

CHAPTER 3 NATURAL FACTORS AFFECTING DEVELOPMENT

INTRODUCTION

The natural environment often dictates the pattern of land use or development in a community. The climate, air and water quality, topography, drainage and flooding, and soils are significant natural factors which affect development. Ignoring these factors can prove to be extremely costly to specific property owners as well as the entire community. Not all land is suitable for development. Therefore, as land use development occurs, natural factors, which cannot be altered, must be considered in the plans for development. The limits and type of land use should be responsive to the natural factors in order to protect the welfare of the general populace. Through increased knowledge of these natural factors and the appropriate use of land, future development can avoid the mistakes of the past. The purpose of this chapter is to review and evaluate the natural factors influencing the land use patterns in Greeneville and its identified projected growth area.

CLIMATE

The climate of Greeneville and Greene County is described as humid-sub-tropical, characterized by relatively mild winters and warm summers. Although Greeneville is located well inland, it lies in the path of cold air moving southward from Canada and warm moist air currents moving northward from the Gulf of Mexico. These alternating currents frequently bring sharp daily changes and are chiefly responsible for seasonal variations.

The average daily temperature is 63 degrees, with an average high temperature for January of 39 degrees and an average low temperature for July of 78 degrees. The average growing season is approximately 188 days, extending from April 16, the average date of the last killing frost, to October 21, the average date of the first frost.

The yearly rainfall amounts are normally abundant for this area. It is heavier in winter and in spring because of frequent flows of moist air from the south. In late spring and early summer, secondary seasonal periods of precipitation occurs in the form of local showers and thunderstorms. Precipitation is generally lightest late summer and early fall.

While there are periods of dry weather, they are usually offset by periods of abundant rainfall. Precipitation averages approximately 41 inches with a low of 2.4 inches in October to a high of 4.6 inches in March. Precipitation for recent years has been below normal.

Findings: The impact of climate on the development of Greeneville can best be described as moderate. In general, climate has very little effect on development in the Town.

AIR QUALITY AND WATER RESOURCES

At present, the air and water quality in the Greeneville area is considered relatively good. Currently, according to the Environmental Protection Agency (EPA), Greene County is located in an attainment air quality area, which is defined by EPA as meeting or doing better than the national primary or secondary ambient air quality standard for the pollutant. According to the First Tennessee Development District's Director of Environmental Programs, Greene County is projected to remain an attainment air quality area when EPA issues their revised final designations no later than March, 2010. An abundance of open space and a lack of highly urbanized areas are conducive to the maintenance of the purity of the air.

The primary water source for the Town of Greeneville is the Nolichucky River. According to the latest information provided by the Tennessee Department of Environment and Conservation, the Town of Greeneville is under no moratoriums due to water and wastewater treatment problems. The municipality has a National Pollutant Discharge Elimination System (NPDES) permit for discharging its treated wastewater into the Nolichucky River.

Findings: There are no air quality or water resource quality problems which would directly affect the future land in Greeneville and its projected growth area.

TOPOGRAPHY

Topography is defined as the general configuration of the earth's surface, including its slope, geological characteristics, and other natural features. About four-fifths of Greene County is in the Great Valley with the Southeastern quarter of the county in the Appalachian Upland. Greeneville is located in the Great Valley portion of the county. The Great Valley is further divided into three subdivisions. Greeneville is located in subdivisions two and three of the Great Valley. The second subdivision, commonly known as the Slate Hills, is a broad area underlain by calcareous shale. Much of this section consists of hilly to steep ridgelines and narrow valley floors. Some areas of the upland area are undulating to rolling. The relief within this belt ranges from 50 to 300 feet, and the predominant soils are shallow. The third subdivision consists of a steep, rugged ridge known as Bays Mountains. It consists of shales and sandstones interbedded with spaced strata of limestone. The ridge is capped in many places by light-gray, massive acid sandstone. The crest of the ridge is 1,300 to 3,118 feet above sea level and rises as much as 1,200 feet above the adjacent shale belt.

Slope is a major topographic consideration impacting the developmental potential of sites. It affects access, erosion potential, and soil capabilities. The rate of erosion increases exponentially with increases in the degree of slope. In areas of greater than 15 percent slope, limitations to development area are significant, and development should occur only with the proper safeguards, based on professional engineering principles and practices. U.S. Highway 11-E runs through Greeneville from Washington County to the Hawkins County line. Most of Greeneville is gently rolling with some rolling hills and moderately steep slopes. Steep slopes impact the development potential of some scattered areas as shown on Illustration 3, which shows the topography of the Town.

Findings: The topography in Greeneville is diverse, ranging from gently rolling land to some scattered areas with steep slopes. Historically, development has occurred primarily on flat to moderately hilly portions of the municipality. Only scattered areas of steep slopes limit the development potential of land within the Town and its urban growth area.

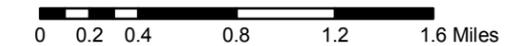


GREENEVILLE

T E N N E S S E E

Natural Factors Illustration 3

- Legend**
-  Corporate Limits
 -  Slope Less than 15%
 -  Slope Greater than 15%



State of Tennessee
 Department of Economic & Community Development
 Local Planning Assistance Office
 Johnson City, Tennessee
 Map Printed: March 9, 2009
 This map is not an engineering map.

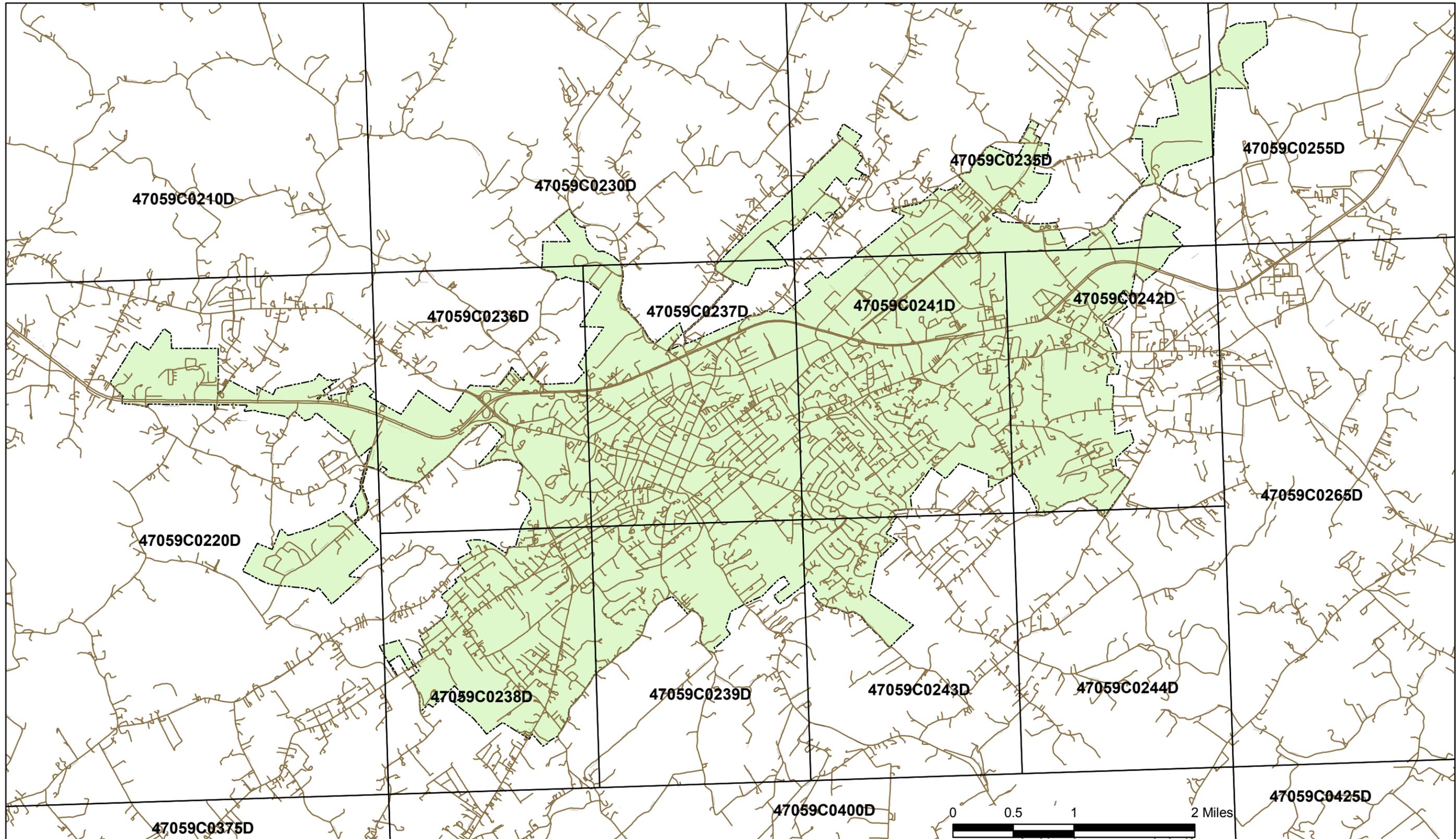
DRAINAGE AND FLOODING

The Nolichucky River and its tributaries form a mature drainage system that reaches practically all of Greene County. Richland Creek and Frank Creek and their tributaries drain Greeneville and its urban growth area. There is no historical data for either Frank Creek or Richland Creek.

The Town's application to join the National Flood Insurance Program (NFIP) became effective on August 1, 1986. This program is organized under the Federal Emergency Management Agency (FEMA). It identifies potential flood hazard areas within the Town, requires the community to adopt floodplain management regulations, and provides residents with the opportunity to purchase flood insurance. The drainage basin for Frank Creek is 5.85 square miles and the drainage basin for Richland Creek is 4.69 square miles.

A new flood plain management ordinance, Flood Insurance Rate Maps (FIRMs), and Flood Insurance Study were adopted by the town on June 6, 2006. This was a culmination of a nation-wide map modernization program started by FEMA in 2003 to update and digitize the FIRM that when complete, will involve about 12,000 municipalities and counties in the United States over a five to seven year period. Illustration 4 reflects the Town's FIRM map panel index. The final FIRMs went into effect on July 3, 2006.

Findings: Although there is no historical data for Frank Creek or Richland Creek the floodplain management regulations are used to control development in areas at risk of flooding.



GREENEVILLE
T E N N E S S E E

DFIRM Panel Index
Illustration 4

- Legend**
- Corporate Limits
 - DFIRM Panel
 - Streets



State of Tennessee
Dept. of Economic & Community Development
Local Planning Assistance Office
Johnson City, Tennessee
Map Printed: March 9, 2009
This map is not an engineering map.

SOILS AND GEOLOGY

One of the most important factors affecting development in any community is the content and capability of the area's soils. Understanding the characteristics of local soils is important in determining various development limitations and the appropriate land use for any particular site. Soil characteristics effecting development potential include such things as flood potential, permeability and drainage qualities, depth to water table, load bearing strength and stability, shrink or swell potential, soil depth, and depth to bedrock are important in determining the appropriate land use for particular sites.

Generally speaking, soil conditions found across large parts of the Greeneville area do not severely limit overall development potential. However, specific limitations do exist and they must be considered on a site by site basis. A site-specific evaluation is vital because each potential development area may contain many different soils. The Greeneville area soils fall into four of twelve different soil associations per the Soil Survey of Greene County, Tennessee published by the United States Department of Agriculture, Soil Conservation Service. These associations are simply groupings of many separate soil types which tend to be found together. The Greeneville area contains about forty-one separate soil types or slope phases of these associations. A soil association's map is useful to people who want a general ideal of the soils in a county. Such a map is a useful general guide in managing a watershed, a wooded tract, a wildlife area, or in locating recreational facilities. It is not suitable for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure because the soils in any one association ordinarily differ in slope, depth, texture, stoniness, drainage, and other characteristics that affect their management.

The soil characteristics that have had the greatest impact on development in Greeneville are related to structural properties, flooding or poor drainage. Some soils have high clay content or are underlain by shale and located on steeper slopes that limit their ability to support roadways and other construction projects. Detailed site evaluation, engineering, and planning are required to avoid or mitigate poor structural soil conditions. These soils tend to be found along streams, in other poorly drained areas, around sinkholes, or land with steep slopes. These and other soils present limitations for subsurface drainage systems due to permeability problems. Fortunately, most of Greeneville and a majority of its urban growth area have access to sanitary sewers.

Findings: Soil conditions found across much of the Town generally do not impose significant developmental constraints. However, specific limitations do exist, and they must be understood. Soil types and characteristics are highly variable and require a site-by-site evaluation. Particular attention should be paid to soil conditions located on steep slopes, along streams and drainage ways, around sinkholes, and in poorly drained or wet areas.

SUMMARY OF FINDINGS

The impact of climate on the development of Greeneville can best be described as moderate with little effect. In general, climate has very little effect on development in the Town.

There are no air quality or water resource quality problems which would directly affect the future land in Greeneville and its projected growth area. The topography in Greeneville is diverse, ranging from gently rolling land to some scattered areas with steep slopes. Historically, development has occurred primarily on flat to moderately hilly portion of any municipality. Only scattered areas of steep slopes limit the development potential of land within the Town and its urban growth area.

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