

## **CHAPTER 4: THE NATURAL ENVIRONMENT**

### **ENVIRONMENTAL GOALS**

The primary goals for preserving the best of the existing natural environment and enhancing it where possible are found below:

- *Identify and preserve those natural and scenic resources that characterize the City.*
- *Preserve the points of highest elevation.*
- *Preserve drainage channels and runs in the Urban Growth Area.*
- *Increase the forest cover of the watershed within the Urban Growth Area*

The City of Charles Town lies in the middle of a rolling limestone valley of Jefferson County, West Virginia at an average elevation of 540 feet above sea level. Jefferson County is in an area referred to as the Eastern Panhandle of West Virginia. The Great Limestone Valley as it is known is mostly rolling and is underlain by folded limestone and a small amount of acid shale.

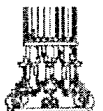
There are many small streams that form a trellis-like drainage pattern moving in a generally south and east direction to the Shenandoah River. The Shenandoah River itself flows north to the Potomac River. However, much of the drainage is through solution channels in the underlying limestone. The land is ideally suited for farming.

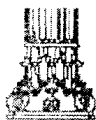
### ***Climate***

The City is located at latitude 39.28 N, 77.86 W and the area has a “continental” type of climate characterized by large seasonal temperature contrasts, which are tempered slightly by a marine influence when the wind is from the east and south. Basic climatic data is found below.

Table 4.1  
**Basic Climate Data**

Average Daily Max. Temperature:	67.1 deg.
Average Daily Min. Temperature:	43.4 deg.
Average Annual Precipitation:	39.89 inches
• 1 yr in 10 will have less than	37.5 inches
• 1 yr in 10 will have more than	50.5 inches
Average Seasonal Snowfall:	20-25 inches





Average Number of Days of Snow > 1"	36 days
Average Length of Frost-free Days:	164
USDA Plant Hardiness Zone	6b

### ***Geology and Hydrology***

The Charles Town Urban Growth Boundary (UGB) sets over carbonate (Limestone and Dolomite) bedrock that contains solution channels. These solution channels are the primary way precipitation gets into the water table. Water percolating into and through the carbonate rock dissolves rock materials and enlarges minute fractures in the rock. This has produced a "karst" geology formation containing caves sinkholes, springs, disappearing or "losing" streams, and underground streams.

One such cave is located in downtown Charles Town and is approximately 300 yards long, of indeterminate width and in places as much as 29 feet high. This karst geology has great implications for building development. While farming with it is mainly an occasional nuisance, building development is impacted in the following ways:

1. It may require special foundations for large and heavy structures such as water storage tanks.
2. It should require special geotechnical exploration when locating large facilities such as schools, hospitals, community buildings, and other institutions. Ground penetrating radar, seismic techniques, and exploratory drilling are a few of the techniques currently used.
3. Storm water ponds using infiltration techniques may increase sinkhole occurrence.
4. Surface water pollution from paved areas may reach ground water more directly.
5. Land development may change drainage patterns and reduce needed stream recharge.

### ***Rivers and Streams***

The area around Charles Town contains the headwaters of several perennial streams, such as Evitts Run, Cattail Run, and Bullskin Run. These small creeks or "runs" flow west to east and discharge into the Shenandoah River, a major tributary of the Potomac River. Like most tributaries to the Potomac River in West Virginia, the Shenandoah flows from south to north finally discharging into the Potomac at Harpers Ferry.

The Shenandoah River with a drainage area of 3,022 square miles has an average daily flow of 321 million gallons per day with historical highs and lows of 2.3 billion and 40 million gallons per day respectively. Approximately six miles from the Shenandoah's confluence with the Potomac River, Charles Town takes about one million gallons per day for drinking water. This is Charles Town's sole source of water.

### ***Groundwater***

Although Charles Town derives its drinking water from the Shenandoah River, conserving the quality of the groundwater should be a primary goal. Groundwater under the Charles Town UGB fluctuates seasonally by as much as 32 feet annually.

### ***Topography***

Within the UGB of Charles Town, the topography is gently rolling with three major drainage basins. Evitts Run, Cattail Run, and Bullskin Run form three sub-watersheds of the





Shenandoah River. Surface water and ground water all flow towards the river in the Charles Town area.

The high and low points of the area run from 220 feet above sea level at the Shenandoah River to approximately 560 feet in the western portion of the UGB. Significant high points are rare.

Because of two hundred years of farming, the wooded areas that remain are small and widely scattered.

**Wetlands**

The Altona Marsh is a well-known wetland, a part of the Evitts Run watershed and located near the headwaters of Evitts Run. This is a unique wetland that is currently preserved by its location on a working farm next to the CSX railroad track in the northwest portion of the UGB. It is important for the rare type of wetland that it is, as well as being the home to several species of rare plants, including some unique to this wetland. Although in private ownership, Evitts Run Spring on the west side of Charles Town was the source of water for the Town up until the late 20<sup>th</sup> century.

Other wetlands occur along the named streams within the UGB and at scattered springheads.

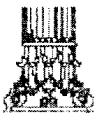
**Riparian Buffers**

A riparian buffer is land next to streams, wetlands, drainage channels that is managed for perennial vegetation (grass, shrubs, and/or trees) to enhance and protect aquatic resources from adverse impacts of agriculture or land development practices. Much of the existing natural cover has been removed since colonial times within Jefferson County. The replacement of riparian buffers would:

- Stabilize eroding banks
- Filter sediment from agriculture land runoff
- Filter nutrients, pesticides, and other water carried pollutants from man-made development
- Provide shade, shelter, and food for aquatic organisms
- Provide wildlife habitat

The size of the riparian buffer (essentially the width as it parallels the water body outline) is determined by the benefits that are sought or the problems to be solved. There should be a minimum width, with the Planning Commission determining adjustments to that width on a case-by-case basis during the review of a proposed project. Suggested widths based on the U.S. Department of Agriculture publication "Agriforestry Notes" are the following:

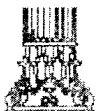
- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Stabilize bank erosion</li> <li>• Filter sediment and sediment attached contaminants</li> </ul>     | <p>Width of the bank depending on severity</p> <p>25-30 feet for slopes &lt; 15%</p> <p>Greater width for slopes &gt; 15% (enough to hold shrubs and trees adequately)</p> |
| <ul style="list-style-type: none"> <li>• Filter soluble nutrients and Pesticides</li> <li>• Provide shade, shelter, and shade and</li> </ul> | <p>Up to 100 feet depending on slope</p> <p>Up to 100 feet wide depending on need for</p>  |





- food for aquatic organisms
- Wildlife habitat

45 feet to promote upland game birds  
Less width if used as travel corridor  
between habitat areas.





### **NATURAL ENVIRONMENT RECOMMENDATIONS**

1. Preserve topographic high points for public use (such as water storage facilities and observation points).
2. Preserve streams (as shown on USGS maps) by establishing wide buffers at least 25 feet from the stream bank. Use the buffer area as a receiving location for tree planting programs.
3. Preserve or replant along intermittent streams (as shown by USGS maps) by establishing buffers at least 25 feet in width along the drainage way. Use these areas as receiving areas for a tree reforestation program.
4. Minimize drainage to be handled by piping or channeling.
5. Preserve wetlands or if impacted, replace at a ratio of one to one (for every 1 square foot of wetland lost, replace with 2 square foot of man-made wetland).
6. Establish forest conservation/reforestation ordinance for subdivision regulations and site plan requirements.
7. Encourage the use of Low Impact Design as a Best Management Practice (BMP) for storm drainage and storm water management.
8. Secure access to the Shenandoah River for future public uses.

