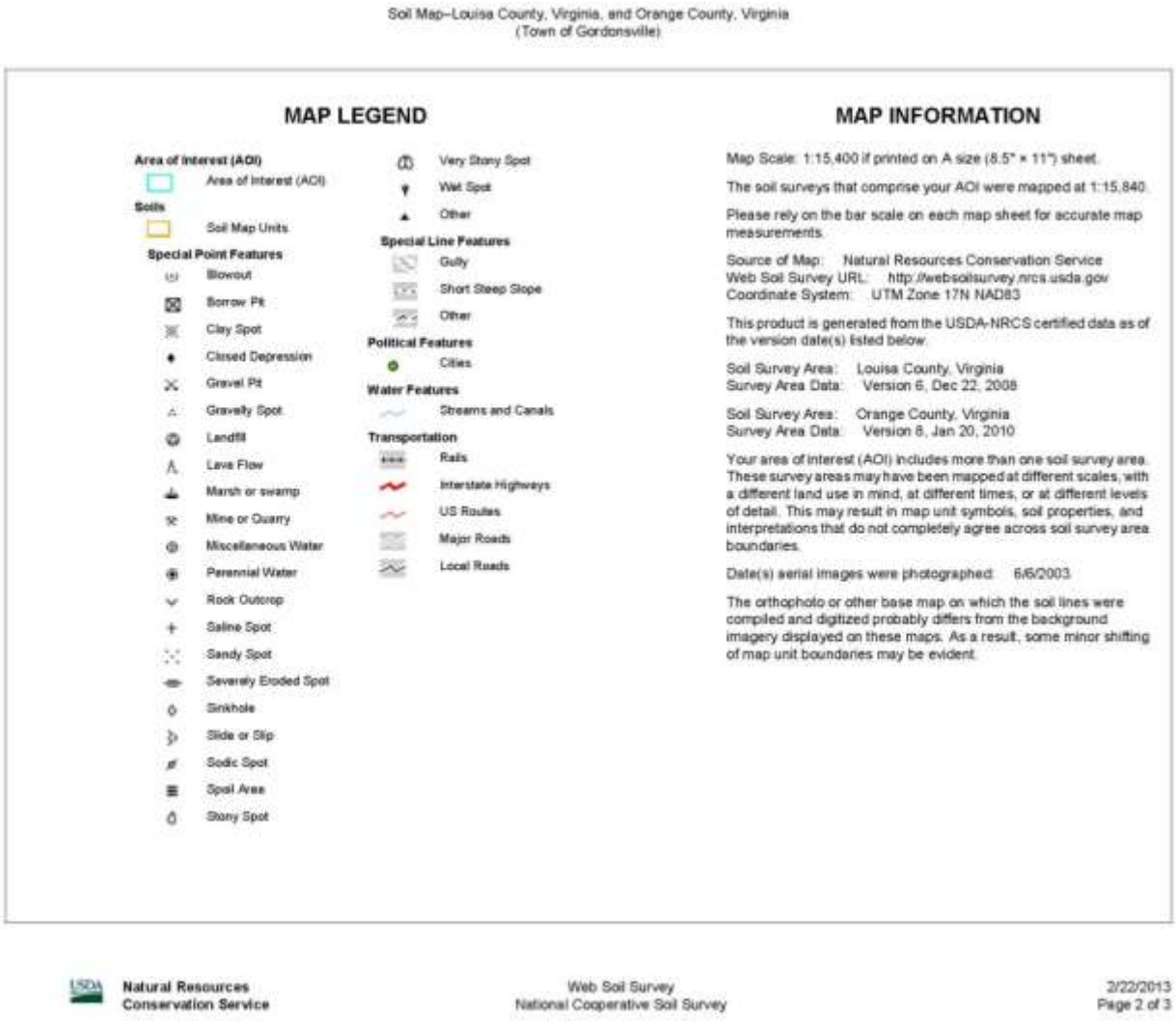
Within the Town of Gordonsville there are the Masada-Turbeville and the Nason-Tatum-Manteo soil associations. Within these associations are roughly fifteen soil types as identified by the U.S. Department of Agriculture. The following table outlines the restrictions and limitations that each type characteristically imposes on development.

Soil Types within the Town of Gordonsville			
	Degree of restriction for:		
Type	Septic	Building 3+ stories	Streets-Parks
NsB2 (Nason)	moderate	slight	moderate
NsC2 (Nason)	moderate	moderate	severe
LgB (Lignum)	severe	severe	moderate
OgA (Orange)	severe	moderate	moderate

YoB (York)	severe	moderate	moderate
WoB (Worshan)	severe	severe	severe
SeB (Seneca)	moderate	moderate	moderate
TuB2 (Turbeville)	moderate	slight	moderate
Eb (Elbert)	severe	severe	moderate
MsB2 (Masada)	moderate	slight	moderate
LIB2 (Lloyd)	moderate	slight	moderate
TsB2 (Tatum)	moderate	slight	moderate
DdE3 (Davidson)	slight	slight	moderate
DaB2 (Davidson)	slight	moderate	slight

The map below shows the general location of each soil type.


Soil Map—Louisa County, Virginia, and Orange County, Virginia
(Town of Gordonsville)
Map Scale: 1:15,400 if printed on A size (8.5" x 11") sheet.
Meters
0 100 200 400 600
Feet
0 500 1,000 2,000 3,000
N
USDA Natural Resources Conservation Service
Web Soil Survey
National Cooperative Soil Survey
2/22/2013
Page 1 of 3



Generally speaking, most areas in town have soils with a limited suitability for dwellings with basements. Specifically, areas along drainage swales or creeks within town have a very limited suitability for these dwelling types. Likewise, most areas in town have soils that are somewhat limited for the location of small commercial buildings; those areas that have soils that are very limited with regard to the location of small commercial buildings are concentrated in the northeastern area of town around Linney Street, Knighting Road and Cadmus Drive; as well as along low-lying drainage swales or creeks.

With regard to the development of local streets and roads, soils throughout most of the town are very limited in their suitability such that new road construction may require the import of soils that are highly compactable to create an adequate road base for construction.

Geology

How rock formations exist under the ground, or the geology of an area, affects how the land above

may be used. Gordonsville is situated on three geologic formations: The Metagraywacke, the Everona, and the Candler. Generally, all three formations run from the southwest to the northeast.

The Metagraywacke formation is situated along the northwestern and southeastern boundaries of the town *(Information about this particular formation is not available at the level of detail provided for the Candler and Everona formations as written below).*

The Candler formation is a very tight rock with few fractures, making ground water difficult to find. The Candler formation is usually covered with thin soil which is poor for both septic field and agricultural uses. Most of the area within the town is situated on this formation.

The Everona formation extends approximately one hundred and twenty miles northeastward from southern Albemarle County and Louisa County's northwest corner, and continues through Orange, Culpeper, Fauquier and Loudoun Counties to the Potomac River. In the Gordonsville area, it is characterized by pink and gray marble limestone. At the Gordonsville Quarry, located approximately one-mile southwest of Gordonsville and one-half mile east of State Route 231. the rock is 1,100 feet thick. Five miles northeast of Gordonsville, that thickness decreases to two hundred feet. The metamorphosed marble is an excellent supply of ground water, yielding up to 150 gallons per minute. However, when the water is a part of the roof support and the water level is lowered, land subsidence and sinkholes can occur, creating the potential for rapid contamination of groundwater resources. Fortunately, exposure in this regard is limited because the formation in this area is steeply inclined, making it the most unique geologic formation east of the Blue Ridge Mountains.

Figure 3. Geologic Formations at Gordonsville. Source data: USGS, Geologic Map of Virginia; April 24, 2012.

The illustration above shows the approximate location of the geologic formations that underlay the Town of Gordonsville.

Seismology

The Town of Gordonsville is located just north of the Central Virginia Seismic Zone (see map below), an area within central Virginia where underground bedrock forms multiple faults and fissures that periodically move, causing minor tremors and an occasional earthquake to occur within the region.

Generally speaking, one does not associate the Gordonsville area or the central Piedmont region with earthquakes. Yet, on August 23, 2011, a 5.8 magnitude quake shook the area, the largest earthquake to be recorded with seismometers in Virginia. With an epicenter located five miles southwest of Mineral, Virginia, the quake was felt as far away as Georgia in the southern United States and regions of Canada to the north, prompting the USGS to report the earthquake as the most widespread in U.S. history[1]. While homes and structures within the Town of Gordonsville experienced only minor shaking or damage, other places within the region were not as fortunate. Structures in downtown Culpeper collapsed, and Louisa County High School was damaged beyond repair, closing the school indefinitely.

Information from the United States Geological Survey website provides the following explanation for earthquakes in central Virginia:

"…Earthquakes everywhere occur on faults within bedrock, usually several miles deep. Most bedrock beneath central Virginia was assembled as continents collided to form a supercontinent about 500-300 million years ago, raising the Appalachian Mountains. Most of the rest of the bedrock formed when the supercontinent drifted apart about 200 million years ago to form what are now the northeastern U.S., the Atlantic Ocean, and Europe.

…The Central Virginia seismic zone is far from the nearest plate boundaries, which are in the center of the Atlantic Ocean and in the Caribbean Sea. The seismic zone is laced with known faults but numerous smaller or deeply buried faults remain undetected. Even the known faults are poorly located at earthquake depths. Accordingly, few, if any, earthquakes in the seismic zone can be linked to named faults. It is difficult to determine if a known fault is still active and could slip and cause an earthquake. As in most other areas east of the Rockies, the best guide to earthquake hazards in the seismic zone is the earthquakes themselves." [2]

[1] Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, "August 23, 2011 1:51pm; 5.8 Magnitude Earthquake"; http://www.dmme.virginia.gov/DMR3/va_5.8_earthquake.shtml, April 24, 2012.

[2] United States Geological Survey; Magnitude 3.9 Virginia Preliminary Earthquake Report; May 5, 2003; http://neic.usgs.gov/neis/eq_depot/2003/eq_030505/; April 24, 2012.

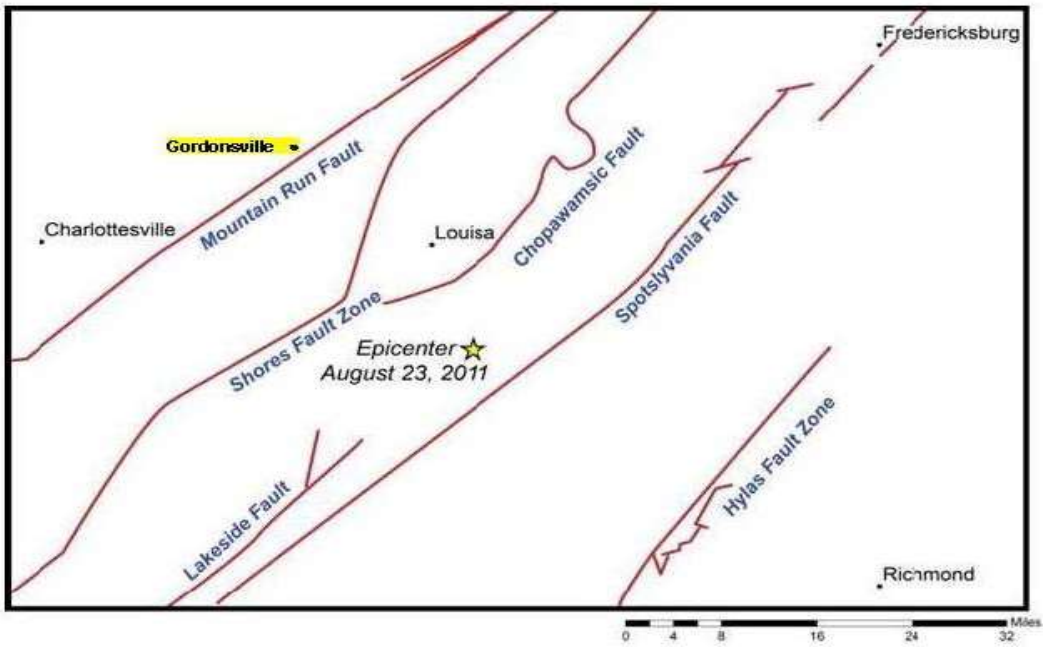


Figure 4. Generalized Geologic Fault Map of Central Virginia. Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, "August 23, 2011 1:51pm; 5.8 Magnitude Earthquake"; http://www.dmme.virginia.gov/DMR3/va_5.8_earthquake.shtml, April 24, 2012.

The map above shows the approximate location of Gordonsville in relation to known faults in the area. Mountain Run Fault is generally located along the southeastern boundary of the town.

In the months following the August 23, 2011 earthquake, multiple aftershocks occurred, with the strongest aftershock taking place two days after the initial earthquake and registering 4.5 on the Richter scale. While seismic activity goes mostly unnoticed in this area, being mindful that it is occurring is important in the context of planning for future growth and development, as well as emergency response and hazard mitigation.

Environmental Stewardship

Erosion and Sediment Control and Storm Water Management

Currently, monitoring of land disturbance activity and storm water management in the town is handled through the Orange County Department of Community Development. Specifically, permits for land disturbance are issued and inspections of active construction sites are conducted by the County. Erosion and sediment control plans are reviewed by the Culpeper Soil and Water Conservation District. As part of this plan review, anticipated increases in storm water are evaluated to ensure that adequate measures are put in place during construction to minimize the amount of storm water that may run off the project site during significant rain events, thus reducing the potential of polluting or physically damaging downstream water features.

Urban storm water runoff (runoff that occurs from streets and other features of the built environment) is known to be a significant source of surface water pollution and is one of the major contributors to the polluting of the Chesapeake Bay. Historically, storm water management for most of the state has been locally addressed through the development, review and

implementation of erosion and sediment control plans. In 2012, the state mandated that all localities develop and manage their own separate storm water management programs by July 2014. This mandate is being monitored by the town and it is hoped that the county will expand its current role of monitoring erosion and sediment control to take on the additional storm water management duties for the town.

Chesapeake Bay TMDL and Watershed Implementation Plan

The Chesapeake Bay Total Maximum Daily Load (TMDL) was prepared by the Environmental Protection Agency to ensure that all pollution control measures needed to fully restore the Bay and its tidal rivers are in place by 2025. This plan was prompted by insufficient progress of restoration efforts and continued poor water quality in the wake of the Chesapeake Bay 2000 effort and focuses on reducing nitrogen, phosphorus and sediment throughout the Bay watershed.

As part of the Bay TMDL, each of the six states within the Chesapeake Bay watershed are required to develop an implementation plan for reaching the pollution reduction goals set forth in that initiative. Virginia's response was the development of a Watershed Implementation Plan, phase I of which was provided to the EPA in November 2010 and approved by EPA with modification in December 2010. This plan set forth how the state would meet the pollution reduction goals called for in the Bay TMDL.

As a follow-up to the Phase I plan, the state prepared a Phase II plan that extended the reduction goals established for large watersheds to the local government level. The draft of the Phase II plan was sent to localities in June 2011 for review with a request that comment be provided to the state by October 1, 2011. Specifically, localities were asked to:

- Review and revise the state's current inventory of Best Management Practices for our locality (the information for Gordonsville and Orange are included in the information for Orange County);
- Review and revise Best Management Practice implementation scenarios that the Virginia Department of Conservation and Recreation developed to fit local conditions for Phase I of the plan;
- Evaluate the Bay watershed model local land use data (on which the reduction strategies are based);
- Develop strategies for implementation of the recommended Best Management Practices; and
- Identify resources, authority and assistance needed for Best Management Practice implementation. For clarification, Best Management Practices are activities (such as rain gardens, green roofs, fingerprint clearing, stream fencing, reduction of impervious surfaces through additional landscaping or tree planting, etc.) that reduce impact on the environment from polluting activities such as storm water runoff, land disturbance during construction, etc.

Due to the compressed time frame and the complexity of the information to be reviewed from the state, however, the state offered localities the option to provide comment until February 1, 2012.

In December 2011, Town Council took action to forward the following comments to the state with respect to the Town's current and projected growth and strategies for implementing Best Management Practices in an effort to help the state meet the pollution reduction requirements of the Chesapeake Bay TMDL:

Current and future growth trends and land use
The population of the Town of Gordonsville decreased from 1,498 in 2000 to 1,496 in 2010. Because approximately 76% of the Town's land area is currently developed and the remaining 24% vacant land includes land unsuitable for residential development either due to property zoning or condition, it is not expected that the Town will experience population growth greater than 1-2% per year by 2025 unless its boundaries are expanded and the demand for housing within the Town increases significantly.

Land use within the Town is predominantly residential; approximately 20% of the Town's land area is comprised of streets and railroad right-of-way, 9% is commercial/industrial; 5% is institutional/public, and 24% is vacant. Based on historical development trends within the Town, it is not expected that there will be a significant shift in land use during the next 15 years. The Town is currently updating its comprehensive plan, which will include the creation of a future land use map to provide greater guidance for future growth within the Town.

Best Management Practice Implementation Strategies
The following activities will enable the Town to assist with Bay TMDL implementation:

Main Street Streetscape Plan. The Town is pursuing the development of a streetscape improvement plan for downtown that will reduce the amount of impervious surface through additional landscaping and tree planting along Main Street.

Comprehensive Plan Update. The Town is updating its comprehensive plan to include the encouragement of development practices that minimize land clearing and incorporate Low Impact Design features (rain gardens, grass swales, etc.) to more effectively manage storm water runoff. Strategies for impervious surface reduction and urban stream restoration may also be incorporated into the plan.

Low Impact Design retrofitting. Other best management practices that may be implemented by the Town include the incorporation of rain gardens and other storm water management features in those areas of Town where flooding occurs during significant rain events.

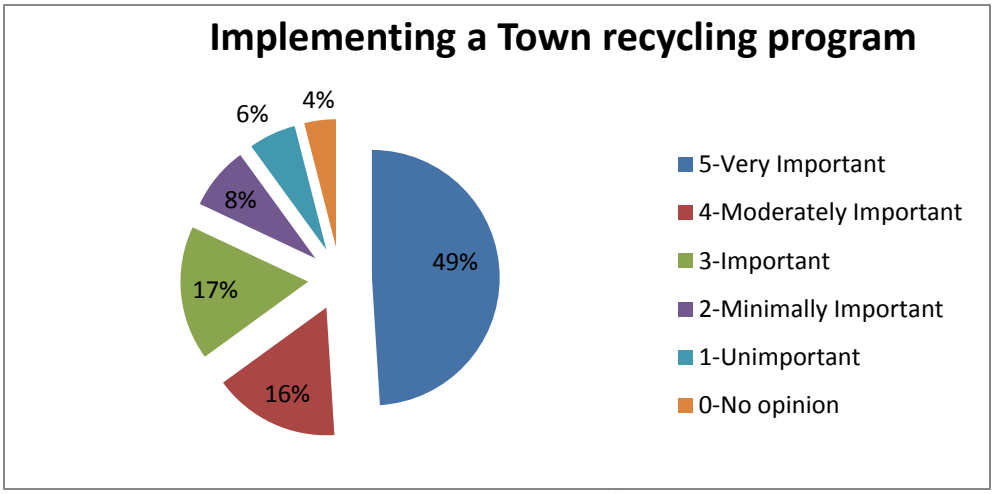
Journey Through Hallowed Ground Living Legacy Project. The Town intends to participate in the Journey Through Hallowed Ground Living Legacy project where trees memorializing soldiers killed during the Civil War will be planted at strategic locations throughout Town, thus increasing the Town's tree canopy for improved storm water management.

Culpeper Soil and Water Conservation District Watershed Implementation Grant. The Town has endorsed the project proposed by the Soil and Water Conservation District, which may include the Town's assistance in developing a pet waste reduction program.

The town has already undertaken activities that will help the state meet its pollution reduction requirements as mandated by the Federal government. In September 2011, the town provided a letter of support for the Culpeper Soil and Water Conservation District grant proposal to obtain funding for a watershed implementation grant project that would likely involve the town in a public information campaign regarding pet waste management. In March 2012, Town Council adopted a pet waste ordinance requiring pet owners to pick up after their pets during walks through town. Information about the new ordinance was posted on the town's website and also sent out to website subscribers to the Town Council agenda. In the spring of 2012, the town worked with the Department of Conservation and Recreation and the Culpeper Soil and Water Conservation District to develop brochures that help inform pet owners of their responsibility to pick up after their pets and the resulting impact that will have on the community.

Community Meeting and Survey Reponses

Town citizens clearly value the environment of the town. In the community survey, implementing a town recycling program was overwhelmingly supported by respondents--nearly 82% indicated doing so was important, moderately important or very important. These respondents noted that having a recycling program in town would reduce the waste going to the landfill, thus reducing landfill costs and saving the environment. The chart below illustrates the breakdown of responses regarding implementing recycling in the town:



During the Community Meetings, participants discussed the environment of the town and noted the following ideas to be pursued for its enhancement and protection:

- Clean out storm drains and control storm water runoff in Town; work with VDOT to improve street drainage
- Promote clean industry
- Work to establish a recycling program in Town
- Develop floodplain protections in Town ordinances
- Examine areas in Town prone to flooding to determine potential drainage solutions or improvements

Echoing the sentiments expressed in the community survey, working to establish a recycling program in town was noted at each of the three community meetings as an activity the town should pursue.

Environment Goal

The environment of the town will be protected, preserved and enhanced through efforts that improve water quality, reduce storm water runoff, increase landscaping and green space and minimize waste disposal in order to keep the town and surrounding areas healthy and pleasant for residents, visitors and future generations to enjoy.

Objective A. Preserve and protect water quality.	
A1.	*Educate citizens on the use of lawn fertilizers and alternative methods of lawn care and maintenance.*
A2.	*Review town ordinances to minimize the impact of development within known floodplain areas of the town.*
Objective B. Minimize the impact of land clearing and grading for new development.	
B1.	*Review the town's Land Development Ordinance and make revisions as needed to require lot development that minimizes environmental impact through minimal land clearing and preservation of existing site topography.*
Objective C. Preserve and enhance the tree canopy within town.	
C1.	*Participate in the Journey Through Hallowed Ground Living Legacy project where trees memorializing soldiers killed during the Civil War will be planted at strategic locations throughout Town, thus increasing the Town's tree canopy.*
C2.	*Develop a tree planting/tree replacement program to maintain and enhance the tree canopy in town.*
Objective D. Encourage clean businesses to locate in the town.	
D1.	*Work with the Orange County Department of Economic Development to bring industries and businesses to the Town that have minimal impact on the environment.*
Objective E. Reduce town waste that is disposed of in the Orange County landfill.	
E1.	*Implement a town-wide recycling program to reduce the amount of waste disposed of in the landfill.*
E2.	*Encourage citizens to engage in other waste-reduction activities, such as back-yard composting and participating in county-wide hazardous waste and electronic recycling collection events.*
Objective F. Educate citizens about the proximity of the town to the Central Virginia Seismic zone and the Mountain Run fault.	
F1.	*Provide town citizens with information regarding earthquake preparedness through the town's website and other information outlets.*
Objective G. As much as is practicable, assist the State of Virginia with meeting its Chesapeake Bay pollution reduction goals.	
G1.	*Work with VDOT to develop complementary storm water management programs to support cost-effective achievement of local and State TMDL goals.*

G2.	*Work with the Culpeper Soil and Water Conservation District and the Virginia Department of Conservation and Recreation to secure funding as needed for impervious surface reduction, LID technique implementation, etc.*
Objective H. Effectively manage stormwater runoff.	
H1.	*Inventory those areas of town where flooding occurs during significant rain events and develop a plan for improving street drainage, incorporating rain gardens and other storm water management features or drainage improvements in those areas.*
H2.	*Reduce the amount of impervious surface in town through landscaping and tree planting along Main Street and other areas.*
H3.	*Establish impervious cover limits or open space requirements for new development to better manage storm water runoff.*
H4.	*Incorporate Low Impact Development (LID) techniques in the town's development standards manual.*
H5.	*Review and amend, as needed, the Land Development Ordinance to address landscaping, tree canopy requirements and parking requirements to ensure they require best management practices that better manage storm water runoff.*

Several of the tasks listed above are modeled after implementation strategies listed in Phase II of the Chesapeake Bay Watershed Implementation Plan.