

A RESOLUTION ADOPTING
ORANGE COUNTY
HAZARD MITIGATION PLAN
Resolution No. 156/2003-04

WHEREAS, the North Carolina General Assembly passed Senate Bill 300 "*An Act to Amend the Laws Regarding Emergency Management as Recommended by the Legislative Disaster Response Commission*" in June of 2001 that among other provisions requires local governments to have a hazard mitigation plan approved prior to August 1, 2002 in order to receive state public assistance funds;

WHEREAS, in October of 2000 the President of the United States signed into law the "*Disaster Mitigation Act of 2000*" (PL 106-390) to amend the "*Robert T. Stafford Disaster Relief and Emergency Act of 1988*" which among other provisions requires local governments to adopt a mitigation plan in order to be eligible for hazard mitigation funding;

WHEREAS, the North Carolina Division of Emergency Management is assisting local governments in the formulation of hazard mitigation plans;

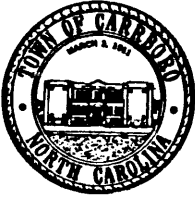
WHEREAS, the North Carolina Division of Emergency Management has established rules and criteria that allow municipalities to adopt their county's approved hazard mitigation plan through resolution;

WHEREAS, the Town of Carrboro has worked closely with the Orange County Hazard Mitigation Planning Team to develop a county-wide hazard mitigation plan that will serve the needs of Carrboro Citizens;

WHEREAS, the Town of Carrboro supports Hazard Mitigation Planning as a logical means toward protecting people and property from the potential devastating effects of natural hazards;

NOW, THEREFORE, BE IT RESOLVED that the Carrboro Board of Aldermen:

1. Desire to participate with Orange County in planning for the mitigation of effects caused by natural hazards;
2. Assign staff representation as determined by the Town Manager to work as a members of the Orange County Hazard Mitigation Planning Team to implement and update hazard mitigation planning activities;
3. Adopt, by way of this resolution, the "*Orange County Hazard Mitigation Plan*" as approved by the North Carolina Division of Emergency Management.



PLANNING BOARD

301 West Main Street, Carrboro, North Carolina 27510

R E C O M M E N D A T I O N

APRIL 22, 2004

ORANGE COUNTY HAZARD MITIGATION PLAN

Motion was made by James Carnahan that we should encourage the Board of Aldermen to pursue funding for the acquisition of greenways in order to mitigate flood hazard and for burial of overhead power lines to mitigate hazards associated with severe storms. It was also recommended that "tornadoes should be changed from "unlikely" to "likely" and droughts should be changed from "unlikely" to "likely". Chairman John Marshall seconded the motion.

VOTE: AYES (9) Marshall, Poulton, Carnahan, Haven-O'Donnell, Ludwig, Hammill, Babiss, Paulsen, West; Absent/Excused (1) Hogan; Abstentions (0).

John Marshall / *sep 5/5/04*
John Marshall, Chair (date)

Orange County Hazard Mitigation Plan

Introduction

Orange County is blessed with an abundance of rich natural resources, as varied and as vital as the people who live here. This bounty provides the county's residents with a wonderful place to call home, but there are also inherent dangers. From time to time, hurricane winds topple trees, severe winter storms immobilize streets, and heavy rains from thunderstorms cause flooding.

Storms, floods and wildfires are a part of the natural balance of the environment. But when such events occur where people have made their homes and built their businesses, the results can be devastating. Natural and technological hazards can wreak havoc in towns, communities and counties disrupting the flow of goods and services, destroying property and unsettling people's lives.

In recent years, the frequency and impact of natural disasters has increased not because natural hazards occur more frequently but because more people are choosing to live and work in locations that put them and their property at risk. While natural hazards cannot be prevented, local communities can use various ways to reduce the vulnerability of people and property to damage. Communities can reduce exposure to future natural hazards by managing the location and construction of both the existing and future built environment. By using location and construction techniques, a community can mitigate negative impacts and reduced future damage to both human lives and property.

Why Hazard Mitigation Planning

As the costs of disasters continue to rise, local governments must find ways to reduced hazard risks to their communities. The efforts made to reduce hazard risks are compatible with community goals; protection of life, health and property for safer communities. As communities plan for new development and improvements to existing infrastructure, mitigation can and should be an important component of the planning effort. This means taking action to reduce or eliminate long-term risk from hazards and their effects.

Hazard Mitigation is the practice of reducing risks to people and property from natural hazards. It includes both structure interventions such as building codes and nonstructural measures such as preventing development in flood areas.

Purpose of the Plan

The essential purposes of Hazard Mitigation Planning are: to protect the health, safety, and economic security of residents by reducing the impacts of natural hazards, influence decision-making in both public and private sectors, and prove community eligibility for government aid and grant programs.

The President of the United States, in October of 2000, signed into law the *Disaster Mitigation Act of 2000* (PL 106-390) to amend the *Robert T. Stafford Disaster Relief and Emergency Act of 1988* which among other provisions requires local governments to adopt a mitigation plan in order to be eligible for hazard mitigation funding. In June of 2001, the North Carolina General Assembly passed Senate Bill 300: *An Act to Amend the Laws Regarding Emergency Management as Recommended by the Legislative Disaster Response and Recovery Commission*. Among other provisions, this bill requires that local governments have an approved hazard mitigation plan in order to receive state public assistance funds (effective for state-declared disasters after November 1, 2004).

The Planning Process

The basic steps in the preparation of the hazard mitigation plan include:

1. Hazard Identification and Analysis
2. Vulnerability Assessment
3. Community Capability Assessment
4. Community Goals
5. Mitigation Strategies
6. Plan Adoption
7. Implementation

Orange County and the Towns of Carrboro, Chapel Hill, and Hillsborough created the Orange County Hazard Mitigation Team (OCHM team) to guide the planning process. This team consisted of Orange County's Planning and Inspection Department as the lead agency and assistance from Orange County Emergency Management to assist with compiling the plan. Other county departments included GIS, Tax, and Public Works designees. The Towns of Carrboro, Chapel Hill and Hillsborough included the Planning, Parks and Recreation, and Public Works Directors. Ultimately, the Town of Chapel Hill prepared a separate Hazard Mitigation Plan which is not a part of this document.

Cooperation at all levels of government is an important element in hazard mitigation. As an example, the Town of Chapel Hill has a Major Emergency Disaster Operations Plan, approved in May 1997. This plan maps out the Town's response to hazards ranging from severe storms to earthquakes. A system of emergency management command and control that is compatible with that of Orange County Emergency Management and the State of North Carolina is established in this Plan.

There are also many other opportunities for new local hazard mitigation programs and for coordination efforts between local and regional governments and communities. As a recent example, the Towns of Carrboro and Chapel Hill have formally entered into a partnership with the State Department of Emergency Management and FEMA called the Cooperating Technical Partnership. This partnership will ultimately increase cooperative efforts in flood hazard mitigation in southern Orange County.

Public Involvement

Over the past several years, Orange County has held numerous public meetings to gain citizen input into planning topics and programs. Although Hazard Mitigation has generally not been the topic per se, programs and regulations that directly mitigate hazard vulnerability have been implemented. For example, both Orange County and Carrboro do not allow any new construction within floodplain areas, regardless of finished elevation. In addition, both of these jurisdictions have implemented regulations that limit development in areas with steep slopes.

Citizens were invited to comment on the Orange County Hazard Mitigation Plan on February 25, 2002. The Orange County Board of Commissioners held a public hearing on this date at 7:30 p.m. in the New Orange County Courthouse located in Hillsborough. A copy of the ad that was run in both the *News of Orange* and the *Chapel Hill Herald* is included as an appendix to this plan. The ad was published twice in each newspaper. No public comments were received during the plan development process.

In addition, the approved plan will be posted on Orange County's website and a link will be provided that will allow citizens to ask questions and make comments about the plan. Furthermore, future updates will strive to involve citizens, businesses, and other interests to a greater extent than they participated during this round of plan development.

National Flood Insurance Program and National Community Rating System

Orange County, Carrboro, and Hillsborough all participate in FEMA's National Flood Insurance Program (NFIP). At this time, none of the communities participate in the voluntary National Community Rating System (CRS) program. However, Orange County has begun assessing the feasibility of participating in the CRS and Carrboro intends to apply for the program in the near future.

Step 1: Hazard Identification and Analysis

Orange County is vulnerable to a number of natural hazards. Although each hazard cannot be predicted, they can be less disruptive to communities with hazard mitigation planning. Each hazard is unique to Orange County in terms of types, likelihood of occurrence, location, and impact. Each of these terms is explained below.

Types Of Hazards

Orange County experiences many different types of natural hazards. Some are more likely than others to occur. Different hazards call for different hazard mitigation measures. The OCHM Team considers all of the hazards that threaten Orange County and focus on those that pose the greater risk. The hazards considered for this plan were: hurricanes, floods, tornadoes, droughts, nor'easters, thunderstorms, severe winter storms, wildfires and droughts.

Likelihood of Occurrence

The OCHM Team estimated the likelihood of each type of hazard occurring in Orange County. This estimate is based on the local history of the events.

- Highly Likely: Near 100% probability in the next year.
- Likely: Between 10% - 100% probability in the next year, or at least one chance in the next ten years.
- Possible: Between 1% - 10% probability in the next year or at least one chance in the next 100 years.
- Unlikely: Less than 1% probability in the next year, or less than one chance in the next 100 years.

Area

Certain areas, such as floodplains and steep slopes, are more prone to hazards than others. Many of these are readily identifiable on maps. The OCHM Team identified those areas that are most vulnerable to each natural hazard and determined whether they cover a small, medium, or large proportion of Orange County and Towns.

Hazard Impact

Some natural hazards have greater impacts than others, but occur infrequently (severe earthquakes) and others hazards occur annually or several time a year but cause less damage (thunderstorms). The impact is a combination of the magnitude of the event, how large an area within the community is affected and the amount of human activity in that area. The following table explains how the impact is measured.

<u>Measurement of Types of Hazard Impacts</u>		
<u>Type</u>	<u>Magnitude (percent of property in county damaged)</u>	<u>Severity</u>
Catastrophic	More than 50%	Multiple deaths, complete shutdown of facilities for 30 days or more. 50% of property damaged.
Critical	25% to 50%	Multiple severe injuries, complete shutdown of critical facilities for 2 weeks, more than 25% of property damaged.
Limited	10% to 25%	Some injuries, complete shutdown of critical facilities for more than a week. More than 10% of property damaged.
Negligible	Less than 10%	Minor injuries, minimal quality of life impact, shutdown of critical facilities for 24-hours or less. Less than 10% of property is severely damaged.

<u>Orange County Hazard Identification and Analysis</u>				
<u>Hazard</u>	<u>Likelihood of Occurrence</u>	<u>Area</u> <u>Small/Medium/</u> <u>Large</u>	<u>Impacts</u> <u>Catastrophic/</u> <u>Critical/Limited/</u> <u>Negligible</u>	<u>Hazard Index</u>
Hurricanes	Possible	Large	Critical	Low
Floods	Possible	Large	Negligible	High
Tornadoes	Unlikely	Medium	Limited	Moderate
Drought	Possible	Large	Limited	Moderate

Orange County Hazard Identification and Analysis				
Hazard	Likelihood of Occurrence	Area Small/Medium/ Large	Impacts Catastrophic/ Critical/Limited/ Negligible	Hazard Index
Nor'easter	Unlikely	Medium	Limited/ Negligible	Low
Thunderstorms	Highly Likely	Large	Negligible	Low
Severe Winter Storm	Likely	Large	Negligible	Moderate
Wildfire	Possible/ Unlikely	Medium	Negligible	Low
Chemical Spills	Likely	Medium	Limited	Moderate
River Basins Dam Failure	Possible	Large	Limited	Medium
Earthquake	Possible	Large	Critical	Low
Tsunamis	Unlikely	Medium	Limited	Low
Volcano	Unlikely	Medium	Critical	Low
Landslide	Possible	Small	Negligible	Medium
Plane Crash	Possible	Small	Limited	Low

Data Sources:

North Carolina Emergency Management, Orange County Emergency Management,
"Keeping Natural Hazards From Becoming Disasters"

Historical Summary

Hurricanes have affected Orange County with the most recent being Floyd (1999) with property damage exceeding \$1,000,000, though Fran in 1996 was the most severe. In addition, Floyd inflicted over \$10,000 in direct recovery costs on Orange County. Furthermore, it caused major damage to property, businesses and infrastructure that impacted the economy.

Flooding, which historically has caused the largest damage in terms of dollar amounts in Orange County, is caused when drainage basins are not capable of withstanding large amounts of rain in a short period of time (thunderstorms).

Tornadoes have struck with little or no warning to alert citizens to protect themselves. A tornado occurred in May 2000, which damaged 55 mobile homes, 80 site built homes and caused several tons of debris.

Severe winter storms can quickly impact and immobilize the county. With roads blocked, power outages and possible loss of critical services, it can pose an immediate threat to loss of life. The last severe winter storm to impact the county was January 2000, when 20 inches of snow and ice fell. Direct recovery costs for Orange County due to the storm event totaled approximately \$45,500.

With increased home development in vulnerable wooded areas, a wildfire can cause heavy losses to homes and forestry. Structures in close proximity of wooded areas are at a greater risk to wildfires than homes in urban areas.

Technological hazards can impact the county in many ways including road closures, power outages, evacuations, and water use restrictions.

Step 2: Vulnerability Assessment

Vulnerability to a natural hazard can be defined as “the extent to which people experience harm and property damage from a hazard”. These hazards can result in the loss of life and property damages in the millions. The impact felt may take years to overcome. It is important to know where and to what extent the community is susceptible to the impacts of natural and technological hazards.

Vulnerability to hazards can be assessed in both the present and future. The current level of development and infrastructure generates a set of conditions, which results in every area of the community being vulnerable to some hazard. This level will change with future increases or decreases of population, development and whether the community implements or ignores hazard mitigation. Future vulnerability should not increase because Orange County land use policies, ordinances, and regulations prohibit development in vulnerable (especially flood prone) areas. Each governmental jurisdiction covered by this Hazard Mitigation Plan shares the same level of vulnerability to each type of hazard; the only difference being the exact location of the hazard (i.e.: each jurisdiction could be impacted by a dam breach but since there are several different dams within the county, one jurisdiction may be impacted while another is not). No jurisdiction is more “at risk” to a particular hazard than any other jurisdiction included in this Plan.

Orange County is centrally located in the piedmont of North Carolina and contains 400 square miles. The 2000 Census recorded a population of 118,227 with 70,943 of these residents in the Towns of Carrboro, Chapel Hill and Hillsborough. A unique feature of Orange County is the University of North Carolina at Chapel Hill. The student population of the university adds approximately 25,000 people to the County's population during the school year. Orange County has several major highways to include I-40/85, US 70, 15/501, and NC 54, 57, 86, and 157. There are portions of three major river basins – Cape Fear, Neuse, and Roanoke - that are located in the county.

The total value of all Orange County and its Townships parcels within floodplains is \$286,479,458. This includes 2,152 parcels that can be classified into four categories: residential, agricultural, commercial or industrial. (These numbers include parcels located within the corporate limits of Chapel Hill; Chapel Hill is not a participating jurisdiction in this Plan). In the event of flooding, these numbers do not represent the total loss potential for the properties. Total Market Value accounts for the value of the property and the structures located therein. Occupied residential properties also have the

potential for damages to personal property such as household contents and motor vehicles. Agricultural properties possess the same personal property loss potential as residential properties and also include potential losses in terms of damage to livestock, crops and equipment. Commercial and industrial parcels may experience great losses in damages to equipment and inventory though there are no known vulnerable commercial or industrial structures. All of these potential losses will have a great impact on the local county economy.

The Total Building-Only Tax Values for structures located within the unincorporated areas of Orange County is \$2,313,188,769. The Total Building-Only Tax Values for structures located within Carrboro is \$767,034,270 and the value for Hillsborough is \$300,484,018. If a catastrophic event such as a devastating tornado were to hit Orange County, property losses could potentially be in the hundreds of millions of dollars, if not into the billions.

If structures were to be damaged or destroyed, the typical building construction cost, per square foot, for various types of uses is as follows:

Commercial:	\$83.00
Single Family Residential:	\$65.00
Multi Family Residential:	\$60.00
Industrial:	\$56.00
Utility:	\$26.00

Appendix A displays a series of maps that help illustrate Orange County's vulnerability to natural disasters. The following table is a brief summary of each jurisdiction' hazard vulnerability.

Hazard Vulnerability Summary

Hazard	Unincorporated Orange County	Carrboro	Hillsborough
Hurricanes	Hurricanes have impacted the jurisdiction in the past and are expected to have an impact in the future. The nature of hurricanes cause them to have an impact over a large geographic area.	Hurricanes have impacted the jurisdiction in the past and are expected to have an impact in the future. The nature of hurricanes cause them to have an impact over a large geographic area.	Hurricanes have impacted the jurisdiction in the past and are expected to have an impact in the future. The nature of hurricanes cause them to have an impact over a large geographic area.
Floods	Flooding has occurred in the past and will likely occur in the future. Governmental regulations prohibit new structures from being located in floodplains, therefore, additional future losses are not	Flooding has occurred in the past and will likely occur in the future. Governmental regulations prohibit new structures from being located in floodplains, therefore, additional future losses are not	Flooding has occurred in the past and will likely occur in the future. Governmental regulations allow the construction of new structures in floodplain areas provided the finished elevation is a

Hazard	Unincorporated Orange County	Carrboro	Hillsborough
	<p>expected. Relatively few structures are located within floodplains in the unincorporated areas. As Map 7 in Appendix A shows, the vast majority of structures located within floodplains are within the corporate limits of Chapel Hill and Carrboro. Floodplains in Orange County tend to be relatively narrow due to the fact the county is located in the upper reaches of river basins.</p>	<p>expected. Approximately 67 single family units are located within floodplain areas. Approximately 20 multi-family units (in 1 complex 2 buildings.) and 24 mobile homes are located in floodplain areas. An estimated 275 people reside in these 111 units. In addition, 2 commercial structures, 6 accessory and 15 public/quasi-public structure are located in floodplain areas. The building value of all structures located within a floodplain area is approximately \$16,725,000.</p>	<p>minimum of 2-feet above the documented flood level. According to National Flood Insurance Program (NFIP) information, six structures are located in floodplain areas, 1 of which is a single family dwelling unit. The value of these structures is unavailable at this time.</p>
Tornadoes	<p>Tornados have struck Orange County in the past and it is reasonable to expect they will affect the county in the future. Tornados in the past decade have struck in the central and northern sections of the county. Other than operating an emergency warning system, mitigating for tornados is impractical.</p>	<p>Tornados have struck Orange County in the past and it is reasonable to expect they will affect the county in the future. Tornados have not impacted Carrboro in the last decade but the threat of a tornado does exist. Other than operating an emergency warning system, mitigating for tornados is impractical.</p>	<p>Tornados have struck Orange County in the past and it is reasonable to expect they will affect the county in the future. Some tornados in the past decade have touched down extremely close to Hillsborough. Other than operating an emergency warning system, mitigating for tornados is impractical.</p>
Drought	<p>Periods of drought have impacted Orange County in the past and ensuring adequate water supply is an issue for the county and its municipalities because the county is located at the headwaters of three major river basins. Therefore, no sizeable rivers flow within the county. Water supplies are stored in reservoirs and most of the population in the unincorporated area has individual wells which</p>	<p>Periods of drought have impacted Carrboro in the past and ensuring adequate water supply is an issue. The vast majority of Carrboro's water is supplied via water storage reservoirs.</p>	<p>Periods of drought have impacted Hillsborough in the past and ensuring adequate water supply is an issue. The vast majority of Hillsborough's water is supplied via water storage reservoirs.</p>

Hazard	Unincorporated Orange County	Carrboro	Hillsborough
	utilize groundwater.		
Nor'easter	Nor'easters rarely reach as far inland as Orange County. Vulnerability to this hazard is relatively low.	Nor'easters rarely reach as far inland as Orange County. Vulnerability to this hazard is relatively low.	Nor'easters rarely reach as far inland as Orange County. Vulnerability to this hazard is relatively low.
Thunderstorms	Thunderstorms are a very common occurrence in Orange County. Hazards associated with thunderstorms include flooding due to heavy rains, lightening strikes, tornados, and high winds.	Thunderstorms are a very common occurrence in Orange County. Hazards associated with thunderstorms include flooding due to heavy rains, lightening strikes, tornados, and high winds.	Thunderstorms are a very common occurrence in Orange County. Hazards associated with thunderstorms include flooding due to heavy rains, lightening strikes, tornados, and high winds.
Severe Winter Storm	Severe winter weather, including "ice storms", is fairly common in Orange County, although it does not necessarily occur each winter.	Severe winter weather, including "ice storms", is fairly common in Orange County, although it does not necessarily occur each winter.	Severe winter weather, including "ice storms", is fairly common in Orange County, although it does not necessarily occur each winter.
Wildfire	Wildfires have not historically been a significant threat in Orange County. However, more development of rural areas can increase vulnerability to this hazard.	Wildfires have not historically been a significant threat in Carrboro. The majority of the jurisdiction is developed in an urban/suburban pattern, thereby minimizing the vulnerability to this hazard.	Wildfires have not historically been a significant threat in Hillsborough. The majority of the jurisdiction is developed in an urban/suburban pattern, thereby minimizing the vulnerability to this hazard.
Chemical Spills	Approximately 30 chemical storage reportable sites with reportable quantities (under the Emergency Planning and Community Right to Know Act) are located within Orange County, Carrboro, and Hillsborough. In addition, the county is vulnerable to transportation spills since Interstates 40 and 85 traverse the county as do railways and state highways.	Approximately 30 chemical storage reportable sites with reportable quantities (under the Emergency Planning and Community Right to Know Act) are located within Orange County, Carrboro, and Hillsborough. In addition, Carrboro is vulnerable to transportation spills since State Highway 54 passes through the municipal limits as does a railway spur.	Approximately 30 chemical storage reportable sites with reportable quantities (under the Emergency Planning and Community Right to Know Act) are located within Orange County, Carrboro, and Hillsborough. In addition, Hillsborough is vulnerable to transportation spills since Interstate 85 and other state highways pass through the municipal limits as does a railway.

Hazard	Unincorporated Orange County	Carrboro	Hillsborough
River Basins Dam Failure	There are 4 water supply reservoirs located within Orange County, one of which (University Lake) is located primarily within Carrboro's jurisdiction. In addition, there are numerous (approximately 30) farm ponds and stormwater management ponds which utilize earthen dams. Dam failure on any of the water supply reservoirs would be expected to cause downstream flooding. Dam failure on farm ponds and stormwater management ponds could cause flooding downstream as well.	Carrboro is vulnerable primarily to dam failure associated with the University Lake water supply reservoir. Several of the small farm ponds/stormwater management ponds are also located upstream or within the municipal limits of Carrboro.	Hillsborough is vulnerable to dam failure of two of the water supply watersheds (Eno Reservoir and Lake Orange). In addition, several of the small farm ponds/stormwater management ponds are also located upstream or within the municipal limits of Hillsborough
Earthquake	The closest active seismic zone to Orange County is the Eastern Tennessee Seismic Zone. There have not been any intense earthquakes in this area since 1928. The location of Orange County to the Eastern Tennessee Seismic Zone puts the county and its municipalities at low risk of experiencing any significant seismic activity.	The closest active seismic zone to Orange County is the Eastern Tennessee Seismic Zone. There have not been any intense earthquakes in this area since 1928. The location of Orange County to the Eastern Tennessee Seismic Zone puts the county and its municipalities at low risk of experiencing any significant seismic activity.	The closest active seismic zone to Orange County is the Eastern Tennessee Seismic Zone. There have not been any intense earthquakes in this area since 1928. The location of Orange County to the Eastern Tennessee Seismic Zone puts the county and its municipalities at low risk of experiencing any significant seismic activity.
Tsunamis	Orange County is located a significant distance from the Atlantic coastal area. Therefore, vulnerability from tsunamis is minimal.	Orange County is located a significant distance from the Atlantic coastal area. Therefore, vulnerability from tsunamis is minimal.	Orange County is located a significant distance from the Atlantic coastal area. Therefore, vulnerability from tsunamis is minimal.
Volcano	There are no known volcanoes in the vicinity of Orange County. Therefore, vulnerability from volcanoes does not exist at this time.	There are no known volcanoes in the vicinity of Orange County. Therefore, vulnerability from volcanoes does not exist at this time.	There are no known volcanoes in the vicinity of Orange County. Therefore, vulnerability from volcanoes does not exist at this time.
Landslide	Parts of Orange County have soil types and slopes that are	Carrboro is located in the southeastern quadrant of the county	Soil types and slopes in the vicinity of Hillsborough are such

Hazard	Unincorporated Orange County	Carrboro	Hillsborough
	vulnerable to landslides. The greatest threat is in the southeastern quadrant of the county.	where soil types and slope characteristics present a moderate level of landslide vulnerability.	that vulnerability to landslides is less than that in other areas of the county.
Plane Crash	Orange County is located approximately 20 miles west of RDU airport. The vulnerability of the county and its municipalities to a plane crash is minimal but does exist.	Orange County is located approximately 20 miles west of RDU airport. The vulnerability of the county and its municipalities to a plane crash is minimal but does exist.	Orange County is located approximately 20 miles west of RDU airport. The vulnerability of the county and its municipalities to a plane crash is minimal but does exist.

Critical Facilities

A critical facility is any facility that if destroyed or damaged to the extent it cannot be utilized, a severe life, health, or safety impact on the public would be created. To a certain extent most or all roadways and bridges within the county could be considered critical facilities if they were damaged and alternate access was not available. However, for the purposes of this Hazard Mitigation Plan, the focus shall be on buildings.

The hospital within Orange County, which is affiliated with UNC-Chapel Hill, is located within the municipal limits of Chapel Hill. The Town of Chapel Hill has prepared a separate Hazard Mitigation Plan. There are several critical facilities within Orange County, Carrboro, and Hillsborough including fire stations, emergency management operations, and law enforcement offices. Both Hillsborough and Carrboro operate their own police departments. Each department operates from its own building within its respective municipal limits. Carrboro also operates its own fire department which is housed separately from the police department. Hillsborough and the unincorporated areas of Orange County rely on nine separate volunteer fire departments for fire suppression services. There are 11 volunteer fire stations located within the county.

Orange County's Emergency Management Department, which operates out of its own facility, provides disaster response, EMS (Emergency Medical Services), and 9-1-1 services for the unincorporated area and the municipalities.

Analysis

Population tends to be concentrated in the municipal areas (Chapel Hill, Carrboro, and Hillsborough) of the county. Therefore, these areas of more dense population would likely suffer a greater impact to a hazard event, in terms of human and structural measures, than the unincorporated portions of the county. The unincorporated portions of

the county contain a relatively large population, in terms of the actual number of people, but the population is not densely concentrated.

Orange County and Carrboro have regulations in place to prevent new construction in flood hazard areas. Both of these jurisdictions contain structures within flood hazard areas that were constructed prior to adoption of the new regulations. Additionally, these jurisdictions limit development in areas of steep slopes. The Town of Hillsborough historically has restricted development less than other jurisdictions and therefore administers a less restrictive code of ordinances that allows development to occur in areas that would not be allowed in other jurisdictions.

Orange County is an area experiencing fairly significant population growth. Regulations and policies are in place that attempt to “steer” growth into the municipal areas where population can be better and more efficiently served with public services and the rural character of the county can be preserved. Orange County is currently updating its Comprehensive Plan and policies have been proposed to further limit housing density in rural areas. The Comprehensive Plan update is expected to be complete and adopted by the end of 2004. Regulation revisions implementing the Comprehensive Plan are expected to be adopted shortly thereafter.

Step 3: Community Capability Assessment

The following provides a summary of ordinances that Orange County is currently involved in or has completed relevant to hazard mitigation. Review processes related to the ordinances are thorough and overlapping.

Legal Capability

The North Carolina General Statutes grant Orange County the general police powers reserved for local governments. This confers the legal authority to enact and enforce local ordinances which define, prohibit, regulate or abate acts, omissions or conditions detrimental to the health, safety and welfare of the people and to define and abate nuisances (including public health nuisances).

Floodplain Management Ordinance

Orange County participates in the National Flood Insurance Program (NFIP) and complies with all related regulatory requirements. The ordinance is enforced through requirements set forth by the County's zoning ordinance. It provides a means for prohibiting or restricting development within areas environmentally constrained by floodways and floodplains. This ordinance seeks to prevent property loss, insure human safety, and enable the safe and natural flow of streams. The Current Planning Division of the Planning and Inspections Department reviews development proposals for consistency with the ordinance.

Stormwater Ordinance

Riparian Area Protection within the Neuse River Basin: The purpose of the County in adopting the Neuse River Basin regulations is to protect the County's streams, wetlands, and floodplains; to protect the water quality of the County's watercourses, reservoirs, lakes, and ponds; to protect the County's riparian and aquatic ecosystems; reduce Nitrogen laden runoff to the Neuse by 30%; and to provide environmentally sound use of the County's land resources. The Sedimentation and Erosion control Division of the Planning and Inspections Department is responsible for this ordinance.

404 Wetlands

404 wetlands are areas covered by water or that have waterlogged soils for long periods during the growing season. Plants growing in wetlands are capable of living in soils lacking oxygen for at least part of the growing season. Some wetlands, such as swamps, are obvious. Others are sometimes difficult to identify because they may be dry during part of the year. Wetlands include, but are not limited to, bottomlands, forest, swamps, pocosins, pine savannas, bogs, marshes, and wet meadows.

Section 404 of the Clean Water Act requires that anyone interested in depositing dredged or fill material into "waters of the United States," including wetlands, must apply for and receive a permit for such activities.

Erosion and Sedimentation Controls

Soil erosion is and has been a serious problem in the Piedmont of North Carolina, resulting in land degradation and water quality deterioration. The Orange County Sedimentation and Erosion Control Ordinance, adopted in 1976, provides the legal means by which the adverse impacts of land disturbing development activities can be minimized. The Ordinance regulates the clearing, grading, excavation, filling and manipulation of the earth and the moving and storing of waters in order to: control and prevent accelerated soil erosion and sedimentation, prevent the pollution of water, prevent damage to public and private property, maintain the balance of nature, prevent the obstruction of natural and artificial drainageways, inhibit flooding and reduce the undermining of roads and other transportation facilities. Before a construction permit is granted, a developer must submit an erosion and sedimentation control plan to the County's erosion control officer. These plans include the type of soils present at the site, the topography and location of nearby streams, erosion control measures to be taken during construction, and the operation and maintenance of any structural controls during the life of the project. The Sedimentation and Erosion control Division of the Planning and Inspections Department is responsible for countywide enforcement of this ordinance.

North Carolina State Building Code

Orange County has adopted the North Carolina Building Code (International Building Code with North Carolina Amendments), North Carolina Residential Code (International

Residential Code with North Carolina Amendments) effective 2002. Appendix G prescribes building in flood hazard areas. However Orange County elected not to allow construction in these areas through previous zoning and land development regulations, therefore Orange County did not adopt Appendix G.

The NCBC and the NCRC (Chapters 16 and Chapter 3) include provisions for requiring specific information regarding structural loads and design loads to include seismic, wind, flood, snow and combination loading. These designs tabulate the total horizontal and vertical forces that are assumed to act on a building in relation to different wind areas, exposures and wind speeds as exposed to building diaphragms and cladding. The Inspections Division of the Planning and Inspections Department is responsible for enforcement of the referenced building codes.

Zoning

The Zoning Ordinance is the major legal tool for implementing the Land Use Element of the Orange County Comprehensive Plan. The Zoning Ordinance serves as the means to achieve the desired relationship between land uses; to prevent incompatible land use associations; and to encourage and provide incentives for the more compact and efficient land use patterns delineated in the plan.

Simply stated, zoning is the division of a jurisdiction into different districts and the regulation of population density, buildings and land use intensity, lot coverage, and building heights and setbacks within those districts. Most zoning ordinances divide land uses into three general categories of residential, commercial, and industrial use and specify the areas (or districts) where each of these uses is permitted. Zoning ordinances consist of maps and written text.

The stated purpose of the Orange County Zoning Ordinance is to accomplish compatible development of the land within Orange County in a manner which will best promote the health, safety, and general welfare, as well as to provide for efficiency and economy in the process of development; to make adequate provisions for traffic; to secure safety from fire, panic, and other hazards; to provide for light and air; to prevent the overcrowding of land; to avoid undue concentration of populations; to facilitate the adequate provision of transportation, water, sewerage, schools, parks, and other public requirements; to provide for the protection of the surface and underground water resources of the County, and to provide for efficient use of renewable and non-renewable sources of energy; to promote desirable living conditions and the sustained stability of neighborhoods; to protect property against blight and depreciation and for other purposes in accordance with the comprehensive plan for the County. The Current Planning Division of the Planning and Inspections Department has primary responsibility for implementation and enforcement of the zoning ordinance.

Subdivision Regulations

Subdivision Regulations govern the conversion of raw land for intensive residential use. This implementation tool is particularly necessary to coordinate existing development and potential future development with proposed development. As the interest of the developer is generally short term, the application of subdivision regulations protects not only the individual homeowner, but also the general public by providing for a review process which suggests and facilitates coordination of the proposal with the long range specifications of the plan. By providing an opportunity for negotiation it likewise allows for the potential coordination of public and private activities.

The purpose of the Orange County Subdivision Regulations is to guide and regulate the subdivision of land for sale or building development in order to insure the public health, safety, and welfare, and to provide for the sound use of land. The regulations are designed to insure adequate planning of street systems; to avoid overcrowding of land, prevent fire, panic, and other dangers; insure that water and sewage systems be safe and adequate; to prevent flood damage; to facilitate an orderly use of land; to insure the proper legal description and monumenting of subdivided land; and to encourage the proper management of Orange County's natural resources.

It is the expressed purpose of the regulations to provide for, in addition to the above, the protection of water resources in Orange County, through the use, alone or in combination, of buffer zones, varying lot sizes, slope restrictions, vegetation, or other equally effective techniques. Innovative techniques on the part of the developer are encouraged where these techniques can be shown to be as effective as the specific requirements of the Ordinance. The Current Planning Division of the Planning and Inspections Department has primary responsibility for implementation of the subdivision regulations and reviews development proposals for consistency with the regulations.

Water Restriction

In the event of severe drought which has caused reservoir levels to decrease to dangerous levels and damages agricultural production, mandatory water restrictions on residential and commercial uses can be put into effect. These and other conservation methods are employed in a gradual time frame so that business and residents are not suddenly struck with severe restrictions that undermine commercial and agricultural efforts. Concurrently, the three public water suppliers to Orange County citizens (Orange Water and Sewer Authority, Hillsborough Municipal, and Orange Alamance Water Service) have been working diligently to increase reservoir capacity to better avoid and mitigate against drought conditions.

Existing Mitigation Efforts

Orange County has participated in the Federal Emergency Management Agency (FEMA) Buyout Program. This program allows local governments to purchase homes that have a history of being flooded several times. One of the most recent buyouts was in Heritage Hills.

Financial Resources

Orange County will seek funds, when available, for Hazard Mitigation studies and implementation of programs. Potential funding sources include (but are not limited to) programs administered by or through NC Emergency Management, the Division of Community Assistance, and the Hurricane Redevelopment Center.

Step 4: Community Goals

Orange County, Carrboro, and Hillsborough planning goals are statements that set priorities for reducing susceptibility to natural and technological hazards. These goals serve as the basis for development of the more specific plan objectives and strategies. These goals are:

1. To reduce loss of human life.
2. To protect property and minimize damage.
3. To increase public awareness of risk and mitigation activities.
4. To minimize damage to public facilities, utilities, infrastructure.
5. To adopt local ordinances and plans that assist hazard mitigation planning.
6. To ensure that NFIP maps are available to property buyers so they may determine if property is located in or near a floodplain.
7. Decrease the community's vulnerability to future disasters.

These goals are broad based and can be revised to meet the future needs of the county. There are no goals that could potentially hinder hazard mitigation efforts. Furthermore, goals are reviewed by the Board of County Commissioners at their goal-setting retreat in December of each year. Existing goals are modified and new ones created as appropriate.

Step 5: Mitigation Strategies

The strategies to meet the goals will be categorized into five different groups:

1. Prevention
2. Property Protection
3. Natural Resource Protection
4. Structural Projects
5. Public Information.

Appendix B lists a series of examples of mitigation strategies currently in place in the Orange County jurisdiction. Also note that Appendix C contains a complete listing of policies, practices, programs, regulations, and activities that address mitigation goals and objectives.

Step 6: Adoption

Following a recommendation from the OCHM Team, the Planning Director will schedule a public hearing before the Board of County Commissioners to consider a resolution of adoption for the plan. The draft plan was presented at public hearing on February 25, 2002 and a revised draft was presented to the Board of County Commissioners on May 8, 2002. The revised draft was submitted to the State for comments which were received and incorporated into the final draft which was adopted by the Commissioners on June 27, 2002.

In August 2003, a formal compliance review assessment was received from the North Carolina Division of Emergency Management. The review indicated that revision of the plan would be necessary to comply with all of FEMA's minimum criteria. Revisions were made and a draft of the revised plan was forwarded to the State in early April 2004.

Step 7: Implementation

The OCHM Team will monitor the plan to measure the effectiveness, implementation process and recommend future changes that may need to be incorporated. After the Orange County Hazard Mitigation Plan has been developed and adopted, it is important to continually track the process of the mitigation actions and evaluate how the implementation strategies contained in the plan work.

The Director of Orange County's Planning Department will serve as Mitigation Coordinator of the plan and assure updating the plan every five years or on an as needed basis. The OCHM Team will meet when the OC Planning Director deems necessary to review, update and prepare a report of the status of the mitigation progress. This report should include: a review of the goals, accomplishments, revisions, discussions on why any goals are not met, why projects maybe behind schedule, recommendations for new projects and review new disasters that may have occurred.

Appendix A: Orange County Hazard Mitigation Maps, 2002

- 1) North Carolina Counties – Graphical representation of Orange County and its surrounding counties.
- 2) Orange County Base Map – This map contains municipal boundaries, roads, streams and rivers.
- 3) Orange County Comprehensive Plan - Land Use Element - This map represents County policy as to desired type and intensity of growth and development. Appropriate zoning is applied to be consistent with the Land Use Element.
- 4) Orange County Zoning - Zoning is a legal tool used to regulate the size, scope, and function of new development (i.e. use, height, impervious surface, etc.) This map represents on a parcel-by-parcel basis the applicable zoning districts for Orange County's planning jurisdiction. See attached for list of definitions.
- 5) Orange County Watersheds – This map includes all watershed and major river basins and streams in the county.
- 6) Orange County Floodplain – This is the 1983 Q3 USGS floodplain with streams and rivers.
- 7) Houses in 100 Year Floodplain, Orange County – Based upon the 1983 Q3 USGS floodplain maps, 1,105 houses were found to be in the floodplain in April, 2002. Their locations are shown in red on the map.
- 8) Orange County Wetlands – Environmental Resource Conservation Division designated wetlands from the National Wetlands Inventory.
- 9) Orange County Topography – This map is in 10 foot elevation intervals.
- 10) Orange County Population Concentration – This map has the 2000 Census population by blocks, with persons per square mile.
- 11) Orange County Approved Subdivisions, 1989-2001 - Includes all major, minor and exempt subdivisions from 1989-2001. Subdivisions displayed by parcel for subdivisions regulated by Orange County. Parcels were identified by tracing the parcel lineage through the Orange County database.
- 12) Orange County Critical Facilities – This map contains sheriff districts, schools, hospitals, government buildings, and water and wastewater treatment facilities. Floodplains, major roads and railroads are also displayed.
- 12a) Orange County Critical Facilities – Northern Sector – Includes the townships of Cedar Grove and Little River.

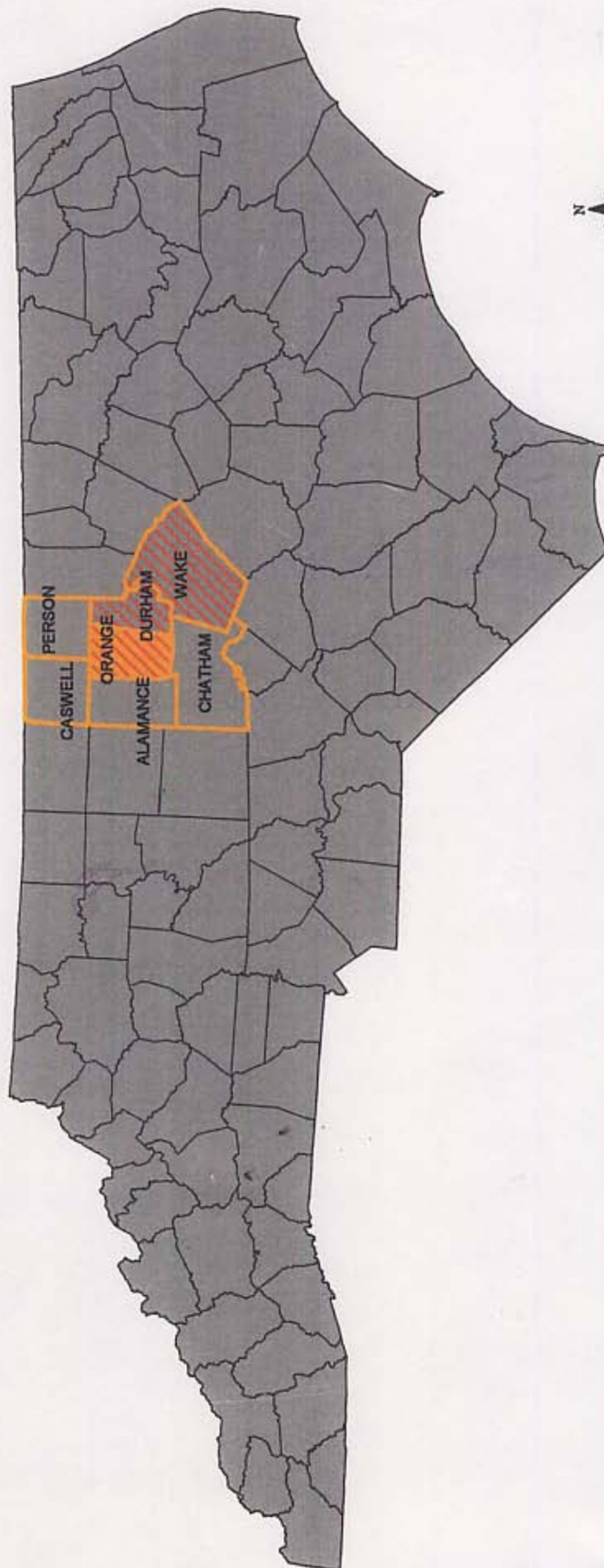
12b) Orange County Critical Facilities – Central Sector – Includes the townships of Checks, Hillsborough, and Eno.

12c) Orange County Critical Facilities – Southern Sector – Includes the townships of Bingham and Chapel Hill.

13) Orange County Developable Land by Watersheds SubArea-

Criteria used/land removed: Planning parcels with >50k/ < 15acres, FEMA 100yr floodplains, all conservation land, open space, “developed” Chapel Hill and Carrboro, Duke Forest, NC Botanical Gardens, agricultural easements, schools. Developable displayed by Watershed Subarea-management areas for the Orange County Comprehensive Plan.

NORTH CAROLINA COUNTIES



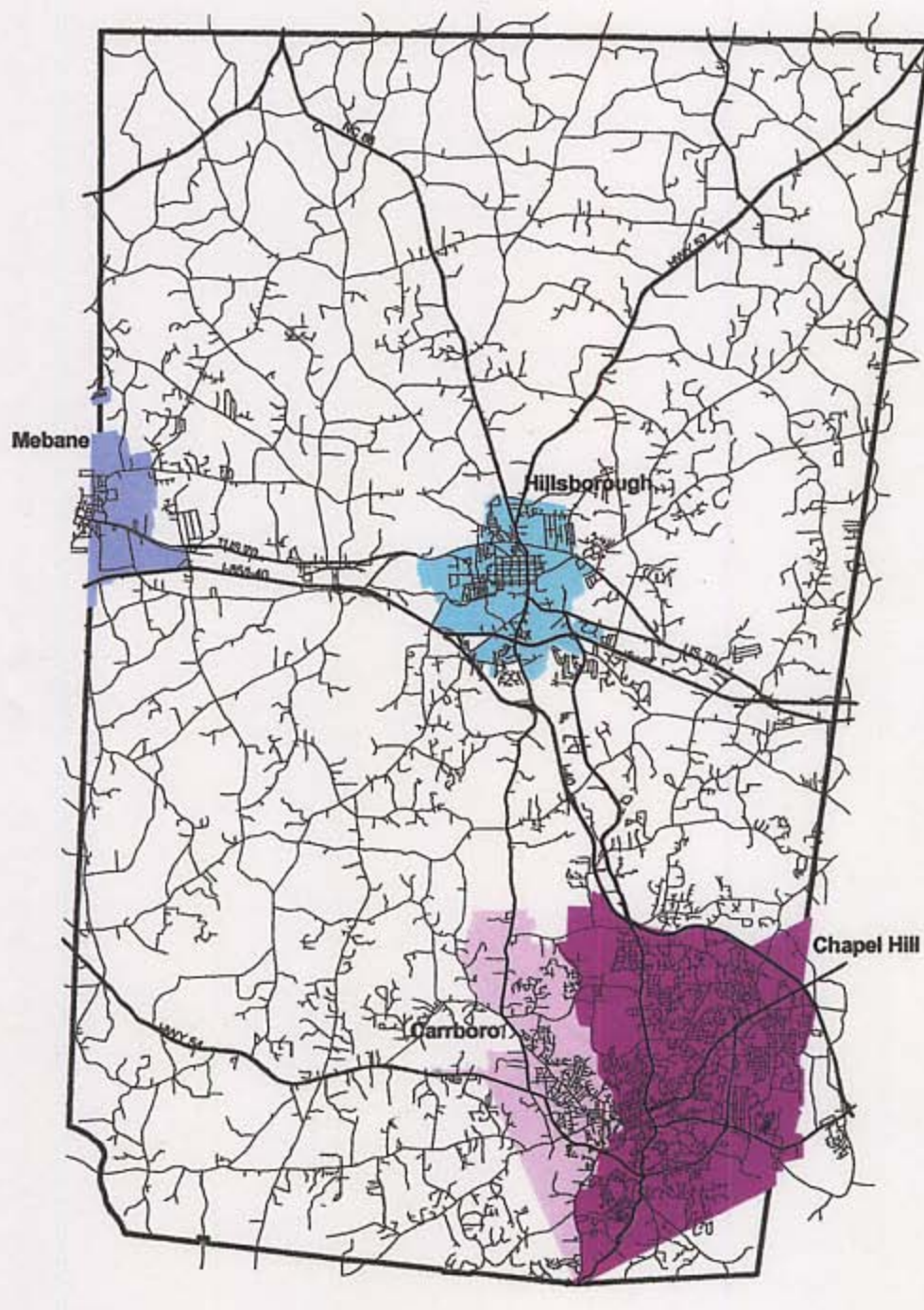
30 0 30 60 Miles










Surrounding Counties
 Triangle
 Orange County
 NC Counties

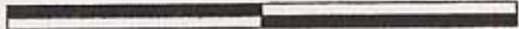
Created by Bettina Brinkley
 Orange County Planning
 April, 2002

BASE MAP



-  Streets
-  Major Roads
-  Municipal Jurisdiction -- Chapel Hill
-  Carrboro
-  Hillsborough
-  Mebane
-  County

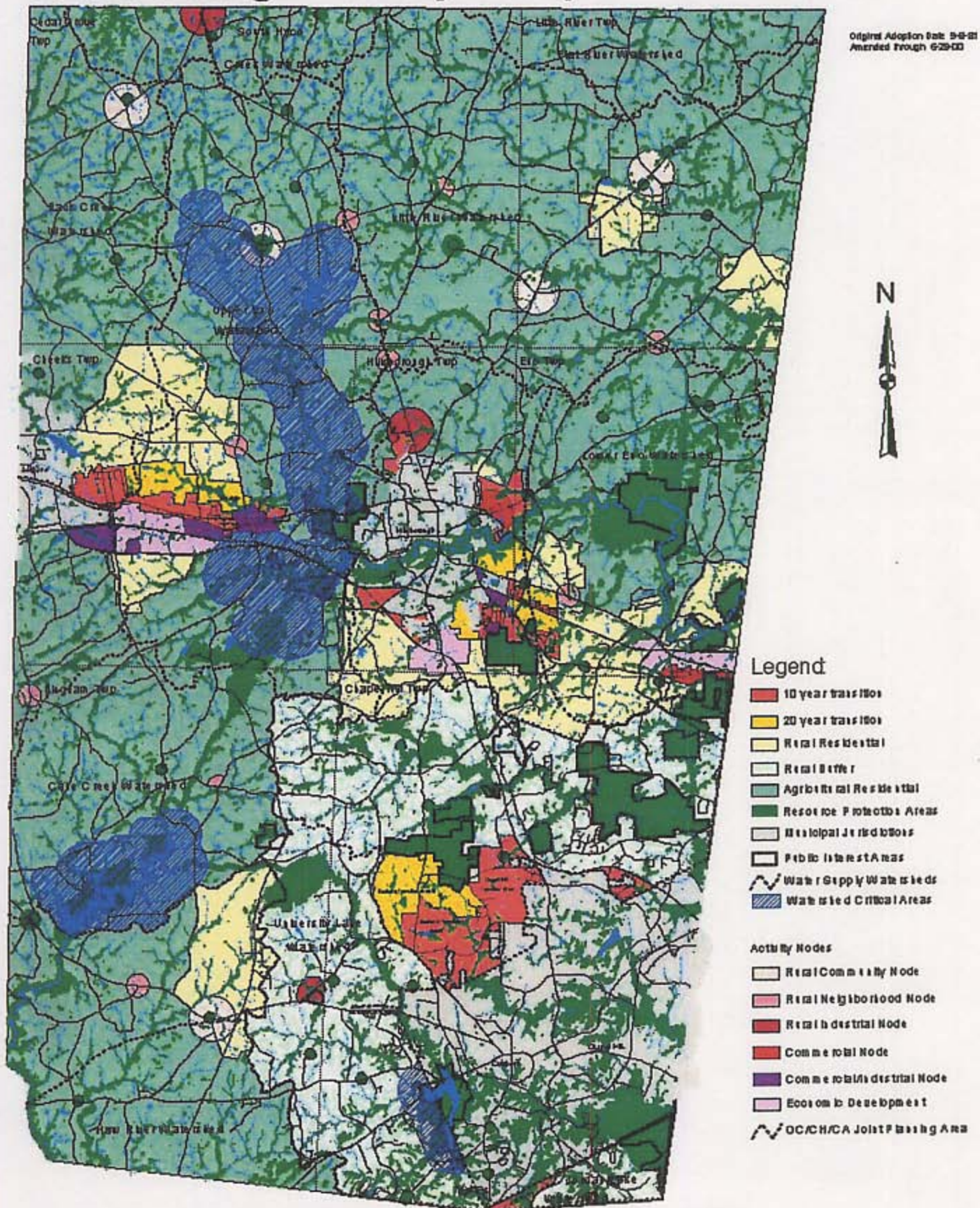
0 5 10 Miles



Created by Bettina Brinkley
Orange County Planning
April, 2002

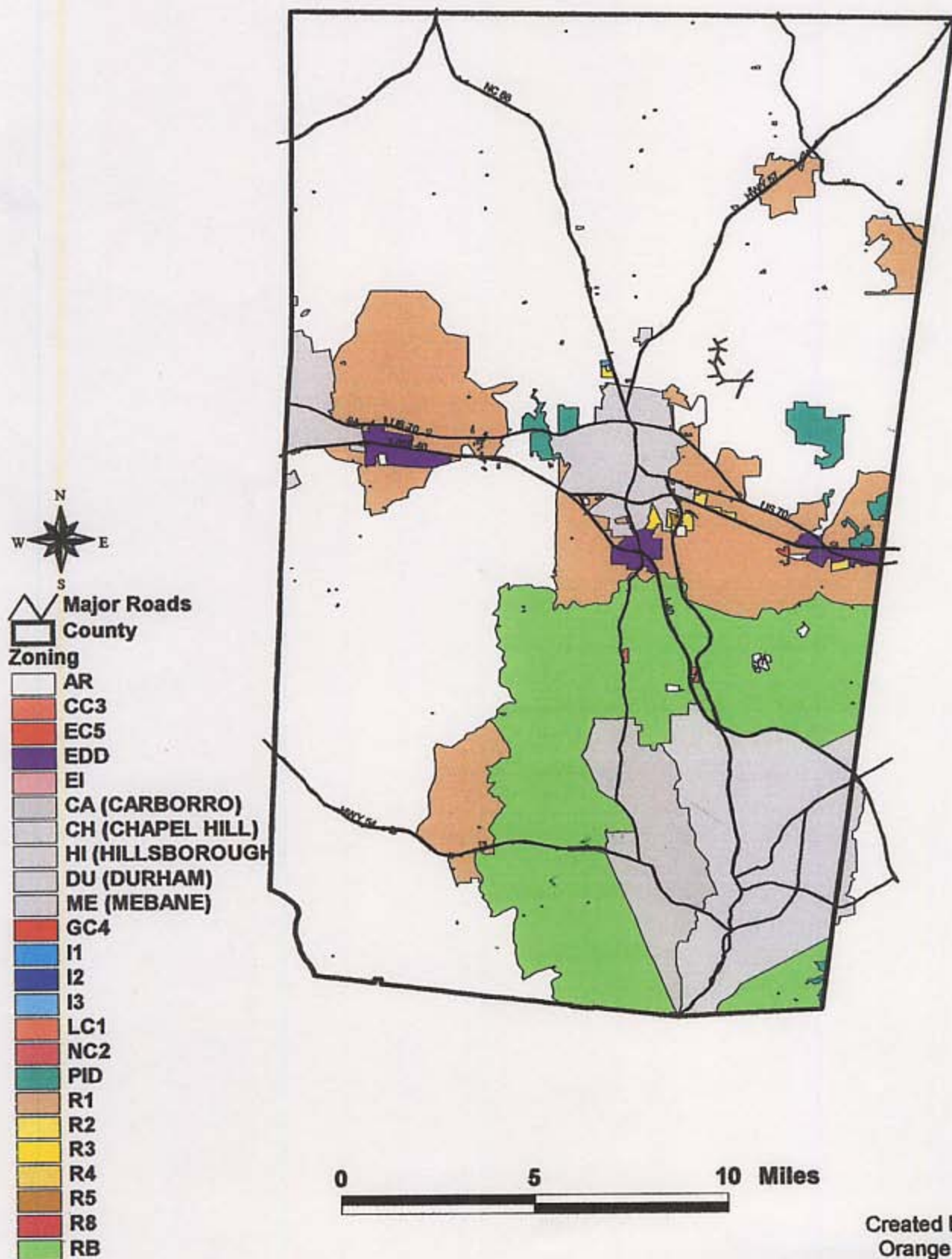
LAND USE ELEMENT

of the Orange County Comprehensive Plan



GIS map prepared by Miriam Coleman, Orange County Planning Department, 2/15/02
(Produced in Arcview from original in Arcinfo)

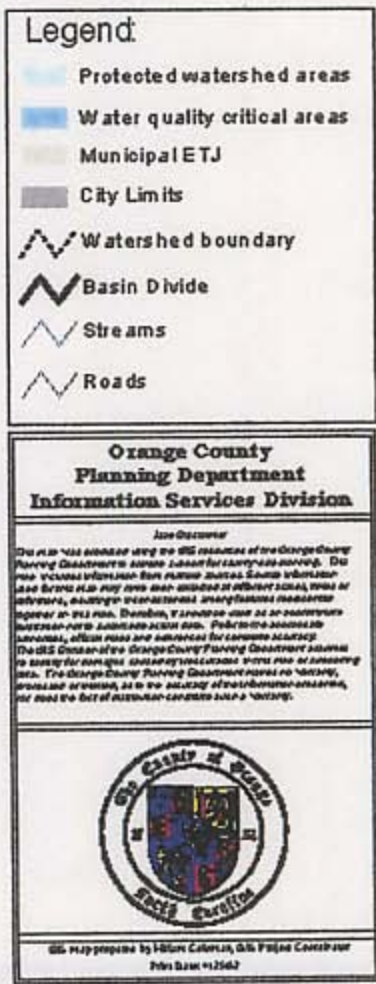
ORANGE COUNTY ZONING



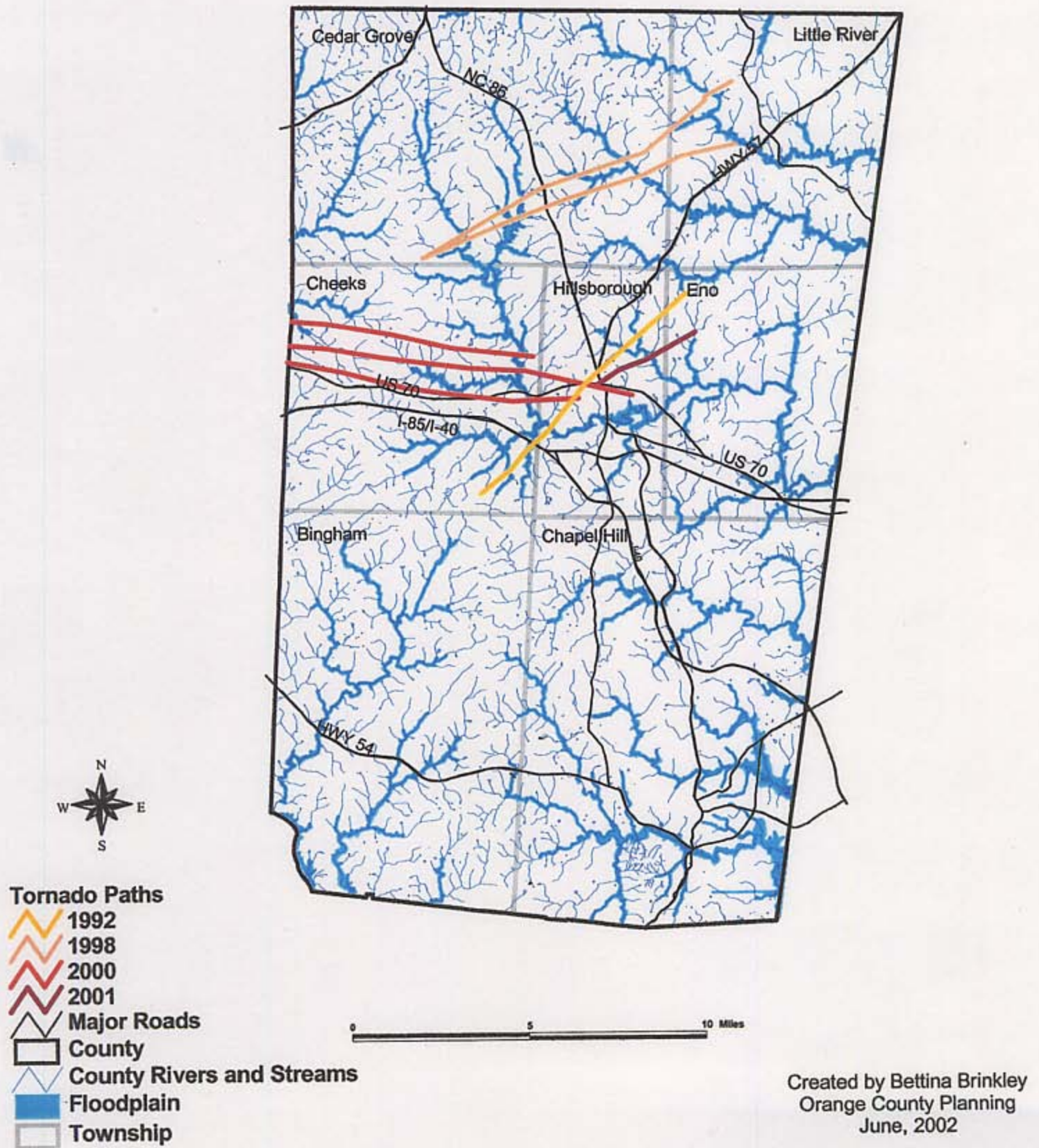
Created by Bettina Brinkley
Orange County Planning
April, 2002

Orange County Zoning Districts

AR	Agricultural Residential
CC3	Community Commercial
EC5	Existing Commercial
EDD	Economic Development
EI	Existing Industrial
GC4	General Commercial
I1	Light Industrial
I2	Medium Industrial
I3	Heavy Industrial
LC1	Local Commercial
NC2	Neighborhood Commercial
PID	Public Interest
R1	Rural Residential
R2	Low and Medium Intensity Residential
R3	Low and Medium Intensity Residential
R4	Low and Medium Intensity Residential
R5	High Intensity Residential
R8	High Intensity Residential
RB	Rural Buffer

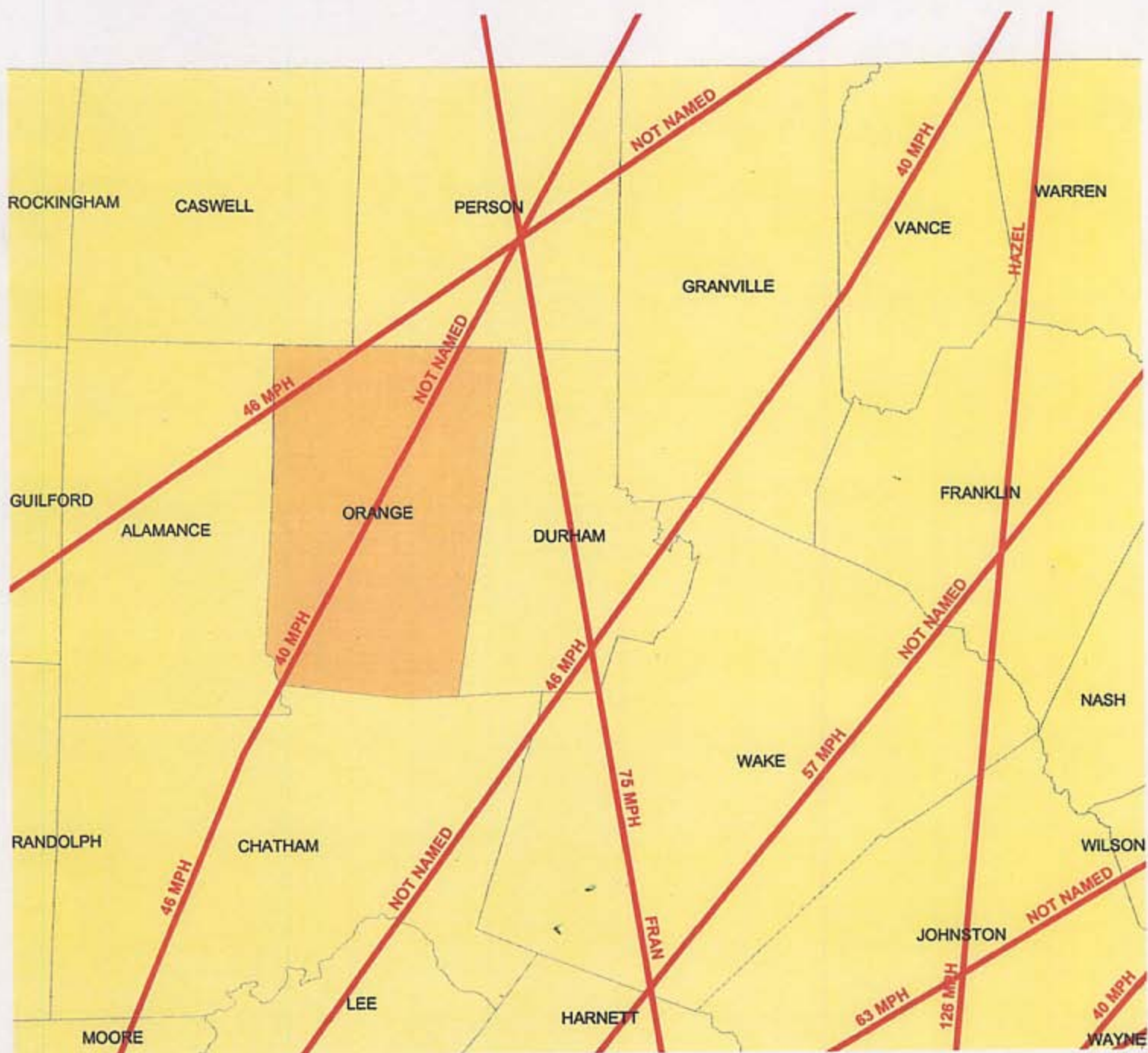


ORANGE COUNTY FEMA Q3 FLOODPLAIN WITH TORNADO PATHS 1990-2001



Hazard Mitigation

Hurricane Paths

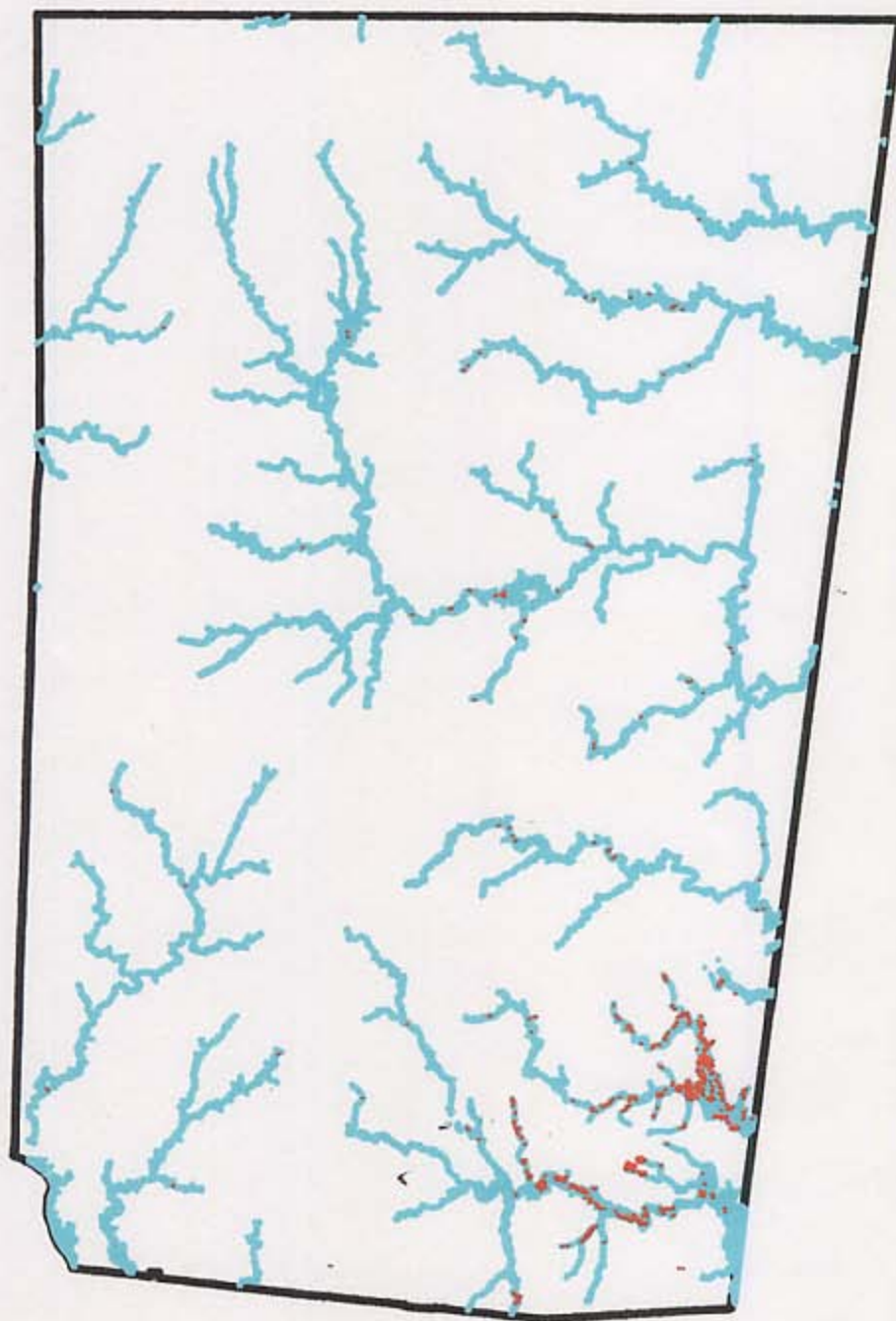


Legend




- Hurricane Paths
- Orange County
- Surrounding Counties



HOUSES IN 100 YEAR FLOODPLAIN ORANGE COUNTY



0 5 10 Miles

-  Houses in Floodplain
-  Floodplain
-  County

Created by Bettina Brinkley
Orange County Planning
April, 2002
Floodplain Data Source: FEMA Q3 Floodplain

ORANGE COUNTY WETLANDS

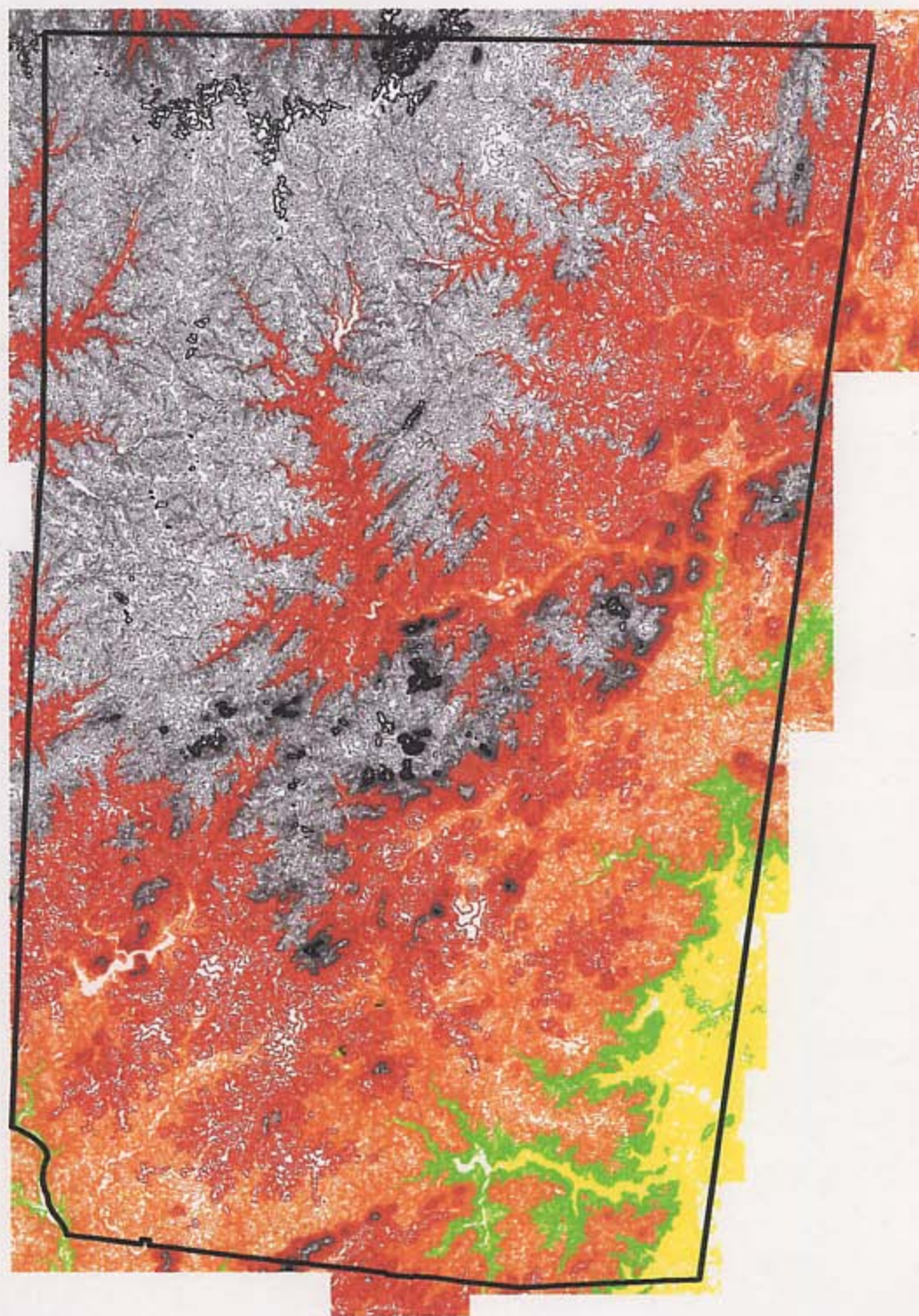


0 5 10 Miles



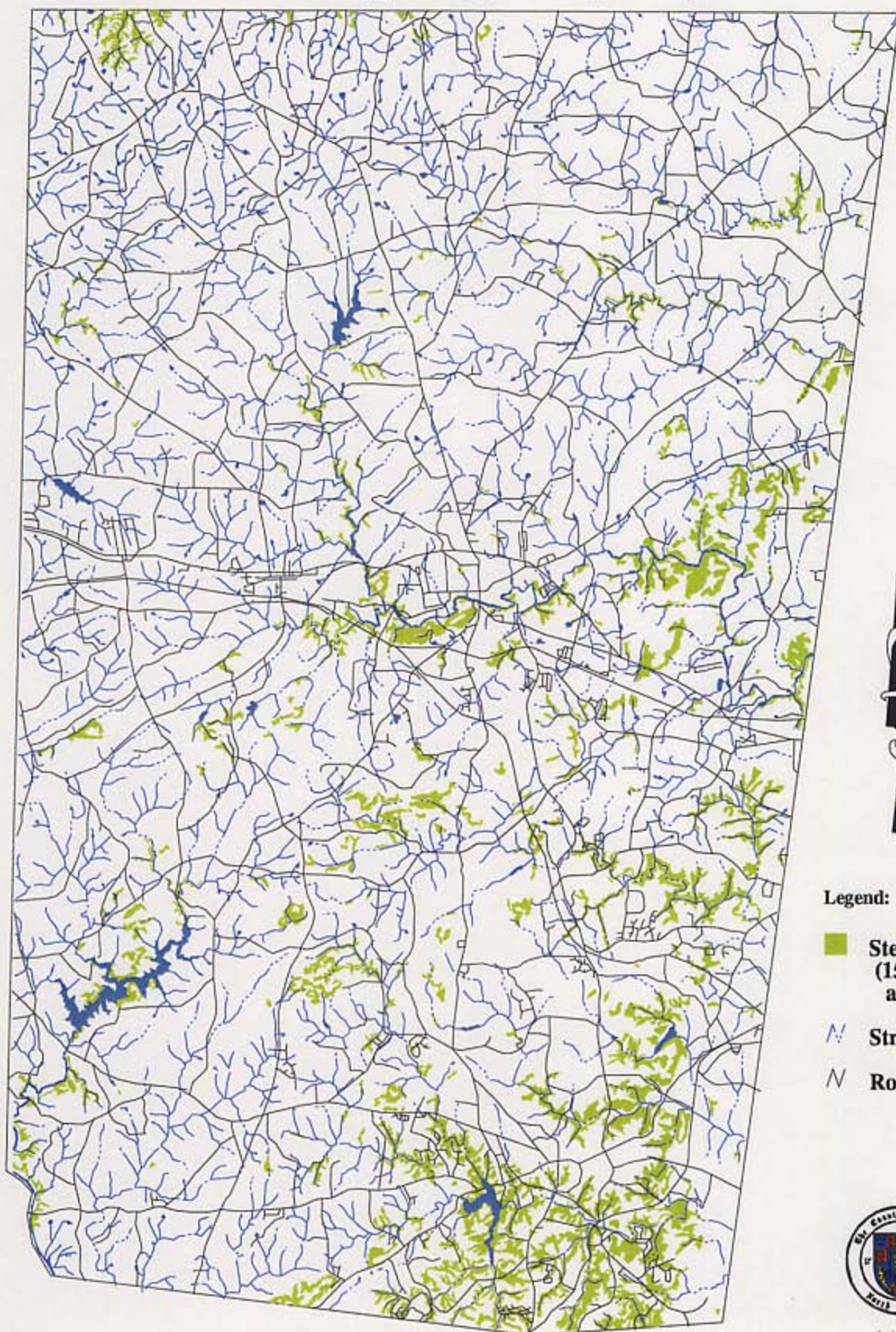
Created by Bettina Brinkley
Orange County Planning
February, 2002
Data Source: Environmental Resource
Conservation Division

ORANGE COUNTY TOPOGRAPHY






Created by Bettina Brinkley
Orange County Planning
April, 2002

Topography



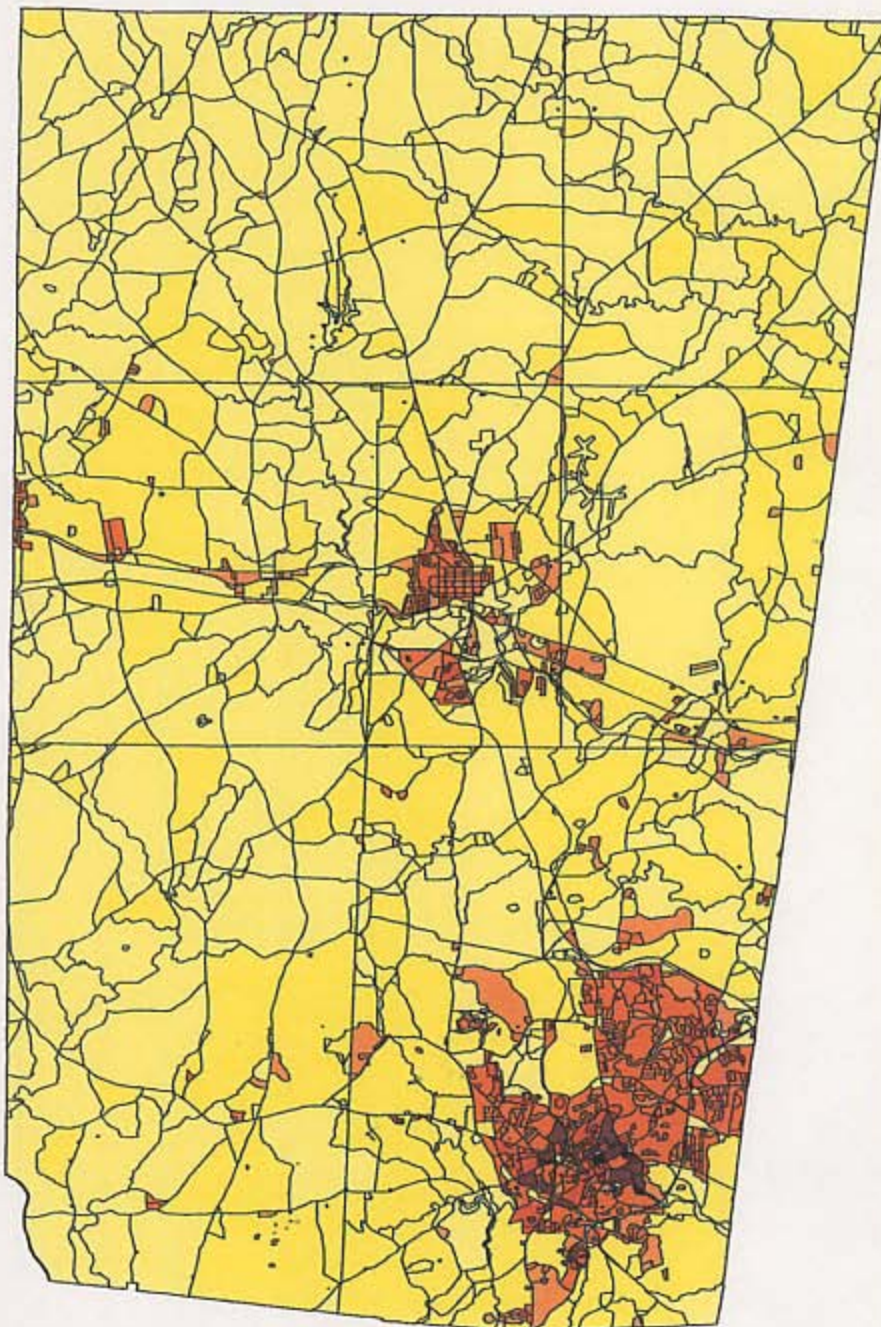
Legend:

-  Steep Slopes
(15 percent
and greater)
-  Streams
-  Roads

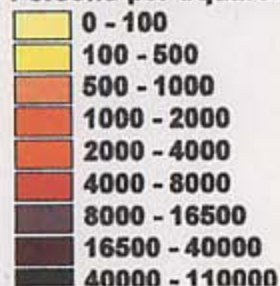


revised 11/08/95

ORANGE COUNTY POPULATION CONCENTRATION



Persons per Square Mile – Census Blocks



0 5 10 Miles

A horizontal scale bar with three segments labeled 0, 5, and 10 Miles. The bar is black with white text.

Created by Bettina Brinkley
Orange County Planning
April, 2002

Orange County Subdivisions Approved 1989 - 2001



LEGEND

- Major Subdivisions
- Minor Subdivisions
- Exempt Subdivisions

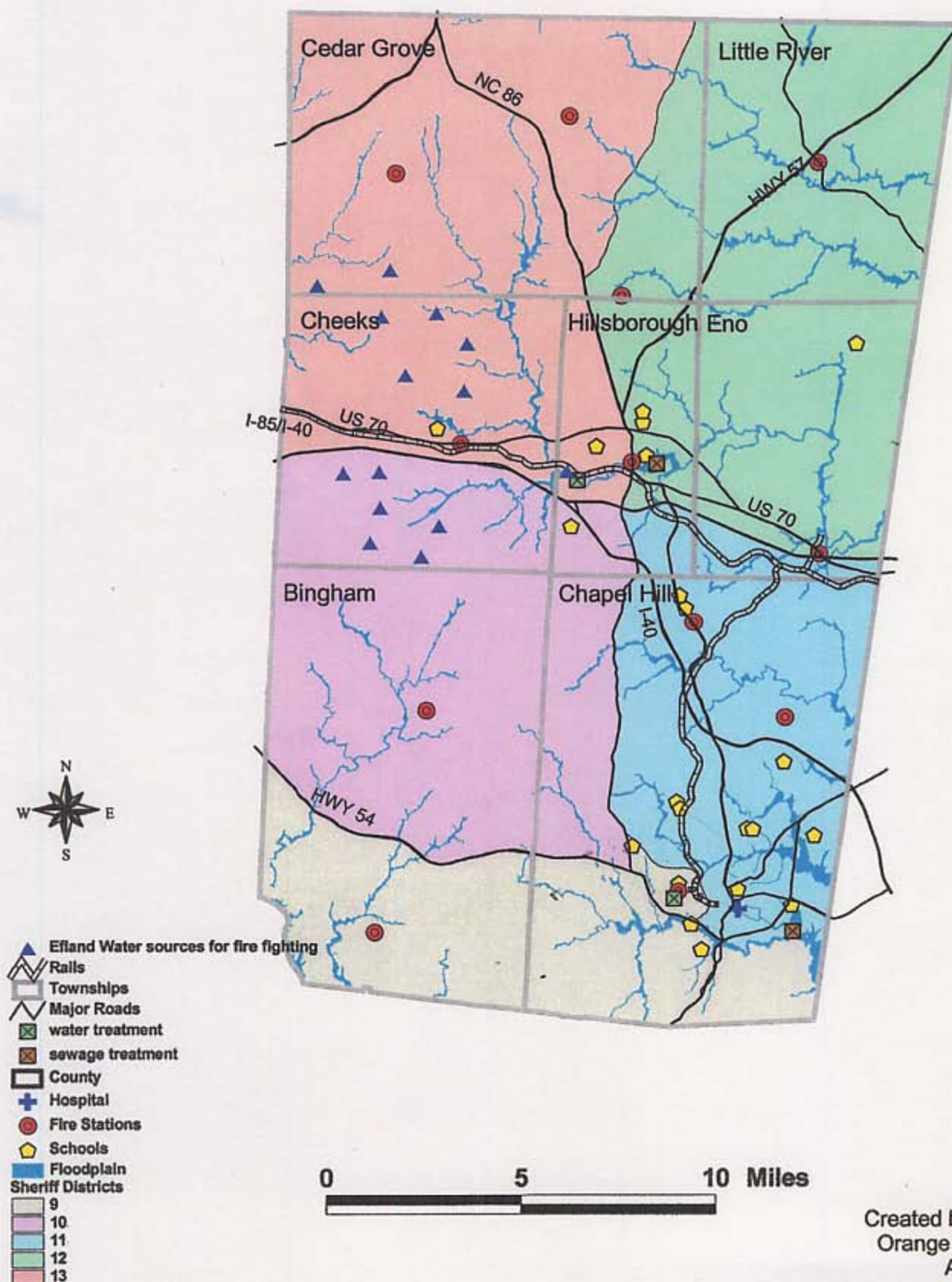


0

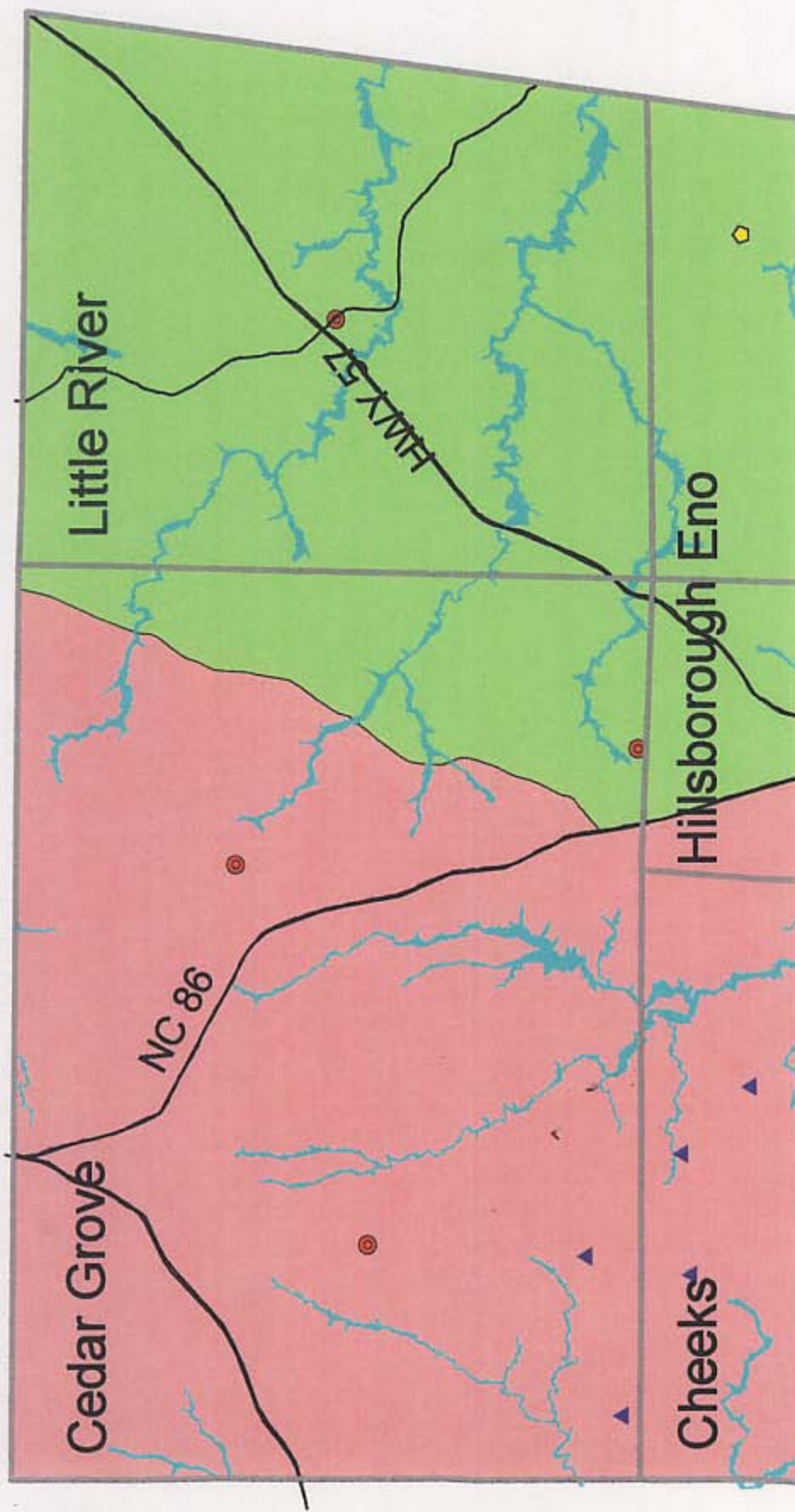
10 Miles

Orange County Planning Department
GIS Map Prepared by Carrie Whitehill
February, 2002

ORANGE COUNTY CRITICAL FACILITIES



Created by Bettina Brinkley
Orange County Planning
April, 2002



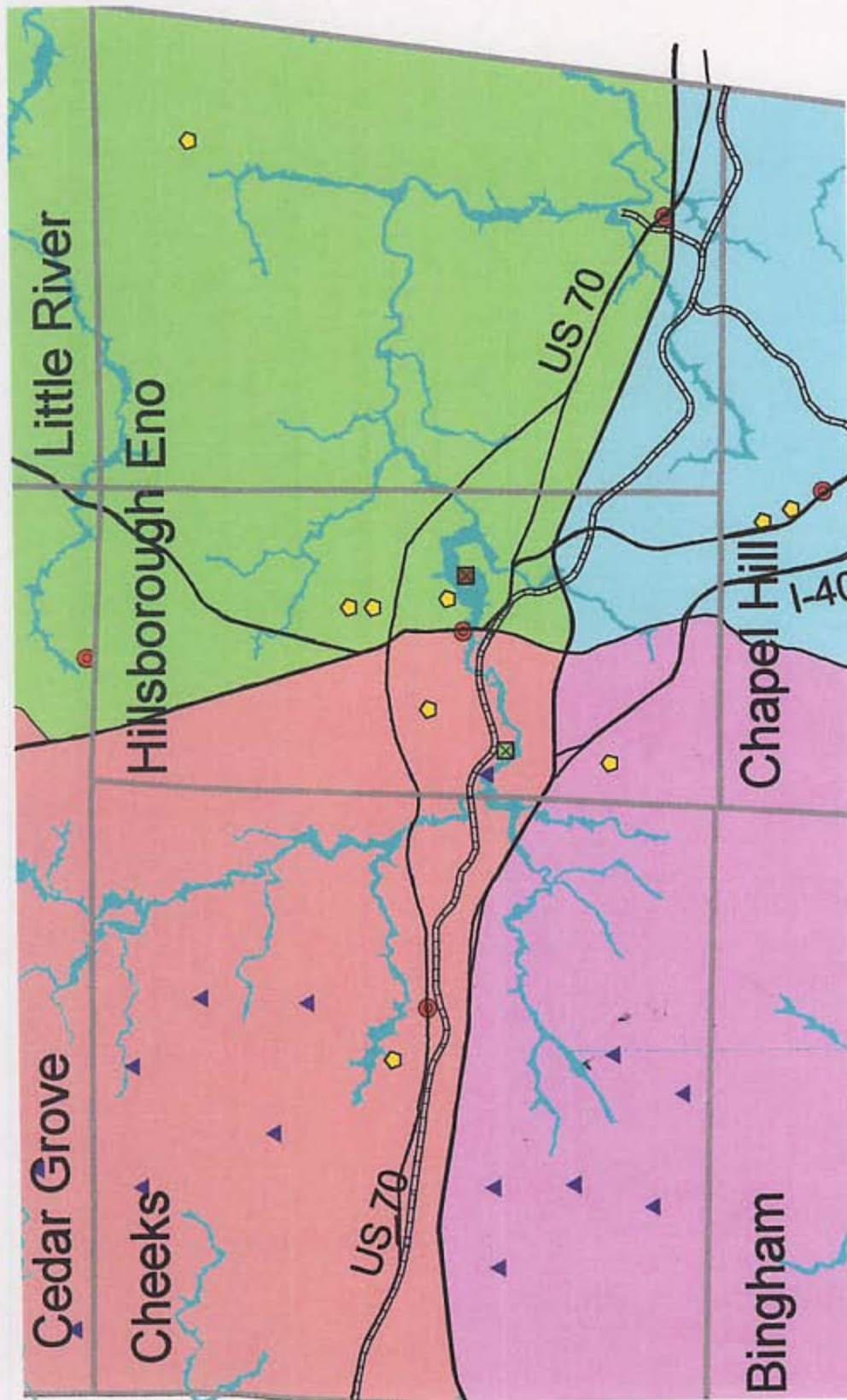
Effland Water sources for fire fighting

- Ralls
- Townships
- Major Roads
- water treatment
- sewage treatment
- County
- Hospital
- Fire Stations
- Schools
- Floodplain
- Sheriff Districts



ORANGE COUNTY CRITICAL FACILITIES NORTHERN SECTOR

Created by Bettina Brinkley
Orange County Planning
April, 2002

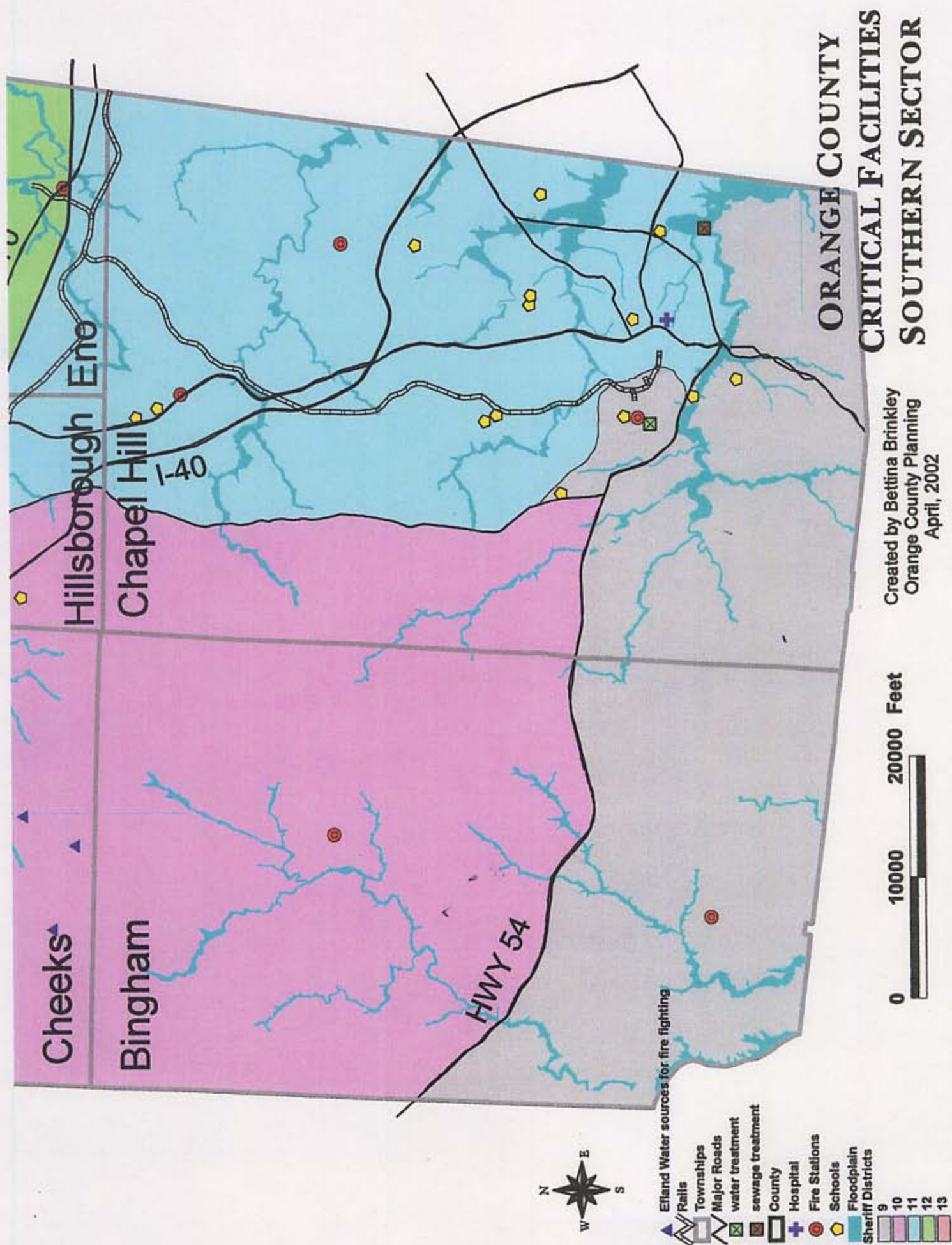


Elford Water sources for fire fighting

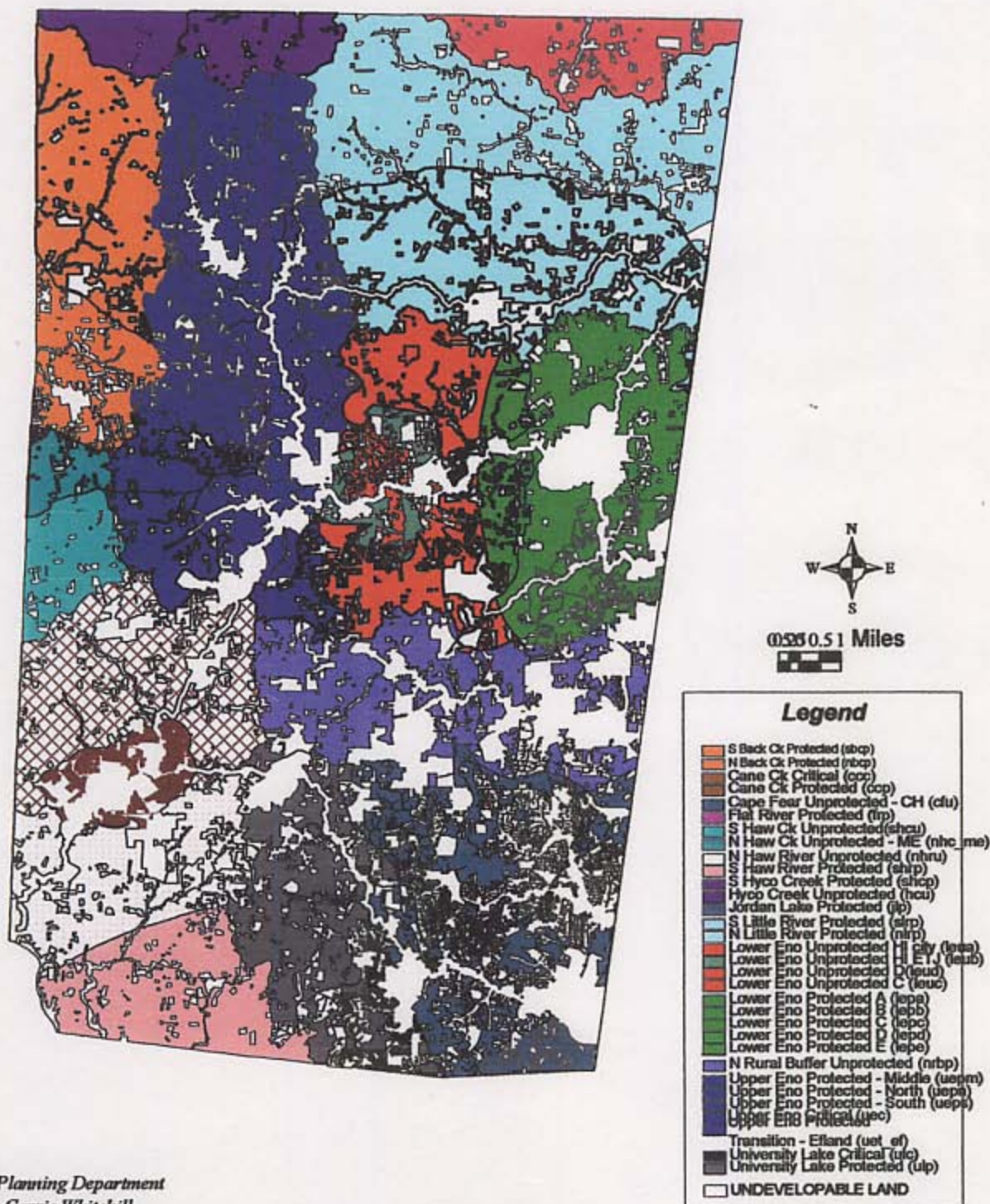


ORANGE COUNTY CRITICAL FACILITIES CENTRAL SECTOR

Created by Bettina Brinkley
Orange County Planning
April, 2002



Developable Land by Watershed Subarea **Orange County Comprehensive Plan**



Appendix B: Examples of New Orange County Mitigation Strategies

Update of Land Use Element of Comprehensive Plan

The Land Use Element of the Comprehensive Plan was first adopted September 2, 1981, and has been amended numerous times since adoption. Preparation of a new Land Use Element is currently under way by the Orange County Planning Department Staff.

The Comprehensive Plan is expected to re-solidify policies that restrict development in hazard areas such as floodplains and steep slopes. In addition, the update will likely recommended policies that lowers density in rural areas.

If policies such as these are adopted and implemented, vulnerability to such hazards such as flooding, landslides, and wildfires should be further reduced.

Responsibility: Orange County Planning and Inspections.

Target Date for Completion: by the end of 2004

Unified Development Ordinance (UDO)

The County's land use ordinances (Zoning, Economic Development District Design Manual, Hillsborough Economic Development District Design Manual, Subdivision, Flood Damage Prevention, Soil Erosion and Sedimentation Control, Storm Water Management, and Environmental Impact) are to be combined into one UDO. Rewrite to occur after update of the Land Use Element of the Comprehensive Plan.

The UDO will implement the policies outlined in the Comprehensive Plan. Implementation of the types of policies likely to be included in the Comprehensive Plan update should reduce vulnerability to such hazards such as flooding, landslides, and wildfires.

Responsibility: Orange County Planning and Inspections

Target Date for Completion: FY 04-05.

Floodplain Mapping Projects

Orange County continues to work with State and Federal agencies to complete new floodplain mapping within its jurisdiction.

Orange County development regulations do not permit new structures to be constructed in floodplain areas.

Responsibility: Orange County Planning and Inspections

Target Date for completion: Unknown.

Decrease Density in Protected Water Supply Watersheds

Current reviews of existing housing densities in protected water supply watersheds are being performed. This work will most likely be connected with the preparation of the new Land Use Element of the Comprehensive Plan.

Reducing density in rural areas should reduce vulnerability to several hazards, including wildfires.

Responsibility: Orange County Planning and Inspections

Target Date for Completion: FY 2004-05

Analysis

Complete removal of risk from several identified hazards is realistically not possible to achieve. For example, tornados can occur anywhere in the region, so restricting development in an area where a tornado had “touched down” in the past is not likely an effective mitigation measure for this hazard. A more effective mitigation measure would be to enforce wind velocity provisions in building codes, which Orange County does. Even so, a very strong tornado would be expected to damage or destroy some structures; it is the risk people take when living in a region of the country where tornado activity is likely.

Mitigation measures for hazards such as earthquakes are available, but because the risk of an earthquake in this region of the country is relatively low, the costs involved to mitigate against a low-risk hazard would increase the cost burden to higher than acceptable levels. For example, building codes similar to those enforced in California, a state with a much greater earthquake risk, could be adopted and enforced but the substantially higher engineering and construction costs make it difficult to justify mitigating against the hazard in Orange County, North Carolina.

Orange County has been proactive in mitigating against the hazards to which it is most susceptible, namely flooding and landslides, by prohibiting construction of new structures in floodplain areas and limiting construction in areas of steep slopes.

Appendix C: Orange County Capability Assessment

Policies, Practices, Programs, Regulations and Activities (Existing and Potential)	Document Reference (Page number)	Effectiveness for Mitigation High/Med/Low/Not Effective	Rationale for Effectiveness
Orange County Subdivision Regulations			
IV. Required Minimum Design Standards	Page 25		
Land Suitability	Page 25	High	Protection of floodplains, wetlands, & steep slopes
Streets	Page 27	High	Street interconnectivity & adequacy of design
Lot Layout	Page 33	Medium	Control lot layout related to streets hazard/sensitive areas
Landscape & Buffer Requirements	Page 46	Medium	Protection from pollution & airborne hazards
Cluster Developments	Page 60-b	High	Encourages preservation & protection of hazard sensitive areas
Wetlands	Page 65-t	High	Permitting for land disturbance in/near water bodies & wetlands
Private Road Standards	Page A-1	Low	Construction standards for private roads. Interconnectivity not required for private roads
Orange County Zoning Ordinance			
The Board of County Commissioners and its Administrative Mechanisms	Page 2-1		
2.2.13 Comprehensive Plan Adoption	Page 2-7	High	Serves as basis for land use regulations
IV. Establishment of permitted use table and schedule	Page 4-11	High	Separation of incompatible land uses.
V. Establishment of Dimensional Requirements	Page 5-1		
5.1.1 Schedule for Residential Development: Single, two family, multi-family, residential hotels, rooming houses, etc.	Page 5-2	High	Building set backs, lot coverage, bld. Height limits
5.1.2 Schedule for non-residential development: lot by lot, planned dev.	Page 5-3	High	Same as 5.1.1

Policies, Practices, Programs, Regulations and Activities (Existing and Potential)	Document Reference (Page number)	Effectiveness for Mitigation High/Med/Low/Not Effective	Rationale for Effectiveness
VI. Application of Dimensional Requirements	Page 6-1		
6.14.1 Electrical Disturbance or Interference	Page 6-15	High	Non-interference with emergency comm. equipment
6.14.9 Air Pollution	Page 6-18-a	Low	Air pollution standards for land uses.
6.14.10 Disposal of Liquid Wastes	Page 6-18-a	High	Standards for liquids waste/septic disposal
6.17 Traffic Impact Study Required	Page 6-25-b	High	Required if project generates 800 trips or greater per day.
6.19 Federal Wetlands Permits	Page 6-25-b	High	Permit required if land disturbance in or near water.
6.23 Extra requirements for watershed protection overlay districts.	Page 6-26	High	Exceeds State requirements for water supply watershed
6.23.1 Land Use Restrictions	Page 6-26	High	Prevention of water supply contamination.
6.23.2 Residential Density	Page 6-27	High	Controls density in protected watersheds
6.23.3 Storm water Infiltration and Detention	Page 6-28	High	Prevention of water supply contamination.
6.23.4 Operation and Maintenance of Structure BMPs (Detention Ponds)	Page 6-28	High	Prevention of water supply contamination.
6.23.5 Placements of streets, Driveways and buildings	Page 6-39	Medium	Protection of stream buffers
6.23.7 Stream Buffers	Page 6-40	High	Protection of floodplains along USGS classified water bodies.
6.23.9 Clustering	Page 6-44	High	Protection of sensitive/flood plain areas.
6.26.4 Site Plan Requirements	Page 6-46	High	Review of plans by local/ State agencies.
6.26.8 Sign Regulations	Page 6-48	High	Restricts size, height, and location of signs.
VII. Planned Development Districts	Page 7-1	High	Protection of sensitive areas.

Policies, Practices, Programs, Regulations and Activities (Existing and Potential)	Document Reference (Page number)	Effectiveness for Mitigation High/Med/Low/Not Effective	Rationale for Effectiveness
IX. Signs	Page 9-1		
9.11 Permitted Signs: Size, Number, height, & location	Page 9-5		Restricts size, height, and location of signs.
XIII. Traffic Impact Study	Page 13-1		Required if project generates 800 trips or greater.
XIV. Site Plan Approval Procedures	Page 14-1		Review of plans by local/ State agencies.
Economic Development District Design Manual			
2.2 Permitted Uses	Page 2.1.1	Medium	Protection of adjoining properties from incompatible uses.
2.3 Land Use Intensity			
Impervious Surface Ratio (ISR)	Page 2.3.3	High	Water supply protection. Storm water runoff control.
Building Volume Ratio (BVR)	Page 2.3.5	High	Regulation of height/bulk of buildings.
Landscape Volume Ratio (LVR)	Page 2.3.7	High	Pollution reduction protection
Site Volume Ratio (SVR)	Page 2.3.10	High	Limits bulk of structures on zoning lots.
2.4 Environmental Factors			
Noise	Page 2.4.2	Low	Reduction in noise pollution.
Vibration	Page 2.4.5	Low	Standards based on dated tech.
Air Pollution	Page 2.4.6	High	Reduction in air pollution.
Electromagnetic Interference	Page 2.4.9	High	Less interference with emergency communications equipment.
Hazardous Materials	Page 2.4.9	High	Water supply/public protection.
Solid Waste	Page 2.4.12	Low	Solid waste management
Grading & Erosion Control	Page 2.4.17	High	Supports floodplain/water supply protection
Storm water Management	Page 2.4.18	High	Supports floodplain/water supply protection.

Policies, Practices, Programs, Regulations and Activities (Existing and Potential)	Document Reference (Page number)	Effectiveness for Mitigation High/Med/Low/Not Effective	Rationale for Effectiveness
3.3 Circulation & Parking			
Parking Lot Design	Page 3.3.1	High	Provides adequate drive lanes and emergency vehicle access.
Thoroughfare Planning	Page 3.3.8	High	Supports coordinated street parking systems.
Transit Access	Page 3.3.14	Medium	Planning in process for transit
3.5 Signs & Lighting			
Signs	Page 3.5.2	High	Limits size, height & placement of signs

Orange County Erosion Control Ordinance

Section	Page #	Hazard Rating
Section 1	4	N/A
Section 2 Purpose	4	N/A
Section 2.1 Findings of fact relating to Sedimentation and Erosion in University Lake Watershed	4	
Section 2.2 Objectives of Regulations applicable to University Lake Watershed	5	Moderate
Section 3 Definitions	6	Moderate
Section 4 Jurisdiction and Effect	11	Low
Section 5 Scope and Exclusions (County-Wide)	11	Moderate
Section 6 General Requirements for areas other than University Lake Watershed	12	Moderate
Section 6.1 General Requirements for University Lake Watershed	13	Moderate
Section 7 Basic Control Objectives	14	Moderate
Section 8 Mandatory Design and Performance Standards for Land- Disturbing Activity	15	Moderate
Section 9 Stormwater Outlet Protection	20	Moderate
Section 10 Borrow and Waste	22	Low
Section 11 Access and Haul	22	Low
Section 12 Operation in Lakes or other Natural Watercourses	22	Low
Section 13 Responsibility for Installation and Maintenance	23	Moderate
Section 13.1 Off-Site Facilities	23	Moderate
Section 14 Additional Measures	23	Moderate
Section 15 Existing Uncovered Areas	23	Moderate
Section 16 Erosion Control Officer	24	Moderate
Section 17 Permits	24	Moderate
Section 18 Erosion and Sedimentation Control	26	Moderate
Section 18.1 Erosion Control Standards	29	Moderate
Section 19 Appeals	29	N/A
Section 20 Compliance with Plan requirements	31	Moderate
Section 21 Inspections and Investigations	31	Moderate
Section 22 Penalties	33	N/A
Section 23 Injunctive Relief	34	N/A
Section 24 Restoration of Areas Affected by Failure to Comply	34	Moderate
Section 25 Severability	34	Moderate
Section 26 Effective	34	N/A
Section 27 Revisions to this Ordinance	35	N/A
* Complete sections of ordinance will be added later as an addendum		

Orange County Storm Water Management/Neuse River Ordinance

Section	Page #	Hazard Mitigation Level
Section 2 Definitions	PAGE 1	NA
Section 3 Riparian Area Protection within the Neuse River Basin	PAGE 6	MODERATE
Section 4 Table of Uses	PAGE 14	LOW
Section 5 New Development Review	PAGE 22	LOW
Section 6 Nutrient Load Calculations	PAGE 22	MODERATE
Section 7 Stormwater Management Plan	PAGE 25	MODERATE
Section 8 Permanent Nitrogen Export Reduction Best Management Practices	PAGE 26	MODERATE
Section 9 BMP Construction	PAGE 27	MODERATE
Section 10 Annual Maintenance	PAGE 28	MODERATE
Section 11 Land Use Planning Provisions	PAGE 28	MODERATE
Section 12 Jurisdiction-Wide and Inter-Local Approaches	PAGE 29	MODERATE
Section 13 Jurisdiction-Wide Collection of Illegal Discharge Information	PAGE 29	HIGH
Section 14 Illegal Discharges	PAGE 29	MODERATE
Section 15 Inspections and Investigations	PAGE 32	MODERATE
Section 16 Penalties	PAGE 34	MODERATE
Section 17 Injunction Relief	PAGE 35	MODERATE
Section 18 Compliance with Requirements	PAGE 35	MODERATE
Section 19 Severability	PAGE 36	MODERATE
Section 20 Effective Date	PAGE 36	NA
Section 21 Revisions to this Ordinance	PAGE 36	NA
*Complete sections of ordinance will be added later as an addendum.		

Appendix D: Plan Submission from the Town Of Carrboro

Resolution Adopting Orange County Hazard Mitigation Plan

A RESOLUTION ADOPTING ORANGE COUNTY HAZARD MITIGATION PLAN

WHEREAS, the North Carolina General Assembly passed Senate Bill 300 "*An Act to Amend the Laws Regarding Emergency Management as Recommended by the Legislative Disaster Response Commission*" in June of 2001 that among other provisions requires local governments to have a hazard mitigation plan approved prior to August 1, 2002 in order to receive state public assistance funds;

WHEREAS, in October of 2000 the President of the United States signed into law the "*Disaster Mitigation Act of 2000*" (PL 106-390) to amend the "*Robert T. Stafford Disaster Relief and Emergency Act of 1988*" which among other provisions requires local governments to adopt a mitigation plan in order to be eligible for hazard mitigation funding;

WHEREAS, the North Carolina Division of Emergency Management is assisting local governments in the formulation of hazard mitigation plans;

WHEREAS, the North Carolina Division of Emergency Management has established rules and criteria that allow municipalities to adopt their county's approved hazard mitigation plan through resolution;

WHEREAS, the Town of Carrboro has worked closely with the Orange County Hazard Mitigation Planning Team to develop a county-wide hazard mitigation plan that will serve the needs of Carrboro Citizens;

WHEREAS, the Town of Carrboro supports Hazard Mitigation Planning as a logical means toward protecting people and property from the potential devastating effects of natural hazards;

NOW, THEREFORE, BE IT RESOLVED that the Carrboro Board of Aldermen:

1. Desire to participate with Orange County in planning for the mitigation of effects caused by natural hazards;
2. Assign staff representation as determined by the Town Manager to work as a members of the Orange County Hazard Mitigation Planning Team to implement and update hazard mitigation planning activities;
3. Adopt, by way of this resolution, the "*Orange County Hazard Mitigation Plan*" as approved by the North Carolina Division of Emergency Management.

Town of Carrboro Local Mitigation Strategies

**TOWN OF CARRBORO, N.C.
LOCAL MITIGATION STRATEGIES**

New or Revised Initiatives	Local Responsibility	Target Dates for Completion
<p>The programs, policies, ordinances and goals listed in the previous section serve the town's hazard mitigation needs quite well and provide a comprehensive approach toward hazard mitigation. This section includes a list of new programs, goals, ordinances, or approaches that the Town may wish to undertake in the future to further reinforce its ability to mitigate natural hazards. In addition to the forgoing, the Town of Carrboro supports the goals listed in <i>Orange County's Hazard Mitigation Plan</i>. The Town of Carrboro, as a member of the Orange County Hazard Mitigation Team, will coordinate with Orange County to reevaluate and update its hazard mitigation planning component at least once every five years or sooner as deemed appropriate by the Orange County Planning Director.</p>		
<p>• Community Rating System The National Flood Insurance Program's (NFIP) Community Rating System (CRS) was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. The National Flood Insurance Reform Act of 1994 codified the Community Rating System in the NFIP. Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that meet the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance. The Community Rating System administered by the Insurance Services Office, Inc. (ISO), provides communities that complete their application requirements with an insurance rating. The town of Carrboro intends to submit an application to the ISO for an insurance rating that will benefit owners of flood prone property.</p>	Town of Carrboro Planning Department	12-2002
<p>• Floodplain Mapping Projects The Town of Carrboro will continue to monitor ongoing efforts by the State and the Army Corps of Engineers to complete new floodplain mapping for the planning area. Local staff resources will be needed to implement and</p>	Town of Carrboro Planning Department and Town Engineer and the Town of Chapel Hill,	Ongoing

New or Revised Initiatives	Local Responsibility	Target Dates for Completion
encourage the completion of these activities.	Engineering Department	
<ul style="list-style-type: none"> • Greenways <p>The Town needs assistance and support for the development of greenways and parklands dedicated to public use along streams and easements. The Town will seek to secure funding from federal, state and local sources to implement the Town's greenway system, which will in turn mitigate flood hazards.</p>	Town of Carrboro Planning Department and Recreation Department	Ongoing
<ul style="list-style-type: none"> • Underground Utilities <p>The Town of Carrboro requires new developments to install electric, cable and telephone wires underground. The older neighborhoods are served by overhead utilities and services fail when fallen trees and or tree limbs break lines. It would be beneficial to locate these utilities underground since the Town has experienced lengthy power outages during ice storms or major storm events such as Hurricane Fran. Retrofitting above ground utilities by placing them underground is beyond the financial means of the town and could only be accomplished with resources from the utilities and/or with state and federal assistance.</p>	Town of Carrboro Planning Department and Public Works Department Public Utilities	Ongoing

Town of Carrboro Community Capability Assessment

TOWN OF CARRBORO, N.C.
COMMUNITY CAPABILITY ASSESSMENT

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<i>Carrboro Vision 2020, Policies Through the Year 2020</i> -adopted by the Carrboro Board of Aldermen on December 5, 2000. This documents provides the following policies that support a decrease in the town's exposure to natural hazards:			
<p style="text-align: center;">Open Space</p> <p>1.11 The town should encourage and support the development of greenways and parklands dedicated to public use along streams and easements. There should be a network of connected greenways throughout the town. These greenways should serve as nature trails, biking and walking trails, wildlife corridors. All should protect our natural environment.</p>	Page 9	High <i>Financial assistance will benefit the full implementation of the greenway system.</i>	Limits or disallows construction within flood hazard areas
<p>2.0 DEVELOPMENT</p> <p>Carrboro's development should take place in a manner consistent with a set of adopted values... Respect for and protection of the natural environment should be integrated into the town's policies as a high priority in enriching the quality of life...</p>	Page 12	Medium <i>Need assistance in maintaining the inventory, database and digital topos /ortho-photos</i>	Supports floodplain protection

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p><u>Preservation of the Natural Environment</u></p> <p>2.21 The Town should continue to require the preservation and maintenance of open space when land is developed, to enforce restraints on clear-cutting, and to require adequate buffers.</p> <p>2.22 Where development is deemed acceptable, there should be well-defined dense development with areas of well-preserved open space.</p> <p>2.23 The town encourages the planting of native plant species, as well as non-native species that are not invasive. Removal of invasive species is encouraged. The town supports education on this topic and encourages the public to become aware of the list of invasive plant species found in Appendix E-17 of the Town of Carrboro Land Use Ordinance.</p>	Page 12-13	<p>Medium</p> <p><i>Enabling legislation is needed to limit clear cutting within buffers on bonafide farms</i></p> <p><i>Need assistance in maintaining the inventory, database and digital topos /ortho-photos</i></p>	Supports floodplain protection
<p>Limits on Development</p> <p>2.41 Development throughout Carrboro should be consistent with its distinctive town character. The town should adhere to policies that limit the widening of roads, encourage plantings alongside roads, preserve historic areas, buildings and older neighborhoods, and retain unspoiled green spaces and other natural areas.</p> <p>2.42 Carrboro should plan and encourage the growth of tree canopies over roads to mitigate the heat and smog effect caused by superheated pavement. Carrboro should strongly encourage the electric utilities to put their lines underground to allow for full canopy coverage.</p>	Page 13	<p>Medium</p> <p>Financial assistance for maintaining and/or enhancing open space.</p> <p><i>Assistance from utilities and others to install existing overhead utilities underground.</i></p>	Supports floodplain protection
<p><i>Town of Carrboro, North Carolina; Land Use Ordinance</i>-adopted by the Board of Aldermen on November 25, 1980. This documents is a unified development ordinance that regulates all matters relating to the use of land throughout the town's planning jurisdiction including both zoning and subdivision regulations. Following is a summary of</p>			

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
regulations that should decrease the town's exposure to natural hazards:			
<p>Floodway And Floodplain Restrictions</p> <p>(a) No building may be constructed or located, and no substantial improvement of an existing building may take place within any floodway.</p> <p>(b) No new building may be constructed or located wholly or partially within any floodplain outside the floodway unless and to the extent that, in the absence of such authorization the property owner would be deprived of all reasonable use.</p>	Section 15-254	High Assistance may be needed to acquire properties substantially within a floodway or floodplain.	Limits or disallows construction within flood hazard areas
<p>Natural Drainage System Utilized to Extent Feasible.</p> <p>(a) To the extent practicable, all development shall conform to the natural contours of the land and natural drainage ways shall remain undisturbed.</p> <p>(b) To the extent practicable, lot boundaries shall be made to coincide with natural drainage ways within subdivisions to avoid the creation of lots that can be built upon only by altering such natural drainage ways.</p>	Section 15-261	High <i>Need assistance in maintaining the drainage inventory, database and digital topos /ortho-photos</i>	Limits or disallows construction within flood hazard areas and minor drainage ways
<p>Storm Water Management</p> <p>(a) All developments shall be constructed and maintained so that they do not cause stormwater-related damage to upstream or downstream properties as provided in the remaining provisions of this section. Compliance with this standard shall be determined in reference to storm events up to the 100-year storm for upstream properties and up to the twenty-five year storm for downstream properties. Effects on downstream drainage facilities within street rights-of-way shall also be evaluated for storm events up to the twenty-five year storm.</p> <p>(1) To achieve this objective, the potential impacts on surface water quantity and quality from all proposed developments requiring special use or conditional use permits shall be identified and evaluated by the developer and reviewed by the town</p>	Section 15-263	High Additional financial support to offset engineering expenses would benefit both the town and the developer. <i>Opportunities exist for storm water mitigation computer models to assist in selecting water quality and quantity BMP's.</i> <i>Additional assistance is needed to fund water</i>	Limits or disallows construction within flood hazard areas, reduces runoff and limits damage to properties and water quality.

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>engineer, staff and the environmental advisory board. The developer shall implement mitigation measures as are determined to be necessary by the town, based upon the results of this evaluation, to prevent the predicted impacts. Potential impacts to be evaluated may include, but are not limited to, backwater effects on upstream properties, increased volumes or rates of stormwater flow, offsite sedimentation, erosion and/or ground-cover loss downstream, increased scouring of any downstream streambed, lowered quality of water due to the pollutants carried in runoff, or any damage that materially injures the value of adjoining or abutting property. The area of study is <i>not</i> limited to the property being developed.</p> <p>(2) Prior to consideration by the permit issuing board, the developer shall, through a qualified professional, submit a statement specifically identifying and quantifying any potential negative stormwater effects the proposed development may have on upstream or downstream properties or water quality. The permit issuing authority may require modifications to the stormwater control plans to achieve compliance with the objectives of this section. If and to the extent that the Board does not require changes to the stormwater control system to eliminate any potential negative effects, then such negative effects shall not thereafter be regarded as “damage” for purposes of subsequent enforcement of this section.</p> <p>(3) Except as provided in subdivision (2) above, approval by the town of a developer’s stormwater control plans, and construction by the developer of the facilities as shown in such plans, shall not relieve the developer of the responsibility of satisfying the “no damage” standard set forth above. If at any time prior to two years following the issuance of a certificate of occupancy (for an</p>		<p><i>quality monitoring on an ongoing basis.</i></p>	

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>unsubdivided development) or the approval of a final plat (for a subdivision) the town determines that the stormwater facilities planned to be installed or actually installed to meet the requirements of this section are inadequate, the town may require the submission of revised plans and the installation of new, altered, or additional facilities to bring the development into compliance. Prior to issuance of a certificate of occupancy or approval of a final plat, the town may require the developer to post a performance bond or other sufficient surety to guarantee compliance with this section.</p> <p>(4) Except as set forth in subdivision (3) above, this section shall impose no obligation on a developer (or any successor to the developer) to modify or alter stormwater facilities installed in accordance with approved plans or to construct new or additional facilities. However, stormwater facilities shall be properly maintained so that they continue to perform as they were designed to perform. All developments shall be constructed and maintained so that they do not cause damage to other properties with their surface waters.</p> <p>(b) The presumption established by this section is that, to comply with the standards set forth herein, the developer shall design and construct all storm water drainage facilities in accordance with the guidelines set forth in the Town of Carrboro Storm Drainage Design Manual (Appendix I to this chapter). However, the permit issuing authority may establish different requirements when it concludes, based upon (i) the information it receives in the consideration of a specific development proposal, and (ii) the recommendations of the Public Works Director or the Town Engineer, that such deviations from the presumptive guidelines are necessary to satisfy the standards set forth in this section, or that the standards can still be met with such deviations and the deviations are otherwise</p>			

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
warranted			
<p align="center">Sedimentation and Erosion Control.</p> <p>(b) The Orange County Erosion Control Officer is authorized by resolution of the Carrboro Board of Aldermen to enforce within the town the Orange County Soil Erosion and Sedimentation Control Ordinance</p>	Section 15-264	Medium Financial assistance would be helpful to support monitoring and enforcement capabilities.	Supports floodplain protection and soil stabilization
<p>Designated Buffer Areas in Watershed</p> <p>(1) <u>Creeks and tributaries</u> (i.e., permanent streams flowing directly into University Lake and permanent streams flowing into such streams). Measure along a line running perpendicular to the edge of the floodplain (or if no floodplain has been demarcated, the center of the stream) fifty feet from the edge of the floodplain (or if no flood plain has been demarcated, from the edge of the water) plus an additional distance equal to:</p> <p align="center">$4 \times \text{slope} \times 100$</p> <p>where "slope" is expressed as a percentage derived by dividing by 100 the rise of elevation between the floodplain boundary line (or if no floodplain has been demarcated, the edge of the water) and a point one hundred feet from that point along the above-described perpendicular line.</p> <p>(2) <u>Intermittent streams flowing into creeks and tributaries.</u> Measure along a line running perpendicular to the centerline of the intermittent stream fifty feet from such stream centerline.</p> <p>(3) <u>Intermittent streams flowing directly into University Lake.</u> Measure along a line running perpendicular to the centerline of the intermittent stream one hundred feet from such stream centerline.</p> <p>(4) <u>Intermittent streams flowing into streams which flow directly into University Lake.</u> Measure along a line running perpendicular to the centerline of the intermittent stream fifty feet from such stream centerline.</p>	Section 15-265	High <i>Need assistance in maintaining the stream buffer inventory, database and digital topos /ortho-photos</i>	Limits or disallows construction within flood hazard areas and minor drainage ways

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>(5) University Lake. Measure along a line running perpendicular to the high water mark or floodplain boundary (whichever is farther from the Lake) one hundred feet from such high water mark or floodplain boundary (whichever is farther from the Lake) plus an additional distance equal to:</p> $4 \times \text{slope} \times 100$ <p>where "slope" is expressed as a percentage derived by dividing by 100 the rise in elevation between the high water line of the Lake and a point one hundred feet from that point along the above described perpendicular line.</p>			
<p>Impervious Surface Limitations (Univ. Lake Watershed)</p> <p>(a) Commercial (B-5 or WM-3 zoning districts) = 6% impervious and 24% impervious with retention of first one inch of rainfall.</p> <p>Residential (C or WR) = may not exceed an impervious surface area equal to 4% of the lot size (minimum lot size is five acres except for existing lots of record)</p>	Section 15-266	Medium No additional <i>gaps, shortfalls, conflicts, or opportunities</i>	Supports floodplain protection and reduces runoff
<p>Protective Buffers Along Streams Outside of the Water Supply Watershed</p> <p>(b) Streams located outside of the University Lake Watershed, with drainage areas smaller than one square mile (640 acres) in area, and where there are no mapped regulatory floodplains, but larger than 50 acres in area shall have a natural protective buffer width of fifty (50) feet or five times the average width of the stream as it flows through the property in question, whichever is larger, maintained on each side of the stream perpendicular to the stream channel, and measured perpendicular to the stream channel from the edge of the stream bank</p> <p>(c) Streams located outside of the University Lake Watershed, with drainage areas smaller than 50 acres in size shall have a natural protective buffer width of fifteen (15) feet or five times the average width of the stream as it flows through the property in question</p>	Section 15-268	High <i>Need assistance in maintaining the stream buffer inventory, database and digital topos /ortho-photos</i>	Limits or disallows construction within flood hazard areas and minor drainage ways

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>Buffers in Northern Transition Area</p> <p>(c) 1. Bolin Creek and Tributaries (permanent streams flowing into Bolin Creek) as shown on the Northern Transition Area Stream Buffer Map on file in the Carrboro Planning Department, which map is incorporated herein by reference. Measure along a line running perpendicular to the edges of the floodplain (or if no floodplain has been demarcated, the center of the stream) one hundred (100) feet from the edge of the floodplain (or if no floodplain has been demarcated, from the edge of the water) plus an additional distance equal to</p> $4 \times \text{slope} \times 100$ <p>where slope is expressed as a percentage derived from dividing by 100 the rise of elevation between the floodplain boundary line (or if no floodplain has been demarcated, the edge of the water) and a point one hundred (100) feet from that point along the perpendicular line described above.</p> <p>2. Intermittent streams flowing into Bolin Creek and its tributaries as shown on the Northern Transition Area Stream Buffer Map. Measure along a line running perpendicular to and sixty (60) feet from the center of the intermittent stream.</p> <p>3. Minor intermittent streams as shown on the Northern Transition Area Stream Buffer Map. Measure along a line running perpendicular to and thirty (30) feet from the center of the minor intermittent stream.</p>	<u>Section 15-269</u>	High <i>Need assistance in maintaining the stream buffer inventory, database and digital topos /ortho-photos</i>	Limits or disallows construction within flood hazard areas and minor drainage ways
<p>Open Space.</p> <p>(3) The following areas shall be regarded as open space if such areas satisfy at least the criteria set forth in Subdivision (1) a, b, and c of subsection (b) of this section:</p> <ol style="list-style-type: none"> Utility easements located outside of street rights of way; Cemeteries located on a tract prior to its development. Areas used for the growing of crops, 	Section 15-198	High Opportunities are created for new greenways and structures are developed outside of fragile environmental areas such as floodways, floodplains, and	Limits or disallows construction within flood hazard areas and minor drainage ways

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>such as hay, corn, or vegetables, if and to the extent that such uses occur within an area that is subject to the control of a homeowners association and such uses are approved by the homeowners association.</p> <p>(4) The term “primary conservation areas” shall mean:</p> <ul style="list-style-type: none"> a. Areas containing slopes greater than 25% b. Hardwood areas identified on the Carrboro Natural Constraints Map c. Wetlands as defined pursuant to Section 404 of the Clean Water Act d. Floodplains e. With respect to streams designated on the adopted Stream Classification Map of Carrboro, those areas within an average perpendicular distance of sixty feet from the edge of the floodway of the stream, if the floodway is designated on the “Flood Boundary and Flood Map” prepared by the U.S. Department of Housing and Urban Development, or sixty feet from the centerline of the stream where the floodway is not designated on this map. f. Lakes and ponds; g. Road buffers as required by Section 15-312 of this Chapter, except for those portions of the buffers that must be included in road or utility crossings. <p>(5) The term “secondary conservation areas” shall mean:</p> <ul style="list-style-type: none"> a. Areas containing slopes greater than 15% but not more than 25%; b. Wooded areas other than hardwood areas identified on the Carrboro Natural Constraints Map; c. Vistas along entranceways to the town; d. Other areas containing unusual natural features (such as major rock formations); 		<p>steep slopes.</p> <p><i>Need assistance in maintaining the primary and secondary conservation area inventory, database and digital topos /ortho-photos</i></p>	

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>f. Other environmentally, historically or archaeologically significant or unique areas.</p> <p>(c) Except as otherwise provided in subsection (j) and Section 15-203, every residential development in zoning districts other than the R-2 district shall be developed so that at least forty percent (40%) of the total area of the development remains permanently as open space. Every residential development in the R-2 district shall be developed so that at least twenty percent (20%) of the total area of the development remains permanently as open space. (AMENDED 09/05/95)</p> <p>(d) Subject to subsection (g), every residential development containing at least 25 lots or dwelling units shall contain, as part of its required open space, one or more areas that are relatively flat, well drained, grassed, and otherwise well suited for use as a play field:</p> <p>(1) Each such area shall contain a minimum of 20,000 square feet configured in such a manner as to be useful as a play field.</p> <p>(2) Every development covered by this subsection shall set aside in one or more play fields meeting the criteria of this subsection a minimum of 400 square feet of area per lot or dwelling unit within the development.</p> <p>(3) Play fields provided under this section shall be located with due regard for the safety and convenience of those using such facilities as well as the welfare of residents living nearby. The play fields required by this subsection shall be located such that 90% of the lots or dwelling units within any development that is required to install such play field are within 1,500 feet of a play field installed to meet the requirements of this subsection, unless the developer demonstrates by clear and</p>			

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>convincing evidence that adherence to this requirement would not be feasible.</p> <p>(4) Play fields constructed to meet the requirements of this subsection may be used by the developer to satisfy the active recreational requirements set forth in Section 15-196 as well as the open space requirements of this section. However, the recreation points assigned to such play fields shall be based upon the actual cost of constructing such play fields, exclusive of land costs.</p> <p>(e) Subject to subsection (g), if a tract where a residential development is proposed contains any areas defined above as primary conservation areas, then such areas shall be designated as open space.</p> <p>(g) A developer shall not be required to set aside as open space under the provisions of subsections (d) and (e) more than the minimum required percentage of open space set forth in subsection (c). If the sum total of open space otherwise required under the provisions of subsections (d) and (e) exceeds forty percent of the development tract (twenty percent in the R-2 district), then the permit issuing authority shall allow the developer to set aside a smaller area of open space under subsections (d) and (e), individually or collectively, so that the developer is not required to preserve as open space more than forty percent of the development tract (twenty percent in the R-2 district). However, if areas that constitute primary conservation areas have not been set aside as open space, then the development plans shall otherwise provide for the preservation of such areas even though they may be located within privately owned lots (e.g. by specifying buildable areas within individual lots). Notwithstanding the foregoing, hardwood areas identified on the Carrboro Natural Constraints Map that are not</p>			

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>set aside as common open space shall be preserved except to the extent that removal of such hardwood trees is necessary to accommodate the permitted uses created out of land not set aside as common open space.</p> <p>(h) If the area of open space required to be preserved under subsections (d) and (e) does not exceed forty percent (40%) of the area of the development tract (20% in the R-2 district), then the permit issuing authority may require that the developer set aside from among the areas that constitute secondary conservation areas as defined above an amount of open space equal to the difference between the amount of open space preserved under subsections (d) and (e) and forty percent (40%) of the development tract (20% in the R-2 district).</p>			
<p>Residential Density of Major Developments in Certain Districts.</p> <p>(a) Notwithstanding the provisions of Section 15-182, when any tract of land within the R-10, R-15, R-20, and RR districts is developed under circumstances requiring the issuance of a special or conditional use permit, the maximum number of dwelling units that may placed on that tract shall be determined in accordance with the provisions of this section.</p> <p>(b) If the development is to be served by OWASA owned water and sewer lines, then the maximum number of dwelling units for any type of residential development shall be determined by dividing the adjusted tract acreage [calculated in accordance with the provisions of subsection (c) below] by the "minimum square feet per dwelling unit" associated with the zoning district of the property to be developed as set forth in Section 15-182. (AMENDED 06/22/99)</p> <p>(c) The adjusted tract acreage shall be calculated by deducting from the gross acreage of the tract</p>	Section 15-182.3	High <i>Opportunity is created to limit the density of development in relation to the land's ability to support development. The need to utilize less suitable areas is reduced and the potential to preserve hazard areas such as flood ways and flood plains is enhanced.</i>	Limits or disallows construction within flood hazard areas

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>the sum total of each of the following areas that may be located within the tract in question. If an area within the tract qualifies under more than one of the following categories, then that area shall be included only within the one category that involves the most restrictive (i.e. the greatest) deduction.</p> <ul style="list-style-type: none"> (1) Floodways: multiply the area within a floodway by a factor of 1.0. (2) Wetlands: multiply the area of designated wetlands by a factor of 0.95. (3) Major Rock Formations: multiply the area of major rock formations by a factor of 0.90. (4) Steep Slopes: multiply the area of land with natural ground slopes exceeding 25 percent by a factor of 0.80. (5) Land traversed by high-tension electrical transmission lines (69kv or higher): multiply the area within the power easement by a factor of 0.75. (6) Floodplains: multiply the 100-year floodplain by a factor of 0.5. (7) Moderately steep slopes: multiply the area with natural ground slopes of between 15 and 25 percent by a factor of 0.4. (8) Land traversed by underground utility lines (not within a street right of way): multiply the area within the easement (or if no easement exists, the area within ten feet on either side of the line) by a factor of 0.3. 			
<ul style="list-style-type: none"> • Floodplain Mapping <p>The Town of Carrboro is participating in the following floodplain mapping projects designed to more accurately define and locate special flood hazard areas throughout Carrboro's planning area:</p>			
<p>NC Floodplain Mapping Program</p> <p>The Town of Carrboro is participating in the North Carolina Floodplain Mapping Program</p>	NA	High <i>A shortfall in funding has delayed</i>	Accurately defines and locates flood

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
<p>administered by the NC Division of Emergency Management. The development of new floodplain maps will be undertaken by the state in order of assigned river basin priorities according to the following three steps: 1) scoping, 2) flood map production and 3) community review and due process. The state has completed the scoping phase for the Cape Fear River Basin that includes Carrboro and is currently in the flood map production phase. This updated flood hazard data will provide current, accurate information for communities and property owners to make proper site and design decisions;</p> <ul style="list-style-type: none"> • Updated flood hazard data will provide current, accurate information for communities and property owners to make proper siting and design decisions; • The use of updated data will dramatically reduce long-term flood losses to local communities; • New flood information will alert those at risk of flooding of the need to purchase flood insurance; • A digital Information System will allow online access to all map users 24 hours a day without requiring sophisticated software; and • Up-to-date base maps along with the digital format will allow users to make more efficient and accurate flood risk determinations. <p>The Town of Carrboro submitted a <i>Flood Hazard Mapping Needs Assessment</i> to the NC Division of Emergency Management on September 27, 2000.</p>		<p><i>the completion of this project. Additional federal or state assistance is needed. The completion of this project should create opportunities for implementing computer storm water modeling.</i></p>	<p>hazard areas and directly supports the regulation of development activity within flood hazard areas.</p>

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation (High/Medium/Low/Not Effective) <i>Notes: gaps, shortfalls, conflicts, or opportunities</i>	Rational for Effectiveness
The Army Corps of Engineering Section 22 Project The Town of Carrboro along with the Town of Chapel Hill, the University of North Carolina and Orange County have contracted with the Army Corps of Engineers to produce a watershed runoff model, a flood boundary and floodway model and water surface profiles for the Booker, Bolin and Morgan Creek basins. This Town of Chapel Hill serving as the lead local agency is working with the Army Corps of Engineers to complete this study.	NA	High <i>A shortfall in funding has delayed the completion of this project. Additional federal or state assistance is needed. The completion of this project should create opportunities for implementing computer storm water modeling.</i>	Accurately defines and locates flood hazard areas and directly supports the regulation of development activity within flood hazard areas.
<ul style="list-style-type: none"> Cooperating Technical Partner The Town of Carrboro and the Town of Chapel Hill have entered into an agreement with the State of North Carolina and the Federal Emergency Management Agency to cooperate as technical partners for the purpose of reducing flood losses. Carrboro adopted a resolution and signed the agreement in June of 2001. 	NA	High <i>This project creates opportunities to work cooperatively in formulating and implementing mutually beneficial solutions that reduce the risk associated with flooding.</i>	Directly supports the enforcement, administration, and application of flood hazard regulations

TECHNICAL AND FISCAL CAPABILITIES

Technical-Staff Responsibilities Regarding Hazard Mitigation

The following positions, listed by department, share primary responsibility for implementing components of Carrboro's Hazard Mitigation Plan:

Planning Department

- **Planning Director**-coordinates the implementation of FEMA regulations; directs efforts to secure financial assistance from other sources, recommends local budget support for hazard mitigation projects, coordinates hazard mitigation activities with neighboring jurisdictions, prepares hazard mitigation plans and updates, serves as a member of the Orange County Hazard Mitigation Team.
- **Planning Administrator**-administers amendments to the town's land use ordinance and zoning map, coordinates the formulation and adoption of plans, policies, and programs related to transportation, the use of land and environmental resources within the town's planning jurisdiction.
- **Environmental Planner**-works under the general supervision of the planning administrator and is responsible for NPDES permitting, the Community Rating System and coordinating greenway acquisition activities.
- **Transportation Planner**- works under the general supervision of the planning administrator, responsible for Transportation Improvement Program activities including enhancement projects such as the development and funding of greenway trails.
- **Town Engineer**-reviews all site plans and construction drawings to assure that town engineering standards are complied with including storm water management and FEMA requirements.
- **Land Use Administrator**-Reviews all site plans, final plats, and construction drawings to assure compliance with the Town's land use ordinance.
- **Code Enforcement Supervisor**-reviews and inspects all structures to assure compliance with the NC State Building Code, Minimum Housing Code and FEMA construction requirements.

Public Works Department

- **Director of Public Works**-Serves as a member of the Orange County Hazard Mitigation Team, directs the maintenance and improvement of the Town's street and storm water system, administers emergency clean up efforts for the Town of Carrboro.

Fire Department

- **Fire Chief**-Directs the town's Primary Command Center during an emergency, coordinates the town's emergency response with Orange County

Emergency Management, serves as the town's Civil Preparedness Coordinator, monitors emergency activities such as rising flood waters and coordinates evacuation efforts.

Police Department

- **Police Chief**-Directs general police services, traffic control, protection of life and property, records a photographic and video history of the disaster, assists in search, rescue and evacuation operations.

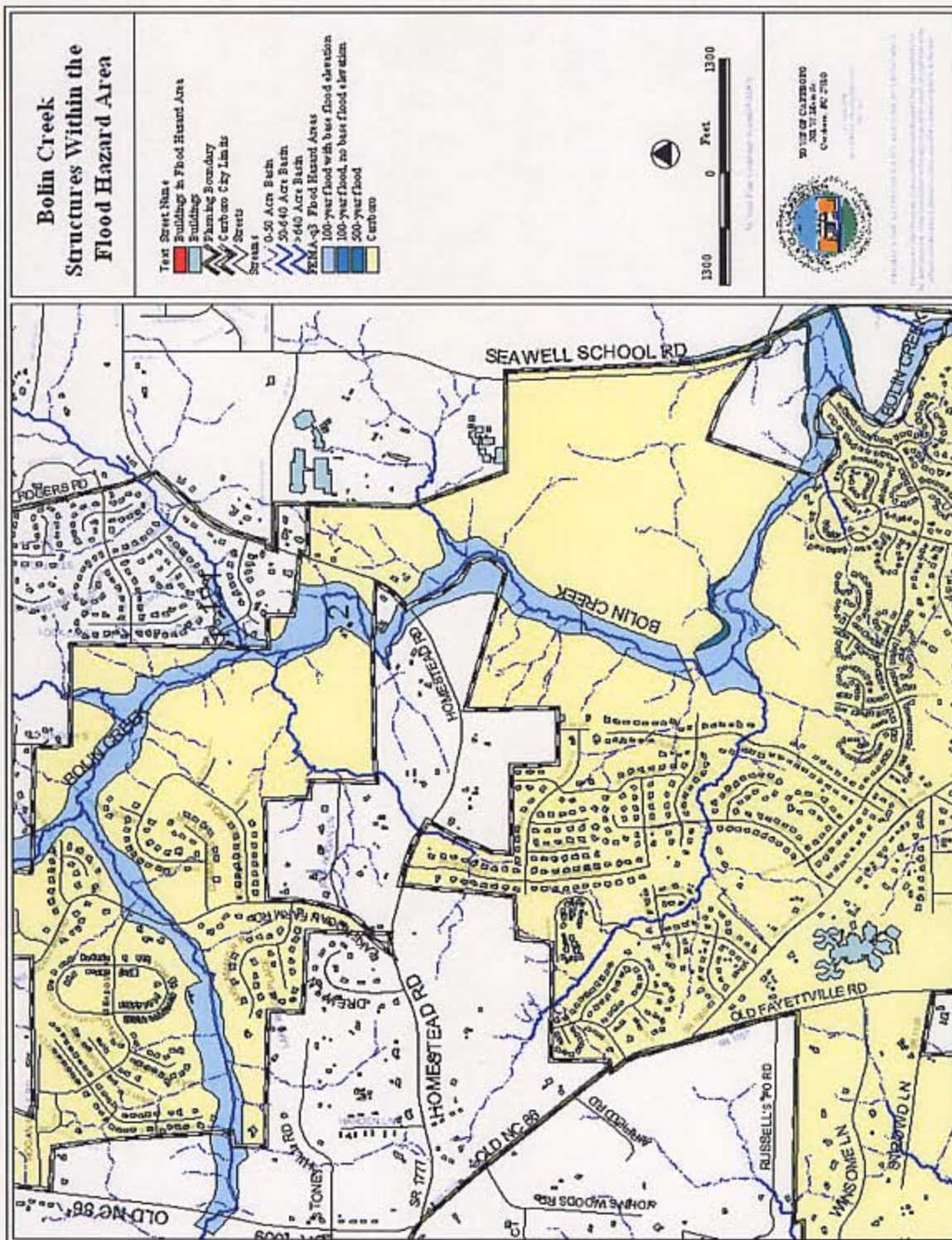
Fiscal Capabilities Regarding Hazard Mitigation

The Town of Carrboro, in addition to its basic operating budget, the Town will continue to seek additional financial resources through available funding sources such as those listed on the NCEM website

http://www.ncem.org/Mitigation/additional_funding.htm .

PUBLIC COMMENT

The *Orange County Hazard Mitigation Plan* was presented for public comment on February 25, 2002. The Orange county Commissioners held this hearing during a 7:30 PM meeting in the Judge F. Gordon Battle Superior Courtroom of the New Orange County Courthouse in Hillsborough, NC. The Carrboro mitigation plan was included as a part of the *Orange County Hazard Mitigation Plan* presented for public comment.



Appendix E: Plan Submission from the Town of Hillsborough

Resolution Adopting Orange County Hazard Mitigation Plan

A RESOLUTION ADOPTING ORANGE COUNTY HAZARD MITIGATION PLAN

WHEREAS, the North Carolina General Assembly passed Senate Bill 300 "*An Act to Amend the Laws Regarding Emergency Management as Recommended by the Legislative Disaster Response Commission*" in June of 2001 that among other provisions requires local governments to have a hazard mitigation plan approved prior to August 1, 2002 in order to receive state public assistance funds;

WHEREAS, in October of 2000 the President of the United States signed into law the "*Disaster Mitigation Act of 2000*" (PL 106-390) to amend the "*Robert T. Stafford Disaster Relief and Emergency Act of 1988*" which among other provisions requires local governments to adopt a mitigation plan in order to be eligible for hazard mitigation funding;

WHEREAS, the North Carolina Division of Emergency Management is assisting local governments in the formulation of hazard mitigation plans;

WHEREAS, the North Carolina Division of Emergency Management has established rules and criteria that allow municipalities to adopt their county's approved hazard mitigation plan through resolution;

WHEREAS, the Town of Hillsborough has worked closely with the Orange County Hazard Mitigation Planning Team to develop a county-wide hazard mitigation plan that will serve the needs of Hillsborough Citizens;

WHEREAS, the Town of Hillsborough supports Hazard Mitigation Planning as a logical means toward protecting people and property from the potential devastating effects of natural hazards;

NOW, THEREFORE, BE IT RESOLVED that the Hillsborough Board of Commissioners:

4. Desire to participate with Orange County in planning for the mitigation of effects caused by natural hazards;
5. Assign staff representation as determined by the Town Manager to work as a members of the Orange County Hazard Mitigation Planning Team to implement and update hazard mitigation planning activities;
6. Adopt, by way of this resolution, the "*Orange County Hazard Mitigation Plan*" as approved by the North Carolina Division of Emergency Management.

Town of Hillsborough Local Mitigation Strategies

Town Of Hillsborough Local Mitigation Strategies

New or Revised Initiatives	Local Responsibility	Target Dates for Completion
The programs, policies, ordinances and goals listed in this section serve as the Town's Hazard Mitigation needs and provide a comprehensive approach toward hazard mitigation. This section includes a list of new programs; goals, ordinances, or approaches that the Town may wish to under in the future to further reinforce its ability to mitigate natural hazards.		
<ul style="list-style-type: none"> Loss Prevention <p>The Town of Hillsborough has experienced previous damage or losses at older facilities located where natural hazards are reasonable to expect. The Town plans to take the following steps to limit future losses:</p>		Ongoing
Relocate the Motor Pool operation to a non-flood prone site. This is a sizable project generally beyond the Town's financial capabilities in the next 10 years. Funding assistance is needed.	Public Works Department	Facility Design- FY04 Construction- FY05
Relocation of sewer pump stations in critical areas.	Engineering Dept.	Ongoing
Relocation of raw water intake pumps at Ben Johnston Lake (raise above flood levels).	Engineering Dept.	FY04
Work with Tree Board, Public Works, and Utilities to ensure that dangerous situations are addressed timely.	Public Works Dept.	Ongoing
Work with State efforts to study hydrology and map/designate any new flood prone areas.	Planning Dept.	FY05
Amend Flood Plain Ordinance to prohibit building and land disturbance in floodplain	Planning Dept.	Post FY05
<ul style="list-style-type: none"> Preparedness and Education 		Ongoing
Adopt local operations plan that details which Town functions will be maintained, and how we will keep the public informed.	Town Manager	End of FY05
Look at alternative electrical sources (generators, etc.), for each Town administrative facility and determine what level needs to be maintained and where.	Town Management Team	End of FY05
Prepare sewer pump stations for easy generator connection	Engineering Dept.	End of FY03
Install generators at most serious pump station locations	Engineering Dept.	End of FY05
Outfitting the Water Plant with a generator.	Engineering Dept.	FY04
Outfitting the Sewer Plant with a generator.	Engineering Dept.	Approx. FY10

Town of Hillsborough Community Capability Assessment

TOWN OF HILLSBOROUGH COMMUNITY CAPABILITY ASSESSMENT

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation High/Medium/Low/Not Effective)	Rationale for Effectiveness
The Town of Hillsborough currently ensures the enforcement of all policies, programs and ordinances. Through various departments and assistance from the County, the town implements its strategies of mitigation. Overall, the Town of Hillsborough had established effective hazard mitigation policies and other potential hazards that are consistent with the County's overall floodplain policies.			
<i>Hillsborough Zoning Ordinance</i>			
<i>Stream Buffer requirements</i>	Section 7.11	High	Limits or disallows construction within flood hazard areas
<i>Watershed protection Standards</i>	Section 10	High	
<i>Underground Utility requirements</i>	Section 5.21	Low	Limits exposure of new development areas to loss of service
<i>Conditional Use Permits for transmission lines & towers</i>	Section 4.33&37	Low	Impacts locations of potentially hazardous uses
<i>Hillsborough Subdivision Regulations</i>			
<i>Tree preservation, buffering, and stormwater</i>	Section 4.7&8	Medium	
<i>Underground Utility requirements</i>	Section 4.5	Low	Limits exposure of new development areas to loss of service
<i>Cluster development provisions</i>	Section 4.9	Medium	Provides design flexibility to protect sensitive areas
<i>Hillsborough Vision 2010 revised Plan</i>			
Create a preservation plan including an inventory of open spaces, historic resources, and other areas for acquisition and protection	Page 6	Medium	Document and prioritize important

Policies, Practices, Programs, Regulations and Activities (Existing and potential)	Document Reference (Include page numbers or Other Source)	Effectiveness for Mitigation High/Medium/Low/Not Effective)	Rationale for Effectiveness
			preservation areas
Encourage preservation of sensitive and aesthetically significant open land through public acquisition, <u>conservation easements</u> , and other devices	Page 7	Low	Limit exposure of new development to hazards/ Education
Adopt regulations of the Upper Neuse Basin Management Study to allow for local enforcement and protection of water quality	Page 7	Medium	Strengthens state implementation
Strengthen the floodplain ordinance to go beyond the minimum requirements and prohibit development within floodplains	Page 7	High	Limits or disallows construction within flood hazard areas
Create emergency/disaster response plan to address natural disasters and other situations	Page 8	High	Education
<i>Hillsborough Floodplain Ordinance</i>	Entire	High	Includes state mandated minimum standards for floodplain development
<i>Soil and Erosion Control</i> The Town of Hillsborough has an agreement with Orange County to provide Soil and Erosion Control review, inspection and enforcement within the town.		Medium	Supports floodplain protection and soil stabilization