Adopted by the Harnett County Board of Commissioners

September 20, 2004

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Town of Angier, Adopted August 16, 2004
Town of Coats, Adopted September 9, 2004
City of Dunn, Adopted September 2, 2004
Town of Erwin, Adopted September 2, 2004
Town of Lillington, Adopted October 12, 2004

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INTRODUCTION

A. *What is Hazard Mitigation?*

Hazard mitigation is the ongoing process of reducing the risks to people and property from natural hazards, such as hurricanes, thunderstorms, winter storms, and flooding. It includes both structural interventions, such as flood control levees, and nonstructural measures, such as avoiding construction in the most flood-prone areas. Mitigation includes not only avoiding development in vulnerable sections of the community, but also making existing development in hazard-prone areas safer and more sustainable. For example, a community could identify the local areas that are susceptible to damage from natural hazards and takes steps to make these areas less vulnerable, while also steering growth to less hazardous regions. The essence of hazard mitigation is safeguarding residents, infrastructure, and the environment from harm.

Mitigation should not be seen as an impediment to the growth and development of a community. On the contrary, incorporating mitigation into decisions related to your community's growth can result in a safer, more resilient community, and one that is more attractive to new families and businesses. (Keeping Natural Hazards From Becoming Disasters, N.C. Emergency Management May 2000)

B. *Purpose of the Plan*

This Natural Hazard Mitigation Plan for Harnett County and surrounding municipalities has been developed to help serve the citizens of Harnett County by providing the impetus for making our homes, businesses, and communities as safe as possible against the impacts of natural hazards. Harnett County has experienced rapid growth in recent years; much of this can be contributed to the growth that is taking place in surrounding counties. However, as the county continues to grow it becomes increasingly important to be prepared for flooding and other natural disasters. The creation of a solid mitigation plan will play a key role in ensuring safe and more resilient community development. This plan seeks to identify hazard-prone areas and assess their vulnerability while also examining present policies for their strengths and weaknesses. By integrating current policies with new stronger policies, the county has developed a Mitigation Plan that will allow citizens to live, work, and play in a safer and more sustainable Harnett County.

C. *The Planning Process*

The Harnett County Mitigation Plan was developed through the combined efforts of Harnett County Planning, and Emergency Management Departments and representatives from all five of the county's local municipalities: Town of Angier, Town of Lillington, Town of Coats, Town of Erwin, and City of Dunn. A Mitigation Committee was created in order to provide proper representation from all parts of the county. This group was made up of members from each of the above-mentioned agencies. The group met periodically with the main objective of constructing a plan that would both address the needs of their communities and meet the minimum criteria set forth by North Carolina Emergency Management (NCEM) and the Federal Emergency Management Agency (FEMA). The Committee preformed many duties such as providing outreach to their respective jurisdictions, researched vulnerability, and developed goals and strategies. All decisions were made through group consensus.

A key component in the planning process was citizen input. Therefore, during the development of the Harnett County Mitigation Plan, the county considered it very important to incorporate the ideas and thoughts of the general public and elected officials. Multiple public hearings and presentations were periodically held for each governing board during the development stages of the plan. Agendas and announcements of these meetings were posted on the front door of the Planning Department as well as the County Administration building. The purpose of these meetings was to provide updates to the elected officials and allow the public to share their opinions about the plan. This information was documented (see appendix F for documentation of each meeting) and taken into consideration for each phase of the plan. Also, during the adoption phase, the September public hearing was advertised in the "Daily Record", a countywide newspaper, on September 10 and 17, 2004.

Mitigation Planning Luncheon, May 2003

On top of citizen input, local businesses, academia, and nonprofits were contacted for their input. A letter and questionnaire that was sent to local businesses and academia can be found in appendix F (Community Input). The information gathered is also discussed along with the letter and questionnaire.

The Harnett County Planning Department also obtained the assistance of interns from Campbell University through the Government and Public Administration internship program. The student interns conducted research, organized meetings, coordinated municipality efforts, and helped in editing the plan.

The plan was developed over the course of two years in five phases using the basic planning process prescribed by the N.C. Emergency Management Mitigation Section. The first phase involved the organization of information and departments in preparation for devising the plan. In this phase we held preliminary meetings with departments and made initial presentations to each municipality. The second phase consisted of performing background studies for the county. In this phase we completed a hazard identification & analysis, vulnerability assessment, and community capability assessment. Phase three was the formulation of goals & mitigation strategies, and phase four was the implementation of the plan, which included an implementation strategy and sending the plan to NCEM for review. The final phase was the adoption of the plan. During this phase we made final presentations to the boards and received final approval of the plan.

The County plans to annually evaluate and update its mitigation plan and related policies for their effectiveness in diminishing and preventing loss of life and property. The Harnett County Planning and Emergency Management Departments along with members of the Harnett County Hazard Mitigation Committee will conduct this update.

BACKGROUND OF HARNETT COUNTY

A. *History*

Harnett County was first settled in the mid-1720s and later became a county in 1855. Historically, Harnett County residents have lived in rural areas, and it was not until after the 1880's that the county's population began to move into urban rather than rural areas. Today more than one-fifth of the population lives in towns. Despite the urban growth that has occurred in the commercial centers of Lillington, Dunn, Coats, Angier, and Erwin, the county's main source of income comes from agriculture.

B. *Topography*

The topography of Harnett County is suited well for agriculture and industrial development. Harnett County is located in the south central portion of North Carolina lying partially in the Coastal Plain and partially in the Piedmont section. The eastern two-thirds of the county generally exhibits topographic features common to the Coastal Plains of North Carolina. It is an area of level to gently rolling terrain with elevations ranging from 100 to 300 feet above sea level. Topographic features in the western part of the county resemble the Piedmont region of North Carolina. It is an area of steeper hills with elevations as high as 450 feet above sea level.

Harnett County is comprised of 384,640 acres, or 601 square miles of land. The Cape Fear River, which flows from the northwest part of the county to southeast part, is the main drainage system. The chief tributaries include the Upper Little River system, Lower Little River, and the Black River. The county is bordered by Sampson and Johnston County to the east; by Wake County to the north; by Chatham, Lee, and Moore County to the west; and by Cumberland County to the south. Lillington, the county seat, is approximately 30 miles south of Raleigh, and 30 miles north of Fayetteville. Cumberland and Wake counties, which are separated by Harnett County, are two of seven standard Metropolitan Statistical Areas within the state. Harnett County is approximately 160 miles east of Charlotte, North Carolina's largest city.

C. *Population*

With a population of 91,025 and a growth rate of 34.2% between 1990 and 2000, Harnett County ranked as the eighth fastest growing county in North Carolina according to the 2000 census. Much of this growth can be contributed to the county's unique location between Cumberland and Wake counties. Like the county, the municipalities have also experienced similar growth in the last 10 years (see chart below).

Table 1. Harnett County 2000 Population

Municipality	APR 1990	APR 2000	% Change	APR 2001	% Change
Harnett County	67,833	91,025	34.2	93,602	2.8
Angier	2,235	3,419	53.0	NA	NA
Coats	1,493	1,845	23.6	NA	NA
Dunn	8,556	9,196	7.5	NA	NA
Erwin	4,109	4,537	10.4	NA	NA
Lillington	2,048	2,915	42.3	NA	NA

Source: *U.S. Census Database*

*See appendix G for more population Demographics

D. *Land Uses*

Harnett County is recognized as a choice place to live and work, appealing to a broad base of residents and businesses. It offers viable small towns for businesses and residents, subdivisions near rural community crossroads for those seeking larger lots, and protected farming communities. The Cape Fear River provides an ample supply of clean water as well as an opportunity for recreation. With 98% of the county being supplied by the public water system, water is very vital to the county's livability and growth. The public schools, community college, and Campbell University keep residents abreast of the latest technology and prepare them for the changing workplace.

Seven golf courses, a Division I university, and a state park are a few of the leisure opportunities available to Harnett County residents. Keith Hills Golf and Country Club is recognized as one of the finest golf courses in the southeast. Raven Rock State Park provides 3000 acres along the Cape Fear River and offers camping, fishing, horseback riding, and canoeing. Campbell University hosts Division I athletics, plays, musical performances, lectures, and art exhibitions for the community to attend.

Harnett County is devoted to its industrial development. Community planning, new leadership, and the geographical character (proximity to large and growing metropolitan areas) put the county in a competitive position. For this reason, Hazard Mitigation planning is important. Hazard Mitigation planning saves lives and property, reduces vulnerability to future hazards, facilitates post disaster funding, speeds recovery, and demonstrates commitment to improving community health and safety.

HAZARD IDENTIFICATION AND ANALYSIS

The first step in developing a hazard mitigation plan is to identify which natural hazards are most likely to affect Harnett County. Once the potential impact of the various natural hazards has been determined, the County can develop a hazard mitigation plan that most effectively and efficiently uses limited time and resources to combat the potential for these natural hazards to produce a natural disaster.

All types of natural hazards affect portions of our state, however this plan will only focus on the natural hazards that are common for Harnett County: hurricanes, flooding, wildfires, severe winter storms, thunderstorms, drought, and tornadoes.

In the following sections, each natural hazard is described and a history of the natural hazards impact on Harnett County is detailed. A map for flood prone areas is included, however most of the addressed hazards do not have a specific geographic location to map due to their sporadic occurrences. Historic climatic information on past storm events has bee gathered from the National Climatic Data Center as well as other local resources, and information describing these types of hazard events was gathered from the North Carolina Division of Emergency Management's Mitigation Planning Guidebook.

A. *Hurricanes*

Hurricanes are a great threat to North Carolina coastlines, but they can travel inland and become a hazard for all parts of the state. According to the North Carolina Division of Emergency Management, a hurricane is a category of tropical cyclone that develops over warm waters and is "caused by the atmospheric instability created by the collision of warm air with cooler air." Hurricanes are characterized by thunderstorms and surface wind circulation that blow in a large spiral pattern around an "eye", the calm center of a storm that can be twenty to thirty miles wide. Over water, hurricanes can last more than two weeks and extend outward four hundred miles. Once on land, hurricanes bring "torrential rains, high winds, storm surges, coastal flooding, inland flooding, and sometimes tornadoes". Hurricane season for North Carolina is June 1 though November 1, peaking in mid-September.

Residential damage in Harnett County during Hurricane Danny 1997

Coastal storms are characterized by storm surges, storm tides, inland flooding, water force, wind velocity, and coastal erosion, as described by the North Carolina Division of Emergency Management Mitigation Planning guidebook. Storm surges are "large waves of ocean water that sweep across coastlines where a storm makes landfall" and are the most dangerous and damaging during a coastal storm. The height of the water increases with the intensity of the storm, and "the higher the storm surge, the greater the damage to the coastline". "Storm tide is the combination of the storm surge and the normal tide." The higher the height of the waves before the storm surge the greater the water height will be, 'a fifteen foot storm surge along with a two foot high tide creates a storm tide of seventeen feet".

Inland flooding is caused when torrential rains and backwater from the ocean is brought in by hurricanes as they reach landfall. In recent years, most deaths that resulted from hurricanes and tropical storms occurred due to inland flooding. Another characteristic of coastal storms is water force, flooding with velocity or "wave action [in] areas subject to receiving waves on top of the rising water". This water force makes flooding more destructive because it can "knock over buildings, move debris, erode dunes, scour the shoreline, and displace and redeposit sand".

Along with water damage, wind velocity can cause more damage as it increases. Hurricane winds can travel hundreds of miles inland and the higher the wind speed, the more damage to buildings, vegetation, and infrastructure. Coastal erosion and accretion are possible results of a coastal storm. Erosion occurs when more sediment is lost than replaced along the shoreline of a body of water, while accretion is the result of more sediment being replaced than lost.

The effects of coastal storms can be intensified by several high risk factors. Certain coastal shapes, especially shorelines that are concave (rounded inward), sustain more damage. The velocity

of the center of the storm is a risk factor because the slower the center of the storm moves, the greater the possible damage, and the worst is when a storm stalls along a coast through several high tides. Low-lying barrier islands, like off the coast of North Carolina, are more easily over washed by storm waves and storm surge. Just like an area that has saturated soil caused by previous rainfall is more prone to flooding, a coastal area that has been weakened by a minor storm before a major coastal storm is more vulnerable to greater damage. The increased development in coastal areas has lead to greater damage as well as more dangerous floating debris. Groins, jetties, or seawalls increase scour and erosion and are at risk for collapse during a coastal storm.

The intensity of a hurricane is measured between one (minimal) and five (catastrophic) by the Saffir-Simpson Scale, which assigns a numerical category to a hurricane based on certain variables, such as maximum wind speed and height of storm surge. On this scale, Hurricane Fran in 1996 rated a category three with extensive damage characterized by environmental damage, destroyed structures, and serious flooding. In comparison, Hurricane Andrew in 1992 rated a category four with extreme damage, including factors such as destruction of residences, major flooding, beach erosion, and massive evacuation.

The occurrence of a hurricane is highly likely in Harnett County and the effects can be quite critical. Most of the county's damages originate from high winds, inland flooding, or even tornadoes that may spawn from the hurricane. Hurricane's Fran ('96), Danny ('97), Bonnie ('98), Dennis ('99), and Floyd ('99) are the storms that continue to stay fresh in everyone's eyes. These storms were responsible for over 58 million dollars in property damage. That includes farmland, home, business, and infrastructure damage. As a result Harnett County and its municipalities has increased its capability to become a more sustainable environment for the wellbeing of its citizens. Please see the Vulnerability Assessment section on page 34 and the Capability Assessment on page 55 for further information.

Table 2: Saffir-Simpson Hurricane Scale

Saffir-Simpson Category	**Maximum Sustained Wind Speed** Mph	**Minimum Surface Pressure** Millibars (mb)	**Storm Surge Feet**
1	74-96	Greater than 980	3-5
2	97-111	979-965	6-8
3	112-131	964-945	9-12
4	132-155	944-920	13-18
5	156+	Less than 920	19+

Source: Keeping Natural Hazards From Becoming Disasters, pg 84.

Table 3 Hurricane Damage By Category

Category	Level	Description	Example
1	Minimal	Damage primarily to shrubbery, trees, foliage, and unanchored homes. No real damage to other structures. Some damage to poorly constructed signs. Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings.	Hurricane Jerry (1989)
2	Moderate	Considerable damage to shrubbery and tree foliage; some trees blown down. Major damage to exposed mobile homes. Extensive damage to poorly constructed signs. Some damage to roofing materials of buildings. Coast roads and low-lying escape routes inland cut by rising water 2 to 4 hours before arrival of hurricane center. Considerable damage to piers. Marinas flooded. Small craft in unprotected anchorages torn from moorings. Evacuation of some shoreline residences and low-lying areas required.	Hurricane Bob (1991)
3	Extensive	Foliage torn from trees; large trees blown down. Practically all poorly constructed signs blown down. Some damage to roofing materials of buildings; some wind and door damage. Some structural damage to small buildings. Mobile homes destroyed. Serious flooding at coast and many smaller structures near coast destroyed; larger structures near coast damaged by battering waves and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Flat terrain 5 or less above sea level flooded inland 8 miles or more. Evacuation of low-lying residences within several blocks of shoreline possibly required.	Hurricane Gloria (1985) Hurricane Fran (1996)
4	Extreme	Shrubs and trees blown down; all signs down. Extensive damage to roofing materials, windows, and doors. Complete failures of roofs on many small residences. Complete destruction of mobile homes. Flat terrain 10 feet or less above seal level flooded inland as far as 6 miles. Major damage to lower floors of structures near shore due to flooding and battering by waves and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Major erosion of beaches. Massive evacuation of all residences within 500 yards of shore possibly required, and of single-story residences within 2 miles of shore.	Hurricane Andrew (1992)
5	Catastrophic	Shrubs and trees blown down; considerable damage to roofs of buildings; all signs blown down. Very severe and extensive damage to windows and doors. Complete failure of roofs on many residences and industrial buildings. Extensive shattering of glass in windows and doors. Some complete building failures. Small buildings overturned or blown away. Complete destruction of mobile homes. Major damage to lower floors of all structures less than 15 feet above sea level within 500 yards of shore. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Massive evacuation of residential areas on low ground within 5 to 10 miles of shore possible required.	

Source: Keeping Natural Hazards From Becoming Disasters, pg 85.

B. *Floods*

Flooding is a natural occurrence for rivers, streams, and coastal areas caused by "excess water from snowmelt, rainfall, or storm surges" that accumulates and overflows onto banks and into the floodplain. Floods can occur at any time of the year, night or day, and are the most common hazard in North Carolina. It is important to note that thousands of homes are located within the floodplains (lowlands, adjacent to rivers, lakes, and oceans subjected to recurring flooding). Floods are classified one of two ways: flash flooding ("the product of heavy localized precipitation in a short period over a given location, or caused by a dam break or levee failure") or general flooding ("occurs in riverine, coastal, and urban setting").

Flooding in Harnett County 1999

Flash flooding can occur after a few minutes or hours of rainfall, a dam or levee failure, or a sudden release of water from an ice jam. Flash flooding is caused by slow-moving thunderstorms, repeated thunderstorms, or heavy rains from hurricanes and tropical storms. Flash flooding can destroy buildings and bridges, uproot of trees, scour new drainage channels, and trigger mudslides. The suddenness of flash flooding is a serious problem for steep rivers and streams in mountainous or hilly areas, areas with steep slopes with little or no vegetation, regions behind dams or levees that could fail, barrier islands and coastal areas vulnerable to sudden storm surges, and urban areas with much of the land covered with impervious surfaces or inadequate drainage channels.

General flooding includes riverine, coastal, and urban flooding. Riverine flooding is characterized by a stream flow exceeding the capacity of the normal watercourse. This is due to high precipitation levels and water runoff volumes within the watershed of a particular river or

stream. The severity of flooding depends on the river basin's physiography, local thunderstorm movement, moisture level of the soil, and degree of vegetation. Coastal flooding emerges from storm surges, wind-driven waves, and heavy rainfall that may or may not be the result of hurricanes, nor'easters, or large coastal storms. As the result of the use of waterways in the past for transportation leading to urbanization along streams and rivers, urban flooding occurs in these stream floodplains. "Urbanization increases the magnitude and frequency of floods by increasing impermeable surfaces, increasing the speed of drainage collection, reducing the carrying capacity of the land, and occasionally, overwhelming sanitary sewer systems." Some areas are subject to long-term, permanent flooding, such as, "barrier islands and beaches inundated by rising sea levels, areas around lakes subject to long-term fluctuations of ground water, erosion-prone areas such as bluffs, where land is destroyed, areas subject to subsidence by ground water or oil and gas withdrawals, or areas behind dikes and levees where high ground water levels may persist for months or years".

Several high-risk factors, conditions, may exacerbate flooding. Impermeable surfaces increase the amount and rate of runoff by replacing the natural vegetation that would normally absorb the water. For example, in an undeveloped area close to ninety percent of rainfall will be absorbed into the ground, where as a developed area will have close to 90% of its rainfall become run off. In hilly, mountainous areas the steeply sloped watersheds may be flooded within minutes of hard rain allowing little or no warning time and characterized by high velocities. Constrictions, re-grading or filling within or on the edge floodplains, obstruct flood flows causing waters to back up upstream and in adjacent properties while also sending more water downstream causing higher levels of flooding. Obstructions, bridges and culverts, and debris can block the flow of water increasing the chances of flooding upstream and the velocity of flooding downstream. Continued rainfall in areas with saturated soil will also increase runoff and thus water flow downstream. It is important to understand how water flow works in a community and what areas are prone to flooding. Contaminants such as soil, road oil, farm and lawn chemicals, animal waste, and run-off from wastewater treatment plants and hazardous material storage sites can impact flood-prone areas, as well as locations downstream.

Floods are quantified in terms of their velocity, the speed of water as measured in feet per second, and are assessed according to slopes, waves, and other factors. Damage potential increases as velocity increases, and a velocity level over five feet per second "can erode stream banks, lift buildings off their foundations, and scour away soils around bridge supports and buildings". Flood velocity causes major damages in areas subject to coastal wave action, coastal inlets and over wash

areas, steep inland floodplain areas along smaller rivers and streams, alluvial fans, some riverine floodways, and in mudflow and high gradient sheet flow areas, and areas behind levees or dams where the protective structure suddenly fails or the design capacity is suddenly exceeded.

The occurrence of a flood is likely in Harnett County and the effects can range from minimal to severe. The majority of the county's flooding issues are localized and caused by anything from storm water runoff to a mid summer hurricane. The county and all of its municipalities, except one, are members of the NFIP, and have only one repetitive loss property which is in Dunn. The Cape Fear River, an obvious source of flooding, is not protected by any specific State issued guidelines as in the Neuse River Regulations. However, Harnett County has taken the initiative to implement a conservation district. This purpose of this district is to encourage the preservation of and continued used of land for conservation purposes, prohibit commercial, and industrial use in the areas subject to flooding (see page 65). Included are several maps indicating the county's special flood hazard areas, thirteen specifically repetitive flood prone areas (page 34), watershed/ water supply area, as well as the location of critical facilities in relation to the floodplain. Please see the Vulnerability Assessment section on page 34 for further vulnerability information.

C. *Severe Winter Storms*

All of North Carolina is subject to experiencing severe winter weather. Severe winter storms produce hazardous weather conditions such as heavy snow, blizzards, freezing rain and ice pellets, and extreme cold. Snow events disrupt society by bringing down power lines and trees and causing roof collapses. Severe winter storms are the result of "extra-tropical cyclones being fueled by temperature gradients and an upper-level jet stream". Storms formed in the Gulf of Mexico or off the southeast Atlantic Coast affect North Carolina, but few of these storms result in blizzards, winds in excess of 35 mph, falling and blowing snow, and a maximum temperature of 20 degrees Fahrenheit. Harnett County is affected most by ice storms that are the result of cold air damming (CAD), "shallow, surface-based layer of relatively cold, stably-stratified air entrenched against the eastern slopes of the Appalachian Mountains". "With warmer air above, falling precipitation in the form of snow melts, then becomes either super-cooled or re-freezes."

Harnett County Winter Storm February 2000

The occurrence of a winter storm is likely in Harnett County however they are expected to be moderately intense with limited effects. Vulnerable areas can be countywide with the majority of the effects relating to power lines and road obstructions. After exhausting several resources no conclusive dollar or damage reports were located. Every part of the county is vulnerable to thunder storms, therefore it is quite difficult to map vulnerable areas. Please see the Vulnerability Assessment section on page 34 for further vulnerability information.

D. *Thunderstorms*

Thunderstorms are common throughout North Carolina and occur at any time in the year. Thunderstorms are caused by convection in the air and atmospheric instability in which rising air forms cumulus clouds that turn into cumulonimbus (thunderstorm) clouds. Severe thunderstorms have strong winds, frequent lightning, hail, downbursts, and tornadoes and are defined by the

National Weather Service as "one that produces tornadoes, hail 0.75 inches or more in diameter, or winds of fifty knots (58 miles) or more". Thunderstorms may be three miles long at their base, rise between 40,000 to 60,000 feet in the troposphere, and contain as much as half a million tons of water. Several thunderstorms along cold fronts can extend for hundreds of miles. Lightening is the result of the large amounts of energy derived from the condensation of water.

The occurrence of a thunderstorm is highly likely in Harnett County and its effects can vary. Since 1960, there have been several strong thunderstorms within the County. These storms, which include high winds, lightning, and hail, have caused over 1.5 million dollars in property damage and injured numerous citizens. Since thunderstorms are not geographically characterized, every part of the county is vulnerable. Therefore, mapping this hazard is quite difficult. Please see the Vulnerability Assessment section on page 34 for further vulnerability information.

E. ***Tornadoes***

A tornado is a "violently rotating column of air extending to the ground" with speeds that can reach over 250 mph with paths up to a mile wide and fifty miles long. Although tornadoes can strike any time of year, its official "season" runs from March through August. During thunderstorms and hurricanes, cold air may override a layer of warm air causing it to rise rapidly, resulting in a tornado. Tornadoes strike at random in North Carolina and 71% of them are classified as weak, 28% as strong, and 1% as violent. North Carolina ranks eighteenth in tornado deaths and twenty-second in total number of tornadoes between 1953-1995. Tornadoes are classified by damage pattern and wind speed using the Fujita-Pearson Tornado Scale. Since 1950, 74% of all tornados have been rated weak at F0-F1; 25% have been rated strong at F2-F3; and only 1% have been rated violent at F4-F5.

The occurrence of a Tornado is common in Harnett County and the effects can range from minimal to catastrophic. Since 1960, there have been at least 15 tornadoes touchdown within the County. These storms have caused over 4 million dollars in property damage and injured approximately 10 people. Vulnerable properties would certainly include the County's 250 manufactured mobile home parks. The research and findings concerning safe rooms is still a bit vague, however as funding and options become available this may be a way to provide some shelter to these vulnerable residents. Since tornadoes are not geographically characterized, every part of the county is vulnerable, therefore it is quite difficult to map vulnerable areas. Please see the Vulnerability Assessment section on page 34 for further vulnerability information.

Table 4 The Fujita-Pearson Tornado Scale

F-Scale	Damage	Winds (mph)	Path Length (miles)	Mean Width (miles)
FO (Weak)	Light	40-72	<1	<0.01
F1 (Weak)	Moderate	73-112	1-3.1	0.01-0.03
F2 (Strong)	Considerable	113-157	3.2-9.9	0.04-0.09
F3 (Strong)	Severe	158-206	10-31	0.1-0.31
F4 (Violent)	Devastating	207-260	32-99	0.32-0.99
F5 (Violent)	Incredible	261-318	>99	>0.99

Source: Keeping Natural Hazards From Becoming Disasters, 2001, p. 92.

F. *Wildfires*

A wildfire is an uncontrolled fire spreading through vegetative fuels, naturally occurring and non-native species of grass, brush, and trees. A wild land fire occurs in areas that are not developed whereas an urban-wild land interface fire is a wildfire that occurs in an area in which human development meet wild land or vegetative fuels. Usually wildfires result from burning debris, arson, or carelessness, making humans the cause of four out of five wildfires, more than lightening strikes (second leading cause). North Carolina is among the states with a highest risk of wildfire due to its large amount of woodland area. Since Harnett County is a relatively rural area, the likelihood of wildfires exists, however only one major event has been recorded since 1960, which damaged approximately 80 acres in 1999. Every part of the county would be vulnerable to wild fires, as opposed to flooding where that can be associated to the low lying areas, thus difficult to map vulnerable areas. If an uncontrollable rage were to ignite, we feel that pine trees and farmlands would be affected the most.

Fuel, topography, and weather affect the behavior of wildfires. The type, amount, burning qualities, and continuity (horizontal and vertical) of fuel affect the potential and behavior of wildfires. The slope and shape (topography) of the land affects the speed at which a wildfire spreads. For example, the steeper the slope, the faster a fire will spread up the slope. Factors of weather such as temperature, humidity, and wind affect the severity and duration of wildfires. "Critical Fire Weather Frequency is a set of weather conditions, usually of low relative humidity and wind, whose effects on fire behavior make control difficult and threaten firefighter safety." A Fire Hazard Severity Table is used to measure the probability of a wildfire based on several environmental factors, such as fuel, topography, and weather.

Table 5 Fire Hazard Severities

Fuel Classification	**Critical Fire Weather Frequency**								
	<1 Day/Year			7 to 2 Days/ Year			>8Days/Year		
	Slope %			Slope %			Slope %		
	< 40	41-60	>61	<40	41-60	>61	<40	41-60	>61
Light Fuel	M	M	M	M	M	M	M	M	H
Medium Fuel	M	M	H	H	H	H	E	E	E
Heavy Fuel	H	H	H	H	E	E	E	E	E

Heavy Fuel is vegetation consisting of round wood 3 to 8 inches in diameter
Medium Fuel is vegetation consisting of round wood 1/3 to 3 inches in diameter
Light Fuel is vegetation consisting of herbaceous plants and round wood less than ¼ inch in diameter
M= Moderate Hazard; **H=** High Hazard; **E=** Extreme Hazard
Source: Keeping Natural Hazards From Becoming Disasters, 2001, p.93.

G. *Earthquakes*

Earthquakes are not frequent in North Carolina but are possible. North Carolina epicenters are concentrated on the Eastern Tennessee Seismic Zone reaching from South Carolina up to Virginia and into Tennessee. An earthquake is a sudden motion or trembling caused by a release of strain within or along the Earth's tectonic plates. The amount of energy released from the fault or epicenter determines the severity of an earthquake that can affect areas beyond the site of occurrence. Earthquakes usually come without warning and within a few seconds, a community can bear massive damage and extensive casualties.

Ground motion, vibration or shaking of the ground, is caused when a fault ruptures and seismic waves radiate. "The severity of the vibration increases with the amount of energy released and decreases with the distance from the causative fault or epicenter, but soft soils can further amplify ground motions." The place where the ground breaks is referred to as surface faulting and can differ in length, width, and displacement with each earthquake. The Richter Scale and Modified Mercalli Intensity (MMI) Scale, measure Earthquakes' magnitude and intensity, respectively.

The occurrence of an Earthquake is highly unlikely for the Harnett County region, thus has been excluded from the plan's vulnerability assessment and analysis.

Table 6 Modified Mercalli Scale of Earthquake Intensity

Scale	Intensity	Description of Effects	Maximum Acceleration (mm/sec)	Corresponding Richter Scale
I	Instrumental	Detected only on seismographs	<10	
II	Feeble	Some people feel it	<25	<4.2
III	Slight	Felt by people resting; like a truck rumbling by	<50	
IV	Moderate	Felt by people walking	<100	
V	Slightly Strong	Sleepers awake; church bells ring	<250	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off selves	<500	<5.4
VII	Very Strong	Mild Alarm; walls crack; plaster falls	<1000	<6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures; poorly constructed buildings damaged	<2500	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	<5000	<6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	<7500	<7.3

XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables destroyed; general triggering of other hazards	<9800	<8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	>9800	>8.1

Source: Keeping Natural Hazards From Becoming Disasters, 2001, p. 87.

H. *Drought*

A drought is roughly defined as a condition of abnormally dry weather within a geographic region where some rain is usually expected. This is caused by a lack of precipitation in conjunction with wind, high temperatures, and low humidity. This lack of rain in a region results in a number of problems. There are varying degrees of severity in a drought. This severity depends on the demand on water in a region, duration, and intensity. Problems of a drought can include:

- Diminished water supplies or reduction of water quality
- Undernourished livestock and wildlife
- Crop damage
- Increased fire hazards
- Reduced forest productivity

Indirect Impacts:

- Reduced income for farmers and agribusiness
- Increased prices for food and lumber
- Unemployment
- Reduced tax revenues because of reduced expenditures
- Increased Crime
- Foreclosures on bank loans to farmers and agribusiness

There are four types of droughts:

1. Meteorological Drought- This is a reduction of precipitation over time. This definition is regionally based. In the United States, this is indicated by less then 2.5mm of rainfall in 48 hours. This is the first indication of a drought.
2. Agricultural Drought- This occurs when soil moisture cannot meet the demands of a crop. This type of drought happens after a meteorological drought but before a hydrological drought.

3. Hydrological Drought- This type refers to reduction in surface and subsurface water supplies. It is measured through stream flow and water levels in lakes, reservoirs, and groundwater.
4. Socioeconomic Drought- This occurs when water shortages affect people, either in terms of water supply or economic impacts (ie loss of crops so price increases).

It is difficult to determine when a drought is approaching because of slowly accumulating effects. There is no commonly accepted approach for assessing drought risk. However, there are several indices that can be helpful in defining risk. The Palmer Drought Severity Index is especially well known. This index is used to measure drought impact on agriculture and water supplies. The National Drought Mitigation Center is using a newer index, the Standardized Precipitation Index, to monitor moisture supply conditions. Distinguishing traits of this index are that it identifies emerging drought months sooner than the Palmer Index and that is computed on various time scales.

The National Drought Mitigation Center was founded in 1995. This group prepares drought policy, conducts preparedness research, conducts training seminars and conferences, and maintains current databases related to droughts. Information on droughts can be found on their web page at: http://enso.unl.edu/ndmc/.

Droughts tend to initially be noticed at the local level. The first decision makers to become involved are local or municipal water suppliers, and property owners. However, by law, most of the authority for allocating water rests with the state government. North Carolina has an Emergency Operations Procedures for Drought Emergencies manual to provide an effective means of assessing and responding to the impact of drought on the water supply and agriculture in North Carolina. The federal government also plays a significant role in drought mitigation. The Federal Emergency Management Agency (FEMA) undertakes hazard mitigation, preparedness planning, relief operations, and recovery assistance for droughts. Other federal agencies that may become involved when there is a drought are the Fish and Wildlife Service, EPA, USGS, USDA, and Army Corps of Engineers. In all, at least 35 units within 10 different Federal departments, as well as 7 independent agencies and several bilateral organizations, currently exercise some responsibility for water programs and projects.

Harnett County is blessed with an abundant supply of underground and aboveground water. There are no recorded droughts, or associated dollar figures, as far as declared disasters are

concerned, but the likelihood is present however we feel the effects would be minimal. If something catastrophic were to happen, we fill the vast agricultural crops would be effected the most.

I. *Nuclear Waste & Hazardous Materials*

Nuclear materials and waste stored in nuclear power plants can cause harm to humans if radioactive materials are released into the environment. Radioactive materials consist of unstable atoms that emit excess energy as radiation, which can be harmful to humans at certain levels and proximities. Hazardous materials are chemical substances that can cause harm to humans, animals, and the environment if improperly used or released. These chemical materials can be the result of industrial and agricultural activities, in addition to being used in pharmaceutical and research facilities, as well as residences. According to FEMA, the release of hazardous materials is most commonly the result of a transportation accident, or a chemical accident in a plant.

Nuclear power plants are required to have an onsite emergency response plan that must be approved by the Nuclear Regulatory Commission [NRC], and an offsite plan that is evaluated by the Federal Emergency Management Agency. The NRC also takes into account the evaluation of FEMA when issuing permits and updating licenses. These plans are developed by Federal, State, and local officials and encompass an emergency planning zone within a 10-mile radius of the plant, and an ingestion planning zone within a 50-mile radius. Residents in the 10-mile zone are given emergency information and educational materials, as well as information and schedules regarding alert systems and periodic tests. Commonly used Alert and Notification Systems inform the public of danger through either sirens, tone alert radios, route alerting, or with instructions providing by the Emergence Alert System on radio and television stations.

Terms for Describing Nuclear Power Plant Emergencies
Notification of Unusual Event means a problem has occurred at the plant, but no radiation leak is expected. No action by you is necessary. **Alert** means that small amounts of radiation could leak inside the plant, but it will not affect the community. No action by you is necessary. **Site Area Emergency** describes a more serious problem. Small amounts of radiation could leak from the Plant. Area sirens may sound. Listen to your radio or television for information. **General Emergency** refers to a serious problem. Radiation could leak outside the plant and off the plant

Site. Area sirens will sound. Listen to your radio or television for instructions. Be prepared to evacuate or
Find shelter in your home.

Source: FEMA, Nuclear Power Plant Emergency Factsheet.

The Shearon Harris nuclear power plant is located in Wake and Chatham County, approximately 22 miles southwest of Raleigh, in the town of New Hill. Shearon Harris is operated by Carolina Power & Light Company and owned by Progress Energy. The plant type is a pressurized water reactor, which produced 5.37 billion kilowatt hours of power in 2001.

The northwest corner of Harnett County is within a 10-mile radius of Shearon Harris and lies in the plant's safety sub-zone H. This safety zone borders the Cape Fear River and includes the communities of Duncan, Camp Agape, Raven Rock Park, and the Avents Creek area. The evacuation route for this region is to the south and east, using the main roadways US Hwy. 401 and NC Hwy. 210, with the general meeting place being Harnett Central High School.

The occurrence of a nuclear or hazardous materials event can be considered likely for the Harnett County region, due to its proximity; however, it has been excluded from the Plan's vulnerability assessment and analysis since it is presently concerning natural occurrences. The County's Mitigation Committee will incorporate such hazards when necessary and will continue to monitor all situations as needed.

J. Coastal Storms, *Nor'easters*

Harnett County does not lie within the coastal region susceptible to Nor'easters, and thus the evaluation of these events has been excluded from the Plan's vulnerability assessment and analysis.

K. *Volcano*es

Harnett County is not subject to any volcanic activity and is not in the vicinity of any active or inactive volcanoes. The evaluation of volcanoes has been excluded from the Plan's vulnerability assessment and analysis.

L. *Tsunamis*

Harnett County is not subject to Tsunamis events and is not in the vicinity of waves generated by an undersea disturbance, such as an earthquake. The evaluation of a Tsunamis event has been excluded from the Plan's vulnerability assessment and analysis.

M. *Riverine Erosion*

Erosion is an ever-present danger to homes and other types of infrastructure located near a river or other body of water (such as a lake, ocean, or sound). An "Erosion Hazard Area" is defined

by legislation as "an area where erosion or avulsion is likely to result in damage to or loss of buildings and infrastructure within a 60-year period." FEMA has been conducting a feasibility study of riverine erosion because of the difficulty in mapping the hazard areas. Using cost data associated with existing case studies, the study team estimated the approximate unit cost (i.e., cost per river mile) of conducting riverine erosion hazard studies and adding the areas to existing Flood Insurance Rate Maps (FIRMs). The study team estimated the approximate overall costs for conducting studies and mapping the riverine erosion hazard areas nationwide.

At the current time riverine erosion hazard studies have not been conducted for Harnett County's major river, the Cape Fear, or its subsidiaries, the Little River and Upper Little River. Any development along these rivers will be reviewed so that mitigation and FEMA requirements are met. However, when more information is acquired, Harnett County will adjust its mitigation efforts to include river erosion control.

N. Dam/Levee Failure

The majority of dams in the United States are owned privately while some are owned by public entities (state and local authorities, public utilities, and federal agencies). Dams provide drinking water, navigation, irrigation, hydroelectric power, and create lakes for fishing and recreation. Dams also save lives because they help to prevent flooding. Just as dams are very useful, they can be hazardous. Dams and levees have enough power stored behind them that in the event of a failure loss of life and property damage could result downstream of the dam or levee. The National Dam Safety Program is dedicated to protecting the lives of American citizens and their property from the risks of dams and levees. Mitigation efforts include making sure that dams are constructed in a manner to ensure the greatest amount of safety and that dams are maintained, designed, and operated properly.

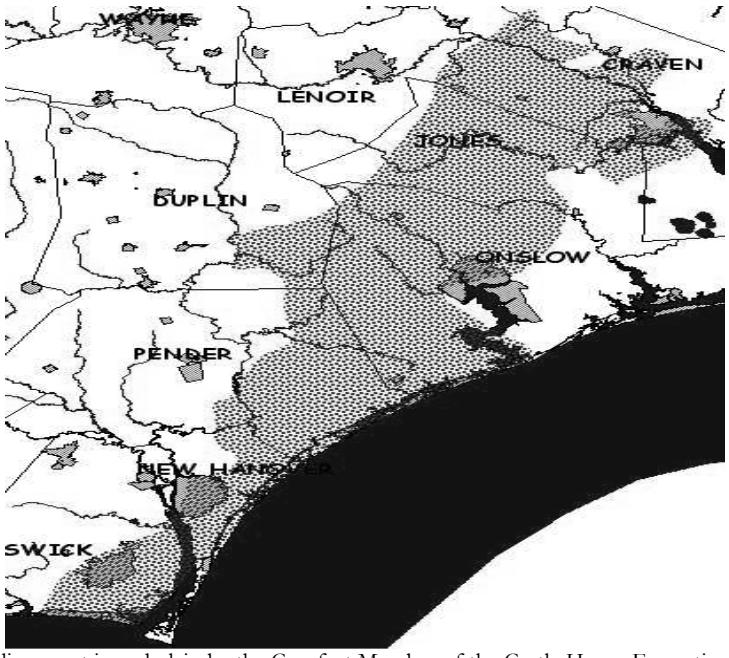
Based on data received from the North Carolina Department of Environment and Natural Resources there are 88 dams operating in Harnett County. At the present time mitigation efforts are difficult to define because the risk of failure is still being researched by NCDENR. When all the information has been acquired, Harnett County will adjust its mitigation efforts to include proactive dam and levee failure.

O. *Sinkholes*

Sinkholes are typically formed in areas with limestone bedrock and are described as "roughly circular depressions in the land surface". Limestone is highly volatile and readily dissolves when it comes in contact with acidic ground water. Humid climates allow rain water to get into holes in the

limestone causing the rock matrix to gradually dissolve, forming void spaces in the subsurface. Most limestone bedrock in the southeastern United States is not exposed at the surface, but covered by a thick layer of sand, silt, and clay. This surface layer is called the overburden, and it can bridge subsurface cavities for a long time but a catastrophic collapse will eventually occur. These are referred to as a cover collapse sinkhole, and they occur mainly in the outer coastal plain of North Carolina around Castle Hayne or River Bend Formations occur at the surface. Most of these sinkholes appear as small to medium sized circular lakes distinguished as a sinkhole because they are not connected to a drainage system.

Cover subsidence sinkholes occur over surfaces that have a relatively thick overburden. Just like a cover collapse sinkhole, cover subsidence sinkholes are caused by void spaces in the limestone bedrock. However, the overburden is not thick enough to form a significant "bridge" across the void and the land surface gradually subsides into the void space below. Their formation is not as dramatic as a cover collapse sinkhole and is connected with the formation of cracks in nearby buildings or in roads. Sinkholes typically form rather slow, but the process can be speed up human activities such as, dredging, diversion of surface drainage systems, or pumping of ground water.



Stippled area of North Carolina coast is underlain by the Comfort Member of the Castle Hayne Formation or the River Bend Formation which are known for their solution features.

Sinkholes are not prevalent in Harnett County, nor is the county located in the area designated for sinkhole activity in North Carolina. The evaluation of a sinkhole event has been excluded from the Plan's vulnerability assessment and analysis.

Harnett County Natural Hazard History

The following is a climatic natural hazard history for Harnett County from the 1960's until to the development of this plan*. This list was created using information gathered from the National Climatic Data Center & the local Emergency Management office in order to assist with our vulnerability assessment. Due to the limitations within the NCDC website, this is not a complete list of hazards occurrences within Harnett County. Other resources, such as newspapers, EM files, and veteran government employees, were used to research other occurrences and vulnerable areas.

Date	Type of Event	Monetary Damages
• 2-18-60	F1 Tornado	$25,000 property damage
• 11-2-66	F2 Tornado	$250,000 property damage
• 1-5-71	F2 Tornado	$250,000 property damage
• 5-17-73	F1 Tornado	$25,000 property damage
• 5-15-75	F1 Tornado	6 injuries, $25,000 property damage
• 6-16-82	F2 Tornado	$250,000 property damage
• 6-5-85	Thunderstorm	$92,300 property damage (14 homes)
• 7-1-86	F1 Tornado	$25,000 property damage
• 7-1-86	F0 Tornado	$3,000 property damage
• 2-21-89	Thunderstorm winds	1 death, 4 injuries; $122,300 damage
• 3-6-89	Thunderstorm	1 injury, 2 mobile homes damaged
• 6-12-89	F1 Tornado	$25,000 property damage
• 2-16-90	Thunderstorm winds	1 injury
• 10-23-90	F1 Tornado	$25,000 property damage

• 11-4-92	F1 Tornado	$3,000 property damage
• 11-23-92	F3 Tornado	3 injuries, $952,000 damage
• 5-1-94	F1 Tornado	$67,000 property damage
• 7-17-94	Thunderstorm winds	$5,000 damage to property
• 8-17-94	F1 Tornado	$500,000 property damage
• 1-7-95	Thunderstorm winds	$600,000 damage to property
• 5-24-96	Thunderstorm winds	$20,000 damage to property
• 9-5-96	Hurricane Fran	$167,308 damage
• 6-24-97	Hurricane Danny	$3 million crop damage
• 8-5-97	1.75 inch Hail	$50,000 property damage
• 5-23-98	Thunderstorm Wind	$85,000 property damage
• 8-27-98	Hurricane Bonnie	$50 million damage to crops
• 3-3-99	Thunderstorm Wind	$60,000 property damage
• 3-15-99	Woods Fire	75-80 acres damaged
• 8-1-99	Thunderstorm Wind	$60,000 property damage
• 9-4-99	Hurricane Denis	$3 million damage to crops
• 9-15-99	Hurricane Floyd	Individual and Family Grant Program (State/FEMA administered) Amount Approved $123,112 Disaster Housing (FEMA administered)= $173,230 Small Business Association; Total Loans Approved= $665,000 Infrastructure; Public Assistance (State/ FEMA Administered) Funds Paid= $541,298
• 9-24-01	Thunderstorm Wind	$10,000 property damage
• 12-14-02	Winter Storm	$28,770 damage
• 3-20-2003	Flooding	$150,000 property damage

• 9-18-2003	Hurricane Isabel	Total number of Applicants for Assistance-90; Total Amount received- $147,822.38
• 1-25-04	Ice Storm	18 injuries
• 8-12-04	Tornado	11 houses either destroyed or condemned due to damages, 1 church damaged, 1 community center damaged.

*Due to limited resources, data from 1960-on provides the best available information.

Natural Hazard Analysis for Harnett County

The North Carolina Division of Emergency Management recommends in their workbook Keeping Natural Hazards From Becoming Disasters, 2001 that each community should decide which hazards to specifically focus its attention and resources on. In order to do this a local government should take the following five factors into consideration:

1. The type of natural hazards that threaten the community.
2. The likelihood of occurrence of the hazards.
3. The location of the community that is most vulnerable.
4. The impact of the hazard.
5. The hazard index for each hazard.

The Hazard Identification and Analysis Worksheet has been provided by NCEM to help organize the information needed for items 1-5. The county and municipalities used this worksheet to help determine the Hazard Identification and Analysis for Harnett County. The following information and scales provided by NCEM, were used to complete worksheet one.

1. Type- Communities face many different types of hazards. A community must consider all the hazards that threaten them and focus on those that pose the greatest risk. After reviewing the Harnett County hazard history it was determined that this plan would focus on the following natural hazards: Earthquake, Hurricane, Thunderstorm, Tornado, Severe Winter Storms, Flooding, and Wildfire.

2. Likelihood of Occurrence- Estimate the likelihood of each type of hazard occurring in your area. The following scale has been used to help determine Likelihood of Occurrence:

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

3. Location or Intensity Rating- Identify the areas that are most vulnerable to each natural hazard and note whether they cover a small, medium, or large portion of the county.

4. Impact- Each community should determine the likely impact from each natural hazard threat. The following scale was used to determine the impact of natural hazards in Harnett County.

Impact Scale

Impact	Magnitude (% of county affected)	Severity
Catastrophic	More than 50%	Multiple deaths
Critical	25 to 50%	Multiple sever injuries.
Limited	10 to 25%	Some injuries
Negligible	Less than 10%	Minor injuries

5. Hazard Index- Because some hazards occur more frequently then others, it is important to identify which type of risk each hazard poses for the county and rank them according to the frequency of the hazard. For the purposes of this plan all hazards were ranked 1-8 with one (1) being high likelihood, high-intensity hazard and/ or severe impacts, and eight (8) being low likelihood, low-intensity hazard and/ or limited impacts.

Worksheet #1 Hazard Identification and Analysis

Worksheet one is for the county's jurisdiction; however, both the county and local municipalities worked together to formulate the hazard identification and analysis for Harnett County. A reoccurring issue during simple round table discussion was man-made disasters, but the Committee choose not to explore them at this time.

Additional worksheets for all municipalities can be found in the appendices of this document.

Harnett County

Worksheet # 1: Hazard Identification and Analysis

Type of Hazard & Associated Elements	**Likelihood of Occurrence** (Highly Likely, Likely, Possible, Unlikely)	**Intensity Rating** (Intensity Scales or Relative Terms)	**Impact** (Catastrophic, Critical, Limited, Negligible)	**Conclusions** (Rank the seriousness of the hazard)
Hurricane	Highly Likely	Category 2	Critical	1
Thunderstorm (Hail/ Wind)	Highly Likely	Severe/Moderate	Limited	2
Winter storm	Likely/Possible	Moderate	Limited	5
Tornado	Possible	F2	Critical	4
Wildfire	Likely	Moderate	Limited	7
Flooding (including flash Floods)	Likely	Moderate/Severe	Limited/ Negligible	6
Drought	Possible	Moderate	Negligible	8

1----------8

High Likelihood, High-Intensity Hazard &/or Severe Impacts Low Likelihood, Low-Intensity Hazard, &/or Limited Impact

Vulnerability Assessment

When developing a strategy to reduce the impact of natural hazards, the county must determine its present and future vulnerability to such hazards. Vulnerability is calculated by combining the probability of potential hazards in each jurisdiction, and the amount and value of development in that area. North Carolina Emergency Management (NCEM) recommends that communities inventory and estimate the cost of damage to critical facilities and highly vulnerable residential, commercial, industrial and public facilities (Keeping Natural Hazards From Becoming Disasters, NCEM May 2000). This calculation includes an inventory of the current and projected population, number of buildings and the combined value of all buildings and critical facilities in the county and its municipalities. Both existing developed land and land scheduled for future development, guided by zoning and land use plans, are included in the analysis.

Harnett County and its municipalities sought the best available information from various departments and public service providers especially researching tax records and insurance information. Departments that were included in the vulnerability assessment are but not limited to: Emergency Management, Public Utilities, hospitals, Public School system, local businesses and academia, Planning Department, Economic Development Commission, and MIS. Estimates were developed from the information gathered in order to assess Harnett County's vulnerability in the event of a natural hazard. All approximate values correspond to all our addressed hazards and are based on best available information. As resources, funding, & time become available we hope to utilize a specifically designed loss estimation software to advance these assessments. For example, a future task would be a calculating the assets within the flood zones. This would yield a more accurate risk assessment for flooding.

A. Present Vulnerability

There are many considerations in determining the overall vulnerability of a community or area. These include vulnerable populations, high-risk areas, and vulnerable structures and facilities. Although all parts of the county are vulnerable during a natural hazard some areas can be at more risk than others. Specific areas in Harnett County that have historically experienced damage due to flooding are predominantly in the following areas: (See Flood Areas of Harnett County Map).

Flood Prone Areas in Harnett County. See Appendix F for Flood Prone Areas Map

1. Page Road [SR 1243] and Leaflet Church Road.
2. McDougald Road [SR 1229] at the creek close to AC Morrison Road [SR 1288].

3. McDougald Road [SR 1229] and O'Quinn Road [SR 1247] at the creek.

4. Nursery Road [SR 1117] and NC 27 at Upper Little River.

5. Elliott Bridge Road [SR 2045] between Will Lucas Road [SR 2044] and Bethal Baptist Road [SR 2048].

6. Norrington Road at [SR 1130] at Upper Little River.

7. NC 27 area from bridge on Kershaw Road [SR 1140] covering area from Upper Little River , Clark Road [SR 1129], Mack Road [SR 1145] up across NC 27 up on Tim Currin Road [SR 1250] SE across Walkers Creek to Autry Road [SR 1131] back down to Norrington Road [SR 1130] at Upper Little River.

8. McLean Chapel Road [SR 2030] and Wire Road [SR 2031] at Stewart's Creek.

9. Sheriff Johnson Road [SR 1518] where East Buies Creek crosses between Mitchel Road [SR 1535] & NC 27.

10. US 421 Avery's Trailer Park.

11. Black River at Dorman Road [SR 1777] & Arrowhead Road [SR 1780] down the river to Cumberland/Harnett line.

12. Long Branch Road [SR 1002] & Pope Road [SR 1793] at Mingo Swamp.

13. Blackman Road [SR 1781] at Cumberland/Harnett line.

** 6 inches of rain will flood Hwy 55 downstream from McLamb Pond Dam located 0.7 miles east from intersection of I-95 & US 421 (Dunn) on NC 55.

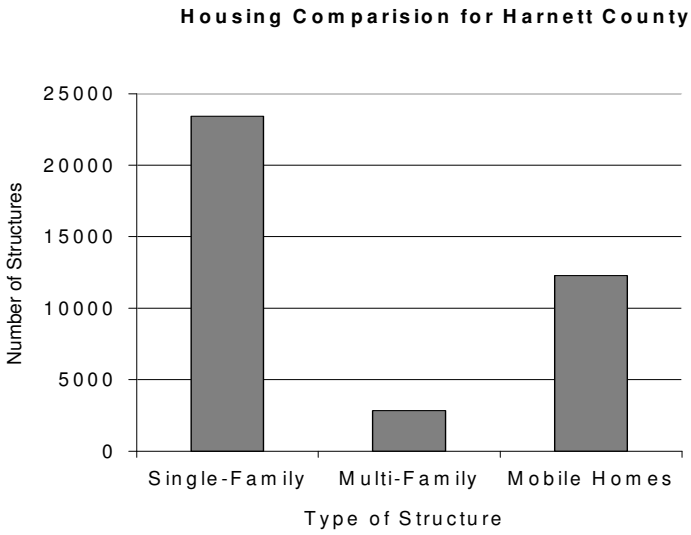
Harnett County and its municipalities are susceptible to other hazards. However, hurricanes, wildfires, severe winter storms, thunder & lightning/ hail/ windstorms, drought, and tornadoes are geographically less predictable. Every part of the county is vulnerable to theses hazards as opposed to flooding where that can be associated to the low lying areas. It is quite difficult to determine the impact of each addressed hazard on each jurisdiction without proper loss estimation tools and lots of risk assessment modeling. However, the next few sections will describe in detail the residential and commercial, existing and future, vulnerability of our county using values that correspond to all our addressed hazards.

Residential Development

Harnett County has experienced a boom in residential growth in the last 10 years. Most of this growth has taken place in the northern and southern regions where the county borders the metropolitan areas of Cumberland and Wake Counties. According to permitting figures by townships from 1998 to 2000, manufactured homes are becoming the predominate type of housing in Harnett County (See Housing Comparison charts below). Manufactured homes offer affordable and easily obtainable housing for the residents of Harnett County. There are approximately 200 manufactured home parks (parcels with three or more mobile homes) within the county alone. According to the 2001 Census, 31% of the housing stock in the County was manufactured homes. Although many of the manufactured homes built today are able to withstand more of the adverse affects of natural hazards than those built in the past, they still offer less resistance against the effects of natural hazards. This is mostly due to the unique design and the requirement that these homes be built to HUD (Housing and Urban Development) standards which offer more protection against natural hazards the than North Carolina Building Code.

A mobile home in Harnett County following a tornado in January of 1995

Harnett County and its municipalities currently have approximately 44,030 structures valued at over several billion dollars (See worksheets 2 & 2A for complete listing of actual numbers and costs for each jurisdiction). More than half of these structures are either single-family, multi-family, or manufactured residential structures.



Commercial & Industrial Development

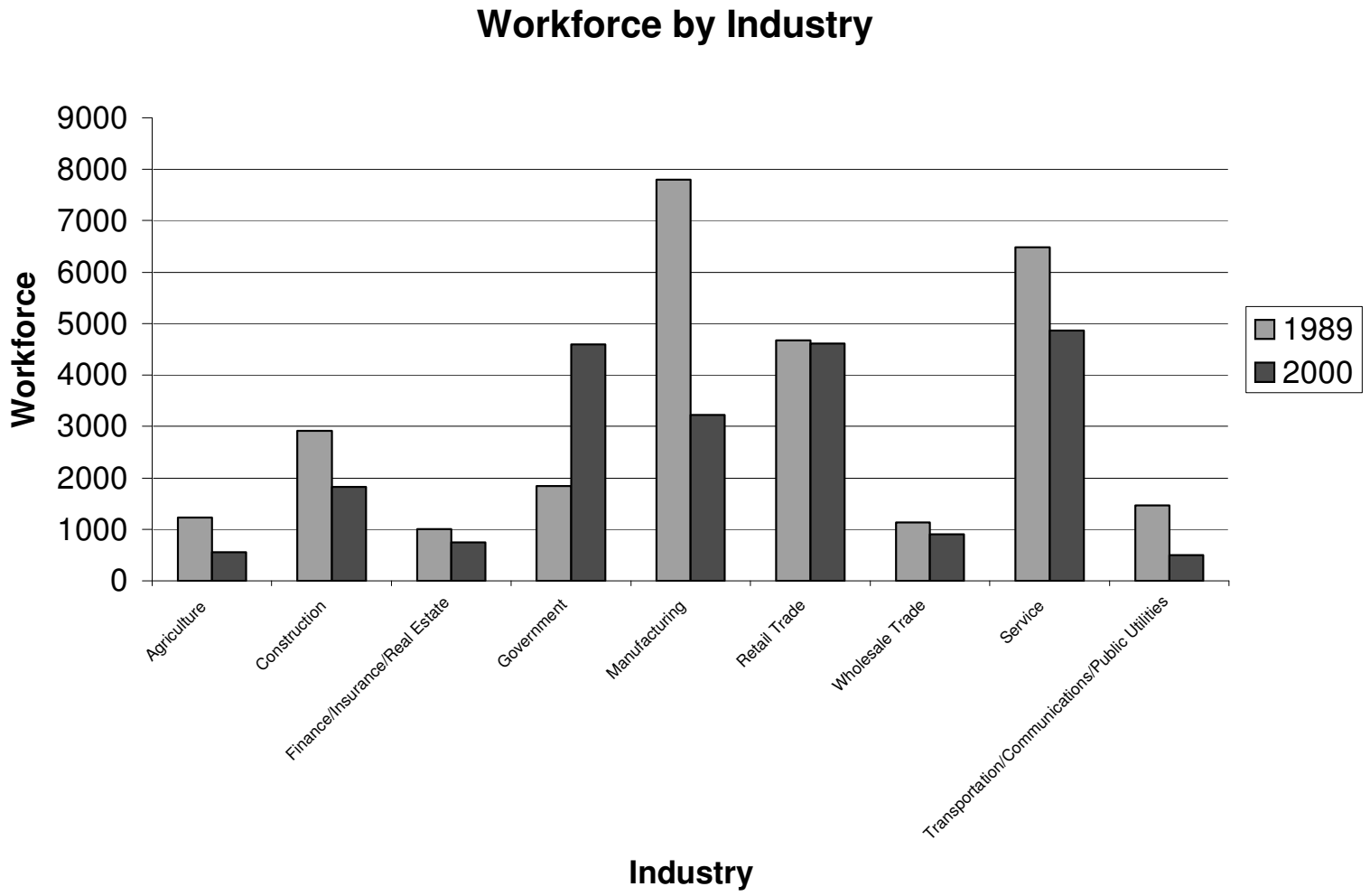
Harnett County and its municipalities offer a variety of industrial and commercial businesses. Agriculture served as the major economic contributor for the county far into the 20th century. Overtime, Harnett has converted from an agrarian society to a more urbanized one. Denim manufacturing, furniture, screen-printing, and tobacco lead the county's economic success prior to 1997 when the unemployment rate rose from its normal 3-5% to 7.3% by March of 2003. Swift Denim (est. 1903) was the largest employer for the county until it closed its doors in 2001. Other major employers that went out of business were This End Up Furniture (270 employees) and Champion Products (750 employees). Since 1992, Harnett County has lost over 3,000 manufacturing jobs, 2000 of which were in the textile industry alone due to the closing of Swift Denim, Champion Products, P.T. Apparel, and VF Image Wear. Agriculture, tobacco particularly, has been declining over the years causing many residents to look outside the county for jobs.

Over the past decade, Harnett County's commercial and development trends have changed. Most industries have experienced reductions in their workforce. Government more than doubled its workforce while manufacturing decreased by more than half its workforce. These changes have encouraged the county's economic commission to re-evaluate the county's commercial and development trends. In recent years, the area has attracted several large-scale commercial businesses such as Super-Wal-Mart, Lowes Home Improvement, and Goodies. Other smaller scale businesses

have also built new larger facilities or in new locations: Wendy's, Dairy Queen, CVS, Andy's, Domino's Pizza, and Bojangles. Another indicator of economic growth in the county has been the increase in per capita income: $10,053 (1990) to $19,781 (2000). Despite this economic growth, unemployment is still a concern for the county as well as the possible negative effects of a natural hazard on the evolving economy.

Major Employers

Organization	Specialization	# of Employees (2003)
Harnett County Public Schools	Education	2,055
Morganite, Inc.	Carbon Brushes	800
Campbell University	University/Education	800
Food Lion Distribution Center	Warehouse and Shipping	760
Harnett County Government	Local Government	600
Harnett Correctional Institution	Correctional Facility	451
Betsy Johnson Hospital	Healthcare	400
Edwards Brothers	Hard and Soft-Bound Books	300
Wal-Mart	Mass Retail	275
Champion Homes	Manufacturing Mobile Homes	250
Good Hope Hospital	Healthcare	250
Machine and Welding Supply	Industrial Gases and Supplies	200
Godwin Manufacturing Company	Truck Bodies and Hydraulics	177


Workforce by Industry
Workforce
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1989
2000
Agriculture
Construction
Finance/Insurance/Real Estate
Government
Manufacturing
Retail Trade
Wholesale Trade
Service
Transportation/Communications/Public Utilities
Industry

Critical Facilities and Infrastructure Development

Critical facilities provide necessary services for everyday needs of the community, including but not limited to power, water, and sewer. In the event of a natural disaster, many of these facilities would provide vital emergency services. Damage to these facilities could result in crippling effects on the county's ability to deal effectively with the disaster. Harnett County has several facilities within its jurisdiction.

Sewage Treatment Plants

Harnett County has four sewage treatment plants with five employees. In total, the sewage system within Harnett County is currently valued at approximately $3.8 million dollars. Lillington, Angier, Erwin, and Dunn provide their own wastewater collection and treatment services.

Water Treatment Plants

Harnett County has one water treatment plant that serves over 1,500 miles of water lines to 99% of Harnett County and also provides water to surrounding counties. This plant is valued at $15 million dollars and has twelve employees on a daily basis. Erwin, Dunn, and Angier have their own water supply systems with a water supply from the Cape Fear River. Angier, Coats, and Lillington, purchase water from the County water system as well as Cumberland, Lee, Wake, Johnston, and Moore counties.

Hospitals

There are two hospitals located within Harnett County. Betsy Johnson is a privately owned hospital located in the City of Dunn. Betsy Johnson offers 24-hour emergency services and has approximately 500 employees and 118 licensed beds available. The estimated value is approximately $50 million and at full capacity approximately 700 people could be at risk during a natural hazard. Recently the hospital has opened a $2 million, 15,000 square foot Wellness/Rehab Center, added nine physicians to their team of fifty-six, and installed a new $1.6 million CT multi-slice scanner. The second hospital is Good Hope located in the Town of Erwin. Good Hope is also a 24-hour emergency facility that offers 72 licensed beds. The estimated value is approximately $15 million and at full capacity 150 people could be at risk during a natural hazard.

Schools

Harnett County has twenty-five public schools with a combined estimated value of approximately $263 million dollars. On a standard school day 18,366 students and faculty would be at risk if a natural hazard occurred. All of Harnett County's public schools also

serve as shelters during disasters. Harnett County also hosts one university and one community college. Campbell University is a four-year private university located in the Buies Creek area of the county. On a normal school day Campbell University will have approximately 4,500 students and faculty on its campus. Central Carolina Community College has a main campus in Harnett County and approximately 30 satellite classrooms in different portions of the county. On a normal school day Central Carolina will have approximately 1,000 students and faculty members on various campuses across the county.

Police

Police protection for Harnett County is provided by the Harnett County Sheriff Department. This office has a total of 160 employees, 60 of those are sworn officers. The Harnett County Law Enforcement Center has an estimated value of $3,259,467 dollars, and has a capacity of 84 inmates and averages 120 inmates on a daily basis. All municipalities provide their own police protection. The State of North Carolina, Department of Corrections has a prison facility in Lillington. This site is valued at $17,195,000 and houses 1,060 inmates and staff.

Harnett County recently constructed a new county courthouse in Lillington near the Cape Fear River. This facility employs approximately 100 people and houses several county offices such as the register of deeds, land records, and the clerk of courts office. The estimated cost of this project was $20 Million dollars and opened in November 2002.

Fire

Harnett County has 13 fire and rescue buildings valued at approximately $26 Million dollars, and altogether employs 365 workers. All municipalities provide fire protection for their jurisdiction with support from surrounding departments.

Roads

Harnett County has 1,058 miles of primary (184 miles), secondary, and urban state-maintained roads, with a replacement value in excess of a billion dollars. Of this 1,051.2 miles of roads, 973.97 are paved while 77.23 are unpaved. Major routes in the County include I-95, US 401, US 421, NC 24, NC 210, NC 27, NC 55, NC 217, and NC 87. The loss of any of these corridors would have crippling effects on Harnett County due to their extensive daily use.

The Harnett County board of Commissioners recently amended the Harnett County Zoning Ordinance by adding the Highway Corridor Overlay District. The Harnett County Planning Board with the technical assistance of the North Carolina Department of Commerce's Division of Community Assistance in Fayetteville conducted the corridor study. The district provides for an additional set of

development standards that are applied over the regular zoning district requirements for a specified corridor along a highway. By definition, the corridor depth is 600' along both sides of the right-of-way unless modified by the Board of Commissioners. Highways are included in the overlay district only after they have been studied, a plan has been adopted and the zoning map has been amended. At this time, only N.C. 87 has been studied.

Repetitive Loss Properties

Under the Community Rating System (CRS), a repetitive loss property is one in which two or more flood insurance claims of at least $1,000 each have been paid within any 10-year period since 1978. Harnett County has one repetitive loss property located in the City of Dunn's jurisdiction. Since the County only has one repetitive loss property a CRS plan is not required at this time.

Rationale for Designating Critical Facilities

Various resources were pulled in order to designate facilities in Harnett County as critical facilities. Infrastructure of critical value to a community include but are not limited to: employment Centers, repetitively damaged structures, emergency facilities, public schools, hospitals, water treatment plants, sewage treatment plants, streets, primary roads, municipalities, fire stations, and chemical storage companies. Using the best available information, the county and its municipalities identified such infrastructures, estimated their values, and mapped them on a critical facilities map. **See Appendix F for Critical Facilities Map**

Harnett County Unincorporated Areas
Worksheet #2: Geographic Planning Area Vulnerability Assessment

Current Conditions				Potential Future Conditions		
Type of Development	**Number of Buildings**	**Current Value**	**Current Number of People**	**Projected Number of Private Buildings** (If developed under existing policies)	**Projected Value**	**Projected Number Of people** (If developed under existing policies)
Singe-Family Residential	30,803	$1.5 Billion	68,268	40,043	$2 Billion	78,000
Multi-Family Residential	705	$64 Million	1,840	916	$80 Million	3,000
Commercial	1,866	$242 Million	3,732	2,500	$150 Million	5,000
Industrial	71	$47 Million	7,100	85	$65 Million	10,000
Other	–	–	–	–	–	–
Subtotal	**33,445**	**$1 Billion +**	**80,940**	**43,544**	**2 Billion +**	**96,000**

Note: All approximate values correspond to all our addressed hazards and are based on best available information. As resources, funding, & time become available we hope to utilize a specifically designed loss estimation software to advance these assessments.

Worksheet #2, continued from previous page

Public Buildings and Critical Facilities						
CURRENT CONDITIONS				**POTENTIAL FUTURE CONDITIONS**		
Type of Facility	**Number of Existing Public Buildings and Critical Facilities**	**Current Replacement Value**	**Current Number of People**	**Projected Number of Public Buildings and Critical Facilities**	**Projected Replacement Value**	**Projected Number of of People**
Sewage Treatment Plant	4	$3.8 Million	5	2	$7.5 Million	4
Water Treatment Plant	1	$15.0 Million	12	0	0	0
Hospital	2	$2.2 Billion	2,000	1	$30.0 Million	300
Schools	26	$263 Million	18,366	2	$36 Million	2,556
Infrastructure (roads, bridges, drainage, etc.	1,051 Mites	Billion +	N/A	Expansions	$20 Million	N/A
Police Station	1	$3.2 Million	160	1	$20 Million	100
Fire Station	13	$26 Million	365	2	$5 Million	8
Haz. Material Facilities	0	0	0	0	0	0
Government Offices	See Lillington					
Emergency Shelter	See Schools					
Subtotal	47	$3.511 Billion	20,908	8	$118.5 Million	2,968
TOTAL:	**33,492**	**$5.3 Billion +**	**105,848**	**43,552**	**$2.4 Billion +**	**98,968**

Note: All approximate values correspond to all our addressed hazards and are based on best available information. As resources, funding, & time become available we hope to utilize a specifically designed loss estimation software to advance these assessments.

Harnett County

Worksheet #2A: Total Community Vulnerability Summary

Current Conditions						Potential Future Conditions				
Geographic Planning Area	**Total Current Number of People**	**Total Number Of Existing Private Buildings**	**Total Current Value**	**Total Number of Current Public Buildings & Critical Facilities**	**Total Current Replacement Value**	**Total Projected Number Of People**	**Total Projected Number of Private Buildings**	**Total Projected Value**	**Total Projected Number of Public Buildings & Critical Facilities**	**Total Projected Replacement Value**
Harnett County	80,940	33,445	$1 Billion +	47	$3 Billion +	96,000	40,043	$2 Billion	8	$118.5 *Million*
Coats	3,410	940	$55 Million	18	$69.5 Million	2,682	1,077	$60.8 Million	8	$76.46 minion
Coats ETJ	641	91	$22 Million	4	$22.8 Million	772	132	$24.2 Million	6	$25 Million
Angier	5,500	1,778	$147 Million	1,788	$182.5 Million	1,255	463	$31 Million	468	$59 Million
Angier ETJ	1,000	387	$47 Million	387	$47 Million	525	205	$55 Million	206	$15.5 Million
Erwin	5,225	2,292	$137 Million	28	$113 Million	6,458	2,383	$151 Million	35	$145 Million
Erwin ETJ	840	338	$18 Million	0	$12 Million	1,387	363	$25 Million	0	$14 Million
Dunn	15,172	4,620	$352 Million	21	$2.1 Billion	20,646	4,985	$377 Million	21	$3.19 *Billion*
Dunn ETJ	465	139	$11 Million	0	N/A	715	199	$18 Million	0	N/A
Lillington	10,295	1,154	$105 Million	1,184	$193 Million	11,734	1,318	$129 Million	1,351	$225 Million
***Community* Total**	123,488	45,184	$1.8 Billion+	3,477	$6 Billion	142,000	51,168	$2.8 Billion	2,103	$4 Billion

Note: All approximate values correspond to all our addressed hazards and are based on best available information. As resources, funding, & time become available we hope to utilize a specifically designed loss estimation software to advance these assessments.

B. Future Vulnerability

Future vulnerability is defined as the extent of expected harm and property damage caused by a hazard event if projected development were to occur. If current development patterns continue in Harnett County, vulnerability will increase accordingly. Indeed, vulnerability will increase significantly if development occurs in areas susceptible to adverse impacts from natural hazards.

Future Residential Development

As surrounding counties continue to grow, Harnett County anticipates that residential growth will continue to soar. As mentioned previously, the most recent census shows Harnett County as the eighth fastest growing county in the state with an average growth rate 34.2% in the past ten years, primarily near the Wake and Cumberland County borders. Geographically, the county seems well positioned for growth: The Cape Fear River provides an abundant water supply, the county is accessible from I-40 and I-95, and Harnett County is within a day's drive of 50% of the U.S. population. The Research Triangle area is consistently listed as a premium area in which to live and work. Although Harnett County welcomes residential growth, there is the fear of becoming a bedroom community to surrounding counties. Therefore the county has recently taken some measures in the County Subdivision Regulations to help slow growth and ensure that development takes place in a safe and orderly manner. The County also has current research projects that are expected to help future land use planning as well. Details of these projects are located in the *Evaluating County Ordinances* section of this plan. If these measures do not show that growth is being controlled, then additional measures may be taken in the future.

Future Commercial and Industrial Development

The recent economic downturn and alarming unemployment rate have led elected officials and community leaders to closely examine Harnett County's ability to improve its economic well being. Several actions have been taken to restore commercial and industrial performance and to stimulate its growth. Harnett County has hired an economic development consultant to provide suggestions as well as allocating financial resources to assist in developing industrial property and improving infrastructure. Established in 1994, the Harnett Forward Together Committee, comprised of members from the private sector who give their time, effort, and financial support, also strives to attract the growth necessary to improve the per capita income and quality of life in the

county. This committee assists in advertising available properties, businesses relocating into the county, constructing and maintaining buildings, and acquiring land for the development of industrial sites.

A recent step towards economic growth and success of the county is the approval of three certified industrial parks by the North Carolina Department of Commerce. One was approved in December 2002 while the other two were approved in May 2003. The Harnett County Economic Development Commission began an aggressive marketing campaign to promote the development and use of the parks.

In 1999, Harnett County's new business growth rate (11.9%) was above the state's average, proving the county's potential for future development. Another indicator of potential growth is the Development Capacity Checklist compiled by the North Carolina Department of Commerce. According to the chart below, Harnett County is suitable and ready for industrial and commercial growth. Taking this, the development of three industrial parks, and 2001 data on expansion and new buildings into consideration, shows that Harnett County can develop at a steady and/or frenzied pace, making smart expansion and growth important to Hazard Mitigation.

Development Capacity Checklist

Indicator	Yes/No
County Development Program	Y
Local Development Corporation	Y
Chamber of Commerce	Y
Economic Development Plan	Y
80% of population within 10 miles of a 4-lane road	N
Commercial Airport within 50 miles	Y
Interstate Highway within 10 miles	Y
Wastewater Treatment Capacity Available	Y
Natural Gas Available	Y
100,000+ sq ft of Industrial Space Available	Y
Industrial Sites Available	Y

Source: N.C. Department of Commerce, 2000 County and Regional Scans

Harnett County 2001 Commercial and Industrial Expansion and Construction

Expansion		New		Total	
Investment	New Jobs	Investment	New Jobs	Investment	New Jobs
3,820,000	75	1,500,000	20	5,320,000	95

Future Critical Facility Development

Currently Harnett County has several critical facility projects under development or planned for the future. Some of these projects include:

Police

The County is planning no future developments in policing facilities or services at this time.

Fire

The County has plans to add 2 additional rescue buildings that will create jobs for 8 employees. The estimated cost to replace these structures will be $5 Million dollars.

Schools

There are two schools under construction, with an estimated value of $18 million dollars and an estimated size of 1,000 students and faculty.

Hospitals

Both hospitals located in Harnett County, Good Hope and Betsy Johnson, have plans for expansion. Good Hope Hospital plans to relocate onto a 64-acre campus off of Highway 421 between Lillington and Buies Creek. This $33.5 million project will provide county residents with a hospital in the center of the county adjacent to a key commercial/industrial development park outlined in the county's economic development goals. Along with improving access to a hospital for residents of Harnett County, Good Hope's relocation and expansion will add 64 job positions as well as preserving the 200 already existing jobs. The relocation was denied by the state in September 2003, and the hospital is currently appealing the decision. The current facility will be used for the next two years, and in November 2003, the County Commissioners backed Good Hope Hospital when they passed a resolution to support their bid for expansion and asked Betsy Johnson to stop opposing the plan.

Betsy Johnson Hospital has recently accomplished several betterment projects, including a new $2 million, 15,000 square foot Wellness/Rehab Center; nine new physicians; and installation of $300,000 chemistry analyzers and a $1.6 million CT multi-slice scanner. The hospital has received the Certificate of Need approval from the North Carolina Department of Facilities Services to expand its facilities. The $24 million patient care expansion includes a four-floor patient tower, sixty-eight private rooms with bath accommodations, renovation of pre-op, post-op, and recovery rooms, new outpatient surgery area, six new ICU rooms, renovated and expanded obstetrics area, expansion of mammography, pharmacy, microbiology, laboratory, and medical records, and a new

dining room with a capacity of over ninety. A $2 million surgical expansion is also part of the project that involves 64,565 square feet of new space with renovations to another 34,320 square feet. With ground breaking already underway, Betsy Johnson, in July 2003, announced the purchase of 6 acres of property in Erwin to house a Rehabilitation and Wellness center.

Water Treatment Plant

There are no projected water treatment plant upgrades or construction scheduled for the future at this time.

Sewage Treatment Plant

The County is currently expanding sewer to several areas within the county mostly along major corridors where major growth is expected in the future. Harnett County has four sewage treatment plants with five employees and projects major upgrades to at least two existing plants in the future that will add four more jobs. In total, the sewage system within Harnett County is currently valued at approximately $3.8 million and will be valued at $11.3 million in the future.

Roads

On April 15, 2002 the Board of Commissioners voted to include N.C. 87 from the Cumberland County line to the Lee County line in the Highway Corridor Overlay District. Currently, this 14 mile long segment is under renovation and will become a multi-lane road with five traffic signals and possibly a sixth traffic signal. The extra development standards within the Highway Corridor Overlay District apply to all land use permits issued after April 15, 2002.

Capability Assessment

The ability of a community to develop an effective hazard mitigation plan depends upon its capability to implement policy and programs. This is accomplished through the legal, technical, and fiscal capabilities of the local government. Therefore, a complete assessment of the County's and all the municipalities' capabilities was preformed and incorporated into the development of this Mitigation plan. This evaluation strongly influenced our goals and strategies, as well as provided an excellent guide to inform policy makers and enforcers of what is satisfactory and what can be enhanced.

The local government functions of Harnett County, as well as the Town of Angier, Town of Coats, City of Dunn, Town of Erwin, and Town of Lillington, are exercised by a Board-Manager form of government. The elected Board of Commissioners is the decision making body for the county. The appointed Planning Board serves as an advisory body to the elected Board on planning matters. The county also has a Board of Adjustment, which is a quasi-judicial administrative body who are also appointed, and duties include hearing administrative reviews, variances, and conditional use applications. The county has a number of professional staff departments to serve the citizens of the County and to carry out day-to-day administrative activities. This capability assessment is for the Harnett County jurisdiction only. Each municipality's capability assessment worksheet can be found in the appropriate appendices of this document

A. Legal Capability

General Authority

In North Carolina, authority is given to local governments to implement regulatory measures. These police powers to protect public health, safety and welfare are best served at the local level. This authority enables local officials to enact and enforce ordinances and to define and abate nuisances. As hazard mitigation is a form of protecting public health, safety and welfare, it falls under the general regulatory powers of local governments. Local authority also extends to building codes and inspections, land use, acquisition, taxation and floodway regulation.

Building Codes and Inspections

Many structural mitigation measures involve constructing and retro-fitting homes, businesses and other structures according to standards designed to make buildings more resilient to the impacts of natural hazards. The North Carolina State Building Code prescribes minimum standards for building construction, and local governments are permitted to adopt additional codes as long as the

regulations are at least as stringent as the state standards. Local governments are also empowered to carry out building inspections to ensure local structures adhere to the minimum state building standards. The state building code regulations for Harnett County are enforced by Harnett County Planning and Inspections Department.

Land Use Planning

Regulatory powers granted by the state to local governments are the most basic manner in which a local government can control the use of land within its jurisdiction. Through various land use regulatory powers, a local government can control the amount, timing, density, and location of new development. All these characteristics of growth can determine the vulnerability level of a community in the event of a natural hazard. Land use regulatory powers include the power to engage in planning, enact and enforce zoning ordinances, floodplain ordinances, and subdivision controls.

Zoning

Within its zoning authority, a local government is authorized to divide the planning area into specific development districts. For each type of district, as defined in a written ordinance and by zoning maps, the local government may "regulate and restrict construction, reconstruction, alteration, repair or use of buildings, structures of land" (N.C.G.S. 160A-382). Harnett County's zoning ordinance was adopted by Averasboro, Black River, Buckhorn, Duke, Grove, Hector's Creek, and Neill's Creek Townships (North of the Cape Fear River) on July 18, 1988. Anderson Creek, Barbecue, Johnsonville, Lillington, and Upper Little River Townships (South of the Cape Fear River) adopted the zoning ordinance on June 5, 2000. The ordinance was last amended on February 19, 2001. Stewart's Creek is a township located in the southern portion of the county and remains the only unzoned portion of Harnett County.

Subdivision Ordinance

Subdivision regulations control the division of land into parcels with the intent to develop or sell various parcels. Flood-related subdivision controls typically require that sub dividers install adequate drainage facilities, and design water and sewer systems to minimize flood damage and contamination. They prohibit the subdivision of land subject to flooding unless flood hazards are overcome through filling or other measures and prohibit filling of floodway areas. Subdivision ordinances require that subdivision plans be approved prior to the sale of land. Subdivision regulations are a more limited tool than zoning and only indirectly affect the type of land use or minimum specifications for structures. Local governments are authorized under N.C.G.S. 160A-371

to regulate the subdivision of land within their jurisdiction. Subdivision regulations apply when land is divided into parcels that are ten acres or smaller.

Acquisition

Under the North Carolina General Statutes (160A-240.1), local governments have the power to acquire property "by gift, grant, devise, bequest, exchange, purchase, lease, or any other lawful method," pursuant to state eminent domain laws (N.C.G.S. 40A). This regulatory tool may be used by local governments to reduce community vulnerability to natural hazards by directly controlling development and use of areas especially vulnerable to natural hazards.

Taxation

Taxation can be a powerful mitigation tool by providing local government with a way to guide development. Preferential tax rates may be used to discourage development in hazard-prone areas and to encourage it in safer areas.

Spending

A major power that has been delegated from the North Carolina General Assembly to local governments is the power to make expenditures for the public interest. Hazard mitigation principles should be made a routine part of all spending decisions made by the local government, including annual budgets and a Capital Improvement Plan (CIP).

A CIP is a schedule for the provision of municipal or county services over a specified period of time. Capital Improvement Programming, by itself, can be used as a growth management technique, with a view to hazard mitigation. By tentatively committing itself to a timetable for the provision of capital to extend services, a community can control its growth and regulate the extension of and access to services. A CIP that is coordinated with extension and access policies can provide a significant degree of control over the location and timing of growth. If the CIP is effective in directing growth away from environmentally sensitive or high hazard areas, for example, it can reduce possible environmental costs resulting from a natural hazard.

Floodway Regulation

The North Carolina General Statutes declare that the channels and a portion of the floodplain of all the State's streams have to be designated as a floodway, either by a local government or by the State. The purpose of designating these areas as floodways is to help control and minimize the extent of floods by preventing obstructions, which inhibit water flow and increase flood height. Inhibited water flow and increased flood height cause damage and losses to private and public property located within the floodway. Using floodway regulations promotes the public health, safety, and welfare of North Carolina citizens in these flood hazard areas.

To carry out this purpose, local governments are empowered to grant permits for the use of floodways, including the placement of any artificial obstruction in the floodway (NCGS 143-215.53 – 215.54). No permit is required for certain uses: agricultural, wildlife and related uses; ground level area uses such as parking areas, rotary aircraft ports; lawns, gardens, golf courses, tennis courts, parks, open space, and similar private and public recreational uses (NCGS 143-251.54 (b)). Existing artificial obstructions in the floodway may not be enlarged or replaced without a permit. Local governments are empowered to acquire existing obstructions by purchases, exchange, or condemnation, if necessary, to avoid flood damages (NCGS 143-215.55).

Issuing permits for floodway use requires the local government to consider the dangerous effects a proposed artificial obstruction may create by causing water to be backed up or diverted; or the danger that the obstruction will be swept downstream and cause injury to others; or the injury or damage that may occur at the site of the obstruction itself. Local governments need to take into account any anticipated development in the foreseeable future, which may be adversely affected by the obstruction, as well as existing development (NCGS 143-215.57 (a)).

According to state statute, the channel and part of the floodplain of each stream are to be designated as a floodway in order to limit flood disaster as much as possible. Within the floodway, local governments, through permitting, are to prevent obstructions that may increase the height of floods and the extent of flood damage.

N*ational Flood Insurance Program and National Community Rating System*

The National Flood Insurance Program (NFIP) provides flood insurance to individuals in communities that are members of the program. Membership in the program is contingent on the community adopting and enforcing floodplain management and development regulation. The NFIP uses the Community Rating System (CRS), a program that adjusts flood insurance premiums in relation to a community's investment in flood damage mitigation. To be included in the system, a community's floodplain management procedures must be reported and evaluated. There are ten classes within the CRS system, with 1 providing the greatest premium reduction and 10 providing no reduction. Harnett County has participated in the National Flood Insurance Program sine April 1990, currently has a National Community Rating System ranking of 10. The creation of an all-hazards mitigation plan should help reduce the flood premiums for Harnett County.[*]

[*] At this time Harnett County is a CRS participant, but a plan is not required.

NFIP Statistics for Harnett County
(Source: N.C. Emergency Mgmt.)

Area	Total Premiums	Total Policies	Total Coverage	Total Claims Since 1978	Total $ Since 1978
Dunn	$13,387	35	$4,079,400	7	$41,512
Erwin	$2,852	10	$1,343,500	0	0
Lillington	$1,626	5	$1,020,000	0	0
Harnett County	$22,901	67	$10,755,700	6	$28,321

These resources provide Harnett County, Angier, Coats, Dunn, Erwin and Lillington with the proper legal capability to carry out this plan and its hazard mitigation goals and objectives. Also see the following municipality appendices for further information.

B. Fiscal Capability

Beyond legal authority and political willpower, fiscal capability is a key component to effectively developing and implementing a hazard mitigation plan. In addition to local tax funds, non-profits and other non-government organizations are often interested in helping to implement hazard mitigation projects. Fortunately, local governments can also apply for State and Federal funds to implement hazard mitigation initiatives.

Local Funds

In the State of North Carolina, property taxes provide the primary source of revenue for counties. These taxes are typically used to finance services that must be available and delivered on a daily basis, such as schools, health and social services, planning, solid waste management, and emergency services. Such spending leaves very little, if any, for additional services and projects; however, State and Federal funds are available to local governments for the development and implementation of hazard mitigation programs.

Non-Governmental Funds

Another potential source of revenue for local mitigation efforts, are the contribution of non-governmental organizations, such as churches, charities, community relief funds, the Red Cross, hospitals, for-profit businesses, and nonprofit organizations. A variety of these local organizations can be tapped to help carry out local hazard mitigation initiatives.

State and Federal Funds

There are many sources of Federal and State funding available to local governments for the purposes of implementing hazard mitigation plans. These programs include Hazard Mitigation Grants, Flood Mitigation Assistance Programs, and the Community Development Block Grants.

- **The Hazard Mitigation Grant Program** (HMGP) provides funding for mitigation measures following a Presidential disaster declaration. The HMGP is funded mostly by the Federal government and administered by respective State governments. HMGP funds can be used for such projects as acquisition or relocation, retrofitting, development of local mitigation standards and comprehensive mitigation plans, structural hazard control and the purchase of equipment to improve preparedness and response.
- **The Flood Mitigation Assistance Program** (FMAP) is also a federally funded program for mitigation assistance to states, communities and individuals for cost-effective measures to reduce or eliminate the long-term risk of flood damage to the built environment and to real property. Unlike the HMGP, FMAP is available to eligible communities on an annual basis. An eligible community must be a participant in the National Flood Insurance Program and must develop a flood mitigation plan. FMAP funds may be used for such projects as elevation and/or dry proofing of structures, acquisition of real property, relocation or demolition of structures, and minor structural projects.
- **The Community Development Block Grant** (CDBG) is another source of funding for hazard mitigation initiatives. The objective of the CDBG program is to assist communities in rehabilitating substandard dwelling structures and to expand economic opportunities, primarily for low-to-moderate-income families. However, as a result of a Presidential declared disaster, CDBG funds may be used for long-term needs such as acquisition, reconstruction, and redevelopment of disaster-affected areas.

These means provide Harnett County, Angier, Coats, Dunn, Erwin and Lillington with the political capability to carry out this plan and its hazard mitigation goals and objectives. Also see the following municipality appendices for further information.

C. Institutional Capability

Harnett County is a chartered county, which is governed by a Board of Commissioner-Manger form of government that was adopted into law on February 1, 1974. In August of 2004

there were 725 full-time employees. The distribution of employment can be found in the table on the next page labeled Harnett County Staffing.

Harnett County Staffing

Department	Total Permanent Employees
1. Administration	4
2. Animal Control	6
3. Bd. Of Elections	5
4. Coop. Extension	21
5. DOA/CAPS	10
6. Economic Development	3
7. Emergency Services	9
8. EMS	50
9. Finance	10
10. General Services	14
11. Health	82
12. Human Resources	8
13. Library	15
14. MIS	17
15. One-on-One	1
16. Planning & Inspections	24
17. Parks & Rec.	7
18. Personnel	5
19. Public Buildings	13
20. Public Utilities	64
21. Register of Deeds	13
22. Sheriff	159
23. Social Services	137
24. Soil & Water	3
25. Solid Waste	13
26. Tax	31
27. Vet. Services	2

Harnett County's Mitigation practices will be carried out through collaborative efforts of all the county departments. However, all mitigation activities will be coordinated with the combined efforts of Harnett County Planning, Emergency Management Departments, and all five of the county's local municipalities. Together these groups will strive to create and maintain a mitigation ethic throughout Harnett County. See the following municipality appendices for their related institutional capability.

D. Political Capability

Harnett County is working to establish hazard mitigation in its day-to-day operations. In taking this step, the county will have to de-politicize many of the issues surrounding mitigation efforts. Public education and awareness campaigns about the economic efficiency and social utility of mitigative measures can help foster its general acceptance by citizens and politicians in the long run. Close governmental coordination is needed for the prevention of damage and recovery from natural disasters. This refers to coordination and cooperation between agencies in a local government, between local governments within a county and between local, state, and federal governments. This provides Harnett County, Angier, Coats, Dunn, Erwin and Lillington with the political capability to carry out this plan and its hazard mitigation goals and objectives. Also see the following municipality appendices for further information.

E. Technical Capability

Effective hazard mitigation initiatives depend largely on a community's technical capability. Local governments such as Harnett County typically have limited technical capability due to a lack of funding and human resources. Fortunately, Federal agencies such as the Federal Emergency Management Association (FEMA), and the North Carolina Division of Emergency Management (NCDEM) have made available numerous implementation manuals and other resource documents. These manuals provide information on mitigation techniques for various hazards, including hurricanes, floods, wildfires, tornadoes, and earthquakes. The manuals include information on engineering principles, construction methods, costs and even suggestions for how techniques can be financed and implemented. Other Federal agencies such as the U.S. Corp of Engineers and Soil Conservation Service also provide similar services. The North Carolina Division of Emergency Management works in concurrence with these various Federal agencies to ensure that the State and local governments are prepared to respond to natural disasters. These provide Harnett County, Angier, Coats, Dunn, Erwin and Lillington the technical capable to carry out this plan and its hazard mitigation goals and objectives. Also see the following municipality appendices for further information.

F. Evaluation of County Ordinances

Harnett County has used its regulatory power to adopt and implement ordinances that help mitigate the potential harmful effects of natural hazards. The County has developed and adopted the following local ordinances:

- Zoning Ordinance (With the exception of Stewarts Creek Township)
- Comprehensive Land Use Plan
- Flood Damage Prevention Ordinance
- Subdivision Regulations
- Water Supply Watershed Protection Ordinance
- Manufactured Home Park Ordinance

These ordinances establish development regulations for different types of land development including both subdivided and non-subdivided land uses. Each policy, ordinance or regulation has a unique and varying impact on hazard mitigation. Although these policies are not specifically oriented toward mitigation purposes, they can be utilized to implement hazard mitigation initiatives. A summary of how these ordinances pertain to hazard mitigation is listed below.*

Zoning Ordinance

Harnett County initially adopted a zoning ordinance on July 18, 1988 by townships located north of the Cape Fear River (Averasboro, Black River, Buckhorn, Duke, Grove, Hector's Creek, and Neill's Creek). Townships located south of the Cape Fear River (Anderson Creek, Barbecue, Johnsonville, Lillington, and Upper Little River) adopted the zoning ordinance on June 5th, 2000. Stewart's Creek, a township located in the southern portion of the county, remains the only un-zoned portion of Harnett County. The purpose of the zoning ordinance is to promote the health, safety, and general welfare of the Harnett County residents. In regards to hazard mitigation the zoning ordinance has several regulations that promote hazard mitigation in Harnett County. Some of these regulations include the following:

Article I. General Provisions

Section 12.0 Standards for Effluent and Emissions

All effluent and emissions into the air or surface or ground waters from development permitted by this ordinance must be in conformity with applicable federal, state, or county health and environmental quality regulations.

Section 13.0 Sedimentation Control

All land-disturbing activities shall meet the requirements of the North Carolina General Statutes.

* Harnett County currently participates in the CRS, but at the time a CRS plan is not required.

Article VI. Zoning Districts and Regulations

Section 1.0 Industrial District

The purpose of this district is to promote and protect both existing industrial activities and potential sites which are considered suitable for industrial use, to prohibit uses of land which would substantially interfere with the continuation of uses permitted in the district, and to promote the operation of well-planned and maintained industrial facilities.

Section 2.0 Commercial Business District

It is the purpose of the Commercial/Business District to accommodate the widest variety of commercial, wholesale, and retail businesses in areas that are best located and suited for such uses.

Section 3.0 Conservation District

The purpose of the conservation district is to encourage the preservation of and continued use of the land for conservation purposes, to prohibit commercial, and industrial use of the land in areas subject to flooding. Lots in subdivisions established prior to July 18, 1988, will be exempt from the no building requirements of the conservation district, but must adhere to the use and setback requirements of the RA-30 Zoning District, and all provisions of this Zoning Ordinance applicable to said District.

Section 3.2 Dimensional Requirements

A. The following dimensional requirements for the Conservation District shall apply:
   A. Cape Fear River- five hundred (500) feet on each bank measured from the waters edge at normal flow.
   B. Black River- three hundred (300) feet on each side of the main channel as measured at its center until the river intersects with SR 1532 from that point the districts is two hundred (200) feet on each side of the main channel as measured at its center.
   C. Other Major Creeks- two hundred (200) feet on each side of the main channel.

B. Single family dwellings in the Conservation District shall meet the following development standards, except as otherwise provided by this ordinance or applicable ordinances: All Single Family Dwellings shall be connected to public water and sewer.

Minimum Lot Area:	30,000 square feet
Minimum Lot Width:	100 feet
Minimum Required Front Yard	35 feet*
Minimum Required Rear Yard	25 feet*
Minimum Required Side Yard	10 feet*

Minimum Required Corner Yard	20 feet*
Maximum Building Height	35 feet

*Except when the single-family dwelling yard is located adjacent to said rivers or creeks the yard requirement (setback) shall be as follows:

Minimum Yard for Cape Fear	250 feet
Minimum Yard for Black River	150 feet
Minimum Yard for Other Creeks	100 feet

Section 4.0 Residential/Agricultural District - RA-40

The RA-40 Residential/Agricultural District is established exclusively as a single-family residential and agricultural district.

Section 5.0 Residential/Agricultural District - RA-30

The RA-30 Residential/Agricultural District is established as primarily a single family residential district, but includes occasional two-family and multi-family structures.

Section 6.0 Residential/Agricultural District RA-20M

The RA-20M Residential/Agricultural District is established primarily to support high density development. Inclusive in such developments are single family dwellings, multi-family dwellings, duplexes, and manufactured home parks.

Section 7.0 Residential/Agricultural District - RA-20R

The RA-20-R Residential/Agricultural District is established primarily to support high density development. Inclusive in such development is single family dwellings, multi-family dwellings, and duplexes.

Section 8.0 Highway Corridor Overlay District - HCO

It is the intent of the highway corridor overlay districts (HCO) to protect natural resources, provide landscape improvements, and enhance the overall appearance of the corridors identified. This district has development standards established to regulate development within a corridor. The Highway Corridor Overlay District standards, which apply to the entire length of a corridor becomes effective once a corridor has been studied, a plan adopted and the area subsequently identified on the official zoning map. Development standards from the Highway

Corridor District applies to all parcels within six hundred feet (600') of the right-of-way on both sides of the road as shown on the official zoning map except in such instances in which the corridor width has been modified by the Board of Commissioners.

Overall the current zoning ordinance for Harnett County is very effective for the purposes of mitigation planning. The conservation district offers the most restrictive regulations; however, these restrictions should help reduce the vulnerability of our flood plains and the citizens who choose to live in them. The restrictions placed on residential, commercial, and industrial building within the conservation district shields development away from areas that may be vulnerable to natural hazards especially flooding.

Comprehensive Land Use Plan

Harnett County's Comprehensive Land Use Plan was adopted in June of 1976 and has been recently updated and adopted by the County Commissioners in September of 1999. The plan is intended to be used by both the public and private sectors as a guide for making decisions concerning the future use of land in Harnett County to insure orderly, economically viable, environmentally sound and compatible development. The plan contains broad based land use goals and policies intended to guide future development while providing protection to sensitive resources and desirable land uses which are threatened. Specific goals, objectives, and relevant strategies from the updated land use plan that directly affect hazard mitigation are extracted from the plan and outlined below:

Land Use Plan Goals

3. Provide for a wide range of land uses reflecting the diversity within Harnett County in a harmonious and sustainable manner.

A. Enact County wide zoning which designates areas for a broad range of land use activities based on individual community character and the carrying capacity of the land.
Responsibility- County Planning Board, County Commissioners
Time Frame- Short Term

B. Respect the uniqueness of each geographic area when developing services for that area, regulations and incentives to encourage types of activities.
Northwest- Chalybeate Springs: Agricultural protections except for 401 corridor, rural community node at Chalybeate Springs and Christian Light area

Northeast- Angier- Coats: Suburban development centered around the existing towns, industrial and business development in growth area of existing municipalities

East I-95 Corridor: Business and industry growth area, residential in towns

North Central- Buies Creek- Wake County: Residential subdivision growth area

Southwest Central- Mamers: Agricultural area, except for rural community nodes

Southwest- Johnsonville- Overhills: Subdivision development with some agricultural lands protection and development corridor on NC 87

South Central- Anderson Creek: Subdivision development with rural community nodes

Southeast- 401 east to county line: Rural until Highway 13 expansion in Cumberland County is complete, then industrial and business development and medium density residential

Responsibility- County Planning Board, County Utilities Board, County Commissioners

Time Frame- Mid-range

C. Identify and designate development corridors and nodes. See Future Development Guide Map.
Responsibility- Planning Board and County Commissioners
Time Frame- Short term to mid-range

D. Work with municipalities to provide a harmonious transition between town planning jurisdictions and the County's.
Establish regular meetings of Harnett County Local Government Association to discuss issues of common concern.
Responsibility- Administration and County Commissioners
Time Frame- Short term and on-going

E. Establish development standards for more intensive uses such as commercial and industrial. These standards should provide buffering and screening standards between uses of differing intensity and control of adverse off site impacts including light, odor, and noise. Require the preservation of trees in buffer areas.
Responsibility- Planning Board and County Commissioners
Time frame- Mid-range

F. Develop more rigorous manufactured home park regulations with greater buffers and the preservation of existing trees in buffer areas.
Responsibility- Planning Board and County Commissioners
Time Frame- Short term

G. Encourage a complete range of housing opportunities to serve the diversity within Harnett County.
    1. Utilize programs through the NC Housing and Finance agency to provide adequate housing for moderate and lower residents.
    Responsibility- County Commissioners
    Time Frame- Short term to on-going

    2. Encourage more dense residential development, multifamily rental and condominium development around existing municipalities and near rural community nodes.

- Locate water and sewer in these areas to serve existing and new development
- Establish zoning to allow more dense development
- Locate County supported facilities such as senior citizens, health clinics and libraries at these rural community nodes.
  Responsibility- Utilities Board, Planning Board, County Commissioners
  Time Frame- Mid to long range

3. Develop a housing code enforcement program for rental housing including mobile homes. Apply for Community Development and Housing Finance program participation substandard and cannot be economically rehabilitated.
   Responsibility- County Commissioners, Planning Board
   Time Frame- Mid-range

4. Apply to Federal Office of Management and Budget for designation as part of the Raleigh-Durham-Chapel Hill Metropolitan Statistical Area to raise the price range for FHA residential loans.
   Responsibility- County Commissioners
   Time Frame-Short term

H. Using subdivision regulations provide limited recreation opportunity in new residential development. Require dedication of suitable lands for recreation or fees in lieu of dedication of property. Use incentives to encourage the developer to provide improvements to the sites including playground equipment, picnic facilities, ect.
Responsibility- Planning Board
Time Frame- Mid range

I. Using Subdivision regulations require that sensitive lands to be protected. Sensitive lands include stream buffers, wetlands, steep slopes, and habitats of endangered species.
Responsibility- Planning Board
Time Frame- Mid range

J. Develop regulations and programs to encourage clustering in residential developments with the provision of open space for developed recreation, preservation of agricultural lands, and the preservation of natural areas.
Responsibility- Planning Board and County Commissioners
Time Frame- Mid range

6. Harnett County has plenty of clean drinking water, good air quality, efficient waste-water treatment and clean streams.

A. Continue to implement and enforce the State Water Supply Watershed Protection Regulations.
Responsibility- Planning Board and County Commissioners
Time Frame- On-going

B. Continue to support State and Federal programs to reduce sedimentation and erosion, protect ground water and protect surface water including, USDA, US Army CORPS and NC Dept. of Environmental Health and Natural Resources.
Responsibility- Planning Board, Cooperative Extension Service

Time Frame- On-Going

D. Require Protected streams buffers on all perennial streams using subdivision regulations. Perennial streams are by identified solid blue lines on most recent versions of the 1:24 scale (7.5 minute quadrangle) topographic maps prepared by the United States Geological Service.
Responsibility- County Utilities Board and County Commissioners
Time Frame- Short Term

Although the goals mentioned in the land use plan are not oriented for mitigation purposes, they can be utilized to implement hazard mitigation initiatives. These goals offer the tools needed for Harnett County to implement a hazard mitigation ethic and will help the county create more sustainable communities in the future. For this reason the Harnett County Land Use Update should be considered an effective tool for hazard mitigation planning.

Flood Damage Prevention Ordinance

The Flood Damage Prevention Ordinance was adopted by Harnett County on September 18, 1995 and is enforced by the Harnett County Planning Department. North Carolina General Statutes empower counties to regulate designated floodways for the purpose of controlling and minimizing the extent of floods by preventing obstructions which inhibit water flow and increase flood height and damage and other losses (both public and private) in flood hazard areas, and to promote the public health, safety and welfare of citizens of North Carolina in flood hazard areas.

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA). This program makes flood insurance available to a local community which, in exchange, agrees to adopt and enforce a flood damage prevention ordinance to regulate flood-prone areas to help reduce future flood losses. In addition to the availability of flood insurance, the NFIP supports mitigation through floodplain management measures and the flooded property acquisition program. Enforcement of a local Flood Damage Prevention Ordinance is required for participation in the NFIP.

Harnett County's Flood Damage Prevention ordinance is based on the State of North Carolina Model for Flood Ordinances and meets all FEMA requirements. Thus, the ordinance currently offers a wide variety of tools that help mitigate flooding within the County. One of the more beneficial regulations in regards to hazard mitigation is the requirement that new construction or substantial improvement of any residential structure (including manufactured homes) shall have the lowest floor, including basement, elevated no lower than 2 feet above the base flood elevation. Overall the Harnett County Flood Damage Prevention ordinance currently serves as the county's

biggest contributor for hazard mitigation in the event of a flood, and is considered an asset to the county.

Subdivision Regulations

Subdivision regulations control the division of land into parcels for the purposes of building development or sale. The regulations require that subdivisions plans be approved whenever any subdivision of land takes place. Subdivision regulations are a more limited tool than zoning and only indirectly affect the type of use made of land or minimum specifications for structures.

Flood-related subdivision controls typically require that developers install adequate drainage facilities, which may be required to do so by the Planning Board. Where necessary, storm water drainage shall be maintained by landscaped open channels of adequate size and grade in order to hydraulically accommodate maximum potential volumes of flow. These channels are subject to review and approval by the Planning Board. The Subdivision Ordinance provides for orderly growth and development by setting standards for street construction, interconnecting street systems, and for other improvements that ensure the appropriate design and layout of new development.

The Subdivision Ordinance is also used to ensure erosion and sedimentation controls are properly met in developments. Any person wishing to sub-divide land shall cause all grading, excavations, open cuts, side slopes, and other land surface disturbances to be so mulched, seeded, sodded, or otherwise protected so that erosion, siltation, sedimentation, and washing are prevented in accordance with plans and specifications set forth by the planning board. Although the Harnett County Subdivision Ordinance currently provides some measures that support hazard mitigation initiatives, the ordinance can be amended to include more restrictive standards to further mitigation efforts for Harnett County.

Water Supply Watershed Protection Ordinance

The Water Supply Watershed Act of 1989 instituted a statewide program to protect drinking water supply watersheds from the inappropriate development. The intent of the program was to protect the quality of surface water supplies from non-point source pollution, and to minimize storm-water runoff by regulating development densities and the amount of built-upon area within the critical and protected areas of affected watersheds. Certain land uses are also prohibited within protected water supply watersheds.

Harnett County's Water Supply Watershed Management and Protection Ordinance was adopted on November 15, 1993 and became effective January 1, 1994. The Ordinance divides the

watershed into three separate areas and provides regulations for each area specifically. These areas are defined as:

1. WS-III-BW (Balance of Watershed)
2. WS-IV-CA (Critical Area)
3. WS-IV-PA (Protected Area)

The ordinance applies within these areas, which are designated by the North Carolina Environmental Management Commission. These areas are also shown on the official watershed map for Harnett County.

The ordinance provides for the continuation of existing uses and the reconstruction of buildings and built-upon areas. The ordinance establishes development restrictions for different types of streets systems (with and without curb and gutter) and the density at which development can be within the watershed areas. Any development with in the watershed requires a minimum lot size of half an acre. Within the critical and balance of the watershed areas discharging landfills and sites for land application of residuals or petroleum contaminated soils are prohibited.

The number one priority of the Harnett County Water Supply Watershed Protection Ordinance is to protect the drinking water from contamination. Suitably, the regulations provided in this ordinance indirectly promote hazard mitigation planning by regulating the quantity of built-upon or impervious surface caused by development. As a result, the ordinance reduces the vulnerability of flooding, in particular flash flooding. **See Appendix F for Watershed Map**

Manufactured Home Park Ordinance

Harnett County initially adopted the Manufactured Home Park Ordinance on January 20, 1986, revised it September 17, 1990, and adopted a new ordinance September 15, 2003. The purpose of a manufactured home park ordinance is to provide for more orderly growth and development of mobile home parks. This ordinance sets the standards for development by establishing minimum space size requirements for individual spaces, design and construction standards, and construction plan submittal requirements.

Before the new ordinance was adopted, it offered very little to hazard mitigation except for the requirement of secured footings in accordance to North Carolina Regulations for manufactured homes. The new plan is stricter on where manufactured homes can be placed and on the upkeep and structure of mobile home parks. These tougher regulations are a step towards successful hazard mitigation.

Some of the regulations that promote mitigation include the following:

ARTICLE VIII GENERAL REQUIREMENTS

D. **Street(s) -** Maintenance of all internal streets and drainage facilities shall be the responsibility of the owner of the park. Such streets shall be maintained in a manner to be free from pot holes, breaks in pavement, rough surfaces, standing water and associated problems which would impede or cause hazards to motor vehicles.

J. **Ground Cover** - In order to control erosion, all land areas shall be protected by landscape material and vegetative ground cover.

K.

ARTICLE IX DESIGN STANDARDS

I. **Development in Flood Hazard Areas**

Manufactured home parks shall not be located in areas that are susceptible to regular flooding as noted on FEMA Maps. Existing Manufactured Home Parks located in Flood Hazard areas shall not be allowed to add additional spaces or manufactured homes. Manufactured home parks shall be graded so as to prevent water from ponding or accumulating on the premises.

ARTICLE X UTILITIES AND STORM DRAINAGE

Storm Drainage

A. The owner shall provide for adequate drainage of all surface water.

B. Based on the 25 year design storm, runoff from a site shall be calculated based on conditions prior to development. This shall be considered the pre-development flow.

C. Post development runoff shall then be calculated based on the proposed site conditions and using the 25 year design storm. The storm water management system must show that the post development flow does not exceed pre-development flow. Unless a Professional Engineer Certifies impacts downstream are negligible and downstream systems can carry the increase flow without impacting other properties.

D. Prediction of the peak flow rates shall be a calculation using the procedure in the USDA Soil Conservation Service Method, the Rational Method, or other acceptable calculation procedure.

E. The storm drainage plans shall be certified by a N.C. Professional Engineer

Final Analysis of County Ordinances

All of Harnett County's Ordinances support hazard mitigation initiatives either directly or indirectly. The current ordinances offer protection against damage in the flood sensitive portions of the county, and also take measures to protect our water supply from the harmful affects of pollution. However steps can and should be taken to strengthen all of the county's ordinances in order to offer more regulations for hazard mitigation planning.

Current Projects

The following is a list and brief description of studies that are currently under way and that will benefit the county's mitigation actions and overall sustainability. When results are completed and evaluated, they will be incorporated into the plan upon the next update.

1. **Abandoned Mobile Home Pilot Program:**

- Harnett County was one of three counties in North Carolina selected to participate in a pilot program designed to develop techniques to deal with the clean-up of abandoned manufactured homes.
- The N.C. Association of County Commissioners and the N.C. Manufactured Housing Institute sponsored the program, and funds for the program came from the N.C. Manufactured Housing Institute ($5,000). This contribution was contingent upon Harnett County contributing matching funds on a 2-1 basis or $10,000 bringing the funds available for the pilot program total to $15,000.
- As a pilot program, procedures and techniques will be developed and tested for the proper disposal of manufactured homes.
- Another benefit is that other units of government dealing with this problem can use the knowledge, procedures and techniques developed here.
- Dealing with abandoned manufactured homes is a major problem across the country, and North Carolina is one of the first states to tackle this problem.

2. **Neil's Creek/ 401 Corridor Land Use Study**

- Being conducted by the North Carolina Division of Commerce Assistance
- Study is to ensure the safe and environmentally secure development in anticipation of major residential growth.
- The study is also reviewing the possibility and feasibility of a proposed $30 million sewer line project.

3. **Kenneth Creek Local Watershed Planning Initiative**

- Lead by the Cape Fear River Assembly and the NC Wetlands Restoration Program
- Seeks to improve and protect water quality.
- Restore, enhance, and preserve wetlands, streams, and riparian buffer areas.
- Address the causes and effects of storm water Pollutants
- This area is listed by the EPA as a 303-watershed area.

MITIGATION GOALS, OBJECTIVES, AND STRATEGIES

Mission Statement

Harnett County aspires to make the county less vulnerable to the impacts of natural hazards through the effective administration of hazard mitigation policies and programs.

Vision Statement

In order to achieve this mission, Harnett County and its municipalities need to institutionalize a hazard mitigation ethic throughout the county.

A. Goals

Hazard Mitigation requires the formulation of goals, statements of desired end states toward which efforts are directed. Such goals tend to be broad in scope and assist in setting community priorities. The Harnett County Mitigation Committee through several meetings and collaborations formulated the following goals. These goals will provide the basis for the objectives and implementation strategies included in this plan.

(General)

1. Strive to reduce loss of life, personal injury, and property damage from natural hazards will be greatly minimized.

(Future Development)

2. Manage future development so that vulnerability of public and private property to natural hazards will be none to very little.

(Existing Structures)

3. Strive to maintain existing structures and infrastructure in such a manner that they will be as resilient as possible from natural hazards.

(Public Education & Outreach)

4. Attempt to increase public understanding, support and demand for hazard mitigation and continue coordination and communication with all relevant organizations.

(Redevelopment)

5. Encourage safe and responsible redevelopment growth patterns, which lessen the effects of natural hazards.

(Natural Resource Protection)

6. Protect and preserve the natural resources and environmentally sensitive areas within Harnett County.

B. Objectives

Objectives are more tangible and specific then goals. When an objective is accomplished, it may be checked off and progress directed toward accomplishing another objective. Whereas goals are general statements that may never be fully realized, objectives should be achievable. Harnett County hazard mitigation objectives provide intermediate steps toward reaching the goals that have been provided in this plan. Each objective that has been provided will address a goal and is complimented by a strategy that will help achieve the goal and objective for the county and each municipality. Harnett County and its municipalities can accomplish these objectives by utilizing their powers detailed earlier in the capability section of this plan.

It should be stressed that this plan is a policy document and should be used as a planning tool. This plan is not a regulatory document; therefore, the adoption of the plan does not require Harnett County or any of the five municipalities to implement all of the objectives included in the plan. However, Harnett County along with the members of the mitigation committee will periodically review their hazard mitigation goals and objectives and make a concerted effort towards implementation.

The county and municipalities' hazard mitigation objectives are as follows:

1. **Ensure that county & town services, especially Emergency Services are adequate to protect public health and safety during a natural hazard and encourage communication between county and municipalities regarding hazard mitigation planning;**

2. **Encourage growth in areas suitable for development while discouraging growth in environmentally sensitive or flood hazard prone areas;**

3. **Support activities that will make structures less susceptible to damage during natural hazard events;**

4. **Improve education and outreach to the community regarding flood hazards, flood mitigation and high wind hazards;**

5. **Improve land use planning so future development is less susceptible to damage during a natural disaster;**

6. **Preserve open space in floodplain or environmentally sensitive areas.**

C. Strategies

The following strategies are designed to help the county and each municipality achieve each goal and objective set forth by the Harnett County Hazard Mitigation Committee. To ensure completion, each strategy indicates the party responsible for monitoring & evaluation, a possible funding source, benchmarks and indicators of progress, and a target completion date. Since a cost-benefit review can be rather costly and time consuming, such a review will be completed as needed. For those mitigation actions that require FEMA funds (HMGP, PDM, or FMA), their cost-benefit criteria will be used to evaluate and execute strategies when funding is applied for.

A process for prioritization of identified hazard mitigation strategies was performed. The hazard mitigation advisory committee used the following criteria for prioritization of hazard mitigation strategies:

1) Cost-benefit review: cost effectives vs. benefits were evaluated in three different categories. Either *High* (little to no cost of implementation), *Medium* (low cost of implementation, may be able to do in-house), or *Low* (expensive, require State or federal funding). Some strategies may be expensive to implement yet result in a benefit for the community. Therefore, State and Federal funding will be sought to help assist.
2) results of Hazard Identification and Analysis
3) results of Vulnerability Assessment
4) results of Community Capability Assessment
5) effectiveness in meeting hazard mitigation goals and comprehensive plan goals

❖ General

GOAL #1- Strive to reduce loss of life, personal injury, and property damage from natural hazards.

Objective: Ensure that County & Town services, especially emergency services are adequate to protect public health and safety during a natural hazard and encourage communication between county and municipalities regarding hazard mitigation planning.

Strategies:

- **Harnett County:** The County will conduct a training exercise each year to ensure that County emergency resource distribution operations, such as response time, communication, and coordination with DOT, are adequate for natural hazard events.

  Responsible Party: Harnett County Emergency Management

  Monitoring and Evaluation Responsibility: E.M. Director

Funding Source: Local

Benchmarks and Indicators of Progress: Success of training

Target Completion Date: On-going each year

Priority: High

- **Lillington:** To protect life and property through continuing efforts to improve emergency response and preparation.

  Responsible Party: Town Manager and Local Fire Chiefs

  Monitoring and Evaluation Responsibility: Town Manager

  Funding Source: All funds will contribute.; amount to be determined as needs arise.

  Benchmarks and Indicators of Progress: Continuation and completion of the following specific aspects of hazard mitigation planning.

  Target Completion Date: Continuous

  Priority: Medium

- **City of Dunn:** Create policy to annually trim trees and cut down dead trees under the city's supervision prior to April 15th.

  Responsible Party: Public Works Department, City Council & Planning Board

  Monitoring and Evaluation Responsibility: City Council & Planning Board

  Funding Source: Local

  Benchmarks and Indicators of Progress: Reduction of downed power lines, property loss/damage, closed streets, ability to travel efficiently.

  Target Completion Date: April 2005

  Priority: Medium

- **Town of Erwin**: Renew and update disaster response /readiness plan.

  Responsible Party: Erwin Board of Commissioners, Fire & Emergency Services Director

  Monitoring and Evaluation Responsibility: Fire & Emergency Services Director.

  Funding Source: Local

  Benchmarks and Indicators of Progress: Creation of a written listing of resourced man-power and emergency service capabilities-reviewed annually

  Target Completion Date: Early 2005

  Priority: Medium

- **Town of Coats:**

  1. The Town will initiate a policy to identify and remove potentially dangerous trees and vegetation along public roadways.

2. The Town will conduct quarterly inspections of all storm sewers and open ditches in order to evaluate their readiness and to make corrections as needed. The Town will review and update its Storm Water Readiness Plan.
3. The Town will update and revise it Emergency Services and Disaster Response Readiness Plan.

Responsible Party:

1. Town of Coats Board of Commissioners
2. Town of Coats Public Works Department
3. Town of Coats Public Works Department Director, Coats Police Department, Town Manager, Town Board.

Monitoring and Evaluation Responsibility:

1. Town Manager
2. Town Manager, Public Works Director
3. Town Manager, Town Board

Funding Source: Local

Benchmarks and Indicators of Progress:

1. Reduction of tree damage during hazard events.
2. Reductions in the dispersal times for storm water buildup. An updated Storm Water Readiness Plan on file at the Town Hall.
3. An updated Disaster Readiness Response Plan on file at the Coats Town Hall.

Target Completion Date: April, 2005; On-going; major Reviews Semi-Annually.

Priority: High

- **Town of Angier:** Pursue State and Federal grants that would help improve emergency services along with mitigation planning and try to set aside monies for long range Capital Improvement Projects that would help protect public health and safety.

  Responsible Party: Town/County Manager, Planning Director, Finance Director.

  Monitoring and Evaluation Responsibility: Town/County Manager, Planning Director, Finance Director.

  Funding Source: Local

  Benchmarks and Indicators of Progress: Training of employees, annual contact with utilities company, County EMS to help prepare to reduce personal injury and loss of life

  Target Completion Date: On-Going

  Priority: Medium

❖ Future Development

GOAL #2 Manage future development so that vulnerability of public and private property to natural hazards is reduced.

Objective: Encourage growth in areas suitable for development while discouraging growth in environmentally sensitive or flood hazard prone areas.

Strategies:

- **Harnett County:** The County will make it policy that any property owner wanting to build in a floodplain, must wait for 48 hours until a complete review of the elevation certificate can be made, to determine that the FEMA form is filled out correctly and the information is accurate.

  Responsible Party: Harnett County Planning Department

  Monitoring and Evaluation Responsibility: Planning Chief

  Funding Source: None; unless a consultant is needed, then Local.

  Benchmarks and Indicators of Progress: Policy adoption and implementation.

  Target Completion Date: July 2005

  Priority: High

- **Lillington:** To include in our rewrite of our Zoning Ordinance and Subdivision Ordinance sound planning practices that allow only responsible growth in floodplain areas. Note: All new buildings are inspected by Harnett County. The Town will coordinate with the County to make sure that all applicable building codes are followed with regard to hurricane or high wind standards.

  Responsible Party: Town Board of Commissioners and the Town Manager

  Monitoring and Evaluation Responsibility: Town Manager or Responsible Party

  Funding Source: Local Funding

  Benchmarks and Indicators of Progress: Rewritten ordinances to reflect changes.

  Target Completion Date: On-going

  Priority: High

- **City of Dunn:** Create and modify existing policies to prevent building in areas prone to flooding and/or wind damage.

  Responsible Party: Planning Department, City Council & Planning Board

  Monitoring and Evaluation Responsibility: Planning Department

Funding Source: Local/State

Benchmarks and Indicators of Progress: Reduction of loss of property due to wind and flooding damage; prevention of natural resources from damage by runoff of commercial areas into river and tributaries.

Target Completion Date: On-going

Priority: Medium

- **Town of Erwin:** Encourage activities that will make structures less susceptible to damage during natural hazard events through improving the Erwin code of ordinances and creation of a storm-water management plan.

  Responsible Party: Town of Erwin Planning Department and Planning Board.

  Monitoring and Evaluation Responsibility: Town of Erwin Board of Commissioners.

  Funding Source: Local/Grant

  Benchmarks and Indicators of Progress: Continue current practice of monitoring /evaluation both during and after all flooding events.

  Target Completion Date: On-going

  Priority: Medium

- **Town of Coats:** Ensure that all redevelopment and growth is sustainable to natural hazards through the development of new Zoning and Subdivision regulations.

  Responsible Party: Town of Coats Planning Board and Board of Commissioners

  Monitoring and Evaluation Responsibility: Town Manager

  Funding Source: Local

  Benchmarks and Indicators of Progress: On going reviews and updating.

  Target Completion Date: On-Going

  Priority: High

- **Town of Angier:** Create and define suitable areas for growth by updating existing land use plan or creation of a new land use plan.

  Responsible Party: Zoning/Planning Administrator/Town Administrator

  Monitoring and Evaluation Responsibility: Zoning Inspectors

  Funding Source: Local

  Benchmarks and Indicators of Progress: Continue monitoring both during and after all flooding events with the documentation and history of storms.

  Target Completion Date: On-Going

  Priority: Medium

❖ Existing Structures

GOAL #3 Strive to maintain existing structures and infrastructure in such a manner that they would be as resilient as possible from natural hazards.

Objective: Support activities that will make structures less susceptible to damage during natural hazard events.

Strategies:

- **Harnett County:** Distribute information to citizens in the Inspections department on how to retrofit homes to help prevent wind & flood damage during natural hazards.

  Responsible Party: Chief Building Inspector

  Monitoring and Evaluation Responsibility: Harnett County Planning Department

  Funding Source: FEMA, NCEM

  Benchmarks and Indicators of Progress: Distribution of educational materials.

  Target Completion Date: July 2005

  Priority: Medium

- **Lillington:** Retrofit all Town owned buildings to safeguard against natural disasters and distribute information to the community on how to retrofit privately owned structures.

  Responsible Party: Town Manager and Director of Public Works

  Monitoring and Evaluation Responsibility: Director of Public Works

  Funding Source: Local Funding

  Benchmarks and Indicators of Progress: Improvements to buildings that reduce risk.

  Target Completion Date: April 1, 2005

  Priority: Low

- **City of Dunn:**
  1. Seek funding to retrofit or acquire repetitive loss property
  2. Create a policy to require private property owners to remove storm debris (trees, limbs, etc.) within 45 days to prevent potential fire hazards to existing structures.
  3. Create policy to inspect public buildings on an annual basis for areas that need repair to keep the buildings as structurally sound as possible.

  Responsible Party: Planning Department, Planning Board, Inspections Department, City Council.

  Monitoring and Evaluation Responsibility: Planning & Inspections Department.

  Funding Source: Local/State/ Federal (especially for the repetitive loss property)

Benchmarks and Indicators of Progress:

1. Decrease in number of structures damaged by natural hazards.
2. Decrease in number of fires related to dry debris being left on property.

Target Completion Date: April 2005

Priority: Medium

- **Town of Coats:**

1. The Town will strive to become a member of the National Flood Insurance Program.
2. The Town will target infrastructure needs during the development of the annual Town budget.
3. The Town will develop a checklist to be used for an annual inspection of all Public Buildings to insure they remain as structurally secure to hazard events as possible.
4. The Town will become a member of the National Flood Insurance Program

Responsible Party:

1. Town of Coats Board of Commissioners
2. Coats Public Works Department, Town Manager, Town Board

Monitoring and Evaluation Responsibility: Town Manager, Public Works Director

Funding Source: Local

Benchmarks and Indicators of Progress:

1. Actions taken to monitor and evaluate evolving infrastructure needs before and after hazard events.
2. A written checklist completed for each Public Building on file at the Town Manager's Office. This checklist will be used in annual budget preparations in order to properly fund the corrections of identified problems.

Target Completion Date: On-going; January of each year

Priority: High

- **Town of Angier:**

1. Create a yearly checklist that will help monitor and protect infrastructure and existing structures.
2. Educate the public about local codes, ordinances and standards to help protect existing structures and resources.

Responsible Party: Public Works Director, Building Inspector.

Monitoring and Evaluation Responsibility: Public Works Director, Building Inspector.

Funding Source: Local/ State

Benchmarks and Indicators of Progress: Continue to monitor preceding and following storm events to decrease the number of structures damaged by natural hazards.

Target Completion Date: 1 year from the date of adoption.

Priority: High

❖ Public Education & Outreach

GOAL #4 Increase public understanding, support and demand for hazard mitigation and improve coordination and communication with all relevant organizations.

Objective: Improve education and outreach to the community regarding flood hazards, flood mitigation and high wind hazards. For example, informing the public about new MFIP (Special Flood Hazard Area Maps) being provided by NCEM and FEMA in the fall of 2004.

Strategies:

- **Harnett County:** The County will hold an emergency management open house on June 1st each year to inform the public and County employees about the upcoming hurricane season & natural hazard mitigation techniques.

  Responsible Party: Emergency Management Director

  Monitoring and Evaluation Responsibility: Harnett County Hazard Mitigation Committee.

  Funding Source: Local & State; sell advertisements for public information handed out aat meetings.

  Benchmarks and Indicators of Progress: The number of citizens present at open house.

  Target Completion Date: Continuous

  Priority: Medium

- **Lillington:** Send out newsletter to inform the community of when hurricane season begins and ends and ask community to inspect their property for possible hurricane/high wind susceptibility.

  Responsible Party: Town Manager

  Monitoring and Evaluation Responsibility: Town Manager

  Funding Source: Local Funding

  Benchmarks and Indicators of Progress: Educational activities and materials.

  Target Completion Date: April 1, 2005

  Priority: Medium

- **City of Dunn:** Create a brochure to increase public awareness of the benefits of being more conscientious of mitigation activities that minimize loss of property/property damage.

  Responsible Party: Administration, City Council

  Monitoring and Evaluation Responsibility: Administration

  Funding Source: Local/Grant money

  Benchmarks and Indicators of Progress: Reduction of debris to landfill after storms; Reduction of harmful runoff and trash being dispersed into the river and its tributaries.

  Target Completion Date: May 2005

  Priority: Medium

- **Town of Erwin:** Improve education and outreach to the community regarding flood hazards and flood mitigation through dissemination of mitigation pamphlets in the Town Hall.

  Responsible Party: Chief Building Inspector

  Monitoring and Evaluation Responsibility: Erwin Planning Department.

  Funding Source: Local

  Benchmarks and Indicators of Progress: Distribution of educational materials.

  Target Completion Date: 6 months following adoption of the plan.

  Priority: High

- **Town of Coats:**

  1. The Town will educate and solicit public input concerning hazard mitigation strategies and policies through semiannual Town Meetings.
  2. The Town will develop an informational flier to be distributed each year that will provide our citizenry with the information and suggestions useful during natural disasters.

  Responsible Party:

  1. Board of Commissioners & Planning Board/ Harnett County EMC
  2. Coats Public Works Department, Town Manager, and Town Board

  Monitoring and Evaluation Responsibility:

  1. Board of Commissioners & Planning Board
  2. Town Manager, Public Works Director

  Funding Source: Local

  Benchmarks and Indicators of Progress:

  1. Holding successful Town meetings where public input is solicited.

2. A written flier available to be distributed each year prior to the beginning of hurricane season. To be distributed with the annual Harnett County Water Quality flier.

Target Completion Date: On-going

Priority: Medium

- **Town of Angier:** Make a list available for distribution at the Inspections Department of contractors and consultants knowledgeable or experienced in retrofitting techniques and construction.

  Responsible Party: Chief Building Inspector, Harnett County Planning and Inspections Department.

  Monitoring and Evaluation Responsibility: Chief Building Inspector.

  Funding Source: Local / Possible Grant

  Benchmarks and Indicators of Progress: Distribution of educational material; number of people at public meetings; form committees of administration, public safety and utilities along with concerned citizens and businesses.

  Target Completion Date: 6 months from the date of adoption.

  Priority: Medium

❖ Redevelopment

GOAL #5 Encourage safe and responsible redevelopment growth patterns, which lessen the effects of natural hazards.

Objective: To improve land use planning so future development is less susceptible to damage during a natural disaster.

Strategies:

- **Harnett County:**
  1. The County will start a GIS project that will create a data layer of all known properties that are located within the floodplain to be used for future development planning purposes.
  2. The County will provide a GIS training project that will be aimed at educating surveyors and builders about responsible growth in regard to hazard mitigation.

  Responsible Party: Harnett County MIS; Planning Department

  Monitoring and Evaluation Responsibility: Planning Chief

Funding Source: Local/State

Benchmarks and Indicators of Progress: Use of GIS project information in sustainable development policies in the County and municipalities.

Target Completion Date: July 2005

Priority: High

- **Lillington:** The Town will aim to have flood plain data and other useful tools available online to aid with responsible growth.

  Responsible Party: Town Manager

  Monitoring and Evaluation Responsibility: Town Manager

  Funding Source: Local Funding

  Benchmarks and Indicators of Progress: Reduction of property damage from hazards.

  Target Completion Date: April 1, 2005

  Priority: High

- **City of Dunn:** Create a policy to prevent redevelopment in areas that are especially prone to flooding and wind damage, especially repetitive loss structures located in the City.

  Responsible Party: Inspections & Planning Department, Planning Board, City Council, Public Works.

  Monitoring and Evaluation Responsibility: Planning Department

  Funding Source: Local/State

  Benchmarks and Indicators of Progress: Reduction in the amount of property that is lost and damaged due to natural hazards.

  Target Completion Date: April 2005

  Priority: Medium

- **Town of Erwin:** Meet quarterly with other local governments to discuss new ideas that will help Erwin provide safe and responsible growth patterns for the future.

  Responsible Party: Erwin Planning Department

  Monitoring and Evaluation Responsibility: Town Manager

  Funding Source: Local

  Benchmarks and Indicators of Progress: Meeting dates throughout the year, and model policies being used by the Town of Erwin.

  Target Completion Date: On-Going

  Priority:

- **Town of Coats:** The Town will utilize information obtained from the county GIS floodplain project to prevent redevelopment in flood prone areas and to help identify any currently developed areas that may be at risk.

  Responsible Party: Town Manager, Town Planning Board, and Town Board

  Monitoring and Evaluation Responsibility: Town Manager and Town Planning Board

  Funding Source: Local

  Benchmarks and Indicators of Progress: Revision of zoning ordinance and floodplain perimeters with acquisition of the new GIS flood plain information.

  Target Completion Date: March 2005

  Priority: Medium

- **Town of Angier:** The Town will involve county officials with future growth plans and patterns, and hold community-visioning meetings to educate the public and developers about future growth and hazard mitigation planning.

  Responsible Party: Town Administrator, Planning Director, Town /County Boards

  Monitoring and Evaluation Responsibility: Town Administrator, Planning Director, Town /County Boards

  Funding Source: Local

  Benchmarks and Indicators of Progress: Achievement through educational public meetings, adoption of new ordinances, codes, and subdivision regulations, resulting in less property loss due to a natural disaster

  Target Completion Date: 1 year from the date of adoption

  Priority: Medium

❖ Natural Resource Protection

GOAL #6. Protect and Preserve the natural resources and environmentally sensitive areas within Harnett County.

Objective: Preserve more open space in floodplain and/or environmentally sensitive areas.

Strategies:

- **Harnett County:** Explore requiring all new major subdivisions to set aside land for open space and restrict any building in environmentally sensitive areas.

  Responsible Party: Harnett County Planning Department

Monitoring and Evaluation Responsibility: Planning Chief

Funding Source: None

Benchmarks and Indicators of Progress: Changes in ordinances affecting land protection.

Target Completion Date: July 2005

Priority: High

- **Lillington:** Rewrite the Zoning Ordinance to protect natural areas along the Cape Fear River and to determine the correct riparian buffer to preserve open space and limit development.

  Responsible Party: Town Manager

  Monitoring and Evaluation Responsibility: Town Manager

  Funding Source: Local Funding

  Benchmarks and Indicators of Progress: ($51,000 dedicated)

  Target Completion Date: April 1, 2005

  Priority: High

- **City of Dunn:**

  1. Create a policy to establish vegetative buffers on all properties bordering drainage canals, creeks, streams, etc. to prevent water contamination.
  2. Create policy to require quarterly checks on these buffers to ensure that they are free of debris and are being maintained properly.
  3. Create a stormwater management ordinance and provide the inspectors and /or code enforcement officers with the authority to complete inspections of businesses that could cause potential harm to the environment in the case of a natural hazard occurrence.

  Responsible Party: Planning Department, Planning Board, Inspections Department, City Council, Public Works, County Environmental Health Department

  Monitoring and Evaluation Responsibility: Planning & Inspections Departments.

  Funding Source: Local/State

  Benchmarks and Indicators of Progress:

  1. Reduction in the amount of pollutants entering water resources.
  2. Provide reports stating the number of businesses/properties that were required to clean up properties, therefore reducing pollution by chemicals, debris, etc.
  3. New Stormwater Management Ordinance

  Target Completion Date: May 2005

  Priority: Medium

- **Town of Erwin:** Encourage growth only in areas suitable for development and preserve open space in environmentally sensitive areas through enforcement of a Comprehensive Land Use Plan.

  Responsible Party: Town of Erwin Planning Board

  Monitoring and Evaluation Responsibility: Town of Erwin Board of Commissioners

  Funding Source: Local

  Benchmarks and Indicators of Progress: Reduction of development in environmentally sensitive areas.

  Target Completion Date: On-Going

  Priority: Medium

- **Town of Coats: 6.1:**

  1. The Town will include in its new Zoning Ordinances an Open Space District Classification that will effectively set aside any environmentally sensitive areas and restrict any development therein.
  2. The Town will update its Land Use Plan with special emphasis being given to any environmentally sensitive or flood-prone areas.

  Responsible Party: Town Manager, Town Planning Board

  Monitoring and Evaluation Responsibility: Town Manager, Planning Board, and Town Board

  Funding Source: Local

  Benchmarks and Indicators of Progress:

  1. A rewritten Zoning Ordinance for the Town of Coats that specifically addresses the protection and preservation of environmentally sensitive areas through a new zoning classification.
  2. A rewritten and updated Land Use Plan.

  Target Completion Date: April 2005

  Priority:

- **Town of Angier:** Create new ordinances and or strengthen existing ordinances to protect and preserve environmentally sensitive areas and open space.

  Responsible Party: Town Administrator, Planning/Zoning Administrator, Town/County Boards

Monitoring and Evaluation Responsibility: Town Administrator, Planning/Zoning Administrator, and Town/County Boards

Funding Source: Local

Benchmarks and Indicators of Progress: Changes in Town ordinances, and the creation of educational information and policies.

Target Completion Date: 1 year from the date of adoption.

Priority: High

Implementation and Plan Maintenance Procedures

The implementation of the Harnett County Hazard Mitigation Plan shall be carried out by the Harnett County Planning Department and the Emergency Management Department on the county level, and by the designated authorities within the municipalities. The responsible party or parties will implement the mitigation strategies according to the legal and financial parameters established by the county or municipality within the time frame specified.

After development and adoption of a local hazard mitigation plan, it is important for planners and other local officials to monitor the implementation of the plan and evaluate its effectiveness in practice. The monitoring and evaluation is conducted in order to recommend additional mitigation actions, make periodic revisions, and update hazard vulnerability and history information. The 44 CFR §201.6 (c)(4)(i) requires that a hazard mitigation plan contain a method of implementing, evaluating, and updating the mitigation plan. It is stated that such an evaluation is to occur within a five-year cycle to ensure that implementation occurs as planned, and to ensure that the plan remains current and in compliance with state and federal mandates. Additionally, the monitoring and evaluation of the plan will measure progress in achieving goals, objectives, and policies within established legal and financial parameters.

There are two ways to evaluate a mitigation plan, using quantitative or qualitative measures. Quantitative measures can be explored during the evaluation process by asking: has the area's vulnerability amplified, stabilized, or decreased as a result of planning and mitigation efforts? Were the damages sustained prior to the adoption and implementation of the Hazard Mitigation Plan greater than or less than the damages sustained after implementation of the Plan? If the area's vulnerability has decreased, planners and local officials should determine if additional improvements to the objectives could lead to greater improvements in reducing vulnerability when balanced against potential costs. If there was an increase in the area vulnerability, planners and local officials should determine if other mitigation strategies would be more effective in reducing vulnerability.

A qualitative approach can assess the ability of the mitigation measures to achieve multifunctional purposes, such as reducing the area's vulnerability and increasing environmental sustainability. The question should be addressed: did the mitigation measure diminish or conflict with existing strategies and community goals? Additionally, the qualitative evaluation should address any problems with implementation, as well as be used to monitor the time frame in which mitigation measures were adopted to ensure that objectives identified in the plan were met in the best window of opportunity available.

Revisions and updates are an integral part of a hazard mitigation plan in order to correct flaws as they are discovered. Certain circumstances are unforeseen and revisions can help to better fit the plan to real life situations. Periodic updates ensure that local mitigation efforts include the latest and most effective mitigation techniques in order to maintain the mitigation plan's compliance with state and local statutes and regulations.

The local government intends to create a process by which the requirements of this hazard mitigation plan will be incorporated into other local plans. During the planning process for new and updated local planning documents, such as a comprehensive plan, capital improvements plan, or emergency management plan, to name a few examples, the local planner will provide a copy of the hazard mitigation plan to each respective advisory committee member. The local planner will recommend the advisory committee members to ensure that all goals and strategies of new and updated local planning documents are consistent with the hazard mitigation plan and will not contribute to increased hazards in the jurisdiction.

The following are the guidelines the County will use to implement and maintain the Mitigation Plan:

I. The Harnett County Planning Department and the Harnett County Emergency Management Department will execute the monitoring and updating of the Harnett County Mitigation Plan.

II. Evaluation will be conducted by the Mitigation Committee comprised of officials from Planning, Emergency Management, the Fire Marshall's office, and each of the municipalities.

III. The Mitigation Committee will meet annually to develop a report on the status of the plan and make any necessary updates to the plan.

IV. The Mitigation Committee will also assess the mitigation goals and objectives in reference to the changing needs of the community and its vulnerabilities.

V. The Committee will also evaluate the Plan's effectiveness in terms of reduction of risks and efficient implementation of mitigation strategies according to county goals and objectives.

VI. The Committee will revise the plan if needed when there are new developments in mitigation strategies or new hazards that may impact the County's vulnerability.

VII. Mitigation strategies for the county and municipalities will be evaluated by means of the pre-established benchmarks and indicators of progress already mentioned in the plan.

VIII. Municipality officials involved with hazard mitigation will cooperate with the Harnett County Planning Department and Emergency Management Department to facilitate the

implementation and evaluation of the Plan, and if needed, participate in annually revising the Plan to incorporate new developments.

IX. Public meetings will be held whenever changes are made to the plan in order to gain their input, as is required if an amendment is made to any other local ordinance. These will be held in accordance to local regulations and follow the same steps that were taken during construction and adoption of this plan. If these meetings are poorly attended, then questionnaires, emails, phone calls, and other grass root techniques will be conducted to gain obtain input.

X. The plan should be annually reviewed for maintenance purposes, but a major review shall be made once every five years or after a major hazard. Such a review will include a public meeting as well as Mitigation Committee, Emergency Management, NCEM and FEMA reviews in order to update the plan to meet any new mitigation standards and/or modify mitigation strategies to meet the growing needs of the County.

- Do the goals and objectives address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the plan?
- Are there implementation problems, such as technical, political, legal or coordination issues with other agencies?
- Are the outcomes expected?
- Did the agencies and other partners participate as proposed?

XI. A copy of the Harnett County Mitigation Plan will be kept on file at all county branch libraries and the Government Document Annex of the Campbell University Carrie Rich Memorial Library. A public record of persons reviewing the plan shall be kept for security purposes to insure the safety of the County due to the vulnerability assessment involved with Hazard Mitigation.

Responsible Departments for Monitoring and Updating:

Harnett County Planning & Inspections Department

Harnett County Emergency Management Department

Contact Names: Mark Locklear, Senior Planner: 910-893-7525

Gary Pope, Director of Emergency Services: 910-893-7580

Contact Address: Harnett County
102 E. Front St
P.O. Box 65
Lillington, NC 27546

Date of Plan Adoption: _____, 2004.

Appendices

Appendix A

Town of Angier

Town of Angier
Harnett County
North Carolina

The Angier Community, named after Colonel Angier, was settled in the mid 1800's. The town was charted in 1901 and established on one square mile of farmland owned by J.C. Williams. In the beginning farming cotton and peas, raising pigs, and extracting turpentine from the vast acres of pine trees grounded the community. The first settlers consisted of Scotch, Scotch-Irish, and English. Colonel Jonathan C Angier built a railroad that connected Angier to Apex in July of 1899. The railroad jumpstarted the lumber industry and sparked the transportation of turpentine and other goods. In 1903, the railroad was extended from Angier to Dunn allowing cotton and tobacco to become the primary farming industries.

Starting in the 1930's, the Town of Angier became known as the Town of Crepe Myrtle's because the Homemakers Extension Club planted Crepe Myrtles along the major corridors of the town. For this reason, the annual Crepe Myrtle Celebration is held the second Saturday in September. Each year the celebration grows and offers food, arts and crafts, games and all around fun times to the residents of the town and surrounding area. Angier recently celebrated is Centennial on March 3, 2001 leading to a yearlong celebration of historic and entertainment events that brought the community closer together.

The Town of Angier is located 8 miles west of Interstate 40 and Highways 210 and 55 intersect at the center of Town. The Town is mostly residential homes and is expected to receive an explosive amount of growth from its neighbors to the north (Fuquay –Varina, Holly Springs, and Apex). The Town is located in northeast Harnett County and is wedged in the corner that borders Wake and Johnston counties. The most recent census count for the Town of Angier was 3,410. The Town of Angier is approximately 3.5 square miles and observes a 1-mile extraterritorial jurisdiction (ETJ).

Several natural disasters have affected the Town of Angier, in the 1950's Hurricane Hazel had a serious impact of the Town. Most recently, Hurricane Fran in 1996 and Hurricane Floyd in 1999 had tremendous impacts of flooding and debris damage. Less major natural occurrences that do affect Angier on a more frequent basis include snow and ice storms, severe thunderstorms with heavy rain, wind, hail, and lightning, severe heat and drought, and temporary flooding of certain streets and areas. The impacts of these natural hazards are usually short-term and have a relatively low impact. Although all of these hazard events are of great importance, hurricanes, tornadoes, and droughts are of the most concern for the Town of Angier's well being.

The Town of Angier's political, legal, technical, and fiscal capabilities follow the same path as the County's capacity. These are detailed on pages 55-62. However, the following information and worksheets provide further information about Angier's internal, or institutional, capability and vulnerability. A distribution of Town's employment and regulations can be found in the tables below. They are also thoroughly described in the worksheets. **See Appendix F for Vulnerability Map.**

	Department	Total Permanent Employees
1	Administration	20
2	Police Department	10
3	Fire Department	4 paid/ 31 vol.
4	Sewage Treatment Plant	2

Ordinances and Regulations

1	State Building Codes
2	Subdivision Regulations
3	Flood Damage Prevention Ordinance
4	Zoning Regulations
5	Watershed Regulations

Angier
Worksheet #1: Hazard Identification and Analysis
NFIP member since February 3, 2000

Type of Hazard & Associated Elements	Likelihood of Occurrence (Highly Likely, Likely, Possible, Unlikely)	Intensity Rating (Intensity Scales or Relative Terms)	Impact (Catastrophic, Critical, Limited, Negligible)	Conclusions (Rank the seriousness of the hazard)
Hurricane	Highly Likely	Category 2	Critical	1
Thunderstorm (Hail, Wind)	Highly Likely	Sever/Moderate	Limited	2
Nuclear Accident	Unlikely	Moderate	Limited	9
Winter Storm	Likely/Possible	Catastrophic/Critical	Limited	3
Tornado	Possible	F2	Critical	5
Flooding (including flash floods)	Possible	Moderate/Severe	Negligible	7
Drought	Possible	Moderate	Negligible	6

Angier

Worksheet #2: Geographic Planning Area Vulnerability Assessment

Type(s) Hazard: Hurricane, Thunderstorm(Severe),Nuclear Accident,Winter Storm,Tornado, Severe Heat, Lightening, Flooding, Drought

Current Conditions							Potential Future Conditions					
Type of Development	**Number of Existing Private Buildings**		**Current Value**		**Current Number of People**		**Projected Number of Private Buildings** (If developed under existing policies)		**Projected Value**		**Projected Number of People** (If developed under existing policies)	
	Town	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**
Single-Family Residential	1,500	350	104,000,000	40,000,000	3,750	875	250	100	12,000,000	1,000,000	625	250
Multi-Family Residential	200	20	20,000,000	1,000,000	1,250	50	200	100	8,000,000	500,000	500	250
Commercial	70	15	15,000,000	5,000,000	350	75	10	5	7,000,000	4,000,000	50	25
Industrial	2	NA	3,000,000	NA	50	NA	1	NA	2,000,000	NA	70	NA
Other	6	2	5,300,000	1,000,000	100	20	2	NA	2,000,000	NA	10	NA
Subtotal	**1,778**	**387**	**$147,300,000**	**$47,000,000**	**5,500**	**1,000**	**463**	**205**	**$31,000,000**	**$5,500,000**	**1,255**	**525**

Note: All approximate values correspond to all our addressed hazards and are based on best available information. As resources, funding, & time become available we hope to utilize a specifically designed loss estimation software to advance these assessments.

Angier

Worksheet #2, continued from previous page…

Public Buildings and Critical Facilities												
Current Conditions							Potential Future Conditions					
Type of Facility	Number of Existing Public Buildings and Critical Facilities		Current Replacement Value		Current Number of People		Projected Number of Public Buildings and Critical Facilities		Projected Replacement Value		Projected Number of People	
	Town	ETJ	Town	ETJ	Town	ETJ	Town	ETJ	Town	ETJ	Town	ETJ
Sewage Treatment Plant	2	0	$5.5M	NA	2	NA	Upgrade	0	$8M	NA	3	NA
Water Treatment Plant	2	0	$1.2M	NA	NA	NA	1 Tank	0	$2.5M	NA	NA	NA
Hospital	0	0	0	NA	0	NA	0	0	0	NA	NA	NA
Schools	1	0	$1M	NA	300	NA	0	1	0	$10M	NA	800
Infrastructure (roads, bridges, drainage, etc.)	**	NA	$25M	NA	NA	NA	NA	NA	$15M	NA	NA	NA
Police Station	0	0	0	NA	10	NA	1	NA	$300,000	NA	15	NA
Fire Station	1	0	$1.5M	NA	4pd/ 31 vol.	NA	0	NA	0	NA	8pd/ 40 vol.	NA
Haz. Material Facilities	0	0	NA	NA	NA	NA	0	0	NA	NA	NA	NA
Government Offices	4	0	$1M	NA	20	NA	3	0	$2.2M	NA	30	NA
Emergency Shelter	0	0	NA	NA	NA	NA	0	0	NA	NA	NA	NA
Public Housing	0	0	NA	NA	NA	NA	0	0	NA	NA	NA	NA
Subtotal	**10**	**0**	**$35.2M**	**NA**	**367**	**NA**	**5**	**1**	**$28M**	**$10M**	**96**	**800**
TOTAL:	**1,788**	**387**	**$182.5M**	**$47M**	**5,867**	**1,000**	**468**	**206**	**$59M**	**$15.5M**	**1,351**	**2,676**

**31 Miles of Streets and 50 Miles of Drainage

Angier
Worksheet #3: Community Capability Assessment

Policies, Practices, Programs, Regulations, and Activities (existing and potential)	**Document Reference**	**Effectiveness for Mitigation** (high/medium/ low/ not effective)	**Rationale for Effectiveness**
State Building Codes	State Building Codes	High	Current building codes are designed to protect consumer, contractor, and land from damage of potential natural hazards.
Subdivision Regulations	Angier Town Code	High	Requires advanced planning of subdivision and requires approval from various state and city departments to ensure environmental and public safety.
Flood Damage Prevention	Angier Town Code	High	Purpose is to restrict or prohibit uses that are dangerous to health, safety, and property due to water or erosion hazards; controls the alteration of natural flood plains, stream channels, and natural protective barriers.
Zoning Regulations	Angier Town Code	Medium	Need greater analysis of natural hazards sensitive areas to prevent the location of certain businesses in areas near water or areas that experience high water run-off during rain events
Fire Prevention	Angier Town Code	Medium	It is a good policy to have in place but enforcement can be difficult with a low number of staff to direct their attention to the issues addressed in the ordinance
Watershed Regulations	NCDENR	Medium	Low awareness of these regulations
Streets and Sidewalks: Curbs and Draining	Angier Town Code	High	Ensure that water flow is directed in the appropriate locations to prevent erosion; protects natural areas and ensures a plan for the removal of snow, ice, debris, etc.

Angier

Worksheet #4: Community Goals

Goal Category	Goal Statements	Hazard Threat Addressed (type of hazard and/or location)
General	We will strive to reduce loss of life, personal injury, and property damage from natural hazards.	
Future Development	We will strive to manage future development so that vulnerability of public and private property to natural hazards is reduced.	
Existing Structures	We will strive to maintain existing structures and infrastructures.	
Public Education and Outreach	We will strive to increase public understanding, support, and demand for hazard mitigation and improve coordination and communication will all relevant organizations.	
Redevelopment	We will strive to encourage safe and responsible redevelopment growth patterns, which lessen the effects of natural hazards.	
Natural Resource Protection	We will strive to protect and preserve the natural resources and environmentally sensitive areas within Harnett County.	

Appendix B

Town of Coats

Town of Coats
Harnett County
North Carolina

James Thomas Coats, a Confederate Army Corporal, founded the town of Coats on a seven hundred-acre tract of land purchased around 1870. The Town was officially established in 1905 and was primarily involved with the practice of agriculture.

Today, the Town of Coats is fairly evenly divided between the Black River and the Cape Fear River watersheds. During the most recent census, the Town had a population of 1800, residing in a two-mile square area with a one-mile ETJ. The Town is bisected by highways N.C. 55 and N.C. 27, and is close to Interstate 95 (seven miles, east). The Harnett County airport is approximately five miles to the west. The Town of Coats is now mostly a residential community, with one major industry and several commercial areas, which provide some employment opportunities, shopping, and services.

Most of the destructive events taking place in and around the Town of Coats in the past fifty years have been either directly or indirectly related to the sustained high winds and torrential rains of hurricanes. Damage to trees, power and communication lines, as well as flooding, have resulted in significant personal and real property losses. Public properties and public services have been disrupted for over a week. The Town is not associated with the NFIP program, but will strive to become a member.

Some of the most notable Hurricanes to affect the Town of Coats have been Hazel in October 1954, Fran in September 1996, and most recently Floyd in September 1999. Winter ice storms resulting in damage to power and communications lines, trees and the increase of hazardous travel have occurred more frequently, but to a lesser degree of damage and for a shorter duration.

The Town of Coats's political, legal, technical, and fiscal capabilities follow the same path as the County's capacity. These are detailed on pages 55-62. However, the following information and worksheets provide further information about Coats's internal, or institutional, capability and vulnerability. A distribution of Town's employment and regulations can be found in the tables below. They are also thoroughly described in the worksheets. **See Appendix F for Vulnerability Map.**

	Department	Total Permanent Employees
1	Administration	11
2	Police Department	3
3	Fire Department	5

Ordinances and Regulations

1. State Building Codes
2. Subdivision Regulations
3. Flood Damage Prevention Ordinance
4. Zoning Regulations
5. Watershed Regulations
6. Land Use Plan
7. Capital Improvement Plan

Town of Coats
Worksheet #1: Hazard Identification and Analysis

Type of Hazard & Associated Elements	**Likelihood of Occurrence** (Highly Likely, Likely, Possible, Unlikely)	**Intensity Rating** (Intensity Scales or Relative Terms)	**Impact** (Catastrophic, Critical, Limited, Negligible)	**Conclusions** (Rank the seriousness of the hazard) {1 = Most Serious; 5 = Least}
Hurricanes	Likely	Cat. 2	Moderate	1
Flooding	Likely	Moderate	Limited	3
Tornado	Likely	F2	Considerable	3
Wildfire	Possible	Light (M)	Negligible	5
Winter Storms (Ice Damage)	Likely	Medium	Limited	3
Thunderstorm (Hail/ Wind)	Likely	Moderate	Limited	4
Severe Heat (and Drought)	Possible	Light (M)	Negligible	5

Town of Coats
Worksheet #2: Geographic Planning Area Vulnerability Assessment
Type(s) Hazard: Hurricanes, Flooding, Tornado, Wildfire, Winter Storms (Ice), Hail, Flash Flooding, Damaging Winds

Type of Development	Current Conditions						Potential Future Conditions					
	Number of Existing Private Buildings		Current Value		Current Number of People		Projected Number of Private Buildings (If developed under existing policies)		Five Year Projected Value		Projected Number of People (If developed under existing policies)	
	Town	ETJ	Town	ETJ	Town	ETJ	Town	ETJ	Town	ETJ	Town	ETJ
Single-Family Residential	819	71	$32 M	$15 M	1,500	550	100	30	$35.2 M	$16.5 M	280	84
Multi-Family Residential	46	0	$12 M	NA	300	0	25	5	$13.2M	NA	100	10
Commercial	67	18	$4.5 M	$4M	335	90	10	4	$4.95M	$4.4 M	50	20
Industrial	2	1	$2.8 M	$1 M	65	7	1	1	$3.08M	$1.1 M	30	7
Other (Also: Churches, Warehouses, Senior Center, etc.)	6	1	$4 M	$2 M	20	2	1	1	$4.4 M	$2.2 M	2	2
Subtotal	**940**	**91**	**$55.3 M**	**$22 M**	**2,220**	**649**	**137**	**41**	**$60.83M**	**$24.2 M**	**462**	**123**

Note: All approximate values correspond to all our addressed hazards and are based on best available information. As resources, funding, & time become available we hope to utilize a specifically designed loss estimation software to advance these assessments.

Worksheet # 2 continued….

Public Buildings and Critical Facilities												
CURRENT CONDITIONS							**POTENTIAL FUTURE CONDITIONS**					
Type of Facility	**Number of Existing Public Buildings and Critical Facilities**		**Current Replacement Value**		**Current Number of People**		**Projected Number of Public Buildings and Critical Facilities**		**Five Year Projected Replacement Value**		**Projected Number of People**	
	Town	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**
Sewage Treatment Pumping Stations	5	2	750K	300K	NA	NA	0	1	$825K	$330K	2,500	1,000
Water Storage Facilities	2	1	800K	500K	NA	NA	0	0	$880K	$550K	NA	NA
Hospital	0	0	NA	NA	NA	NA	0	1	NA	NA	NA	NA
Schools	1	1	6.5 M	NA	670	0	1	0	$7.15 M	NA	800	0
Infrastructure (roads, bridges, drainage, etc.)	##	NA	4.5 M	NA	**NA**	**NA**		NA	$4.95M	NA	**NA**	**NA**
Police Station	1	0	80K	NA	3	NA	0	0	$88 K	NA	NA	NA
Fire Station	1	0	1.3 M	NA	5	NA	0	0	$1.43M	NA	NA	NA
Hazardous Material Facilities	0	0	NA	NA	NA	NA	0	0	N/A	NA	NA	NA
Government Offices	4	0	780K	NA	11	NA	1	0	$858K	NA	NA	NA
Emergency Shelter	2	0	NA	NA	NA	NA	0	0	NA	NA	NA	NA
Public Housing	0	0	NA	NA	0	0	0	0	NA	NA	NA	NA
Subtotal	**18**	**4**	**$14.21M**	**$8000K**	**689**	**0**	**4**	**2**	**$15.63M**	**$880 K**	**3,300**	**1,000**
TOTAL:	**958**	**95**	**$69.51 M**	**$22.8 M**	**2,909**	**649**	**8**	**6**	**$76.46M**	**$25.08M**	**3762**	**1,123**

Includes 14.77 miles of Streets and 31.0 miles of Drainage

Town of Coats
Worksheet #2A: Total Community Vulnerability Summary

Current Conditions						Potential Future Conditions				
Geographic Planning Area	Total Current Number of People	Total Number of Existing Private Buildings	Total Current Value	Total Number of Current Public Buildings & Critical Facilities	Total Current Replacement Value	Total Projected Number of People	Total Projected Number of Private Buildings	Total Projected Value	Total Projected Number of Public Buildings & Critical Facilities	Total Projected Replacement Value
COATS	1,924	940	$55.3 M	18	$69.51 M	2,682	1,077	$60.83 M	8	$76.46 M
ETJ	641	91	$22 M	4	$22.8 M	772	132	$24.2 M	6	$25.08 M
Community Total	**4051**	**1031**	**$77.3 M**	**22**	**$82.31 M**	**3454**	**1209**	**$85.03 M**	**14**	**$101.54 M**

Town of Coats
Worksheet #3: 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
Building Codes	Harnett County and State Building Codes	High	Current County Building Codes are very effective at handling water and wind problems.
Subdivision Regulations	Code of Zoning Ordinances (Town of Coats)	High	Current Subdivision Regulations are effective at handling water and wind problems.
Flood Plan Regulations	Code of Zoning Ordinances (Town of Coats)	High	Will not allow construction in 100-year Flood Plain Areas
Land Use Plans	Code of Zoning Ordinances (Town of Coats)	Low	Not Restrictive Enough Not an Enforcement Tool
Water Supply	Code of Zoning Ordinances (Town of Coats)	Low	Not an Enforcement Tool
Water Shed Regulations	DEHNR	Medium	Not being enforced as should be
Capital Improvement Plan	Town Board of Commissioners (Budget Ordinance)	High	Town is very specific on where it spends its money!!
Zoning Regulations	Code of Zoning Ordinances (Town of Coats)	High	Town is highly selective in its Permitting Areas

Town of Coats
Worksheet #4: Community Goals

Goal Category	Goal Statements (include source reference)	Hazard Threat Addressed (type of hazard and/or location)
General	We will strive to reduce loss of life, personal injury, and property damage from Natural Hazards.	Hurricanes, Flash Flooding, Severe Storms
Future	Manage future development so that vulnerability of public and private properties to natural hazards is reduced	Hurricanes, Flash Flooding, Severe Storms
Existing Structures	We will strive to maintain existing structures and infrastructures in such a manor that they would be as resilient as possible from natural hazards.	Hurricanes, Flash Flooding, Severe Storms
Public Education And Outreach	Increase public understanding, support and demand for hazard mitigation and improve coordination and communication with all relevant organizations	Hurricanes, Flash Flooding, Severe Storms
Redevelopment	Encourage safe and responsible redevelopment growth patterns, which lessen the effects of future natural hazards	Hurricanes, Flash Flooding, Severe Storms
Natural Resource Protection	Protect and Preserve the natural resources and environmentally sensitive areas within Harnett County	Hurricanes, Flash Flooding, Severe Storms

Town of Coats
Worksheet #5: Geographic Planning Area Policies

Policy (includes new initiatives, continuation and support of existing policies, and recommended policy changes)	**Type of Mitigation Strategy** (Preventive, Property Protection, Natural Resource Protection, Structural Projects, Public Information)	**Type(s) of Hazard This Policy Will Target**	**Funding** (amount and source; local match required?)	**Responsible Party/ Start & Completion Dates**	**Benchmarks and Indicators of Progress** (Monitoring and Evaluation)
The Town will continue our existing and future Ordinances and Policies that will provide for the safety and welfare of our Citizens	Preventative/ Property Protection/Natural Resource Protection	Hurricanes/ Flash Flooding/ Severe Storms	Local	Town of Coats Board of Commissioners (July, 2002)	On-going; Major Reviews Semi-Annually
The Town will review and update all existing Ordinances, Plans and Policies to insure they meet all our future needs.	Preventative/ Property Protection/Natural Resource Protection	Hurricanes/ Flash Flooding/ Severe Storms	Local	Town of Coats Board of Commissioners (Sept., 2002)	Creation and Adoption of new Zoning and Subdivision Regulations; On-going Reviews.
Through the adoption of our Annual Town Budget, we will target our infrastructure needs.	Preventative/ Property Protection/Natural Resource Protection/Structural Protection	Hurricanes/ Flash Flooding/ Severe Storms	Local	Town of Coats Board of Commissioners (On Going)	Continue Town's Current Practice of Monitoring/ Evaluation Both During and After all Flooding Events
Through Semiannual Town Meetings, we will Educate and Solicit Public input on our Hazard Mitigation Strategies	Public Information	Hurricanes/ Flash Flooding/ Severe Storms	Local	Town of Coats Board of Commissioners/ Harnett County EMC/ Town of Coats Planning Board (On Going)	By Holding Successful Town Meetings where Public Input is Solicited
Through our New Zoning and Subdivision Regulations, the Town will be able to insure that all Redevelopment and Growth is Proper	Property Protection/ Public Information	Hurricanes/ Flash Flooding/ Severe Storms	Local	Town of Coats Board of Commissioners/ Town of Coats Planning Board (On Going)	On-Going Reviews and Updating

Appendix C

City of Dunn

City of Dunn
Harnett County
North Carolina

The City of Dunn was founded around the efforts of loggers and farmers during the late 1800's. What is now the City of Dunn was once mainly woodlands, cotton fields, and farm dwellings. Deep swamps surrounded the city and even today it is difficult to travel more than 3 or 4 miles without crossing a river or a swamp. Dunn was known as "Wade" and "Lucknow" before becoming the City of Dunn. The city was named in honor of Mr. Bennett R. Dunn, the engineer that designed the roadbed and supervised the construction of the railroad that was laid between Wilson and Fayetteville. The first street in the City of Dunn was Broad Street, the current location of the Municipal Building and many of the city's offices.

By the 1980s, Dunn had a population of approximately 9,000 residents. In 1986, the home of Major General William C. Lee was dedicated and opened to the public. In 1989 Dunn received the title of the "All-American City", an award that was given to only 9 other cities in the United States. The City of Dunn is still known as the "All-American City" today.

The most recent census for the City of Dunn reflects that 9,196 people, roughly 10 percent of the county's population resides in the city limits. The City of Dunn is approximately 6 square miles in area and observes an one mile extraterritorial jurisdiction (ETJ). The City of Dunn is located directly off of Interstate 95, and highway 421 travels through the center of the city. The City of Dunn is mostly residential but commercial businesses play an integral part of the community as growth is expected in the coming years. Several industries are also housed in the city limits.

Several natural disasters have affected the City of Dunn, Hurricane Fran in September of 1996 is the most recent to have a serious impact. Hurricanes such as Bertha, Dennis, and Floyd have all had some impact on the City and its resources. Less major natural occurrences that do affect Dunn on a more frequent basis include snow and ice storms, severe thunderstorms with heavy rain, hail, wind, and lightning, severe heat and drought, and temporary flooding of certain streets and areas. The impacts of these natural hazards are usually short-term and have a relatively low impact. The hurricanes that bring the rain, wind, and flooding are of most concern to the City of Dunn's well being.

The Town of Dunn's political, legal, technical, and fiscal capabilities follow the same path as the County's capacity. These are detailed on pages 55-62. However, the following information and worksheets provide further information about Dunn's internal, or institutional, capability and vulnerability. A distribution of Town's employment and regulations can be found in the tables below. They are also thoroughly described in the worksheets. **See Appendix F for Vulnerability Map.**

	Department	Total Permanent Employees
1	Administration	58
2	Police Department/ Animal Control	60
3	Fire Department	4 paid/ 31 vol.
4	Sewage Treatment Plant	4
5	Water Treatment Plant	4

Ordinances and Regulations

1	State Building Codes
2	Subdivision Regulations
3	Flood Damage Prevention Ordinance
4	Zoning Regulations
5	Watershed Regulations
6	Fire Prevention Ordinance

City of Dunn
Worksheet #1: Hazard Identification and Analysis
NFIP member since September 4, 1986

Type of Hazard & Associated Elements	**Likelihood of Occurrence** (Highly Likely, Likely, Possible, Unlikely)	**Intensity Rating** (Intensity Scales or Relative Terms)	**Impact** (Catastrophic, Critical, Limited, Negligible)	**Conclusions** (Rank the seriousness of the hazard)
Hurricane	Highly Likely	Category 2	Critical	1
Thunderstorm (Hail, Wind)	Highly Likely	Severe/Moderate	Limited	2
Nor'easter	Likely/Possible	Moderate	Limited	6
Winter storm	Likely/Possible	Moderate	Limited	5
Tornado	Possible	F2	Critical	4
Severe heat	Likely	Moderate	Negligible	8
Flooding (including flash floods)	Possible	Moderate/Severe	Negligible	7
Drought	Possible	Moderate	Negligible	9

City of Dunn

Worksheet #2: Geographic Planning Area Vulnerability Assessment

***Type(s) Hazard**: Hurricane, Thunderstorm (Severe), Nor'easter, Winter Storm, Tornado, Severe Heat, Lightning, Flooding, Drought*

Current Conditions							Potential Future Conditions					
Type of Development	**Number of Existing Private Buildings**		**Current Value**		**Current Number of People**		**Projected Number of Private Buildings** (If developed under existing policies)		**Projected Value**		**Projected Number of People** (If developed under existing policies)	
	Town	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**
Single-Family Residential	3,610	90	203,698,800	6,307,750	8,246	225	3,810	120	206,181,555	8,410,200	8,746	300
Multi-Family Residential	390	8	22,633,200	560,000	916	20	470	12	27,740,179	840,000	1,116	50
Commercial	585	20	97,948,764	3,714,250	5,850	140	625	35	105,315,850	6,500,000	6,250	245
Industrial	15	1	27,378,000	600,000	90	10	20	2	37,416,600	1,700,400	115	15
Mobile Homes	20	20	84,162	84,162	70	70	60	30	269,318	126,243	180	105
Subtotal	**4,620**	**139**	**$351,742,926**	**$11,266,162**	**15,172**	**465**	**4,985**	**199**	**$376,923,502**	**$17,576,843**	**16,407**	**715**

Note: All approximate values correspond to all our addressed hazards and are based on best available information. As resources, funding, & time become available we hope to utilize a specifically designed loss estimation software to advance these assessments.

City of Dunn

Worksheet #2, continued from previous page…

Public Buildings and Critical Facilities												
	Current Conditions						Potential Future Conditions					
Type of Facility	Number of Existing Public Buildings and Critical Facilities		Current Replacement Value		Current Number of People		Projected Number of Public Buildings and Critical Facilities		Projected Replacement Value		Projected Number of People	
	Town	ETJ	Town	ETJ	Town	ETJ	Town	ETJ	Town	ETJ	Town	ETJ
Sewage Treatment Plant	1	0	$15M	N/A	4	N/A	1	0	$30M	N/A	5	N/A
Water Treatment Plant	1	0	$20M	N/A	4	N/A	1	0	$40M	N/A	5	N/A
Hospital	1	0	$2B	N/A	1850	N/A	1	0	$3B	N/A	2050	N/A
Schools	4	0	$26M	N/A	1800	N/A	4	N/A	$33.8M	N/A	2000	N/A
Infrastructure (roads, bridges, drainage, etc.)	N/A	N/A	$65M	N/A	N/A	N/A	N/A	N/A	$75M	N/A	N/A	N/A
Police Station, Police Athletic League, Animal Control	2	0	$1.3M	N/A	60	N/A	2	N/A	$2.6M	N/A	65	N/A
Fire Station	2	0	$4.5M	N/A	4pd/ 31vol.	N/A	2	N/A	$5.6M	N/A	10pd/ 40 vol.	N/A
Haz. Material Facilities	0	0	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Government Offices (Finance, Admin., Insp., Public Works, Library, Parks & Rec.)	10	0	$5.1M	N/A	58	N/A	10	0	$6.5M	N/A	64	N/A
Emergency Shelter	0	0	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Public Housing	0	0	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Subtotal	**21**	**0**	**$2.137B**	**N/A**	**3,811**	**N/A**	**21**	**0**	**$3.194B**	**N/A**	**4,239**	**N/A**
TOTAL:	**4,641**	**139**	**$2.489B**	**$11,266,162**	**18,983**	**465**	**5,006**	**199**	**$3.571B**	**$17,576,843**	**20,646**	**715**

City of Dunn
Worksheet #2A: Total Community Vulnerability Summary

Current Conditions						Potential Future Conditions				
Geographic Planning Area	**Total Current Number of People**	**Total Number of Existing Private Buildings**	**Total Current Value**	**Total Number of Current Public Buildings & Critical Facilities**	**Total Current Replacement Value**	**Total Projected Number of People**	**Total Projected Number of Private Buildings**	**Total Projected Value**	**Total Projected Number of Public Buildings & Critical Facilities**	**Total Projected Replacement Value**
Dunn	18,983	4,620	$351,742,926	21	$2.137B	20,646	4,985	$376,923,502	21	$3.194B
ETJ	465	139	$11,266,162	0	NA	715	199	$17,576,843	0	NA
Community Total	**19,448**	**4,759**	**$363,009,088**	**21**	**$2.137B**	**21,361**	**5,184**	**$394,500,345**	**21**	**$3.194B**

City of Dunn
Worksheet #3: Community Capability Assessment

Policies, Practices, Programs, Regulations, And Activities (existing and potential)	**Document Reference or Other Source**	**Effectiveness for Mitigation** (high/medium/ low/ not effective)	**Rationale for Effectiveness**
State Building Codes	State Building Codes	High	Current building codes are designed to protect consumer, contractor, and land from damage of potential natural hazards
Subdivision Regulations	Dunn City Code, Chapter 20	High	Requires advanced planning of subdivision and requires approval from various state and city departments to ensure environmental and public safety
Flood Damage Prevention	Dunn City Code, Chapter 9	High	Purpose is to restrict or prohibit uses that are dangerous to health, safety, and property due to water or erosion hazards; controls the alteration of natural flood plains, stream channels, and natural protective barriers
Zoning Regulations	Dunn City Code, Chapter 22	Medium	Need greater analysis of natural hazard sensitive areas to prevent the location of certain businesses in areas near water or areas that experience high water run-off during rain events
Fire Prevention	Dunn City Code, Chapter 8	Medium	It is a good policy to have in place but enforcement can be difficult with a low number of staff to direct their attention to the issues addressed in the ordinance
Watershed Regulations	NCDENR	Medium	Low awareness of these regulations
Streets & Sidewalks: Curbs and Drainage	Dunn City Code, Chapter 19	High	Ensure that water flow is directed in the appropriate locations to prevent erosion; protects natural areas and ensures a plan for the removal of snow, ice, debris, etc.

City of Dunn
Worksheet #4: Community Goals

Goal Category	Goal Statements	Hazard Threat Addressed (type of hazard and/or location)
General	We will strive to reduce loss of life, personal injury, and property damage from natural hazards.	
Future Development	We will strive to manage future development so that vulnerability of public and private property to natural hazards is reduced.	
Existing Structures	We will strive to maintain existing structures and infrastructures	
Public Education & Outreach	We will strive to increase public understanding, support and demand for hazard mitigation and improve coordination and communication with all relevant organizations.	
Redevelopment	We will strive to encourage safe and responsible redevelopment growth patterns, which lessen the effects of natural hazards.	
Natural Resource Protection	We will strive to protect and preserve the natural resources and environmentally sensitive areas within Harnett County.	

City of Dunn
Worksheet #5: Geographic Planning Area Policies

Policy (includes new initiatives, continuation and support of existing policies, and recommended policy changes)	**Type of Mitigation Strategy** (Preventive, Property Protection, Natural Resource Protection, Structural Projects, Public Information)	**Type(s) of Hazard This Policy Will Target**	**Funding**	**Responsible Party/ Start & Completion Dates**	**Benchmarks and Indicators of Progress** (Monitoring and Evaluation)
General: Create policy to annually trim trees and cut down dead trees under the city's supervision prior to April 15th	Preventative, Property Protection	Wind, Flooding, Hurricanes	Local	Public Works Department Annual, Planning Board, City Council September 2002	Reduction of downed power lines, property loss/damage, closed streets, ability to travel efficiently
Future Development: Create and tweak existing policies to prevent building in areas prone to flooding, wind damage	Preventative, Property Protection, Natural Resource Protection	Flooding, Flash Flooding, Hurricanes, Wind	Local/State	Planning Department, Planning Board, City Council Ongoing	Reduction of loss of property due to wind and flooding damage; Prevent natural resources from damage by runoff of commercial areas into river and tributaries
Existing Structures: 1) Create a policy to require private property owners to remove storm debris (trees, limbs, etc.) within 45 days to prevent potential fire hazards to existing structures. 2) Create a policy to inspect public buildings on an annual basis for areas that need repair to keep the building as structurally sound as possible.	Preventative, Property Protection	Fire, Flooding, Wind, Hurricanes	Local/State	Planning Department, Planning Board, Inspections Department, City Council September 2002	Decrease in number of fires related to dry debris being left on property. Decrease in number of structures damaged by natural hazards.
Public Education & Outreach: Create a brochure and increase public awareness by advertising the benefits of being more conscientious of things that citizens can do to minimize loss of property/property damage, and reduce the possibility of flooding.	Preventative, Property Protection, Natural Resource Protection, Public Information	Wind, Flooding, Hurricanes, Thunderstorms	Local/Grant money	Administration, City Council September 2002	Reduction of debris to landfill after storms; Reduction of harmful runoff and trash being dispersed into the river and its tributaries
Redevelopment: Create a policy to prevent redevelopment in areas that are especially prone to flooding and wind damage.	Preventative, Property Protection, Natural Resource Protection	Hurricanes, Flooding, Wind, Thunderstorms	Local/ State	Inspections Department, Planning Department, Planning Board, City Council, Public Works October 2002	Reduction in the amount of property that is lost and damaged due to natural hazards.

Natural Resource Protection: 1) Create a policy to establish vegetative buffers on all properties bordering drainage canals, creeks, streams, etc. to prevent water contamination. 2) Create policy to require quarterly checks on these buffers to ensure that they are free of debris and are being maintained properly. 3) Create an ordinance providing the inspector and/or code enforcement officer to complete inspections of businesses that could cause potential harm to the environment in the case of a natural hazard occurrence.	Preventative, Natural Resource Protection, Public Information	Hurricanes, Flooding, Wind, Thunderstorms	Local/ State	Planning Department, Planning Board, Inspections Department, City Council, Public Works October 2002	Reduction in the amount of pollutants entering water resources. Can provide reports stating the number of businesses/properties that were required to clean up properties, therefore reducing pollution by chemicals, debris, etc.

Appendix D

Town of Erwin

The Town of Erwin
Harnett County
North Carolina

The history of Erwin dates only from the 1900's but the community is located in an area rich in history that stretches back to colonial times. Erwin is located near the site of the old settlement of Averasboro, which finds mention in accounts of both the Revolutionary War and The Civil War. It lies on the east side of the Cape Fear River on low but well drained lands which in their original state were heavily wooded.

The community of Erwin began with the erection of a cotton mill in 1903. In fact, Erwin's history is in large part the history of this milling enterprise, which was constructed by the Erwin Cotton Mills Company and is now the property of a successor-Swift Industries, Inc. The Erwin Mills Company began in 1892 by a group of financiers who included W.A. Erwin and J.B. "Buck" Duke. Construction started in the spring of 1903, and the mill was in full operation by the latter part of 1905. The site had been selected because of the proximity of the Cape Fear River, the proximity of the cotton fields, and the probable supply of adequate labor.

The Town, which was constructed to house the workers of the mill, was originally called Duke, but its name was changed to Erwin in 1936 when Trinity College in Durham became Duke University. In the initial plan there were about 300 dwelling houses. The establishment of basic services came quick on the heels of the first developments in the town. The first doctor began practicing in 1903, and in 1910, the first hospital in Harnett County opened in Erwin.

In the 1920's, enlargements were made in the mill and a number of new houses were built for employees of the mill. The company laid the water and sewer lines in the basic system that still serve the town. In the 1950's, Erwin Mills began selling houses and other lots to residents of the town. This policy was continued by Burlington Industries, with the consequence that today all residential and store buildings in the town are owned by individuals.

The Town of Erwin has been subjected to several major natural disasters over the last few decades, mostly in the form of hurricanes and the resulting wind and water damage. Hurricanes Hazel (1954), Fran (1996), and Floyd (1998) have caused considerable damage to the town. Less major natural occurrences that have affected the Town of Erwin are snow and ice storms, severe thunder and lightning storms, extreme rainfall, and drought.

The Town of Erwin's political, legal, technical, and fiscal capabilities follow the same path as the County's capacity. These are detailed on pages 55-62. However, the following information and worksheets provide further information about Erwin's internal, or institutional, capability and vulnerability. A distribution of Town's employment and regulations can be found in the tables below. They are also thoroughly described in the worksheets. **See Appendix F for Vulnerability Map.**

	Department	**Total Permanent Employees**
1	Town Hall/ Police	11
2	Library/ Community Bldg.	20
3	Fire Department	7
4	Sewage Treatment Plant	3
5	Water Treatment Plant	3
6	Parks and Recreation	6
7	Public Works	8

Ordinances and Regulations

1	State Building Codes
2	Subdivision Regulations
3	Flood Damage Prevention Ordinance
4	Zoning Regulations
5	Watershed Regulations
6	Capital Improvements Plan
7	Land Use Plan

Town of Erwin
Worksheet #1: Hazard Identification and Analysis
NFIP member since February 28, 1997

Type of Hazard & Associated Elements	**Likelihood of Occurrence** (Highly Likely, Likely, Possible, Unlikely)	**Intensity Rating** (Intensity Scales or Relative Terms)	**Impact** (Catastrophic, Critical, Limited, Negligible)	**Conclusions** (Rank the seriousness of the hazard) {1 = Most Serious; 5 = Least}
Hurricanes	Likely	Cat. 2	Moderate	1
Flooding	Likely	Moderate	Limited	3
Tornado	Likely	F2	Considerable	3
Wildfire	Possible	Light (M)	Negligible	5
Winter Storms (Ice Damage)	Likely	Medium	Limited	3
Thunderstorm (Wind/ Hail)	Likely	Moderate	Limited	4
Severe Heat (and Drought)	Possible	Light (M)	Negligible	5

Town of Erwin

Worksheet #2: Geographic Planning Area Vulnerability Assessment

Current Conditions							Potential Future Conditions					
Type of Development	**Number of Existing Private Buildings**		**Current Value Million Dollars**		**Current Number of People**		**Projected Number of Private Buildings**		**5 Year Projected Value Million Dollars**		**Projected Number Of People**	
	Town	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**
Single-Family Residential	2,094	315	101	15	4,300	650	2,169	327	111	15.57	4,600	675
Multi-Family Residential	12		1.75		300		14	6	1.93	1	350	200
Commercial	172	18	10.60	1.50	325	40	182	22	11.66	1.85	368	50
Industrial	2	0	19.20		0		3	1	21.10	5	800	300
Other	12	5	5	1.80	**300**	**150**	15	7	6.24	2.52	340	162
Subtotal	**2,292**	**338**	**137.55**	**18.30**	**5,225**	**840**	**2,383**	**363**	**151.93**	**25.94**	**6,458**	**1,387**

Note: All approximate values correspond to all our addressed hazards and are based on best available information. As resources, funding, & time become available we hope to utilize a specifically designed loss estimation software to advance these assessments.

Town of Erwin
Worksheet #2: Geographic Planning Area Vulnerability Assessment

Continued from previous page……

Current Conditions							Potential Future Conditions					
Type of Facility	**Number of Existing Public Buildings Critical Facilities**		**Current Replacement Value Million Dollars**		**Current Number of People**		**Projected Number of Public Buildings and Critical Facilities** (If developed under existing policies)		**Projected Replacement Value Million Dollars**		**Projected Number Of People** (If developed under existing policies)	
	Town	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**	**Town**	**ETJ**
WWTP/ Liftstations	14	0	6.5	0	3	***NA***	17	0	14	0	5	0
WTP/ Elevated Tank	2	0	3	0	3	NA	5	0	5	0	5	0
Hospital	1	0	15	0	150	NA	2	0	2	0	250	0
Schools	3	0	13	0	1,500	NA	3	0	14.30	0	1,800	0
Infrastructure (roads, bridges, drainage, etc.)	NA	NA	70	12	NA	NA	NA	NA	80	14	NA	NA
Pubic Works	1	0	1	0	8	NA	1	0	1.20	0	12	0
Fire Station	1	0	2	0	7	NA	1	0	2.20	0	15	0
Municipal Parks	4	0	0.55	0	6	NA	4	0	0.65	0	15	0
Town Hall/ Police Station	1	0	1.35	0	11	NA	1	0	1.50	0	11	0
Library/ Community Bld.	1	0	1.10	0	20	NA	1	0	1.20	0	25	0
Public Housing				0		NA						0
Subtotal	28	0	113.5	12	1,708	0	35	0	145.05	14	2,138	0
Total	**2,320**	**338**	**251.05**	**30.3**	**6,933**	**840**	**2,418**	**363**	**296.98**	**39.94**	**8,596**	**1,387**

Town of Erwin
Worksheet #2A: Total Community Vulnerability Summary

Current Conditions						Potential Future Conditions				
Geographic Planning Area	**Total Current Number of People**	**Total Number of Existing Private Buildings**	**Total Current Value**	**Total Number of Current Public Buildings & Critical Facilities**	**Total Current Replacement Value**	**Total Projected Number of People**	**Total Projected Number of Private Buildings**	**Total Projected Value**	**Total Projected Number of Public Buildings & Critical Facilities**	**Total Projected Replacement Value**
Erwin	5,225	2,292	137.55	28	113.5	6,458	2,383	151.93	35	145.05
ETJ	840	338	18.3	0	12	1,387	363	25.94	0	14
Community Total	**6,065**	**2,630**	**155.85**	**28**	**125.5**	**7,845**	**2,746**	**177.87**	**35**	**159.05**

Town of Erwin
Worksheet #3: Community Capability Assessment

Policies, Practices, Programs, Regulations, and Activities (existing and potential)	**Document Reference**	**Effectiveness for Mitigation** (high/medium/ low/ not effective)	**Rationale for Effectiveness**
Building Codes	Harnett County and State Building Codes	High	Current County Building Codes are very effective at handling water and wind problems.
Subdivision Regulations	Code of Zoning Ordinances (Town of ERWIN)	High	Current Subdivision Regulations are effective at handling water and wind problems.
Flood Plan Regulations	Code of Zoning Ordinances (Town of ERWIN)	High	Will not allow construction in 100-year Flood Plain Areas
Land Use Plans	Code of Zoning Ordinances (Town of ERWIN)	High	Comprehensive Plan
Water Supply	Code of Zoning Ordinances (Town of ERWIN)	Low	Not an Enforcement Tool
Water Shed Regulations	DEHNR	Medium	Not being enforced as should be
Capital Improvement Plan	Town Board of Commissioners (Budget Ordinance)	High	20 year plan allows forecasting readiness needs
Zoning Regulations	Code of Zoning Ordinances (Town of ERWIN)	High	Town is highly selective in its Permitting Areas

Town of Erwin
Worksheet #4: Community Goals

Goal Category	Goal Statements	Hazard Threat Addressed
General	We will strive to reduce loss of life, personal injury, and property damage from natural disasters.	See Worksheet I
Future Development	Manage future development so that vulnerability of public and private property to natural hazards is reduced	See Worksheet I
Existing Structures	Strive to maintain existing structures and infrastructure in such a manor that they would be resilient as possible from natural hazards	See Worksheet I
Public Education & Outreach	Increase public understanding, support and demand for hazard mitigation and improve coordination and communication with all relevant organizations.	
Redevelopment	Encourage safe and responsible redevelopment growth patterns, which lessen the effects of natural hazards.	
Natural Resource Protection	Protect and Preserve the natural resources and environmentally sensitive areas within Harnett County.	

Town of Erwin
Worksheet #5: Geographic Planning Area Policies

Policy (includes new initiatives, continuation and support of existing policies, and recommended policy changes)	**Type of Mitigation Strategy**	**Type(s) of Hazard This Policy Will Target**	**Funding** (amount and source; local match required?)	**Responsible Party/ Start & Completion Dates**	**Benchmarks and Indicators of Progress** (Monitoring and Evaluation)
Identify Equipment Resources to be used in a Natural Disaster	Preventative/ Property Protection	See Work Sheet I	Local	Town of Erwin; Board of Commissioners (2002)	Creation of a written listing of Resourced Equipment; Review listing Semi-Annually
Disaster Response Plan	Preventative/ Property Protection	See Work Sheet I	Local	Town of Erwin; Board of Commissioners (2002)	Creation of a written listing of Resourced Man-Power; Review listing Semi-Annually
Storm Water Management Policy	Preventative/ Property Protection	Flooding / Flash Flooding	Local/Grant	Town of Erwin; Board of Commissioners (start-up)	Continue current Practice of Monitoring/ Evaluation Both During and After all Flooding Events
Comprehensive Land Use Plan	Preventative/ Property Protection	Flooding/ Flash Flooding	Local	Town of Erwin; Board of Commissioners; Planning Board	DONE

Appendix E

Town of Lillington

Town of Lillington
Harnett County
North Carolina

The Town of Lillington was officially chartered by the State of North Carolina on March 4, 1903 as an incorporated municipality but has actually existed as the Harnett County seat since 1855. The Town of Lillington is named in honor of the General Alexander Lillington, a Cape Fear Patriot and hero at the battle of Moore's Creek during the Revolutionary War. Lillington is the birthplace of Pulitzer Prize winning Paul Green, creator and author of the first and most famous outdoor drama "The Lost Colony".

Lillington has a population of approximately 3,000 residents spanning 16 square miles. The Cape Fear River flows through the town enhancing the already aesthetic quality of the surroundings. It is a major crossroads in central North Carolina connecting "The Triangle" region of Raleigh-Durham-Chapel Hill to Fayetteville, Fort Bragg and Pope AFB and to Sanford in Lee County.

The Town of Lillington has a balanced mix of residential, commercial and industrial development. Lillington is home to a number of industries that provide unique products sold throughout the world. Included in these are Edwards Brothers Publishing, Gould & Goodrich (makers of leather law enforcement accessories), and Saab Barracuda (a Swedish owned company and the nation's only manufacturer of camouflage netting and air combat countermeasures).

Several natural disasters have affected the Town of Lillington, Hurricane Fran in September of 1996 is the most recent to have a serious impact. Hurricanes such as Bertha, Dennis, and Floyd have all had some impact on the Town and its resources. Less major natural occurrences that affect Lillington on a more frequent basis include severe thunderstorms with heavy rain, hail, wind, and lightning, severe heat and drought. The impacts of these natural hazards are usually short-term and have a relatively low impact. The threat of hurricanes that bring the rain, wind, and flooding are the greatest concern to the Town of Lillington and have had the most profound effect on the safety of its citizens.

The Town of Lillington's political, legal, technical, and fiscal capabilities follow the same path as the County's capacity. These are detailed on pages 55-62. However, the following information and worksheets provide further information about Lillington's internal, or institutional, capability and vulnerability. A distribution of Town's employment and regulations can be found in the tables below. They are also thoroughly described in the worksheets. **See Appendix F for Vulnerability Map.**

	Department	Total Permanent Employees
1	Administration	15
2	Fire/ Police Department	7
3	Sewage Treatment Plant	1
4	Water Treatment Plant	50

Ordinances and Regulations

1	State Building Codes
2	Subdivision Regulations
3	Flood Damage Prevention Ordinance
4	Zoning Regulations

Town of Lillington
Worksheet #1: Hazard Identification and Analysis
NFIP member since September 4, 1986

Type of Hazard & Associated Elements	**Likelihood of Occurrence** (Highly Likely, Likely, Possible, Unlikely)	**Intensity Rating** (Intensity Scales or Relative Terms)	**Impact** (Catastrophic, Critical, Limited, Negligible)	**Conclusions** (Rank the seriousness of the hazard)
Hurricane	Highly Likely	Category 2	Critical	1
Thunderstorm (Hail/ Wind)	Highly Likely	Severe/Moderate	Limited	2
Winter storm	Likely/Possible	Moderate	Limited	5
Tornado	Possible	F2	Critical	4
Wildfire	Likely	Moderate	Limited	7
Flooding (including flash Floods)	Likely	Moderate/Severe	Limited/ Negligible	6
Drought	Possible	Moderate	Negligible	8

Town of Lillington
Worksheet #2: Geographic Planning Area Vulnerability Assessment

Current Conditions				Potential Future Conditions		
Type of Development	**Number of Existing Private Buildings**	**Current Value**	**Current Number of People**	**Projected Number of Private Buildings**	**Projected Value**	**Projected Number of People**
Single family Residential	886	$45,724,707	1,750	972	$50,297,177	1,925
Multi-Family Residential	98	$5,080,523	317	147	$7,620,785	475
Commercial	109	$23,303,200	1,199	136	$29,129,000	1,499
Industrial	7	$13, 851,000	324	9	$17,313,750	406
Prison	TBD	TBD	TBD	TBD	TBD	TBD
Subtotal	1100	$87,960,430	4,440	1264	$104,360,712	4,305

Note: All approximate values correspond to all our addressed hazards and are based on best available information. As resources, funding, & time become available we hope to utilize a specifically designed loss estimation software to advance these assessments.

Town of Lillington
Worksheet #2: Geographic Planning Area Vulnerability Assessment

Continued from previous page…….

Public Buildings and Critical Facilities						
Current Conditions				**Potential Future Conditions** (next 5 years)		
Type of Facility	**Number of Existing Public Buildings and Critical Facilities**	**Current Replacement Value**	**Current Number of People**	**Projected Number of Public Buildings and Critical Facilities**	**Projected Replacement Value**	**Projected Number of People**
Lillington Municipal Government Offices	3	$1,229,237	15	3	$1,229,237	15
Lillington Elementary School	4	$5,402,403	300	4	$6,626,866	N/A
STAR Academy	1	$1,066,933	60	1	$1,236,868	60
Shawtown Primary School	1	$5,091,004	300	1	5,908,869	N/A
Lillington/ Shawtown Elementary School	N/A	N/A	N/A	1	N/A	600
Other School Board Buildings	8	4,076,110	110	6	4,725,474	80
Subtotal	17	$16,869,992	785	16	$18,917,312	755

Town of Lillington
Worksheet #2: Geographic Planning Area Vulnerability Assessment

Continued from previous page……..

Public Buildings and Critical Facilities						
Current Conditions				**Potential Future Conditions** (next 5 years)		
Type of Facility	**Number of Existing Public Buildings and Critical Facilities**	**Current Replacement Value**	**Current Number of People**	**Projected Number of Public Buildings and Critical Facilities**	**Projected Replacement Value**	**Projected Number of People**
Sewage Treatment Plant	1	$1,700,000	1	1	$3,000,000	6
Water Treatment Plant	1	$15,265,000	50	1	$16,000,000	55
Infrastructure	N/A	$32,000,000	N/A	N/A	$35,000,000	N/A
Municipal Police/Fire Station	2	$800,000	7	3	$1,500,000	10
County Government Offices	8	$17,500,000	124	9	$17,500,000	150
County Sheriff's Building	1	$3,259,000	65	1	$3,259,000	65
Subtotal	13	$70,524,000	247	15	$76,259,000	286
Total	1,130	$175,354,422	5,472	1,295	$199,537,024	5,346

Town of Lillington
Worksheet #3: Community Capability Assessment

Policies, Practices, Programs, Regulations, and Activities (existing and potential)	**Document Reference**	**Effectiveness for Mitigation** (high/medium/low/not effective)	**Rationale for Effectiveness**
Zoning Ordinance	Numerous	High	▪ Proper Land Use ▪ Fire Protection Standards ▪ Minimum Housing Standards ▪ Good Density Standards
Subdivision Ordinance	Numerous	High	▪ Setback Standards ▪ Density Standards ▪ Storm Water Standards ▪ Fire Protection Standards ▪ Environmental Protection Standards
Flood Damage Protection Ordinance	Numerous	High	▪ Development Permit ▪ Provides for Flood Hazard Reduction ▪ Construction Standards ▪ Construction Material and Method Standards

Town of Lillington
Worksheet #5: Geographic Planning Area Policies

Policy	Type of Mitigation Strategy	Types of Hazard This Policy Will Target	Funding	Responsible Party/ Start and Completion Dates	Benchmarks and Indicators of Progress
Zoning Ordinance	Property Protection Natural Resource Protection Public Information	Flood (Hurricane) Lightning	General Fund	Town Manager	
Subdivision Ordinance	Preventative Natural Resource Protection Public Information	Flood (Hurricane)	General Fund	Town Manager	
Flood Damage Protection Ordinance	Preventative Property Protection Public Information	Flood (Hurricane)	General Fund	Town Manager	

Appendix F

Maps

Appendix G

Repetitive Loss Properties

Due to privacy issues, this information is contained within a separate document at the City of Dunn Planning Department and at the North Carolina Division of Emergency Management Hazard Mitigation Section office. Its use is protected under the privacy act of 1974, 5 U. S. C. section 552(a).

Appendix H

Citizen Input

Harnett County Hazard Mitigation Meeting Log*#

09-07-01 Kick-off Meeting with Harnett County Departments.

10-02-01 Briefed the Harnett County Planning Board on Hazard Mitigation presented a power point provided by NCEM and provided them with supporting information. *(public meeting)*

10-10-01 Met with Town of Erwin, Angier, and Dunn to introduce Hazard Mitigation Plan and to offer them the opportunity to join the County plan.

1-17-02 Met with all the Towns for 1st work session

2-13-02 Met with Clenton Smith, Town of Coats

2-18-02 Met with Kenneth Fail, Town of Erwin

2-28-02 Met with all the Towns work session

3-8-02 Met with all the Towns work session

3-22-02 Met with all the Towns work session

3-30-02 Met with Emergency Management Personnel in order to finalize hazard events for the county.

4-30-02 Updated Harnett County Planning Board on the progress of the Hazard Mitigation Plan

5-20-02 Briefed the Harnett County Board of Commissioners on Hazard Mitigation presented a power point provided by NCEM and provided them with supporting information. *(public meeting)*

5-21-02 Met with all the Towns work session

3-26-03 Met with Bob Greback, Town of Lillington

3-26-03 Met with Clenton Smith, Town of Coats

3-28-03 Met with Coley Price, Town of Angier

3-22-03 Met with all Towns in a work session

3-28-03 Met with Clenton Smith and Fred Robinson, Town of Coats.

3-29-03 Met with Coley Price, Town of Angier

2-24-04 County Planning Department meeting regarding initial NCEM review *(public meeting)*

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* This is not a conclusive list but a work in progress, this list will be updated as other meetings and updates continue to occur.

Public notices for a public hearing shall be published in a newspaper of general circulation in the County at least once each week for two successive weeks prior to public hearing. This applies to the municipalities as well.

3-2-04 County Planning Department meeting regarding changes to the plan

4-12-04 Called municipalities about plan review.

8-16-04 The Town of Erwin Planning Board met to review the plan and recommend adoption by Town Commissioners. *(public meeting)*

9-2-04 The Town of Erwin Board of Commissioners met to adopt the plan. *(public meeting)*

9-2-04 The City of Dunn Board of Commissioners met to adopt the plan. *(public meeting)*

9-7-04 The Town of Angier Board of Commissioners met to adopt the plan. *(public meeting)*

9-7-04 Harnett County Planning Board met to review the plan and recommend adoption by the County Commissioners. *(public meeting)*

9-9-04 The Town of Coats Board of Commissioners met to adopt the plan. *(public meeting)*

9-20-04 The Harnett County Commissioners met to adopt the plan. *(public meeting)*

10-12-04 The Lillington Town Board **will meet** to adopt the plan. *(public meeting)*

Local Business and Academia

In an effort to include local business, academia, and nonprofits the following was sent to several locations:

> To Whom It May Concern:
>
> Currently the Harnett County Planning Department is working on the completion of the countywide Hazard Mitigation Plan. This plan is designed to help the county prepare for natural hazards, such as, hurricanes, flooding, thunderstorms, winter storms, tornadoes, and so on. The state has requested that local businesses and academia be informed and included with the process.
>
> Enclosed is a questionnaire that will help us identify where our businesses and/or schools help or impede hazard mitigation. Your assistance in a timely manner will be greatly appreciated. Please feel free to call us if you have any questions. Again thank you for you time.
>
> Thank you,
> Jennifer Feltis and Jay Sikes
> Harnett County Planning Department
> jsikes@harnett.org

The following questionnaire was sent to local businesses and academia:

Hazard Mitigation Questionnaire for Local Businesses and Academia

1) Do you have an emergency plan in the event of a natural hazard (hurricanes, flooding, thunderstorms, winter storms, tornadoes, etc.)?
2) Has your company planned ahead/ safeguarded for a natural hazard?
3) Do you have an inclement weather plan? If so, please explain.
4) Has your business been affected by recent and/or past natural hazard events? If so, how?
5) Are your employees/ students local? How does this affect your business if you have several commuting employees?
6) Is there anything you feel the county needs to do as far as mitigation (safeguarding against natural hazards) is concerned?

Please feel free to send any additional information that will aid us with developing a superior countywide Mitigation Plan.

Local schools were the first to respond to the questionnaire. With the latest winter storm fresh on their minds, our desire to include them gave them a chance to review their natural hazard policies. They mentioned the winter storm and Hurricane Isabel as examples of when they used their emergency plans. The National Weather Service, Emergency Management Service, Highway Patrol, and the Harnett County Sheriff's Department all aid in the decision making process in the event of a hazard. Of the utmost concern for these schools is the safety of their students and staff, which is secondary to loss of school days. Local academia and businesses choose to close in order to keep their students and/or staff off of the hazardous roads or out of hazardous weather conditions. In the event of an unexpected natural hazard, such as a tornado or other event, each has an emergency plan in effect to keep students and/or staff safe. Suggestions from those who replied back were to keep local businesses and academia informed about mitigation efforts and to continue to help clear main and secondary roads after a natural hazard. Some even mentioned that they were in the process of updating their existing safety plans.*

On several occasions, we did not receive replies in our attempts to gather comments from other entities. Also, during the advertising of each public hearing, neighboring communities, local businesses, and non-profit organizations were again invited. However, the information we did receive was quite useful in formulating our goals and objectives.

Appendix I

Population Demographics

Population Demographics

Population Summary

Total Population	91,025
Total Households	33,800
Population in Households	88,138
Average Household Size	2.61
Total Families	24,107
Population in Families	74,040
Average Family Size	3.07

Source: US Census

Population Characteristics

% of Population by Age	
Total Population	91,025
0 - 17 Years	27.0%
18 - 24 Years	10.6%
25 - 44 Years	32.1%
45 - 64 Years	19.9%
65 + Years	10.4%
Median Age	32.5

Source: US Census 2000 / RTRP Data Book

Population by Township

Township	Population
Anderson Creek	11,137
Averasboro	12,882
Barbecue	9,257
Black River	8,120
Buckhorn	1,935
Duke	5,921
Grove	9,623
Hector's Creek	3,635
Johnsonville	6,927
Lillington	4,622
Neill's Creek	5,829
Stewart's Creek	3,478
Upper Little River	7,659

Source: US Census 2000

Educational Attainment

Persons 25 or Older	Harnett County	Wake County	Cumberland County
Less than 9th grade	4,693 / 8.2%	15,158 / 3.8%	8,389 / 4.7%
9th to 12th grade, no diploma	9,578 / 16.8%	27,928 / 6.9%	18,137 / 10.3%
High school graduate	18,653 / 32.6%	71,648 / 17.8%	50,122 / 28.4%
Some college, no degree	12,589 / 22.0%	80,950 / 20.1%	49,846 / 28.2%
Associate degree	4,327 / 7.6%	30,768 / 7.6%	16,451 / 9.3%
Bachelor's degree	5,347 / 9.4%	119,389 / 29.6%	23,232 / 13.1%
Graduate or professional degree	1,951 / 3.4%	57,640 / 14.3%	10,537 / 6.0%
Total	57,138 / 100%	403,481 / 100%	176,714 / 100%
% high school graduate or higher	75.0%	89.3%	85.0% %
% bachelor's degree or higher	12.8%	43.9%	19.1%

Source: US Census 2000

Per Capita Income

Jurisdiction	1990	1995	1996	1997	1998	1999	2000
Harnett County	13,404*	17,119	17,622	18,565	19,383	19,705	19,781
Raleigh-Durham MSA	20,759	25,900	27,069	28,758	30,525	32,054	32,537
Fayetteville MSA	15,141	20,945	22,205	23,088	24,186	25,285	24,899
North Carolina	17,367	21,938	22,940	24,189	25,452	26,417	26,882
United States	10,584	23,562	24,651	25,874	27,321	28,546	29,469

(2000 Census Data in Current Dollars)
Source: US Census 2000

Average Annual Pay

Area	1997	1998	1999	2000
Harnett County	21,164	22,170	22,896	23,806
Raleigh-Durham MSA	30,919	32,824	34,823	37,785
Fayetteville MSA	23,545	24,491	25,123	26,112
North Carolina	26,684	28,176	29,462	31,068
US Total	30,353	31,945	33,340	35,323

Source: US Department of Labor

Transportation Patterns

Transportation Pattern	%
Percent of population driving greater than 30 minutes to work	45.3%
Number of residents driving greater than 30 minutes to work	18,061
Mean travel time to work (in minutes)	29.2

Source: US Census Bureau, Census Transportation Planning Package 2000

House Hold Income

Geographical Area	Less than 10,000	10,000-14,999	15,000-24,999	25,000-34,999	35,000-49,999
Harnett County	4,360	2,453	5,160	4,893	6,215
Cumberland County	10,502	16,776	15,354	16,411	22,114
Wake County	13,269	8,725	22,216	26,989	37,364
Raleigh-Durham MSA	8,113	5,154	12,758	14,896	19,062
Fayetteville MSA	5,566	3,274	6,845	7,387	9,522
North Carolina	328,770	201,123	431,701	435,975	553,041
United States	10,067,027	6,657,228	13,536,965	13,519,242	17,446,272

Continued…….

Geographical Area	50,000-74,999	75,000-99,999	100,000-149,999	150,000-199,999	250,000 or more
Harnett County	6,431	2,496	1,258	232	339
Cumberland County	20,851	8,596	4,568	1,126	1,093
Wake County	52,077	33,970	31,305	9,040	7,178
Raleigh-Durham MSA	23,007	13,262	10,843	3,081	2,551
Fayetteville MSA	8,490	3,636	2,388	618	673
North Carolina	608,777	279,020	188,621	50,650	50,604
United States	20,540,604	10,799,245	8,147,826	2,322,038	2,502,675

(2000 Census Data in Current Dollars)
Source: US Census 2000

Appendix J

Adoption Resolutions & Letters

References

Harnett County, North Carolina Updated Land Use Plan. September 7, 1999.

Harnett County, North Carolina Zoning Ordinance. June 5, 2000.

Harnett County, North Carolina Revised Subdivision Ordinance. April 2, 2001.

Harnett County, North Carolina Water Supply Watershed Management and Protection Ordinance. November 15, 1993.

Harnett County, North Carolina. Flood Damage Prevention Ordinance. September 18, 1995.

Federal Emergency Management Agency. 1995. *The National Mitigation Strategy: Partnerships for Building Safer Communities*. Washington, D.C.

Federal Emergency Management Agency. 1999. *National Flood Insurance Program CRS Coordinator's Manual, 1999 Edition. Washington, D.C.*

Guiding Principles for the Quality Redevelopment of Eastern North Carolina. Produced by the North Carolina Division of Emergency Management, 10 min. videocassette.

National Oceanic and Atmospheric Administration. National Hurricane Center. 13 February 2001. http://www.nhc.noaa.gov.

National Climatic Data Center. 5 February 2001. *Storm Events.* http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

North Carolina Department of Crime Control and Public Safety, Emergency Management Division. 1999. *Hazard Mitigation Successes in the State of North Carolina.* Raleigh.

North Carolina Department of Environment, Health and Natural Resources. Division of Environmental Management Groundwater Section. *Protecting Local Underground Water Supplies: The North Carolina Wellhead Protection Guidebook*. 1995. Edited by L. Smutko, L. Danielson, and G. Jennings.

North Carolina Division of Emergency Management and Federal Emergency Management Agency. *Hazard Mitigation in North Carolina: Measuring Success.* Raleigh.

North Carolina Division of Emergency Management and the Hazard Mitigation Planning Clinic. 1998. *Local Hazard Mitigation Planning Manual.*

North Carolina Division of Emergency Management and the Hazard Mitigation Planning Clinic. 1998. *Tools & Techniques: Putting a Hazard Mitigation Plan to Wo*rk.

North Carolina Division of Emergency Management and the Hazard Mitigation Planning Clinic. 2000. *Keeping Natural Hazards from Becoming Disasters.*

North Carolina, Hertford County. Hertford County Emergency Operation Plan. 16 March, 1992.

North Carolina State Climactic Office. 5 February 2001. http://www.nc-climate.ncsu.edu/sco.

State of North Carolina. 5 February 2001. *North Carolina Mapnet.* http://www.ncmapnet.com.

U.S. Army Corps of Engineers, Mobile District, Operations Division Readiness Branch. 7 February 2001. *Saffir-Simpson Scale for Hurricane Classification.* http://www.sam.usace.army.mil/op/opr/hurrclss.htm.