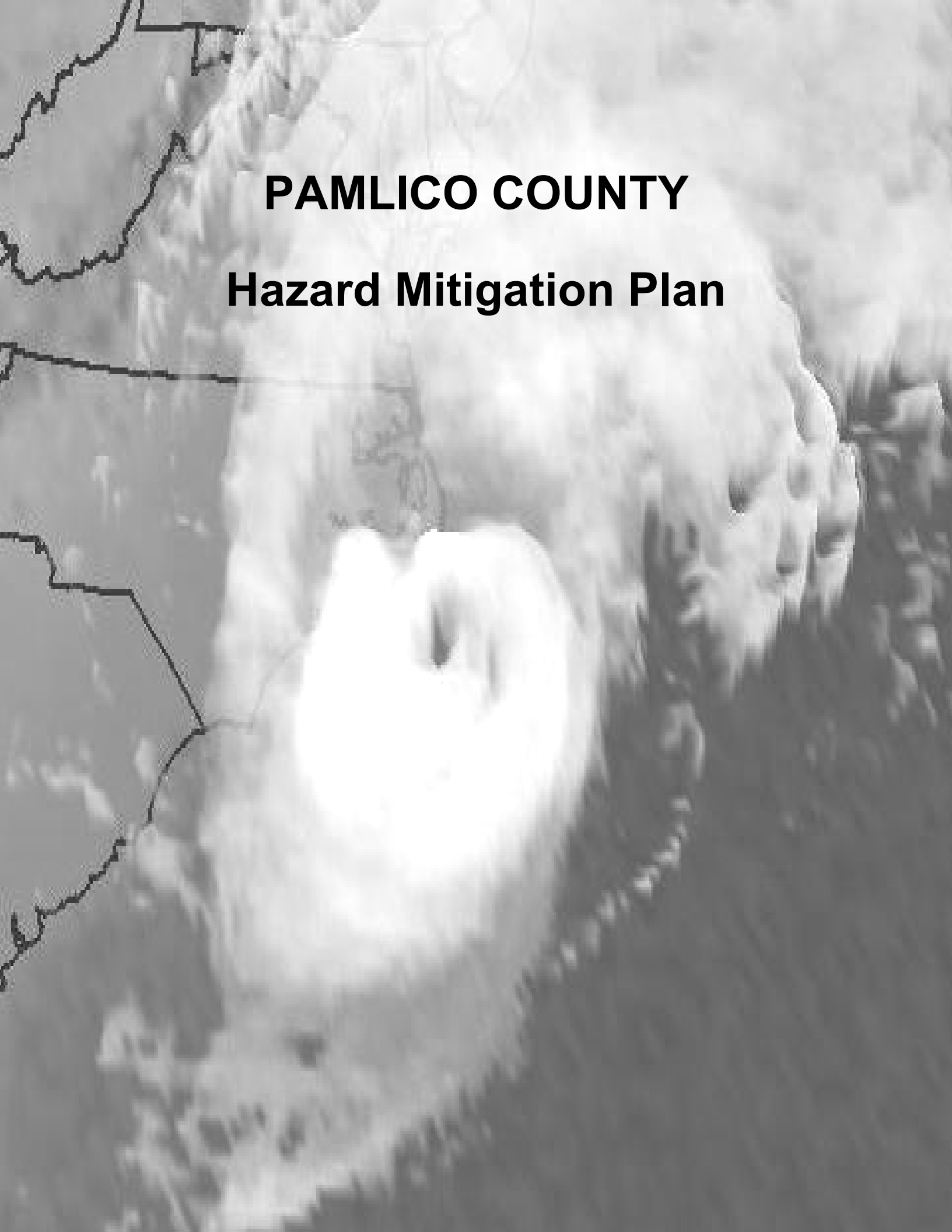

PAMLICO COUNTY

Hazard Mitigation Plan

Pamlico County Hazard Mitigation Plan

Adopted by the Pamlico County Commissioners on
June 21, 2010

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EXECUTIVE SUMMARY

This document is the Pamlico County Hazard Mitigation Plan. It has been prepared to meet the requirements of the federal government's Stafford Act as amended by the Federal Disaster Mitigation Act of 2000 (DMA2K). North Carolina Senate Bill 300 requires local hazard mitigation plans to be in compliance with the federal legislation. Senate Bill 300, passed by the NC Legislature in the summer of 2001, required local governments to have an approved and locally adopted hazard mitigation plan in place by August 1, 2002 in order to be eligible for state disaster funds to remedy disasters that occur after August 1, 2002. Additionally, the Disaster Mitigation Act of 2000 passed by the US Congress and signed into law by the President, required local governments to have a FEMA-approved and locally adopted hazard mitigation plan in place by November 1, 2004 in order to be eligible for federal disaster funds. This document is an updated version of the plan adopted in 2004.

Pamlico County is vulnerable to coastal flooding, high winds, winter ice and snow storms and wildfire. This document identifies the vulnerability of Pamlico County and its municipalities to these natural hazards and sets goals to mitigate damage. **It is the intent of the plan to meet all requirements of the Federal Disaster Mitigation Act of 2000 (DMA2K) for Pamlico County and its municipalities in regard to hazard mitigation planning requirements.**

Each municipality will formally adopt this multi-jurisdictional planning document. In addition to adopting this countywide approach to hazard mitigation, each municipality has a separate action plan, establishing goals for their jurisdiction.

Mission Statement

> *Pamlico County, through hazard mitigation planning, seeks to maintain or lower the community's flood insurance rating, qualify for future disaster funding, identify potential problems, minimize repetitive losses, and educate the public on Pamlico County's vulnerability to natural hazards.*

Goals, Objectives, and Actions

The plan *goals* describe the overall direction that Pamlico County can take to minimize the impacts of natural hazards. The goals are stepping-stones between the broad direction of the mission statement and the specific recommendations that are outlined in the action items.

Mitigation objectives are designed to support and correspond directly with the goals established in the previous subsection. These objectives were established to provide Pamlico County with some measurable, mid-range benchmarks (2-5 years).

The *action items* are a listing of activities the County and the citizens can be engaged to reduce risk.

Goal 1: Improve Pamlico County's fiscal and operational capabilities to adequately mitigate the effects of natural hazards.

Goal 2: Enhance existing or implement new County policies that will reduce susceptibility to natural hazards without conflicting with other community goals.

Goal 3: Protect Pamlico County's buildings, critical facilities, and infrastructure through the implementation of cost-effective and technically feasible mitigation projects.

Goal 4: Promote public health, safety, and welfare by increasing the public awareness of existing hazards and fostering individual and public responsibility in mitigating risks due to those hazards.

Monitoring, Evaluating and Updating the Plan
Implementation of the activities recommended by this plan will be monitored so the deadlines will be met. Where possible, each activity should be monitored in terms of dollar value of its flood loss reduction benefits.

The Pamlico County Planner will be responsible for the tracking the activities outlined in this plan. Each person assigned a responsibility in this plan shall report to the Pamlico County Planner by the last day of each quarter (March 31, June 30, September 30, December 31). The Pamlico County Planner will report to the County Commissioners once each year, on the first week of hurricane season (June 1st). The report should review progress and recommend changes as needed.

If changes are necessary, the Hazard Mitigation Planning Committee will reconvene during the first week of June to receive a presentation on the progress of the plan. If convened, the Hazard Mitigation Planning Committee will prepare an evaluation report that will be submitted to the County Commissioners.

Implementation through Existing Programs
Pamlico County will incorporate the hazard mitigation goals and actions into other policy statements, and will address conflicts with other policies where possible. As with any planning process, the Hazard Mitigation Plan will be referenced when developing or updating other planning documents, such as the CAMA Land Use Plan and any other official documents regarding land use and emergency management.

Continued Public Involvement
Pamlico County is dedicated to involving the public directly in review and updates of the Hazard Mitigation Plan. Any amendment to the Hazard Mitigation Plan must be made by the County Commissioners. A public hearing will be required before any consideration of an amendment to the plan can be made. Pamlico County's current outreach methods will be used to disseminate hazard mitigation information to citizens and property owners.

SECTION 1: INTRODUCTION

North Carolina faces extreme hazard and consequence from natural hazards. Between 1989 and 2000, there were 14 federally declared disasters. Damages from Hurricane Floyd alone reached $3.5 billion. With Hurricane Floyd, 4,117 uninsured and under-insured homes were destroyed. The State's vulnerability to natural hazards makes it crucial that communities and property owners have accurate, up-to-date information about the risk.

Natural hazards, such as floods, hurricanes, tornadoes, winter storms, earthquakes, wildfires, and other hazardous natural events occur every year and are an essential component of the earth's natural systems. These events damage the ecological environment, but the natural environment possesses remarkable recuperative capabilities, restoring plant and animal habitat in a short time.

The built, or manmade, environment does not possess these recuperative capabilities. When these natural hazards interact with the built environment, disasters occur. The frequency of disasters is increasing, not necessarily because natural hazards are occurring more frequently, but as the result of more people living in harm's way. Since the 1960's, increasing numbers of people are choosing to live and work in and visit areas at risk from coastal storms and repetitive flooding. By 2010, the number of people living in hurricane-prone counties will likely double (*Local Hazard Mitigation Planning* Manual. 1998). this realization makes it imperative that coastal and riverine communities undertake floodplain management and hazard mitigation.

This document is Pamlico County's Hazard Mitigation Plan. It has been prepared to meet the requirements of the federal government's Stafford Act as amended by the Federal Disaster Mitigation Act of 2000 (DMA2K). North Carolina Senate Bill 300 requires local hazard mitigation plans comply with the federal legislation. Senate Bill 300, passed by the NC Legislature in the summer of 2001, required local governments to have an approved and locally adopted hazard mitigation plan in place by August 1, 2002 in order to be eligible for state disaster funds to remedy disasters that occur after August 1, 2002. Additionally, the Disaster Mitigation Act of 2000 passed by the US Congress and signed into law by the President, required local governments to have a FEMA-approved and locally adopted hazard mitigation plan in place by November 1, 2004 in order to be eligible for federal disaster funds.

The County is vulnerable to coastal flooding, high winds, winter ice and snow storms and wildfire. This document identifies Pamlico County's vulnerability to several natural hazards and sets goals to mitigate damage from these hazards. The planning process includes problem perception, definition, assessment, solution / mitigation alternatives, strategy, goals, objectives, and establishing performance measurement tools for implementation.

Each municipality will formally adopt this multi-jurisdictional planning document. In addition to adopting this countywide approach to hazard mitigation, each municipality has a separate action plan, establishing goals for the jurisdiction.

It is the intent of this plan to meet all requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2K) for Pamlico County and the municipalities of Bayboro, Grantsboro, Alliance, Stonewall, Oriental, Mesic, Vandemere, Arapahoe, and Minnesott Beach in regard to hazard mitigation planning.

Why Develop a Mitigation Plan?
Planning is one of the best ways to anticipate and mitigate the destructive impact of identified hazards. The objective of planning is to produce a program of activities that will best tackle the community's hazard problems and meet other community needs. A well-prepared plan will guide a community's development efforts so that they are implemented more economically and in ways more attuned to the needs and objectives of the community and its residents. A well-prepared and executed plan should result in reduced hazard losses. Risks not eliminated or mitigated through construction techniques have traditionally been offset through insurance (flood, wind, and fire). However, the magnitude of losses faced by the insurance industry in recent years and resulting policy premium increases warrants reevaluation of the balance of risk to be insured against.

Originally, this document was prepared to qualify as a "Floodplain Management Plan" to be credited by Insurance Services Office (ISO) Community Rating System (CRS) program of the National Flood Insurance Program (NFIP). The NFIP provides federally supported flood insurance in communities that regulate development in their floodplains. The CRS reduces flood insurance premiums in those communities that do more than implement the minimum regulatory requirements. Pamlico County participates in the NFIP and is currently certified under the CRS as a Class 9 Community. The County has developed this plan in order to limit life and property losses due to a major flood. Additional credit is provided if the activities are implemented based on a floodplain management plan that meets the criteria in Section 511 of the *CRS Coordinator's Manual*. The approach selected for preparing this plan was taken from Section 511 and some of this plan's section headings coincide with Section 511's headings.

Since then, there have been state and federal requirements placed on municipalities and counties regarding hazard mitigation. This planning document strives to meet those requirements.

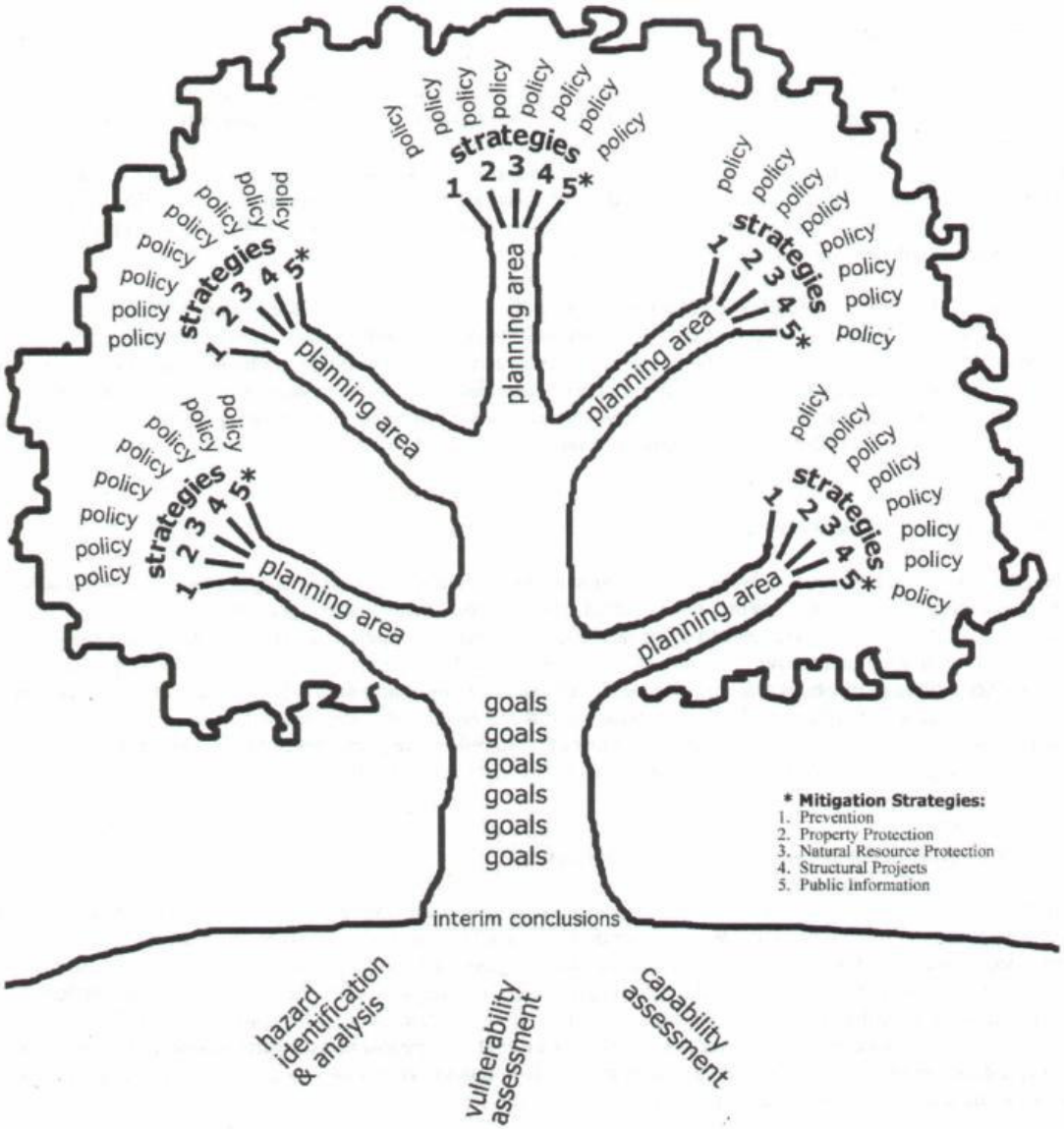
Plan Methodology
Planning is one of the best ways to correct shortcomings associated with natural hazards. The objective of planning is to produce a program of activities that will best tackle the community's problems with hazards and meet other community needs. A well-prepared plan will guide a community's hazard mitigation activities so that they are implemented more economically and in ways more attuned to the needs and objectives of the community and its residents.

A hazard mitigation plan, one that is carefully researched to reflect local needs and conditions, can provide many benefits to a community. This is especially true of plans that are prepared in advance of a hazard event, not in the aftermath of a disaster. Many communities have engaged in mitigation activities on a project-by project basis by incorporating such projects into the context of a comprehensive plan that considers multiple aspects of the community. A local government can avoid the often inconsistent and uncoordinated results of this ad hoc approach to mitigation by developing a mitigation plan. A local hazard mitigation plan can be effective for establishing the community's commitment to mitigation goals, objectives, policies and programs. By articulating what the community hopes to achieve, the plan can serve to establish an important connection between the public interest and mitigation measures to be employed.

Description of the Planning Process

In order to help the reader visualize the nature of the planning process, a "mitigation planning tree" is used. By comparing the planning process to a living, growing being, emphasizes is placed on the interrelationships between each step and the dynamism of the final plan itself. Each step is designed to be supported by the previous step, and in turn, provides support for the next. Some of the steps in the planning process are "root" steps. These essential analytical steps provide the necessary background data and justification for the action part of the plan. Next, the "ground" level steps will be pursued, followed by the "branch" steps, or actions and policies.

Figure 1. Planning Tree



This plan has been drafted using the guidelines and recommendations promulgated by both the North Carolina Emergency Management Division (NCEM) and the Federal Emergency Management Agency (FEMA). The essential planning steps are:

Identify the hazards - The first of the "root" steps requires the community to identify the natural hazards that affect the area and analyze them in terms of likelihood, magnitude, and potential impact.

Assess vulnerability of people and property – The next "root" step is made up of multiple tasks, or sub-steps, that helps the community to assess the vulnerability to the hazards

identified in Step 1. During the vulnerability assessment, the areas within the community where the hazards are likely to occur will be identified.

Assess community capability – The final "root" step asks Pamlico County to assess the community's current mitigation practices, as well as its potential to engage in mitigation activities. While few communities in North Carolina have a dedicated mitigation strategy, most do have policies that affect construction and land-use in hazard-prone areas.

Form interim conclusions – At this level, the County has established a strong root system that identifies the problems Pamlico County faces, where those problems are located, and the tools at the County's disposal to address them. Step 4 gives the community an opportunity to look at these background analyses and determine whether or not it should move forward with the planning process.

Establish values and goals – Pamlico County now determines how mitigation fits into the community's vision of its future, and formulates goal statements to express that vision. Picture the goal statements as forming the "trunk" of the Mitigation Planning Tree. The goals and values are the central supporting element of the entire plan – they shape and determine all the mitigation policies that will be created as a result of the plan.

Set policy selection criteria – Current and potential policies will be examined by: 1) Effectiveness; and 2) Cost. Effectiveness will be determined by the perception of the Hazard Mitigation Plan Committee as High, Medium, or Low. Cost will be determined by the Committee and rated as High, Medium, or Low. The cost will be the expense of implementation and administration to the community.

Formulate mitigation strategies and policies – Step 7 is where all the previous steps have been leading up to. The mitigation policies are the "branches" of the Mitigation Planning Tree. The policies will put into action the goals established for reducing vulnerability.

Preparation of the final plan – The draft plan will be assembled and meet all minimum requirements of a Floodplain Management Plan that meets Section 510 of the Community Rating System as required by the National Flood Insurance Program. The plan will also meet all minimum requirements of Senate Bill 300 and keep Pamlico Count eligible for state public assistance funds, effective for state-declared disasters after August 1, 2002. Also, this plan will meet requirements of the Disaster Mitigation Act of 2000, passed by the US Congress and signed into law by the President.

Assign implementation responsibilities – Each action step outlined in the plan will be assigned to an individual or a County department. A 5-year implementation schedule is included for every action step.

Establish procedures for monitoring, evaluation, and reporting progress – An effective plan is dynamic and evolving. A community must periodically monitor its implementation, evaluate its effectiveness, and report on the progress of the plan.

Establish procedures for revisions and updates – This step calls for establishing procedures to see that the annual evaluation report results in revisions and updates of the plan, when warranted.

Purpose of the Plan

This hazard mitigation plan assesses Pamlico County's current natural hazard risk and sets forth goals and schedules for 2004 and beyond to eliminate, reduce, and mitigate this risk. After conducting a few meetings, the committee developed a mission statement, or purpose for the plan. The purpose of this plan is:

Pamlico County, through hazard mitigation planning, seeks to maintain or lower the community's flood insurance rating, qualify for future disaster funding, identify potential problems, minimize repetitive losses, and educate the public on Pamlico County's vulnerability to natural hazards.

This document is Pamlico County's Hazard Mitigation Plan. It is prepared to guide policy in the County's vulnerable areas and to assist state and federal funding efforts. This document has also been prepared to qualify as a "floodplain management plan" to be credited under the Community Rating System (CRS) of the National Flood Insurance Program (NFIP).

Pamlico County participates in the NFIP and is certified under the CRS. The NFIP provides federally supported flood insurance in communities that regulate development in their floodplains. The CRS reduces flood insurance premiums in those communities that do more than implement the minimum regulatory requirements. The County has developed this plan in order to limit life and property losses due to a major flood.

Additional credit is provided if the activities are implemented based on a floodplain management plan that meets the criteria in Section 511 of the *CRS Coordinator's Manual*. The approach selected for preparing this plan was taken from Section 511 and this plan's section headings coincide with Section 511's headings.

The benefits of hazard mitigation planning are:

Saves lives and property – Pamlico County can save lives and reduce property damage from natural hazards through mitigation actions, such as moving families and their homes out of harm's way.

Reduces vulnerability to future hazards – By having a mitigation plan in place, Pamlico County is prepared to take steps that will permanently reduce the risk of future losses. This opportunity is often lost when we build communities without regard to natural hazards or when we rebuild them after a disaster "just like they were before."

Saves money – Pamlico County will experience cost savings by not having to provide emergency services, rescue operations, or recovery measures to areas that are dangerous to people in the event of a hazard.

Facilitates post-disaster funding – By identifying and ranking projects before the next disaster, Pamlico County is in a better position to obtain post-disaster funding because much of the background work necessary for applying for federal and state aid will already be done.

Speeds recovery – By developing a mitigation plan, Pamlico County can identify post-disaster mitigation opportunities in advance of a disaster. By having this strategy in advance, Pamlico County can be ready to respond quickly after a disaster.

Demonstrates commitment to improving community health and safety – A mitigation strategy demonstrates a community's commitment to safeguarding its citizens and protecting its economic, social, and environmental well-being.

Who Was Involved

The North Carolina Division of Community Assistance provided Pamlico County with professional planners to draft this plan, with input from a planning committee, the Hazard Mitigation Planning Committee, established by the Pamlico County Commissioners. All towns in the County were notified of the planning meetings and encouraged to attend. The Hazard Mitigation Planning Committee membership included:

Bronte Jones, Citizen, Bayboro
Jerry Prescott, Citizen, Grantsboro
Barbara Baker, Deputy Town Clerk, Bayboro
Mark Howell, Town of Bayboro, Bayboro
Josh Potter, Mayor, Minnesott Beach
Jayne Robb, Pamlico County Planner
David Spruill, Pamlico County Emergency Management
Tim Buck, Pamlico County Manager
Ron Kilburn, Citizen, Oriental
Nick Santoro, Citizen, Merritt
Wyatt Cutler, Town Manager (retired), Oriental
Booker T. Jones, Mayor, Mesic
Pat Prescott, Town Clerk, Grantsboro
Skip Lee, Pamlico County Building Inspector
Amy Spruill, Pamlico County Floodplain Coordinator
Miriam Prescott, Pamlico County GIS Coordinator

In addition to being invited to all meetings, each individual town updated and revised the draft section of the plan pertaining to their respective jurisdictions, with the assistance of the North Carolina Division of Community Assistance. These draft action plans were developed to meet the state requirements of Senate Bill 300. These draft plans were adopted locally and they were incorporated into this planning document.

Each municipality participated in the drafting of this document by: 1) developing draft action plans; and 2) being invited to participate in the County's multi-jurisdictional hazard mitigation plan. No attendance policy was implemented at the plan's committee meetings.

All decisions and recommendations of the Plan Committee were accomplished through reaching consensus on the goals, objectives, and action items.

No subcommittees were formed to execute any particular tasks.

How the Public Was Involved
The Committee held five committee meetings, on November 5, 2008; December 3, 2008; January 7, 2009; February 4, 2009 and March 4, 2009, during the preparation of the plan update.

Elements of the public participation plan included:

- Holding two public information meetings on April 23, 2009 at 7:00 p.m. and April 27, 2009 at 7:00 p.m. to describe the planning process to interested citizens and listen to citizen suggestions and concerns.

- Copies of the Draft Hazard Mitigation Plan were made available at the Pamlico County Building Inspections Office for public review and;

- On June 7**,** 2010, and June 21, 2010 public hearings were held on the amended Hazard Mitigation Plan.

At the two public information meetings, the public was given the opportunity to contribute ideas and concerns about hazard mitigation activities in Pamlico County. Some significant ideas were offered, and some action items were generated or changed to address these comments. A cross-section of the community attended the public information meetings, including residents, business leaders, and government agency officials.

How Do I Use the Plan?
Each section of the mitigation plan provides information and resources to assist people in understanding Pamlico County and the hazard-related issues facing municipalities, citizens, businesses, and the environment. Combined, the sections of the plan work together to create a multi-jurisdictional document that guides the mission to reduce risk and prevent loss from future natural hazard events.

The structure of the plan enables people to use a section of interest to them. It also allows the County to review and update sections when new data becomes available. The ability to update individual sections of the mitigation plan places less of a financial burden on Pamlico County. Decision-makers can allocate funding and staff resources to selected pieces in need of review, thereby avoiding a full update, which can be costly and time-consuming. New data can be easily incorporated, resulting in a natural hazards mitigation plan that remains current and relevant to Pamlico County.

How will the County and Local Municipalities Use the Plan?
Pamlico County will maintain, review and revise this plan as it becomes necessary. The plan will be reviewed by County officials when progress is made in the implementation of the plan. Updated or revised mitigations strategies will be reviewed by the Pamlico County Hazard Mitigation Planning Committee at such times revision is deemed necessary and will be adopted and incorporated into the existing plan after pubic review and a public hearing.

County and Municipal officials will also refer to the plan when considering the development or amendment to any regulation or policy pertaining to the physical development of land in Pamlico County and the municipalities located within.

SECTION 2: COMMUNITY PROFILE

Why Plan for Natural Hazards in Pamlico County?

Natural hazards impact citizens, visitors, property, the environment, and the economy of Pamlico County. Flooding, hurricanes, nor'easters, wildfire, thunderstorms, tornadoes, heat waves, and coastal erosion have exposed Pamlico County's residents and businesses to the financial and emotional costs of recovering after natural disasters. The risk associated with natural hazards increases as more people move to areas affected by natural hazards. The inevitability of natural hazards, and the growing population and activity within the County create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future natural hazard events. Identifying risks posed by natural hazards, and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses can work together with the County to create a natural hazards mitigation plan that addresses the potential impacts of hazard events.

Geography and the Environment

Pamlico County, a peninsula reaching out into the Pamlico Sound, was formed from part of Craven County in 1872 and from parts of Beaufort County in 1874 and 1875. The County had a 2001 population of 12,934 permanent residents (North Carolina State Demographics). It has a total area of 562 square miles and is bordered by water: Upper Broad Creek forms the county's western boundary with Craven County; Goose Creek separates Beaufort County and Pamlico County; Pamlico Sound lies to the east; and the Neuse River to the south. Of the 562 square miles, only 337 square miles are land area.

The topography of Pamlico County is relatively flat with elevations ranging from sea level to 50 feet. The highest elevations are west of the beach ridge which is parallel to NC 306. In this area of the County, elevations range from 25 to 50 feet. The larger portion of the county lying east of the beach ridge has elevations from 1 to 25 feet with most of the elevations ranging from 2 to 15 feet.

Farming is an important source of income in Pamlico County. Grain, tobacco, potatoes, livestock, and poultry are currently the principal farm income sources. Commercial forestland occupies more land than any other land use in the County. Forestry, like agriculture, is another important source of income in the area.

Pamlico County's climate is characterized by mild winters and warm summers. The average annual temperature is approximately 64 degrees Fahrenheit. Average annual precipitation of the region is approximately 56 inches, with the heaviest rain usually occurring during the summer months.

Demographic Profile

In terms of populations, Pamlico County ranks 91st in the state with a current population of 12, 934 people. Most of the county's residents are widely dispersed throughout the

county, with a significant portion of the population living in and around the towns that are located along Highway NC 55. The average population density for the entire county is 39.09 people per square mile (NC Department of Commerce, Economic Development Information System).

Unlike many of North Carolina's counties, Pamlico County is not experiencing rapid population growth. North Carolina, between the years of 1990 and 2000, experienced an average population growth of 21%, while Pamlico County grew only at 14% during this same period.

There are reasons for Pamlico County's slower growth rate. First, there are limited employment opportunities within the county. This lack of opportunity has forced non-retired people to look elsewhere for a place to live and work. Secondly, while other areas have seen significant economic growth, Pamlico County remains rural and is isolated from mainstream shopping, medical facilities, and daily routines. This isolation has driven some residents to relocate to other areas where much needed goods and services are more easily accessible.

Table 1. Pamlico County Population Data

Subject	Number	Percent
Total Population	12,934	100
Sex and Age		
Male	6,513	50
Female	6,421	50
Under 5 years	643	5
5 to 9 years	728	5.6
10 to 14 years	833	6.9
15 to 17 years	522	4
18 and 19 years	245	1.9
20 years	103	0.8
21 years	105	0.8
22 to 24 years	373	2.9
25 to 29 years	671	5.2
30 to 34 years	724	5.6
35 to 39 years	926	7.2
40 to 44 years	1,016	7.9
45 to 49 years	971	7.5
50 to 54 years	991	7.7
55 to 59 years	848	6.6
60 and 61 years	327	2.5
62 to 64 years	479	3.7
65 and 66 years	353	2.7

Subject	Number	Percent
67 to 69 years	434	3.4
70 to 74 years	668	5.2
75 to 79 years	447	3.5
80 to 84 years	275	2.1
85 years and over	252	1.9
Median age (years)	42.9	
65 years and over	2,429	18.8
RACE		
White	9,384	72
Black or African American	3,167	24
Hispanic	342	2
American Indian and Alaska Native	66	0.005
Asian	49	0.003
Native Hawaiian / Pacific Islander	2	0.0001
Some other race	9	0.0007
Two or more races	86	0.006
HOUSEHOLD SIZE		
1-Person	1,294	25.0
2-Person	2,101	40.6
3-Person	820	15.8
4-Person	612	11.8
5-Person	251	4.8
6-Person	67	1.3
7 or more Person	33	0.6
YEAR STRUCTURE BUILT	6,781	100.0
1999 to March 2000	229	3.4
1995 to 1998	685	10.1
1990 to 1994	659	9.7
1980 to 1989	1,334	19.7
1970 to 1979	1,433	21.1
1960 to 1969	861	12.7
1940 to 1959	921	13.6
1939 or earlier	659	9.7

Source: US Census 2000 Summary File 1

Economic Profile

Pamlico County's rural population, combined with a lack of major transportation infrastructure, makes economic development more difficult than the more urban areas in

the state. Agriculture, commercial fishing, and forestry have been the traditional industries for many years, but their dominance is not as great as it once was. Although farming is still a big business in Pamlico County, many county residents have looked toward other economic sectors for employment.

During the year 2001, 4.6% were unemployed and looking for work. The government sector employs the largest number of county residents (30%), followed by service employment (25%) and retail trade (19%).

Table 2. Pamlico County Workforce by Industry (2001)

Industry	Number	Percent
Agriculture	110	3.6
Construction	196	6.5
Finance/Insurance/Real Estate	39	1.3
Government	917	30.4
Manufacturing	255	8.4
Retail Trade	583	19.3
Wholesale Trade	84	2.8
Service	743	24.6
Transportation/Communications/Public Util.	93	3.1
TOTAL WORKFORCE	3,020	100

Source: NC Department of Commerce, Economic Policy and Research Division, 2002

Although retail trade provides a large share of the local employment base, Pamlico County ranks 91st out of the state's 100 counties in gross retail sales for fiscal year 2000-2001, with $65,300,609. Pamlico County's largest manufacturers are all part of the seafood industry. *Garland Fulcher Seafood* in Oriental and *Diamond Shoal Seafood* in Oriental employ between 70-80 persons each, while *Fulcher's Point Pride Seafood* and *Normans Seafood* in Oriental employs around 50 persons each (*NC Department of Commerce, Economic Policy and Research Division, 2002)*.

In 2000, the county's per capita personal income was $22,788, which ranked 48th in the state. In 2002, the county's median family income was $45,500, which ranked 51st in the state (*NC Department of Commerce, Economic Policy and Research Division, 2002)*. The most recent poverty estimates indicate that 17.3% of Pamlico County residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

The North Carolina Department of Commerce classifies counties into one of five tiers, with Tier 1 representing the most economically disadvantaged and Tier 5 the most prosperous. Tiers 1, 2, and 3 are considered "distressed" based on various economic and demographic characteristics. Pamlico County is currently classified as a **Tier 2** county.

Distressed counties can access state-provided business incentive programs under the William S. Lee Quality Jobs and Business Expansion Act, and other agencies such as the North Carolina Rural Economic Development Center also use this tier system to determine eligibility for certain programs. Companies that choose to locate a new business or expand existing operations in Tier 1 counties are eligible for credits toward their state taxes. Other offerings for these counties include access to a special utilities fund, priority status for Community Development Block Grant funds for economic development, and a waiver of local matching fund requirements for CDBG funds and Industrial Development Fund loans and grants.

Natural, Historic, and Cultural Resources

Pamlico County is a haven for those seeking a quieter way of life. With miles of back roads, opportunities exist for unmatched outdoor experiences such as freshwater fishing, bird watching, canoeing, kayaking, hunting, and boating. The area's most abundant natural resource may arguably be the water. Pamlico County is a peninsula surrounded by the Neuse River, Pamlico Sound, the Bay River, and the Pamlico River. Pamlico County was formed from part of Craven County in 1872 and from parts of Beaufort County in 1874 and 1875. The first permanent European settlers arrived in the early 1700's. The area was inhabited by the Pampticoe Indians, part of the Algonquin Indian Nation, from whom Pamlico got its name. These Indians referred to the area as "TaTakua" or where the land and sea meet the sky. After the Tuscarora War in 1711, Scotch and English colonists came to the area. Settlement was slow, however, because the county is on an isolated peninsula. The earliest settlements were at the heads of the rivers, creeks, and bays. The interior of the county was settled as the road system was developed.

Historical sites can be a significant tourist attraction if properly developed and maintained. The State of North Carolina has submitted and listed the following building on the National Register for Historic Places:
China Grove – added in 1973

This private single-family dwelling was built by William S. Sparrow. The period of significance 1800-1824 is an example of Federal architectural style. This structure is located 3 miles southwest of Oriental on SR 1302.

Development Trends and Implications

Pamlico County is located within a region which ranks below the state average for population growth, employment growth, business failure rate, and business startup rate *(NC Department of Commerce, Economic Policy and Research Division)*.

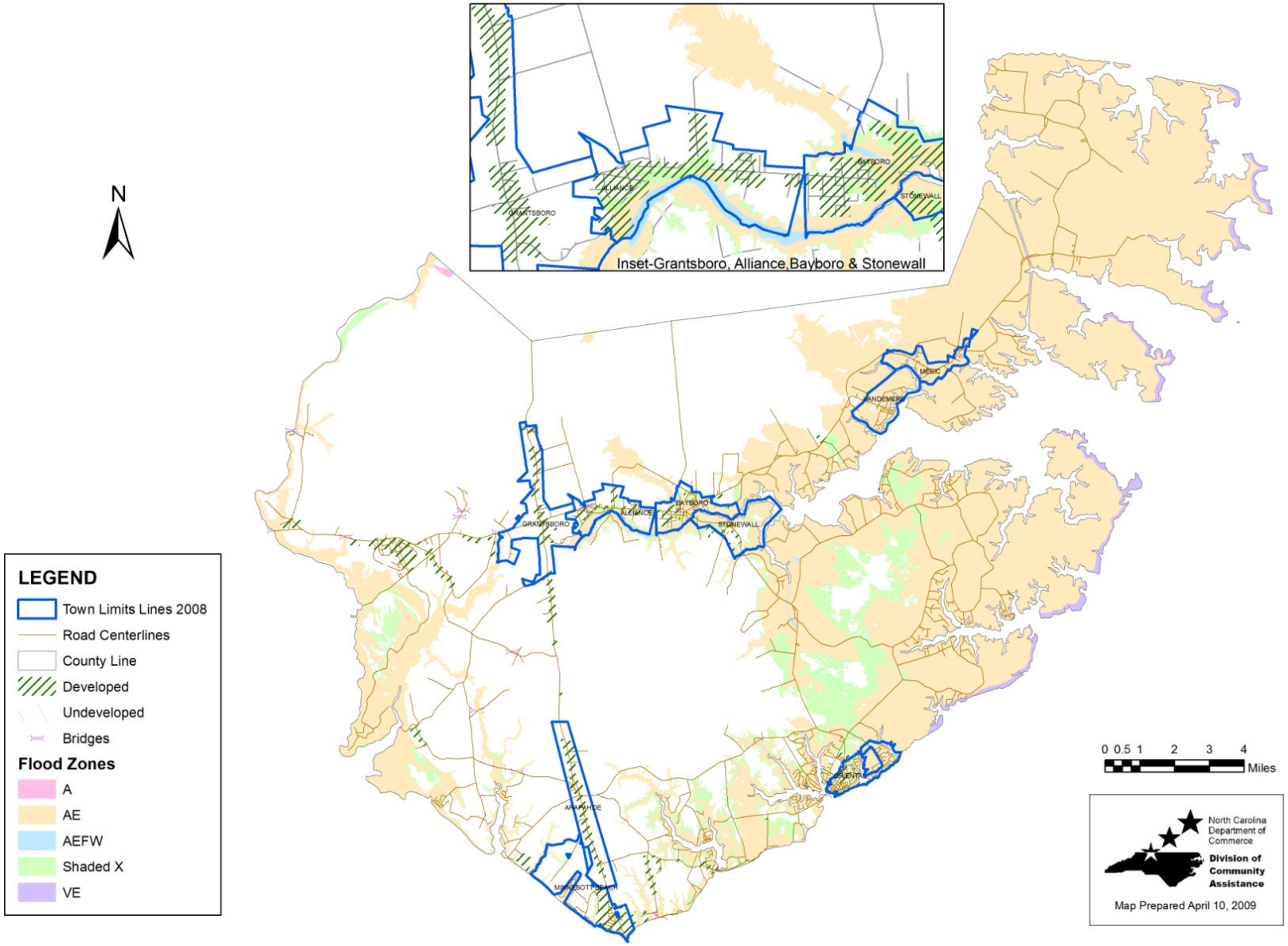
Pamlico County grew 13.9% in population between 1992 and 2002, ranking 91st in the state (the state's average population growth was 21.4%). Over the next twenty years, the county is projected to grow in population by another 16.8% (the state's average is projected to grow another 26.6%). Pamlico County has a population density of 39.09 persons per square mile (the state average is 165.25). This population density is

expected to increase to 44.87 persons per square mile in 2020 *(NC State Demographics Unit, 2002)*.

Pamlico County's residential development is mostly located within the incorporated municipalities, and along primary and secondary roads. There is some residential development expected within the next 20 years. The NC State Demographics Unit projects that 1,938 people will be living in Pamlico County in the year 2020, so it is projected that there will be a small number of housing starts to accommodate the new residents. Similarly, according to the NC Department of Commerce, it is unlikely that Pamlico County will see significant commercial or industrial development in the next 20 years.

With a few exceptions, land use patterns in Pamlico County have remained unchanged for many years. Relatively built up areas continue to be located in the towns of Oriental and Minnesott Beach, with smaller concentrations located in other areas. Commercial land uses are primarily limited to the incorporated municipalities. Some major factors that limit the development potential for Pamlico County include the lack of readily available goods and services and soil limitations for septic tank usage in areas not served by sewer.

Figure 2. Existing Land Use with Floodplain Overlay



SECTION 3: RISK ASSESSMENT

What is a Risk Assessment?

Conducting a risk assessment can provide information on the location of hazards, the value of existing land and property in hazard locations, and an analysis of risk to life, property, and the environment that may result from natural hazard events. Specifically, the five levels of a risk assessment are as follows:

1 – ***Hazard Identification*** identifies the geographic extent and intensity of the hazard, the intensity of the hazard, and the probability of its occurrence. Maps are frequently used to display hazard identification data. Pamlico County identified nine major hazards that consistently affect this geographic area. These hazards - flooding, hurricanes, nor'easters, earthquakes/tsunamis, landslides, thunderstorms, tornadoes/waterspouts, wildfire, severe winter storms, coastal erosion, and mosquitoes – were identified through an extensive process that utilized input from the Hazard Mitigation Planning Committee, as well as recommendations from North Carolina Emergency Management. The geographic extent of each of the identified hazards has been identified using the best available data.

2 – ***Profiling Hazard Events*** describes the causes and characteristics of each hazard, how it has affected Pamlico County in the past, and what part of Pamlico County's population, infrastructure, and environment has historically been vulnerable to each specific hazard. A profile of each hazard discussed in this plan is provided in each hazard section. For a full description of the history of hazard specific events, please see the appropriate hazard chapter.

3 – ***Vulnerability Assessment/Inventorying Assets*** combine's hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard. Critical facilities are of particular concern because these entities provide essential products and services to the general public that are necessary to preserve the welfare and quality of life in the county and fulfill important public safety, emergency response, and/or disaster recovery functions. The critical facilities have been identified, mapped, and are illustrated in Figure 3 at the end of this section. A description of the critical facilities in the county is also provided in this section.

4 – ***Risk Analysis/Estimating Potential Losses*** involves estimating the damage, injuries, and financial losses likely to be sustained in a geographic area over a given period of time. Describing vulnerability in terms of dollar losses provides the community with a common framework to measure the effects of hazards on assets. For each hazard where data was available, quantitative estimates for potential losses are included in the hazard assessment.

5 – ***Assessing Vulnerability/Analyzing Development Trends*** provides a general description of land uses and development trends within the county so that mitigation options can be considered in land use planning and future land use decisions. Analyzing these trends can help in identifying potential problem areas and can serve as

a guide for incorporating the goals and ideas contained in this mitigation plan into other community development plans.

Note: The information on the maps in this plan was derived from Pamlico County's GIS. Care was taken in the creation of these maps, but is provided "as is." Pamlico County cannot accept any responsibility for any errors, omissions or positional accuracy, and therefore, there are no warranties that accompany these products (the maps). Although information from land surveys may have been used in the creation of these products, in no way does this product represent or constitute a land survey. Users are cautioned to field verify information on this product before making any decisions.

Hazard assessments are subject to the availability of hazard-specific data. Gathering data for a hazard assessment requires a commitment of resources on the part of participating organizations and agencies. Each hazard-specific section of the plan includes a section on hazard identification using data and information from local, county, state, or federal agency sources.

Pamlico County conducted a vulnerability assessment for the flood hazard using Geographic Information Systems (GIS) to identify the geographic extent of the hazard and assess the land use and value at risk from the flood hazard. Insufficient data exists to conduct vulnerability assessments and risk analyses for all the hazards listed and addressed in the plan.

Regardless of the data available for hazard assessments, there are numerous strategies the county can take to reduce risk. These strategies are described in the action items detailed in each hazard section of this plan. Mitigation strategies can further reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure. Action items throughout the hazard sections provide recommendations to collect further data to map hazard locations and conduct hazard assessments.

Table 3. Federal Criteria for Risk Assessment

Section 322 Requirement	How is This Addressed?
Identifying Hazards	Each hazard section includes an inventory of the best available data sources that identify hazard areas. To the extent GIS data are available, the county developed maps identifying the location of the hazard in the county. The Executive Summary and the Risk Assessment sections of the plan include a list of the hazard maps.
Profiling Hazard Events	Each hazard section includes documentation of the history, and causes and characteristics of the hazard in the county.

Assessing Vulnerability: Identifying Assets	Where data is available, the vulnerability assessment for each hazard addressed in the mitigation plan includes an inventory of all publicly owned land within hazardous areas. Each hazard section also identifies potential mitigation strategies.
Assessing Vulnerability: Estimating Potential Losses	The Risk Assessment Section of this mitigation plan identifies key critical facilities and lifelines in the county and includes a map of these facilities. Vulnerability assessments have been completed for the hazards addressed in the plan, and quantitative estimates were made for each hazard where data was available.
Assessing Vulnerability: Analyzing Development Trends	The Pamlico County Profile Section of this plan provides a description of the development trends in the county, including the geography and environment, population, and land use and development.

Storm Events in Pamlico County

Pamlico County has been susceptible to many types of storm events over the past 50 years. The table below contains the type and number of events, and the associated deaths and injuries, along with property and crop damage.

Table 4. Summary of Reported Storm-Related Damage and Casualties in Pamlico County

Events	Numbers	Deaths	Injuries
Pamlico			
Extreme Cold	1	0	0
Hail	36	0	0
Flash Flood	4	0	0
Thunderstorm	2	0	0
Thunderstorm Wind	19	0	0
Funnel Cloud	1	0	0
Tornado	13	1	45
Subtotal	76	1	45
Hurricanes	10	20	19
Tropical Storms	5	0	1
Winter Storms	9	11	179
Subtotal	24	31	199

Events	*Property Damage	*Crop Damage	*Total Damage
Pamlico			
Extreme Cold	$0	$378,344	$378,344
Hail	$133,098	$0	$133,098
Flash Flood	$0	$0	$0
Thunderstorm	$0	$0	$0
Thunderstorm Wind	$68,059	$0	$68,059
Funnel Cloud	$0	$0	$0
Tornado	$17,639,398	$0	$17,639,398
Subtotal	$17,840,555	$378,344	$18,218,899
Hurricanes, Tropical Storms & Winter Storms (multi-county events that affected Pamlico)			
Hurricanes	$1,976,373,464	$731,186,200	$2,707,559,664
Tropical Storms	$24,612,367	$63,953,307	$88,565,674
Winter Storms	$25,021,537	$0	$25,021,537
Subtotal	$2,026,007,368	$795,139,507	$2,821,146,875

Source: NOAA, National Climatic Data Center (Reports from National Weather Service in Categories)

*Damages are in 2008 US dollars, adjusted using the consumer price index (US Bureau of Labor Statistics, March 2003-USDL-02-222,

**Period of Record: Storms (1/1993-7/1999 except 6-7/1993); Tornadoes (1/1950-12/1992); Wind and hail (1/1959-12/1992) ** Numbers Include 1/1/03-8/31/08 for all totals (National Climatic Data Center)

***Hurricane, tropical storm, and winter storm damages are multi-county estimates and storm-specific

Critical Facilities, Infrastructure and Vulnerable Populations

Facilities critical to government response and recovery activities (i.e., life safety and property and environmental protection) include: emergency operations centers, police and fire stations, public facilities, roads, and to a lesser extent, drug stores and grocery stores. Facilities that, if damaged, could cause serious secondary impacts may also be considered "critical." Critical and essential facilities are those facilities that are vital to the continued delivery of key government services or that may significantly impact the public's ability to recover from the emergency. Figure 3 illustrates the critical facilities, essential facilities, public infrastructure, and emergency transportation routes within Pamlico County.

According to the Local Multi-Hazard Mitigation Planning Guidance provided by FEMA on July 1, 2008, critical facilities may include emergency serve facilities, such as

hospitals and other medical facilities, jails and juvenile detention centers, police and fire stations, emergency operation centers, public works facilities, evacuation shelters, schools, and other uses that house special needs populations.

Critical facilities and Vulnerable Populations for Pamlico County are:

Health / Medical Facilities
Pamlico Medical Center – Bayboro
Oriental Medical Center – Oriental
Pamlico County Health Department – Bayboro
Pamlico Pediatrics – Alliance
Britthaven of Pamlico – Grantsboro
Continuum Home Care – Grantsboro
Holland Drive Home – Reelsboro
Hospice of Pamlico County, Inc. – Grantsboro
Neuse Center for MH/DD/SAS – Alliance
Social Services of Pamlico County – Bayboro
Pamlico County Group Home – Grantsboro
Pine Haven Home Health Care – Olympia
TASC/CJP-Pamlico – Alliance
The Gardens of Pamlico – Scotts Store

Public Buildings
Pamlico County Courthouse - Bayboro
Pamlico County Senior Services - Alliance
Pamlico County Farm Services Agency – Alliance
Mesic Town Hall, Hwy 304, Mesic
Vandemere Town Hall, Pennsylvania Avenue, Vandemere
Oriental Town Hall, Church Street, Oriental
Minnesott Beach Town Hall, Hwy 306, Minnesott Beach
Arapahoe Town Hall, Hwy 306, Arapahoe
Grantsboro Town Hall, Hwy 306, Grantsboro
Alliance Town Hall, Hwy 55, Alliance
Bayboro Town Hall, 3rd Street, Bayboro
Stonewall Town Hall, Hwy 55, Stonewall
Pamlico County Chamber of Commerce, Hwy 55, Grantsboro

Emergency Services Facilities
Pamlico County Rescue Squad - Bayboro
Triangle Volunteer Fire Department – Bayboro
Grantsboro / Silverhill Volunteer Fire Department – Grantsboro
Olympia Volunteer Fire Department – Olympia
Southeast Volunteer Fire Department – Oriental
Florence / Whortonsville Volunteer Fire Department – Florence
Arapahoe Volunteer Fire Department – Arapahoe
Goose Creek Volunteer Fire Department – Hobucken

Vandemere Volunteer Fire Department – Vandemere
Reelsboro Volunteer Fire Department – Reelsboro

Water Distribution / Wastewater Facilities
Bay River Metropolitan Sewerage District – Bayboro
Bay River Sewerage Lagoon – Bayboro
Bay River Sewerage Spray Site – Grantsboro
Pamlico County Water Department - Bayboro

Water Tower Locations
Lowland Road – Hobucken
Hwy 306 South – Arapahoe
McCotter Road – Stonewall
Hwy 55 – Grantsboro
Hwy 304 – Vandemere
Pamlico Road -- Eastern Pamlico County
Hwy 55 -- Merritt
Broad Street – Oriental
Kershaw Road – Eastern Pamlico County
Leaf Land – Reelsboro
Bay City Road – Bayboro
Dees Avenue – Bayboro

Communication Towers
Kershaw Road – Oriental
Lowland Road – Lowland
Lowland Road – Hobucken
Hwy 304 – Vandemere
Burton Farm Road – Minnesott Beach
Hwy 55 – Reelsboro
Hale Road – Reelsboro
Hwy 55 – Western Pamlico County
Bay City Road – Bayboro
Hwy 55 – Grantsboro
Hwy 55 – Stonewall

Law Enforcement and Detention Centers
Oriental Police Department, Broad St, Oriental
Pamlico County Sheriff's Department, Hwy 55, Bayboro
NC Department of Corrections, Bay City Road, Bayboro

Utility Facilities
Gibbtown Road -- Merritt
Hwy 306 -- Minnesott Beach
Hwy 306 -- Arapahoe
Hwy 306 -- Grantsboro

Hwy 55 – Grantsboro
New Ditch Road – Alliance
Hwy 304 – Bayboro

Airports
Meekins Road – Mesic
Hooker Road – Bayboro

Camps
Jones Street – Vandemere
Janiero Road – Pamlico County
Camp Don Lee Road – Pamlico County
Hwy 306 – Minnesott Beach
Seafarer Road – Minnesott Beach

Daycare and Pre-School Facilities
Hwy 306 – Grantsboro
Hwy 55 – Grantsboro
Hwy 55 – Bayboro

Public and Charter Schools
Arapahoe Charter School – Arapahoe
Pamlico Primary School – Bayboro
Fred Anderson Elementary – Bayboro
Pamlico Middle School – Stonewall
Pamlico High School – Bayboro
Pamlico Community College – Hwy 306

Evacuation Centers
Pamlico Community College – Hwy 306 (located between Grantsboro and Arapahoe)

Pamlico County used a 5 year planning horizon (consistent with the County's Land Use Plan) when generating the list of critical facilities. For purposes of projecting land use estimates in special hazard areas, a 5 year planning horizon will be used.

Figure 3. Critical Facilities and FIRM Flood Zones

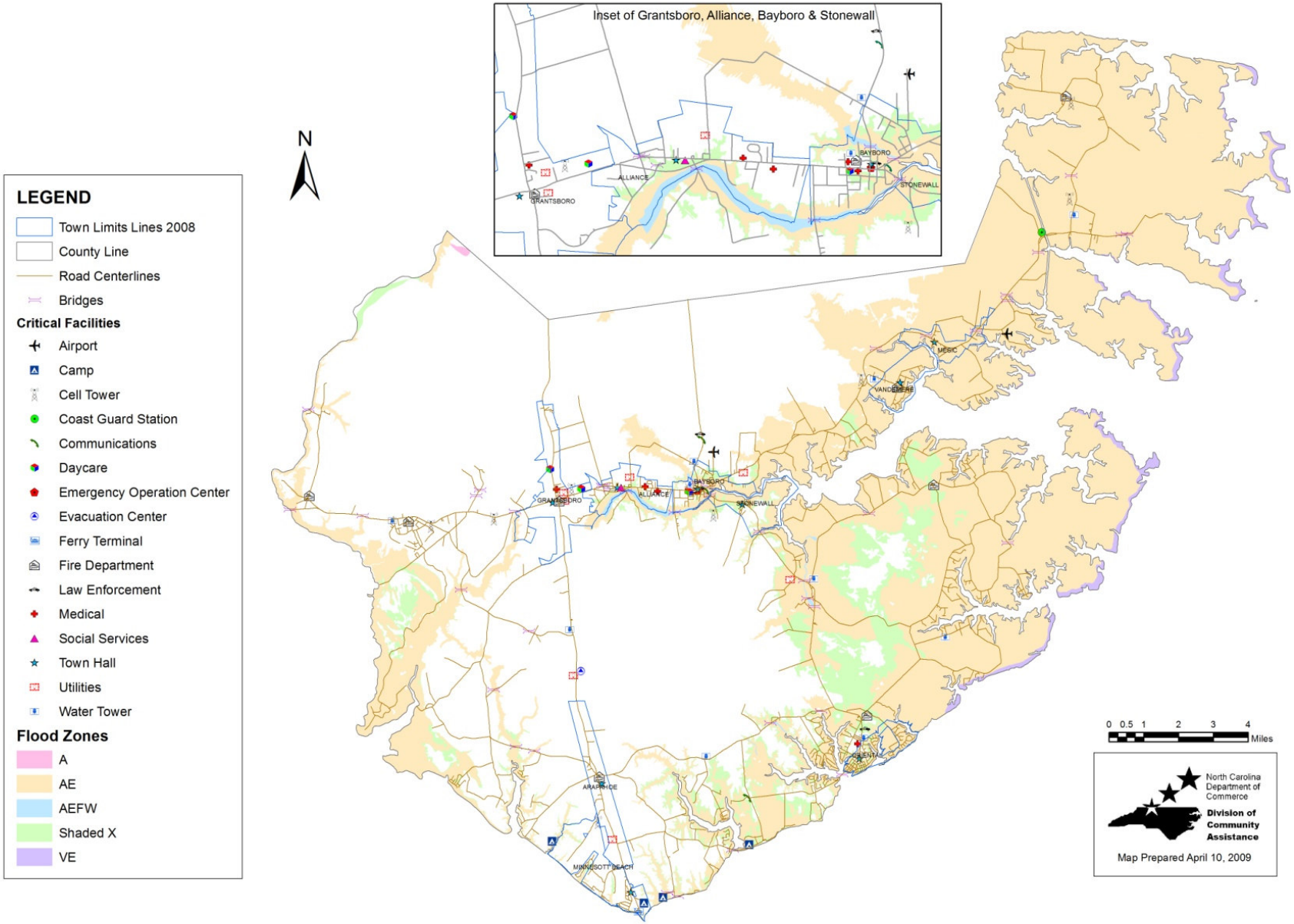
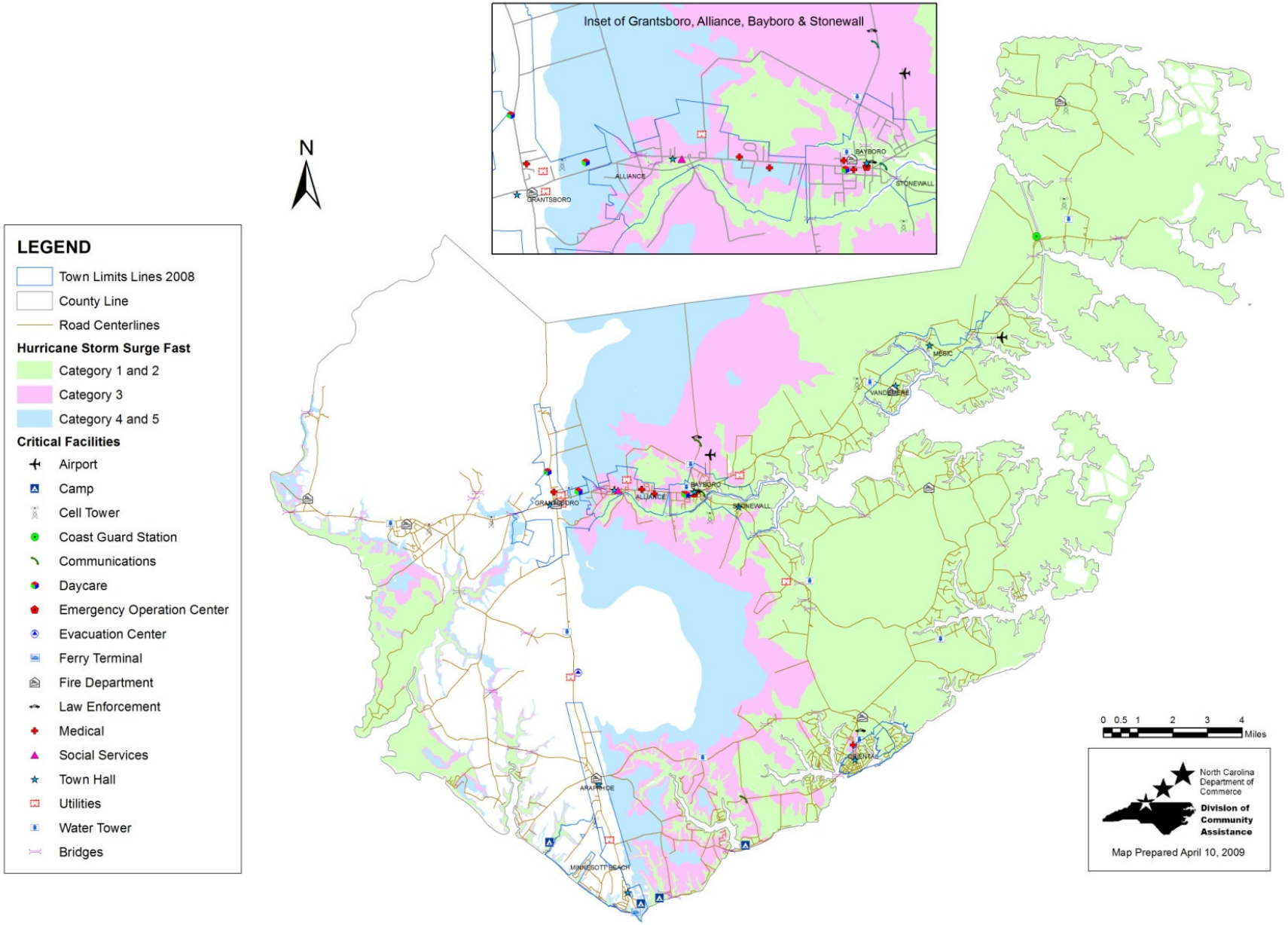


Figure 4. Storm Surge Inundation and Critical Facilities



Repetitive Loss Properties
Over 2.5 million buildings are insured by the National Flood Insurance Program (NFIP), but a fraction of them (less than 2%) account for 33% of the flood insurance claims paid since 1978. This is because these few properties have been flooded more than once, and some of them have been flooded numerous times. Repetitive loss properties are defined by FEMA as properties for which two or more claims of at least $1,000 have been paid by the NFIP within any 10-year period since 1978. (*CRS Coordinator's Manual* 1999, Federal Emergency Management Agency, National Flood Insurance Program, Community Rating System p. 500-3.)

Pamlico County has 263 repetitive loss properties within its jurisdiction, according to a recent FEMA list of repetitive loss properties. 259 of these properties are located with A Zones; 4 of these properties are located in B or X Zones. 182 of the repetitive loss buildings are insured. There were 582 total repetitive losses in the county; 396 of these losses were insured.

Repetitive loss payments were $9,100,297. Of this total, $7,232,228 was for building loss; $1,868,069 was for contents. $5,790,982 of these total losses was insured; $4,626,203 was for insured buildings and $1,164,779 was for insured contents.

There were 73 post-FIRM repetitive loss buildings (buildings constructed after the floodplain regulations were established) in the county. 5 buildings have been damaged by floods at least 4 times. 3 buildings that have been flooded 2-3 times have received more in total insurance damages than the value of the building.

Table 5. Repetitive Loss Data

Pamlico County and All Municipalities as of 6/30/07				
Repetitive Loss (RL) Data				
	AE, A1-30, AO, AH, A	**VE, V1-30, V**	**B, C, X**	**TOTAL**
RL Nonresidential	13	0	1	14
RL Single family	235	0	3	238
RL Condominium	6	0	0	6
RL 2-4 family	1	0	0	1
RL Other residential	4	0	0	4
RL Buildings (Total)	259	0	4	263
RL Buildings (Insured)	178	0	4	182
RL Losses (Total)	573	0	9	582
RL Losses (Insured)	387	0	9	396
RL Payments (Total)	9,014,743	0	85,554	100,297

Building	7,158,486	0	73,742	7,232,228
Contents	1,856,257	0	11,812	1,868,069
RL Payments (Insured)	5,705,428	0	85,554	5,790,982
Building	4,552,461	0	73,742	4,626,203
Contents	1,152,967	0	11,812	1,164,779
Post-FIRM SFHA RL Buildings:				73
Insured Buildings with 4 or More Losses:				5
Insured Buildings with 2-3 Losses > Building Value:				3

Pamlico County's repetitive loss areas are shown on Figure 5.

Figure 5. Repetitive Loss Areas

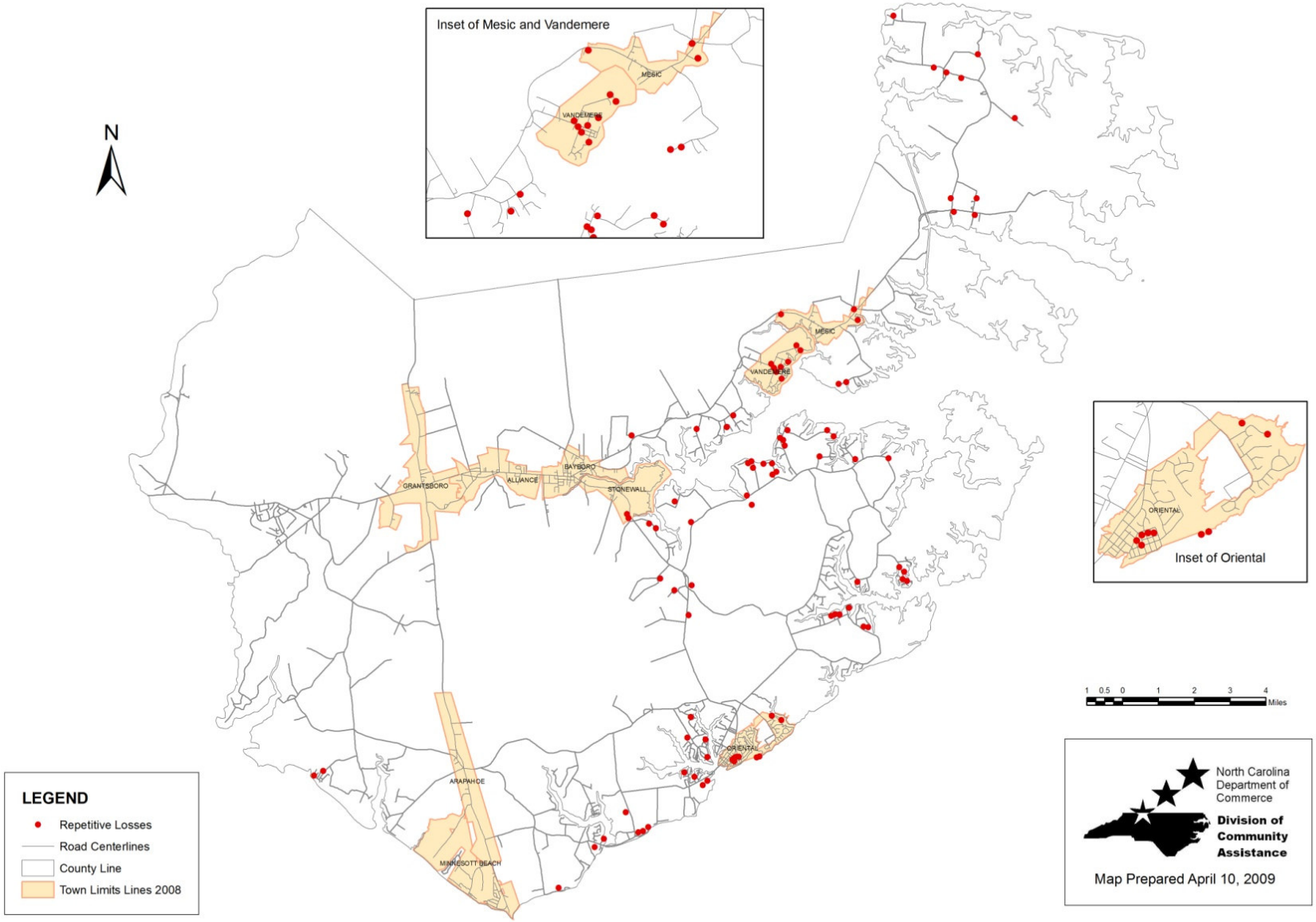


Figure 6. Vulnerable Populations

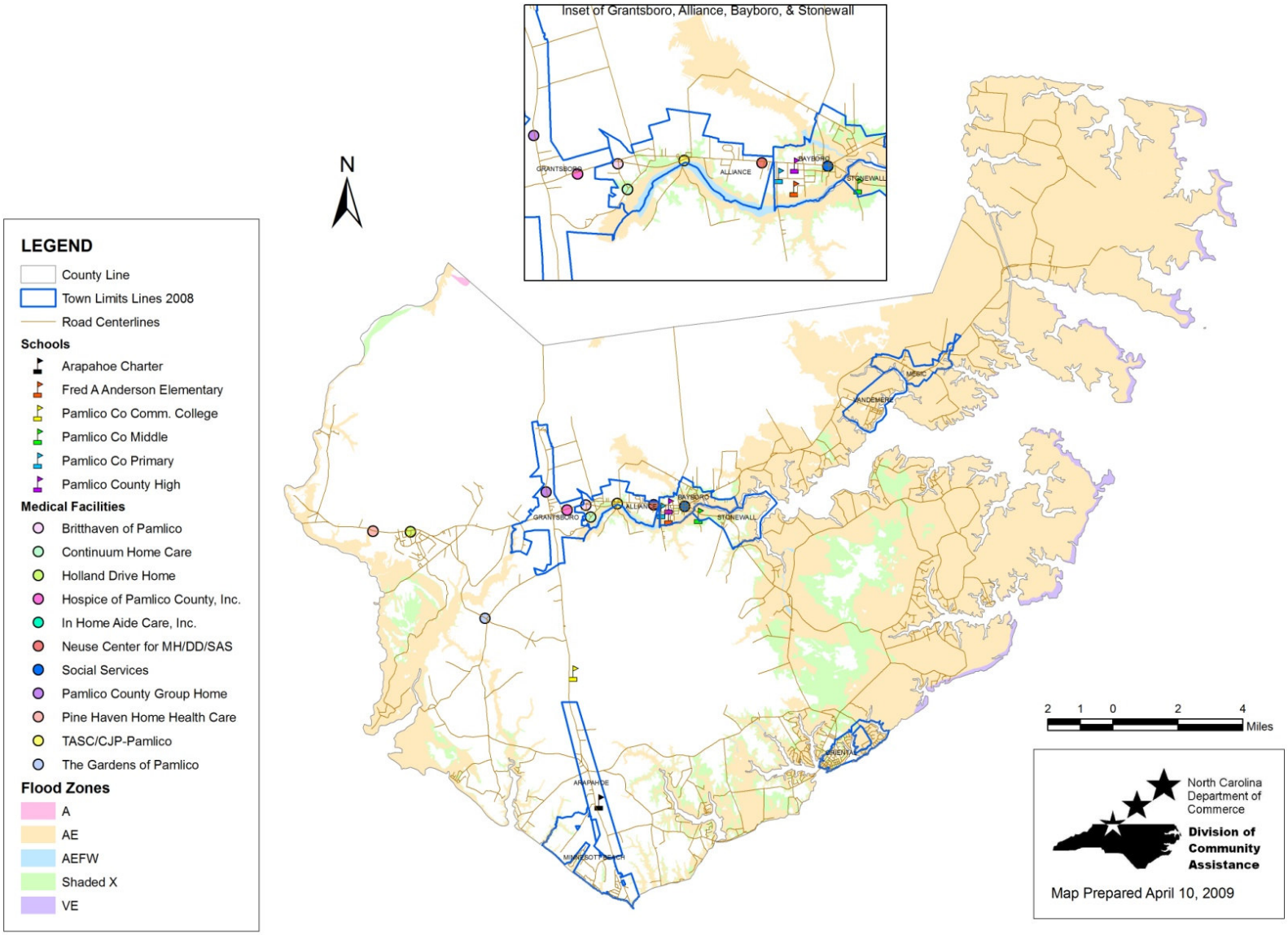
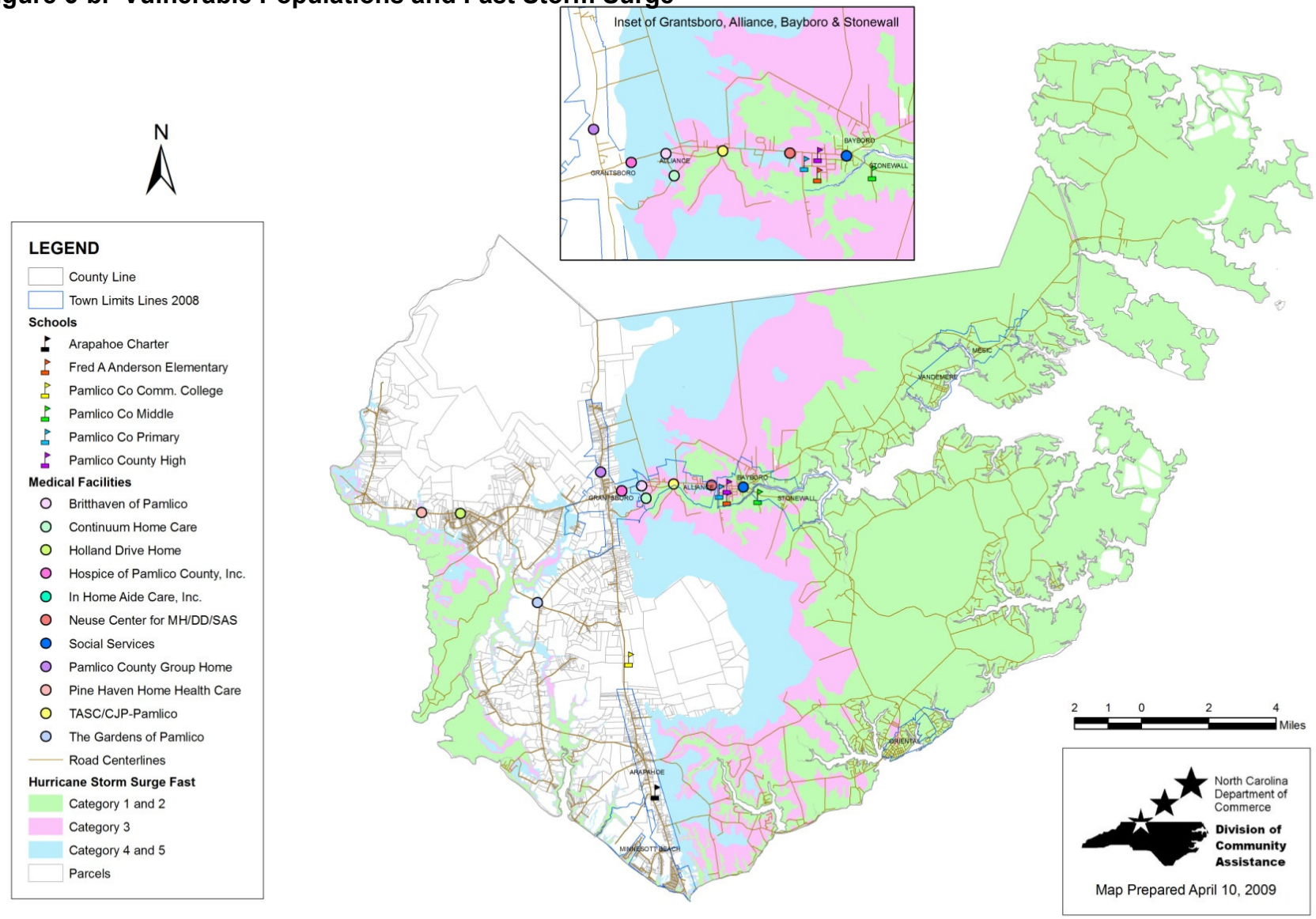


Figure 6-b. Vulnerable Populations and Fast Storm Surge



Identifying Hazards
The county is vulnerable to several natural hazards. Using Tables 4 (Summary of Reported Storm Related Damage and Casualties in Pamlico County) and 5, below, the Plan Committee identified the natural hazards that have occurred previously in Pamlico County. Additionally, the Plan Committee identified other hazards that occur in the county's jurisdiction. The committee identified and analyzed each specific hazard as required by FEMA, even if the hazard does not pertain, or is very unlikely to occur in Pamlico County. The hazards were ranked by importance to the County, taking into consideration, the likelihood of occurrence, the severity of past events and the County's ability to respond.

The Plan Committee, after identifying each hazard, and evaluated each hazard, using their knowledge of previous natural hazard occurrences.

A '4' is the highest score for a hazard, and represents the highest threat to the community. Conversely, a '1' indicates that the Plan Committee did not rate that hazard as a significant threat.

Table 5 represents the Hazard Identification and Analysis matrix and the corresponding determined by the planning committee at the January 7, 2009 meeting.

Table 6. Hazard Identification and Analysis

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
North Carolina Greater Hazards					
FLOODING					
Flooding*	4				
10-49 year event	4	High	Limited	Structures located in low lying areas not within 100 year flood plain	44.1%
50-100 year event	4	Moderate	Critical	Structures located within 100 year flood plain	52.3%
>100 year event	4	Low	Critical	Structures located within 500 year flood event	60.3%
Riverine Flooding*	1	Low	Limited	Structures located in close proximity to main water body's with the County	
Flash Flooding	3	Moderate	Limited	All structures	100%
Tidal Flooding	1	Low	Limited	Structures located in close proximity to main water body's	

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Ice Jam Flooding	1	Very Low	Limited		
Local Drainage or High Groundwater Levels	3	Moderate	Limited	All Structures	
Fluctuating Lake Levels	1	Very Low	Limited		
Coastal Flooding*	3	Moderate	Critical	All Structures in close proximity to main water body's	
Urban Flooding*	1	Low	Limited	All Structures located within an urban area	
EARTHQUAKES				All Structures	
Earthquake*	1	Very Low	Limited		
Ground Motion	1	Very Low	Limited		
Seismic Activity	1	Very Low	Limited		
Surface Faulting	1	Very Low	Limited		
Earthquake-related Ground Failure	1	Very Low	Limited		
HURRICANES/COASTAL HAZARDS				All Structures	
Hurricane*	4				
-Tropical Storm	4	High	Limited		
-Category 1	4	High	Limited		13.7%
-Category 2	4	Moderate	Critical		16.6%
-Category 3	4	Low	Critical		18.2%
-Category 4	4	Low	Catastrophic		21.0%
-Category 5	4	Very Low	Catastrophic		23.7%
Storm Surge*	4	Moderate	Critical		23.7%
High Wind*	4	High	Critical		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Torrential Rain*	4	High	Limited		
Tornado*	4	Low	Limited		
Nor'easter*	4				
-1 (weak)	4	High	Limited		5.2%
-2 (Moderate)	4	Moderate	Limited		7.6%
-3 (Significant)	4	Moderate	Critical		9.3%
-4 (Severe)	4	Low	Critical		13.4%
-5 (Extreme)	4	Very Low	Catastrophic		16.4%
Storm Surge*	4	Moderate	Critical		
High Wind*	4	High	Critical		
Severe Winter Weather*	2	Low	Limited		
Tsunami*	1	Low	Catastrophic		
Coastal Erosion*	3	Moderate	Critical		
Rip Current*	1	Very Low	Limited		
SEVERE WINTER WEATHER				All Structures	100%
Severe Winter Weather*	2				
Freezing Rain*	2	Low	Limited		
Snowstorms*	2	Low	Limited		
Blizzard*	1	Low	Limited		
Wind Chill*	1	Low	Limited		
Extreme Cold*	1	Low	Limited		
WILDFIRE				All Structures	100%
Wildfire*	3	Moderate	Limited		
Wild-land Fires	1	Low	Limited		
Interface of Intermix Fires	1	Low	Limited		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Firestorms	1	Low	Limited		
Prescribed Fires and Prescribed Natural Fires	1	Low	Limited		
Dam Failure				All Structures	100%
Dam Failure*	< 1	N/A	N/A		
Drought				All Structures	100%
Drought*	3				
Meteorological*	3	Moderate	Limited		
Hydrologic*	2	Moderate	Limited		
Agriculture*	3	Moderate	Limited		
Socioeconomic*	1	Moderate	Limited		
Heat Wave*	1	Moderate	Limited		
Infectious Diseases				All Structures	100%
Infectious Disease*	2	Low	Limited		
Human Contact*	2	Low	Limited		
Animal Contact*	2	Low	Limited		
Food-borne*	1	Low	Limited		
Water-borne*	1	Low	Limited		
Human Respiratory*	2	Low	Limited		
Animal Respiratory*	1	Low	Limited		
Vector-borne*	1	Low	Limited		
Geological				All Structures	100%
Landslide/Debris Flow*	1	Low	Limited		
Subsidence*	1	Low	Limited		
Acidic Soil*	1	Low	Limited		
Geochemical-related*	1	Low	Limited		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Mine Collapse*	1	Low	Limited		
Sinkholes*	1	Low	Limited		
Expansive Soil*	1	Low	Limited		
Tornado/Thunderstorm				All Structures	100%
Severe Thunderstorm*	3	High	Limited		
Hailstorm*	2	High	Limited		
Torrential Rain*	2	High	Critical		
Thunderstorm-related Wind*	2	High	Limited		
Lightning*	3	High	Limited		
Tornado*	2				
-F0	2	High	Limited		
-F1	2	Moderate	Limited		
-F2	2	Low	Critical		
-F3	2	Very Low	Critical		
-F4	2	Very Low	Catastrophic		
-F5	2	Very Low	Catastrophic		
-F6	2	Very Low	Catastrophic		
Waterspout*	1	Low	Limited		
High Wind/Wind Storm*	2	Moderate	Limited		
Fog*	1	Moderate	Limited		
OTHER HAZARDS				All Structures	
Snow Avalanches	1	Very Low	Limited		
Extreme Summer Weather	1	High	Limited		
Fires				All structures	100%
Structure Fires	2	Moderate	Limited		
Outdoor Fires	1	Low	Limited		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Man-Made Hazards/HAZMAT Events				All structures	100%
Fixed-Site Facilities	2	Low	Limited		
Highway and rail Transportation	1	Very Low	Limited		
Marine Transportation	2	Low	Limited		
Air Transportation	1	Very Low	Limited		
Pipeline Transportation	2	Low	Limited		
Natural Hazards	1	Very Low	Limited		
Nuclear Accidents				All Structures	100%
Criticality Accidents	1	Very Low	Catastrophic		
Loss-of-Coolant Accidents	1	Very Low	Catastrophic		
Loss-of-Containment Accidents	1	Very Low	Catastrophic		
Other Technological Hazards				All Structures	100%
National Security Hazards	1	Very Low	Limited		
Power failures	3	Moderate	Critical		
Telecommunications Failures	2	Low	Limited		
Volcanic Hazards				All Structures	100%
Volcano Eruption	1	Very Low	Limited		

The Hazard Identification allowed the Hazard Mitigation Committee to prioritize the natural hazards in Pamlico County. Hurricanes and nor'easters were determined to be the major threat, mainly because of flooding concerns. Wildfire and thunderstorms/lightning constitute the other major natural hazard that affect the county. All natural hazards listed will be discussed, but emphasis on planning will focus on these high-ranking natural hazards.

While not normally considered as a "natural hazard," mosquitoes were included in the list. Anyone that has spent time in Pamlico County during the summer and fall will agree that mosquitoes can be quite bothersome and create discomfort for residents and visitors. While there is literature describing the spread of disease and mosquitoes, such narrative is not included in this plan. However, the Plan Committee felt that mosquitoes were a significant nuisance in the County, and decided to include them in the list of hazards.

Assessing Vulnerability

The Committee also evaluated the County's current programs and policies, along with potential programs and policies that could reduce Pamlico County's susceptibility to natural hazards.

Current and potential policies were examined by: 1) Effectiveness; and 2) Cost. Effectiveness was determined by the perception of the Hazard Mitigation Plan Committee as High, Medium, or Low. Cost was determined by the Committee and rated as High, Medium, or Low. The cost is the expense of implementation and administration to the community.

An inventory of Pamlico County ordinances and policies relevant to hazard mitigation was conducted and tabulated in Table 6. Pamlico County administers many of its ordinances within the corporate limits of the individual incorporated towns. The sections that pertain to the individual towns will include any local ordinances that are related to hazard mitigation. The bulk of hazard mitigation policies and programs are geared toward hurricanes and nor'easters, and associated flooding, since those hazards were identified as the highest ranking natural hazards affecting the county and its municipalities.

The table identifies the program or policy, the document reference, effectiveness, cost, and a rationale for effectiveness.

Table 6. Inventory of Local Policies and Programs Relevant to Hazard Mitigation

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
1. Preventive – keep flood problems from getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Group Housing Ordinance	Adopted June 2006	Medium	Medium because the group housing ordinance regulates the height and density of multi-family developments, particularly in or near flood hazards	Any amendments to the GHO should be incorporated in future updates of the Hazard Mitigation Plan
Subdivision regulations	Adopted February 2, 1992, Updated January 2006	High	High because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and	Any amendments to the subdivision regulations should be incorporated into future updates of the Hazard Mitigation Plan

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
			erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985 Updated in 2003	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible that flood plain area will be delineated with updated topography, and that base flood elevations will be recalculated. All municipalities in Pamlico County have adopted the County's ordinance and	The Hazard Mitigation Plan will serve as the community's floodplain management plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
			the County administers the ordinance for all municipalities.	
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface regulations	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the NC Department of Water Quality
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Building elevation	Floodplain Regulations	High	High because the ordinance requires new construction to be built at two (2) feet above BFE	Any amendments to the Floodplain regulations should be incorporated into future updates of the

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
				Hazard Mitigation Plan.
Flood relief (venting)	NC State Building Code Volume 1	High	High because floodwaters actually reduce the pressure exerted by deep water	n/a
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that provide insurance for natural hazards to citizens.
3. Natural Resource Protection – preserves or restores natural areas or the natural functions of floodplain and watershed areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protections should be a component of any future hazard mitigation document.
Best management practices	N/A	High	High because BMPs can be used to collect a number of techniques into a single directive for action	BMPs can help limit runoff and flash-flooding in a storm event.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
				regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are highly effective at removing nitrogen before it reaches streams	Natural buffers can slow the flow and rise of water in a flood event
4. Emergency Services – taken during a flood to minimize its impact. These measures are the responsibility of city or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Citizen notification is an ongoing action strategy in the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Changes in policy should be incorporated into future updates of the Hazard mitigation Plan.
Critical facilities protection	Emergency Operations Plan	Medium	Medium because County facilities are well-	The plan includes a list and a map of

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
			protected	locations of all critical facilities.
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Public health and safety are an important component of a Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	Evacuation routes should be clearly marked in case of an emergency.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	Breakwaters and bulkheads are effective mitigation tools.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMS play a major role in Hazard Mitigation.
Library (Hazard related)	N/A	Low	Low because people do not take advantage of the library	Hazard library is located at the County building Inspector's office.
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies when addressing Hazard Mitigation.
Outreach projects	N/A	Medium	Medium because people often ignore outreach material and are generally unaware.	Continue outreach projects highlighted as an action step in this plan.
Real estate disclosure	N/A	Low	Low because there is no federal or state requirement	
Elevation markers (stating the	N/A	High	High because an	All communities

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
altitude above sea-level)			elevation marker program would inform the public	should consider an elevation marker program to inform residents and visitors about flood levels.

Risk Assessment Summary

Natural hazard mitigation strategies can reduce the impacts concentrated at large concentrations of people, public infrastructure, and critical facilities. Natural hazard mitigation for citizens and visitors may include developing relationships with emergency management services and their employees before disaster strikes, and establishing mitigation strategies together. Collaboration among the public and private sector to create mitigation plans and actions can reduce the impacts of natural hazards.

SECTION 4: MULTI-HAZARD GOALS AND ACTION ITEMS

This section provides information on the process used to develop goals and action items that pertain to the natural hazards addressed in the mitigation plan. It also describes the framework that focuses the plan on developing successful mitigation strategies. The framework is made up of three parts: the *Mission, Goals,* and *Action Items*.

Mission

Pamlico County, through hazard mitigation planning, seeks to maintain or lower the community's flood insurance rating, qualify for future disaster funding, identify potential problems, minimize repetitive losses, and educate the public on Pamlico County's vulnerability to natural hazards.

Public Comments and Participation

The Hazard Mitigation Plan Committee met on November 5, 2008 as a first step in this year's review and developed a plan to include public participation in the planning process. Elements of the public participation plan included:

Holding two public information meetings on April 23, 2009 at 7:00 p.m. and April 27, 2009 at 7:00 p.m. to describe the planning process to interested citizens and listen to citizen suggestions and concerns;
Copies of the Draft Hazard Mitigation Plan were made available at the Pamlico County Building Inspections Office for public review and
On June 7, 2010 and June 21, 2010, public hearings were held on the amended Hazard Mitigation Plan.

Coordination with Other Agencies

There are two reasons to involve agencies and private organizations in planning efforts. First, they may be implementing or planning to implement activities that can affect flood damage or some of the other interests and concerns. The Committee wanted to make sure that their efforts were not going to be in conflict with a government program or duplicate the efforts of another organization. Second, the Committee wanted to involve other agencies to see if they could assist their efforts. Help may be in the form of flood hazard data, technical information on various measures, guidance on regulatory requirements, advice and assistance in the planning effort, implementation of a recommended measure, and financial assistance to help implement a recommended measure.

During the initial research period at the beginning of the planning process, the Committee members discussed various outside agencies to contact.

- US Army Corps of Engineers
- Federal Emergency Management Agency
- Pamlico County Floodplain Manager
- Pamlico County Management Information Specialist

- Soil and Water Conservation District
- NC Division of Coastal Management
- NC Division of Emergency Management

These agencies were invited to attend the two public input meetings, held on April 23, 2009 at 7:00 p.m. and April 27, 2009 at 7:00 p.m. Both meetings gave the public and outside agencies an opportunity to comment on a draft of the hazard mitigation plan. Several action items were added to the draft plan as a result of public comment and outside agency participation.

In addition to coordination with outside agencies, Pamlico County reviewed existing plans, studies, reports, and technical information to assist in the preparation of this plan. These existing resources included:

- Pamlico County Land Use Plan
- Flood Insurance Study
- Flood Insurance Rate Maps

Integration of goals, objectives, and action items from the hazard mitigation plan will occur in future updates of the land use plan, flood insurance study, and other planning documents. The main means by which integration will take place is through implementation of the actions listed in this plan.

Goals

Each goal is meant to be general and broad, and can only be achieved through the long-term implementation of more specific objectives. It is intended that each goal listed below will be more specifically addressed and realized through the implementation of short-term mitigation objectives and action steps established later in this section.

The Hazard Mitigation Plan Committee had previously generated and recommended a floodplain management plan and a State hazard mitigation plan that contained goals and action steps. The Committee reviewed the previous plans and amended the goals for purposes of this plan.

The Hazard Mitigation Plan Committee developed 4 goals to mitigate hazards and to protect life and property in Pamlico County.

Goal 1 Improve Pamlico County's fiscal and operational capabilities to adequately mitigate the effects of natural hazards.

Goal 2 Enhance existing or implement new County policies that will reduce susceptibility to natural hazards without conflicting with other community goals.

Goal 3 Protect Pamlico County's buildings, critical facilities, and infrastructure through the implementation of cost-effective and technically feasible mitigation projects.

Goal 4 Promote public health, safety, and welfare by increasing the public awareness of existing hazards and fostering individual and public responsibility in mitigating risks due to those hazards.

These goals were presented at the public input meetings on March 4, 2004 and March 6, 2004. No changes were made to the goal statements as a result of these public meetings and the goals did not change for the plan update.

Objectives and Action Items

Mitigation *objectives* are designed to support and correspond directly with the goals established in the previous subsection, and was established to provide Pamlico County with some measurable, mid-range benchmarks (2-5 years). Each objective is numbered (i.e., "1.1"), with the first digit representing the corresponding goal.

The *action items* are short-term, specific measures to be undertaken by Pamlico County in order to achieve the identified objectives. Most of these actions are also hazard-specific. Each action identifies the objective(s) it is intended to achieve, includes some general background information to justify the proposed action, and provides measures to assure successful and timely implementation.

The mitigation plan identifies action items developed through data collection and research, surveys, and the public participation process. Mitigation plan activities may be considered for funding through federal and state grant programs, and when other funds are made available. To help insure activity implementation, each action item includes information on the timeline and the responsible party. Upon implementation, the responsible person(s) may look to partner organizations for resources and technical assistance.

Responsible Person: The responsible person(s) is the person or entity that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Responsible person(s) may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

Deadline: Each action item includes an estimate of the timeline for implementation.

Funding: Each action item will include a possible source of funding. Implementation ideas may include grant programs or human resources.

Mitigation Objectives

Objective 1.1 Handle/filter storm water runoff to lessen pollutants into tributaries of

the Neuse River

Objective 1.2 Establish clear evacuation procedures and routes

Objective 1.3 Improve communication between the County and towns as to recommendations to evacuate or not to evacuate areas

Objective 2.1 Monitor the effectiveness of the Base Flood Elevation (BFE) as needed.

Objective 3.1 Improve storm water drainage system in vulnerable areas

Objective 4.1 Educate the public on how to minimize flood damage to their property.

Objective 4.2 Increase knowledge, understanding, and awareness of the National Flood Insurance Program (NFIP)

Mitigation Actions

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Pamlico County to the effects of natural hazards. In general, all of these activities fall into one of the following broad categories of mitigation techniques. The Committee reviewed each goal and developed action items to fulfill each stated goal and objective.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

Available Mitigation Techniques

Prevention

Preventative activities are intended to keep hazard problems from getting worse. They are particularly effective in reducing a community's future vulnerability, especially in

areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

Planning and Zoning

- Open space preservation
- Floodplain regulations
- Storm water management
- Drainage system maintenance
- Capital improvements programming
- Shoreline / riverine / fault zone setbacks

Property Protection

Property protection measures protect existing structures by modifying the building to withstand hazardous events, or removing structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (i.e., wind proofing, flood proofing, seismic design standards, etc.)
- Insurance
- Safe rooms

Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their mitigate functions. Such areas include floodplains, wetlands, and dunes. Parks, recreation, or conservation agencies and organizations often implement these measures. Examples include:

- Floodplain protection
- Beach and dune preservation
- Riparian buffers
- Fire resistant landscaping
- Fuel breaks
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Levees / dikes / floodwalls / seawalls
- Diversions / detention / retention
- Channel modification

- Beach nourishment
- Storm sewers

Emergency Services
Although not typically considered a "mitigation technique," emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Sandbagging for flood protection
- Installing shutters for wind protection

Public Information and Awareness
Public information and awareness activities are used to advise residents, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children education
- Hazard expositions

Mitigation Actions
The mitigation action steps proposed for Pamlico County to undertake are listed on the pages that follow. Each has been designed to achieve the goals and objectives listed in this plan. Each proposed action step includes:

1 – The appropriate category for the mitigation technique;
2 – The hazard it is designed to mitigate;
3 – The objective(s) it is intended to help achieve;
4 – Some general background information;
5 – The person responsible for the implementation of the action;
6 – A deadline in which the action is to be implemented;
7 – The funding source for the action; and
8 – The priority given to the action.

Action #1

Monitor and review damage assessments in the County during and after future events to evaluate the effectiveness of the increased BFE.

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	2.1
Background	Pamlico County currently requires new construction to be elevated to two (2) feet above Base Flood Elevation (BFE). This increase not only gives property owners additional vertical protection, but also qualifies them for a discount on flood insurance through the National Flood Insurance Program (NFIP). This action is consistent with an action item in the Land Use Plan.
Responsibility	Hazard Mitigation Committee
Deadline	Continuous monitoring, ongoing
Funding Sources	N/A
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #2

Identify vulnerable areas and prioritize the critical drainage ditches

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	Drainage in Pamlico County, mainly because of the flat topography, remains an important issue. This action proposes to identify the areas in the County that are vulnerable to flooding and identify critical drainage ditches. Once the critical drainage ditches are identified, the maintenance of these ditches should be prioritized. By identifying the vulnerable areas and the critical drainage ditches, priorities can be established to better protect these areas.
Responsibility	Hazard Mitigation Committee, North Carolina Department of Transportation
Deadline	June 1, 2010
Funding Sources	County's General Fund
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #3

Explore grant funding for storm water management plans

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	Pamlico County will research potential grant sources in order to create a storm water management plan to highlight and address the County's current storm water drainage needs.
Responsibility	Hazard Mitigation Committee
Deadline	ongoing
Funding Sources	NC Division of Emergency Management
Priority	Medium. This action is: 1) cost effective; and 2) technically feasible.

Action #4

Continue participation in the community service program to clean ditches and petition the State of North Carolina to continue the community service program

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	Pamlico County participates in the community service program, which provides the County with labor to clean ditches, thereby increasing the efficiency of storm water management. With fiscal pressures increasing at the state level, the County wants state legislators and administrators to know that the community service program is vital to the health, safety, and welfare of Pamlico County citizens.
Responsibility	Pamlico County Commissioners
Deadline	Ongoing
Funding Sources	N/A
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #5

Make public aware of the importance of drainage areas and the link to the proliferation of mosquitoes

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1, 4.1, 4.2
Background	Because of the flat topography and many acres of low lying areas, Pamlico County has a large population of mosquitoes during certain times of the year. Mosquitoes breed in areas of standing and/or stagnant water, so the need to promote awareness regarding storm water drainage is great. By involving the public (i.e., encouraging people to report problem drainage areas to the County), the County can better address the issue of standing water and mosquito proliferation.
Responsibility	Hazard Mitigation Committee
Deadline	ongoing
Funding Sources	County's General Fund
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #6

Coordinate with the State Forest Service / NC DOT concerning drainage ditches and tree-cutting activities

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	The forestry industry is important to Pamlico County. Because of the scale of forestry in the County, there are numerous instances where trucks hauling cut trees from a job site drive over the drainage ditches and damage the ditch cuts. This damage, in turn, greatly affects storm water drainage.
Responsibility	Pamlico County Manager
Deadline	ongoing
Funding Sources	N/A
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #7

Meet with insurance agents, realtors, and bankers to coordinate public education activities

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire
Objective(s) Addressed	4.1, 4.2
Background	When purchasing property, many prospective homeowners' only contact the officials that are familiar with natural hazard protection, insurance agents, realtors, and bankers. The County wishes to get these groups of professionals involved in the public education and awareness programs, to better serve the public and to make potential homeowners aware of the hazards to which they are susceptible.
Responsibility	Floodplain Coordinator
Deadline	ongoing
Funding Sources	Research potential grant funding
Priority	Medium This action is: 1) cost effective; and 2) technically feasible.

Action #8

Create a publication or brochure in order to communicate the potential of natural hazards in the area to potential landowners and residents

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.1, 4.2
Background	The publication will contain important information related to the County's susceptibility to potential natural hazards that occur in the area. It should also contain information pertaining to flood zones as well as storm surge potential displayed graphically on a map. The publication also will contain information related to the Coastal Area Management Act (CAMA).
Responsibility	Floodplain Coordinator, County Planner
Deadline	ongoing
Funding Sources	N/A
Priority	Medium This action is: 1) cost effective; and 2) technically feasible.

Action #9

Pursue placemats containing information about flood zones

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.1, 4.2
Background	In conjunction with Action #8, by distributing placemats to area restaurants containing flood zone information and information about storm surge associated with hurricanes, tropical storms, and nor'easters would be an original and unique method of communicating information to the public. Also, the low cost of printing (on recycled paper) the informative placemats makes this action cost-beneficial.
Responsibility	Floodplain Coordinator, County Planner
Deadline	ongoing
Funding Sources	NC Division of Emergency Management, FEMA
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #10

Meet with schools, churches and other community organizations to disseminate information

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.1, 4.2
Background	Communicating with churches and schools is a great way of disseminating information and promoting awareness of a subject. Hazard mitigation efforts should be taken to these arenas. By working with these organizations, the County can more effectively communicate information and solicit public input.
Responsibility	Floodplain Coordinator
Deadline	Ongoing, immediately following an event
Funding Sources	County's General Fund
Priority	Medium This action is: 1) cost effective; and 2) technically feasible.

Action #11

Recommend annual review by towns of storm readiness coordinated by County Emergency Management

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes
Objective(s) Addressed	1.3
Background	An annual review of storm readiness will keep the municipalities' plans regarding hazard mitigation updated and current. This review can be coordinated at the County Emergency Management level, and will allow the County to more proficient in the delivery of emergency services in the event of a natural hazard.
Responsibility	Pamlico County Emergency Management
Deadline	Ongoing
Funding Sources	County's General Fund
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #12

Support State efforts to develop guidelines to reduce nonpoint source water pollution that originates from new construction and use of fertilizers

Category	Natural Resource Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning
Objective(s) Addressed	1.1
Background	Nonpoint source water pollution has been an ongoing problem in the Neuse River Basin. The Neuse River and its water quality are vital to the quality of life and the economy in Pamlico County. Reducing the amount of nitrogen and phosphorus has been shown to increase water quality and usability. Additionally, new construction is often a source of sediment transport into the river. Guidelines would help make people aware of the water quality concerns and promote better water quality, improving the quality of life in Pamlico County.
Responsibility	NC Division of Water Quality
Deadline	July 1, 2006
Funding Sources	NC Division of Emergency Management, NC Division of Coastal Management, NC Division of Water Quality
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #13

Seek upstream river monitoring by the NC Division of Water Quality

Category	Natural Resource Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning
Objective(s) Addressed	1.1
Background	Nonpoint source water quality has been and will continue to be a significant concern in Pamlico County and the Neuse River. Studies have indicated that upstream development can contribute to decreased water quality in the Neuse River, as it runs along the southern border of Pamlico County. Upstream river monitoring will give the County a source of information about water quality problems upstream, and potentially allow the County to act proactively or to disseminate information pertaining to expected decreases in water quality.
Responsibility	Hazard Mitigation Committee
Deadline	ongoing
Funding Sources	N/A
Priority	Medium This action is: 1) environmentally sound; and 2) technically feasible.

Action #14

Map preferable secondary roads to be used for evacuation and place more evacuation route signs on roads throughout the County

Category	Emergency Services
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.2, 1.3
Background	All of the major roads in Pamlico County have "EVACUATION ROUTE" signs, depicting the route for citizens to take in case of an impending natural hazard. The secondary routes, however, are not marked as evacuation routes. The Hazard Mitigation Committee identified the marking of secondary as a need, to assist county residents and visitors with evacuation.
Responsibility	Pamlico County Emergency Management
Deadline	June 1, 2010
Funding Sources	County's General Fund, NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #15

Develop flood marker program and pursue a grant to fund the program

Category	Public Information
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Coastal Erosion
Objective(s) Addressed	4.2
Background	A flood marker program is a series of strategically placed poles or signs in heavily visited areas of the County that would inform citizens and visitors of flood elevations during various categories of storms. For example, a Category 1 hurricane could cause a 5-7' storm surge. The sign or pole would identify the various flood elevations and inform the public of the potential for flooding from storm surge.
Responsibility	Floodplain Administrator
Deadline	June 1, 2011
Funding Sources	NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #16

Develop the County's floodplain map for public dissemination in the brochure to be developed in Action #8 of this plan

Category	Public Information
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.2
Background	Knowledge of the location of flood zones is key to improving safety during a storm event. If citizens are aware of what flood zone they live in, and the expected flood elevation for a particular storm event, they can better make decisions regarding whether or not to evacuate or not. This action step proposes to create a user-friendly flood zone map that can be easily interpreted by most people. This step further proposes to circulate this flood map in different manners, including placement on the County's website.
Responsibility	Floodplain Administrator
Deadline	June 1, 2010
Funding Sources	County's General Fund, NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #17

Research methods to address repetitive loss properties

Category	Preventive
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.2
Background	Various techniques for mitigating or addressing repetitive loss properties exist, including but not limited to the Increased Cost Compliance program, acquisition, elevation, and relocation.
Responsibility	Floodplain Administrator
Deadline	ongoing
Funding Sources	County's General Fund, NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #18

Request the NC Climate Office in their Storm Events Database to include nor'easters, wildfires, and severe winter storms (damage estimates by county) in the list of various types of storms

Category	Public Information and Awareness
Hazard	Nor'easters, Wildfires, Severe Winter Storms
Objective(s) Addressed	4.1
Background	Data on nor'easters, wildfires, and severe winter storms historically affecting Pamlico County. This request will ensure the North Carolina counties will be able to include previous occurrences of these natural hazards in future updates of the hazard mitigation plan
Responsibility	Floodplain Administrator
Deadline	July 2011
Funding Sources	NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

SECTION 5: PLAN MAINTENANCE

The plan maintenance section of this document details the formal process that will ensure that the Pamlico County Hazard Mitigation Plan remains an active and relevant document.

Plan Maintenance Process

The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing a plan revision every five years. This section describes how Pamlico County and its municipalities will integrate public participation throughout the plan maintenance process.

Plan Adoption

The Pamlico County Commissioners will be responsible for adopting the Pamlico County Hazard Mitigation Plan. This governing body has the authority to promote sound public policy regarding natural hazards. Once the plan has been adopted, the Floodplain Administrator will be responsible for submitting it to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management. NC Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Pamlico County will remain eligible for Hazard Mitigation Grant Program funds.

Additionally, each municipality in Pamlico County will need to formally adopt this document. This plan will include a copy of the executed resolution formally adopted by the governing bodies of each of the jurisdictions requesting approval of the plan.

Monitoring, Evaluating and Updating the Plan

Implementation of the activities recommended by this plan will be monitored so the deadlines will be met. The Floodplain Administrator will be responsible for the tracking the activities outlined in this plan. Each person assigned a responsibility in this plan shall report to the Floodplain Administrator by the last day of each quarter (March 31, June 30, September 30, December 31). The Floodplain Administrator will report to the County Commissioners once each year, on the first week of hurricane season (June 1st). The report should review progress and recommend changes as needed. Also, the report will be released to the media and made available to the public.

When preparing the report to the County Commissioners, the Floodplain Administrator will refer to the following questions to assess the effectiveness and appropriateness of the hazard mitigation plan:

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

- Did agencies and other partners participate as agreed?

If changes are necessary, the Hazard Mitigation Planning Committee will reconvene during the first week of June to receive a presentation on the progress of the plan. If convened, the Hazard Mitigation Planning Committee will prepare an evaluation report that will be submitted to the County Commissioners.

Implementation through Existing Programs
Pamlico County will incorporate the hazard mitigation goals and actions into other policy statements, and will address conflicts with other policies where possible. As with any planning process, the Hazard Mitigation Plan will be referenced when developing or updating other planning documents, such as the CAMA Land Use Plan and any other official documents regarding land use and emergency management. The main means of integration will take place through implementation of the actions listed in the plan.

Continued Public Involvement
Pamlico County is dedicated to involving the public directly in review and updates of the Hazard Mitigation Plan. Any amendment to the Hazard Mitigation Plan must be made by the County Commissioners. A public hearing will be required before any consideration of an amendment to the plan can be made. Pamlico County's current outreach methods, sent to property owners located in the 100-year floodplain, will be used to disseminate hazard mitigation information to citizens and property owners.

Additionally, properties located outside of known hazard zones will be informed of susceptibility to natural hazards through one of the County's numerous actions items addressing public information dissemination and involvement.

Copies of the plan will be available at the public library and at the Building and Inspections Office. Public comments and suggestions are always welcome, and should be addressed to the Floodplain Administrator. Also, the Floodplain Administrator will work toward displaying the plan on a website. The County does not presently have this capability.

Pamlico County will review and revise this plan every five years (as required by FEMA), and it will be resubmitted to the State Hazard Mitigation Office for review and approval. Changes to the County's portion of this multi-jurisdictional plan may change the policies and programs of the participating individual municipalities. Any substantial change to the plan will require participation from the individual municipalities, in the form of representation on all future meetings of the Hazard Mitigation Planning Committee, and the municipalities' subsequent adoption of the amended plan. Conversely, the policies and programs formulated by an individual municipality participating in this multi-jurisdictional plan may change those policies and programs at anytime without consultation with or the approval of any of the other jurisdictions.

SECTION 6: HURRICANES AND NOR'EASTERS

The primary source of flooding in Pamlico County is wind driven surge generated in the Atlantic Ocean by tropical storms and hurricanes. The surge propagates into Pamlico Sound and further propagates into Bay River, Big Porpoise Bay, Jones Bay, Kershaw Creek, Middle Bay, Morris Creek, Pamlico River, Pamlico Sound, Smith Creek, Thomas Creek, and Trent Creek. Flooding from heavy rainfall occurs on Greens Creek, Kershaw Creek, Morris Creek, North Prong Bay River, Smith Creek, South Prong Bay River, Thomas Creek, and Trent Creek. High winds associated with tropical storms can also produce extremely high waves that create higher than normal surge. The wave action during a tidal flood can be more damaging than the higher water level. Not all storms that pass close to Pamlico County produce extremely high surge. Similarly, storms that produce flooding conditions in one area may not necessarily produce flooding conditions in other parts of Pamlico County.

The contribution from nor'easters to the overall storm surge elevation in the Pamlico County area was found to be insignificant compared to hurricanes; therefore, only the effects of hurricane and tropical storm induced surge elevations were considered. In other areas of North Carolina, particularly the Outer Banks area of the northern part of the state, nor'easters were found to provide a significant contribution to the overall storm surge.

These storms present three types of hazards: wind, storm surge, and rain. The following is a description of these three hazards:

<u>High winds</u>: Storms with wind speed ranging from over 74 mph up to 155 + mph are classified as hurricanes. These winds can blow roofs off of buildings and destroy mobile homes. All evacuation activities must be completed prior to onshore winds reaching tropical storm status (40 mph).

A related problem is tornadoes spawned by hurricanes, which will develop fast, inflict tremendous destruction, and vanish as fast as they appeared.

<u>Storm surge</u>: This is a great dome of water caused by winds and pressure differences in the air. Areas are flooded by water that can be up to 18 feet higher than normal sea levels, although such a surge is not likely in Pamlico County. In Pamlico County, the maximum storm surge is experienced north of where the hurricane's eye makes landfall. This surge especially when coupled with the breaking waves causes great destruction and accounts for most hurricane deaths.

<u>Rainfall</u>: Six to twelve inches of rainfall generally accompanies a hurricane. This causes flooding of streets before and during the worst part of a hurricane and river flooding inland after the storm passes. Flooding can be aggravated where drainage-ways are blocked by hurricane-blown debris.

Characteristics of Coastal Storms:

Storm Surge: The most dangerous and damaging feature of a coastal storm is storm surge. Storm surges are large waves of ocean water that sweep across coastlines where a storm makes landfall. The greatest height of the water is when the storm is more intense. The higher the storm surge the greater the damage to the coastline. Storm surges inundate coastal areas, wash out dunes, cause backwater flooding in rivers, and can flood streets and buildings in coastal communities. Storm surge areas can be mapped by the probability of storm surge occurrences using Sea, Lake, and Overland Surges from Hurricanes modeling (SLOSH) (see discussion of SLOSH).

Storm Tide: If a storm surge occurs at the same time as high tide, the water height will be even greater. Storm tide is the combination of the storm surge and the normal tide. For example, a 15-foot storm surge along with the normal 2-foot high tide creates a storm tide of 17 feet.

Inland Flooding: In recent years, most deaths related to hurricane and tropical storm activity have been the result of inland flooding. As hurricanes move across land bringing torrential rains and backwater flooding from the ocean, rivers and streams overflow. Hurricanes and tropical storms have been known to cause floods whose elevations represent greater than a 500-year probability of occurring in inland areas.

Water Force: During hurricanes and other coastal storms, coastal areas will experience flooding with velocity or “wave action,” defined as areas subject to receiving waves on top of the rising water from coastal flooding. The velocity and the force of the water make flooding even more destructive. The velocity and wave action knocks over buildings, move debris, erode dunes, scour the shoreline, and displace and redeposit sand. Areas subject to coastal flooding with velocity are designated as V or VE zones on FIRMs.

Wind Velocity: The higher the wind speed, the greater the damage. Hurricane force winds can travel hundreds of miles inland, creating substantial damage to buildings, vegetation, and infrastructure.

Coastal Erosion: Coastal erosion is the wearing away of coastal land. It is commonly used to describe the horizontal retreat of the shoreline along the ocean. Erosion is considered a function of larger processes of shoreline change, which includes erosion and accretion. Erosion results when more sediment is lost along a particular shoreline than is re-deposited by the water body. Accretion results when more sediment is deposited along a particular shoreline than is lost. When these two processes are balanced, the shoreline is said to be stable.

Hurricanes

Hurricanes are tropical cyclones with winds that exceed 74 miles per hour (mph) and circulate counter-clockwise about their centers in the Northern Hemisphere (clockwise in the Southern Hemisphere). Hurricanes are formed from simple complexes of

thunderstorms, commonly known as convection. However, these thunderstorms can only grow to hurricane strength with cooperation from both the ocean and the atmosphere. First, the ocean water itself must be warmer than 81 degrees Fahrenheit. The heat and moisture from this warm water is ultimately the source of energy for hurricanes. Hurricanes will weaken rapidly when they travel over land or colder ocean waters -- locations with insufficient heat and/or moisture.

Using SLOSH Maps

SLOSH is a computerized model run by the National Hurricane Center to estimate storm surge heights and winds resulting from historical, hypothetical, or predicted hurricanes by taking into account pressure, size, forward speed, track and winds. The SLOSH boundaries may differ from the base flood boundary on the FIRM. The SLOSH flood areas are determined by compositing the model surge values from 200-300 hypothetical hurricanes. The point of a hurricane's landfall is crucial to determining which areas will be inundated by the storm surge. Where the hurricane forecast track is inaccurate, SLOSH model results will be inaccurate. As a result, the SLOSH model is best used for defining the potential maximum surge for a location.

High Risk Factors

The following conditions may exacerbate the effects of coastal storms:

Coastal shape: Concave shoreline sections sustain more damage because the water is driven into a confined area by the advancing storm, thus increasing storm surge height and storm surge flooding.

Storm center velocity: The slower the storm moves, the greater the damage. The worst possible situation is a storm that stalls along a coast, through several high tides.

Nature of coast: Damage is most severe on low-lying barrier island shorelines because they are easily over washed by storm waves and storm surge.

Previous storm damage: A coast weakened by even a previous minor storm may be subject to proportionately greater damage in a subsequent storm.

Human activity: With increased development, property damage increases, multiplying the amount of floating debris available to damage or destroy other structures.

Hardened sand and flood control structures: Structures such as groins, jetties, or seawalls exacerbate localized scour and erosion and can be undermined, resulting in collapse (particularly seawalls).

Hurricane intensity is measured using the Saffir-Simpson Scale, ranging from 1 (minimal) to 5 (catastrophic). The scale categorizes hurricane intensity linearly based upon maximum sustained winds; minimum barometric pressure and storm surge potential, which are combined to estimate the potential flooding and damage to property

given a hurricane's estimated intensity (see Saffir-Simpson Scale and Damage tables below).

Some hurricanes are characterized primarily by water — a rainy or wet hurricane (such as Hurricane Floyd, which landed in North Carolina in 1999) — while others are primarily characterized by wind — a windy or dry hurricane (such as Hurricane Fran in 1996). Wet hurricanes can flood both coastal and inland areas, even as the storm dissipates in wind strength, while windy hurricanes primarily affect coastal areas with their high winds and storm surge. Inland communities will be most conceded with the flooding aspect of coastal storms. Torrential rains of even Category One hurricanes and tropical storms have been known to cause 500-year floods (which have a 0.2% chance of occurring each year) and greater flooding in inland communities. Pamlico County can determine how severe the high winds, storm surge and erosion could be from their storm surge inundation map.

Hurricane Categories (Saffir-Simpson scale)

Category 1: Winds 74-95 mph. Some examples are damage to shrubbery, trees, unanchored mobile homes, and some signs with a storm surge 5-7 feet above normal. Some damage to piers, exposed small craft, and low-lying buildings.

Category 2: Winds 96-110 mph. Some examples are some trees blown down, major damage to mobile homes and signs, some damage to building roofs and windows with a storm surge 8-10 feet. Other examples are considerable damage to piers, marinas, small craft, and low-lying buildings.

Category 3: Winds 111-130 mph. Some examples are large trees and many signs blown down, mobile homes substantially damaged, some structural damage to small buildings with a storm surge 11-12 feet. In addition to water damage, structures severely damaged by waves and floating debris.

Category 4: Winds 131-155 mph. Some examples are all signs blown down, mobile homes destroyed, extensive damage to roofing, windows, and doors with a storm surge of 13-18 feet above normal water levels.

Category 5: Winds over 155 mph. Some complete building failures, major damage to structures less than 15 feet above sea level within 500 yards of shore with a storm surge over 18 feet.

Historical Occurrences
North Carolina has a long and notorious history of destruction by hurricanes. Ever since the first expeditions to Roanoke Island in 1586, hurricanes are recorded to have caused tremendous damage to the state. The state's protruding coastline makes it a favorable target for tropical cyclones that curve northward in the western Atlantic Ocean.

According to the State Climate Office of North Carolina, 39 tropical cyclones have made direct landfall in North Carolina since 1886. Of these, 10 were tropical storms, 23 were minor hurricanes and 6 were major hurricanes. Another 56 tropical cyclones have impacted North Carolina since 1886 by either entering from another state or by passing in proximity to the coast but remaining offshore. Of these, 41 were tropical storms, 8 were minor hurricanes and 7 were major hurricanes. According to the State Climate Office, the coast of North Carolina can expect to receive a land falling tropical cyclone once every four years and be affected by one every 1.3 years.

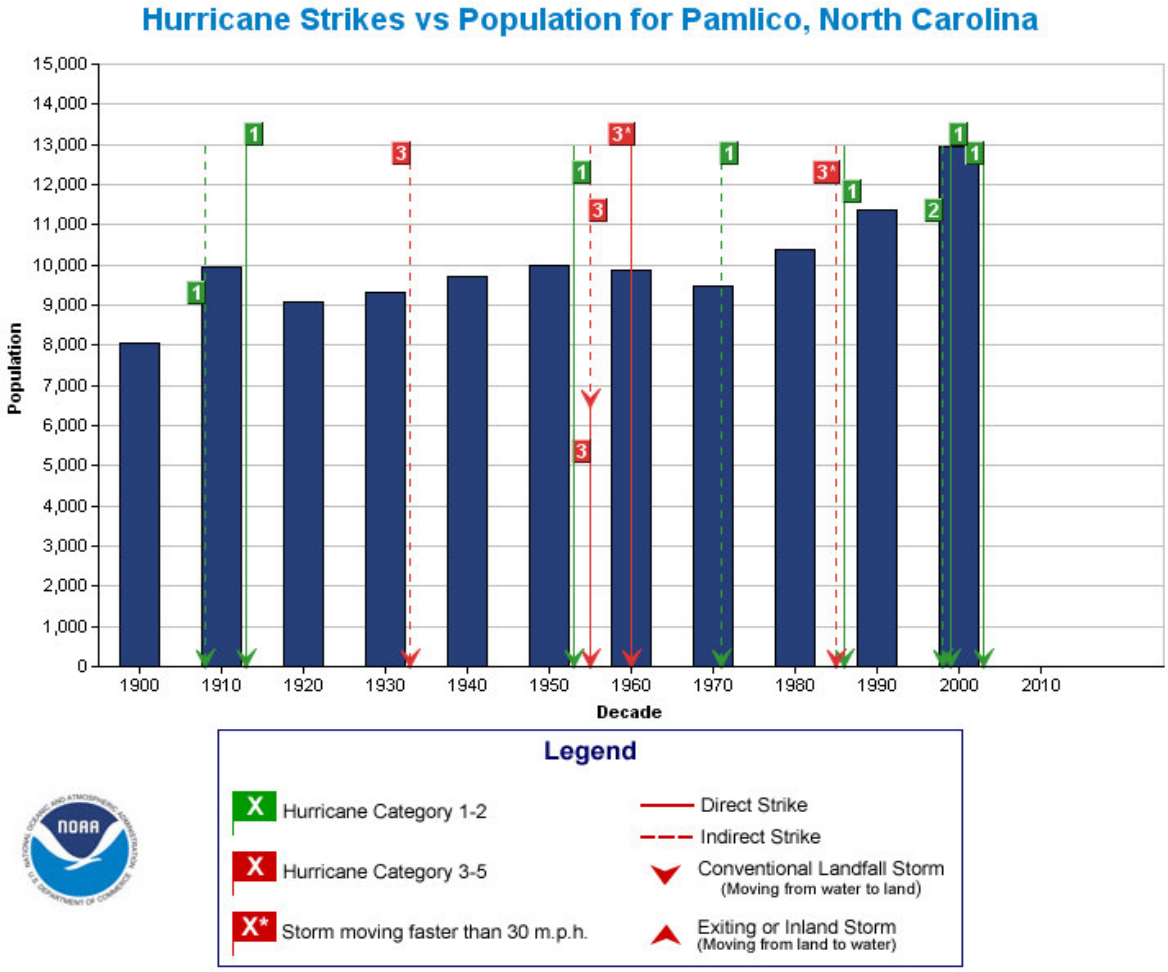
Table 7 lists all hurricanes and tropical storms that have made direct landfall in North Carolina since 1800. Approximate location of landfall and estimated wind speed and storm surge at landfall are also listed.

Table 7. Direct Land falling Hurricanes and Tropical Storms in North Carolina Since 1886

Approximate Date of Landfall	Storm Name	Saffir-Simpson Intensity at Landfall	Approximate Location of Landfall	Estimated Wind Speed (kt)	Storm Surge (ft)	Estimated Damages in Pamlico County
8/31/06	Ernesto	Trop. Storm	Onlsow/Carteret	60	2-3	$22,200,000
9/13/05	Ophelia	1	Atlantic Beach	85	6-8	$11,500,000
8/14/04	Charley	Trop. Storm	Onslow County	60	2-3	$2,900,000
8/03/04	Alex	2	Ocracoke	100	4-6	
9/18/03	Isabel	2	Core Banks	100	6-8	$14,300,000
9/16/99	Floyd	2	Topsail Island	95		$413,600,000
9/4/99	Dennis	Trop. Storm	Core Banks	60		$39,900,000
8/26/98	Bonnie	3	Cape Fear	100	6-8	$117,000,000
9/6/96	Fran	3	Cape Fear	100	8-12	
7/13/96	Bertha	2	Topsail Beach	90	5	$127,000,000
6/20/96	Arthur	Trop. Storm	Morehead	35		
8/18/86	Charley	1	Morehead	70		
9/26/85	Gloria	2	Hatteras	90	6-8	
9/9/84	Diana	1	Long Beach	80	5-6	
9/30/71	Ginger	1	Atlantic Beach	65	4	
8/27/71	Doria	Trop. Storm	Atlantic Beach	55		
10/16/64	Isabell	1	Morehead	65		
9/11/60	Donna	2	Carolina Beach	95	6-8	
9/19/55	Ione	2	Salter Path	90	3-10	
8/17/55	Diane	1	Carolina Beach	75	5-9	
8/12/55	Connie	1	Cape Lookout	70	7	
10/15/54	Hazel	4	NC/SC border	125	10-20	$28,400
8/30/54	Carol	2	Hatteras	85		
8/13/53	Barbara	2	Cape Lookout	90		
7/6/46		Trop. Storm	Wilmington	60		
6/25/45		Trop. Storm	Hatteras	55		
8/1/44		1	Southport	80		
9/18/36		2	Hatteras	85		
9/16/33		3	Ocracoke	100		

Approximate Date of Landfall	Storm Name	Saffir-Simpson Intensity at Landfall	Approximate Location of Landfall	Estimated Wind Speed (kt)	Storm Surge (ft)	Estimated Damages in Pamlico County
8/23/33		2	Hatteras	85		
12/2/25		1	Wilmington	65		
9/22/20		1	Topsail Beach	65		
8/25/1918		Trop. Storm	Morehead	50		
9/6/1916		Trop. Storm	Southport	35		
9/3/1913		1	Hatteras	70	10	
7/31/1908		2	Morehead	85		
11/13/1904		3	Hatteras	100		
7/11/1901		1	Hatteras	65		
10/13/1900		Trop. Storm	Hatteras			
10/31/1899		1	Wrightsville	80	8	
8/16/1899		4	Hatteras	115	4-10	
10/26/1897		Trop. Storm	Hatteras	55		
10/22/1893		Trop. Storm	Hatteras	50		

Figure 7.



Hurricane Strike Data: National Hurricane Center
Population Data: U.S. Census Bureau
NOTE:Population values may be missing in some counties, particularly for earlier periods. This is most often attributable to the fact that the county had not yet been established.
NOTE:There may be discrepancies between the strike data shown in this chart and the HURDAT strike data used in the Historical Hurricanes Tracks Tool. The National Hurricane Center is currently updating the strike data used for these charts. For more information visit http://www.aoml.noaa.gov/hrd/data_sub/re_anal.html
NOTE:Population data is current as of 2000 U.S. Census. X-axis on graphs depict years through 2010 to illustrate storms that have occurred from 2000-2006.

Figure 8.

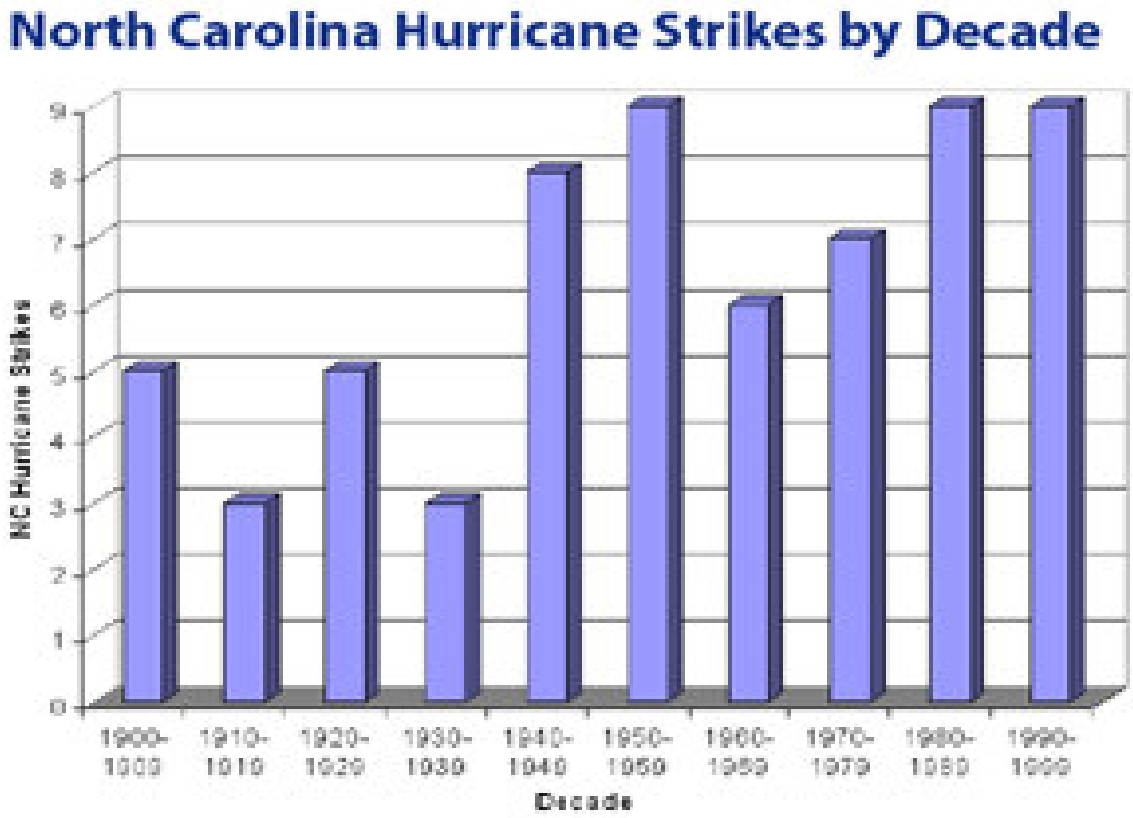
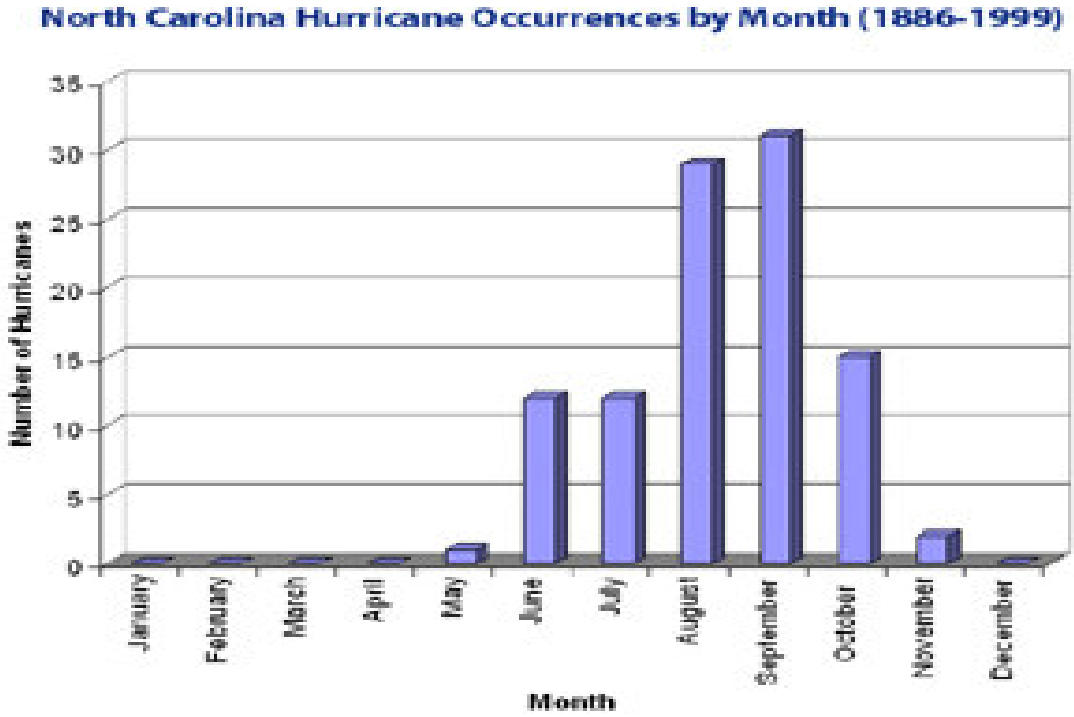


Figure 9.



Source: North Carolina State Climate Office Website

Figure 10. Probability of a Named Storm

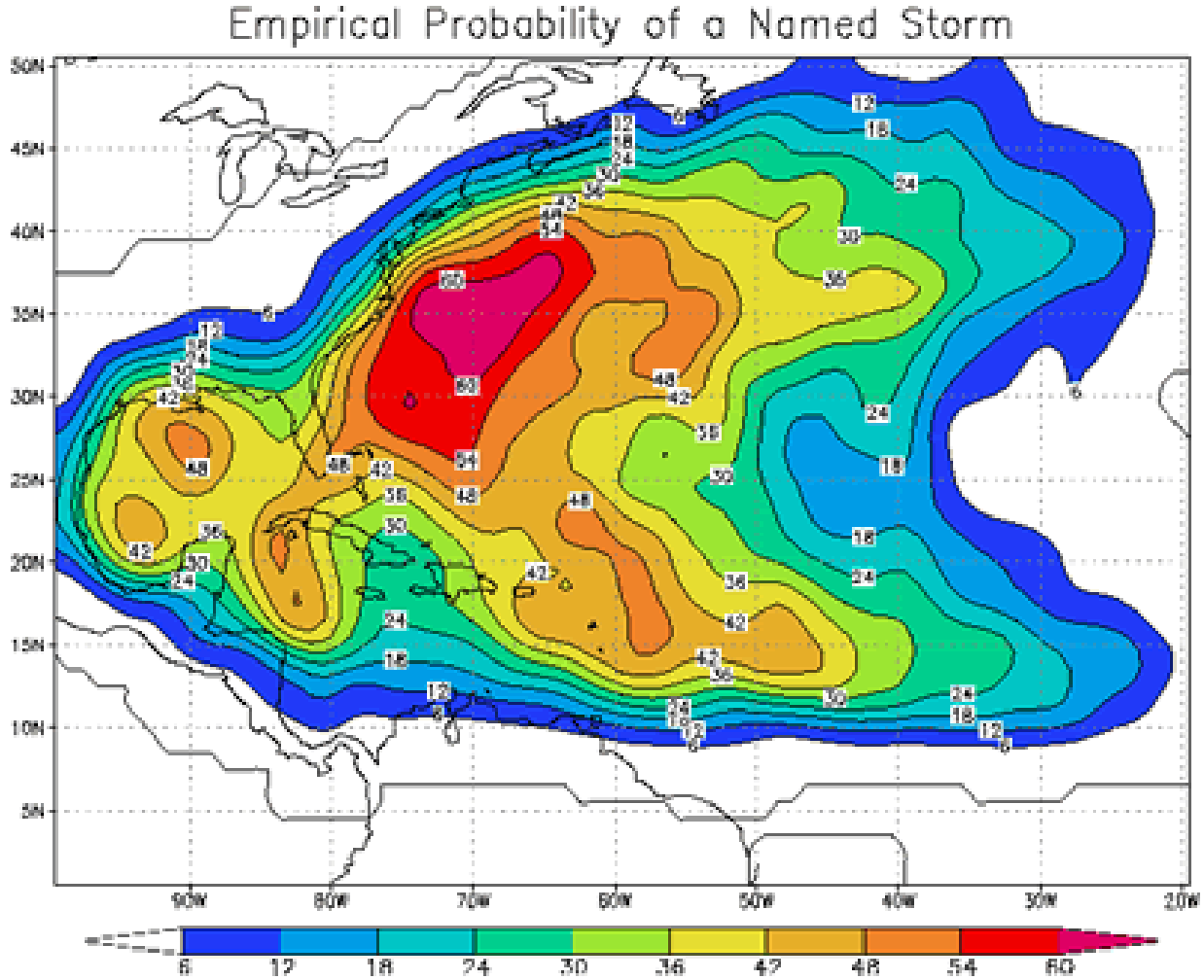


Figure 6 shows for any particular location what the chance is that a tropical storm or hurricane will affect the area sometime during the Atlantic hurricane season. The figure was created by Todd Kimberlain of the National Oceanic and Atmospheric Administration's Hurricane Research Division. In creating the graphic, he utilities the years of 1944 to 199 in the analysis and counted hits when a storm or hurricane was within about 100 miles (165 km) of each location. The figure shows that Pamlico County faces a 36-48% annual chance that a tropical storm or hurricane will affect the area.

Pamlico County has a storied past with hurricanes and tropical storms. While detailed damage data is not available for most of the 20th century, the period from 1993-2009 is well chronicled. Hurricane Floyd, in 1999, is the most costly hurricane in Pamlico County's history with $413,600,000 in damages. Hurricane Bertha in 1996 was the second most costly hurricane, with $127,000,000 in damages. Hurricane Bonnie, a slow-moving storm in 1998, is the third most costly hurricane in Pamlico County with $117,000,000 in damages.

Source: http://www.nc-climate.ncsu.edu/products_old/wx/events/events.php

Nor'easters

Although nor'easters are listed as a major threat to Pamlico County, the effects of a nor'easter are not felt with the same severity as they are in parts of the state that border the open ocean. Still, nor'easters can bring high winds and storm surges to Pamlico County. Unlike a hurricane that may pass over a coastal location in less than a day, a nor'easter, or a severe extra tropical cyclone, may blow from the same direction and over long distances for several days. Although nor'easters are more diffuse and less intense than hurricanes, they occur more frequently and cover larger areas and longer coastal reaches at one time. Nor'easters form near the Atlantic coast, generally over coastal areas where there is a large temperature gradient in wintertime between air over a cold landmass and air over relatively warm ocean waters. The presence of the Gulf Stream off the eastern seaboard in the winter season acts to dramatically enhance the surface horizontal temperature gradients within the coastal zone. This is particularly true off the North Carolina coastline where, on average, the Gulf Stream is closest to land north of 32 degrees latitude. During winter offshore cold periods, these horizontal temperature gradients can result in rapid and intense destabilization of the atmosphere directly above and shoreward of the Gulf Stream. This air mass modification or conditioning period often precedes wintertime coastal extra-tropical cyclone development.

When jet stream disturbances (which create lift) move over this temperature gradient, surface low-pressure systems can form. Because of the abundant moisture from the ocean and temperature gradient of the coastal front, these storms can develop explosively.

It is the temperature structure of the continental air mass and the position of the temperature gradient along the Gulf Stream that drives this cyclone development. As a low pressure deepens, winds and waves can uninhibitedly increase and cause serious damage to coastal areas as the storm generally moves to the northeast.

The coastal counties of North Carolina are most vulnerable to the impacts of nor'easters. Since the storms typically make landfall with less warning than hurricanes (due to their rapid formation right along the coast), residents may be caught at home unprepared. On the other hand, nor'easters typically occur during the off-season when fewer non-residents are visiting the coast. As with hurricanes, vulnerability is proportional to structural strength, with mobile homes particularly vulnerable.

A scale, similar to the Saffir-Simpson scale for hurricanes, has been developed by Robert Davis and Robert Dolan (1993). Although beach erosion and dune erosion by nor'easters is not a serious threat to Pamlico County as it is in other coastal areas, this scale gives you an idea of the intensity of various nor'easters. The Dolan-Davis scale is shown below.

Table 9. Dolan-Davis Nor'easter Scale

Storm Class	Beach Erosion	Dune Erosion	Over wash	Property Damage	Duration (measured in number of tidal cycles)
1 (Weak)	Minor changes	None	No	No	Up to 1 tide
2 (Moderate)	Modest; mostly to lower beach	Minor	No	Modest	Up to 2 tides
3 (Significant)	Erosion extends across beach	Can be significant	No	Loss of many structures at local level	2 to 3 tides
4 (Severe)	Severe beach erosion and recession	Severe dune erosion or destruction	On low beaches	Loss of structures at community-scale	3 to 4 tides
5 (Extreme)	Extreme beach erosion	Dunes destroyed over extensive areas	Massive in sheets and channels	Extensive at regional-scale; millions of dollars	4 to 5 tides

Table 10. Nor'easters from 1942 to 1984

Storm Class	Number of Storms	Percentage of Total
1 – Weak	670	49.7
2 – Moderate	340	25.2
3 – Significant	298	22.1
4 – Severe	32	2.4
5 - Extreme	7	0.1

Source: Dolan, Robert and Robert E. Davis. "An Intensity Scale for Atlantic Coast Northeast Storms." Journal of Coastal Research. Vol. 8:4, pp. 840-853.

Unfortunately, no data source exists, which details or describes damages in Pamlico County due to nor'easters. This data limitation precludes information on previous occurrences. Pamlico County will include, as a mitigation action, a request to the NC Climate Office's Storm Events Database (http://www.nc-climate.ncsu.edu/monitoring/events.html) to include "nor'easters" in the list of various types of storms.

SECTION 7: WILDFIRE

Wildfire

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the air for miles around. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires. A wild land fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines and similar facilities. An Urban-Wild land Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wild land or vegetative fuels.

People start more than four out of every five wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires.

North Carolina, with its large amount of wooded areas, is included among the states with a high risk of wildfire. As development has spread into areas of North Carolina which were previously rural, new residents have been relatively unaware of the hazards posed by wildfires and have used highly flammable material for constructing buildings. This has increased the threat of loss of life and property, and has also resulted in a greater population of people less prepared to cope with wildfire hazards. The southern coastal plain is particularly vulnerable to the wildfire hazard. The mountain region has also experienced wildfires.

Wildfire behavior is based on three primary factors: fuel, topography and weather:

Fuel: The type and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. The continuity of fuels, expressed in both horizontal and vertical components is also a factor, in that it expresses the pattern of vegetative growth and open areas.

Topography (slope) is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. In general terms, the steeper the slope of the land, the faster a fire can spread up the slope. A topographic map can help identify areas of the community with slopes less than 40%, between 41% and 60%, and greater than 61%, corresponding to low, moderate and steep gradients relative to the spread of wildfires.

Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity, and wind (both short and long term) affect the severity and duration of wildfires. Critical Fire Weather Frequency is a set of weather conditions, usually a combination of low relative humidity and wind, whose effects on fire behavior make control difficult and threaten firefighter safety. The average number of days per year of critical fire weather experienced in the community can be obtained from the local or state fire marshal, forestry department, or department of natural resources. The

National Weather Service or NOAA Websites can help determine past weather conditions.

To determine fire hazard severity for the community, the Fire Hazard Severity Table below was used. There may be more than one classification in the community depending on the degrees of the slope and fuel models.

Table 11. Fire Hazard Severity

Fuel Classification	Critical Fire Weather Frequency								
	<1 Day / Year			2 to 7 Days/Year			>8 Days/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 inches in diameter
M = Moderate Hazard; **H** = High Hazard; **E** = Extreme Hazard
(Source: FEMA Report No. 386-2)

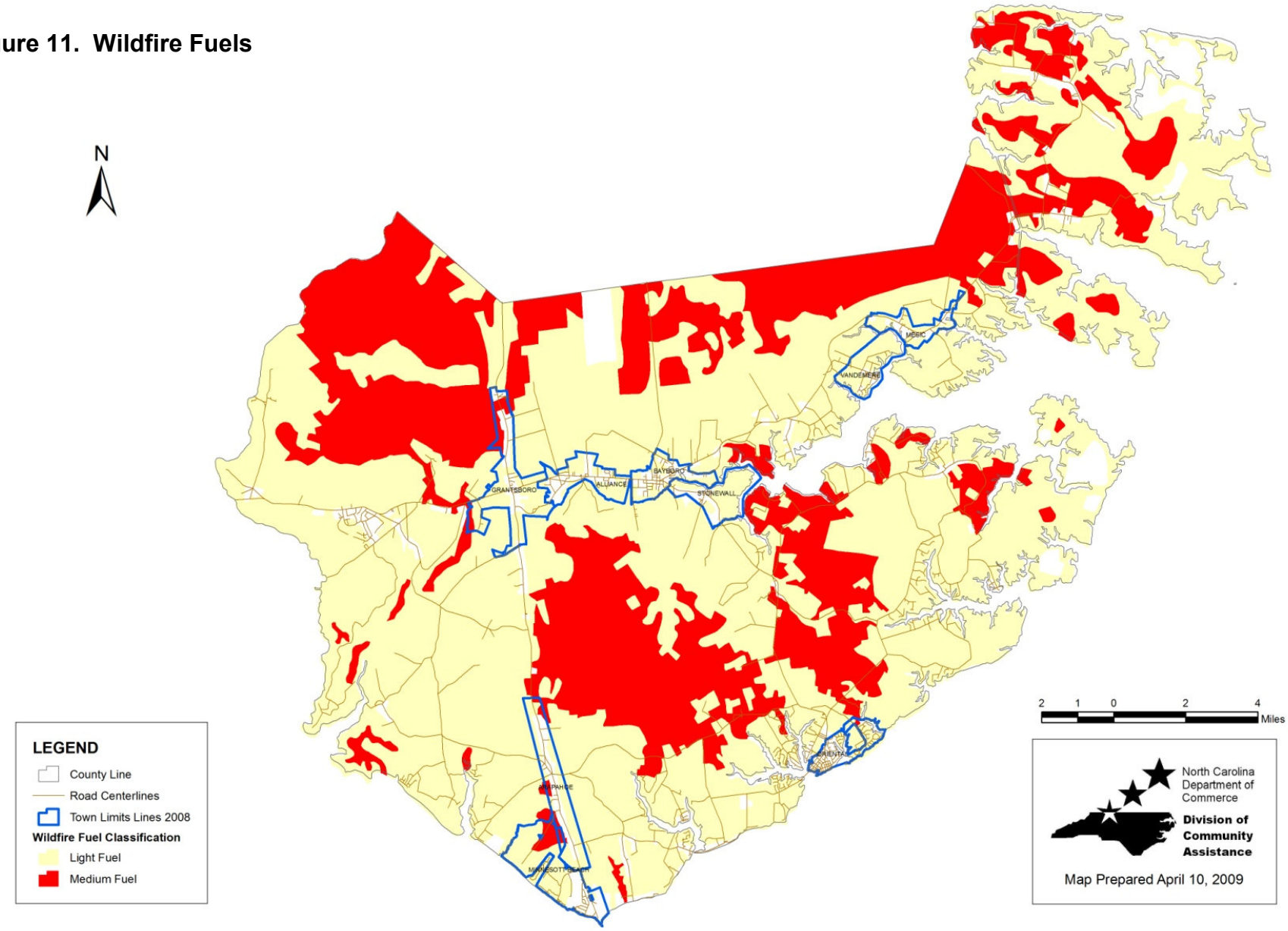
In Pamlico County, the types of vegetative fuels are cropland and pasture, forested lands, wetlands, and rangeland. The following table is a vulnerability assessment of the county, in regard to wildfire.

Unfortunately, no data source exists that detail or describes damages in Pamlico County due to wildfires. This data limitation precludes information on previous occurrences. Pamlico County will include, as a mitigation action, a request to the NC Climate Office's Storm Events Database (http://www.nc-climate.ncsu.edu/monitoring/events.html) to include "wildfires" in the list of various types of storms.

Table 12. Wildfire Vulnerability

Type of Fuel	Fuel Classification	Acres
Cropland and pasture	Light	45,684
Deciduous forest	Light	982
Evergreen forest	Light	45,507
Mixed forest	Light	27,424
Non-forested wetlands	Light	25,074
Forested wetlands	Medium	62,910
Shrub and brush rangeland	Medium	1,973

Figure 11. Wildfire Fuels



SECTION 8: THUNDERSTORMS

Thunderstorms

Thunderstorms are the result of convection in the atmosphere. They are typically the by-product of atmospheric instability, which promotes the vigorous rising of air parcels that form cumulus and, eventually, the cumulonimbus (thunderstorm) cloud. Instability can be caused either by surface heating or upper-troposphere (~50,000 feet) divergence of air (rising air parcels can also result from air flows over mountainous areas). Generally, the former “air mass” thunderstorms form on warm-season afternoons and are not severe. The latter “dynamically-driven” thunderstorms generally form in association with a cold front or other regional-scaled atmospheric disturbance. These storms can become severe, producing strong winds, frequent lightning, hail, downbursts and even tornadoes.

A typical thunderstorm may be three miles wide at its base, rise to between 40,000 to 60,000 feet in the troposphere, and contain half a million tons of condensed water. Conglomerations of thunderstorms along cold fronts (with squall lines) can extend for hundreds of miles. Thunderstorms contain tremendous amounts of energy derived from condensation of water. The half million tons of condensed water release 300 trillion calories of energy, equivalent to about 100 million kilowatt-hours of electricity, or several Hiroshima-sized atomic bombs.

According to the National Weather service, a severe thunderstorm is one that produces tornadoes, hail 0.75 inches or more in diameter, or winds of 50 knots (58 mph) or more. Structural wind damage may imply the occurrence of a severe thunderstorm. Hail, formed by the accretion of super cooled liquid water on ice particles in a thunderstorm updraft, can pose a serious threat to agriculture and exposed objects. Likewise, strong winds can potentially wreak havoc on fragile or flimsy structures, or yield secondary damage through the downing of trees. Lightning associated with thunderstorms poses a threat to people and animals in unsheltered areas. The tornado, however, is by far the greatest natural hazard threat from a severe thunderstorm.

Thunderstorms are common throughout North Carolina and have occurred in all months of the year. Thunderstorm-related deaths and injuries in North Carolina peak during July and August. Visitors fishing on the open waters, golfing or swimming at the beach are at risk.

Table 13. Severe Thunderstorm Events and Damage

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 PAMLICO	06/13/1974	1330	Tstm Wind	0 kts.	0	0	0	0
2 PAMLICO	07/11/1981	1050	Tstm Wind	0 kts.	0	0	0	0
3 Near Bayboro	08/05/1994	1647	Thunderstorm Winds	0 kts.	0	0	0	0
4 Whortonsville	10/14/1994	2227	Thunderstorms Winds	N/A	0	0	0	0
5 Stonewall	11/07/1995	1915	Thunderstorm Winds	0 kts.	0	0	1K	0
6 Grantsboro	04/26/1996	02:14 PM	Tstm Wind	0 kts.	0	0	0	0
7 Bayboro	06/14/1997	02:45 PM	Tstm Wind	50 kts.	0	0	0	0
8 Vandemere	01/08/1998	11:00 AM	Tstm Wind	0 kts.	0	0	5K	0
9 Reelsboro	05/23/1998	12:20 PM	Tstm Wind	61 kts.	0	0	0	0
10 Oriental	03/12/2000	03:20 AM	Tstm Wind	61 kts.	0	0	0	0
11 Grantsboro	05/22/2000	09:28 PM	Tstm Wind	67 kts.	0	0	20K	0
12 Florence	08/16/2000	11:15 PM	Tstm Wind	0 kts.	0	0	30K	0
13 Olympia	08/18/2000	06:55 PM	Tstm Wind	52 kts.	0	0	0	0
14 Grantsboro	05/28/2001	11:10 AM	Tstm Wind	62 kts.	0	0	0	0
15 Vandemere	07/10/2002	03:07 PM	Tstm Wind	62 kts.	0	0	0	0
16 Pamlico	03/07/2004	09:30 PM	High Wind	60 kts.	0	0	29K	0
17 Arapahoe	06/11/2004	11:00 PM	Tstm Wind	50 kts.	0	0	0	0
18 Countywide	03/08/2005	11:42 AM	Tstm Wind	55 kts.	0	0	10K	0

19 Alliance	06/12/2007	16:45 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
20 Merritt	08/10/2007	17:20 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
21 Whortonville	03/05/2008	01:50 AM	Thunderstorm Wind	56 kts.	0	0	0K	0K
22 Kennel Beach	07/08/2008	15:39 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
23 Scotts Store	06/26/2009	15:27 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
TOTALS:					0	0	95K	0

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Source: http://www.nc-climate.ncsu.edu/products_old/wx/events/events.php

Over the past 40 years, Pamlico County has experienced a number of severe thunderstorm events. The most damaging event was in Florence in 1980 ($30,000), followed by an event that impacted the entire county in 2004 ($29,000 in damages). Fortunately, no deaths have been reported in Pamlico County due to thunderstorms in the past 40 years. Data prior to 1974 is not available.

SECTION 9: COASTAL EROSION

In assessing the erosion hazard in Pamlico County, it is important to realize that there is a temporal or time aspect associated with the average rate at which a shoreline is either eroding or accreting. Over a long-term period (years), a shoreline is considered eroding, accreting, or stable. When evaluating coastal erosion in the community, it is important to focus on the long-term erosion situation. However, it is important to understand that storms can erode a shoreline that is, over the long-term, classified as accreting, and vice versa.

Erosion is measured as a rate, with respect to either a linear retreat (i.e., feet of shoreline recession per year) or volumetric loss (i.e., cubic yards of eroded sediment per linear foot of shoreline frontage per year). Erosion rates are not uniform, and vary over time at any single location. Annual variations are the result of seasonal changes in wave action and water levels.

Erosion is caused by coastal storms and flood events; changes in the geometry of tidal inlets, river outlets, and bay entrances; man-made structures and human activities such as shore protection structures and dredging; long-term erosion; and local scour around buildings and other structures.

Shoreline erosion is a natural hazard within Pamlico County. Of the county's 348 miles of bay and estuarine shoreline, 54.7 miles are considered to be experiencing serious erosion problems. These areas are identified on Figure 8. The following defines the nine shoreline areas experiencing serious erosion problems (source: Pamlico County 1992 Land Use Plan Update).

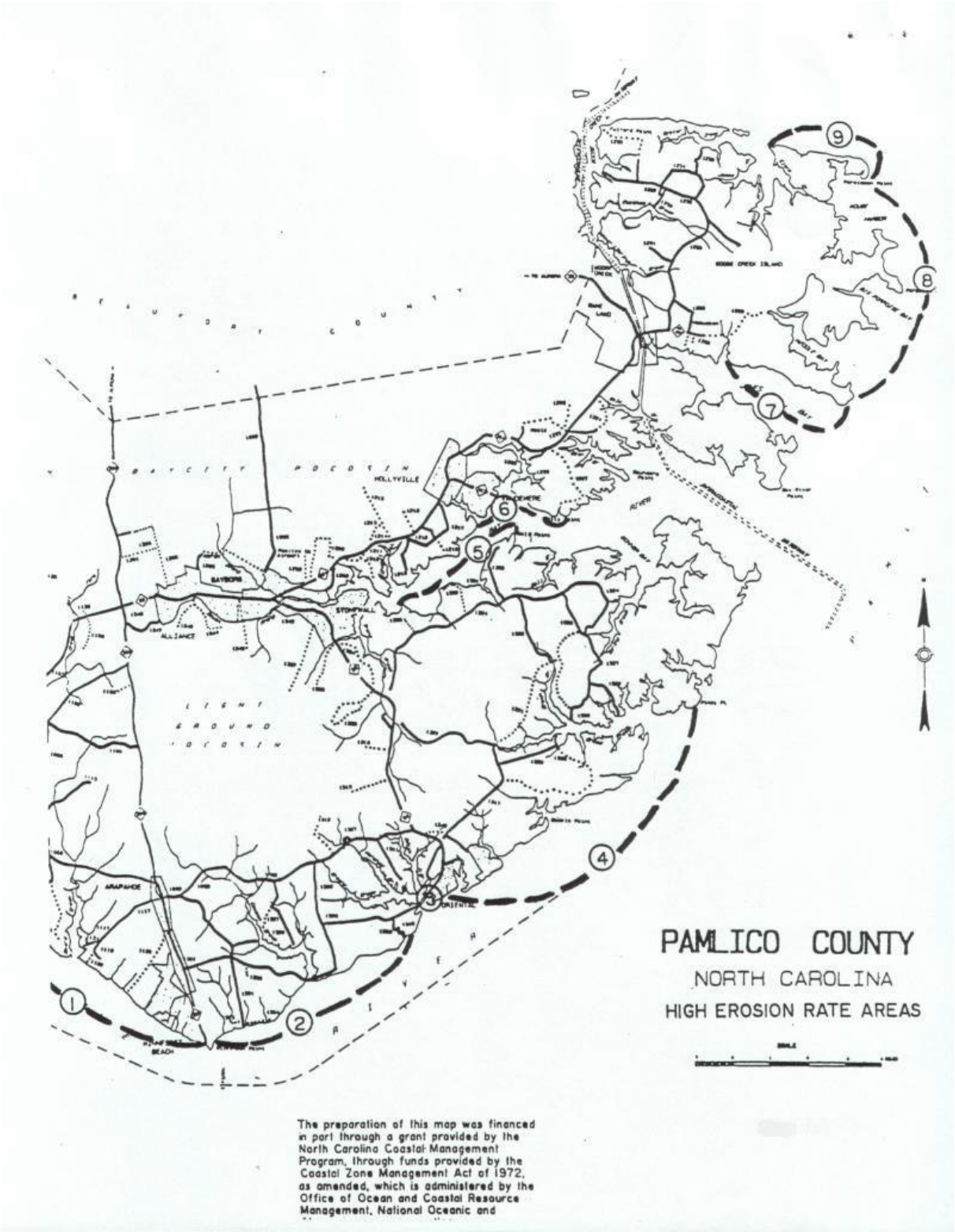
Reach No. 1	Average width lost to erosion	74.8 feet
	Average height of bank	14.3 feet
	Length of shoreline eroding	6.8 feet
	Length of shoreline accreting	0 miles
	Total length of shoreline	6.8 miles
Reach No. 2	Average width lost to erosion	159.2 feet
	Average height of bank	8.4 feet
	Length of shoreline eroding	7.5 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	7.5 miles
Reach No. 3	Average width lost to erosion	0 feet
	Average height of bank	0 feet
	Length of shoreline eroding	0 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	.5 miles
Reach No. 4	Average width lost to erosion	237.1 feet

	Average height of bank	4.8 feet
	Length of shoreline eroding	7.1 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	7.1 miles
Reach No. 5	Average width lost to erosion	52 feet
	Average height of bank	4.0 feet
	Length of shoreline eroding	4.4 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	7.1 miles
Reach No. 6	Average width lost to erosion	95.4 feet
	Average height of bank	2.9 feet
	Length of shoreline eroding	2.3 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	2.3 miles
Reach No. 7	Average width lost to erosion	76.3 feet
	Average height of bank	3.8 feet
	Length of shoreline eroding	2.8 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	2.8 miles
Reach No. 8	Average width lost to erosion	85.5 feet
	Average height of bank	3.3 feet
	Length of shoreline eroding	19.4 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	19.5 miles
Reach No. 9	Average width lost to erosion	98.3 feet
	Average height of bank	2.6 feet
	Length of shoreline eroding	3.9 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	3.9 miles

Some areas of rapid erosion may be found along stretches of the Intracoastal Waterway which are caused by boat induced wave action.

Unfortunately, coastal erosion data has not been collected since 1992. Pamlico County will incorporate new data into future updates of the hazard mitigation plan as it becomes available.

Figure 12. Excessive Erosion Areas
Source: Pamlico County 1992 Land Use Plan Update



SECTION 10: TORNADOES

A tornado is a violently rotating column of air extending to the ground. Over water, a tornado is called a *waterspout.* The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of 1 mile wide and 50 miles long.

Tornadoes are among the most unpredictable of weather phenomena. Tornado season runs ordinarily from March through August; however, tornadoes can strike at any time of the year if the essential conditions are present.

Thunderstorms and hurricanes spawn tornadoes when cold air overrides a layer of warm air, causing the warm air to rise rapidly. The winds produced from hurricanes, earthquake-induced fires, and wildfires have been known to produce tornadoes as well.

The nature of tornadoes is that they strike at random. While it is known that some areas of the country experience tornadoes more than others, predicting exactly what parts of the community have a greater chance of being struck by a tornado is difficult. In order to determine the likelihood and potential severity of tornado events in the community, the community should ascertain the number and intensity of tornadoes that have affected the area in the past. Take note, however, that the past number and severity of events is not necessarily a predictor of future occurrences.

Historical Occurrences

The majority of tornadoes (71%) reported in North Carolina have been classified as weak, 28% as strong, and about 1% as violent. Weak tornadoes have caused 3% of North Carolina tornado deaths, similar to the national figure. Strong tornadoes were responsible for 49% of North Carolina deaths (compared to 70% for the nation). Based on state tornado statistics (SERCC, 1996), there have been 941 confirmed tornadoes in the state since 1950. North Carolina ranks 22nd in total number of tornadoes and 18th in tornado deaths for the period 1953-1995.

Although tornadoes have been reported in North Carolina throughout the year, most of them have occurred in the spring, with 13% in March, 11% in April, 22% in May and 14% in June. The most severe tornadoes have also taken place during the spring, with more than half of all F2 or stronger storms occurring in that season.

The mountains and northern piedmont of North Carolina experience the lowest frequency of tornadoes because of less favorable conditions for severe thunderstorm activity in those regions. The highest frequency of tornadoes historically has occurred in the southeastern portion of the State.

Table 14. Tornadoes in Pamlico County

Tornadoes in Pamlico County (1950-July 31, 2003)						
Location	**Date**	**Type**	**Magnitude**	**Deaths**	**Injuries**	**Property Damage**
Pamlico County	9/29/1963	Tornado	F2	0	0	25K
Pamlico County	3/17/1965	Tornado	F3	1	40	2.5M
Pamlico County	3/21/1983	Tornado	F0	0	0	25K
Pamlico County	4/19/1988	Tornado	F1	0	0	25K
Pamlico County	11/28/1988	Tornado	F1	0	5	2.5M
Oriental	8/26/1998	Tornado	F0	0	0	0
Arapahoe	9/15/1999	Funnel Cloud	N/A	0	0	0
Grantsboro	9/15/1999	Tornado	F0	0	0	0
Bayboro	9/15/1999	Tornado	F0	0	0	0
Hobucken	9/15/1999	Tornado	F2	0	0	700K
Bayboro	9/15/1999	Tornado	F0	0	0	0
Bayboro	6/23/04	Tornado	F0	0	0	0
Grantsboro	10/12/04	Tornado	F0	0	0	0
Merritt	10/13/04	Tornado	F0	0	0	0
TOTALS:				1	45	$5,775,000

Source: National Climatic Data Center

Since 1963, tornadoes in Pamlico County have caused $5,775,000 in damages. The most costly tornadoes in Pamlico County were: 1) a F3 event in 1965 that affected the entire county, resulting in $2,500,000 in damages, 1 death, and 40 injuries; and 2) a F1 event in 1998 that affected much of the county, resulting in $2,500,000 in damages and

injuring 5 persons. These two events make up the majority of the damages in Pamlico County from tornadoes.

Scale
Tornadoes are characterized by damage pattern, FO through F5 on the Fujita-Pearson Tornado Scale. The table below shows the tornado category, expected damages, and corresponding wind speed.

Table 15. Fujita-Pearson Tornado Scale

F-Scale	Damage	Winds (mph)	Path Length (miles)	Mean Width (miles)
F0 (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	≥ 100	> 1.0

SECTION 11: MOSQUITOES

Mosquitoes also affect the entire county. While not typically included in hazard mitigation discussions, mosquitoes can be a nuisance in Pamlico County.

The life cycle of a mosquito can vary from one to several weeks depending upon the species (the adult, mated females of some species can survive the winter in cool, damp places until spring, when they will lay their eggs and die.) The females lay their eggs in water and the larva and pupa stages live entirely in water. During the late summer and early fall, Pamlico County receives some of the greatest rainfall totals of the year, providing ample breeding grounds for mosquitoes.

Since the mosquito hazard is unique to Pamlico County, there is no available data depicting previous occurrences in the county.

SECTION 12: LANDSLIDES

Common throughout the mountainous Appalachian region, landslides are described as downward movement of a slope and materials under the force of gravity. The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways), and natural factors (geology, precipitation, and topography).

Mudflows (or debris flows) are flows of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt, changing the earth into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. Other types of landslides include: rock slides, slumps, mudslides, and earth flows. All of these differ in terms of content and flow.

Landslides occur when masses of rock, earth, or debris move down a slope. Therefore, gravity acting on an overly steep slope is the primary cause of a landslide. They are activated by storms, fires, and by human modifications to the land. New landslides can result from heavy rainstorms, earthquakes, and various human activities.

The best predictor of future landslides is past landslides because they tend to occur in the same places. Existing or old landslides may be found in the following areas:

- On or at the base of slopes;
- In or at the base of minor drainage hollows;
- At the base or top of an old fill slope;
- At the base or top of a steep cut slope; or
- Developed hillsides where leach field septic systems are used.

The following conditions may exacerbate the effects of landslides:

<u>Erosion</u>: Erosion caused by rivers, glaciers, or ocean waves created by overly steep slopes.

<u>Unstable Slopes</u>: Rock and soil slopes are weakened through saturation by snowmelt or heavy rains.

<u>Earthquakes</u>: The shaking from earthquakes creates stress that makes weak slopes fail.

<u>Vibrations</u>: Machinery, traffic, blasting, and even thunder may cause vibrations that trigger failure of weak slopes.

<u>Increase of Load</u>: Weight of rain/snow, fills, vegetation, stockpiling of rock or ore from waste piles, or from man-made structures may cause weak slopes to fail.

Hydrologic Factors: Rain, high water tables, little or no ground cover, and numerous freeze/thaw cycles may cause weak slopes to fail.

Human Activity: These include development activities such as cutting and filling along roads and removal of forest vegetation. Such activities are capable of greatly altering slope form and ground water conditions which can cause weak slopes to fail.

Removal of Lateral and Underlying Support: Erosion, previous slides, road cuts and quarries can trigger failure of weak slopes.

Increase of Lateral Pressures: Hydraulic pressures, tree roots, crystallization, swelling of clay soil may cause weak slopes to fail.

Regional Tilting: Geologic movements can trigger weak slopes to fail.

The three most useful types of landslide maps are: 1) landslide inventories; 2) landslide susceptibility maps; and 3) landslide hazard maps.

Landslide Inventories: Landslide inventories identify areas that appear to have failed due to landslides, including debris flows and cut-and-fill failures. Detailed inventories depict and classify each landslide and show scarps, zones of depletion and accumulation, active versus inactive slides, geological age, rate of movement, and other pertinent data on the depth and type of materials involved in sliding. Overlaying a geologic map with an inventory map that shows existing landslides can identify specific landslide-prone geologic units. For this reason, a landslide inventory is essential for preparing a landslide susceptibility map.

Landslide Susceptibility Maps: Landslide susceptibility maps depict areas that have the potential for landslides by correlating some of the principal factors that contribute to landslides - steep slopes, geologic units that lose strength when saturated, and poorly drained rock or soil - with the past distribution of landslides. These maps indicate the relative stability of slopes; however, they do not make absolute predictions. More complex maps may include additional information such as slope angle, and drainage.

Landslide Hazard Maps: Landslide hazard maps show the real extent of the threat: where landslides have occurred in the past, where they are likely to occur now, and where they could occur in the future. They contain detailed information on the types of landslides, extent of slope subject to failure, and probable maximum extent of ground movement. These maps can be used to predict the relative degree of hazard in a landslide area.

Landslide Areas in Pamlico County
Because of the relatively flat topography of the area, Pamlico County is not susceptible to landslide. However, there are a few areas along the northern bank of the Neuse River that are characterized by high bluffs at the waters edge. Storms cause elevated water levels and damaging waves in the Neuse River. Breaking waves can overtop existing bulkheads and rip rap. Older bulkheads can be undermined with an associated loss of backfill.

Sinkholes do not threaten Pamlico County.

Since landslides and sinkholes do not threaten Pamlico County, no data regarding previous occurrences exists.

SECTION 13: SEVERE WINTER STORMS

Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, blizzards, freezing rain and ice pellets and extreme cold. Extreme snow events are the most potentially disruptive to society, for they can bring down power lines, trees and lead to roof collapses. All forms of severe winter weather can make traveling treacherous. Severe winter storms are extra-tropical cyclones fueled by strong temperature gradients and an active upper-level jet stream. The winter storms that impact North Carolina generally form in the Gulf of Mexico or off the southeast Atlantic Coast. Few of these storms result in blizzard conditions, defined by the presence of winds in excess of *35* mph, falling and blowing snow, and a maximum temperature of 20^0 Fahrenheit.

While the frequency and magnitude of snow events are highest in the mountains due to elevation, the geographical orientation of the mountains and Piedmont contribute to a regular occurrence of freezing precipitation events (e.g., ice pellets and freezing rain) in the Piedmont. Such ice events (up to and including ice storms) are often the result of cold air damming (CAD). CAD is a 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 (liquid below the melting point of water) or re-freezes. In the former case, super cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet).

The entire state of North Carolina has a likelihood of experiencing severe winter weather. The threat varies by location and by type of storm. Coastal areas typically face their greatest threat from nor'easters and other severe winter coastal storms. These storms can contain strong waves and result in extensive beach erosion and flooding. Freezing rain and ice storms typically occur once every several years at coastal locations and severe snowstorms have been recorded occasionally in coastal areas.

Cold air damming contributes to elevated freezing rain and ice storm events in the Piedmont of North Carolina. These events occur at least as often as moderate or severe snow events in this region.

The mountains of North Carolina usually receive several snowfalls of 4 to 6 inches in a given winter weather season. There has been at least one severe winter storm at some location in the mountains each year for the past several decades. The western area of the state is more likely to experience greater and more frequent snowfalls and blizzards than other locations in the state. The mountains also have the highest number of extreme one-day snowfalls.

Unfortunately, no data source exists that detail or describes damages in Pamlico County due to severe winter storms. While there is statewide data on winter storms, county-specific data is not available. This data limitation precludes information on

previous occurrences within the county's boundaries. Pamlico County will include, as a mitigation action, a request to the NC Climate Office's Storm Events Database (http://www.nc-climate.ncsu.edu/monitoring/events.html) to include county-specific information in the severe winter storm database.

SECTION 14: EARTHQUAKES

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of Earth's tectonic plates. The severity of these effects is dependent on the amount of energy released from the fault or epicenter. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and after just a few seconds can cause massive damage and extensive casualties.

The variables that characterize earthquakes are ground motion, surface faulting, ground failure, and seismic activity.

Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.

Surface faulting is the differential movement of two sides of a fracture - in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.

Liquefaction is the phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength. Lateral spreads develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies. Loss of bearing strength results when the soil supporting structures liquefies. This can cause structures to tip and topple.

Earthquakes are measured in terms of their magnitude and intensity. There are several different scales that are commonly used, including Richter Magnitude, Modified Mercalli Intensity (MMI), Moment Magnitude and Peak Ground Acceleration (PGA), among others.

Magnitude is measured using the Richter scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. Each unit increase in magnitude on the Richter scale corresponds to a ten-fold increase in wave amplitude, or a 244-fold increase in energy.

Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale. It is a twelve-level scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using Roman numerals, with a I corresponding to imperceptible (instrumental) events, IV corresponding to moderate (felt by people awake), to XII for catastrophic (total destruction). A detailed description of the Modified Mercalli Scale of Earthquake Intensity (and its correspondence to the Richter scale) is below.

Earthquakes are relatively infrequent but not uncommon in North Carolina. Epicenters of North Carolina earthquakes are generally concentrated in the active Eastern Tennessee Seismic Zone, which is second in activity in the eastern United States only to the New Madrid Fault.

The Eastern Tennessee Seismic Zone is part of a crescent of moderate seismic activity risk extending from Charleston, South Carolina northwestward into eastern Tennessee and then curving northeastward into central Virginia. While there have not been any earthquakes with a MMI intensity greater than IV since 1928 in this area, it has the potential to produce an earthquake of significant intensity in the future.

North Carolina's vulnerability to earthquakes decreases from west to east in relation to the Eastern Tennessee Seismic Zone. Generally, there are three different zones of seismic risk in North Carolina that correspond to different effective peak velocity-related accelerations of ground movement. The eastern portion of the State faces minimal effects from seismic activity. Locations in the middle and southeastern areas of the State face a moderate hazard from seismic activity, while the area from Mecklenburg County west through the Blue Ridge faces the greatest risk from seismic activity. These different levels of risk correspond to proximity to areas with historical seismic activity and changes in topography.

The steep topography of western North Carolina exacerbates the potential for damage from this area of seismic activity. There could be significant ground movement on steep slopes from seismic activity, which could result in human injuries, damage to property, and road closures, which would add to the difficulty of bringing in relief supplies and fire protection equipment.

An earthquake in eastern North Carolina is unlikely but possible. In 1994, a weak earthquake impacted Pamlico County. Any damage from the event was negligible as no structural damage was reported. That quake registered a 3.4 on the Richter scale of intensity. It is not possible to ascertain the impact of an earthquake in the area; as such estimates would depend strongly upon where the epicenter is located and to how powerful the earthquake event actually is.

Table 16. 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 shelves	<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

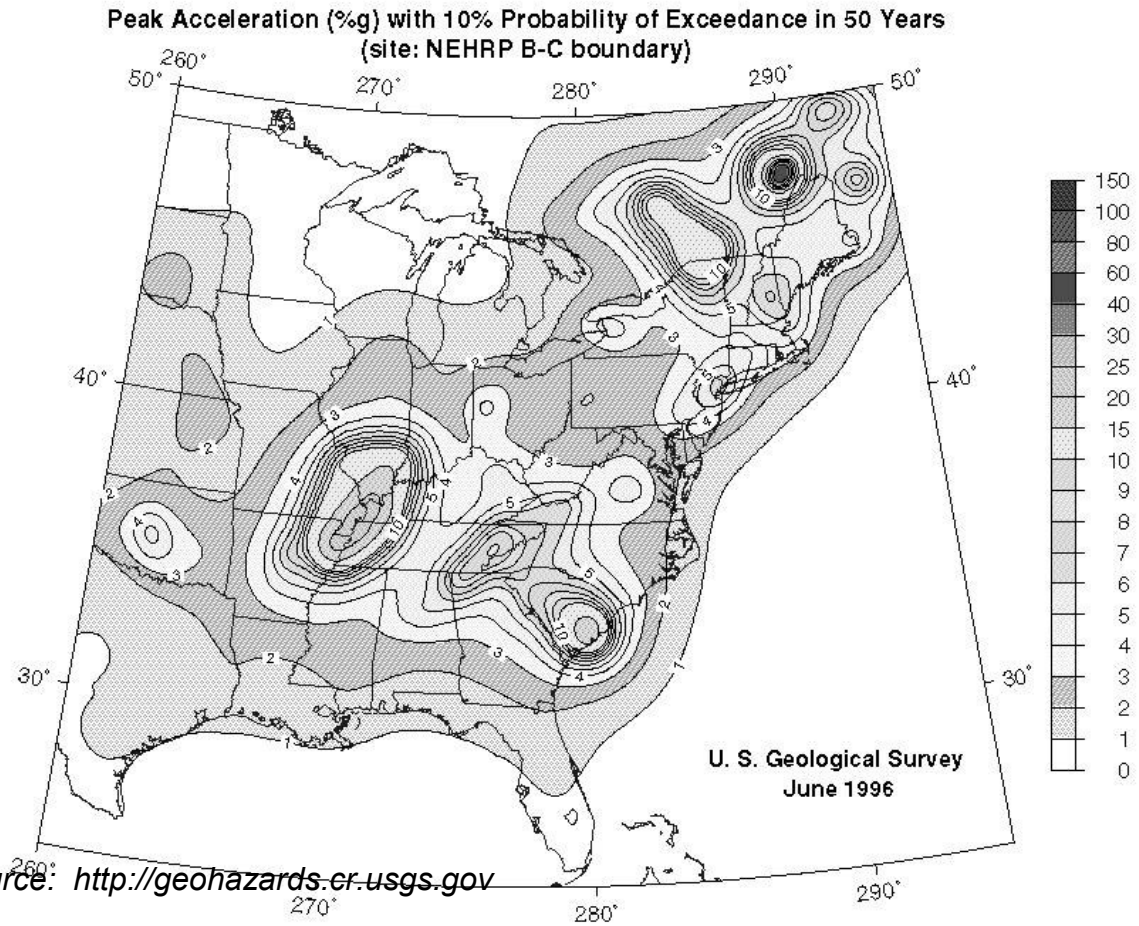
One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. If you're standing on the surface of the earth and drop an object (ignoring wind resistance) it will fall toward the earth faster and faster, until it reaches terminal velocity. This principle is known as acceleration and represents the rate at which speed is increasing. The acceleration due to gravity is often called "g", a term you may have heard associated with roller coasters, rockets, or even stock car racing. The acceleration due to gravity at the earth's surface is 9.8 meters (980 centimeters) per second squared. That means that every second that something falls

toward the surface of earth its velocity increases 9.8 meters per second. A 100% g earthquake is very severe.

An analogy would be if you floor your car's gas pedal and your groceries get smashed against the back of the trunk. The quicker you press on the gas, the more eggs are likely to get broken. That's because the quick acceleration caused the contents of your trunk to shift rapidly and violently, not slowly and smoothly. In fact, the eggs might not have moved at all if you had sped up slowly. The same thing is true in an earthquake. If ground acceleration is rapid, more things tend to break than if the shaking is relatively slow, even if the ground moves the same distance.

The map shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected, the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity.

Figure 13. Peak Acceleration (%g) with 10% Probability of Exceeding in 50 Years



Source: http://geohazards.cr.usgs.gov

SECTION 15: FLOODING

What Is A Flood?

A flood is a natural event for rivers, streams and coastal areas. Excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers, lakes and oceans that are subject to recurring floods. Flooding is the most common hazard in North Carolina, and thousands of households are located within floodplains. Floods can occur at any time of the year, and at any time of day or night. Most injuries and deaths occur when people are swept away by flood currents, often when attempting to traverse floodwaters in a vehicle. Most property damage results from inundation by sediment-filled water, or by debris in floodwaters that acts as "battering rams."

Floods generally fall into two *categories: flashfloods,* the product of heavy localized precipitation in a short period over a given location, or caused by a dam break or levee failure; and *general floods,* which can occur in riverine, coastal, and urban settings. There are also areas in North Carolina that are subject to long-term or permanent inundation.

Flash Flooding: Flash floods occur within a few minutes or hours of heavy amounts of rainfall, from a dam or levee failure, or from a sudden release of water held by an ice jam. In North Carolina, most flash flooding is caused by slow-moving thunderstorms, repeated thunderstorms in a local area, or by heavy rains from hurricanes and tropical storms. Areas subject to rapid floodwater inundation pose special threats to life and property because there is insufficient time for warning, evacuation, emergency flood proofing, or other protective measures. Flash floods can destroy buildings and bridges, uproot trees, and scour out new drainage channels. Heavy rains that produce flash floods can also trigger mudslides. Suddenness is a serious problem in the following areas:

- Steep rivers and streams in mountainous or hilly areas subject to sudden rainfall and rapid runoff;
- Areas with steep slopes and little or no vegetative ground cover;
- Areas behind dams or levees subject to failure or overtopping;
- Barrier islands and other areas along the coast which may be subject to relatively rapid hurricane storm surge; and
- Urban areas where much of the ground is covered by impervious surfaces, or where fixed drainage channels may be unable to contain the runoff that is generated by intense rainfall events.

Riverine Flooding: Riverine flooding occurs when stream flow exceeds the capacity of the normal watercourse, and is a function of precipitation levels and water runoff volumes within the watershed of the stream or river. The severity of a flooding event is determined by a combination of river basin physiographic, local thunderstorm movement, past soil moisture conditions, and the degree of vegetative clearing. Abnormal weather patterns may also contribute to flooding of a local area.

Coastal Flooding: Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall. These conditions are produced by hurricanes during the summer and fall, and nor' Easters and other large coastal storms during the winter and spring. Storm surges may overrun barrier islands and push seawater up coastal rivers and inlets, blocking the downstream flow of inland runoff. Thousands of acres of crops and forestlands may be inundated by both saltwater and freshwater. Escape routes, particularly from barrier islands, may be cut off quickly, stranding residents in flooded areas and hampering rescue efforts.

Urban Flooding: Urban flooding occurs where there has been development within stream floodplains. This is partly a result of the use of waterways for transportation in earlier times. Sites adjacent to rivers and coastal inlets provided convenient places to ship and receive commodities. Floodplains are also attractive for development since they provide flat areas for building. The price of this accessibility and convenience has been increased flooding of the ensuing urban areas. 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.

Long-Term or Permanent Inundation: Unlike the normal riverine or coastal flood situation where flood waters rise and fall relatively quickly, certain areas are subject to long term or essentially permanent flooding. In such areas, structures elevated on pilings or flood proofed are often permanently unusable, and must be abandoned unless there are specially designed for long-term inundation with adequate access and utility services. Long-term flood areas include:

- 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 the land is destroyed;
- Areas subject to subsidence by ground water or oil and gas withdrawals;
- Areas behind dikes and levees where high ground water levels may persist for months or years.

High Risk Factors*:*
The following conditions may exacerbate the effects of floods: impermeable surfaces, steeply sloped watersheds, constrictions, obstructions, debris, contamination, soil saturation, and velocity.

Impermeable surfaces: Excessive amounts of paved areas or other surfaces upstream or in the community can increase the amount and rate of water runoff. Development affects the runoff of storm water when buildings and parking lots replace the natural vegetation, which normally would absorb water. When rain falls in an undeveloped area, as much as 90 percent of it will infiltrate the ground; in a highly developed area, as much as 90 percent of rainfall will run off.

Steeply sloped watersheds: In hilly and mountainous areas, a flood may occur minutes after a heavy rain. These flash floods allow little or no warning time, and are characterized by high velocities.

Constrictions: Re-grading or filling within or on the edge of floodplains obstructs flood flows, backing up floodwaters onto upstream and adjacent properties. It also reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels. This also increases floodwater's velocity downstream of the constriction.

Obstructions: Bridges, culverts and other obstructions can block flood flow and trap debris, causing increased flooding upstream and increased velocity downstream.

Debris: Debris from the watershed, such as trees, rocks, and parts of damaged buildings, increases the hazard posed by moving water. Moving water will float, drag or roll objects, which then act as battering rams that can knock holes in walls and further exacerbate the effects of debris.

Contamination: Few floods have clear floodwater, and the water will pick up whatever was on the ground within the floodplain, such as soil, road oil, farm and lawn chemicals, and animal waste. In addition, if a wastewater treatment plant was inundated, the floodwaters will likely include untreated sewage. Contamination is also caused by the presence of hazardous material storage in the floodplain and in the community, as well as upstream from the community.

Soil saturation: Rainfall in areas already saturated with water will increase the runoff.

Velocity: Flood velocity is the speed of moving water, measured in feet per second. Velocity is determined by slope, waves, and several other factors. The damage potential of flood waters increases dramatically, sometimes exponentially, with velocity. High velocities (greater than 5 feet per second) can erode stream banks, lift buildings off their foundations, and scour away soils around bridge supports and buildings. Water velocity is a major cause of damage in the following areas:

Areas subject to coastal wave action (velocity zones);

- 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;
- Areas behind levees or dams where the protective structure suddenly fails or the design capacity is suddenly exceeded.

Flood Frequency

100-Year Flood

Floodplain managers use the term "100-year flood" to describe a flood that has a one-percent chance of occurring in any given year. Many people find it helpful to think of the 100-year flood risk as a bag of 100 marbles: 99 clear marbles and one black marble. Depending on weather conditions, a community may draw one or more marbles, or floods, from the bag. Most of these—the clear marbles—will be minor floods. It is possible, however, to draw the black marble, representing the 100-year flood, at any time. Because the marbles must be returned to the bag after they are drawn, it is even possible to draw the black marble several times in a row. Just because a community has suffered a 100-year flood *does not* mean that it will not face a flood of similar magnitude for another 99 years.

The location of the 100-year floodplain is often indicated on maps, such as the National Flood Insurance Program's Flood Insurance Rate Maps (FIRMs). In practice, the location of the 100-year flood should be judged in part by community experience as well. Where the water goes in a flood depends on many changing variables, including land use that may not be accurately reflected by a map in every instance.

Flood Insurance Rate Maps (FIRMs)**:**

Fortunately, most of the known floodplains in the United States have been mapped by FEMA, which administers the National Flood Insurance Program (NFIP). When a flood study is completed for the NFIP, the information and maps are assembled into a Flood Insurance Study (FIS). An FIS is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community and include causes of flooding.

The FIS report and associated maps delineate Special Flood Hazard Areas (SFHAs), designate flood risk zones, and establish base flood elevations (BFEs), based on the flood that has a 1% chance of occurring annually, or the 100-year flood. The study may have three components:

- The FIS - Flood Insurance Study text;
- The FIRM - Flood Insurance Rate Map; and
- A separate Flood Boundary and Floodway Map (FBFM) that was issued as a component of the FIS for each community studied prior to 1986. No BFE or flood zone names are shown on the floodway map and people often confuse the white floodway with the white area representing land that is free from flooding. FIS reports published since 1986 have corrected this problem by delineating the floodways as diagonally hatched areas on the FIRMs.

New Flood Maps using LIDAR:

Light Detection and Ranging (LIDAR) is being used by the North Carolina Floodplain Mapping Program to generate digital elevation data. These highly accurate topographic data are then used with other digital information and field data to analyze flood hazards and delineate floodplain boundaries, which are depicted on Flood Insurance Rate Maps. Data Acquisition using Airborne LIDAR sensors emit between 5,000 and 50,000 laser pulses per second in a scanning array. The most common scanning arrays go back and forth sideways relative to the points measured on the ground. The scan angle and flying height determine the average point spacing in the cross-flight direction, whereas the flying height and the airspeed determine the average point spacing in the in-flight direction. Each laser pulse has a pulse width (typically between 0.5 and 1 meter in diameter) and a pulse length (equivalent to the short time lapse between the time the laser pulse was turned on and off). Therefore, each laser pulse is actually like a cylinder of light with diameter and length.

Several technologies operate for LIDAR to survey high-accuracy data points on the ground:

Airborne Global Positioning System (GPS) is needed to determine the x, y, and z coordinates of the moving LIDAR sensor in the air, surveyed relative to one or more GPS base stations. The Inertial Measuring Unit (IMU) directly measures the roll, pitch, and heading of the aircraft, establishing the angular orientation of the LIDAR sensor about the x, y, and z axes in flight. The LIDAR sensor measures the scan angle of the laser pulses. Combined with the IMU data, this establishes the angular orientation of each laser pulse. The LIDAR sensor measures the time needed for each emitted pulse to reflect off the ground (or features thereon) and return to the sensor.

LIDAR sensors are capable of receiving multiple returns, some up to five returns per pulse. This means that a 30-KHz sensor (30,000 pulses per second) must be capable of recording up to 150,000 returns per second. The "first return" recorded by a LIDAR sensor is the first thing hit by a laser pulse. This could be a treetop, roof, ground point, or a bird in flight. When a laser pulse hits a soft target (e.g., a forest canopy), the first return represents the top of that feature. However, a portion of the laser light beam might continue downward below the soft target and hit a tree branch. This would provide a second return. Theoretically, the last return represents the bare earth terrain, but this is sometimes not the case. Some vegetation is so thick that no portion of the laser pulse penetrates to the ground. This is usually the case with sawgrass, mangrove, and dense forests where a person on the ground cannot see the sky through the canopy. LIDAR for the North Carolina Floodplain Mapping Program was flown during "leaf off" conditions to favor the acquisition of bare earth data.

The existing flood maps for Pamlico County were updated since the initial Hazard Mitigation Plan for Pamlico County. LIDAR mapping technology was used. The new flood hazard maps use the following zones:

Coastal:

Zone AE is subject to flooding by the base or 1% annual chance (100-year) flood, and waves less than 3 feet high, (formerly called Zones A1-A30).

Unshaded Zone X is the area of minimal flood risk outside the 500-year floodplain, formerly called Zone C.

Shaded Zone X is subject to flooding by the 0.2% annual chance (500-year) flood, formerly called Zone B.

Zone VE is where wave heights are expected to be 3 feet or more.

Base Flood Elevation (BFE) is the water surface elevation (in feet above the vertical datum shown on the map).

Shoreline Riverine:

Zone A (unnumbered) is the flood hazard area without BFEs.

Cross Section location:

Shaded Zone X is the 0.2% annual chance (500-year) floodplain (formerly Zone B).

Base Flood Elevation (BFE) is the water surface elevation of the base flood at approximate locations (in feet above the vertical datum shown on the map).

Zone AE is the 1% annual chance (100-year) floodplain with BFEs (formerly Zones A1-A30).

The **Floodway** is the cross-hatched area.

Unshaded Zone X is all other areas considered low risk (formerly Zone C)

The primary source of flooding in Pamlico County is wind driven surge generated in the Atlantic Ocean by tropical storms and hurricanes. The surge propagates into Pamlico Sound and further propagates into Bay River, Big Porpoise Bay, Jones Bay, Kershaw Creek, Middle Bay, Morris Creek, Pamlico River, Pamlico Sound, Smith Creek, Thomas Creek, and Trent Creek. Flooding from heavy rainfall occurs on Greens Creek, Kershaw Creek, Morris Creek, North Prong Bay River, Smith Creek, South Prong Bay River, Thomas Creek, and Trent Creek. High winds associated with tropical storms can also produce extremely high waves that create higher than normal surge. The wave

action during a tidal flood can be more damaging than the higher water level. Not all storms that pass close to Pamlico County produce extremely high surge. Similarly, storms that produce flooding conditions in one area may not necessarily produce flooding conditions in other parts of Pamlico County.

The contribution from nor'easters to the overall storm surge elevation in the Pamlico County area was found to be insignificant compared to hurricanes; therefore, only the effects of hurricane and tropical storm induced surge elevations were considered. In other areas of North Carolina, particularly the Outer Banks area of the northern part of the state, nor'easters were found to provide a significant contribution to the overall storm surge.

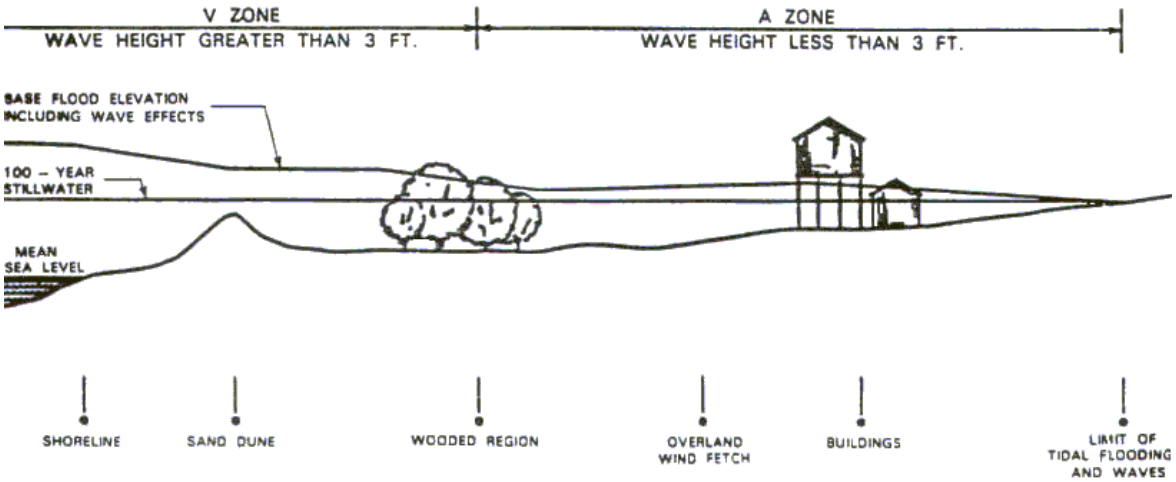
One representation of Pamlico County's flood hazard area is illustrated by the Flood Insurance Rate Map (FIRM). Flood hazard areas in coastal regions are determined using statistical analyses of records of storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. A FIRM usually is issued following a flood risk assessment conducted in connection with the community's conversion to the Regular Phase of the NFIP. If a detailed assessment, termed a Flood Insurance Study, has been performed, the FIRM will show base flood elevations and insurance risk zones in addition to floodplain boundaries. After the effective date of the FIRM, the community's floodplain management ordinance must be in compliance with the appropriate Regular Phase requirements. Actuarial rates, based on the risk zone designations shown on the FIRM, are then applied for newly constructed, substantially improved, and substantially damaged buildings.

Table 17. Base Flood Elevation

Flooding Source and Transect	**Location**	**Stillwater Elevations (Feet NGVD)**				**Zone**	**Base Flood Elevation (Feet NGVD)**
		10-year	50-year	100-year	500-year		
Atlantic Ocean / Pamlico Sound / Pamlico River	Pamlico Sound, including Mouse Harbor	4.5	6.1	6.7	7.7	VE	9-10

Flooding		Stillwater Elevations (Feet NGVD)					Base Flood
Atlantic Ocean / Pamlico Sound / Jones Bay / Middle Bay / Porpoise Bay	Pamlico Sound, including Jones Bay, Middle Bay and Porpoise Bay	5.1	7.0	7.5	8.7	VE	9-11
Atlantic Ocean / Pamlico Sound / Kershaw Creek / Smith Creek / Green's Creek / Morris Creek	Pamlico Sound, including Piney Point and Maw Point	5.2	6.9	7.6	8.7	VE	10-11
Atlantic Ocean / Pamlico Sound / Kershaw Creek / Smith Creek / Green's Creek / Morris Creek	Pamlico Sound, including Bay River Point	5.2	7.2	7.7	9.0	VE	10-11

Figure 14. Flood Insurance Study Schematic



Historical Floods

Coastal North Carolina has a storied hurricane history. The area suffered storms during the 19th century in 1837, 1846, 1856, 1879, 1883, and 1899.

September 16, 1933

This hurricane formed east of the Leeward Islands, moved northwest and then northward, increasing in intensity and striking the coast a little west of Hatteras about 8 a.m. on September 16. It was reported that hardly a building was left standing in several coastal towns. High winds, waves, and the piling up of water in Pamlico and Albemarle Sounds caused 21 deaths. An estimated high tide of 7 feet above mean sea level occurred at Ocracoke.

October 5, 1954 – Hazel

Hurricane Hazel was the most destructive storm in the history of North Carolina. The storm crossed the coast just north of Myrtle Beach, South Carolina, as hurricane force winds hit the Atlantic coast between Georgetown, South Carolina and Cape Lookout. Storm tides (i.e. hurricane surge) devastated the immediate oceanfront of this stretch of coast. Storm surge of 16.6 feet above MSL was observed at Holden Beach and Calabash, North Carolina.

August 12, 1955 – Connie

Hurricane Connie entered the North Carolina coastline close to Cape Lookout. The prolonged pounding of high waves against the coast caused tremendous beach erosion estimated to have been worse than that caused by Hurricane Hazel, a storm that severely affected the southern North Carolina coast in 1954. Water in sounds and near the mouths of rivers was 5 to 8 feet above normal. At Fort Macon, winds of 75 mph, gusts of 100 mph, and a barometric pressure of 962 mb were reported. The storm also brought torrential rains with the maximum rainfall, around 12 inches in 48 hours,

occurring near Morehead City. Total damage throughout the state was estimated at $50 million.

September 19, 1955 – Ione
Hurricane Ione, moving from the south, crossed the North Carolina coast near Salter Path, about 10 miles west of Morehead City. It then slowly curved to the northeast, passing out to sea near the Virginia State Line early on September 20. When Ione entered North Carolina, highest winds were a little over 100 mph. Heavy rains accompanied Ione. At the same time, prolonged easterly winds drove tide water onto the beaches and the sounds to a height of 3 to 10 feet above MSL. The result was inundation of the greatest area of eastern North Carolina ever recorded. At New Bern, the depth of the flood was the greatest ever recorded, about 10.5 feet above mean low water. Forty city blocks were flooded with up to 4 feet of water. A high tide of 6.9 feet NGVD was reported at Atlantic Beach, North Carolina.

September 27, 1958 – Helene
Hurricane Helene was one of the most powerful storms of recent history and, fortunately for North Carolina, the storm center moved up the coast staying well out at sea, on September 26 – 27. Even so, the highest winds of record were noted in Wilmington, with peak gusts of 135 mph. There was some beach erosion due to the seas and tides but this was minimized by the passage of the storm at the time of low astronomical tide. The highest tides on ocean beaches were estimated at 3 to 5 feet above normal. Tides were higher on the southern edge of Pamlico Sound, where a sudden rise following the wind shift as the center passed brought the tides to 7 to 8 feet above normal.

August 31, 1993 – Emily
Hurricane Emily, a Category 3 hurricane, grazed Hatteras Island on August 31, 1993. The eye of the hurricane came within 20 miles of Cape Hatteras, but did not pass over the Outer Banks. When the winds shifted from the northeast to the northwest, water was forced onto the island from Pamlico Sound, washing several homes from their foundations. Wind measuring equipment recorded wind gusts of up to 107 miles per hour.

July 13, 1996 – Bertha
Hurricane Bertha came ashore around the Cape Fear area during the early morning hours of July 13, 1996. This early season storm was a Category 2 when it made landfall, quickly dropping below hurricane strength when it moved inland over eastern North Carolina. Coastal storm surge flood heights, from Florida through New England, ranged from 1 to 4 feet, but values to 5 feet were estimated on the North Carolina coast from Cape Fear to Cape Lookout. A storm surge of 6 feet or a little higher is indicated near Swansboro, where 5 to 6 feet of water was "inside of businesses on the waterfront". The primary effects in North Carolina were to the coastal counties and included storm surge flooding and beach erosion, roof damage, piers washed away, fallen trees, and damage to crops. A survey indicated over 5000 homes damaged, mostly from storm surge. A Federal Emergency Management Agency estimate of the number of persons in South and North Carolina who evacuated is 750,000. Minor wind

damage and flooding also spread along the path of the storm all the way to New England.

September 6, 1996 – Fran
Fran was moving northward near 15 knots when it made landfall on the North Carolina coast. The center moved over the Cape Fear area on the morning of September 6, 1996, but the circulation and radius of maximum winds were large and hurricane force winds likely extended over much of the North Carolina coastal areas of Brunswick, New Hanover, Pender, Onslow and Carteret counties. At landfall, the minimum central pressure is estimated at 954 mb and the maximum sustained surface winds are estimated at 100 knots. The strongest winds likely occurred in streaks within the deep convective areas north and northeast of the center. Storm surge on the North Carolina coast destroyed or seriously damaged numerous beachfront houses. Widespread wind damage to trees and roofs as well as downed power lines occurred as Fran moved inland over North Carolina and Virginia. Extensive flooding was responsible for additional damage in the Carolinas, Virginia, West Virginia, Maryland, Ohio and Pennsylvania. Nearly a half-million tourists and residents were ordered to evacuate the coast in North and South Carolina. Press reports from Reuters News Service stated that 4.5 million people in the Carolinas and Virginia were left without power. The Property Claim Services Division of the American Insurance Services Group reports that Fran caused an estimated $1.6 billion dollars in insured property damage to the United States. This estimate includes $1.275 billion in North Carolina, $20 million in South Carolina, $175 million in Virginia, $50 million in Maryland, $20 million in West Virginia, $40 million in Pennsylvania and $20 million in Ohio. A conservative ratio between total damage and insured property damage, compared to past land falling hurricanes, is two to one. Therefore, the total U.S. damage estimate is $3.2 billion.

August 27, 1998 - Bonnie
Hurricane Bonnie was a Category 2 storm when it came to shore on August 27, 1998, near Cape Fear. Storm tides of 5 to 8 feet above normal were reported mainly in eastern beaches of Brunswick County NC, while a storm surge of 6 feet was reported at Pasquotank Three people died as a consequence of Bonnie. A 12-year old girl was killed when a large tree fell on her home in Currituck County, NC. Another person was caught in rip currents and drowned in Rehoboth Beach, Delaware. The third person died in Cape Cod in a rowboat accident when choppy seas overturned the boat. The last one may have been indirectly related to Bonnie. The Property Claim Services Division of the American Insurance Services Group reports that Bonnie caused an estimated $ 360 million in insured property damage to the United States. This estimate includes $ 240 million in North Carolina, $ 95 million in Georgia, and $ 25 million in South Carolina. A conservative ratio between total damage and insured property damage, compared to past land falling hurricanes, is two to one. Therefore, the total U.S. damage estimate is $ 720 million.

August 30, 1999 – Dennis
Hurricane Dennis's first pass near the coast of the Carolinas on August 30, 1999, caused sustained tropical storm force winds with gusts to hurricane force in coastal

North Carolina and gusts to tropical storm force in coastal South Carolina from Charleston northward. Dennis drifted just east of the North Carolina Outer Banks for several days before coming ashore again on September 4, 1999. Dennis was just below hurricane strength when it made landfall over the Cape Lookout National Seashore just east of Harkers Island, NC. Storm tides of 3 to 5 ft above normal were reported along much of the North Carolina coast on both August 30th and September 4th. Areas along the Neuse River reported tides of 8 to 10 ft above normal tide level on August 30th, while areas along the Pamlico River reported similar values on September 4th. Portions of the South Carolina and southeastern Virginia coast experienced 2 to 4 ft above normal tides during Dennis. Since Dennis meandered off the North Carolina coast for several days, the above normal tides were unusually prolonged. This led to extensive beach erosion along portions of the North Carolina and southeastern Virginia coasts. The Property Claims Services Division of the Insurance Services Office reports insured losses due to Dennis totaled $60 million in North Carolina and Virginia. Press reports indicate that agricultural losses in North Carolina and Virginia were $37 million. Combining these reports gives a total estimated damage from Dennis of $157 million.

September 16, 1999 – Floyd
Hurricane Floyd made landfall near Cape Fear, North Carolina in the early morning hours of September 16, 1999, as a Category 2 hurricane with estimated maximum winds near 90 knots. Floyd was losing its eye wall structure as it made landfall. Continuing to accelerate north-northeastward, Floyd's center passed over extreme eastern North Carolina on the morning of the 16th and over the greater Norfolk, Virginia area in the afternoon. Storm surge values as high as 9 to 10 feet were reported along the North Carolina coast. Rainfall totals as high as 15 to 20 inches were recorded in portions of eastern North Carolina and Virginia. A number of tornadoes were sighted in eastern North Carolina. There was a confirmed tornado in Bertie County and another in Perquimans County. The latter tornado destroyed two houses and damaged three or four others. At least ten tornadoes were reported by spotters in the Newport/Morehead City County Warning area, and these apparently caused some structural damage. Four tornadoes or funnel clouds were seen in the Wilmington area, but no damage was apparent. Total damage estimates range from 3 to over 6 billion dollars.

September 17, 2003 – Isabel
Hurricane Isabel made landfall early in the afternoon on September 18th as a category two hurricane across core banks in extreme eastern Carteret County. Isabel moved north northwest near 20 mph across eastern North Carolina during the afternoon. Areas mainly near and east of the storm center experienced significant wind and storm surge effects. Major over wash and beach erosion occurred along the North Carolina Outer Banks where waves up to 20 feet accompanied a 6 to 8 foot storm surge. Almost 350 million dollars in damage occurred in Dare County alone where several thousand homes and businesses, several piers, and sections of Highway 12 were damaged or washed away. Eastern Carteret, eastern Pamlico, southern Craven, Beaufort and Hyde counties experienced significant storm surge damage with hundreds of homes flooded in most of these counties. The highest storm surges were experienced in the lower

reached of the Neuse River where water levels rose to as high as 10.5 feet at the mouth of Adams Creek. Storm surge values ranged from 6 to 10 feet across eastern Pamlico County with the highest water levels recorded near Oriental.

Structures Subject to Hazards

There are 156,150 acres within the boundaries of Pamlico County. This analysis included incorporated and unincorporated areas of the county. Susceptibility of property in Pamlico County was analyzed using three different flooding scenarios: 100-year, SLOSH – Slow, and SLOSH – Fast.

The Pamlico County GIS data used for this analysis did not contain a land use code. Therefore, analysis of residential, commercial, and institutional properties was not possible without conducting a detailed land use survey of the entire county. However, the GIS data included a field for Total Value and a field for Current Land Value. By subtracting the Current Land Value from the Total Value, it was possible to determine how many developed properties were located within the study area and the value of those structures. Projections of potential damage were not included with this analysis. Pamlico County is sparsely developed and has numerous environmental constraints on development. Therefore, projections made by using average structure values and application to undeveloped properties would not be useful.

Using the 100-year flood models (the FIRM model, or the model insurance rates are based on); the A Zone contains 4,237 acres of developed property. The AE Zone contains 27,733 acres of developed property. The VE Zone contains 645 acres of developed property. According to the Pamlico County tax records, the developed properties in the A Zone contain structures that (the total property value minus the land value) amount to $58,233,584. The developed properties in the AE Zone contain structures amount to $215,049,229. The VE Zone contains structures amounting to $3,076,955.

The SLOSH Slow Storm Zone contains 35,842 developed acres that would be affected by a Category 1 or Category 2 hurricane. A storm of this magnitude would affect 2,209 structures worth $254,389,602. A Category 3 storm would affect 6,153 developed acres more, for a total building value of $344,966,369. A Category 4 or 5 storms would affect 6,816 developed acres more than the previous three categories and total building values of $ 379,938,963.

The SLOSH Fast Storm Zone contains 32,571 developed acres that would be affected by a Category 1 or Category 2 hurricane. A storm of this magnitude would affect 2,404 structures worth $210,013,479. A Category 3 storm would affect 5,815 developed acres more, for a total building value of $306,968,348. A Category 4 or 5 storms would affect 7,718 developed acres more than the previous three categories and total building values of $343,835,881.

Individual analyses for each Geographic Planning Area are included in separate sections.

While Pamlico County has a long history with flooding, detailed information regarding the extent of previous occurrences of coastal flooding is unavailable. Also, damage estimates from flooding associated with hurricanes, tropical storms, and nor'easters is not separated from wind damage. Therefore, it is not possible to estimate the amount of damage due to flooding alone in previous events. Pamlico County will endeavor to more accurately record flood damage in future events.

No parcel specific data available to identify existing structures to assess vulnerability.

Figure 15. Hurricane Evacuation Routes

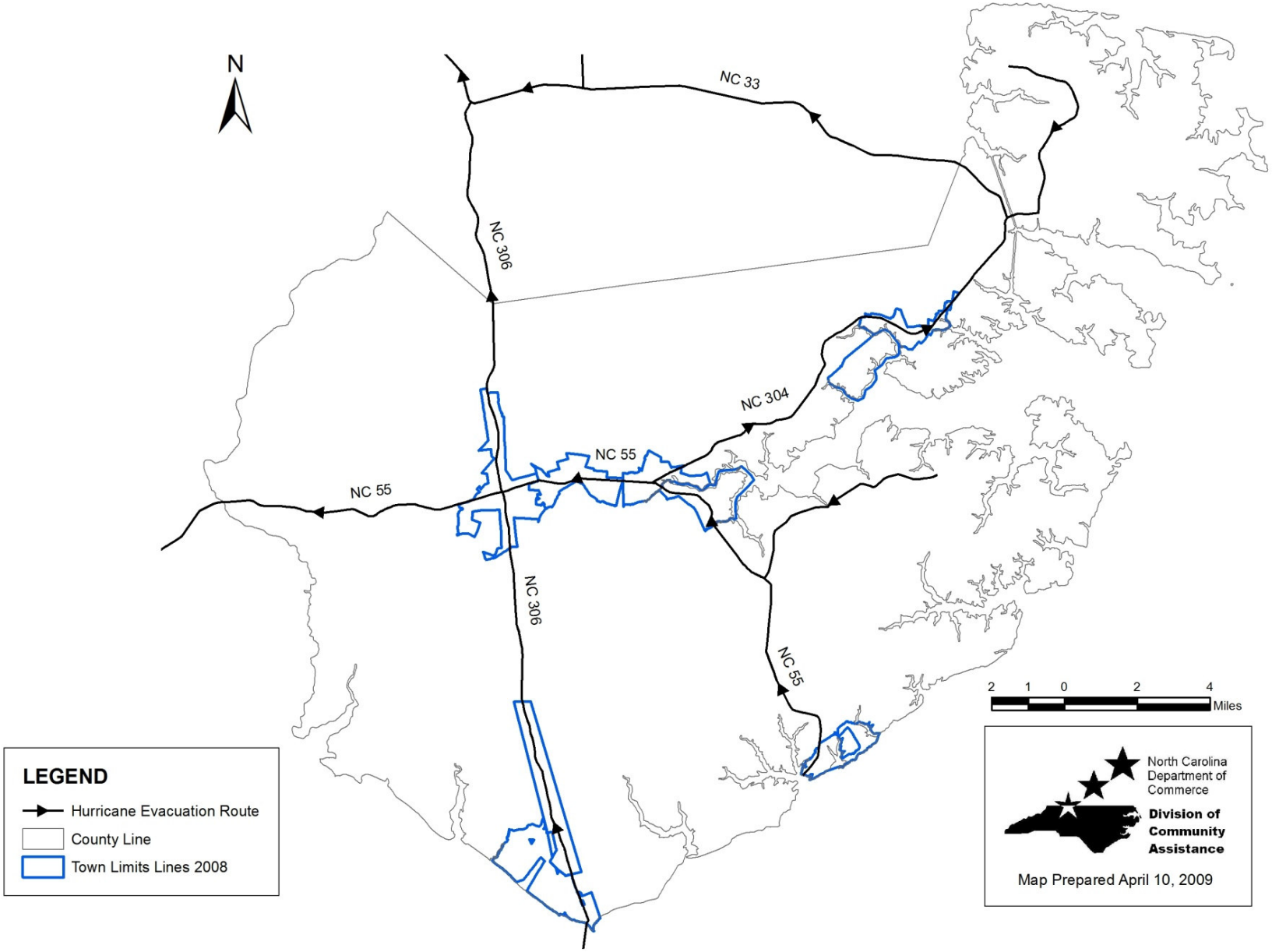


Figure 16. Slow Moving (<15 mph) Tropical Systems

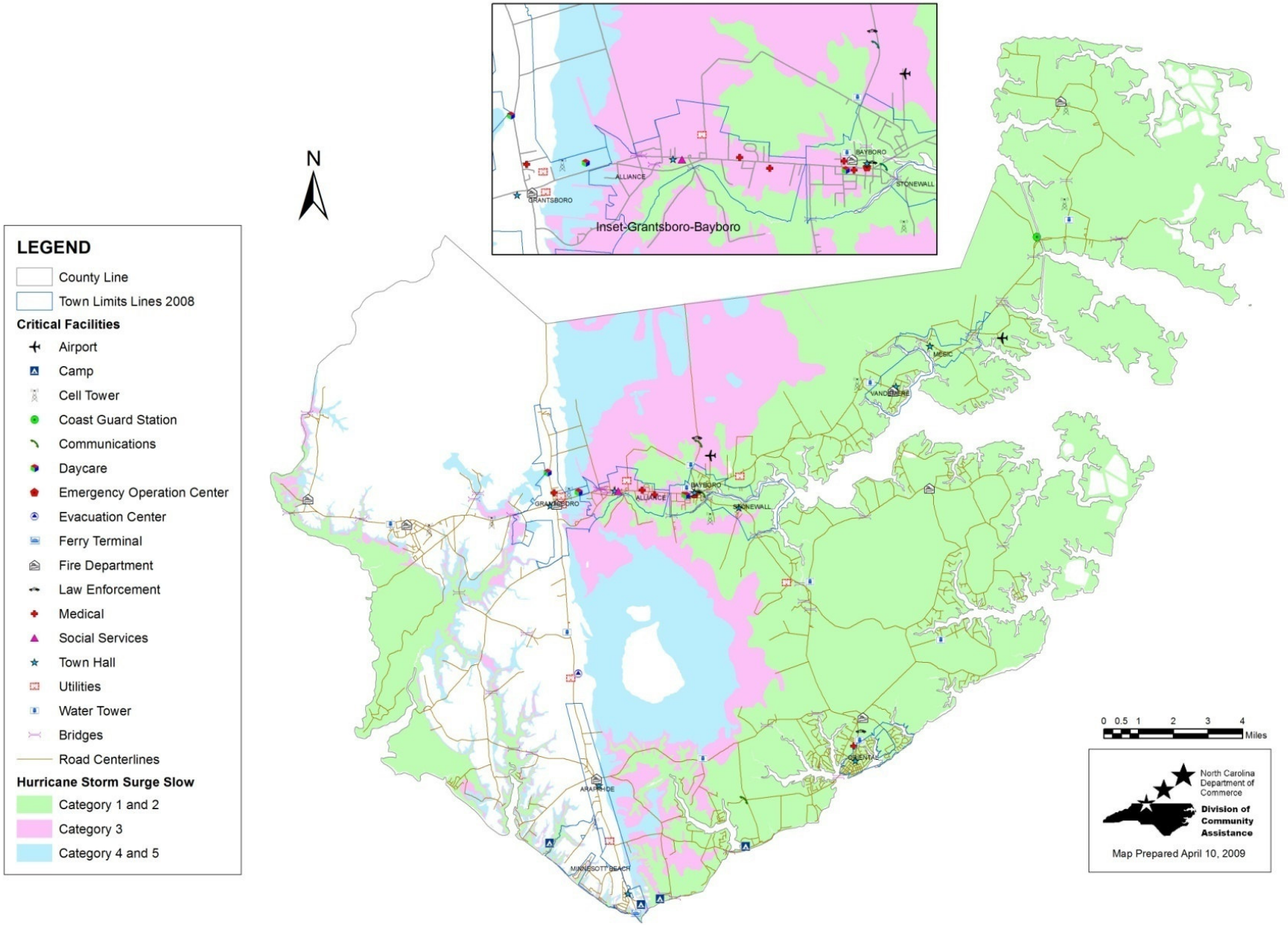


Table 17. Pamlico County Present Vulnerability

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	Potential Losses*
Inundation - Slow							
Category 1 & 2	82,960	23,868	106,828	358,667,931	357,166,959	715,834,890	1,624,771,600
Category 3	25,127	4,348	29,475	57,294,542	46,098,759	103,393,301	492,112,295
Category 4 & 5	2,085	5,001	7,086	22,178,190	27,981,244	50,159,434	40,834,725
Total	110,172	33,217	143,389	438,140,663	431,246,962	869,387,625	2,157,718,620
Inundation - Fast							
Category 1 & 2	75,555	20,227	95,782	309,902,577	326,565,584	636,468,161	1,479,744,675
Category 3	18,556	4,756	23,312	86,216,822	56,419,465	142,636,287	363,419,260
Category 4 & 5	22,399	5,893	28,292	29,366,862	34,203,131	63,569,993	438,684,415
Total	116,510	30,876	147,386	425,486,261	417,188,180	842,674,441	2,281,848,350
100-Year Floodplain							
AE	68,409	20,346	88,755	258,388,158	286,019,198	544,407,356	1,339,790,265
VE	183	24	207	1,737,518	2,023,023	3,760,541	3,584,055
Total	68,592	20,370	88,962	260,125,676	288,042,221	548,167,897	1,343,374,320

* *Potential Losses* was calculated by multiplying *Vacant Acres* by the average value per acre in the county ($19,585), determined by dividing the *Total Value of Developed Properties* in the county by *Total Developed Acres*

Figure 17. Hazard Areas

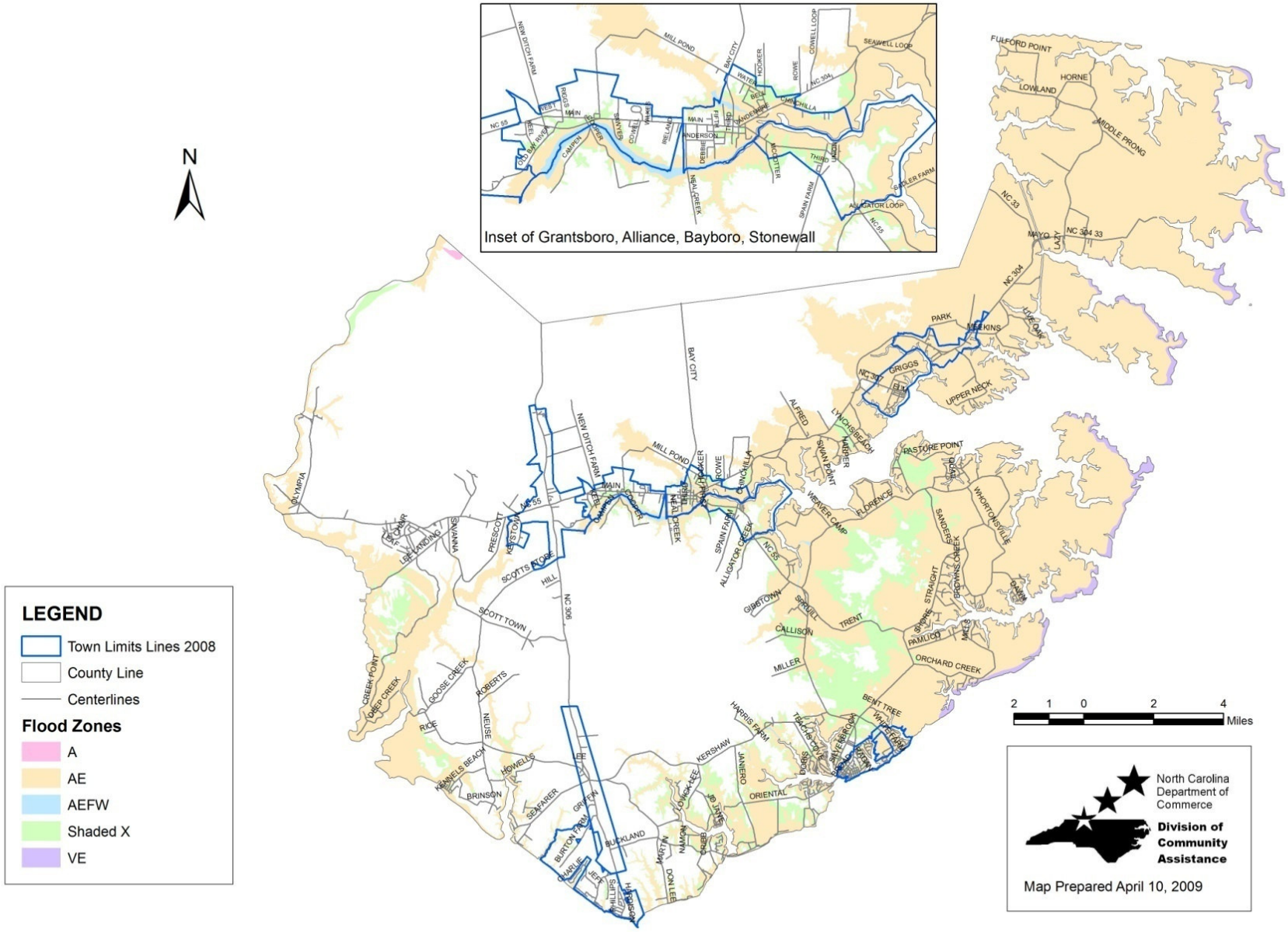


Figure 18. Topographical Map 2 Foot Elevation Intervals

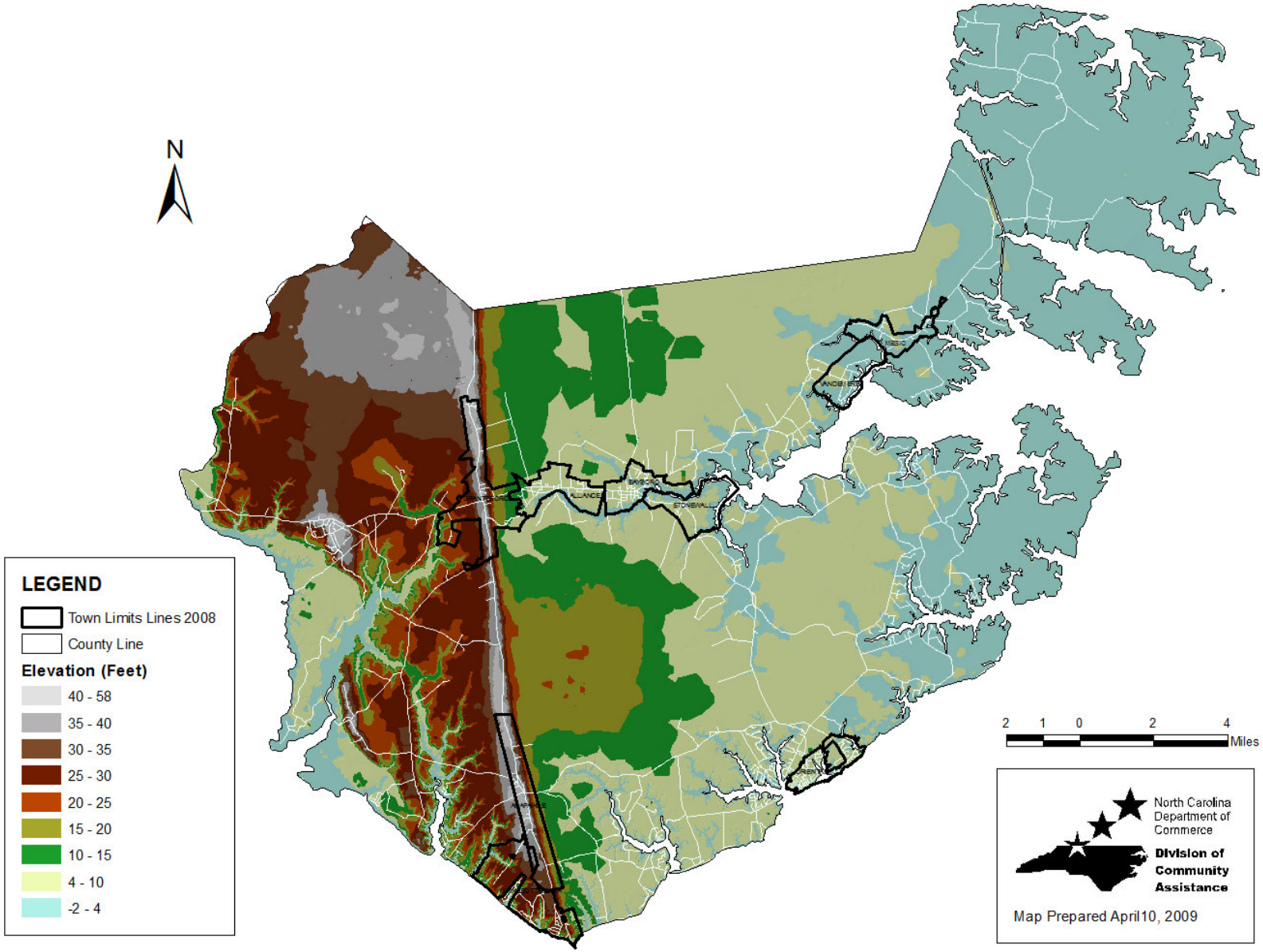
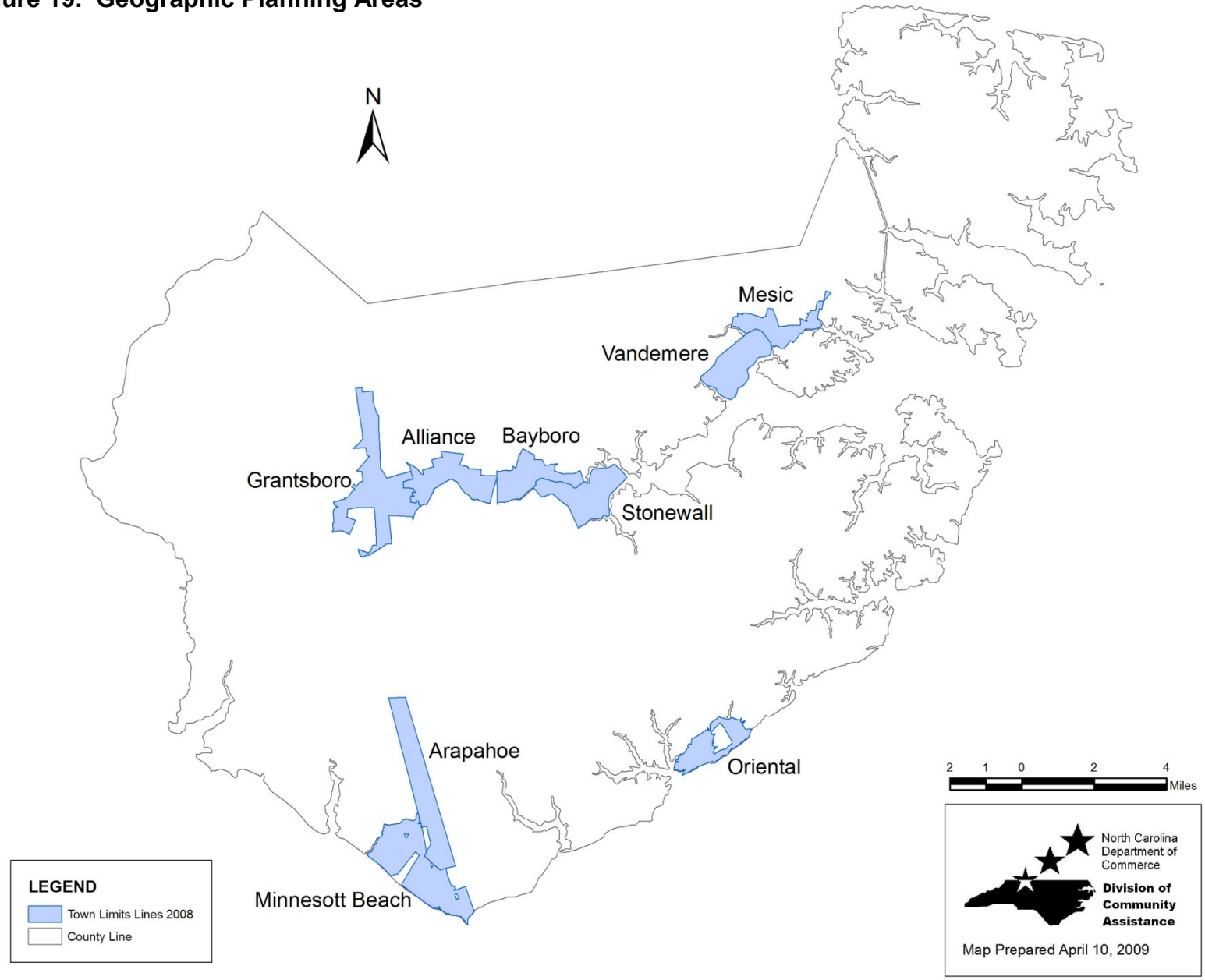


Figure 19. Geographic Planning Areas



SECTION 16: MITIGATION CAPABILITIES ASSESSMENT

Staff and Organizational Capability

Pamlico County has limited staff and organizational capability to implement hazard mitigation strategies. Pamlico County is governed by a seven-member **Board of Commissioners** who bear the responsibility of serving the people and improving the quality of life in the county. The county is divided into five townships, with one commissioner elected from each township and two at-large commissioners. Terms on the board are staggered with elections held every two years. A **County Manager** hired by the commissioners, acts on their behalf and manages County finances and services. More specifically, the County Manager directs and supervises the administration of all county offices, boards, commissions and agencies under the general control of the Board.

Pamlico County has a number of professional staff departments to serve the residents of the county and to carry out day-to-day administrative activities. These include the following:

County Manager	Tax Office	Farm Service
Planning Department	Finance Department	Sheriff's Department
Magistrate's Office	Clerk of Court	Building Inspections
Register of Deeds	Board of Elections	Emergency Management
Social Services	Veteran's Services	Health Department
Recreation Department	Maintenance & Grounds	Cooperative Extension
Soil & Water Conservation	Water Department	Senior Services
Bay River Sewerage		

The **County Manager** is responsible for overseeing the general operation of county government and the implementation of all policies, procedures and regulations mandated by the Board of Commissioners. As Chief Budget Officer, the County Manager is responsible for all financial aspects of county government and for the sound investment of money for the good of all county citizens. All major projects are overseen by the County Manager.

The **Planning Department** seeks to provide effective and efficient services in the form of planning and sound economic development for the future of Pamlico County. In an effort to achieve these goals, the Planning Department implements the land use ordinances of the county. This includes several plans and regulations, such as the 1992 Land Use Plan, the Pamlico County Subdivision Regulations, the Pamlico County Water Supply System Extension Policy, the Pamlico County Environmental Impact Statement Ordinance and the Pamlico County Mobile Home Park Ordinance.

The **Magistrate's Office** is a state department that serves the public as the judge in small claims court, by issuing arrest warrants, orders for arrest, bonds and by setting

pre-trial release conditions. Individuals may also pay waived traffic tickets early at the Magistrate's Office.

The office of the **Register of Deeds** contains all of the real estate transfers for Pamlico County from 1872 until present. Birth and death records were not recorded until the latter part of 1913. Marriage records began in 1872. The office is the custodian of these records, plus it issues copies or certified copies of these records to the appropriate person according to the General Statutes. The office also issues marriage licenses to persons who are going to get married in Pamlico County. Citizens must get their marriage license in the county in which they are going to be married. The Register of Deeds office issues beer and wine licenses to the establishments that have been approved by the NC A.L.E. office to sell alcoholic beverages. They also record UCCs, survey maps and discharges from all branches of the service. The office can give the Oath of Office to all notaries who have been commissioned for Pamlico County and they must retain a record of these acts. This office is also in charge of the Jury Maintenance Program.

The Department of **Social Services** is dedicated to assisting and providing opportunities for individuals and families in need of basic economic support and services to becoming self-supporting and self-reliant. In addition, Social Services advocates and encourages individuals' right to select actions appropriate to their needs. Furthermore, they recognize their responsibility through teamwork and professional effort to assist in this process. The Department of Social Services cooperates with other public and private entities and seeks to identify needs, devise and focus resources and deliver services responsibly and compassionately.

The **Recreation Department** is dedicated to providing as much leisure and athletic activity as possible for all citizens of Pamlico County. The basic objective of the Recreation Department is to provide a variety of recreational opportunities to enhance the lives of Pamlico County citizens and to direct and educate citizens for more positive use of leisure time. Recreation is a function of county government available to each and every person. Youth activities are especially popular and participation is on an upswing. Recreation league activities involve the most staff hours and attract the most participants of any other area of programming. The Recreation Department is proud of the popularity of its programs and of its ability to provide quality recreation to all Pamlico County citizens.

The Bay River **Soil and Water Conservation** District is a governmental subdivision of state government with the local responsibilities for developing annual and long-range programs of conservation and resource development within the boundaries of the district. Its main goals are to carry out a broad program of assistance to farmers, ranchers and land users. This includes soil and water conservation, watershed protection, flood prevention, farm forestry, urban and rural area development, education, technical assistance and cost sharing.

The **Bay River Metropolitan Sewerage District** is an independent local government agency which provides and administers the sewage collection and treatment systems which are located inside the district's boundaries. The service area includes Grantsboro, Alliance, Bayboro, Stonewall, Oriental, Maribel, Vandemere, Cash Corner, and Mesic. The Bay River Metropolitan Sewerage District's purpose is to promote the general health and welfare of the local government and to protect the Bay River from pollution caused by failing septic fields and illegal discharges.

The **Tax Office** is the primary source of revenue of local revenue for county government operation. The office provides information to the public on all records concerning real estate recording, assessment and taxes. The office also provides information on situs, tax jurisdictions, parcel locations, size and shape, special assessment and transfer of title ownership. The tax office is responsible for personal property assessment and situs. The office is an information center for realtors, attorneys, developers, paralegal staff and property owners. They interact with the various departments such as the Department of Social Services, Register of Deeds, Inspections Department, County Planner's Office, Agriculture Extension Services and Enhanced 911 through the Sheriff's Department. The Tax Office has the responsibility and the duty to act in strict accordance with the General Statutes of North Carolina which are found in the Machinery Act. The Tax Office maintains and operates the central computer system and is the focal point for public information and special requests of data bases. The office is also responsible for Geographic Information Systems. It provides spatial data information and delineations of political subdivisions and other special boundaries.

The **Finance Department** is responsible for all planning, coordinating and directing all aspects of county financial management and administration. This office is unique in that it handles the county financial dealings and is not directly involved with the public.

The office of the **Clerk of Superior Court** consists of the Clerk and three full time employees and one part time employee. This office will hold citizens' wills for safekeeping and only that citizen may remove this will from safekeeping. The Clerk's office also files estates when a person dies. Another function of the Clerk of Court is to file and handle special proceedings, which in many instances are hearings before the Clerk on subjects ranging from partitions to foreclosures and cart ways. Criminal citations, summons, and warrants are filed in the Clerk's office. Calendars and record checks concerning these files are open to the general public. Waivers are also entered with the Clerk concerning these cases. Civil cases are also filed in the Clerk's Office, summons issued and costs collected. The most important part of the Clerk's office is the management of money for different cases. All jury notices originate in the Clerk's office, though they are distributed by the Sheriff's office. Child support cases are filed in the Clerk's office and money is paid through this office. Finally, waived traffic violations can be paid at this office.

The purpose of the **Board of Elections** is to conduct honest and fair elections on the local, state, and federal level. The Board of Elections consists of one full-time employee, the Director of Elections and about fifty part-time employees. The part-time

employees are precinct officials and a three member board. The board members represent the two major parties in the state. The chairmen of each political party recommend persons from their party to the State Board of Elections and the appointment is made by the State Board of Elections for a term of two years. The Board of Elections provides the public with several services. One of these services is to work directly with candidates, party chairmen, political parties, political organizations and civic organizations regarding voter registration, elections, and election information and elections laws. In addition, the Board of Elections receives all notices of candidacy for elective office and keeps records of all such notifications. The Board is responsible for setting up all municipal, county, state, national and other elections required to be held in Pamlico County. Also, the preparation of all ballots for voting machines, the supervision of the counting and reporting of voting results are done by this office.

The primary program of the **Veteran's Services** Department is the deliverance of service in procuring benefits available from the Department of Veteran's Affairs for Pamlico County's veterans, widows, and their dependent children. Currently, there are approximately 1,700 veterans in the county. Veterans with their dependents comprise about 4,300 citizens of the county, about one third of the total county population.

The **Maintenance and Grounds Department** is an in-house maintenance department that serves the maintenance needs of the county offices.

The **Water department** or the Pamlico County Water System (PCWS) was founded in 1980 with the mission of supplying clean, safe drinking water to the citizens of Pamlico County. The system had a customer base of 2,650 and had approximately 200 miles of distribution lines. Water was supplied via two newly built treatment facilities and the "Old Town of Bayboro" plant. The source of the water supply is currently from ground water that is pumped from the Castle Hayne aquifer. The water is then treated from five water treatment facilities and distributed county-wide to customers through approximately 300 plus miles of water distribution lines. PCWS currently provides service to more than 5,000 homes and businesses. Pamlico County Water System is a self-supporting agency which depends on customer rates and fees to support its operation. No tax dollars are used to pay for PCWS's operations.

The **Farm Service** administers programs to farmers that are written by Congress. These programs are designed to ensure that farmers get full benefits of these programs. Programs deal with issues such as environmental practices concerning soil, air and water pollution; loans on commodities such as corn, soybeans and cotton; the measuring of crop land; the acreage of each crop that has been planted; disaster insurance for crops that have been insured; and the tracking of tobacco quotas and marketing.

The **Sheriff's Department**'s foremost goal is to protect and to serve the public. To this end, it is diligent in protecting lives, property, and information. In addition, it also serves the public in day to day concerns or needs. In order to receive a permit to purchase a handgun or carry a concealed handgun, citizens must go through the Sheriff's

Department. Finger printing for child protective services and day care providers is also done at the Sheriff's Department. Escorts to and from funerals and tours of the jail for schools can be provided. DARE officers visit schools to educate youth on various safety issues or law enforcement issues? A k-9 unit has been added to the Department. An animal control officer is also on duty to assist citizens with any animal problems.

The **Building Inspections Department** enforces all state building, electrical, plumbing, insulation, structural and mechanical codes to ensure compliance with minimum construction standards. In addition to these codes, the Department is also involved in the National Flood Insurance Program and administers this program to citizens. In compliance with the Coastal Area Management Act (CAMA), the Pamlico County Building Inspector issues permits for all developments which meet CAMA regulatory definition of a minor permit. The Building Inspector is also responsible for conducting fire inspections of county schools twice a year to ensure their compliance with all fire regulations.

The **Emergency Management** office is dedicated to sound emergency management of all aspects. Responsibilities of this office include general emergency management and the Fire Marshall. Under FEMA regulations, the Emergency Management Office is responsible for the following functions: the development and maintenance of programs and systems for effective coordination of community resources in all phases of emergency management; the planning and preparation for population protection, including evacuation and sheltering; the appropriate response to national security emergencies; disaster response and recovery and the promotion of public awareness. As Fire Marshall, the Emergency Management Coordinator works to keep the County Manager and the Board of Commissioners informed of the status of rural fire departments, areas of concern and fire prevention planning. The Fire Marshall also assists with the coordination of fire alarms in the county, the development of Arson Task Forces, the organization of fire prevention programs and the procurement of funds for rural fire departments. In addition, the Fire Marshall maintains all fire incident reports and assists with the inspection of fire scenes.

The **Health Department** strives to promote the optimal health of Pamlico County citizens by providing high quality professional services, fostering public trust, minimizing identified public health risks and ensuring the safety of the environment for future generations. The agency receives state funding for sixteen different programs for public health.

The **Cooperative Extension Service** is an educational organization. It receives support from three levels of government – state, federal, and county – and has close ties to the state's two land grant universities: North Carolina State University in Raleigh and North Carolina A&T University in Greensboro. County extension agents have obtained field faculty status as a link to NC State University. This unique partnership allows the Cooperative Extension Service to serve as a bridge between the people of

North Carolina and the scientists of the US Department of Agriculture and the land grant universities.

Senior Services is a department of county government with offices located in the Senior Center in Alliance. Its purpose is to promote and improve the well-being of older adults and to develop and provide appropriate facilities and services to older adults to enhance their quality of life. A 12 member advisory committee appointed by the Board of County Commissioners advises the staff and makes recommendations to the Board of Commissioners on the development, implementation, and administration of services for older adults in Pamlico County. The Center provides several programs for older adults including: Senior Companion, Senior Health Insurance Information Program; classes, information, and referral; respite; nutrition; transportation; and physical fitness.

Technical Capability

Pamlico County has limited technical capability to implement hazard mitigation strategies.

Technical Expertise
Pamlico County does have a full time planner, emergency manager, and building inspector on staff to administer the County's hazard mitigation programs. The County does not have a licensed engineer or related technical expert on staff, and has in the past relied upon outside contractors/consultants to perform a majority of any required technical work.

Geographic Information Systems (GIS)
GIS systems can best be described as a set of tools (hardware, software, and people) used to collect, manage, analyze, and display spatially-referenced data. Many local governments are now incorporating GIS systems into their existing planning and management operations. Pamlico County currently has GIS capability, and a full time administrator of the system.

Fiscal Capability

Pamlico County has limited fiscal capability to implement hazard mitigation strategies. The majority of the County's annual budget is obligated to human services and education. Pamlico County receives most of its revenues through Ad Valorem taxes and through restricted intergovernmental contributions (federal and state pass through dollars).

It is highly unlikely that Pamlico County could afford to provide the local match for the existing hazard mitigation grant programs if the State of North Carolina did not do so itself. Considering the current budget deficits at both the State and local government level, combined with the apparent increased reliance on local accountability by the Federal government, this is a significant and growing concern for Pamlico County.

The North Carolina Department of Commerce classifies counties into one of three tiers, with Tier 1 representing the most economically disadvantaged and Tier 3 three the most prosperous. Pamlico County is currently classified as a Tier 2 county, which makes it easier for the County to access a special utilities fund and priority status for Community Development Block Grant funds for economic development.

Policy and Program Capability

This part of the capabilities assessment includes the identification and evaluation of existing plans, policies, practices, programs, or activities that either increase or decrease the community's vulnerability to natural hazards. Positive activities, which decrease hazard vulnerability, should be sustained and enhanced if possible. Hazard vulnerability should become targeted for reconsideration and be thoroughly addressed within the mitigation strategies when negative activities are increased.

Recent Hazard Mitigation Efforts
Pamlico County has undertaken a few specific hazard mitigation efforts in the past.

Community Rating System Activities
Communities that regulate development in floodplains are able to participate in the National Flood Insurance Program (NFIP). In return, the NFIP makes federally-backed flood insurance policies available for properties in the community. The Community Rating System (CRS) was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. There are ten CRS classes: Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction.

Pamlico County participates in the Community Rating System as a Class 9 community. This allows County residents to receive a 5% discount on their flood insurance premiums for policies purchased under the NFIP.

In 2006, a total of 917 credit points were verified by Insurance Services Office, Inc. (ISO) which results in a recommendation to the Federal Insurance Administrator that Pamlico County be classified as a CRS Class 9 community. The following is a summary of ISO's findings with the total credit points for each activity noted in parentheses:

Activity 310 – Elevation Certificates: Pamlico County Building Inspections Department maintains elevation certificates for new and substantially improved buildings. (56 points)

Activity 320 – Map Information Service: Credit is provided for furnishing inquirers with flood zone information from the community's latest Flood Insurance Rate Map (FIRM), publicizing the service annually and maintaining records. (140 points)

Activity 340 – Hazard Disclosure: Credit is provided for community and state regulations requiring disclosure of flood hazards. (5 points)

Activity 350 – Flood Protection Information: Documents relating to floodplain management are available in the reference section of the Pamlico County Library. (28 points)

Activity 410 – Additional Flood Data: Credit is provided for a cooperating technical partnership agreement with FEMA and the State of North Carolina. (11 points)

Activity 420 – Open Space Preservation: Credit is provided for preserving more than five acres in the Special Flood Hazard Area (SFHA) as open space. (38 points)

Activity 430 – Higher Regulatory Standards: Credit is provided for enforcing regulations that require freeboard for new and substantial improvement construction and protection of the natural and beneficial functions of floodplains. Credit is also provided for enforcing state mandated regulatory standards, adopting the International Building and Residential Codes and for a Building Code Effectiveness Grading Schedule (BCEGS) Classification of 5/5. (242 points)

Activity 440 – Flood Data Maintenance: Credit is provided for maintaining and using GIS maps in the day to day management of the floodplain. Credit is also provided for maintaining copies of all previous FIRMs and Flood Insurance Study Reports. (114 points)

Activity 450 – Stormwater Management: The community enforces regulations for soil and erosion control. (32 points)

Activity 510 – Floodplain Management Planning: Based on the updates made to the NFIP Report of Repetitive Losses as of April 30, 2006, Pamlico County has 147 repetitive loss properties and is a Category C community for CRS purposes. All requirements for the 2006 cycle have been met. Credit is provided for the adoption and implementation of the Floodplain Management/Hazard Mitigation Plan. Since Pamlico County is a Category C community with an approved Floodplain Management/Hazard Mitigation Plan, a progress report must be submitted on an annual basis. (178 points)

Activity 540 – Drainage System Maintenance: The community enforces a regulation prohibiting dumping in the drainage system. (15 points)

Activity 630 – Dam Safety: All North Carolina communities currently receive CRS credit for the state's dam safety program. (58 points)

Emergency Operations Plan
Pamlico County has developed and adopted an Emergency Operations Plan which predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. For the most part, the plan describes the County's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster.

The plan does not specifically address hazard mitigation, but it does identify the specific operations to be undertaken by the County to protect lives and property immediately before, during, and immediately following an emergency. There are no foreseeable conflicts between this hazard mitigation plan and Pamlico County's Emergency Operations Plan, primarily because they are each focused on two separate phases of emergency management.

Floodplain Management Plan
Pamlico County currently has a separate floodplain management plan for purposes of the National Flood Insurance Program's Community Rating System. The Flood Damage Prevention Ordinance serves in this capacity and was adopted on June, 21, 2004. This Hazard Mitigation Plan is intended to fulfill the CRS planning requirement when it becomes adopted, and will be maintained as such.

County Ordinances
Pamlico County has adopted several ordinances that are relevant to hazard mitigation. These ordinances were listed and evaluated according to effectiveness in Section 3 of this plan.

Legal Capability
Local governments in North Carolina only have the legal authority that is granted to them to exercise by the state. This principle is commonly known as "Dillon's Rule," where all power is vested in the state and can only be exercised to the extent delegated. This rule applies to all of North Carolina's counties and cities.

The North Carolina General Statutes grants legal authority to the counties and cities enabling legislation. Local regulations that are enacted within the state's enabling authority do not automatically meet judicial acceptance. All regulations placed by local governments on land use and building practices must meet the procedural requirements of the 14th Amendment to the U.S. Constitution, or they may be found invalid. Constitutional protections apply to federal and state governments, as well as all municipalities. All mitigation measures taken by local governments in a regulatory sense must be worded and enforced in a manner that is consistent with the parameters set by the state and federal constitutions.

Local governments have a variety of mitigation measures that are consistent with all constitutional protections and within the limits of Dillon's Rule. All local government powers fall within one of four basic groups of powers: regulation, acquisition, taxation,

and spending. Mitigation measures may be carried out under each of the four types of powers.

Regulations

General Police Powers

North Carolina's local governments possess a broad range of regulatory powers at their disposal. North Carolina General Statutes grant general police powers to counties and cities, allowing them to adopt and enforce ordinances that define, prohibit, regulate, or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances, including public health nuisances. Some hazard mitigation measures can be included under the general police power available to local governments. Counties and cities may also use their police powers to abate nuisances that could include, by definition, any activities or conditions that make people or property more vulnerable to hazards.

Pamlico County has enacted and enforces regulatory ordinances designed to promote the public health, safety, and general welfare of its citizens. These ordinances are listed and further discussed in Section 3 of this plan.

Building Codes/Inspections

A number of mitigation measures involve structural modifications and retrofitting homes to be less susceptible to natural hazards. Many of these measures are accomplished through use of the building code. North Carolina has a mandatory building code (NCGS 143-138) imposed throughout the state. Counties and cities are granted the authority to adopt more stringent local building code requirements, but they may not adopt regulations that are less restrictive than the state building code.

Pamlico County has adopted the state building code, and has established a Building Inspections Department to carry out its building inspections.

Land Use

Regulatory authority granted to local governments by the state is the most commonly used manner that counties and towns use to control the use of land within its jurisdiction. Using various land use regulations, a local government may control the amount, timing, density, quality, and location of new development. Land use regulatory authority includes the power to adopt and enforce zoning ordinances, floodplain ordinances, and subdivision regulations.

Planning. In order to exercise the regulatory powers granted by the North Carolina General Statutes, local governments are required to designate a planning agency. The planning agency may perform a number of duties, including: make studies of the area; determine objectives; prepare and adopt plans for achieving those objectives; develop and recommend policies; ordinances and administrative means to implement plans; and perform other related duties.

Subdivision Regulations. Subdivision regulations govern the division of land for development or sale. These regulations can be used for mitigation purposes in various ways. They may prohibit the subdivision of land subject to flooding. Subdivision regulations may also set a standard for public infrastructure that ensures it is adequate for the assessed risk. They may require that developments be built in a hazard-resilient manner, such as requiring "deep" lots in shorefront areas to remedy shoreline erosion. However, subdivision regulations are not as broad as zoning and only indirectly affect the quality and type of development that occurs on subdivided land. Since these regulations apply only when land is subdivided and sold, they do not address development of small or undivided parcels of land.

Pamlico County has adopted a Subdivision Ordinance, which is further discussed in Section 3 of this plan.

Floodplain Regulations. Structures built in the floodplain are subject to damage by rising waters. In addition to increasing the number of properties at risk, development in the floodplain reduces the flood storage capacity of these areas, resulting in greater flood heights. Communities should consider the relocation, elevation or acquisition of buildings in the floodplain. At a minimum, elevation and relocation guidelines should meet NFIP standards.

Pamlico County is in good standing with the National Flood Insurance Program. The County has adopted and enforces a Flood Damage Prevention Ordinance, which is further discussed in Section 3 of this plan.

Spending

Hazard mitigation principles should be made a routine part of all spending decisions made by local governments. The most common forms of hazard mitigation-related spending techniques is capital improvements programming (CIP) and limiting government expenditures in high-hazard areas.

Capital Improvements Programs (CIP)

Capital improvements programs are timetables that define when, where, and what level of municipal services a government will supply. Typically a part of the comprehensive plan, the CIP sets public spending on improvements for the ensuing five to ten years. Timetables can be effective at managing growth because it is rarely feasible for a developer to provide water, sewer and other services without a public subsidy.

Limiting Government Expenditures in High-Hazard Areas

Regional and local governments can limit their expenditures for roads and other infrastructure in high-hazard areas. This technique will discourage development in these areas, which can greatly reduce disaster-related damage and recovery costs. Government facilities, especially those that house emergency services, should not be located in high-hazard areas. By avoiding these areas, local governments can help ensure these facilities will function during and in the immediate aftermath of an emergency. They can also reduce the cost of post-disaster repairs to public structures.

Acquisition
In the long run, it is less expensive to acquire and demolish a building than to repeatedly provide for its reconstruction. In addition to reducing the public cost of recovery and reconstruction, acquisition can be a tool for accomplishing other community goals. It can help increase floodplain storage capacity, preserve wetlands, maritime forests, estuaries and other natural habitats, and provide open space, beach access, and parks and recreation areas. There are several alternative ways to approach acquisition of flood prone properties.

1. Fee Simple Acquisition of Land and Damaged Structures
Land ownership is often defined as a bundle of rights, of which the right to develop is only one. When one person owns all the rights associated with a parcel of land, they are said to own the land "in fee simple." Acquiring a property in fee simple provides a local government with the greatest level of control over the use and disposition of a parcel. Fee simple purchase is usually the most expensive method of land acquisition. In addition to the cost of buying the property, a local government must delete the property from its property tax rolls and assume its maintenance costs.

There are four types of buyouts where built property is involved. *Basic buyouts* are community-run programs without a relocation element. *Buyout and infill* programs are designed to encourage the relocation of families and structures from the floodplain to vacant lots in less hazard-prone neighborhoods. Communities operating *buyout and reorganization* plans often create new subdivisions into which they actively relocate houses and businesses. The community will usually sponsor the planning and installation of infrastructure. *Buyout and complete relocation* is the construction of a new town using new or relocated old buildings.

2. Easements
The owner of an easement has one or more of the rights in a property, leaving the rest of the "bundle" in the hands of the land owner. Easements either grant an affirmative right to use property, such as a right of access, or restrict the land owner's right to use the property in a particular way. Easements can be written either to allow public access or to prohibit it. They must be clear about the restrictions placed on the property. They should also allow inspection by public officials to ensure compliance with the easement provisions. An administrative process for policing easements should be established. The best incentive for encouraging the donation of a conservation easement is the fact that the donation may qualify the donor for tax credits.

3. Relocation of Existing Development
Relocation means moving a building or facility to a less hazard-prone area, either within the same parcel or on a new parcel. This technique is typically used to avoid coastal or riverine flood hazards. "Relocating" can also be used to describe the process of demolishing a building and reconstructing it outside the hazard area.

Taxation
The power of taxation extends beyond merely the collection of revenue. A number of communities set preferential tax rates for areas that are unsuitable for development and can be used to discourage development in hazardous areas.

Differential Assessment
Differential taxation is a technique for reducing the tax burden on land facing development pressure by recognizing that undeveloped properties require fewer public services. This technique can moderate the pressure to develop land at its "highest and best" use in one of several ways; by reducing the assessed value of land to a percentage of urban land; or by assessing the value of land based on its income-producing capacity, as opposed to its market value.

Special Assessment Districts
Special assessment districts apply to property owners who directly benefit from a specific public improvement. These owners of both new and existing development in the district are charged a fee that is proportional to the benefits received from the improvement. There are a number of ways to apply this technique, from temporary assessments that raise revenue for a specific improvement to indefinite assessments that fund independent, special purpose governmental entities.

Pamlico County does levy property taxes, but does not use any preferential tax districts or special assessments for purposes of guiding growth and development.

Funding Sources

Although all mitigation techniques will likely save money be avoiding losses, many projects are costly to implement. Pamlico County will continue to seek outside funding assistance for mitigation projects in both the pre- and post-disaster environment. This section identifies the Federal and State grant programs for Pamlico County to consider, and discusses local and non-governmental funding sources.

Federal
The following federal grant programs have been identified as funding sources which specifically target hazard mitigation projects:

Title: Pre-Disaster Mitigation Program
Agency: Federal Emergency Management Agency
Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential disaster declaration. The Pre-Disaster Mitigation (PDM) Program provides funding to states and communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program, and reduce injuries, loss of life, and damage and destruction of property.

The funding is based upon a 75 percent Federal share, 25 percent non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination. Special accommodations will be made for "small and impoverished communities," who will be eligible for 90% Federal share, 10% non-Federal.

FEMA provides PDM grants to states that, in turn, can provide sub-grants to local governments for accomplishing the following eligible mitigation activities:

- State and local hazard mitigation planning
- Technical assistance [e.g. risk assessments, project development]
- Mitigation projects
- Acquisition or relocation of vulnerable properties
- Hazard retrofits
- Minor structural hazard control or protection projects
- Community outreach and education (up to 10% state allocation)

Title: Flood Mitigation Assistance Program
Agency: Federal Emergency Management Agency

FEMA's Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP.

FMA is a pre-disaster grant program, and is made available to states on an annual basis. This funding is available for mitigation planning and implementation of mitigation measures only, and is based upon a 75 percent Federal share, 25 percent non-Federal share. States administer the FMA program and are responsible for selecting projects for funding from the applicants submitted by all communities within the state. The state then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local governments may submit an application on their behalf.

Title: Hazard Mitigation Grant Program
Agency: Federal Emergency Management Agency

The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration.

To meet these objectives, FEMA can fund up to 75 percent of the eligible costs of each project. The state or local cost-share match does not need to be cash; in kind services or materials may also be used. With the passage of the Hazard Mitigation and Relocation Assistance Act of 1993, federal funding under the HMGP is now based on

15 percent of the federal funds spent on the Public and Individual Assistance programs (minus administrative expenses) for each disaster.

The HMGP can be used to fund projects to protect either public or private property, so long as the projects in question fit within the state and local government's overall mitigation strategy for the disaster area, and comply with program guidelines. Examples of projects that may be funded include the acquisition or relocation of structures from hazard-prone areas, the retrofitting of existing structures to protect them from future damages; and the development of state or local standards designed to protect buildings from future damages.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMGP project funding on behalf of their citizens. In turn, applicants must work through their state, since the state is responsible for setting priorities for funding and administering the program.

Title: Public Assistance (Infrastructure) Program, Section 406
Agency: Federal Emergency Management Agency

FEMA's Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential disaster declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure. The mitigation measures must be related to eligible disaster-related damages and must directly reduce the potential of future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.

Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility, and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility's operation or risk from another hazard.

Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include:

- Roads, bridges, and culverts
- Draining and irrigation channels
- Schools, city halls and other buildings
- Water, power and sanitary systems
- Airports and parks

Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following:

- Universities and other schools
- Hospitals and clinics
- Volunteer fire and ambulance
- Power cooperatives and other utilities
- Custodial care and retirement facilities
- Museums and community centers

Title: SBA Disaster Assistance Program
Agency: U.S. Small Business Administration

The SBA Disaster Assistance Program provides low-interest loans to businesses following a Presidential disaster declaration. The loans target businesses to repair or replace uninsured disaster damages to property owned by the business, including real estate, machinery and equipment, inventory and supplies. Businesses of any size are eligible, along with non-profit organizations.

SBA loans can be utilized by their recipients to incorporate mitigation techniques into the repair and restoration of their business.

Title: Community Development Block Grant
Agency: U.S. Department of Housing and Urban Development

The Community Development Block Grant (CDBG) program provides grants to local governments for community and economic development projects that primarily benefit low and moderate income people. The CDBG program also provides grants for post-disaster hazard mitigation and recovery following a Presidential disaster declaration. Funds can be used for activities such as acquisition, rehabilitation or reconstruction of damaged properties and facilities and for the redevelopment of disaster areas.

The North Carolina Division of Emergency Management (NCEM) recently identified over 300 federal "disaster-related" funding sources. This listing includes mostly federal government grant programs that do not necessarily target hazard mitigation projects, but are certainly related and should be considered as good resources for potential mitigation funding. The listing of these funding sources will continue to be used as a reference but was not included within this plan due to space limitations.

State
The following State grant programs have been identified as the primary funding sources to support hazard mitigation projects within the State of North Carolina:

Title: Water and Sewer Grant Programs
Agency: North Carolina Rural Economic Development Center, Inc.

The Rural Center administers three programs to help rural communities develop the water and sewer systems they need to support local economic growth and ensure a reliable supply of clean water. The programs are made possible through appropriations

from the North Carolina General Assembly and through proceeds from the Clean Water Bonds, approved by the voters of North Carolina in November 1998.

The Supplemental Grants Program enables local governments and qualified non-profit corporations to improve local water and sewer systems. Projects may address public health, environmental, and/or economic development critical needs. The maximum grant amount for this program is now $400,000. Rural Center funds must be used to match other project funds.

The Capacity Building Grants Program provides funding for local governments to undertake planning efforts that support strategic investments in water and sewer facilities. Funds typically are used to prepare preliminary engineering reports, master water/sewer plans, capital improvement plans, water/sewer feasibility studies, rate studies and grant applications. The maximum grant amount for this program is generally $40,000.

The Unsewered Communities Grant Program provides funding for the planning and construction of new central, publicly owned sewer systems. Qualified communities must be not served by wastewater, collection or treatment systems. Unsewered community's grants are designed to cover 90 percent of the total cost of a project, but will not exceed $3 million.

There are two application deadlines per year. Applications must be received by 5:00 p.m. on the last business day of March and September. Funding announcements are generally in August and February.

Title: Clean Water Management Trust Fund
Agency: Board of Trustees, Clean Water Management Trust Fund

Created in 1996, the Clean Water Management Trust Fund (CWMTF) makes grants to local governments, state agencies and conservation non-profits to help finance projects that address water pollution problems. Specifically, CWMTF will fund projects that: (1) enhance or restore degraded waters; (2) protect unpolluted waters; and/or (3) contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits.

At the end of each fiscal year, 6.5% of the unreserved credit balance in North Carolina's General Fund (or a minimum of $30 million) will go into the CWMTF. Revenues from the CWMTF will then be allocated in the form of grants to local governments, state agencies and conservation non-profits to help finance projects that specifically address water pollution problems. The 18 member, independent, CWMTF Board of Trustees has full responsibility over the allocation of money from the Fund.

Title: CAMA Local Planning and Management Grants Program
Agency: North Carolina Department of Environment and Natural Resources, Division of Coastal Management

The Division of Coastal Management helps local governments in the 20 coastal counties fund local land-use planning and management projects through the CAMA Local Planning and Management Grants Program.

The Division accepts grant applications in the spring of each year. Local governments are encouraged to apply for funds for projects that will help them carry out their land- and water-use goals and objectives. Projects that are eligible for funds include new or updated CAMA land-use plans and implementation projects. Examples include local land-use ordinances, beach/waterfront access plans, storm water management plans, storm-hazard mitigation plans and capital facilities plans.

Some local governments may want to work together on a project designed to address land- and water-use issues on a regional basis. Examples of regional projects include a plan to protect or develop shared resources and other projects to enhance basin wide water-quality protection, economic development, regional transportation, and solid waste or wastewater disposal. For regional projects, one local government must serve as "project sponsor" and administer the grant funds on behalf of the other cooperating local governments. There is a special application for regional projects.

Title: Water Resources Development Grant Program
Agency: North Carolina Department of Environment and Natural Resources, Division of Water Resources

Applications for grants may be made for the non-federal share of water resources development projects for the following purposes in amounts not to exceed the percentage of the non-federal costs indicated:

- General navigation projects that are sponsored by local governments – 80%;
- Recreational navigation projects – 25%;
- Construction costs for water management (flood control and drainage) purposes, including utility and road relocations not funded by the State Department of Transportation – 66 2/3%, but only of that portion of the project specifically allocated for such flood control or drainage purposes;
- Stream restoration – 66 2/3%;
- Protection of privately owned beaches where public access is allowed and provided for – 75%;
- Land acquisition and facility development for water-based recreation sites operated by local governments – 50%;
- Aquatic weed control projects sponsored by local governments – 50%.

Local

Local governments depend upon local property taxes as their primary source of revenue. These taxes are typically used to finance services that must be available and delivered on a routine and regular basis to the general public. If local budgets allow, these funds may be used for other purposes in the general public interest. Many times

these funds are used to match Federal or State grant programs when required for large-scale projects.

Non-governmental
Another potential source of revenue for implementing local mitigation projects are monetary contributions from non-governmental organizations, such as private sector companies, churches, charities, community relief funds, the Red Cross, hospitals, Land Trusts and other non-profit organizations.

Political Willpower

Most Pamlico County residents are quite knowledgeable about the potential hazards that their community faces, and in recent years, they have become more familiar with the practices and principles of mitigation. Many flood prone structures have become elevated and to a lesser extent, acquired and relocated or replaced out of harm's way. It is strongly believed that such tangible and visual changes within the community have created a greater sense of awareness among local residents, and that hazard mitigation is a concept that they are beginning to readily accept and support.

Because of this fact, coupled with Pamlico County's history with natural disasters, it is expected that the current and future political climates are favorable for supporting and advancing future hazard mitigation strategies.

SECTION 17: ALLIANCE

Profile
Alliance is located along NC Highway 55, between the incorporated towns of Grantsboro and Bayboro. Incorporated in 1965, Alliance has a land area of 2 square miles.

Alliance has a population of 739 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Alliance residents is 24.7 minutes. The average household size in Alliance is 2.40 persons per household. The following statistics are based on the 2000 Census.

Table 19. Alliance Population Data

Subject	Number	Percent
Total Population	781	100
Sex and Age		
Male	355	45.5
Female	426	54.5
Under 5 years	47	6.0
5 to 9 years	55	7.0
10 to 14 years	35	4.5
15 to 19 years	49	6.3
20 to 24 years	33	4.2
25 to 34 years	73	9.3
35 to 44 years	118	15.1
45 to 54 years	95	12.2
55 to 59 years	44	5.6
60 to 64 years	39	5.0
65 to 74 years	78	10.0
75 to 84 years	55	7.0
85 years and over	60	7.7
Median age (years)	43.3	
65 years and over	193	24.7
RACE		
White	622	79.6
Black or African American	138	17.7
Hispanic	6	0.8
American Indian and Alaska Native	9	1.2

Subject	Number	Percent
Asian	4	0.5
Native Hawaiian / Pacific Islander	0	0
Some other race	2	0.3
Two or more races	6	0.8
SOCIAL CHARACTERISTICS		
Population 25 years and over	561	100.0
High school graduate or higher	136	80.4
Bachelor's degree or higher	19	5.5
Disability status (population 21 to 64 years)		
Foreign born	15	2.0
Now married (population 15 years and older)	347	55.4
Speak a language other than English at home	15	2.2
HOUSING CHARACTERISTICS		
Total housing units	304	100.0
Occupied housing units	288	94.7
Owner-occupied housing units	214	74.3
Renter-occupied housing units	74	25.7
Vacant housing units	16	5.3
YEAR STRUCTURE BUILT		
1999 to March 2000	4	1.3
1995 to 1998	39	12.8
1990 to 1994	29	9.5
1980 to 1989	57	18.8
1970 to 1979	78	25.7
1960 to 1969	37	12.2
1940 to 1959	40	13.2
1939 or earlier	20	6.6

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 3.3% were unemployed and looking for work. The sales and occupation sector employs the largest number of town residents (30.2%), followed by management and related occupations (27.5%) and production and transportation occupations (18.0%).

Table 20. Alliance Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	70	27.5
Service occupations	16	6.3
Sales and office occupations	77	30.2

Farming, fishing, and forestry	3	1.2
Construction, extraction and maintenance	43	16.9
Production and transportation	46	18.0
TOTAL WORKFORCE	255	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $15,951. The most recent poverty estimates indicate that 17.3% of Alliance residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Alliance's Capability

Alliance partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Alliance participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections. Alliance does not have any repetitive loss properties.

Alliance will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Alliance is located in Table 21.

Table 21. Alliance Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those floodplain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Alliance worked with the North Carolina Division of Community Assistance to revise the community's action plan. Alliance currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Alliance identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect life and property from public nuisance such as: unmaintained junk yards, overgrown properties and other public health hazards which include uncontrolled, vicious dogs.

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Alliance to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 22. Alliance Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Ensure that the County has responsibility for storm water detention regulations.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Medium Technically feasible and environmentally sound
2	Continue to address drainage issues as the need arises, to prevent pondering of water	Flooding, Hurricanes and Tropical Storms, Nor'easters Mosquitoes	Town Funds	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
3	Continue an active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Continue to rely upon the television and radio outlets for news and weather updates.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Local TV Stations and Local Radio Stations	ongoing	High Cost effective, technically feasible and environmentally sound
5	Closely monitor the development in hazard areas to ensure buildings meet construction regulations.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
6	Enforce CAMA buffer rules to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
7	Remove debris as	Flooding,	FEMA	Town	ongoing	Medium

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	soon as possible after the event.	Hurricanes and Tropical Storms, Nor'easters		Commissioners		Technically feasible and environmentally sound
10	Keep culverts and drains free of debris with the help of prisoners	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections (hired by Town)	ongoing	High Cost effective, technically feasible and environmentally sound
11	Ensure the county continues to provide technical assistance to property owners on how to protect their property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornados	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
12	County has established building codes which address Base Flood Elevations. Monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
13	Contact the NFIP office to request information on the Community Rating System	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	January 1, 2011	High Cost effective, technically feasible and environmentally sound
14	Continue to work with Tideland Electric and Progress Energy to provide electric power to the	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	community and continue their program of tree trimming					
15	Monitor the National Weather Service reports of wind speeds and storm conditions	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	National Weather Service	ongoing	High Cost effective, technically feasible and environmentally sound
16	Continue working with the state for snow removal	Nor'easters, Severe Winter Storms	DOT (Dept. of Transportation) county Road Funds	DOT (Department of Transportation)	ongoing	High Cost effective, technically feasible and environmentally sound
17	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Technically feasible
18	Seek assistance from the NC Forestry Service which has an ongoing wildfire education program, annually	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
19	Monitor NC Forestry Service tower posts for fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
21	Continue to administer a Public Nuisance Ordinance	Unmaintained junk yards, Public Health Issues,	Town Funds	Town	ongoing	High Cost effective, technically feasible

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	and Animal Control Ordinance	Uncontrolled and vicious dogs				and environmentally sound
22	Continue maintenance on town roads	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town	ongoing	Low Technically feasible
23	Continue to provide Local Fire Protection	Structure fires, i.e.: lightning strikes, automobile accidents	Town Funds	Town and Volunteer Fire Department	ongoing	High Cost effective, technically feasible and environmentally sound
24	Continue to provide Trash Pickup and Large Item Pickup	Flooding, Hurricanes and Tropical Storms, Nor'easters and Public Health Issues	50% Town Funds 50% Citizens	Town	ongoing	High Cost effective, technically feasible and environmentally sound
25	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Manager	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 20. Alliance FIRM Flood Zones

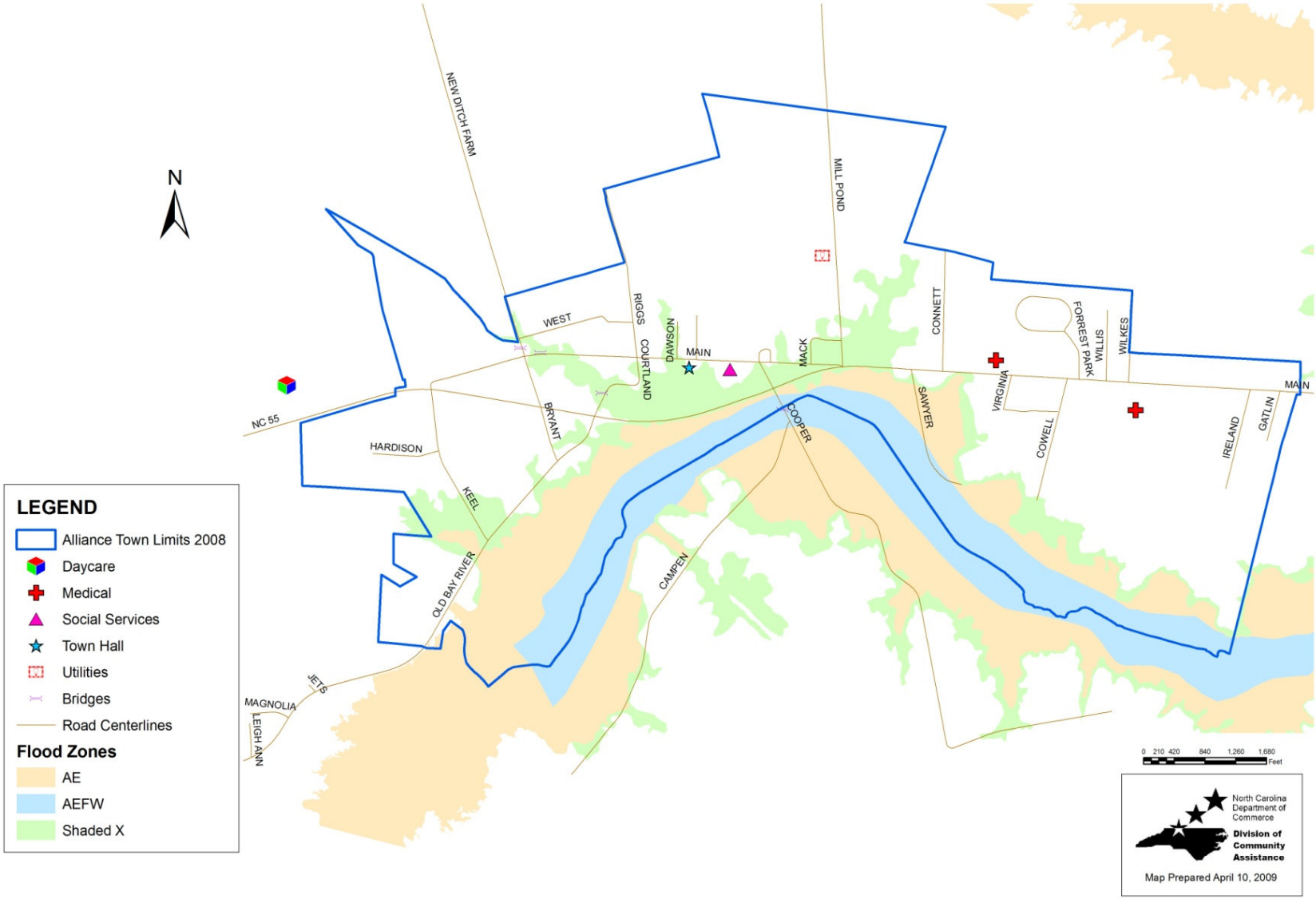


Figure 21. Alliance Storm Surge Inundation by Hurricane Category

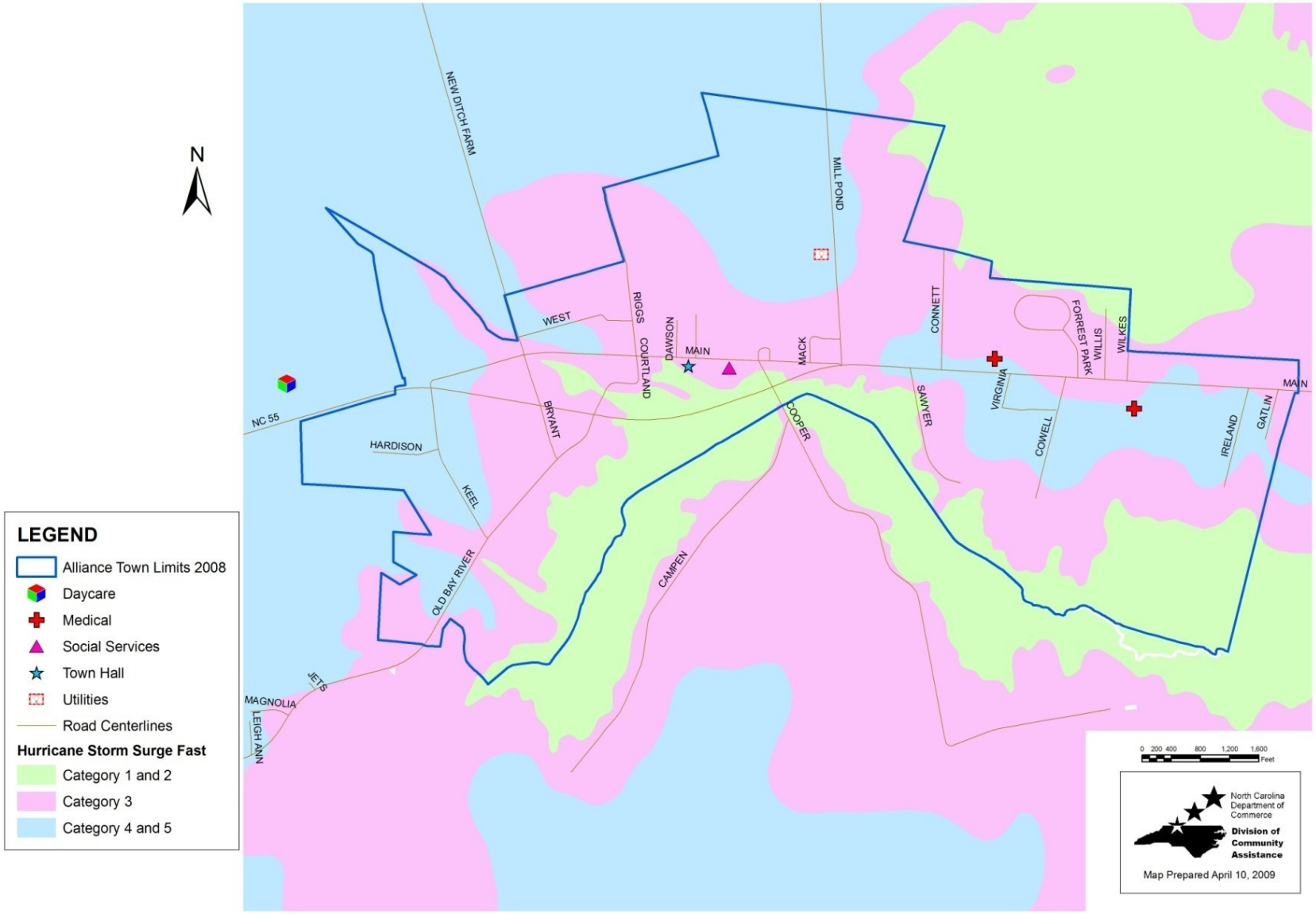


Table 23. Alliance Vulnerability Assessment

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	106	186	292	2,748,513	1,014,810	3,763,323	5,444,160
Category 3	323	419	742	20,614,636	8,327,517	28,942,153	16,589,280
Category 4 & 5	30	20	50	1,453,456	423,091	1,876,547	1,540,800
Total	459	625	1,084	24,816,605	9,765,418	34,582,023	23,574,240
Inundation - Fast							
Category 1 & 2	74	162	236	1,477,442	832,206	2,309,648	3,800,640
Category 3	213	312	525	11,640,616	4,981,012	16,621,628	10,939,680
Category 4 & 5	172	150	322	11,698,547	3,952,200	15,650,747	8,833,920
Total	0	624	1,083	24,816,605	9,765,418	34,582,023	23,574,240
100-Year Floodplain							
AE	72	99	171	1,295,686	710,221	2,005,907	3,697,920
Total	72	99	171	1,295,686	710,221	2,005,907	3,697,920
Inundation - Slow							
Category 1 & 2	106	186	292	2,748,513	1,014,810	3,763,323	5,444,160

* Future Development was calculated by multiplying Vacant Acres by the average value per acre in Alliance ($51,360), determined by dividing the Total Value of Developed Properties in Alliance by Total Developed Acres

SECTION 18: ARAPAHOE

Profile
Arapahoe is located along NC Highway 306, between the incorporated towns of Grantsboro and Minnesott Beach. Incorporated in 1969, Arapahoe has a land area of 0.89 square miles.

Arapahoe has a population of 427 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Arapahoe residents is 32.1 minutes. The average household size in Arapahoe is 2.32 persons per household.[1] The following statistics are based on the 2000 Census.

Table 24. Arapahoe Population Data

Subject	Number	Percent
Total Population	436	100
Sex and Age		
Male	216	49.5
Female	220	50.5
Under 5 years	23	5.3
5 to 9 years	29	6.7
10 to 14 years	20	4.6
15 to 19 years	26	6.0
20 to 24 years	22	5.0
25 to 34 years	57	13.1
35 to 44 years	51	11.7
45 to 54 years	78	17.9
55 to 59 years	29	6.7
60 to 64 years	28	6.4
65 to 74 years	36	8.3
75 to 84 years	30	6.9
85 years and over	7	1.6
Median age (years)	41.8	
65 years and over	73	16.7
RACE		
White	392	89.9
Black or African American	27	6.2

[1] US 2000 Census

Subject	Number	Percent
Hispanic	24	5.5
American Indian and Alaska Native	1	0.2
Asian	5	1.1
Native Hawaiian / Pacific Islander	0	0
Some other race	11	2.5
Two or more races	0	0
SOCIAL CHARACTERISTICS		
Population 25 years and over	309	100.0
High school graduate or higher	115	79.6
Bachelor's degree or higher	25	9.7
Disability status (population 21 to 64 years)	50	18.8
Foreign born	14	3.2
Now married (population 15 years and older)	197	54.9
Speak a language other than English at home	23	5.5
HOUSING CHARACTERISTICS		
Total housing units	214	100.0
Occupied housing units	188	87.9
Owner-occupied housing units	142	75.5
Renter-occupied housing units	46	24.5
Vacant housing units	26	12.1
YEAR STRUCTURE BUILT		
1999 to March 2000	5	2.3
1995 to 1998	17	8.0
1990 to 1994	20	9.4
1980 to 1989	26	12.2
1970 to 1979	41	19.2
1960 to 1969	18	8.5
1940 to 1959	36	16.9
1939 or earlier	50	23.5

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 1.7% was unemployed and looking for work. The sales and office occupations sector employs the largest number of town residents (30.1%), followed by production and transportation (20.4%) and management and related occupations (18.4%).

Table 25. Arapahoe Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	38	18.4

Service occupations	20	9.7
Sales and office occupations	62	30.1
Farming, fishing, and forestry	10	4.9
Construction, extraction and maintenance	34	16.5
Production and transportation	42	20.4
TOTAL WORKFORCE	206	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $17,073. The most recent poverty estimates indicate that 10.9% of Arapahoe residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Arapahoe's Capability

In its hazard mitigation strategy Arapahoe partners with many local, state, and federal agencies. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Arapahoe does not have mapped hazard areas within its jurisdiction. Therefore, Arapahoe will continue to work with the County to lessen the impacts of natural hazards on people and property.

Arapahoe does not participate in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). Arapahoe does not have any repetitive loss properties.

Arapahoe will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Arapahoe is located in Table 26.

Table 26. Arapahoe Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and erosion control. Through its roadway requirements,	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water management.	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance (Arapahoe is not a member of the National Flood Insurance Program)	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and moving structures away from shorelines	Any changes to the buffer rules and regulations should be incorporated in future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Natural Hazards Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people	Continue outreach

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			often ignore outreach material	projects and expand them where practical

Action Plan
Arapahoe worked with the North Carolina Division of Community Assistance to revise the community's action plan. Arapahoe currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Arapahoe identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Arapahoe to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 27. Arapahoe Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Ensure that the County has responsibility for storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Monitor and address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
3	Continue an active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
5	Remove debris as soon as possible after the event.	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
6	Monitor culverts and drains and keep them free of debris	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Dept of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
7	Provide technical	Flooding, Hurricanes and	County's	Pamlico County	ongoing	High

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	assistance to property owners regarding protecting their property	Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	General Fund	Emergency Management, Building Inspections		Cost effective, technically feasible and environmentally sound
8	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress	ongoing	High Cost effective, technically feasible and environmentally sound
9	Pursue State assistance in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	NC Dept of Transportation	NC Dept of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
10	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Technically feasible
11	Seek assistance from the NC Forestry Service has an ongoing wildfire education program, annually	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
12	Monitor NC Forestry Service posts for fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound

Figure 22. Arapahoe FIRM Flood Zones & Critical Facilities

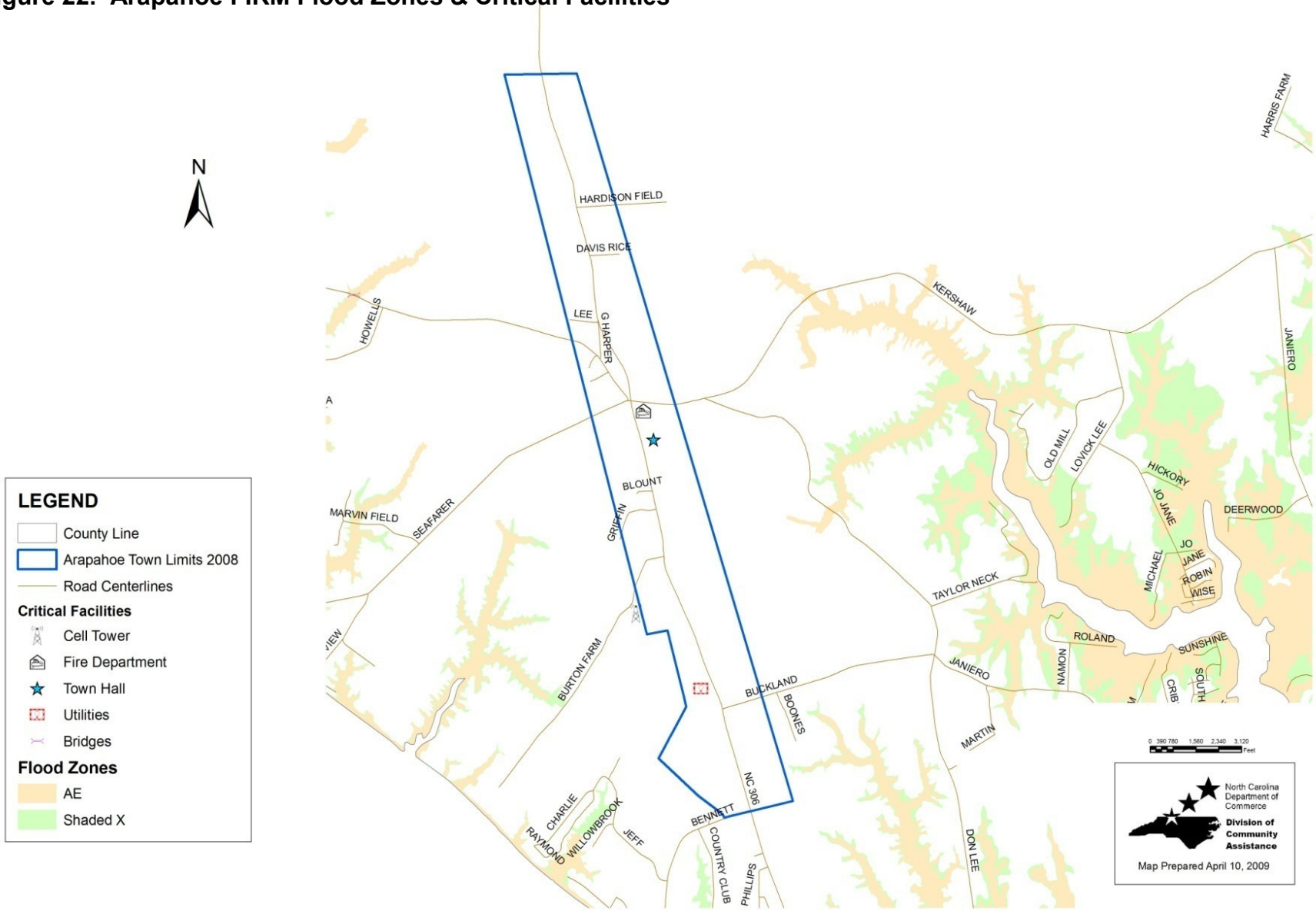


Figure 23. Arapahoe Storm Surge Inundation by Hurricane Category

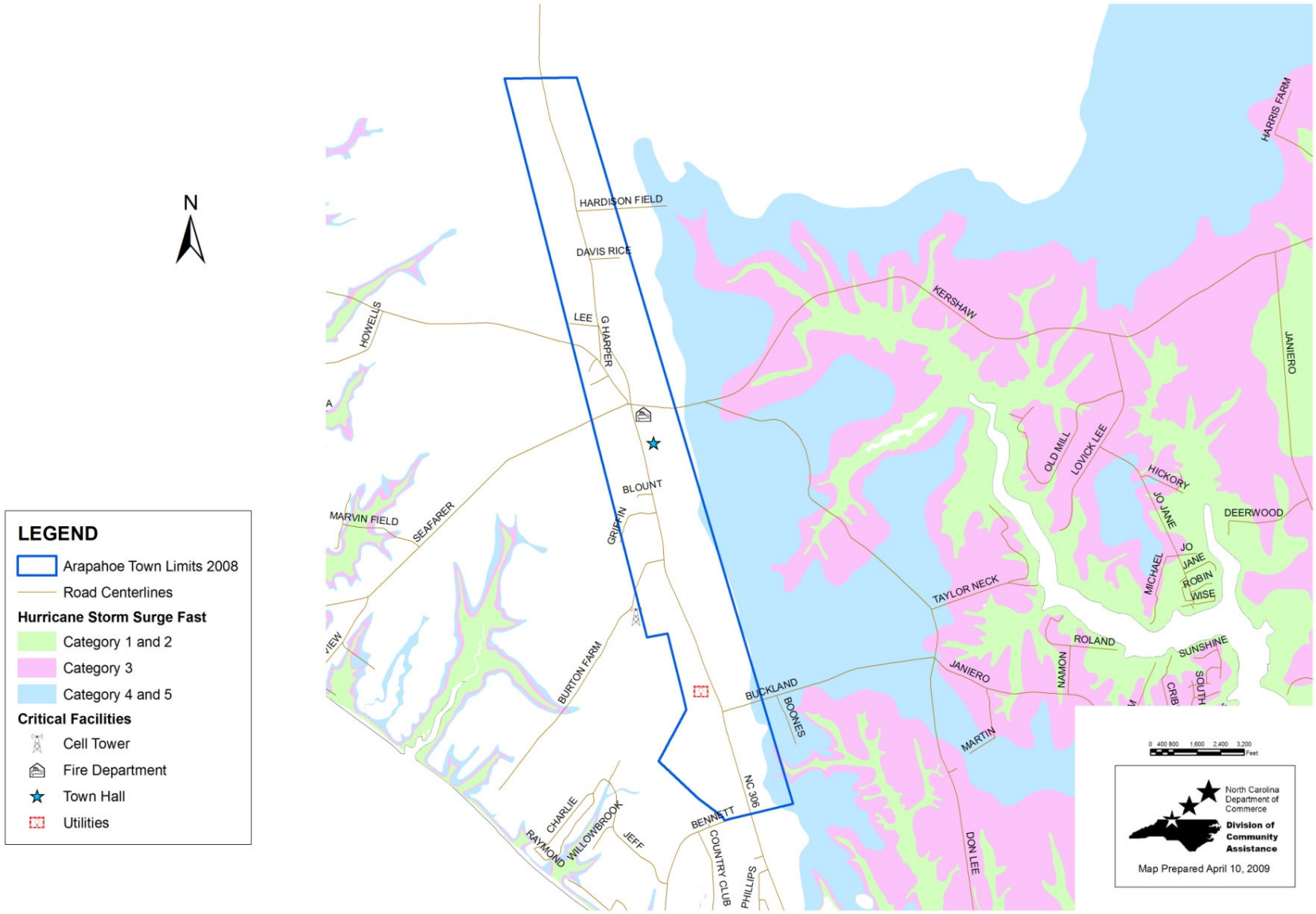


Table 28. Arapahoe Vulnerability Assessment

	Vacant Acres	Developed Acres	Total Acres	Structures	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow								Inundation - Slow
Category 1 & 2	0	0	0	0	0	0	0	Category 1 & 2
Category 3	0		0	0	0	0	0	Category 3
Category 4 & 5	101	1	102	73,329	190,739	264,068	2,415,718	Category 4 & 5
Total	101	1	102	73,329	190,739	264,068	2,415,718	Total
Inundation - Fast								Inundation - Fast
Category 1 & 2	0	0	0	0	0	0	0	Category 1 & 2
Category 3	0	0	0	0	0	0	0	Category 3
Category 4 & 5	93	0	0	0	153,642	153,642	2,224,374	Category 4 & 5
Total	93	0	0	0	153,642	153,642	2,224,374	Total
100-Year Floodplain								100-Year Floodplain
AE	0	0	0	0	0	0	0	AE
Total	0	0	0	0	0	0	0	Total
Inundation - Slow								Inundation - Slow
Category 1 & 2	0	0	0	0	0	0	0	Category 1 & 2

* Future Development was calculated by multiplying Vacant Acres by the average value per acre in Arapahoe ($23.918), determined by dividing the Total Value of Developed Properties in Arapahoe by Total Developed Acres

SECTION 20: BAYBORO

Profile
Bayboro is located along NC Highway 55, between the incorporated towns of Alliance and Stonewall. Incorporated in 1881, Bayboro has a land area of 1 square mile.

Bayboro has a population of 732 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Bayboro residents is 22.5 minutes. The average household size in Bayboro is 2.36 persons per household.[2] The following statistics are based on the 2000 Census.

Table 29. Bayboro Population Data

Subject	Number	Percent
Total Population	741	100
Sex and Age		
Male	361	48.7
Female	380	51.3
Under 5 years	39	5.3
5 to 9 years	55	7.4
10 to 14 years	55	7.4
15 to 19 years	58	7.8
20 to 24 years	29	3.9
25 to 34 years	63	8.5
35 to 44 years	129	17.4
45 to 54 years	98	13.2
55 to 59 years	40	5.4
60 to 64 years	34	4.6
65 to 74 years	96	13.0
75 to 84 years	33	4.5
85 years and over	12	1.6
Median age (years)	41.0	
65 years and over	141	19.0
RACE		
White	346	46.7
Black or African American	379	51.1
Hispanic	11	1.5

[2] US 2000 Census

Subject	Number	Percent
American Indian and Alaska Native	3	0.4
Asian	3	0.4
Native Hawaiian / Pacific Islander	0	0
Some other race	7	0.9
Two or more races	3	0.4
SOCIAL CHARACTERISTICS		
Population 25 years and over	518	100.0
High school graduate or higher	146	71.6
Bachelor's degree or higher	38	13.3
Disability status (population 21 to 64 years)	129	32.3
Foreign born	6	0.8
Now married (population 15 years and older)	254	42.0
Speak a language other than English at home	42	5.9
HOUSING CHARACTERISTICS		
Total housing units	340	100.0
Occupied housing units	301	88.5
Owner-occupied housing units	220	73.1
Renter-occupied housing units	81	26.9
Vacant housing units	39	11.5
YEAR STRUCTURE BUILT		
1999 to March 2000	29	8.6
1995 to 1998	33	9.7
1990 to 1994	21	6.2
1980 to 1989	39	11.5
1970 to 1979	73	21.5
1960 to 1969	76	22.4
1940 to 1959	54	15.9
1939 or earlier	14	4.1

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 3.5% were unemployed and looking for work. The sales and occupation sector employs the largest number of town residents (25%), followed by production and transportation (23.1%) and management and related occupations (19.8%).

Table 30. Bayboro Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	61	19.8
Service occupations	57	18.5

Sales and office occupations	77	25.0
Farming, fishing, and forestry	5	1.6
Construction, extraction and maintenance	37	12.0
Production and transportation	71	23.1
TOTAL WORKFORCE	308	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $13,709. The most recent poverty estimates indicate that 28.5% of Bayboro residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Bayboro's Capability

Bayboro partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Bayboro participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Bayboro will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Bayboro is located in Table 30.

Table 31. Bayboro Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections)	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Bayboro worked with the North Carolina Division of Community Assistance to revise the community's action plan. Bayboro currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Bayboro identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Bayboro to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 32. Bayboro Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to administer storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Address drainage issues as needed	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners, NC DOT	ongoing	Medium Technically feasible and environmentally sound
3	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
4	Continue to enforce State and CAMA buffer rules to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
4	Execute debris removal following an event.	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
6	Monitor culverts and drains maintain them	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High Cost effective, technically

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
						feasible and environmentally sound
7	Continue to provide technical assistance to property owners regarding protection of property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
8	Address Base Flood Elevations and monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
8	Contact the local NFIP representative to determine the status of the Community Rating, the Flood Plain Administrator designation, and the status of the Flood Damage Prevention Ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High Cost effective, technically feasible and environmentally sound
10	Address the storm water runoff issues as necessary	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners, NC DOT	ongoing	Medium Technically feasible and environmentally sound
11	Perform routine maintenance of culverts, ditches, and streams	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
12	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally sound
13	Seek assistance from the state in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	NC DOT	NC DOT	ongoing	High Cost effective, technically feasible and environmentally sound
14	Continue to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Technically feasible
15	Monitor the NC Forestry posts regarding fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
16	Request the NC Forestry Service brief local fire departments on common concerns, annually, prior to fire season	Wildfire	NC Forestry Service	NC Forestry Service, Pamlico County Emergency Management Director	Annually by July 1	High Cost effective, technically feasible and environmentally sound
17	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Commissioners	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 24. Bayboro FIRM Flood Zones & Critical Facilities

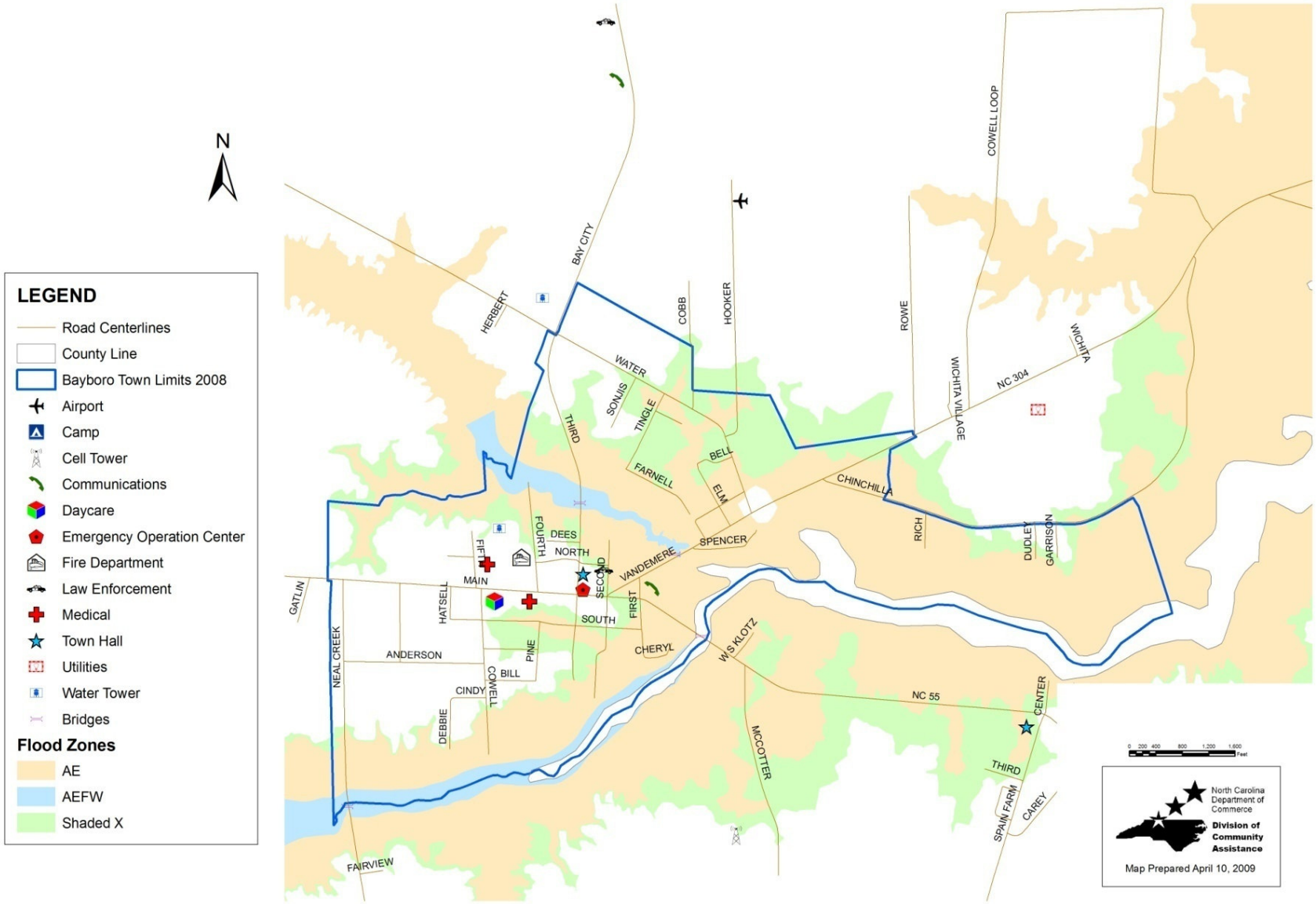


Figure 25. Bayboro Storm Surge Inundation by Hurricane Category

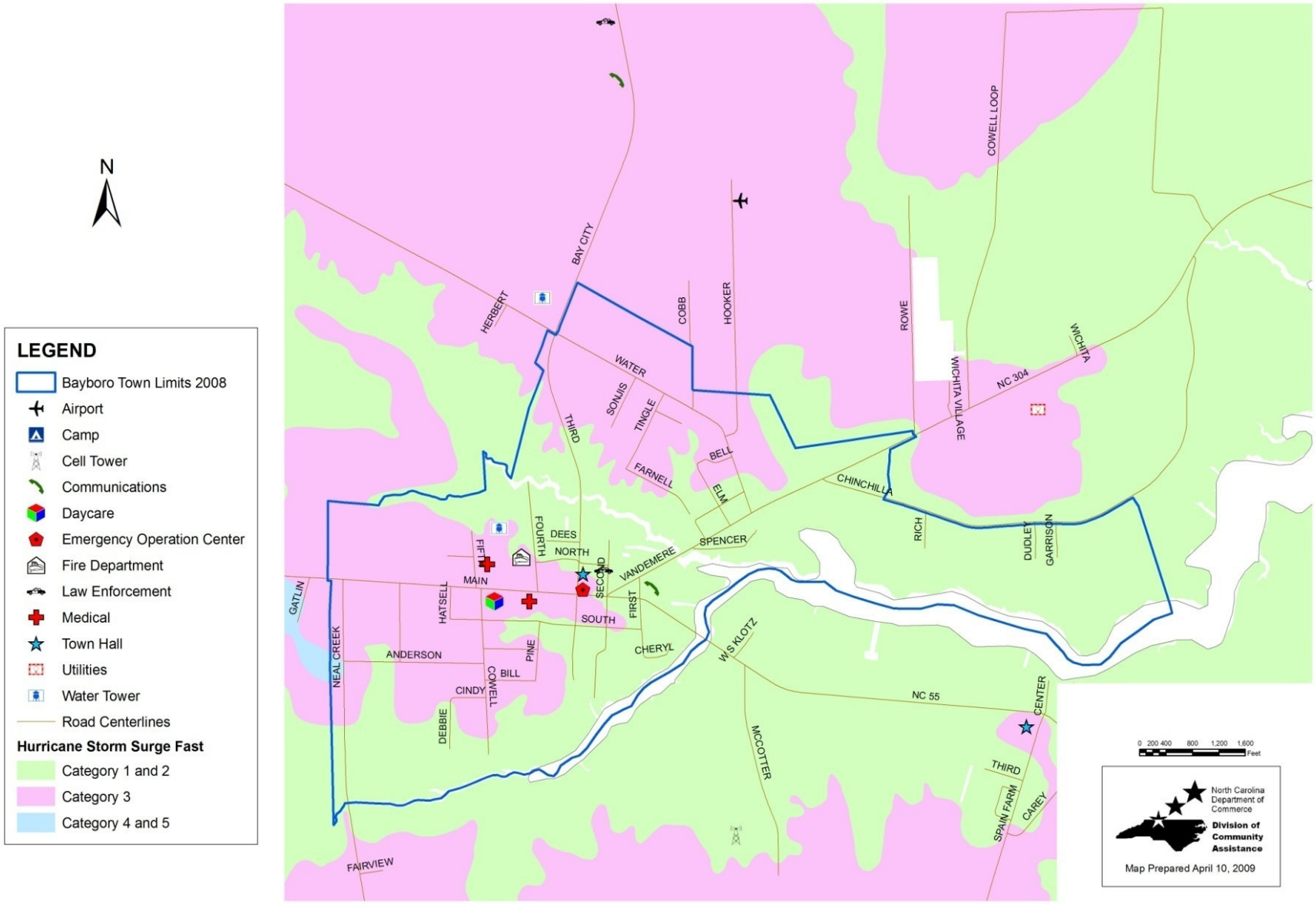


Table 32. Bayboro Vulnerability Assessment

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	310	310	620	21,885,855	6,143,966	28,029,821	28,364,070
Category 3	70	129	199	13,554,510	3,665,912	17,220,422	6,404,790
Category 4 & 5	0	0	0	0	0	0	0
Total	380	439	819	35,440,365	9,809,878	45,250,243	34,768,860
Inundation - Fast							
Category 1 & 2	238	248	486	17,313,609	4,592,327	21,905,936	21,776,286
Category 3	142	192	334	18,115,255	5,198,575	23,313,830	12,992,574
Category 4 & 5	1	1	2	11,501	18,976	30,477	91,497
Total	0	441	822	35,440,365	9,809,878	45,250,243	34,860,357
100-Year Floodplain							
AE	199	224	423	7,806,378	3,476,027	11,282,405	18,207,903
Total	199	224	423	7,806,378	3,476,027	11,282,405	18,207,903
Inundation - Slow							
Category 1 & 2	310	310	620	21,885,855	6,143,966	28,029,821	28,364,070

* Future Development was calculated by multiplying Vacant Acres by the average value per acre in Bayboro ($91,497), determined by dividing the Total Value of Developed Properties in Bayboro by Total Developed Acres

Section 20: Grantsboro

Profile

Grantsboro is located at the intersection of Highway 306 and Highway 55. Incorporated in 1997, Grantsboro has a land area of 3.68 square miles.

During the 2000 Census, the Town of Grantsboro was inadvertently missed during the survey. The error was not picked up until after the Census had been completed. Therefore, detailed socio-economic data is not available for Grantsboro. Some statistics have been generated, however, for voting and state funding purposes.

Grantsboro has a population of 754 persons. There are 322 total housing units in the town, of which 28 are vacant. There are 2.56 persons per household in the town.

Analysis of Grantsboro Capabilities

Grantsboro partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Grantsboro does not have mapped hazard areas within its jurisdiction. Therefore, Grantsboro will continue to work with the County to lessen the impacts of natural hazards on people and property.

Grantsboro does not participate in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). Grantsboro does not have any repetitive loss properties.

Grantsboro will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Grantsboro is located in Table 34.

Table 34. Grantsboro Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water management.	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance (Grantsboro is not a member of the National Flood	N/A	High	High because well-insured structures can be	Continue to participate in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
Insurance Program)			reconstructed	programs that provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it	Any changes to the buffer rules and regulations should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			reaches streams and moving structures away from shorelines	be incorporated in future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				County's action plan.
5. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Natural Hazards Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach material	Continue outreach projects and expand them where practical

Action Plan
Grantsboro worked with the North Carolina Division of Community Assistance to revise the community's action plan. Grantsboro currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Grantsboro identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Grantsboro to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 35. Grantsboro Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to administer storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
3	Continue its participation in the county's active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
5	Enforce State and CAMA buffer rules are enforced to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
6	Develop a municipal zoning code which will address erosion concerns.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	January 1, 2010	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
7	Execute debris removal following an event with assistance from NC Department of Transportation	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA/ NC Department of Transportation	NC Department of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
8	Monitor culverts and drains and maintain through prison labor	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
9	Address Base Flood Elevation and monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
10	Address the storm water runoff issues as necessary	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
11	Establish a more formalized system of routine cleaning of culverts, ditches, streams and the like which impede the flow of water	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	June 1, 2010	Medium Technically feasible and environmentally sound
12	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	tree trimming					sound
13	Monitor the National Weather Service for reports of wind speeds and storm conditions	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	National Weather Service	ongoing	High Cost effective, technically feasible and environmentally sound
14	Seek assistance from the state in clearing the roads after a snow event	Nor'easters, Severe Winter Storms, earthquakes	NC Department of Transportation	NC Department of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
15	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Cost effective
16	Monitor the NC Forestry posts regarding fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound

Figure 26. Grantsboro FIRM Flood Zones & Critical Facilities

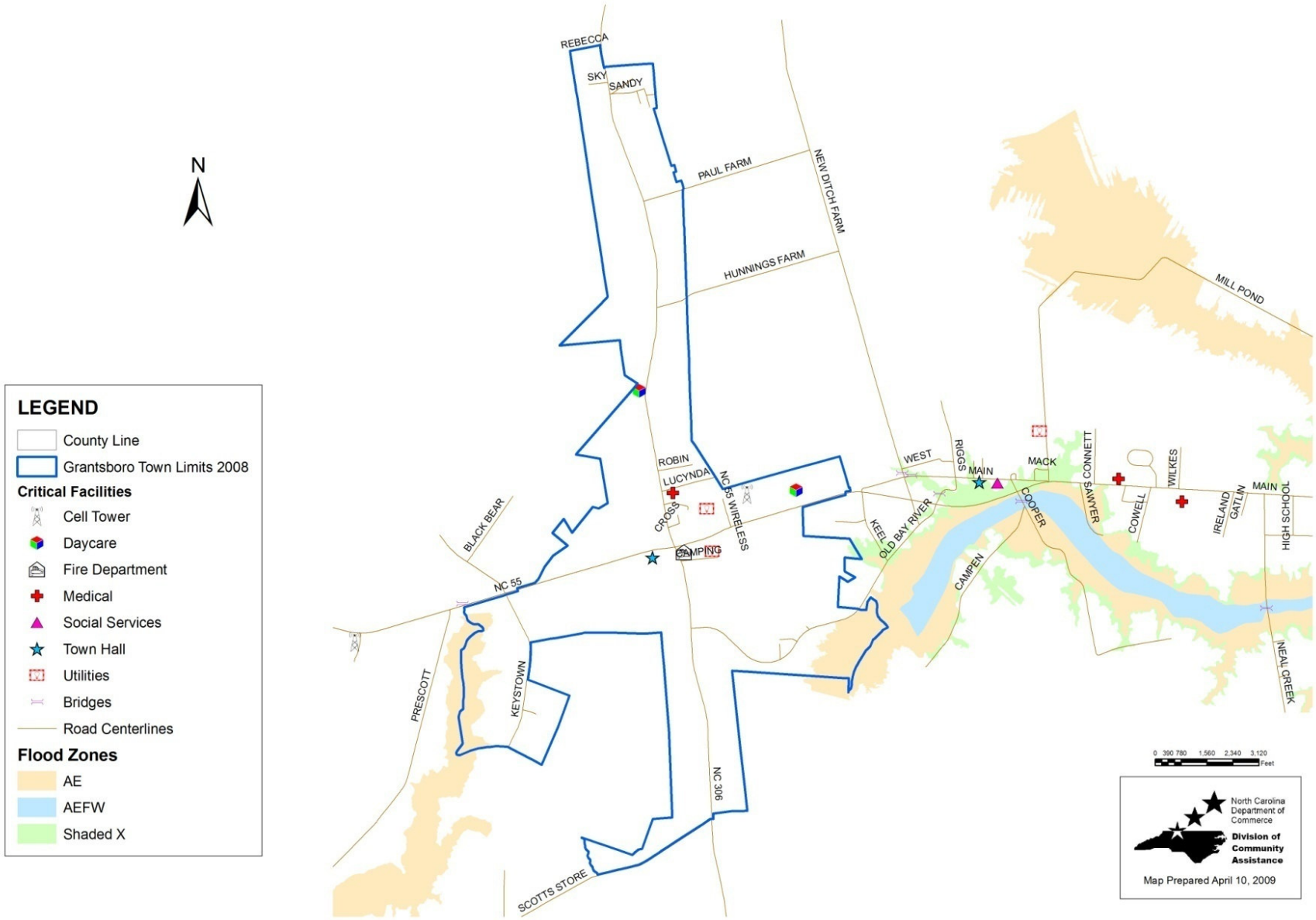


Figure 27. Grantsboro Storm Surge Inundation by Hurricane Category

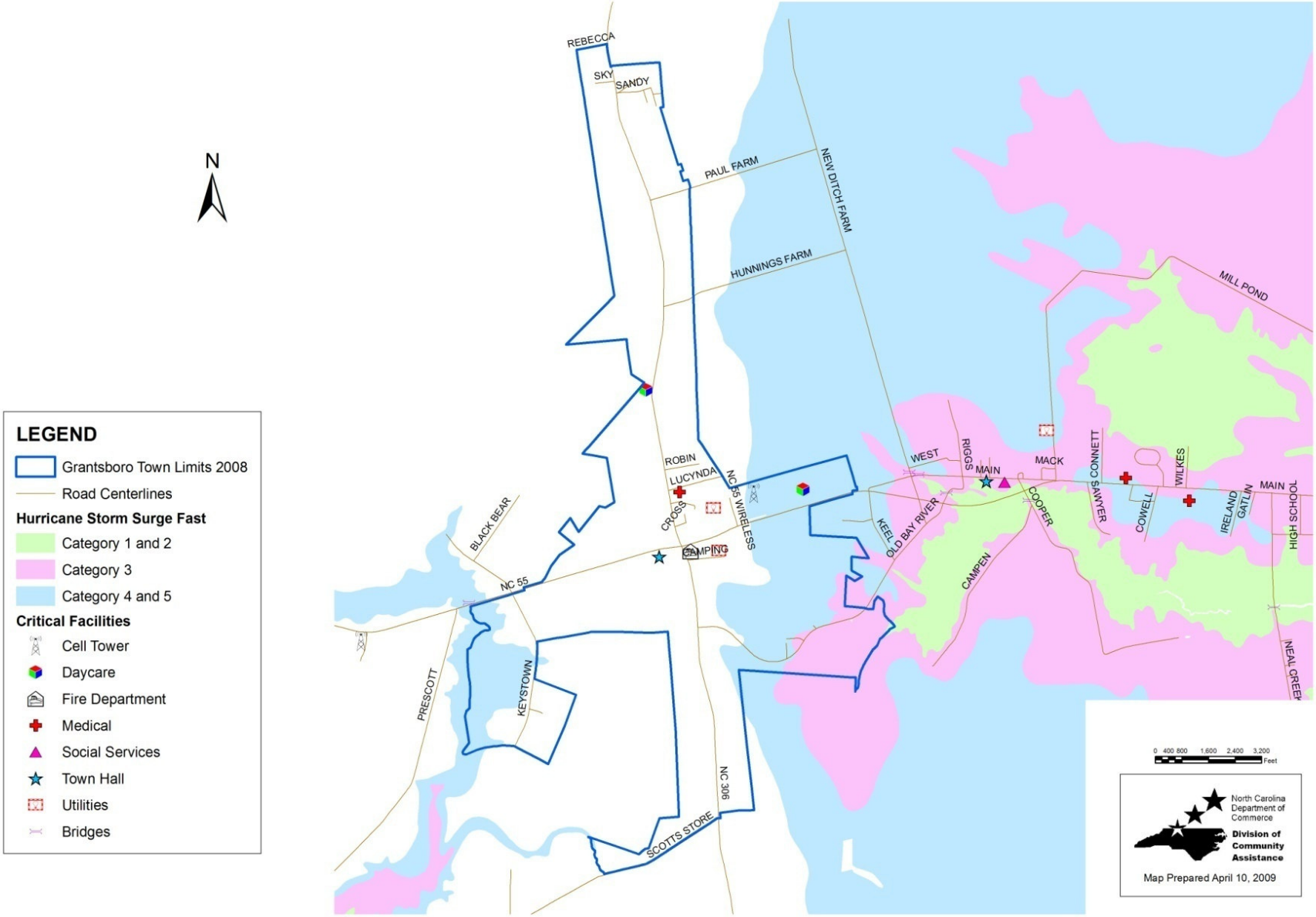


Table 36. Grantsboro Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	0	0	0	0	0	0	0
Category 3	174	15	189	1,810,218	580,937	2,391,155	5,738,346
Category 4 & 5	335	57	392	3,907,457	1,525,956	5,433,413	11,047,965
Total	509	72	581	5,717,675	2,106,893	7,824,568	16,786,311
Inundation - Fast							
Category 1 & 2	0	0	0	0	0	0	0
Category 3	90	3	93	258,448	232,113	490,561	2,968,110
Category 4 & 5	361	43	404	5,117,048	1,684,000	6,801,048	11,905,419
Total	0	46	497	5,375,496	1,916,113	7,291,609	14,873,529
100-Year Floodplain							
AE	112	2	114	199,047	208,718	407,765	3,693,648
Total	112	2	114	199,047	208,718	407,765	3,693,648
Inundation - Slow							
Category 1 & 2	0	0	0	0	0	0	0

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Grantsboro ($32,979), determined by dividing the Total Value of Developed Properties in Grantsboro by Total Developed Acres*

SECTION 21: MESIC

Profile
Mesic is located near the Pamlico County/Beaufort County border in the northeastern part of the county on Highway 304. Incorporated in 1971, Mesic has a land area of 1 square mile.

Mesic has a population of 243 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Mesic residents is 35.9 minutes. The average household size in Mesic is 2.42 persons per household.[3] The following statistics are based on the 2000 Census.

Table 37. Mesic Population Data

Subject	Number	Percent
Total Population	257	100
Sex and Age		
Male	117	45.5
Female	140	54.5
Under 5 years	5	1.9
5 to 9 years	14	5.4
10 to 14 years	26	10.1
15 to 19 years	20	7.8
20 to 24 years	7	2.7
25 to 34 years	14	5.4
35 to 44 years	34	13.2
45 to 54 years	40	15.6
55 to 59 years	11	4.3
60 to 64 years	21	8.2
65 to 74 years	30	11.7
75 to 84 years	24	9.3
85 years and over	11	4.3
Median age (years)	46.3	
65 years and over	65	25.3
RACE		
White	76	29.6
Black or African American	176	68.5

[3] US 2000 Census

Subject	Number	Percent
Hispanic	0	0
American Indian and Alaska Native	0	0
Asian	2	0.8
Native Hawaiian / Pacific Islander	0	0
Some other race	0	0
Two or more races	3	1.2
SOCIAL CHARACTERISTICS		
Population 25 years and over	178	100.0
High school graduate or higher	52	53.9
Bachelor's degree or higher	4	4.5
Disability status (population 21 to 64 years)	43	38.4
Foreign born	0	0.0
Now married (population 15 years and older)	119	58.3
Speak a language other than English at home	6	2.5
HOUSING CHARACTERISTICS		
Total housing units	146	100.0
Occupied housing units	106	72.6
Owner-occupied housing units	94	88.7
Renter-occupied housing units	12	11.3
Vacant housing units	40	27.4
YEAR STRUCTURE BUILT		
1999 to March 2000	8	5.5
1995 to 1998	16	11.0
1990 to 1994	5	3.4
1980 to 1989	24	16.4
1970 to 1979	26	17.8
1960 to 1969	24	16.4
1940 to 1959	25	17.1
1939 or earlier	18	12.3

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 2.6% were unemployed and looking for work. The construction, extraction and maintenance sector employs the largest number of town residents (24.7%), followed by sales and occupation sector and service occupations employ the largest number of town residents (23.5% each).

Table 38. Mesic Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	20	23.5

Service occupations	20	23.5
Sales and office occupations	10	11.8
Farming, fishing, and forestry	0	0
Construction, extraction and maintenance	21	24.7
Production and transportation	14	16.5
TOTAL WORKFORCE	85	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $15,253. The most recent poverty estimates indicate that 27.4% of Mesic residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Mesic Capabilities

In its hazard mitigation strategy, Mesic partners with many local, state, and federal agencies. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Mesic participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Mesic will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Mesic is located in Table 39.

Table 39. Mesic Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those floodplain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water management.	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to	Drainage system maintenance is an

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			better drainage during storm events	ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that provide insurance for natural hazards to residents

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and moving structures away from shorelines	Any changes to the buffer rules and regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of	Health and Safety Maintenance

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			rapid response	capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should include breakwaters and bulkheads as effective mitigation tools.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach material	Continue outreach projects and expand them where practical
Elevation markers	N/A	High	High because an elevation marker program would	All communities should consider an

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			inform the public	elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Mesic worked with the North Carolina Division of Community Assistance to revise the community's action plan. Mesic currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Mesic identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Mesic to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 40. Mesic Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to administer storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Address drainage issues as needed.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Council	ongoing	Medium Technically feasible and environmentally sound
3	Continue participation in the County's beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Continue to rely upon the television and radio outlets for news and weather updates.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Emergency Alert System	ongoing	High Cost effective, technically feasible and environmentally sound
5	Review culverts along Park Avenue and Hollyville Mobile Home Park in Cash Corner to diminish the risk of flooding	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	NC Department of Transportation	November 2010	Medium Technically feasible and environmentally sound
6	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
7	Enforce State and CAMA buffer rules to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Local CAMA Officer	ongoing	High Cost effective, technically feasible and environmentally sound
8	Consider developing a zoning ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Council	ongoing	High Cost effective, technically feasible and environmentally sound
9	Remove debris as soon as possible after the event.	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Council	ongoing	Medium Technically feasible and environmentally sound
10	Keep culverts and drains free of debris with the help of prisoners	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Transportation	ongoing	Medium Technically feasible and environmentally sound
11	Ensure the county continues to provide technical assistance to property owners on how to protect their property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
12	Address Base Flood Elevation and monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
13	Contact the NFIP representative to determine the status of the Community Rating, the Flood Plain Administrator designation, and the status of the Flood Damage Prevention Ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
14	Address the storm water runoff issue	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Medium Technically feasible and environmentally sound
15	Establish a more formalized system of routine cleaning of culverts, ditches, streams and the like which impede the flow of water	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Council, NC Department of Transportation	June 1, 2010	Medium Technically feasible and environmentally sound
16	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and CP&L	ongoing	Medium Technically feasible and environmentally sound
17	Monitor the National Weather Service reports of wind speeds and storm conditions	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	National Weather Service	ongoing	High Cost effective, technically feasible and environmentally sound
18	Seek State assistance in	Nor'easters, Severe Winter	NC Division of	Pamlico County	ongoing	High

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	clearing the roads after a snow event	Storms, earthquakes	Emergency Management	Emergency Management		Cost effective, technically feasible and environmentally sound
19	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services, Coastal Community Action Agency	ongoing	Low Cost effective
20	Seek assistance from the NC Forestry Service for wildfire education program annually	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
21	Monitor NC Forestry Service posts for fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
22	Send written request to the NC Forestry service requesting that they meet with the local fire units prior to fire season to discuss common concerns. The Emergency Management Director for the County will be asked to facilitate the meeting	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
23	Request that the issue of	Flooding, Hurricanes and	General budget	Town Council	November	Medium

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	occluded drainage canals which surround the town be addressed in the county's future hazard mitigation plan updates	Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes			2010	technically feasible and environmentally sound
24	Arrange for the documentation and of grave sites in town and for photographs of the headstones	Flooding, Hurricanes and Tropical Storms, Nor'easters	General budget	Town Council	ongoing	Low Technically feasible
25	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	General budget	Town Council	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 28. Mesic FIRM Flood Zones & Critical Facilities

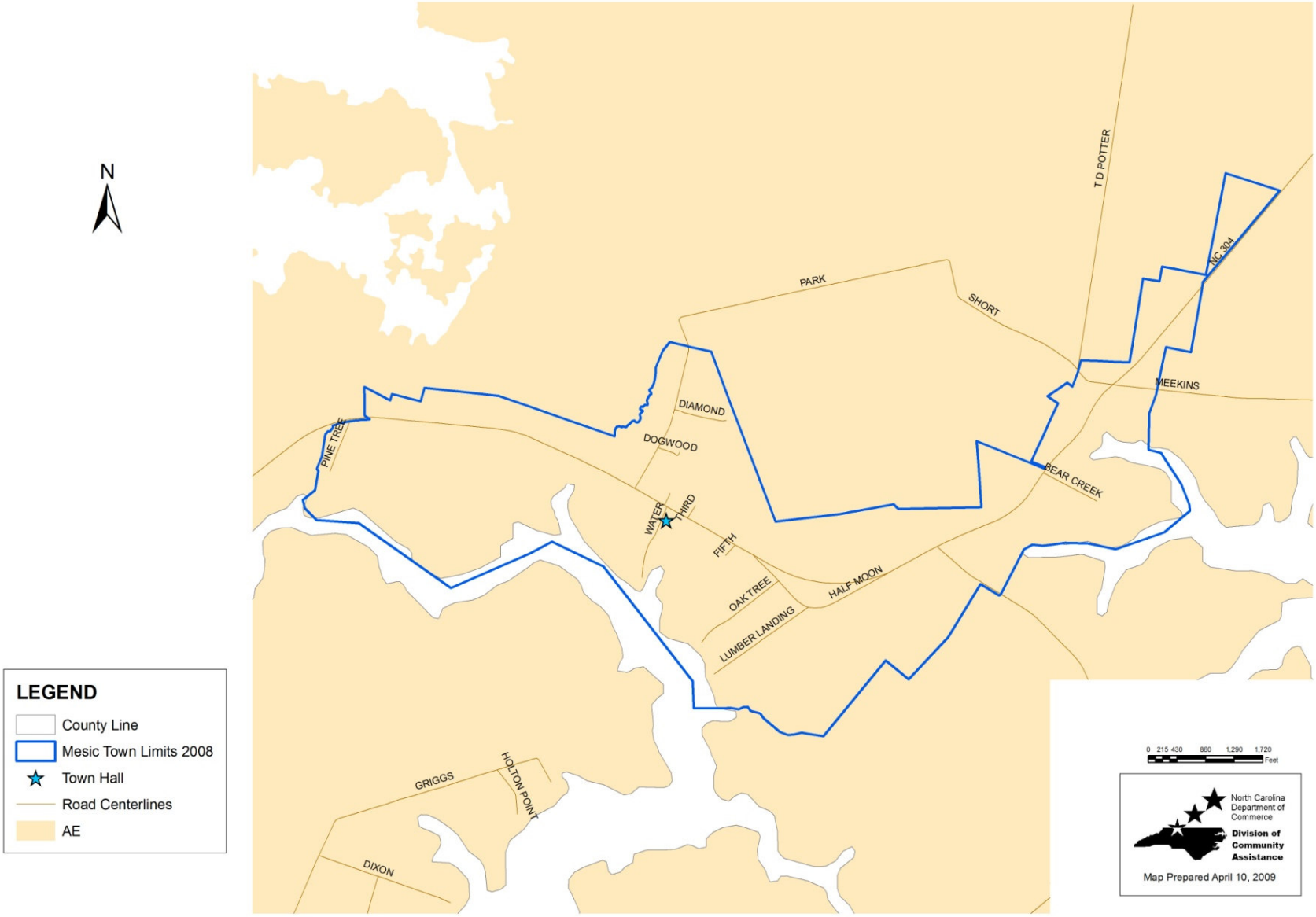


Figure 29. Mesic Storm Surge Inundation

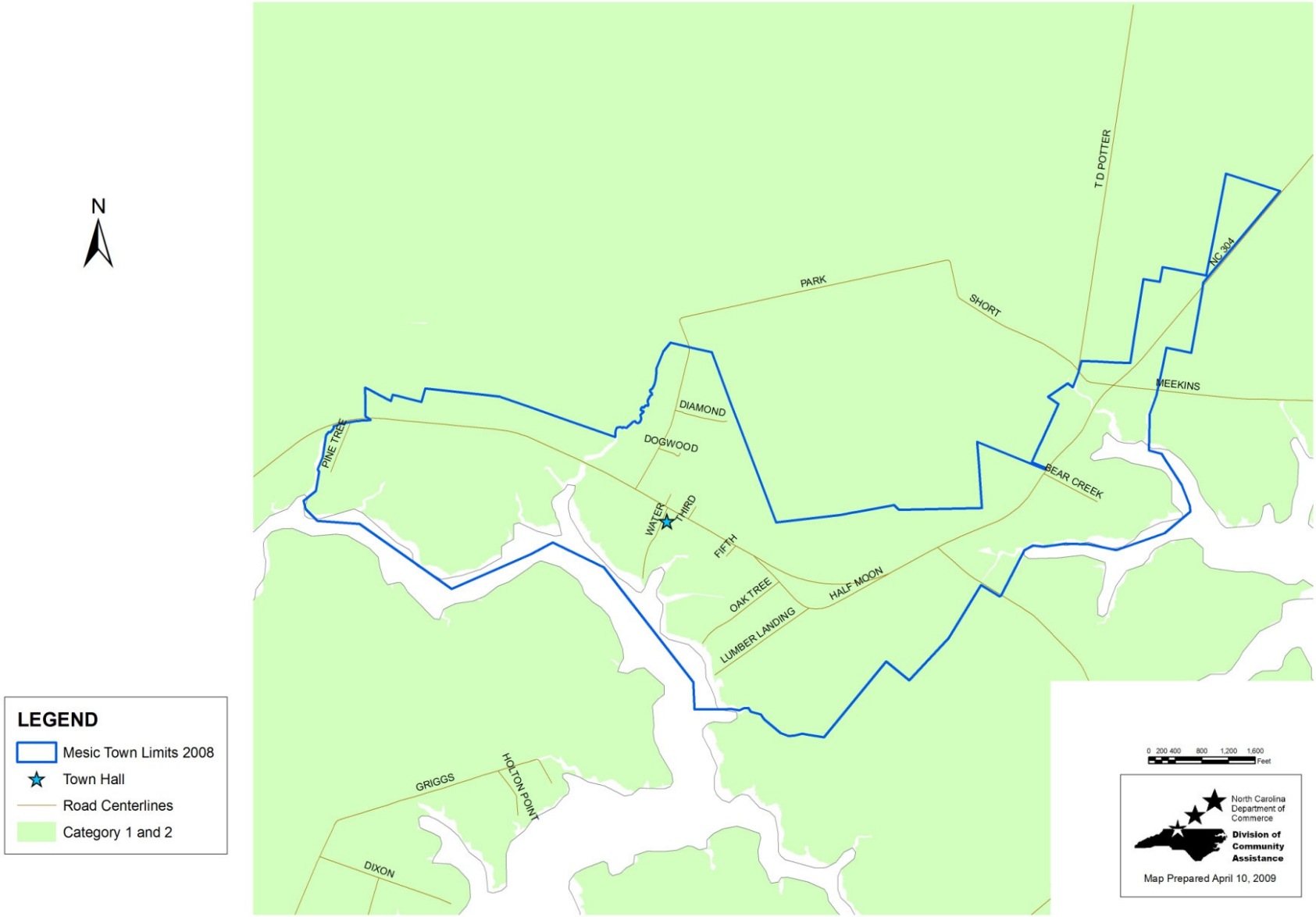


Table 41. Mesic Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409
Inundation - Fast							
Category 1 & 2	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	0	237	686	5,833,309	3,169,738	9,003,047	13,488,409
100-Year Floodplain							
AE	449	267	716	6,026,675	3,232,259	9,258,934	13,488,409
Total	449	267	716	6,026,675	3,232,259	9,258,934	13,488,409
Inundation - Slow							
Category 1 & 2	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Mesic ($30,041), determined by dividing the Total Value of Developed Properties in Mesic by Total Developed Acres*

SECTION 22: MINNESOTT BEACH

Profile
Minnesott Beach is located along the Neuse River, to the southeast of Arapahoe, on Highway 306. Incorporated in 1971, Minnesott Beach has a land area of 3.3 square miles.

Minnesott Beach has a population of 366 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Minnesott Beach residents is 32.7 minutes. The average household size in Minnesott Beach is 2.06 persons per household (US 2000 Census). The following statistics are based on the 2000 Census.

Table 42. Minnesott Beach Population Data

Subject	Number	Percent
Total Population	311	100
Sex and Age		
Male	152	48.9
Female	159	51.1
Under 5 years	6	1.9
5 to 9 years	6	1.9
10 to 14 years	16	5.1
15 to 19 years	10	3.2
20 to 24 years	10	3.2
25 to 34 years	18	5.8
35 to 44 years	37	11.9
45 to 54 years	56	18.0
55 to 59 years	31	10.0
60 to 64 years	31	10.0
65 to 74 years	49	15.8
75 to 84 years	35	11.3
85 years and over	6	1.9
Median age (years)	54.3	
65 years and over	90	28.9
RACE		
White	297	95.5
Black or African American	11	3.5
Hispanic	3	1.0

Subject	Number	Percent
American Indian and Alaska Native	0	0
Asian	2	0.6
Native Hawaiian / Pacific Islander	0	0
Some other race	0	0
Two or more races	1	0.3
SOCIAL CHARACTERISTICS		
Population 25 years and over	268	100.0
High school graduate or higher	56	88.1
Bachelor's degree or higher	44	28.0
Disability status (population 21 to 64 years)	21	10.8
Foreign born	4	1.3
Now married (population 15 years and older)	206	71.5
Speak a language other than English at home	11	3.6
HOUSING CHARACTERISTICS		
Total housing units	230	100.0
Occupied housing units	151	65.7
Owner-occupied housing units	134	88.7
Renter-occupied housing units	17	11.3
Vacant housing units	79	34.3
YEAR STRUCTURE BUILT		
1999 to March 2000	3	1.3
1995 to 1998	8	3.4
1990 to 1994	44	18.6
1980 to 1989	50	21.1
1970 to 1979	92	38.8
1960 to 1969	20	8.4
1940 to 1959	18	7.6
1939 or earlier	2	0.8

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 0.7% was unemployed and looking for work. The management and related occupations sector employs the largest number of town residents (36.7%), followed by sales and occupation sector (27.9%) and production and transportation (11.6%) employ the largest number of town residents.

Table 43. Minnesott Beach Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	54	36.7
Service occupations	14	9.5

Sales and office occupations	41	27.9
Farming, fishing, and forestry	7	4.8
Construction, extraction and maintenance	14	9.5
Production and transportation	17	11.6
TOTAL WORKFORCE	147	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $27,259. The most recent poverty estimates indicate that 2.3% of Minnesott Beach residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Minnesott Beach Capabilities

Minnesott Beach partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Minnesott Beach participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Minnesott Beach will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Minnesott Beach is located in Table 43.

Table 44. Minnesott Beach Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Minnesott Beach worked with the North Carolina Division of Community Assistance to revise the community's action plan. Minnesott Beach currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Minnesott Beach identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Minnesott Beach to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 45. Minnesott Beach Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Commissioners	ongoing	Medium This action is: 1) environmentally sound; and 2) technically feasible.
2	Continue to work with the County on its active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Clerk	ongoing	Medium This action is: 1) cost effective and 2) technically feasible.
3	Continue to enforce the zoning ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
4	Continue to meet all minimum FEMA requirements to remain eligible for debris removal assistance funding from FEMA	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
5	Continue to work with NC Continue to work with the Department of Corrections to provide labor for debris removal from culverts and	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3)

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	drains					technically feasible.
6	Contact the County Floodplain Administrator and the NFIP office to request information on the CRS	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	January 1, 2010	Low This action is technically feasible
7	Continue to work with State and County for assistance in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	County's General Fund, NC Division of Emergency Management	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
8	Continue to work with Pamlico County Health Department and DSS to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low This action is technically feasible
9	Contact the NC Forestry Service once a year to get information about their wildfire education program	Wildfire	NC Forestry Service	Town Clerk	ongoing	Low This action is technically feasible
10	Monitor nearby NC Forestry Service tower posts fire risk for area	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
11	Hold a meeting with NC Forestry service to discuss common concerns. The Emergency Management Director for the County will be asked to facilitate the	Wildfire	NC Forestry Service	Pamlico County Emergency Management	June 1, 2009	Medium This action is 1) cost effective; and 2) technically feasible

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	meeting					
12	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Commissioners	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 30. Minnesott Beach FIRM Flood Zones & Critical Facilities

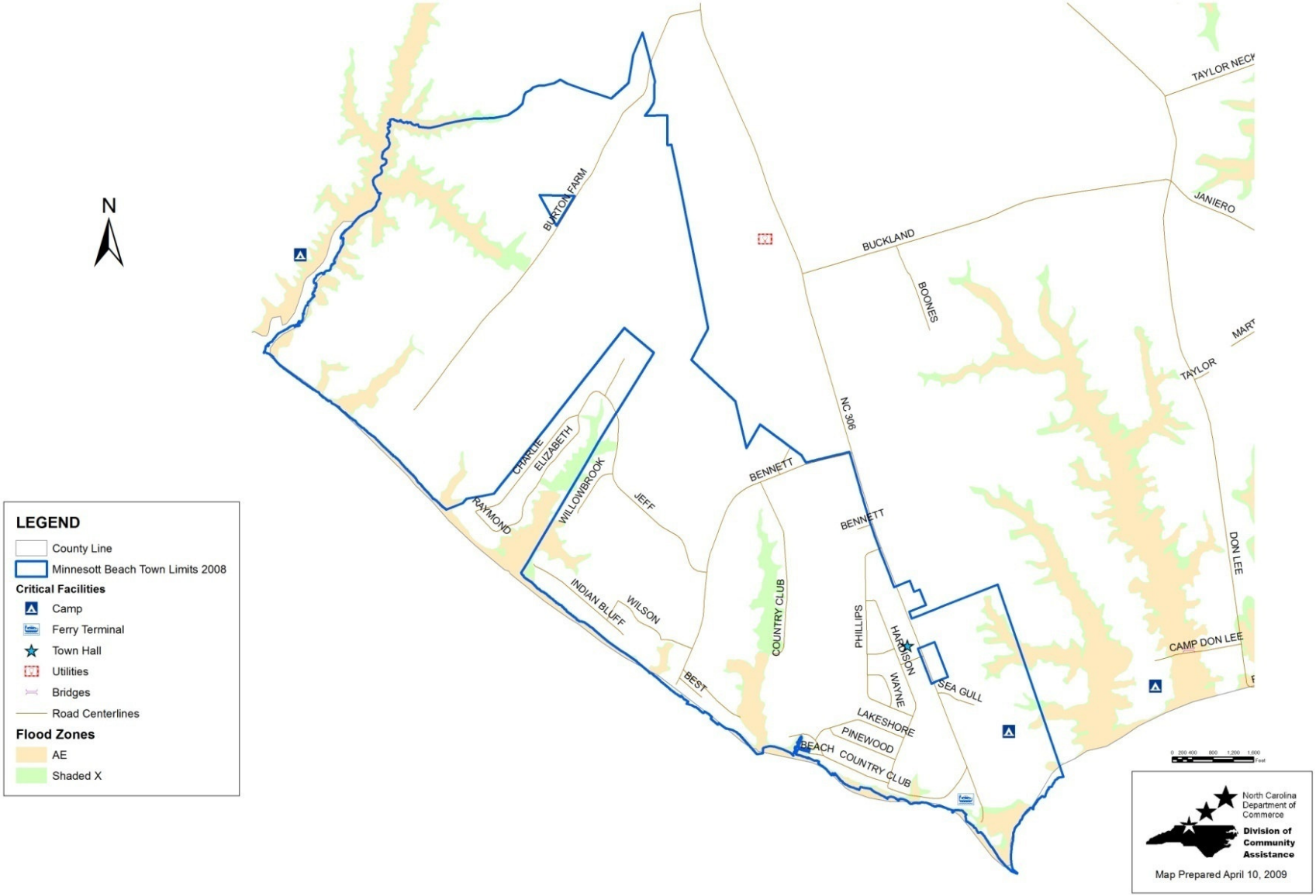


Figure 31. Minnesott Beach Storm Surge Inundation

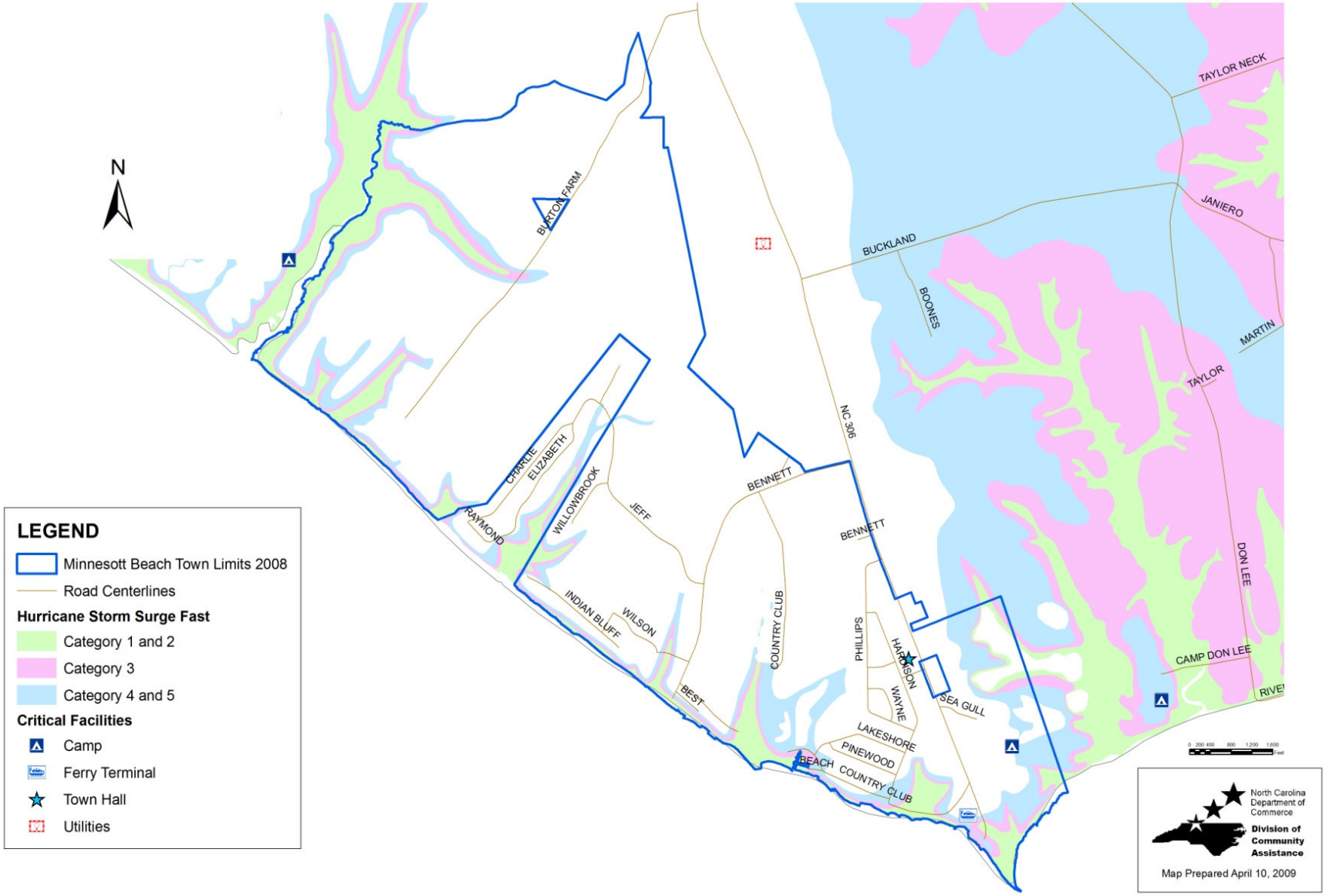


Table 46. Minnesott Beach Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	3	33	36	1,804,154	1,891,783	3,695,937	227,751
Category 3	11	17	28	2,619,330	216,740	2,836,070	835,087
Category 4 & 5	14	77	91	7,593,697	5,017,250	12,610,947	1,062,838
Total	28	127	155	12,017,181	7,125,773	19,142,954	2,125,676
Inundation - Fast							
Category 1 & 2	4	28	32	1,300,669	1,499,749	2,800,418	303,668
Category 3	1	9	10	1,461,868	1,669,515	3,131,383	75,917
Category 4 & 5	15	30	42	5,245,750	211,426	5,457,176	1,138,755
Total	20	67	84	8,008,287	3,380,690	11,388,977	1,518,340
100-Year Floodplain							
AE	1	6	7	385,527	546,332	931,859	75,917
Total	1	6	7	385,527	546,332	931,859	75,917
Inundation - Slow							
Category 1 & 2	3	33	36	1,804,154	1,891,783	3,695,937	227,751

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Minnesott Beach ($75,917), determined by dividing the Total Value of Developed Properties in Minnesott Beach by Total Developed Acres*

SECTION 23: ORIENTAL

Profile
Oriental is located along the Neuse River in the southeastern portion of the county on Highway 55. Incorporated in 1899, Oriental has a land area of 5 square miles.

Oriental has a population of 813 persons as of July 2007, according to the NC Office of State Management and Budget. The main travel time to work for Oriental residents is 30.8 minutes. The average household size in Oriental is 1.98 persons per household. The following statistics are based on the 2000 Census.

Table 47. Oriental Population Data

Subject	Number	Percent
Total Population	875	100
Sex and Age		
Male	419	47.9
Female	456	52.1
Under 5 years	19	2.2
5 to 9 years	26	3.0
10 to 14 years	31	3.5
15 to 19 years	24	2.7
20 to 24 years	24	2.7
25 to 34 years	47	5.4
35 to 44 years	86	9.8
45 to 54 years	145	16.6
55 to 59 years	82	9.4
60 to 64 years	78	8.9
65 to 74 years	181	20.7
75 to 84 years	104	11.9
85 years and over	28	3.2
Median age (years)	57.2	
65 years and over	313	35.8
RACE		
White	794	90.7
Black or African American	64	7.3
Hispanic	12	1.4
American Indian and Alaska Native	1	0.1
Asian	3	0.3

Subject	Number	Percent
Native Hawaiian / Pacific Islander	0	0
Some other race	4	0.5
Two or more races	9	1.0
SOCIAL CHARACTERISTICS		
Population 25 years and over	752	100.0
High school graduate or higher	158	89.1
Bachelor's degree or higher	166	35.2
Disability status (population 21 to 64 years)	97	21.6
Foreign born	40	4.6
Now married (population 15 years and older)	541	67.6
Speak a language other than English at home	43	5.0
HOUSING CHARACTERISTICS		
Total housing units	576	100.0
Occupied housing units	440	76.4
Owner-occupied housing units	353	80.2
Renter-occupied housing units	87	19.8
Vacant housing units	136	23.6
YEAR STRUCTURE BUILT		
1999 to March 2000	23	4.0
1995 to 1998	64	11.0
1990 to 1994	75	12.9
1980 to 1989	142	24.4
1970 to 1979	89	15.3
1960 to 1969	26	4.5
1940 to 1959	46	7.9
1939 or earlier	116	20.0

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 2.5% were unemployed and looking for work. The management and related occupations sector employs the largest number of town residents (42.5%), followed by sales and occupation sector (28.9%) and service occupations (10.3%) employ the largest number of town residents.

Table 48. Oriental Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	116	42.5
Service occupations	28	10.3
Sales and office occupations	79	28.9
Farming, fishing, and forestry	7	2.6

Construction, extraction and maintenance	21	7.7
Production and transportation	22	8.1
TOTAL WORKFORCE	273	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $25,949. The most recent poverty estimates indicate that 8.4% of Oriental residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Oriental Capabilities

In its hazard mitigation strategy, Oriental partners with many local, state, and federal agencies. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Oriental participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Oriental will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Oriental is located in Table 48.

Table 49. Oriental Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Growth Management Ordinance	Adopted July, 1997	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those floodplain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Oriental worked with the North Carolina Division of Community Assistance to revise the community's action plan. Oriental currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Oriental identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Oriental to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
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The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 50. Oriental Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
2	Continue to work with the County on its active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
3	Continue to enforce the growth management ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
4	Continue to meet all minimum FEMA requirements to remain eligible for debris removal assistance funding from FEMA	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
5	Continue to work with NC Department of Corrections to provide labor for debris removal from culverts and drains	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
6	Continue to work with State and County for assistance	Nor'easters, Severe Winter Storms	County's General	Pamlico County Emergency	ongoing	Medium This action is 1) cost

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	in clearing the roads after a snow event		Fund, NC Division of Emergency Management	Management		effective; and 2) technically feasible
7	Continue to work with Pamlico County Health Department and DSS to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
8	Contact the NC Forestry Service once a year to get information about their wildfire education program	Wildfire	NC Forestry Service	Town Manager	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
9	Monitor nearby NC Forestry Service tower posts fire risk for area	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
10	Hold a meeting with NC Forestry service to discuss common concerns. The Emergency Management Director for the County will be asked to facilitate the meeting	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
11	Research storm water management and recommend strategies	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Planning Board	July 2012	Medium This action is: 1) environmentally sound; and 2) technically feasible.
12	Establish a more formalized system of routine cleaning of culverts, ditches, streams and the like which impede the flow	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Town Commissioners	June 1, 2010	Medium This action is: 1) environmentally sound; and 2) technically feasible.

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	of water					
13	Determine the number of repetitive loss properties within the town's jurisdiction and develop strategies to mitigate future risk	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Planning Board	January 2012	Medium This action is: 1) environmentally sound; and 2) technically feasible.
14	Continue the wellhead protection program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town General Fund	Town Manager	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible
15	Evaluate and address boat yards in the 100 flood plain which use hazardous material	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Manager	January 1, 2011	Medium This action is: 1) environmentally sound; and 2) technically feasible.
16	Contact the County Floodplain Administrator and the NFIP office to request information on the CRS	Flooding, Hurricanes and Tropical Storms, Hurricanes, Nor'easters, floods	N/A	Town Manager	January 1, 2010	Medium Low This action is 1) cost effective; and 2) technically feasible
17	Oriental will continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Manager	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 32. Oriental FIRM

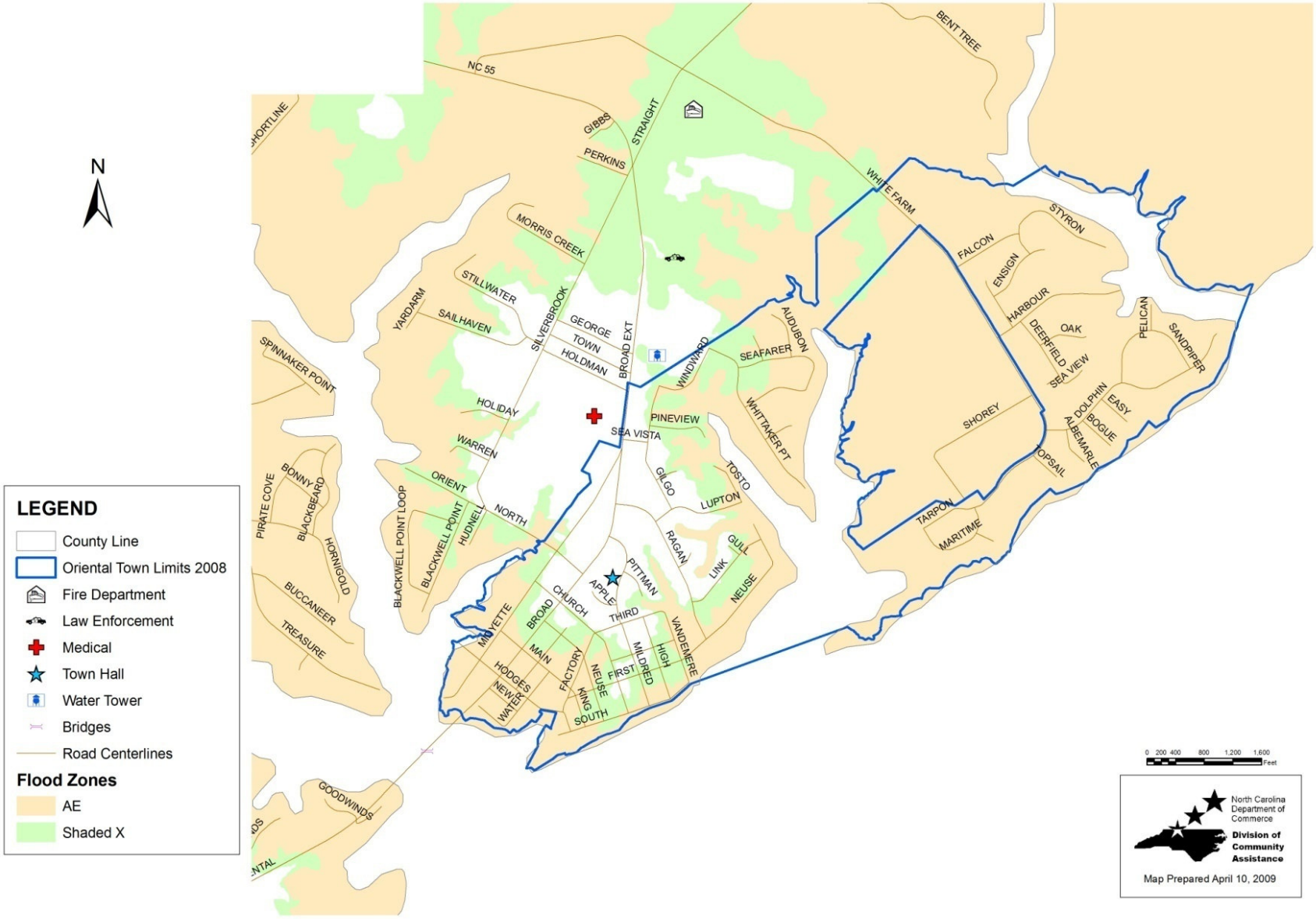

Figure 33. Oriental Storm Surge Inundation

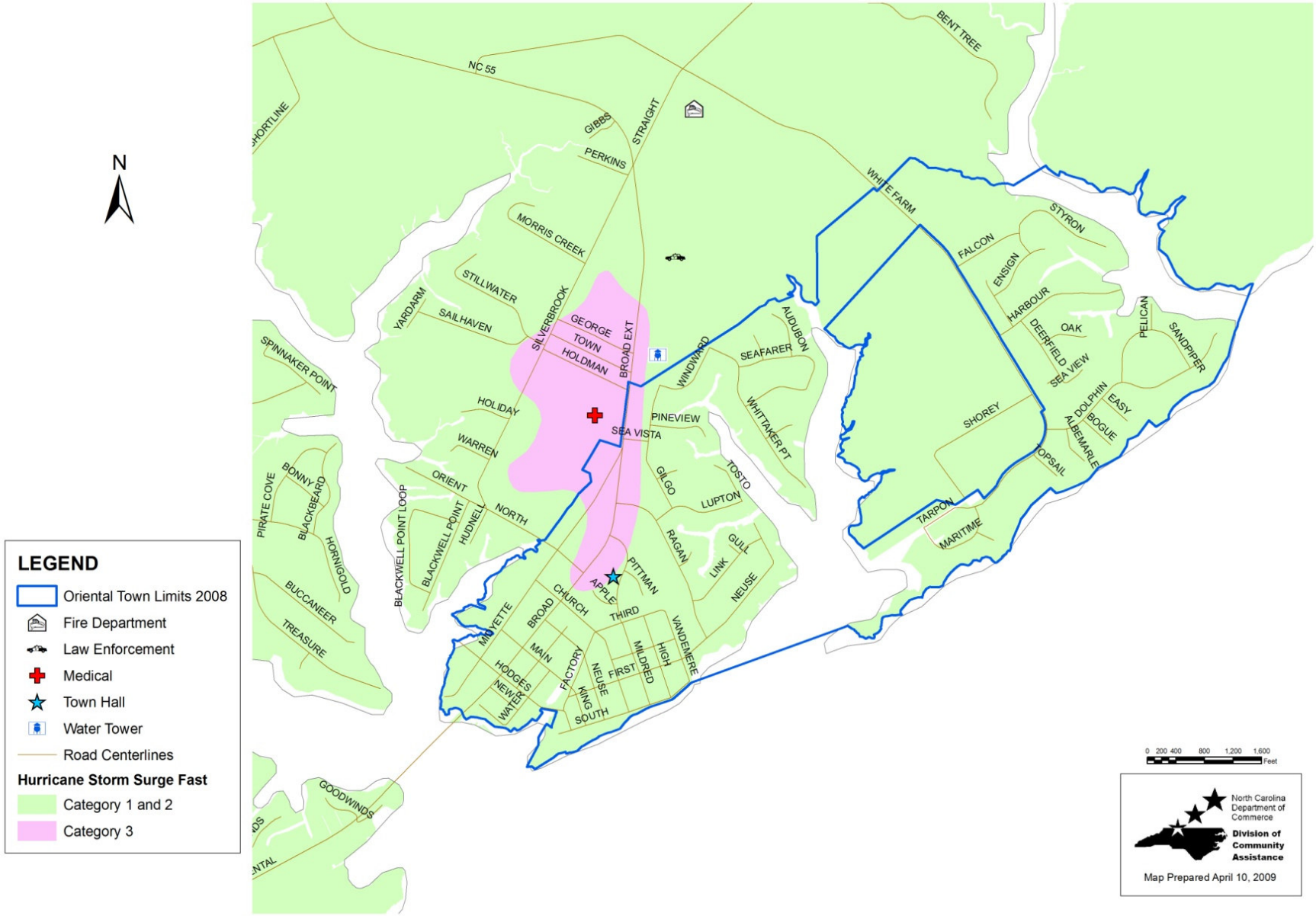

Table 51. Oriental Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	207	384	591	77,755,654	66,412,768	144,168,422	73,435,527
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	207	384	591	77,755,654	66,412,768	144,168,422	73,435,527
Inundation - Fast							
Category 1 & 2	199	364	563	74,616,062	63,438,718	138,054,780	70,597,439
Category 3	7	20	27	3,139,592	2,974,050	6,113,642	2,483,327
Category 4 & 5	0	0	0	0	0	0	0
Total	0	384	590	77,755,654	66,412,768	144,168,422	73,080,766
100-Year Floodplain							
AE	173	261	434	53,012,879	46,664,982	99,677,861	61,373,653
Total	173	261	434	53,012,879	46,664,982	99,677,861	61,373,653
Inundation - Slow							
Category 1 & 2	207	384	591	77,755,654	66,412,768	144,168,422	73,435,527

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Oriental ($354,761), determined by dividing the Total Value of Developed Properties in Oriental by Total Developed Acres*

SECTION 24: STONEWALL

Profile
Stonewall is located along Highway 55, just to the east of Bayboro. Stonewall has a land area of 1.96 square miles.

Stonewall has a population of 282 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Stonewall residents is 25.9 minutes. The average household size in Stonewall is 2.42 persons per household.[4] The following statistics are based on the 2000 Census.

Table 52. Stonewall Population Data

Subject	Number	Percent
Total Population	285	100
Sex and Age		
Male	141	49.5
Female	144	50.5
Under 5 years	15	5.3
5 to 9 years	16	5.6
10 to 14 years	25	8.8
15 to 19 years	21	7.4
20 to 24 years	11	3.9
25 to 34 years	36	12.6
35 to 44 years	37	13.0
45 to 54 years	48	16.8
55 to 59 years	25	8.8
60 to 64 years	16	5.6
65 to 74 years	22	7.7
75 to 84 years	8	2.8
85 years and over	5	1.8
Median age (years)	40.3	
65 years and over	35	12.3
RACE		
White	212	74.4
Black or African American	63	22.1
Hispanic	3	1.1

[4] US 2000 Census

Subject	Number	Percent
American Indian and Alaska Native	0	0
Asian	2	0.7
Native Hawaiian / Pacific Islander	0	0
Some other race	2	0.7
Two or more races	6	2.1
SOCIAL CHARACTERISTICS		
Population 25 years and over	178	100.0
High school graduate or higher	57	73.0
Bachelor's degree or higher	9	8.4
Disability status (population 21 to 64 years)	43	26.2
Foreign born	0	0.0
Now married (population 15 years and older)	112	51.1
Speak a language other than English at home	12	5.0
HOUSING CHARACTERISTICS		
Total housing units	133	100.0
Occupied housing units	118	88.7
Owner-occupied housing units	96	81.4
Renter-occupied housing units	22	18.6
Vacant housing units	15	11.3
YEAR STRUCTURE BUILT		
1999 to March 2000	2	1.5
1995 to 1998	12	9.2
1990 to 1994	8	6.1
1980 to 1989	11	8.4
1970 to 1979	24	18.3
1960 to 1969	12	9.2
1940 to 1959	28	21.4
1939 or earlier	34	26.0

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 2.8% were unemployed and looking for work. The sales and office occupations sector employs the largest number of town residents (25.9%), followed by the production and transportation sector (23.7%) and service occupations (18.5%) employ the largest number of town residents.

Table 53. Stonewall Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	29	21.6
Service occupations	20	14.9

Sales and office occupations	32	23.9
Farming, fishing, and forestry	2	1.5
Construction, extraction and maintenance	40	29.9
Production and transportation	11	8.2
TOTAL WORKFORCE	131	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $16,425. The most recent poverty estimates indicate that 5.5% of Stonewall residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Stonewall Capabilities

Stonewall partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Stonewall participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Stonewall will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Stonewall is located in Table 54.

Table 54. Stonewall Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Stonewall worked with the North Carolina Division of Community Assistance to revise the community's action plan. Stonewall currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Stonewall identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Stonewall to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 55. Stonewall Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to use the Pamlico County storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Continue to address drainage issues as needed	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners, NC DOT	ongoing	Medium Technically feasible and environmentally sound
3	Continue to abide by State building codes that establish specifications for construction.	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
4	Continue to ensure that State and CAMA buffer rules are enforced to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
5	Continue working with the County on enforcement of land use regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Town Commissioners, Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
5	Continue to remove debris following an event.	Flooding, Hurricanes and Tropical Storms,	FEMA	Town Commissioners	ongoing	Medium Technically

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
		Nor'easters				feasible and environmentally sound
7	Continue working with the NC DOC to maintain ditches	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High Cost effective, technically feasible and environmentally sound
8	Continue to seek assistance from the county to provide property owners strategies to protect property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
9	County building code addresses Base Flood Elevations, continue to monitor for effectiveness	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
10	Contact the local NFIP representative to determine the status of their Community Rating, the Flood Plain Administrator designation, and the status of the Flood Damage Prevention Ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High Cost effective, technically feasible and environmentally sound
11	Continue to address the storm water runoff issue	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners, NC DOT	June 1, 2004	Medium Technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
12	Continue routine maintenance of culverts, ditches, and streams	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	June 1, 2004	Medium Technically feasible and environmentally sound
13	Continue to work with Tideland Electric and Progress Energy and their continuous program for tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally sound
14	Seek assistance from the state for snow removal	Nor'easters, Severe Winter Storms	NC DOT	NC DOT	ongoing	High Cost effective, technically feasible and environmentally sound
15	Continue working with the County Health Department and DSS provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Cost effective
16	Monitor the NC Forestry Service displays of fire risk for the area	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
17	Request the NC Forestry Service brief local fire departments on common concerns, annually, prior to fire season	Wildfire	NC Forestry Service	NC Forestry Service, Pamlico County Emergency Management Director	Annually by July 1	High Cost effective, technically feasible and environmentally sound

Figure 34. Stonewall FIRM

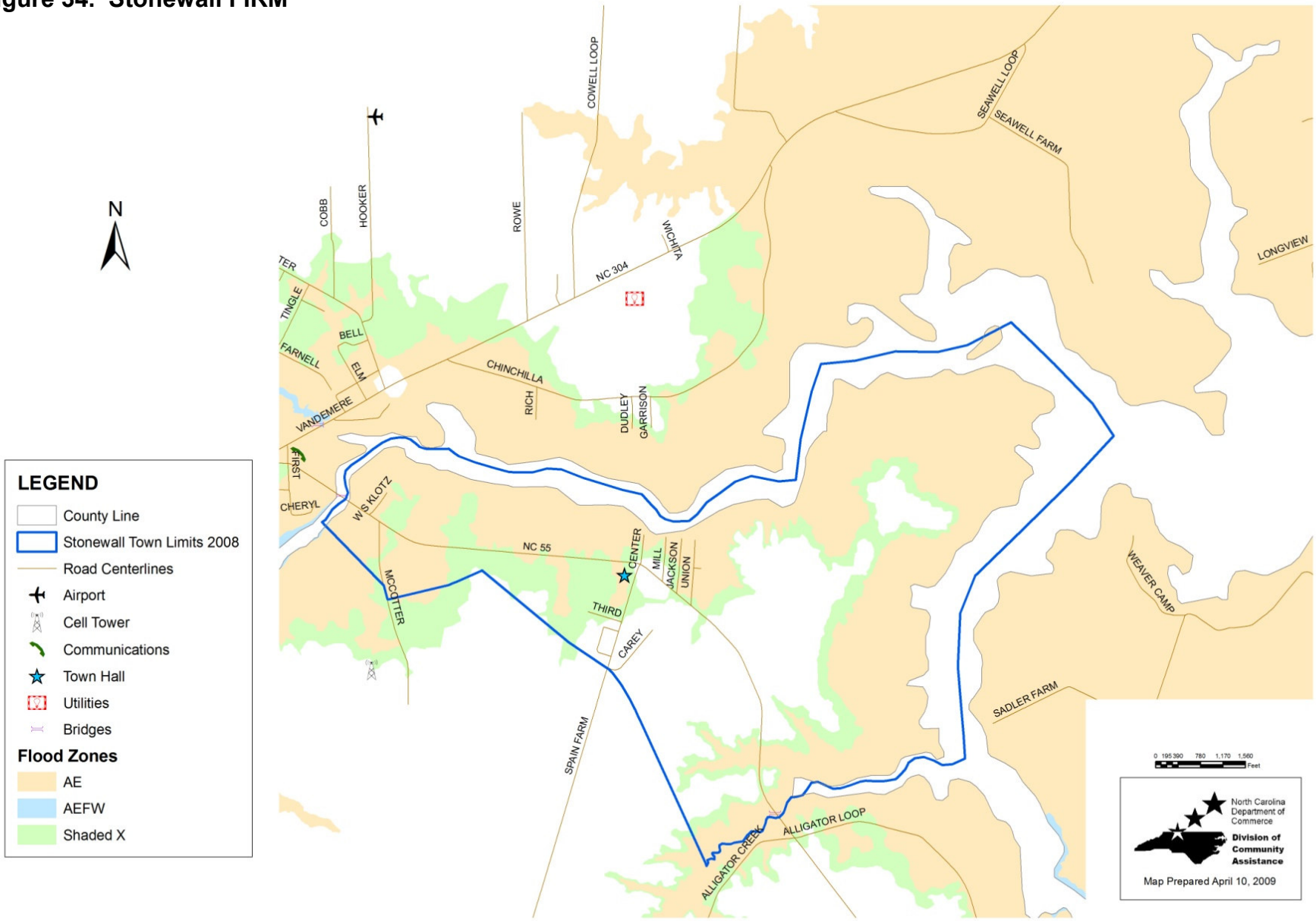

Figure 35. Stonewall Storm Surge Inundation

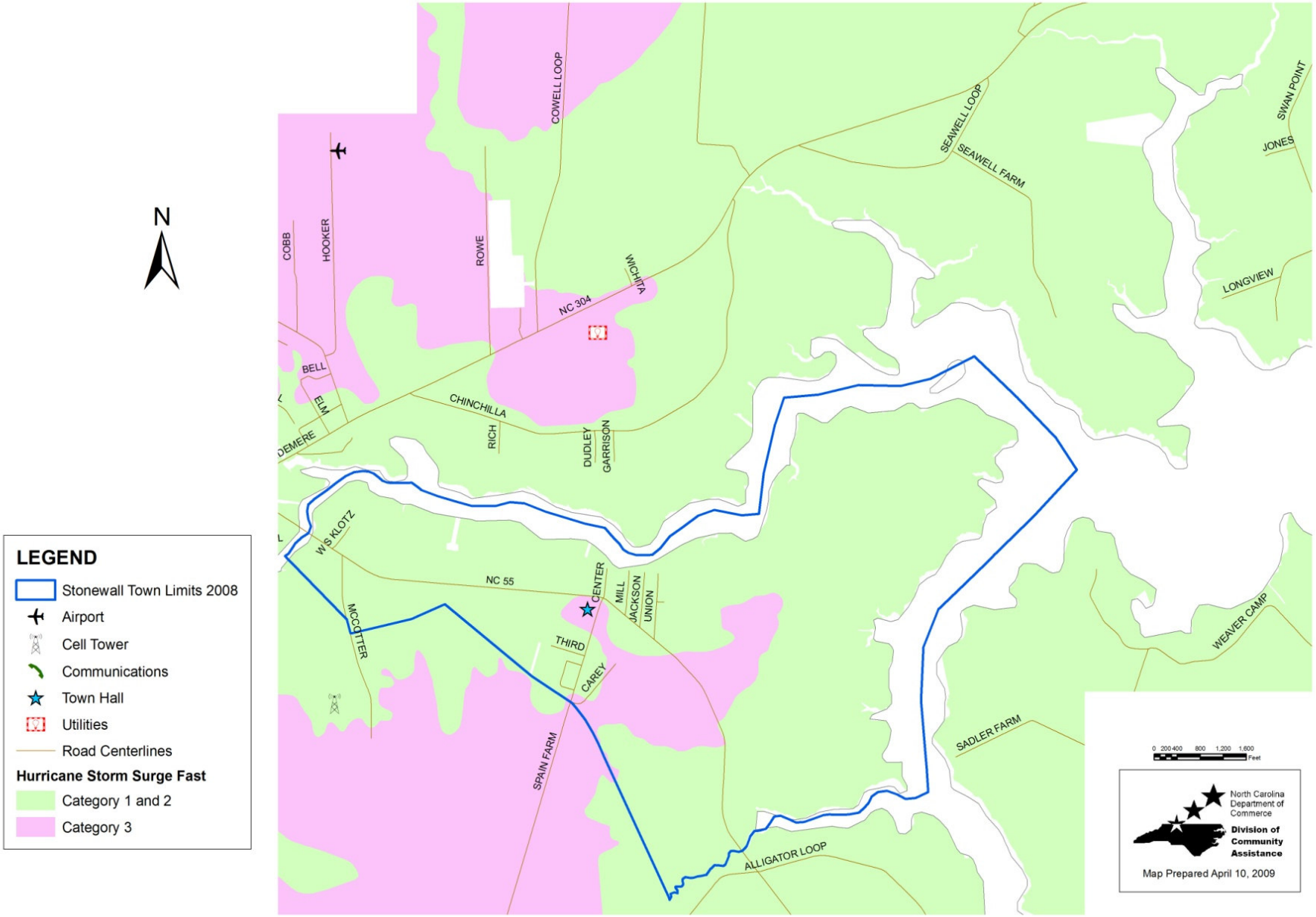

Table 56. Stonewall Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	658	247	905	7,460,484	3,937,912	11,398,396	26,048,246
Category 3	65	35	100	1,493,418	658,112	2,151,530	2,573,155
Category 4 & 5	0	0	0	0	0	0	0
Total	723	282	1,005	8,953,902	4,596,024	13,549,926	28,621,401
Inundation - Fast							
Category 1 & 2	658	254	912	7,777,569	3,995,111	11,772,680	26,048,246
Category 3	64	28	92	1,176,333	600,913	1,777,246	2,533,568
Category 4 & 5	0	0	0	0	0	0	0
Total	0	282	1,004	8,953,902	4,596,024	13,549,926	28,581,814
100-Year Floodplain							
AE	54	152	206	4,592,410	1,814,674	6,407,084	2,137,698
Total	54	152	206	4,592,410	1,814,674	6,407,084	2,137,698
Inundation - Slow							
Category 1 & 2	658	247	905	7,460,484	3,937,912	11,398,396	26,048,246

* *Future Development* was calculated by multiplying *Vacant Acres* by the average value per acre in Stonewall ($39,587), determined by dividing the *Total Value of Developed Properties* in Stonewall by *Total Developed Acres*

SECTION 25: VANDEMERE

Profile
Vandemere is located along Highway 304, near the Town of Mesic. Incorporated in 1895, Vandemere has a land area of 5 square miles.

Vandemere has a population of 280 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Vandemere residents is 25.5 minutes. The average household size in Vandemere is 2.35 persons per household (US 2000 Census). The following statistics are based on the 2000 Census.

Table 57. Vandemere Population Data

Subject	Number	Percent
Total Population	289	100
Sex and Age		
Male	129	44.6
Female	160	55.4
Under 5 years	11	3.8
5 to 9 years	19	6.6
10 to 14 years	20	6.9
15 to 19 years	19	6.6
20 to 24 years	14	4.8
25 to 34 years	28	9.7
35 to 44 years	34	11.8
45 to 54 years	46	15.9
55 to 59 years	20	6.9
60 to 64 years	18	6.2
65 to 74 years	36	12.5
75 to 84 years	20	6.9
85 years and over	4	1.4
Median age (years)	44.9	
65 years and over	60	20.8
RACE		
White	134	46.4
Black or African American	153	52.9
Hispanic	6	2.1
American Indian and Alaska Native	1	0.3

Subject	Number	Percent
Asian	0	0
Native Hawaiian / Pacific Islander	0	0
Some other race	0	0
Two or more races	1	0.3
SOCIAL CHARACTERISTICS		
Population 25 years and over	217	100.0
High school graduate or higher	64	69.1
Bachelor's degree or higher	15	9.2
Disability status (population 21 to 64 years)	55	32.0
Foreign born	9	2.8
Now married (population 15 years and older)	117	46.2
Speak a language other than English at home	15	4.9
HOUSING CHARACTERISTICS		
Total housing units	153	100.0
Occupied housing units	123	80.4
Owner-occupied housing units	103	83.7
Renter-occupied housing units	20	16.3
Vacant housing units	30	19.6
YEAR STRUCTURE BUILT		
1999 to March 2000	4	2.5
1995 to 1998	21	12.9
1990 to 1994	4	2.5
1980 to 1989	25	15.3
1970 to 1979	25	15.3
1960 to 1969	22	13.5
1940 to 1959	27	16.6
1939 or earlier	35	21.5

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 5.7% were unemployed and looking for work. The sales and office occupations sector employs the largest number of town residents (25.9%), followed by the production and transportation sector (23.7%) and service occupations (18.5%) employ the largest number of town residents.

Table 58. Vandemere Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	20	14.8
Service occupations	25	18.5
Sales and office occupations	35	25.9

Farming, fishing, and forestry	1	0.7
Construction, extraction and maintenance	22	16.3
Production and transportation	32	23.7
TOTAL WORKFORCE	130	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $13,570. The most recent poverty estimates indicate that 21.6% of Vandemere residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Vandemere Capabilities

Vandemere partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Vandemere participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Vandemere will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Vandemere is located in Table 60.

Table 59. Vandemere Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
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Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
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5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
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Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Vandemere worked with the North Carolina Division of Community Assistance to revise the community's action plan. Vandemere currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Vandemere identified the following goals:

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In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Vandemere to the effects of natural hazards.

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If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 60. Vandemere Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
2	Continue to enforce the zoning ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
3	Continue to meet all minimum FEMA requirements to remain eligible for debris removal assistance funding from FEMA	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
4	Continue to work with NC Department of Corrections to provide labor for debris removal from culverts and drains	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
5	Contact the County Floodplain Administrator and the NFIP office to request information on	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	January 1, 2012	Medium This action is 1) cost effective; and 2)

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	the CRS					technically feasible
6	Continue to work with State and County for assistance in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	County's General Fund, NC Division of Emergency Management	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
7	Continue to work with Pamlico County Health Department and DSS to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
8	Contact the NC Forestry Service once a year to get information about their wildfire education program	Wildfire	NC Forestry Service	Town Clerk	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
9	Monitor nearby NC Forestry Service tower posts fire risk for area	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
10	Research storm water management and recommend strategies	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Planning Board	Ongoing	Medium This action is: 1) environmentally sound; and 2) technically feasible.
11	Establish a more formalized system of	Flooding, Hurricanes and Tropical Storms,	N/A	Town Commissioners	Ongoing	Medium This action is: 1)

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	routine cleaning of culverts, ditches, streams and the like which impede the flow of water	Nor'easters				environmentally sound; and 2) technically feasible.
12	Request that the issue of occluded drainage canals which surround the town be addressed in the next update of the county's hazard mitigation plan	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	General budget	Town Commissioners	January 2011	Medium This action is: 1) environmentally sound; and 2) technically feasible.
13	Determine the number of repetitive loss properties within the town's jurisdiction and develop strategies to mitigate future risk	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Planning Board	January 2010	Medium This action is: 1) environmentally sound; and 2) technically feasible.
14	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Commissioners	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 36. Vandemere FIRM Flood Zones & Critical Facilities

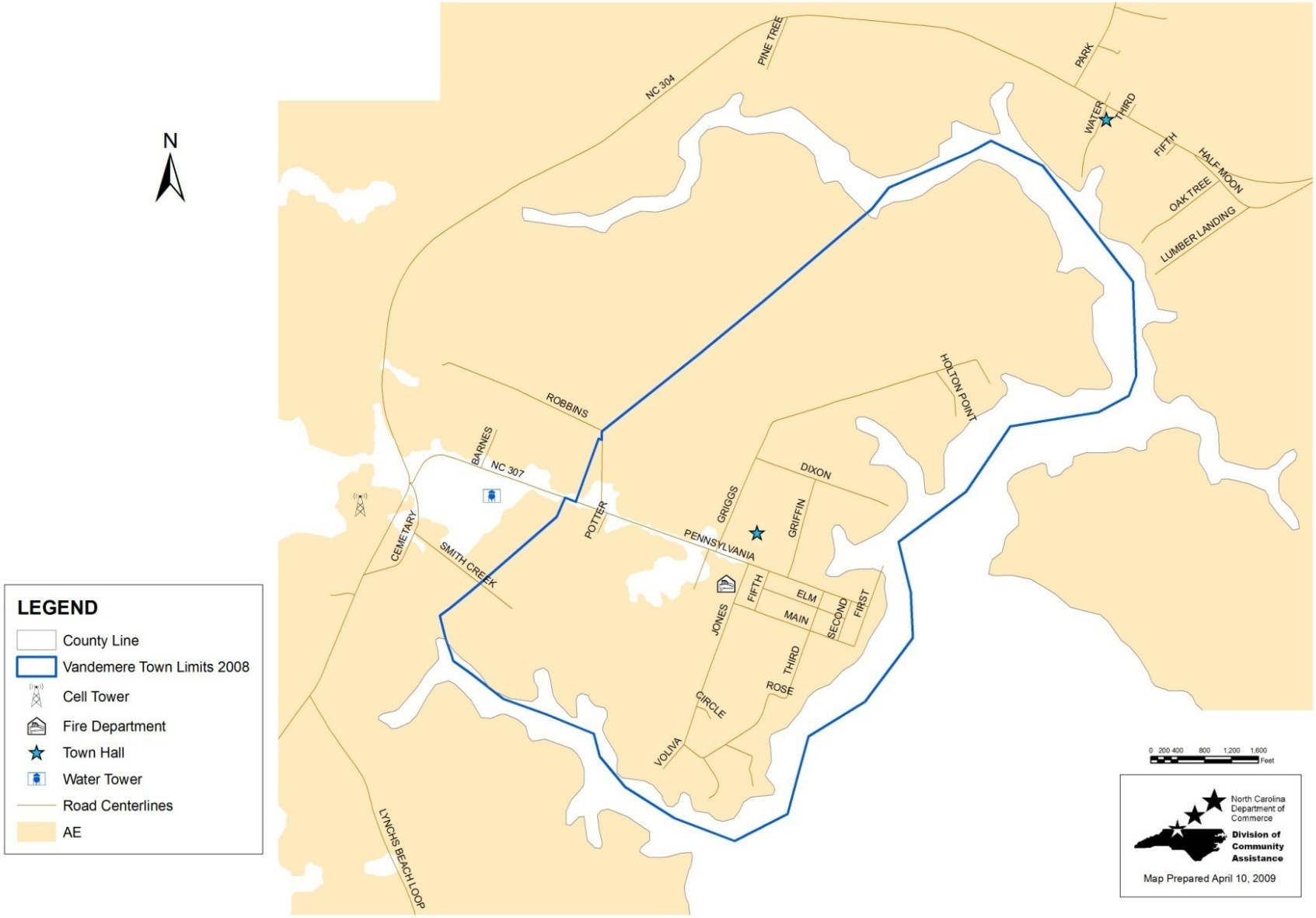


Figure 37. Vandemere Storm Surge Inundation

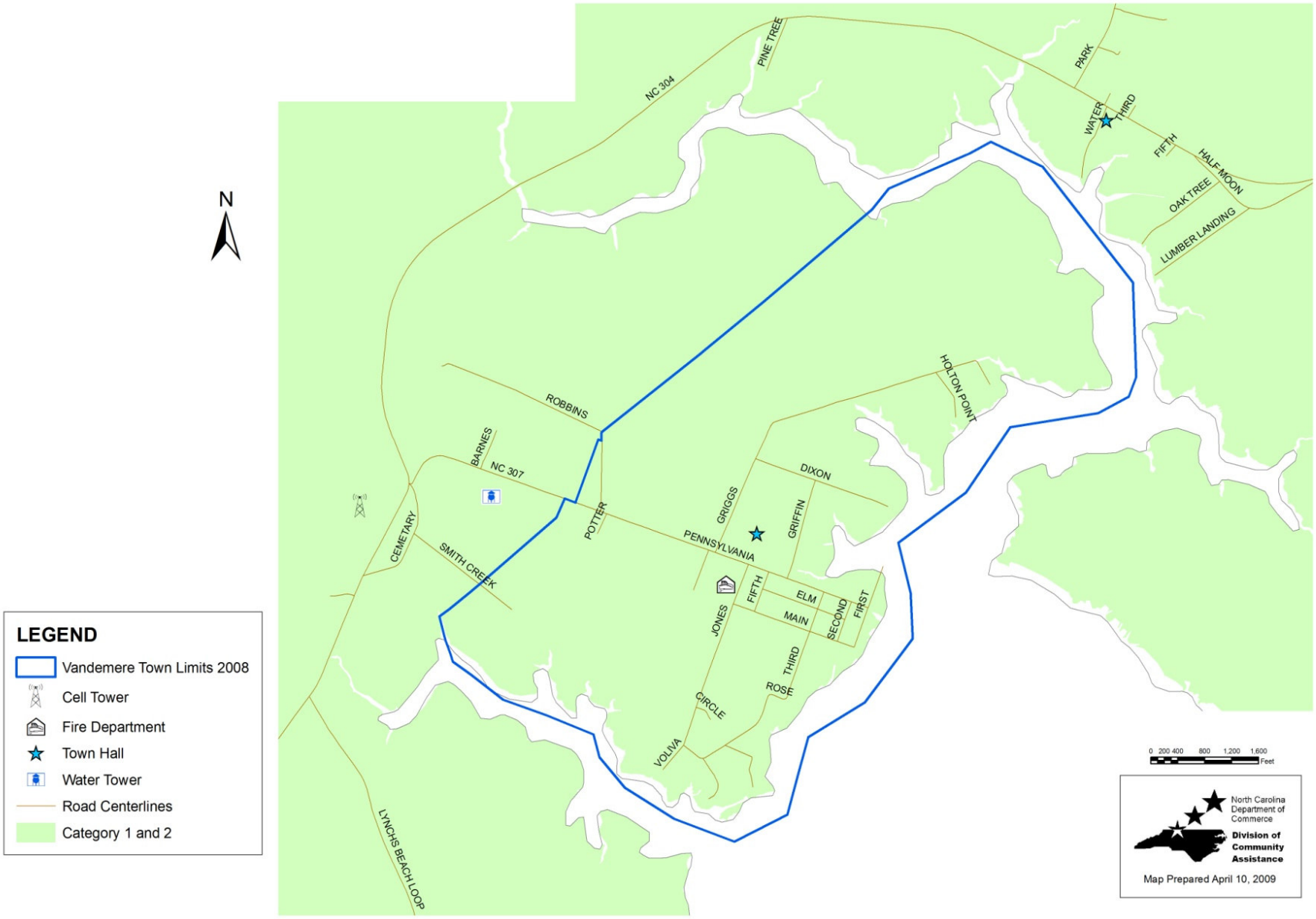
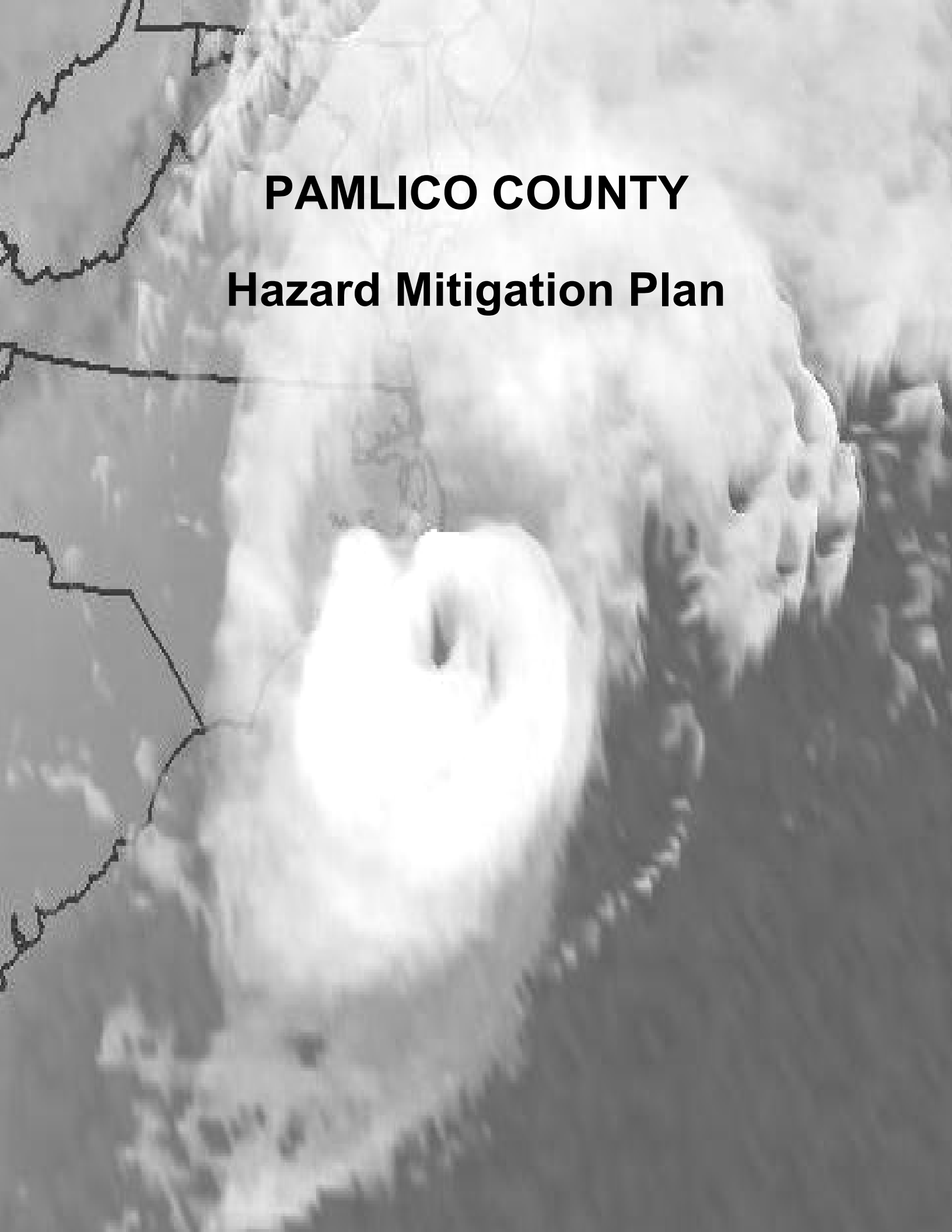


Table 61. Vandemere Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460
Inundation - Fast							
Category 1 & 2	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	0	219	924	9,283,591	7,705,915	16,989,506	47,525,460
100-Year Floodplain							
AE	704	216	920	8,887,443	7,845,195	16,732,638	47,458,048
Total	704	216	920	8,887,443	7,845,195	16,732,638	47,458,048
Inundation - Slow							
Category 1 & 2	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460

* *Future Development* was calculated by multiplying *Vacant Acres* by the average value per acre in Vandemere ($67,412), determined by dividing the *Total Value of Developed Properties* in Vandemere by *Total Developed Acres*



PAMLICO COUNTY

Hazard Mitigation Plan

Pamlico County Hazard Mitigation Plan

Adopted by the Pamlico County Commissioners on
June 21, 2010

Pamlico County Commissioners

Paul Delamar, III, Chairman
Ann Holton, Vice-Chairman
Roy Brinson, Sr.
Christine Mele
Jimmy Spain
Carl J. Ollison
Kenny Heath

Pamlico County Hazard Mitigation Planning Committee

Bronte Jones, Citizen, Bayboro
Ron Kilburn, Citizen, Oriental
Jerry Prescott, Citizen, Grantsboro
Nick Santoro, Citizen, Merritt
Barbara Baker, Deputy Town Clerk, Bayboro
Wyatt Cutler, Town Manager (retired), Oriental
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EXECUTIVE SUMMARY

This document is the Pamlico County Hazard Mitigation Plan. It has been prepared to meet the requirements of the federal government's Stafford Act as amended by the Federal Disaster Mitigation Act of 2000 (DMA2K). North Carolina Senate Bill 300 requires local hazard mitigation plans to be in compliance with the federal legislation. Senate Bill 300, passed by the NC Legislature in the summer of 2001, required local governments to have an approved and locally adopted hazard mitigation plan in place by August 1, 2002 in order to be eligible for state disaster funds to remedy disasters that occur after August 1, 2002. Additionally, the Disaster Mitigation Act of 2000 passed by the US Congress and signed into law by the President, required local governments to have a FEMA-approved and locally adopted hazard mitigation plan in place by November 1, 2004 in order to be eligible for federal disaster funds. This document is an updated version of the plan adopted in 2004.

Pamlico County is vulnerable to coastal flooding, high winds, winter ice and snow storms and wildfire. This document identifies the vulnerability of Pamlico County and its municipalities to these natural hazards and sets goals to mitigate damage. **It is the intent of the plan to meet all requirements of the Federal Disaster Mitigation Act of 2000 (DMA2K) for Pamlico County and its municipalities in regard to hazard mitigation planning requirements.**

Each municipality will formally adopt this multi-jurisdictional planning document. In addition to adopting this countywide approach to hazard mitigation, each municipality has a separate action plan, establishing goals for their jurisdiction.

Mission Statement

> *Pamlico County, through hazard mitigation planning, seeks to maintain or lower the community's flood insurance rating, qualify for future disaster funding, identify potential problems, minimize repetitive losses, and educate the public on Pamlico County's vulnerability to natural hazards.*

Goals, Objectives, and Actions

The plan *goals* describe the overall direction that Pamlico County can take to minimize the impacts of natural hazards. The goals are stepping-stones between the broad direction of the mission statement and the specific recommendations that are outlined in the action items.

Mitigation objectives are designed to support and correspond directly with the goals established in the previous subsection. These objectives were established to provide Pamlico County with some measurable, mid-range benchmarks (2-5 years).

The *action items* are a listing of activities the County and the citizens can be engaged to reduce risk.

Goal 1: Improve Pamlico County's fiscal and operational capabilities to adequately mitigate the effects of natural hazards.

Goal 2: Enhance existing or implement new County policies that will reduce susceptibility to natural hazards without conflicting with other community goals.

Goal 3: Protect Pamlico County's buildings, critical facilities, and infrastructure through the implementation of cost-effective and technically feasible mitigation projects.

Goal 4: Promote public health, safety, and welfare by increasing the public awareness of existing hazards and fostering individual and public responsibility in mitigating risks due to those hazards.

Monitoring, Evaluating and Updating the Plan
Implementation of the activities recommended by this plan will be monitored so the deadlines will be met. Where possible, each activity should be monitored in terms of dollar value of its flood loss reduction benefits.

The Pamlico County Planner will be responsible for the tracking the activities outlined in this plan. Each person assigned a responsibility in this plan shall report to the Pamlico County Planner by the last day of each quarter (March 31, June 30, September 30, December 31). The Pamlico County Planner will report to the County Commissioners once each year, on the first week of hurricane season (June 1st). The report should review progress and recommend changes as needed.

If changes are necessary, the Hazard Mitigation Planning Committee will reconvene during the first week of June to receive a presentation on the progress of the plan. If convened, the Hazard Mitigation Planning Committee will prepare an evaluation report that will be submitted to the County Commissioners.

Implementation through Existing Programs
Pamlico County will incorporate the hazard mitigation goals and actions into other policy statements, and will address conflicts with other policies where possible. As with any planning process, the Hazard Mitigation Plan will be referenced when developing or updating other planning documents, such as the CAMA Land Use Plan and any other official documents regarding land use and emergency management.

Continued Public Involvement
Pamlico County is dedicated to involving the public directly in review and updates of the Hazard Mitigation Plan. Any amendment to the Hazard Mitigation Plan must be made by the County Commissioners. A public hearing will be required before any consideration of an amendment to the plan can be made. Pamlico County's current outreach methods will be used to disseminate hazard mitigation information to citizens and property owners.

SECTION 1: INTRODUCTION

North Carolina faces extreme hazard and consequence from natural hazards. Between 1989 and 2000, there were 14 federally declared disasters. Damages from Hurricane Floyd alone reached $3.5 billion. With Hurricane Floyd, 4,117 uninsured and under-insured homes were destroyed. The State's vulnerability to natural hazards makes it crucial that communities and property owners have accurate, up-to-date information about the risk.

Natural hazards, such as floods, hurricanes, tornadoes, winter storms, earthquakes, wildfires, and other hazardous natural events occur every year and are an essential component of the earth's natural systems. These events damage the ecological environment, but the natural environment possesses remarkable recuperative capabilities, restoring plant and animal habitat in a short time.

The built, or manmade, environment does not possess these recuperative capabilities. When these natural hazards interact with the built environment, disasters occur. The frequency of disasters is increasing, not necessarily because natural hazards are occurring more frequently, but as the result of more people living in harm's way. Since the 1960's, increasing numbers of people are choosing to live and work in and visit areas at risk from coastal storms and repetitive flooding. By 2010, the number of people living in hurricane-prone counties will likely double (*Local Hazard Mitigation Planning* Manual. 1998). this realization makes it imperative that coastal and riverine communities undertake floodplain management and hazard mitigation.

This document is Pamlico County's Hazard Mitigation Plan. It has been prepared to meet the requirements of the federal government's Stafford Act as amended by the Federal Disaster Mitigation Act of 2000 (DMA2K). North Carolina Senate Bill 300 requires local hazard mitigation plans comply with the federal legislation. Senate Bill 300, passed by the NC Legislature in the summer of 2001, required local governments to have an approved and locally adopted hazard mitigation plan in place by August 1, 2002 in order to be eligible for state disaster funds to remedy disasters that occur after August 1, 2002. Additionally, the Disaster Mitigation Act of 2000 passed by the US Congress and signed into law by the President, required local governments to have a FEMA-approved and locally adopted hazard mitigation plan in place by November 1, 2004 in order to be eligible for federal disaster funds.

The County is vulnerable to coastal flooding, high winds, winter ice and snow storms and wildfire. This document identifies Pamlico County's vulnerability to several natural hazards and sets goals to mitigate damage from these hazards. The planning process includes problem perception, definition, assessment, solution / mitigation alternatives, strategy, goals, objectives, and establishing performance measurement tools for implementation.

Each municipality will formally adopt this multi-jurisdictional planning document. In addition to adopting this countywide approach to hazard mitigation, each municipality has a separate action plan, establishing goals for the jurisdiction.

It is the intent of this plan to meet all requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2K) for Pamlico County and the municipalities of Bayboro, Grantsboro, Alliance, Stonewall, Oriental, Mesic, Vandemere, Arapahoe, and Minnesott Beach in regard to hazard mitigation planning.

Why Develop a Mitigation Plan?
Planning is one of the best ways to anticipate and mitigate the destructive impact of identified hazards. The objective of planning is to produce a program of activities that will best tackle the community's hazard problems and meet other community needs. A well-prepared plan will guide a community's development efforts so that they are implemented more economically and in ways more attuned to the needs and objectives of the community and its residents. A well-prepared and executed plan should result in reduced hazard losses. Risks not eliminated or mitigated through construction techniques have traditionally been offset through insurance (flood, wind, and fire). However, the magnitude of losses faced by the insurance industry in recent years and resulting policy premium increases warrants reevaluation of the balance of risk to be insured against.

Originally, this document was prepared to qualify as a "Floodplain Management Plan" to be credited by Insurance Services Office (ISO) Community Rating System (CRS) program of the National Flood Insurance Program (NFIP). The NFIP provides federally supported flood insurance in communities that regulate development in their floodplains. The CRS reduces flood insurance premiums in those communities that do more than implement the minimum regulatory requirements. Pamlico County participates in the NFIP and is currently certified under the CRS as a Class 9 Community. The County has developed this plan in order to limit life and property losses due to a major flood. Additional credit is provided if the activities are implemented based on a floodplain management plan that meets the criteria in Section 511 of the *CRS Coordinator's Manual*. The approach selected for preparing this plan was taken from Section 511 and some of this plan's section headings coincide with Section 511's headings.

Since then, there have been state and federal requirements placed on municipalities and counties regarding hazard mitigation. This planning document strives to meet those requirements.

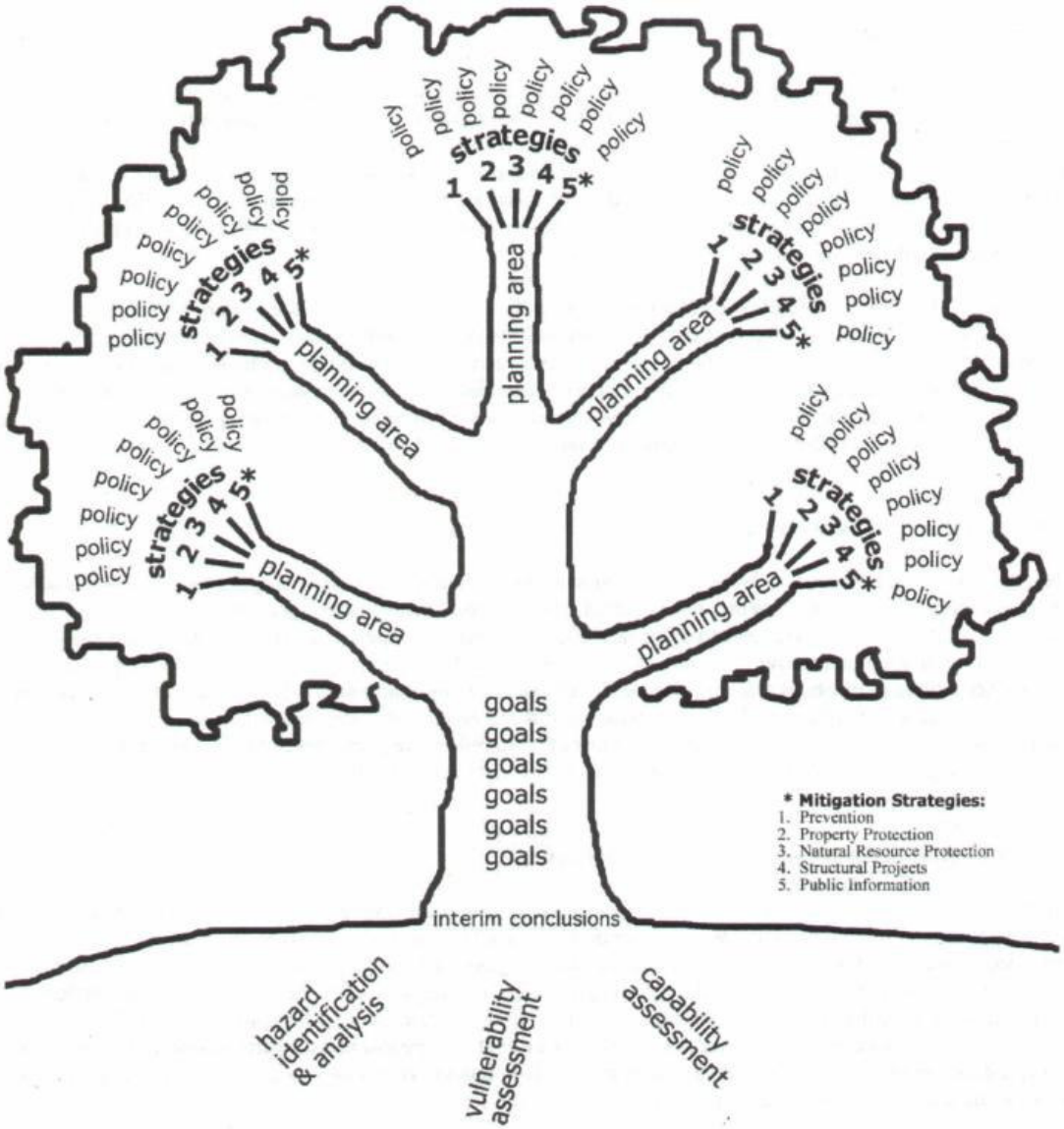
Plan Methodology
Planning is one of the best ways to correct shortcomings associated with natural hazards. The objective of planning is to produce a program of activities that will best tackle the community's problems with hazards and meet other community needs. A well-prepared plan will guide a community's hazard mitigation activities so that they are implemented more economically and in ways more attuned to the needs and objectives of the community and its residents.

A hazard mitigation plan, one that is carefully researched to reflect local needs and conditions, can provide many benefits to a community. This is especially true of plans that are prepared in advance of a hazard event, not in the aftermath of a disaster. Many communities have engaged in mitigation activities on a project-by project basis by incorporating such projects into the context of a comprehensive plan that considers multiple aspects of the community. A local government can avoid the often inconsistent and uncoordinated results of this ad hoc approach to mitigation by developing a mitigation plan. A local hazard mitigation plan can be effective for establishing the community's commitment to mitigation goals, objectives, policies and programs. By articulating what the community hopes to achieve, the plan can serve to establish an important connection between the public interest and mitigation measures to be employed.

Description of the Planning Process

In order to help the reader visualize the nature of the planning process, a "mitigation planning tree" is used. By comparing the planning process to a living, growing being, emphasizes is placed on the interrelationships between each step and the dynamism of the final plan itself. Each step is designed to be supported by the previous step, and in turn, provides support for the next. Some of the steps in the planning process are "root" steps. These essential analytical steps provide the necessary background data and justification for the action part of the plan. Next, the "ground" level steps will be pursued, followed by the "branch" steps, or actions and policies.

Figure 1. Planning Tree



This plan has been drafted using the guidelines and recommendations promulgated by both the North Carolina Emergency Management Division (NCEM) and the Federal Emergency Management Agency (FEMA). The essential planning steps are:

Identify the hazards - The first of the "root" steps requires the community to identify the natural hazards that affect the area and analyze them in terms of likelihood, magnitude, and potential impact.

Assess vulnerability of people and property – The next "root" step is made up of multiple tasks, or sub-steps, that helps the community to assess the vulnerability to the hazards

identified in Step 1. During the vulnerability assessment, the areas within the community where the hazards are likely to occur will be identified.

Assess community capability – The final "root" step asks Pamlico County to assess the community's current mitigation practices, as well as its potential to engage in mitigation activities. While few communities in North Carolina have a dedicated mitigation strategy, most do have policies that affect construction and land-use in hazard-prone areas.

Form interim conclusions – At this level, the County has established a strong root system that identifies the problems Pamlico County faces, where those problems are located, and the tools at the County's disposal to address them. Step 4 gives the community an opportunity to look at these background analyses and determine whether or not it should move forward with the planning process.

Establish values and goals – Pamlico County now determines how mitigation fits into the community's vision of its future, and formulates goal statements to express that vision. Picture the goal statements as forming the "trunk" of the Mitigation Planning Tree. The goals and values are the central supporting element of the entire plan – they shape and determine all the mitigation policies that will be created as a result of the plan.

Set policy selection criteria – Current and potential policies will be examined by: 1) Effectiveness; and 2) Cost. Effectiveness will be determined by the perception of the Hazard Mitigation Plan Committee as High, Medium, or Low. Cost will be determined by the Committee and rated as High, Medium, or Low. The cost will be the expense of implementation and administration to the community.

Formulate mitigation strategies and policies – Step 7 is where all the previous steps have been leading up to. The mitigation policies are the "branches" of the Mitigation Planning Tree. The policies will put into action the goals established for reducing vulnerability.

Preparation of the final plan – The draft plan will be assembled and meet all minimum requirements of a Floodplain Management Plan that meets Section 510 of the Community Rating System as required by the National Flood Insurance Program. The plan will also meet all minimum requirements of Senate Bill 300 and keep Pamlico Count eligible for state public assistance funds, effective for state-declared disasters after August 1, 2002. Also, this plan will meet requirements of the Disaster Mitigation Act of 2000, passed by the US Congress and signed into law by the President.

Assign implementation responsibilities – Each action step outlined in the plan will be assigned to an individual or a County department. A 5-year implementation schedule is included for every action step.

Establish procedures for monitoring, evaluation, and reporting progress – An effective plan is dynamic and evolving. A community must periodically monitor its implementation, evaluate its effectiveness, and report on the progress of the plan.

Establish procedures for revisions and updates – This step calls for establishing procedures to see that the annual evaluation report results in revisions and updates of the plan, when warranted.

Purpose of the Plan

This hazard mitigation plan assesses Pamlico County's current natural hazard risk and sets forth goals and schedules for 2004 and beyond to eliminate, reduce, and mitigate this risk. After conducting a few meetings, the committee developed a mission statement, or purpose for the plan. The purpose of this plan is:

Pamlico County, through hazard mitigation planning, seeks to maintain or lower the community's flood insurance rating, qualify for future disaster funding, identify potential problems, minimize repetitive losses, and educate the public on Pamlico County's vulnerability to natural hazards.

This document is Pamlico County's Hazard Mitigation Plan. It is prepared to guide policy in the County's vulnerable areas and to assist state and federal funding efforts. This document has also been prepared to qualify as a "floodplain management plan" to be credited under the Community Rating System (CRS) of the National Flood Insurance Program (NFIP).

Pamlico County participates in the NFIP and is certified under the CRS. The NFIP provides federally supported flood insurance in communities that regulate development in their floodplains. The CRS reduces flood insurance premiums in those communities that do more than implement the minimum regulatory requirements. The County has developed this plan in order to limit life and property losses due to a major flood.

Additional credit is provided if the activities are implemented based on a floodplain management plan that meets the criteria in Section 511 of the *CRS Coordinator's Manual*. The approach selected for preparing this plan was taken from Section 511 and this plan's section headings coincide with Section 511's headings.

The benefits of hazard mitigation planning are:

Saves lives and property – Pamlico County can save lives and reduce property damage from natural hazards through mitigation actions, such as moving families and their homes out of harm's way.

Reduces vulnerability to future hazards – By having a mitigation plan in place, Pamlico County is prepared to take steps that will permanently reduce the risk of future losses. This opportunity is often lost when we build communities without regard to natural hazards or when we rebuild them after a disaster "just like they were before."

Saves money – Pamlico County will experience cost savings by not having to provide emergency services, rescue operations, or recovery measures to areas that are dangerous to people in the event of a hazard.

Facilitates post-disaster funding – By identifying and ranking projects before the next disaster, Pamlico County is in a better position to obtain post-disaster funding because much of the background work necessary for applying for federal and state aid will already be done.

Speeds recovery – By developing a mitigation plan, Pamlico County can identify post-disaster mitigation opportunities in advance of a disaster. By having this strategy in advance, Pamlico County can be ready to respond quickly after a disaster.

Demonstrates commitment to improving community health and safety – A mitigation strategy demonstrates a community's commitment to safeguarding its citizens and protecting its economic, social, and environmental well-being.

Who Was Involved

The North Carolina Division of Community Assistance provided Pamlico County with professional planners to draft this plan, with input from a planning committee, the Hazard Mitigation Planning Committee, established by the Pamlico County Commissioners. All towns in the County were notified of the planning meetings and encouraged to attend. The Hazard Mitigation Planning Committee membership included:

Bronte Jones, Citizen, Bayboro
Jerry Prescott, Citizen, Grantsboro
Barbara Baker, Deputy Town Clerk, Bayboro
Mark Howell, Town of Bayboro, Bayboro
Josh Potter, Mayor, Minnesott Beach
Jayne Robb, Pamlico County Planner
David Spruill, Pamlico County Emergency Management
Tim Buck, Pamlico County Manager
Ron Kilburn, Citizen, Oriental
Nick Santoro, Citizen, Merritt
Wyatt Cutler, Town Manager (retired), Oriental
Booker T. Jones, Mayor, Mesic
Pat Prescott, Town Clerk, Grantsboro
Skip Lee, Pamlico County Building Inspector
Amy Spruill, Pamlico County Floodplain Coordinator
Miriam Prescott, Pamlico County GIS Coordinator

In addition to being invited to all meetings, each individual town updated and revised the draft section of the plan pertaining to their respective jurisdictions, with the assistance of the North Carolina Division of Community Assistance. These draft action plans were developed to meet the state requirements of Senate Bill 300. These draft plans were adopted locally and they were incorporated into this planning document.

Each municipality participated in the drafting of this document by: 1) developing draft action plans; and 2) being invited to participate in the County's multi-jurisdictional hazard mitigation plan. No attendance policy was implemented at the plan's committee meetings.

All decisions and recommendations of the Plan Committee were accomplished through reaching consensus on the goals, objectives, and action items.

No subcommittees were formed to execute any particular tasks.

How the Public Was Involved
The Committee held five committee meetings, on November 5, 2008; December 3, 2008; January 7, 2009; February 4, 2009 and March 4, 2009, during the preparation of the plan update.

Elements of the public participation plan included:

- Holding two public information meetings on April 23, 2009 at 7:00 p.m. and April 27, 2009 at 7:00 p.m. to describe the planning process to interested citizens and listen to citizen suggestions and concerns.

- Copies of the Draft Hazard Mitigation Plan were made available at the Pamlico County Building Inspections Office for public review and;

- On June 7**,** 2010, and June 21, 2010 public hearings were held on the amended Hazard Mitigation Plan.

At the two public information meetings, the public was given the opportunity to contribute ideas and concerns about hazard mitigation activities in Pamlico County. Some significant ideas were offered, and some action items were generated or changed to address these comments. A cross-section of the community attended the public information meetings, including residents, business leaders, and government agency officials.

How Do I Use the Plan?
Each section of the mitigation plan provides information and resources to assist people in understanding Pamlico County and the hazard-related issues facing municipalities, citizens, businesses, and the environment. Combined, the sections of the plan work together to create a multi-jurisdictional document that guides the mission to reduce risk and prevent loss from future natural hazard events.

The structure of the plan enables people to use a section of interest to them. It also allows the County to review and update sections when new data becomes available. The ability to update individual sections of the mitigation plan places less of a financial burden on Pamlico County. Decision-makers can allocate funding and staff resources to selected pieces in need of review, thereby avoiding a full update, which can be costly and time-consuming. New data can be easily incorporated, resulting in a natural hazards mitigation plan that remains current and relevant to Pamlico County.

How will the County and Local Municipalities Use the Plan?
Pamlico County will maintain, review and revise this plan as it becomes necessary. The plan will be reviewed by County officials when progress is made in the implementation of the plan. Updated or revised mitigations strategies will be reviewed by the Pamlico County Hazard Mitigation Planning Committee at such times revision is deemed necessary and will be adopted and incorporated into the existing plan after pubic review and a public hearing.

County and Municipal officials will also refer to the plan when considering the development or amendment to any regulation or policy pertaining to the physical development of land in Pamlico County and the municipalities located within.

SECTION 2: COMMUNITY PROFILE

Why Plan for Natural Hazards in Pamlico County?

Natural hazards impact citizens, visitors, property, the environment, and the economy of Pamlico County. Flooding, hurricanes, nor'easters, wildfire, thunderstorms, tornadoes, heat waves, and coastal erosion have exposed Pamlico County's residents and businesses to the financial and emotional costs of recovering after natural disasters. The risk associated with natural hazards increases as more people move to areas affected by natural hazards. The inevitability of natural hazards, and the growing population and activity within the County create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future natural hazard events. Identifying risks posed by natural hazards, and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses can work together with the County to create a natural hazards mitigation plan that addresses the potential impacts of hazard events.

Geography and the Environment

Pamlico County, a peninsula reaching out into the Pamlico Sound, was formed from part of Craven County in 1872 and from parts of Beaufort County in 1874 and 1875. The County had a 2001 population of 12,934 permanent residents (North Carolina State Demographics). It has a total area of 562 square miles and is bordered by water: Upper Broad Creek forms the county's western boundary with Craven County; Goose Creek separates Beaufort County and Pamlico County; Pamlico Sound lies to the east; and the Neuse River to the south. Of the 562 square miles, only 337 square miles are land area.

The topography of Pamlico County is relatively flat with elevations ranging from sea level to 50 feet. The highest elevations are west of the beach ridge which is parallel to NC 306. In this area of the County, elevations range from 25 to 50 feet. The larger portion of the county lying east of the beach ridge has elevations from 1 to 25 feet with most of the elevations ranging from 2 to 15 feet.

Farming is an important source of income in Pamlico County. Grain, tobacco, potatoes, livestock, and poultry are currently the principal farm income sources. Commercial forestland occupies more land than any other land use in the County. Forestry, like agriculture, is another important source of income in the area.

Pamlico County's climate is characterized by mild winters and warm summers. The average annual temperature is approximately 64 degrees Fahrenheit. Average annual precipitation of the region is approximately 56 inches, with the heaviest rain usually occurring during the summer months.

Demographic Profile

In terms of populations, Pamlico County ranks 91st in the state with a current population of 12, 934 people. Most of the county's residents are widely dispersed throughout the

county, with a significant portion of the population living in and around the towns that are located along Highway NC 55. The average population density for the entire county is 39.09 people per square mile (NC Department of Commerce, Economic Development Information System).

Unlike many of North Carolina's counties, Pamlico County is not experiencing rapid population growth. North Carolina, between the years of 1990 and 2000, experienced an average population growth of 21%, while Pamlico County grew only at 14% during this same period.

There are reasons for Pamlico County's slower growth rate. First, there are limited employment opportunities within the county. This lack of opportunity has forced non-retired people to look elsewhere for a place to live and work. Secondly, while other areas have seen significant economic growth, Pamlico County remains rural and is isolated from mainstream shopping, medical facilities, and daily routines. This isolation has driven some residents to relocate to other areas where much needed goods and services are more easily accessible.

Table 1. Pamlico County Population Data

Subject	Number	Percent
Total Population	12,934	100
Sex and Age		
Male	6,513	50
Female	6,421	50
Under 5 years	643	5
5 to 9 years	728	5.6
10 to 14 years	833	6.9
15 to 17 years	522	4
18 and 19 years	245	1.9
20 years	103	0.8
21 years	105	0.8
22 to 24 years	373	2.9
25 to 29 years	671	5.2
30 to 34 years	724	5.6
35 to 39 years	926	7.2
40 to 44 years	1,016	7.9
45 to 49 years	971	7.5
50 to 54 years	991	7.7
55 to 59 years	848	6.6
60 and 61 years	327	2.5
62 to 64 years	479	3.7
65 and 66 years	353	2.7

Subject	Number	Percent
67 to 69 years	434	3.4
70 to 74 years	668	5.2
75 to 79 years	447	3.5
80 to 84 years	275	2.1
85 years and over	252	1.9
Median age (years)	42.9	
65 years and over	2,429	18.8
RACE		
White	9,384	72
Black or African American	3,167	24
Hispanic	342	2
American Indian and Alaska Native	66	0.005
Asian	49	0.003
Native Hawaiian / Pacific Islander	2	0.0001
Some other race	9	0.0007
Two or more races	86	0.006
HOUSEHOLD SIZE		
1-Person	1,294	25.0
2-Person	2,101	40.6
3-Person	820	15.8
4-Person	612	11.8
5-Person	251	4.8
6-Person	67	1.3
7 or more Person	33	0.6
YEAR STRUCTURE BUILT	6,781	100.0
1999 to March 2000	229	3.4
1995 to 1998	685	10.1
1990 to 1994	659	9.7
1980 to 1989	1,334	19.7
1970 to 1979	1,433	21.1
1960 to 1969	861	12.7
1940 to 1959	921	13.6
1939 or earlier	659	9.7

Source: US Census 2000 Summary File 1

Economic Profile

Pamlico County's rural population, combined with a lack of major transportation infrastructure, makes economic development more difficult than the more urban areas in

the state. Agriculture, commercial fishing, and forestry have been the traditional industries for many years, but their dominance is not as great as it once was. Although farming is still a big business in Pamlico County, many county residents have looked toward other economic sectors for employment.

During the year 2001, 4.6% were unemployed and looking for work. The government sector employs the largest number of county residents (30%), followed by service employment (25%) and retail trade (19%).

Table 2. Pamlico County Workforce by Industry (2001)

Industry	Number	Percent
Agriculture	110	3.6
Construction	196	6.5
Finance/Insurance/Real Estate	39	1.3
Government	917	30.4
Manufacturing	255	8.4
Retail Trade	583	19.3
Wholesale Trade	84	2.8
Service	743	24.6
Transportation/Communications/Public Util.	93	3.1
TOTAL WORKFORCE	3,020	100

Source: NC Department of Commerce, Economic Policy and Research Division, 2002

Although retail trade provides a large share of the local employment base, Pamlico County ranks 91st out of the state's 100 counties in gross retail sales for fiscal year 2000-2001, with $65,300,609. Pamlico County's largest manufacturers are all part of the seafood industry. *Garland Fulcher Seafood* in Oriental and *Diamond Shoal Seafood* in Oriental employ between 70-80 persons each, while *Fulcher's Point Pride Seafood* and *Normans Seafood* in Oriental employs around 50 persons each (*NC Department of Commerce, Economic Policy and Research Division, 2002)*.

In 2000, the county's per capita personal income was $22,788, which ranked 48th in the state. In 2002, the county's median family income was $45,500, which ranked 51st in the state (*NC Department of Commerce, Economic Policy and Research Division, 2002)*. The most recent poverty estimates indicate that 17.3% of Pamlico County residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

The North Carolina Department of Commerce classifies counties into one of five tiers, with Tier 1 representing the most economically disadvantaged and Tier 5 the most prosperous. Tiers 1, 2, and 3 are considered "distressed" based on various economic and demographic characteristics. Pamlico County is currently classified as a **Tier 2** county.

Distressed counties can access state-provided business incentive programs under the William S. Lee Quality Jobs and Business Expansion Act, and other agencies such as the North Carolina Rural Economic Development Center also use this tier system to determine eligibility for certain programs. Companies that choose to locate a new business or expand existing operations in Tier 1 counties are eligible for credits toward their state taxes. Other offerings for these counties include access to a special utilities fund, priority status for Community Development Block Grant funds for economic development, and a waiver of local matching fund requirements for CDBG funds and Industrial Development Fund loans and grants.

Natural, Historic, and Cultural Resources

Pamlico County is a haven for those seeking a quieter way of life. With miles of back roads, opportunities exist for unmatched outdoor experiences such as freshwater fishing, bird watching, canoeing, kayaking, hunting, and boating. The area's most abundant natural resource may arguably be the water. Pamlico County is a peninsula surrounded by the Neuse River, Pamlico Sound, the Bay River, and the Pamlico River. Pamlico County was formed from part of Craven County in 1872 and from parts of Beaufort County in 1874 and 1875. The first permanent European settlers arrived in the early 1700's. The area was inhabited by the Pampticoe Indians, part of the Algonquin Indian Nation, from whom Pamlico got its name. These Indians referred to the area as "TaTakua" or where the land and sea meet the sky. After the Tuscarora War in 1711, Scotch and English colonists came to the area. Settlement was slow, however, because the county is on an isolated peninsula. The earliest settlements were at the heads of the rivers, creeks, and bays. The interior of the county was settled as the road system was developed.

Historical sites can be a significant tourist attraction if properly developed and maintained. The State of North Carolina has submitted and listed the following building on the National Register for Historic Places:
China Grove – added in 1973

This private single-family dwelling was built by William S. Sparrow. The period of significance 1800-1824 is an example of Federal architectural style. This structure is located 3 miles southwest of Oriental on SR 1302.

Development Trends and Implications

Pamlico County is located within a region which ranks below the state average for population growth, employment growth, business failure rate, and business startup rate *(NC Department of Commerce, Economic Policy and Research Division)*.

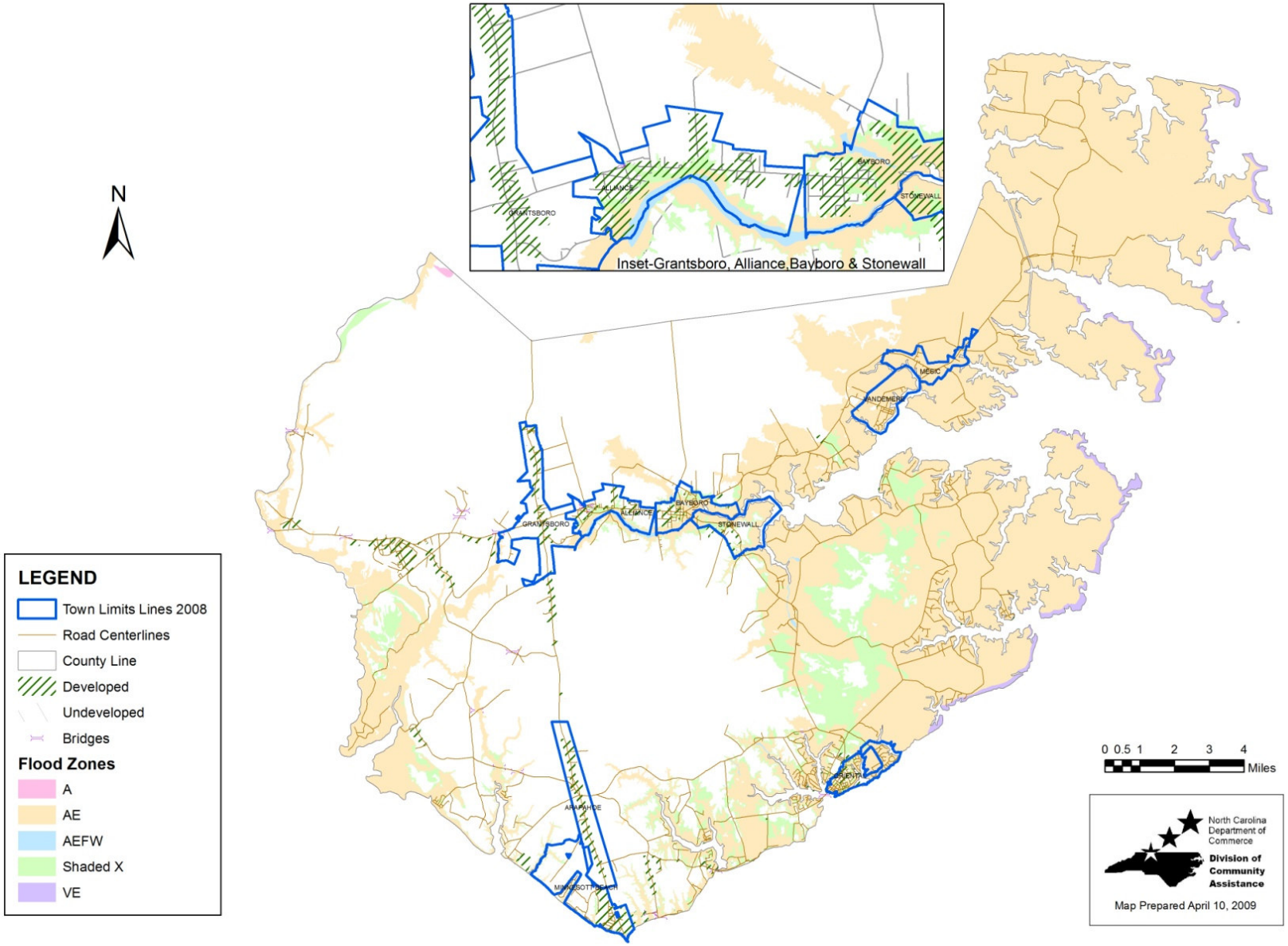
Pamlico County grew 13.9% in population between 1992 and 2002, ranking 91st in the state (the state's average population growth was 21.4%). Over the next twenty years, the county is projected to grow in population by another 16.8% (the state's average is projected to grow another 26.6%). Pamlico County has a population density of 39.09 persons per square mile (the state average is 165.25). This population density is

expected to increase to 44.87 persons per square mile in 2020 *(NC State Demographics Unit, 2002)*.

Pamlico County's residential development is mostly located within the incorporated municipalities, and along primary and secondary roads. There is some residential development expected within the next 20 years. The NC State Demographics Unit projects that 1,938 people will be living in Pamlico County in the year 2020, so it is projected that there will be a small number of housing starts to accommodate the new residents. Similarly, according to the NC Department of Commerce, it is unlikely that Pamlico County will see significant commercial or industrial development in the next 20 years.

With a few exceptions, land use patterns in Pamlico County have remained unchanged for many years. Relatively built up areas continue to be located in the towns of Oriental and Minnesott Beach, with smaller concentrations located in other areas. Commercial land uses are primarily limited to the incorporated municipalities. Some major factors that limit the development potential for Pamlico County include the lack of readily available goods and services and soil limitations for septic tank usage in areas not served by sewer.

Figure 2. Existing Land Use with Floodplain Overlay



SECTION 3: RISK ASSESSMENT

What is a Risk Assessment?

Conducting a risk assessment can provide information on the location of hazards, the value of existing land and property in hazard locations, and an analysis of risk to life, property, and the environment that may result from natural hazard events. Specifically, the five levels of a risk assessment are as follows:

1 – ***Hazard Identification*** identifies the geographic extent and intensity of the hazard, the intensity of the hazard, and the probability of its occurrence. Maps are frequently used to display hazard identification data. Pamlico County identified nine major hazards that consistently affect this geographic area. These hazards - flooding, hurricanes, nor'easters, earthquakes/tsunamis, landslides, thunderstorms, tornadoes/waterspouts, wildfire, severe winter storms, coastal erosion, and mosquitoes – were identified through an extensive process that utilized input from the Hazard Mitigation Planning Committee, as well as recommendations from North Carolina Emergency Management. The geographic extent of each of the identified hazards has been identified using the best available data.

2 – ***Profiling Hazard Events*** describes the causes and characteristics of each hazard, how it has affected Pamlico County in the past, and what part of Pamlico County's population, infrastructure, and environment has historically been vulnerable to each specific hazard. A profile of each hazard discussed in this plan is provided in each hazard section. For a full description of the history of hazard specific events, please see the appropriate hazard chapter.

3 – ***Vulnerability Assessment/Inventorying Assets*** combine's hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard. Critical facilities are of particular concern because these entities provide essential products and services to the general public that are necessary to preserve the welfare and quality of life in the county and fulfill important public safety, emergency response, and/or disaster recovery functions. The critical facilities have been identified, mapped, and are illustrated in Figure 3 at the end of this section. A description of the critical facilities in the county is also provided in this section.

4 – ***Risk Analysis/Estimating Potential Losses*** involves estimating the damage, injuries, and financial losses likely to be sustained in a geographic area over a given period of time. Describing vulnerability in terms of dollar losses provides the community with a common framework to measure the effects of hazards on assets. For each hazard where data was available, quantitative estimates for potential losses are included in the hazard assessment.

5 – ***Assessing Vulnerability/Analyzing Development Trends*** provides a general description of land uses and development trends within the county so that mitigation options can be considered in land use planning and future land use decisions. Analyzing these trends can help in identifying potential problem areas and can serve as

a guide for incorporating the goals and ideas contained in this mitigation plan into other community development plans.

Note: The information on the maps in this plan was derived from Pamlico County's GIS. Care was taken in the creation of these maps, but is provided "as is." Pamlico County cannot accept any responsibility for any errors, omissions or positional accuracy, and therefore, there are no warranties that accompany these products (the maps). Although information from land surveys may have been used in the creation of these products, in no way does this product represent or constitute a land survey. Users are cautioned to field verify information on this product before making any decisions.

Hazard assessments are subject to the availability of hazard-specific data. Gathering data for a hazard assessment requires a commitment of resources on the part of participating organizations and agencies. Each hazard-specific section of the plan includes a section on hazard identification using data and information from local, county, state, or federal agency sources.

Pamlico County conducted a vulnerability assessment for the flood hazard using Geographic Information Systems (GIS) to identify the geographic extent of the hazard and assess the land use and value at risk from the flood hazard. Insufficient data exists to conduct vulnerability assessments and risk analyses for all the hazards listed and addressed in the plan.

Regardless of the data available for hazard assessments, there are numerous strategies the county can take to reduce risk. These strategies are described in the action items detailed in each hazard section of this plan. Mitigation strategies can further reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure. Action items throughout the hazard sections provide recommendations to collect further data to map hazard locations and conduct hazard assessments.

Table 3. Federal Criteria for Risk Assessment

Section 322 Requirement	How is This Addressed?
Identifying Hazards	Each hazard section includes an inventory of the best available data sources that identify hazard areas. To the extent GIS data are available, the county developed maps identifying the location of the hazard in the county. The Executive Summary and the Risk Assessment sections of the plan include a list of the hazard maps.
Profiling Hazard Events	Each hazard section includes documentation of the history, and causes and characteristics of the hazard in the county.

Assessing Vulnerability: Identifying Assets	Where data is available, the vulnerability assessment for each hazard addressed in the mitigation plan includes an inventory of all publicly owned land within hazardous areas. Each hazard section also identifies potential mitigation strategies.
Assessing Vulnerability: Estimating Potential Losses	The Risk Assessment Section of this mitigation plan identifies key critical facilities and lifelines in the county and includes a map of these facilities. Vulnerability assessments have been completed for the hazards addressed in the plan, and quantitative estimates were made for each hazard where data was available.
Assessing Vulnerability: Analyzing Development Trends	The Pamlico County Profile Section of this plan provides a description of the development trends in the county, including the geography and environment, population, and land use and development.

Storm Events in Pamlico County

Pamlico County has been susceptible to many types of storm events over the past 50 years. The table below contains the type and number of events, and the associated deaths and injuries, along with property and crop damage.

Table 4. Summary of Reported Storm-Related Damage and Casualties in Pamlico County

Events	Numbers	Deaths	Injuries
Pamlico			
Extreme Cold	1	0	0
Hail	36	0	0
Flash Flood	4	0	0
Thunderstorm	2	0	0
Thunderstorm Wind	19	0	0
Funnel Cloud	1	0	0
Tornado	13	1	45
Subtotal	76	1	45
Hurricanes	10	20	19
Tropical Storms	5	0	1
Winter Storms	9	11	179
Subtotal	24	31	199

Events	*Property Damage	*Crop Damage	*Total Damage
Pamlico			
Extreme Cold	$0	$378,344	$378,344
Hail	$133,098	$0	$133,098
Flash Flood	$0	$0	$0
Thunderstorm	$0	$0	$0
Thunderstorm Wind	$68,059	$0	$68,059
Funnel Cloud	$0	$0	$0
Tornado	$17,639,398	$0	$17,639,398
Subtotal	$17,840,555	$378,344	$18,218,899
Hurricanes, Tropical Storms & Winter Storms (multi-county events that affected Pamlico)			
Hurricanes	$1,976,373,464	$731,186,200	$2,707,559,664
Tropical Storms	$24,612,367	$63,953,307	$88,565,674
Winter Storms	$25,021,537	$0	$25,021,537
Subtotal	$2,026,007,368	$795,139,507	$2,821,146,875

Source: NOAA, National Climatic Data Center (Reports from National Weather Service in Categories)

*Damages are in 2008 US dollars, adjusted using the consumer price index (US Bureau of Labor Statistics, March 2003-USDL-02-222,

**Period of Record: Storms (1/1993-7/1999 except 6-7/1993); Tornadoes (1/1950-12/1992); Wind and hail (1/1959-12/1992) ** Numbers Include 1/1/03-8/31/08 for all totals (National Climatic Data Center)

***Hurricane, tropical storm, and winter storm damages are multi-county estimates and storm-specific

Critical Facilities, Infrastructure and Vulnerable Populations

Facilities critical to government response and recovery activities (i.e., life safety and property and environmental protection) include: emergency operations centers, police and fire stations, public facilities, roads, and to a lesser extent, drug stores and grocery stores. Facilities that, if damaged, could cause serious secondary impacts may also be considered "critical." Critical and essential facilities are those facilities that are vital to the continued delivery of key government services or that may significantly impact the public's ability to recover from the emergency. Figure 3 illustrates the critical facilities, essential facilities, public infrastructure, and emergency transportation routes within Pamlico County.

According to the Local Multi-Hazard Mitigation Planning Guidance provided by FEMA on July 1, 2008, critical facilities may include emergency serve facilities, such as

hospitals and other medical facilities, jails and juvenile detention centers, police and fire stations, emergency operation centers, public works facilities, evacuation shelters, schools, and other uses that house special needs populations.

Critical facilities and Vulnerable Populations for Pamlico County are:

Health / Medical Facilities
Pamlico Medical Center – Bayboro
Oriental Medical Center – Oriental
Pamlico County Health Department – Bayboro
Pamlico Pediatrics – Alliance
Britthaven of Pamlico – Grantsboro
Continuum Home Care – Grantsboro
Holland Drive Home – Reelsboro
Hospice of Pamlico County, Inc. – Grantsboro
Neuse Center for MH/DD/SAS – Alliance
Social Services of Pamlico County – Bayboro
Pamlico County Group Home – Grantsboro
Pine Haven Home Health Care – Olympia
TASC/CJP-Pamlico – Alliance
The Gardens of Pamlico – Scotts Store

Public Buildings
Pamlico County Courthouse - Bayboro
Pamlico County Senior Services - Alliance
Pamlico County Farm Services Agency – Alliance
Mesic Town Hall, Hwy 304, Mesic
Vandemere Town Hall, Pennsylvania Avenue, Vandemere
Oriental Town Hall, Church Street, Oriental
Minnesott Beach Town Hall, Hwy 306, Minnesott Beach
Arapahoe Town Hall, Hwy 306, Arapahoe
Grantsboro Town Hall, Hwy 306, Grantsboro
Alliance Town Hall, Hwy 55, Alliance
Bayboro Town Hall, 3rd Street, Bayboro
Stonewall Town Hall, Hwy 55, Stonewall
Pamlico County Chamber of Commerce, Hwy 55, Grantsboro

Emergency Services Facilities
Pamlico County Rescue Squad - Bayboro
Triangle Volunteer Fire Department – Bayboro
Grantsboro / Silverhill Volunteer Fire Department – Grantsboro
Olympia Volunteer Fire Department – Olympia
Southeast Volunteer Fire Department – Oriental
Florence / Whortonsville Volunteer Fire Department – Florence
Arapahoe Volunteer Fire Department – Arapahoe
Goose Creek Volunteer Fire Department – Hobucken

Vandemere Volunteer Fire Department – Vandemere
Reelsboro Volunteer Fire Department – Reelsboro

Water Distribution / Wastewater Facilities
Bay River Metropolitan Sewerage District – Bayboro
Bay River Sewerage Lagoon – Bayboro
Bay River Sewerage Spray Site – Grantsboro
Pamlico County Water Department - Bayboro

Water Tower Locations
Lowland Road – Hobucken
Hwy 306 South – Arapahoe
McCotter Road – Stonewall
Hwy 55 – Grantsboro
Hwy 304 – Vandemere
Pamlico Road -- Eastern Pamlico County
Hwy 55 -- Merritt
Broad Street – Oriental
Kershaw Road – Eastern Pamlico County
Leaf Land – Reelsboro
Bay City Road – Bayboro
Dees Avenue – Bayboro

Communication Towers
Kershaw Road – Oriental
Lowland Road – Lowland
Lowland Road – Hobucken
Hwy 304 – Vandemere
Burton Farm Road – Minnesott Beach
Hwy 55 – Reelsboro
Hale Road – Reelsboro
Hwy 55 – Western Pamlico County
Bay City Road – Bayboro
Hwy 55 – Grantsboro
Hwy 55 – Stonewall

Law Enforcement and Detention Centers
Oriental Police Department, Broad St, Oriental
Pamlico County Sheriff's Department, Hwy 55, Bayboro
NC Department of Corrections, Bay City Road, Bayboro

Utility Facilities
Gibbtown Road -- Merritt
Hwy 306 -- Minnesott Beach
Hwy 306 -- Arapahoe
Hwy 306 -- Grantsboro

Hwy 55 – Grantsboro
New Ditch Road – Alliance
Hwy 304 – Bayboro

Airports
Meekins Road – Mesic
Hooker Road – Bayboro

Camps
Jones Street – Vandemere
Janiero Road – Pamlico County
Camp Don Lee Road – Pamlico County
Hwy 306 – Minnesott Beach
Seafarer Road – Minnesott Beach

Daycare and Pre-School Facilities
Hwy 306 – Grantsboro
Hwy 55 – Grantsboro
Hwy 55 – Bayboro

Public and Charter Schools
Arapahoe Charter School – Arapahoe
Pamlico Primary School – Bayboro
Fred Anderson Elementary – Bayboro
Pamlico Middle School – Stonewall
Pamlico High School – Bayboro
Pamlico Community College – Hwy 306

Evacuation Centers
Pamlico Community College – Hwy 306 (located between Grantsboro and Arapahoe)

Pamlico County used a 5 year planning horizon (consistent with the County's Land Use Plan) when generating the list of critical facilities. For purposes of projecting land use estimates in special hazard areas, a 5 year planning horizon will be used.

Figure 3. Critical Facilities and FIRM Flood Zones

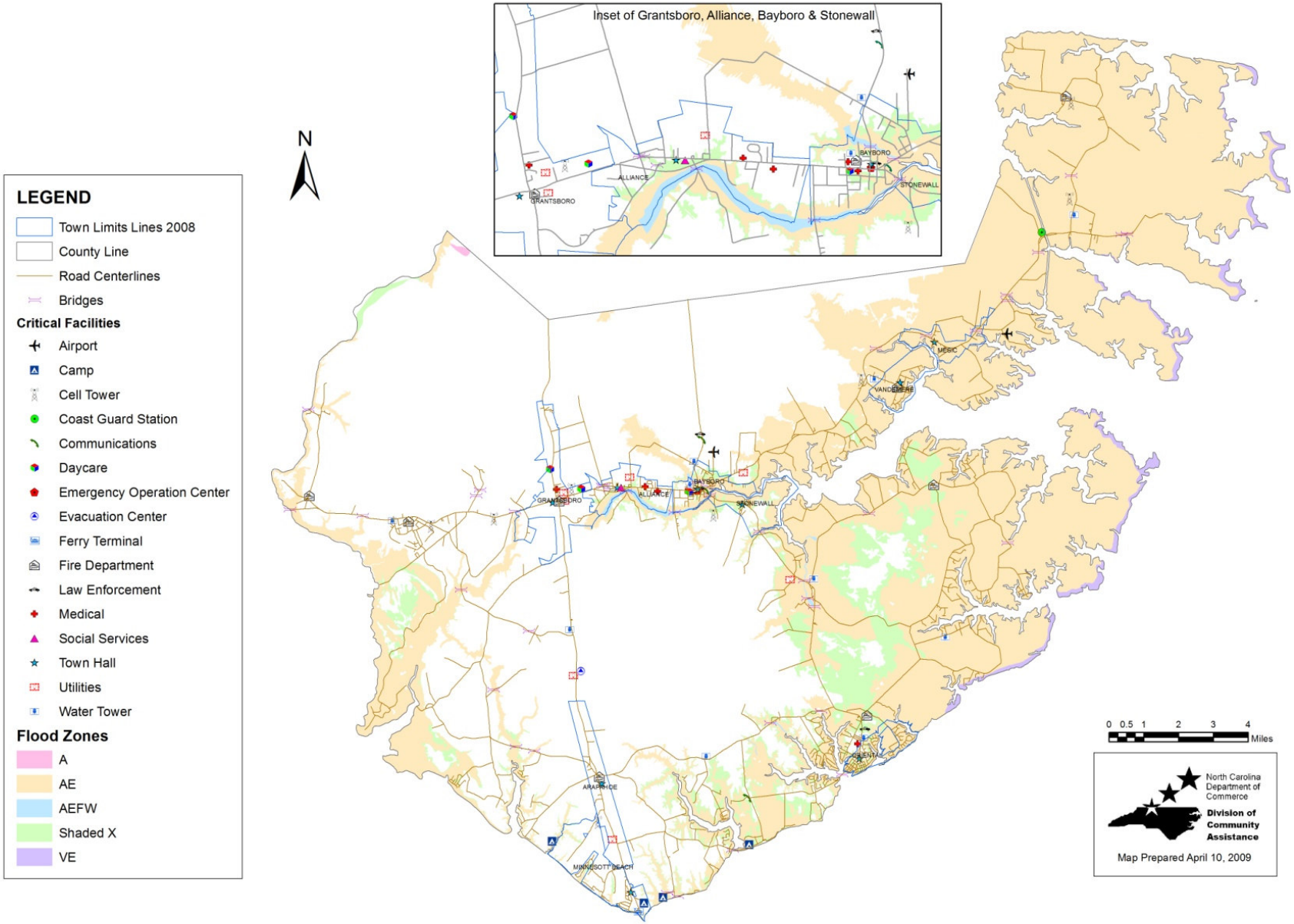
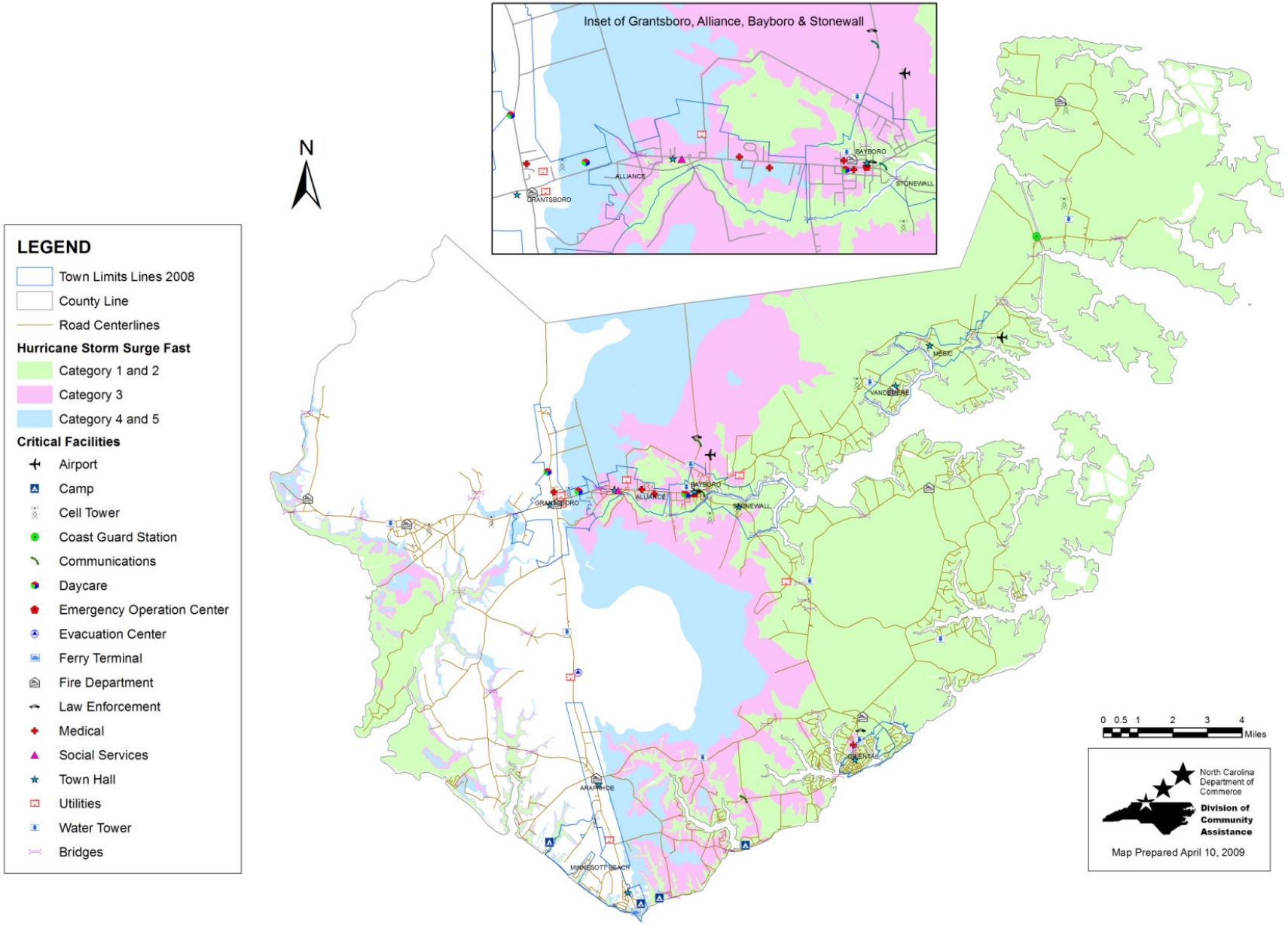


Figure 4. Storm Surge Inundation and Critical Facilities



Repetitive Loss Properties
Over 2.5 million buildings are insured by the National Flood Insurance Program (NFIP), but a fraction of them (less than 2%) account for 33% of the flood insurance claims paid since 1978. This is because these few properties have been flooded more than once, and some of them have been flooded numerous times. Repetitive loss properties are defined by FEMA as properties for which two or more claims of at least $1,000 have been paid by the NFIP within any 10-year period since 1978. (*CRS Coordinator's Manual* 1999, Federal Emergency Management Agency, National Flood Insurance Program, Community Rating System p. 500-3.)

Pamlico County has 263 repetitive loss properties within its jurisdiction, according to a recent FEMA list of repetitive loss properties. 259 of these properties are located with A Zones; 4 of these properties are located in B or X Zones. 182 of the repetitive loss buildings are insured. There were 582 total repetitive losses in the county; 396 of these losses were insured.

Repetitive loss payments were $9,100,297. Of this total, $7,232,228 was for building loss; $1,868,069 was for contents. $5,790,982 of these total losses was insured; $4,626,203 was for insured buildings and $1,164,779 was for insured contents.

There were 73 post-FIRM repetitive loss buildings (buildings constructed after the floodplain regulations were established) in the county. 5 buildings have been damaged by floods at least 4 times. 3 buildings that have been flooded 2-3 times have received more in total insurance damages than the value of the building.

Table 5. Repetitive Loss Data

Pamlico County and All Municipalities as of 6/30/07				
Repetitive Loss (RL) Data				
	AE, A1-30, AO, AH, A	**VE, V1-30, V**	**B, C, X**	**TOTAL**
RL Nonresidential	13	0	1	14
RL Single family	235	0	3	238
RL Condominium	6	0	0	6
RL 2-4 family	1	0	0	1
RL Other residential	4	0	0	4
RL Buildings (Total)	259	0	4	263
RL Buildings (Insured)	178	0	4	182
RL Losses (Total)	573	0	9	582
RL Losses (Insured)	387	0	9	396
RL Payments (Total)	9,014,743	0	85,554	100,297
Building	7,158,486	0	73,742	7,232,228
Contents	1,856,257	0	11,812	1,868,069
RL Payments (Insured)	5,705,428	0	85,554	5,790,982
Building	4,552,461	0	73,742	4,626,203
Contents	1,152,967	0	11,812	1,164,779
Post-FIRM SFHA RL Buildings:				73
Insured Buildings with 4 or More Losses:				5
Insured Buildings with 2-3 Losses > Building Value:				3

Pamlico County's repetitive loss areas are shown on Figure 5.

Figure 5. Repetitive Loss Areas

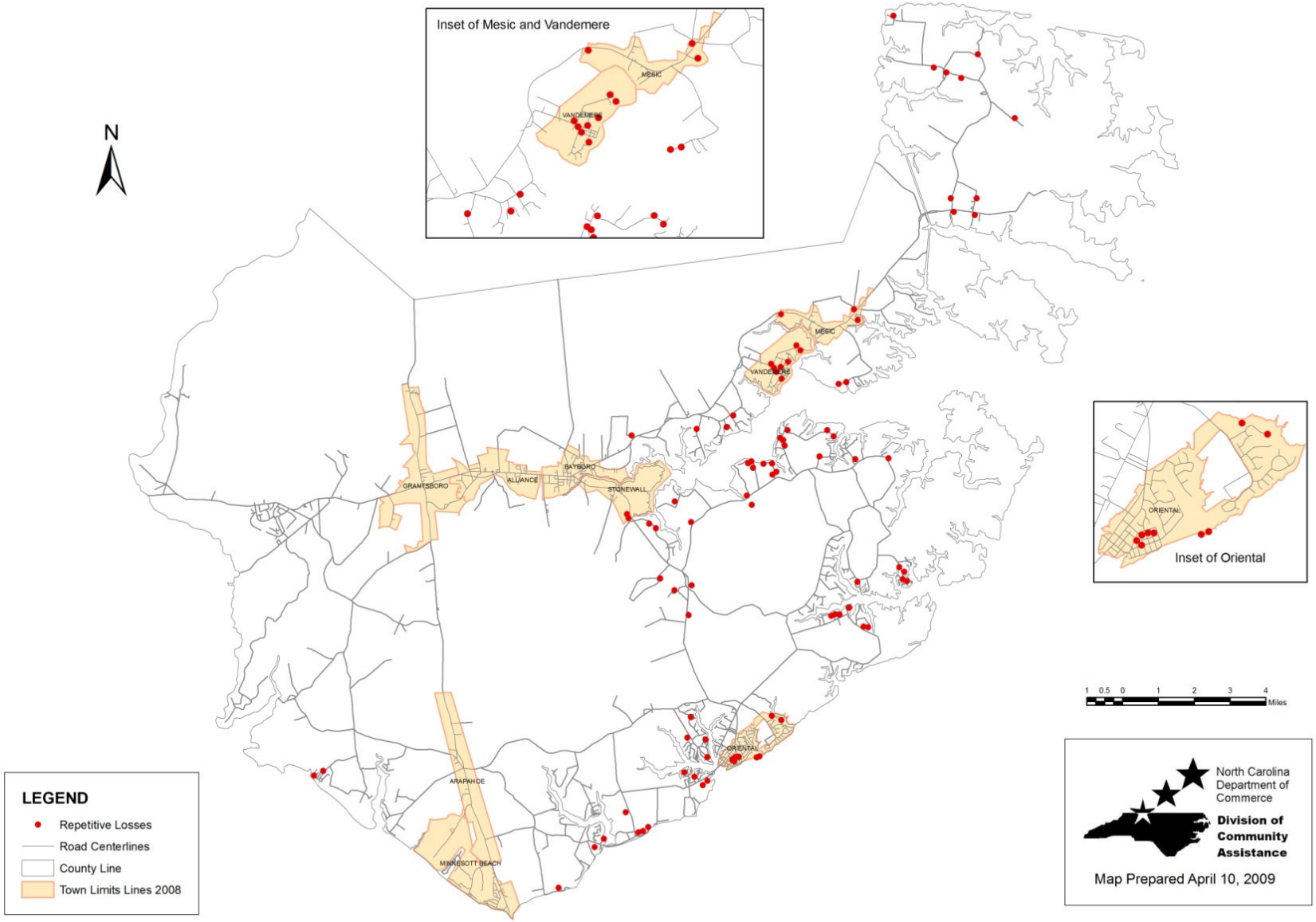


Figure 6. Vulnerable Populations

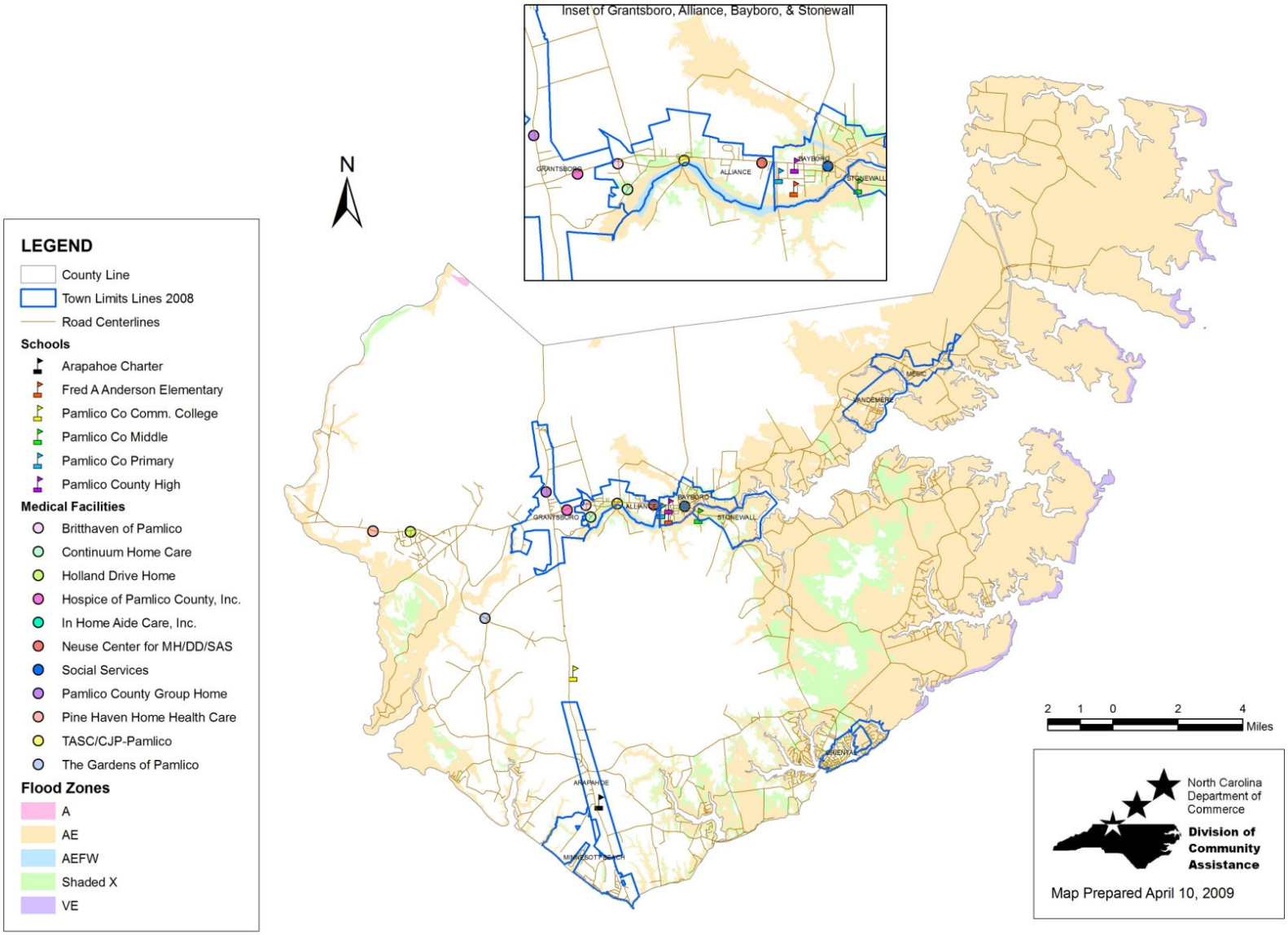
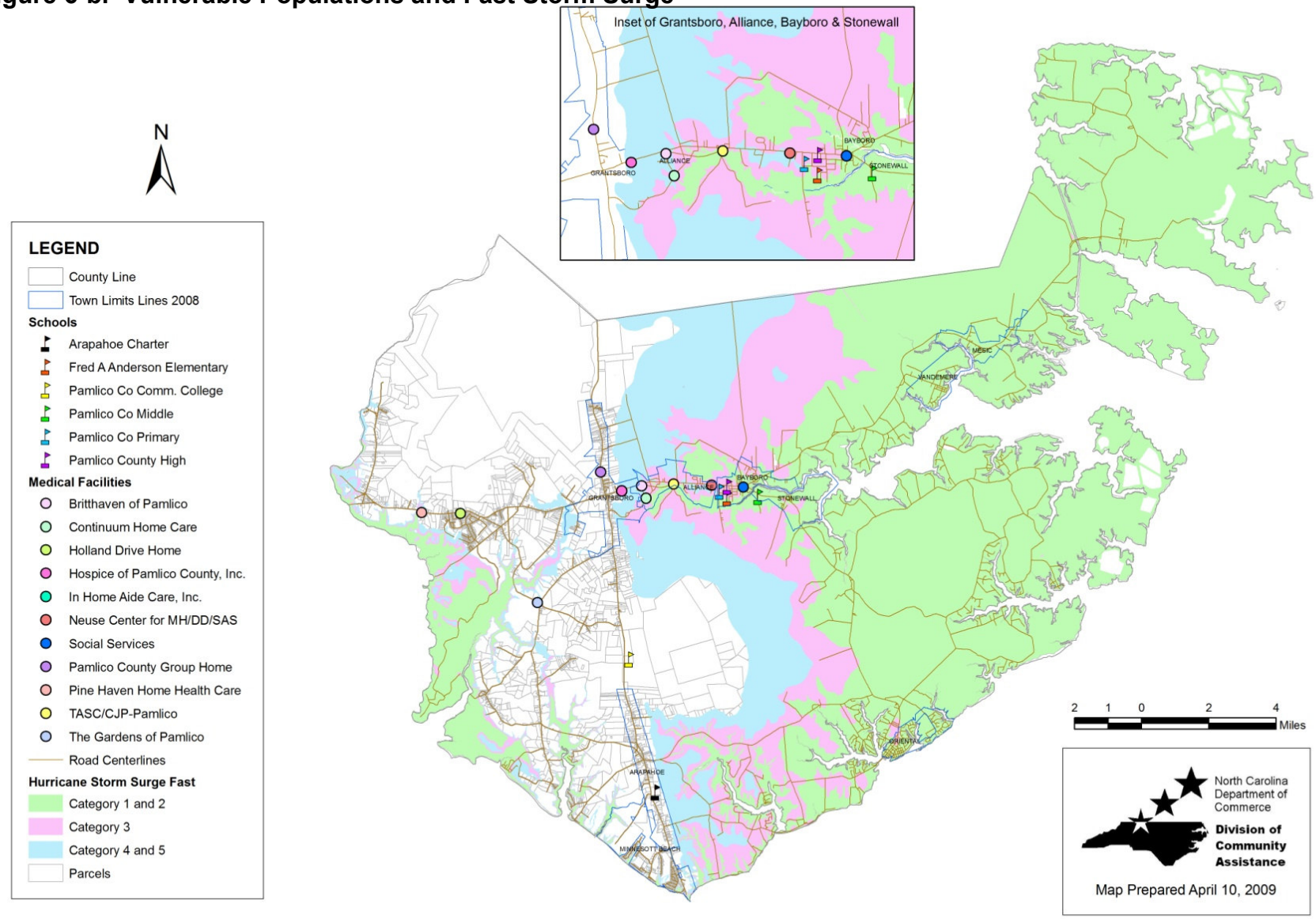


Figure 6-b. Vulnerable Populations and Fast Storm Surge



Identifying Hazards
The county is vulnerable to several natural hazards. Using Tables 4 (Summary of Reported Storm Related Damage and Casualties in Pamlico County) and 5, below, the Plan Committee identified the natural hazards that have occurred previously in Pamlico County. Additionally, the Plan Committee identified other hazards that occur in the county's jurisdiction. The committee identified and analyzed each specific hazard as required by FEMA, even if the hazard does not pertain, or is very unlikely to occur in Pamlico County. The hazards were ranked by importance to the County, taking into consideration, the likelihood of occurrence, the severity of past events and the County's ability to respond.

The Plan Committee, after identifying each hazard, and evaluated each hazard, using their knowledge of previous natural hazard occurrences.

A '4' is the highest score for a hazard, and represents the highest threat to the community. Conversely, a '1' indicates that the Plan Committee did not rate that hazard as a significant threat.

Table 5 represents the Hazard Identification and Analysis matrix and the corresponding determined by the planning committee at the January 7, 2009 meeting.

Table 6. Hazard Identification and Analysis

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
North Carolina Greater Hazards					
FLOODING					
Flooding*	4				
10-49 year event	4	High	Limited	Structures located in low lying areas not within 100 year flood plain	44.1%
50-100 year event	4	Moderate	Critical	Structures located within 100 year flood plain	52.3%
>100 year event	4	Low	Critical	Structures located within 500 year flood event	60.3%
Riverine Flooding*	1	Low	Limited	Structures located in close proximity to main water body's with the County	
Flash Flooding	3	Moderate	Limited	All structures	100%
Tidal Flooding	1	Low	Limited	Structures located in close proximity to main water body's	

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Ice Jam Flooding	1	Very Low	Limited		
Local Drainage or High Groundwater Levels	3	Moderate	Limited	All Structures	
Fluctuating Lake Levels	1	Very Low	Limited		
Coastal Flooding*	3	Moderate	Critical	All Structures in close proximity to main water body's	
Urban Flooding*	1	Low	Limited	All Structures located within an urban area	
EARTHQUAKES				All Structures	
Earthquake*	1	Very Low	Limited		
Ground Motion	1	Very Low	Limited		
Seismic Activity	1	Very Low	Limited		
Surface Faulting	1	Very Low	Limited		
Earthquake-related Ground Failure	1	Very Low	Limited		
HURRICANES/COASTAL HAZARDS				All Structures	
Hurricane*	4				
-Tropical Storm	4	High	Limited		
-Category 1	4	High	Limited		13.7%
-Category 2	4	Moderate	Critical		16.6%
-Category 3	4	Low	Critical		18.2%
-Category 4	4	Low	Catastrophic		21.0%
-Category 5	4	Very Low	Catastrophic		23.7%
Storm Surge*	4	Moderate	Critical		23.7%
High Wind*	4	High	Critical		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Torrential Rain*	4	High	Limited		
Tornado*	4	Low	Limited		
Nor'easter*	4				
-1 (weak)	4	High	Limited		5.2%
-2 (Moderate)	4	Moderate	Limited		7.6%
-3 (Significant)	4	Moderate	Critical		9.3%
-4 (Severe)	4	Low	Critical		13.4%
-5 (Extreme)	4	Very Low	Catastrophic		16.4%
Storm Surge*	4	Moderate	Critical		
High Wind*	4	High	Critical		
Severe Winter Weather*	2	Low	Limited		
Tsunami*	1	Low	Catastrophic		
Coastal Erosion*	3	Moderate	Critical		
Rip Current*	1	Very Low	Limited		
SEVERE WINTER WEATHER				All Structures	100%
Severe Winter Weather*	2				
Freezing Rain*	2	Low	Limited		
Snowstorms*	2	Low	Limited		
Blizzard*	1	Low	Limited		
Wind Chill*	1	Low	Limited		
Extreme Cold*	1	Low	Limited		
WILDFIRE				All Structures	100%
Wildfire*	3	Moderate	Limited		
Wild-land Fires	1	Low	Limited		
Interface of Intermix Fires	1	Low	Limited		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Firestorms	1	Low	Limited		
Prescribed Fires and Prescribed Natural Fires	1	Low	Limited		
Dam Failure				All Structures	100%
Dam Failure*	< 1	N/A	N/A		
Drought				All Structures	100%
Drought*	3				
Meteorological*	3	Moderate	Limited		
Hydrologic*	2	Moderate	Limited		
Agriculture*	3	Moderate	Limited		
Socioeconomic*	1	Moderate	Limited		
Heat Wave*	1	Moderate	Limited		
Infectious Diseases				All Structures	100%
Infectious Disease*	2	Low	Limited		
Human Contact*	2	Low	Limited		
Animal Contact*	2	Low	Limited		
Food-borne*	1	Low	Limited		
Water-borne*	1	Low	Limited		
Human Respiratory*	2	Low	Limited		
Animal Respiratory*	1	Low	Limited		
Vector-borne*	1	Low	Limited		
Geological				All Structures	100%
Landslide/Debris Flow*	1	Low	Limited		
Subsidence*	1	Low	Limited		
Acidic Soil*	1	Low	Limited		
Geochemical-related*	1	Low	Limited		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Mine Collapse*	1	Low	Limited		
Sinkholes*	1	Low	Limited		
Expansive Soil*	1	Low	Limited		
Tornado/Thunderstorm				All Structures	100%
Severe Thunderstorm*	3	High	Limited		
Hailstorm*	2	High	Limited		
Torrential Rain*	2	High	Critical		
Thunderstorm-related Wind*	2	High	Limited		
Lightning*	3	High	Limited		
Tornado*	2				
-F0	2	High	Limited		
-F1	2	Moderate	Limited		
-F2	2	Low	Critical		
-F3	2	Very Low	Critical		
-F4	2	Very Low	Catastrophic		
-F5	2	Very Low	Catastrophic		
-F6	2	Very Low	Catastrophic		
Waterspout*	1	Low	Limited		
High Wind/Wind Storm*	2	Moderate	Limited		
Fog*	1	Moderate	Limited		
OTHER HAZARDS				All Structures	
Snow Avalanches	1	Very Low	Limited		
Extreme Summer Weather	1	High	Limited		
Fires				All structures	100%
Structure Fires	2	Moderate	Limited		
Outdoor Fires	1	Low	Limited		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Man-Made Hazards/HAZMAT Events				All structures	100%
Fixed-Site Facilities	2	Low	Limited		
Highway and rail Transportation	1	Very Low	Limited		
Marine Transportation	2	Low	Limited		
Air Transportation	1	Very Low	Limited		
Pipeline Transportation	2	Low	Limited		
Natural Hazards	1	Very Low	Limited		
Nuclear Accidents				All Structures	100%
Criticality Accidents	1	Very Low	Catastrophic		
Loss-of-Coolant Accidents	1	Very Low	Catastrophic		
Loss-of-Containment Accidents	1	Very Low	Catastrophic		
Other Technological Hazards				All Structures	100%
National Security Hazards	1	Very Low	Limited		
Power failures	3	Moderate	Critical		
Telecommunications Failures	2	Low	Limited		
Volcanic Hazards				All Structures	100%
Volcano Eruption	1	Very Low	Limited		

The Hazard Identification allowed the Hazard Mitigation Committee to prioritize the natural hazards in Pamlico County. Hurricanes and nor'easters were determined to be the major threat, mainly because of flooding concerns. Wildfire and thunderstorms/lightning constitute the other major natural hazard that affect the county. All natural hazards listed will be discussed, but emphasis on planning will focus on these high-ranking natural hazards.

While not normally considered as a "natural hazard," mosquitoes were included in the list. Anyone that has spent time in Pamlico County during the summer and fall will agree that mosquitoes can be quite bothersome and create discomfort for residents and visitors. While there is literature describing the spread of disease and mosquitoes, such narrative is not included in this plan. However, the Plan Committee felt that mosquitoes were a significant nuisance in the County, and decided to include them in the list of hazards.

Assessing Vulnerability

The Committee also evaluated the County's current programs and policies, along with potential programs and policies that could reduce Pamlico County's susceptibility to natural hazards.

Current and potential policies were examined by: 1) Effectiveness; and 2) Cost. Effectiveness was determined by the perception of the Hazard Mitigation Plan Committee as High, Medium, or Low. Cost was determined by the Committee and rated as High, Medium, or Low. The cost is the expense of implementation and administration to the community.

An inventory of Pamlico County ordinances and policies relevant to hazard mitigation was conducted and tabulated in Table 6. Pamlico County administers many of its ordinances within the corporate limits of the individual incorporated towns. The sections that pertain to the individual towns will include any local ordinances that are related to hazard mitigation. The bulk of hazard mitigation policies and programs are geared toward hurricanes and nor'easters, and associated flooding, since those hazards were identified as the highest ranking natural hazards affecting the county and its municipalities.

The table identifies the program or policy, the document reference, effectiveness, cost, and a rationale for effectiveness.

Table 6. Inventory of Local Policies and Programs Relevant to Hazard Mitigation

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
1. Preventive – keep flood problems from getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Group Housing Ordinance	Adopted June 2006	Medium	Medium because the group housing ordinance regulates the height and density of multi-family developments, particularly in or near flood hazards	Any amendments to the GHO should be incorporated in future updates of the Hazard Mitigation Plan
Subdivision regulations	Adopted February 2, 1992, Updated January 2006	High	High because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and	Any amendments to the subdivision regulations should be incorporated into future updates of the Hazard Mitigation Plan

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
			erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985 Updated in 2003	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible that flood plain area will be delineated with updated topography, and that base flood elevations will be recalculated. All municipalities in Pamlico County have adopted the County's ordinance and	The Hazard Mitigation Plan will serve as the community's floodplain management plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
			the County administers the ordinance for all municipalities.	
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface regulations	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the NC Department of Water Quality
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Building elevation	Floodplain Regulations	High	High because the ordinance requires new construction to be built at two (2) feet above BFE	Any amendments to the Floodplain regulations should be incorporated into future updates of the

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
				Hazard Mitigation Plan.
Flood relief (venting)	NC State Building Code Volume 1	High	High because floodwaters actually reduce the pressure exerted by deep water	n/a
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that provide insurance for natural hazards to citizens.
3. Natural Resource Protection – preserves or restores natural areas or the natural functions of floodplain and watershed areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protections should be a component of any future hazard mitigation document.
Best management practices	N/A	High	High because BMPs can be used to collect a number of techniques into a single directive for action	BMPs can help limit runoff and flash-flooding in a storm event.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
				regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are highly effective at removing nitrogen before it reaches streams	Natural buffers can slow the flow and rise of water in a flood event
4. Emergency Services – taken during a flood to minimize its impact. These measures are the responsibility of city or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Citizen notification is an ongoing action strategy in the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Changes in policy should be incorporated into future updates of the Hazard mitigation Plan.
Critical facilities protection	Emergency Operations Plan	Medium	Medium because County facilities are well-	The plan includes a list and a map of

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
			protected	locations of all critical facilities.
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Public health and safety are an important component of a Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	Evacuation routes should be clearly marked in case of an emergency.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	Breakwaters and bulkheads are effective mitigation tools.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMS play a major role in Hazard Mitigation.
Library (Hazard related)	N/A	Low	Low because people do not take advantage of the library	Hazard library is located at the County building Inspector's office.
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies when addressing Hazard Mitigation.
Outreach projects	N/A	Medium	Medium because people often ignore outreach material and are generally unaware.	Continue outreach projects highlighted as an action step in this plan.
Real estate disclosure	N/A	Low	Low because there is no federal or state requirement	
Elevation markers (stating the	N/A	High	High because an	All communities

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
altitude above sea-level)			elevation marker program would inform the public	should consider an elevation marker program to inform residents and visitors about flood levels.

Risk Assessment Summary

Natural hazard mitigation strategies can reduce the impacts concentrated at large concentrations of people, public infrastructure, and critical facilities. Natural hazard mitigation for citizens and visitors may include developing relationships with emergency management services and their employees before disaster strikes, and establishing mitigation strategies together. Collaboration among the public and private sector to create mitigation plans and actions can reduce the impacts of natural hazards.

SECTION 4: MULTI-HAZARD GOALS AND ACTION ITEMS

This section provides information on the process used to develop goals and action items that pertain to the natural hazards addressed in the mitigation plan. It also describes the framework that focuses the plan on developing successful mitigation strategies. The framework is made up of three parts: the *Mission, Goals,* and *Action Items*.

Mission

Pamlico County, through hazard mitigation planning, seeks to maintain or lower the community's flood insurance rating, qualify for future disaster funding, identify potential problems, minimize repetitive losses, and educate the public on Pamlico County's vulnerability to natural hazards.

Public Comments and Participation

The Hazard Mitigation Plan Committee met on November 5, 2008 as a first step in this year's review and developed a plan to include public participation in the planning process. Elements of the public participation plan included:

Holding two public information meetings on April 23, 2009 at 7:00 p.m. and April 27, 2009 at 7:00 p.m. to describe the planning process to interested citizens and listen to citizen suggestions and concerns;
Copies of the Draft Hazard Mitigation Plan were made available at the Pamlico County Building Inspections Office for public review and
On June 7, 2010 and June 21, 2010, public hearings were held on the amended Hazard Mitigation Plan.

Coordination with Other Agencies

There are two reasons to involve agencies and private organizations in planning efforts. First, they may be implementing or planning to implement activities that can affect flood damage or some of the other interests and concerns. The Committee wanted to make sure that their efforts were not going to be in conflict with a government program or duplicate the efforts of another organization. Second, the Committee wanted to involve other agencies to see if they could assist their efforts. Help may be in the form of flood hazard data, technical information on various measures, guidance on regulatory requirements, advice and assistance in the planning effort, implementation of a recommended measure, and financial assistance to help implement a recommended measure.

During the initial research period at the beginning of the planning process, the Committee members discussed various outside agencies to contact.

- US Army Corps of Engineers
- Federal Emergency Management Agency
- Pamlico County Floodplain Manager
- Pamlico County Management Information Specialist

- Soil and Water Conservation District
- NC Division of Coastal Management
- NC Division of Emergency Management

These agencies were invited to attend the two public input meetings, held on April 23, 2009 at 7:00 p.m. and April 27, 2009 at 7:00 p.m. Both meetings gave the public and outside agencies an opportunity to comment on a draft of the hazard mitigation plan. Several action items were added to the draft plan as a result of public comment and outside agency participation.

In addition to coordination with outside agencies, Pamlico County reviewed existing plans, studies, reports, and technical information to assist in the preparation of this plan. These existing resources included:

- Pamlico County Land Use Plan
- Flood Insurance Study
- Flood Insurance Rate Maps

Integration of goals, objectives, and action items from the hazard mitigation plan will occur in future updates of the land use plan, flood insurance study, and other planning documents. The main means by which integration will take place is through implementation of the actions listed in this plan.

Goals

Each goal is meant to be general and broad, and can only be achieved through the long-term implementation of more specific objectives. It is intended that each goal listed below will be more specifically addressed and realized through the implementation of short-term mitigation objectives and action steps established later in this section.

The Hazard Mitigation Plan Committee had previously generated and recommended a floodplain management plan and a State hazard mitigation plan that contained goals and action steps. The Committee reviewed the previous plans and amended the goals for purposes of this plan.

The Hazard Mitigation Plan Committee developed 4 goals to mitigate hazards and to protect life and property in Pamlico County.

Goal 1 Improve Pamlico County's fiscal and operational capabilities to adequately mitigate the effects of natural hazards.

Goal 2 Enhance existing or implement new County policies that will reduce susceptibility to natural hazards without conflicting with other community goals.

Goal 3 Protect Pamlico County's buildings, critical facilities, and infrastructure through the implementation of cost-effective and technically feasible mitigation projects.

Goal 4 Promote public health, safety, and welfare by increasing the public awareness of existing hazards and fostering individual and public responsibility in mitigating risks due to those hazards.

These goals were presented at the public input meetings on March 4, 2004 and March 6, 2004. No changes were made to the goal statements as a result of these public meetings and the goals did not change for the plan update.

Objectives and Action Items

Mitigation *objectives* are designed to support and correspond directly with the goals established in the previous subsection, and was established to provide Pamlico County with some measurable, mid-range benchmarks (2-5 years). Each objective is numbered (i.e., "1.1"), with the first digit representing the corresponding goal.

The *action items* are short-term, specific measures to be undertaken by Pamlico County in order to achieve the identified objectives. Most of these actions are also hazard-specific. Each action identifies the objective(s) it is intended to achieve, includes some general background information to justify the proposed action, and provides measures to assure successful and timely implementation.

The mitigation plan identifies action items developed through data collection and research, surveys, and the public participation process. Mitigation plan activities may be considered for funding through federal and state grant programs, and when other funds are made available. To help insure activity implementation, each action item includes information on the timeline and the responsible party. Upon implementation, the responsible person(s) may look to partner organizations for resources and technical assistance.

Responsible Person: The responsible person(s) is the person or entity that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Responsible person(s) may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

Deadline: Each action item includes an estimate of the timeline for implementation.

Funding: Each action item will include a possible source of funding. Implementation ideas may include grant programs or human resources.

Mitigation Objectives

Objective 1.1 Handle/filter storm water runoff to lessen pollutants into tributaries of the Neuse River

Objective 1.2	Establish clear evacuation procedures and routes
Objective 1.3	Improve communication between the County and towns as to recommendations to evacuate or not to evacuate areas
Objective 2.1	Monitor the effectiveness of the Base Flood Elevation (BFE) as needed.
Objective 3.1	Improve storm water drainage system in vulnerable areas
Objective 4.1	Educate the public on how to minimize flood damage to their property.
Objective 4.2	Increase knowledge, understanding, and awareness of the National Flood Insurance Program (NFIP)

Mitigation Actions
In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Pamlico County to the effects of natural hazards. In general, all of these activities fall into one of the following broad categories of mitigation techniques. The Committee reviewed each goal and developed action items to fulfill each stated goal and objective.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

Available Mitigation Techniques

Prevention
Preventative activities are intended to keep hazard problems from getting worse. They are particularly effective in reducing a community's future vulnerability, especially in

areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

Planning and Zoning

- Open space preservation
- Floodplain regulations
- Storm water management
- Drainage system maintenance
- Capital improvements programming
- Shoreline / riverine / fault zone setbacks

Property Protection

Property protection measures protect existing structures by modifying the building to withstand hazardous events, or removing structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (i.e., wind proofing, flood proofing, seismic design standards, etc.)
- Insurance
- Safe rooms

Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their mitigate functions. Such areas include floodplains, wetlands, and dunes. Parks, recreation, or conservation agencies and organizations often implement these measures. Examples include:

- Floodplain protection
- Beach and dune preservation
- Riparian buffers
- Fire resistant landscaping
- Fuel breaks
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Levees / dikes / floodwalls / seawalls
- Diversions / detention / retention
- Channel modification

- Beach nourishment
- Storm sewers

Emergency Services
Although not typically considered a "mitigation technique," emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Sandbagging for flood protection
- Installing shutters for wind protection

Public Information and Awareness
Public information and awareness activities are used to advise residents, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children education
- Hazard expositions

Mitigation Actions
The mitigation action steps proposed for Pamlico County to undertake are listed on the pages that follow. Each has been designed to achieve the goals and objectives listed in this plan. Each proposed action step includes:

1 – The appropriate category for the mitigation technique;
2 – The hazard it is designed to mitigate;
3 – The objective(s) it is intended to help achieve;
4 – Some general background information;
5 – The person responsible for the implementation of the action;
6 – A deadline in which the action is to be implemented;
7 – The funding source for the action; and
8 – The priority given to the action.

Action #1

Monitor and review damage assessments in the County during and after future events to evaluate the effectiveness of the increased BFE.

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	2.1
Background	Pamlico County currently requires new construction to be elevated to two (2) feet above Base Flood Elevation (BFE). This increase not only gives property owners additional vertical protection, but also qualifies them for a discount on flood insurance through the National Flood Insurance Program (NFIP). This action is consistent with an action item in the Land Use Plan.
Responsibility	Hazard Mitigation Committee
Deadline	Continuous monitoring, ongoing
Funding Sources	N/A
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #2

Identify vulnerable areas and prioritize the critical drainage ditches

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	Drainage in Pamlico County, mainly because of the flat topography, remains an important issue. This action proposes to identify the areas in the County that are vulnerable to flooding and identify critical drainage ditches. Once the critical drainage ditches are identified, the maintenance of these ditches should be prioritized. By identifying the vulnerable areas and the critical drainage ditches, priorities can be established to better protect these areas.
Responsibility	Hazard Mitigation Committee, North Carolina Department of Transportation
Deadline	June 1, 2010
Funding Sources	County's General Fund
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #3

Explore grant funding for storm water management plans

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	Pamlico County will research potential grant sources in order to create a storm water management plan to highlight and address the County's current storm water drainage needs.
Responsibility	Hazard Mitigation Committee
Deadline	ongoing
Funding Sources	NC Division of Emergency Management
Priority	Medium. This action is: 1) cost effective; and 2) technically feasible.

Action #4

Continue participation in the community service program to clean ditches and petition the State of North Carolina to continue the community service program

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	Pamlico County participates in the community service program, which provides the County with labor to clean ditches, thereby increasing the efficiency of storm water management. With fiscal pressures increasing at the state level, the County wants state legislators and administrators to know that the community service program is vital to the health, safety, and welfare of Pamlico County citizens.
Responsibility	Pamlico County Commissioners
Deadline	Ongoing
Funding Sources	N/A
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #5

Make public aware of the importance of drainage areas and the link to the proliferation of mosquitoes

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1, 4.1, 4.2
Background	Because of the flat topography and many acres of low lying areas, Pamlico County has a large population of mosquitoes during certain times of the year. Mosquitoes breed in areas of standing and/or stagnant water, so the need to promote awareness regarding storm water drainage is great. By involving the public (i.e., encouraging people to report problem drainage areas to the County), the County can better address the issue of standing water and mosquito proliferation.
Responsibility	Hazard Mitigation Committee
Deadline	ongoing
Funding Sources	County's General Fund
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #6

Coordinate with the State Forest Service / NC DOT concerning drainage ditches and tree-cutting activities

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	The forestry industry is important to Pamlico County. Because of the scale of forestry in the County, there are numerous instances where trucks hauling cut trees from a job site drive over the drainage ditches and damage the ditch cuts. This damage, in turn, greatly affects storm water drainage.
Responsibility	Pamlico County Manager
Deadline	ongoing
Funding Sources	N/A
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #7

Meet with insurance agents, realtors, and bankers to coordinate public education activities

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire
Objective(s) Addressed	4.1, 4.2
Background	When purchasing property, many prospective homeowners' only contact the officials that are familiar with natural hazard protection, insurance agents, realtors, and bankers. The County wishes to get these groups of professionals involved in the public education and awareness programs, to better serve the public and to make potential homeowners aware of the hazards to which they are susceptible.
Responsibility	Floodplain Coordinator
Deadline	ongoing
Funding Sources	Research potential grant funding
Priority	Medium This action is: 1) cost effective; and 2) technically feasible.

Action #8

Create a publication or brochure in order to communicate the potential of natural hazards in the area to potential landowners and residents

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.1, 4.2
Background	The publication will contain important information related to the County's susceptibility to potential natural hazards that occur in the area. It should also contain information pertaining to flood zones as well as storm surge potential displayed graphically on a map. The publication also will contain information related to the Coastal Area Management Act (CAMA).
Responsibility	Floodplain Coordinator, County Planner
Deadline	ongoing
Funding Sources	N/A
Priority	Medium This action is: 1) cost effective; and 2) technically feasible.

Action #9

Pursue placemats containing information about flood zones

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.1, 4.2
Background	In conjunction with Action #8, by distributing placemats to area restaurants containing flood zone information and information about storm surge associated with hurricanes, tropical storms, and nor'easters would be an original and unique method of communicating information to the public. Also, the low cost of printing (on recycled paper) the informative placemats makes this action cost-beneficial.
Responsibility	Floodplain Coordinator, County Planner
Deadline	ongoing
Funding Sources	NC Division of Emergency Management, FEMA
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #10

Meet with schools, churches and other community organizations to disseminate information

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.1, 4.2
Background	Communicating with churches and schools is a great way of disseminating information and promoting awareness of a subject. Hazard mitigation efforts should be taken to these arenas. By working with these organizations, the County can more effectively communicate information and solicit public input.
Responsibility	Floodplain Coordinator
Deadline	Ongoing, immediately following an event
Funding Sources	County's General Fund
Priority	Medium This action is: 1) cost effective; and 2) technically feasible.

Action #11

Recommend annual review by towns of storm readiness coordinated by County Emergency Management

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes
Objective(s) Addressed	1.3
Background	An annual review of storm readiness will keep the municipalities' plans regarding hazard mitigation updated and current. This review can be coordinated at the County Emergency Management level, and will allow the County to more proficient in the delivery of emergency services in the event of a natural hazard.
Responsibility	Pamlico County Emergency Management
Deadline	Ongoing
Funding Sources	County's General Fund
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #12

Support State efforts to develop guidelines to reduce nonpoint source water pollution that originates from new construction and use of fertilizers

Category	Natural Resource Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning
Objective(s) Addressed	1.1
Background	Nonpoint source water pollution has been an ongoing problem in the Neuse River Basin. The Neuse River and its water quality are vital to the quality of life and the economy in Pamlico County. Reducing the amount of nitrogen and phosphorus has been shown to increase water quality and usability. Additionally, new construction is often a source of sediment transport into the river. Guidelines would help make people aware of the water quality concerns and promote better water quality, improving the quality of life in Pamlico County.
Responsibility	NC Division of Water Quality
Deadline	July 1, 2006
Funding Sources	NC Division of Emergency Management, NC Division of Coastal Management, NC Division of Water Quality
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #13

Seek upstream river monitoring by the NC Division of Water Quality

Category	Natural Resource Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning
Objective(s) Addressed	1.1
Background	Nonpoint source water quality has been and will continue to be a significant concern in Pamlico County and the Neuse River. Studies have indicated that upstream development can contribute to decreased water quality in the Neuse River, as it runs along the southern border of Pamlico County. Upstream river monitoring will give the County a source of information about water quality problems upstream, and potentially allow the County to act proactively or to disseminate information pertaining to expected decreases in water quality.
Responsibility	Hazard Mitigation Committee
Deadline	ongoing
Funding Sources	N/A
Priority	Medium This action is: 1) environmentally sound; and 2) technically feasible.

Action #14

Map preferable secondary roads to be used for evacuation and place more evacuation route signs on roads throughout the County

Category	Emergency Services
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.2, 1.3
Background	All of the major roads in Pamlico County have "EVACUATION ROUTE" signs, depicting the route for citizens to take in case of an impending natural hazard. The secondary routes, however, are not marked as evacuation routes. The Hazard Mitigation Committee identified the marking of secondary as a need, to assist county residents and visitors with evacuation.
Responsibility	Pamlico County Emergency Management
Deadline	June 1, 2010
Funding Sources	County's General Fund, NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #15

Develop flood marker program and pursue a grant to fund the program

Category	Public Information
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Coastal Erosion
Objective(s) Addressed	4.2
Background	A flood marker program is a series of strategically placed poles or signs in heavily visited areas of the County that would inform citizens and visitors of flood elevations during various categories of storms. For example, a Category 1 hurricane could cause a 5-7' storm surge. The sign or pole would identify the various flood elevations and inform the public of the potential for flooding from storm surge.
Responsibility	Floodplain Administrator
Deadline	June 1, 2011
Funding Sources	NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #16

Develop the County's floodplain map for public dissemination in the brochure to be developed in Action #8 of this plan

Category	Public Information
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.2
Background	Knowledge of the location of flood zones is key to improving safety during a storm event. If citizens are aware of what flood zone they live in, and the expected flood elevation for a particular storm event, they can better make decisions regarding whether or not to evacuate or not. This action step proposes to create a user-friendly flood zone map that can be easily interpreted by most people. This step further proposes to circulate this flood map in different manners, including placement on the County's website.
Responsibility	Floodplain Administrator
Deadline	June 1, 2010
Funding Sources	County's General Fund, NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #17

Research methods to address repetitive loss properties

Category	Preventive
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.2
Background	Various techniques for mitigating or addressing repetitive loss properties exist, including but not limited to the Increased Cost Compliance program, acquisition, elevation, and relocation.
Responsibility	Floodplain Administrator
Deadline	ongoing
Funding Sources	County's General Fund, NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #18

Request the NC Climate Office in their Storm Events Database to include nor'easters, wildfires, and severe winter storms (damage estimates by county) in the list of various types of storms

Category	Public Information and Awareness
Hazard	Nor'easters, Wildfires, Severe Winter Storms
Objective(s) Addressed	4.1
Background	Data on nor'easters, wildfires, and severe winter storms historically affecting Pamlico County. This request will ensure the North Carolina counties will be able to include previous occurrences of these natural hazards in future updates of the hazard mitigation plan
Responsibility	Floodplain Administrator
Deadline	July 2011
Funding Sources	NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

SECTION 5: PLAN MAINTENANCE

The plan maintenance section of this document details the formal process that will ensure that the Pamlico County Hazard Mitigation Plan remains an active and relevant document.

Plan Maintenance Process

The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing a plan revision every five years. This section describes how Pamlico County and its municipalities will integrate public participation throughout the plan maintenance process.

Plan Adoption

The Pamlico County Commissioners will be responsible for adopting the Pamlico County Hazard Mitigation Plan. This governing body has the authority to promote sound public policy regarding natural hazards. Once the plan has been adopted, the Floodplain Administrator will be responsible for submitting it to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management. NC Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Pamlico County will remain eligible for Hazard Mitigation Grant Program funds.

Additionally, each municipality in Pamlico County will need to formally adopt this document. This plan will include a copy of the executed resolution formally adopted by the governing bodies of each of the jurisdictions requesting approval of the plan.

Monitoring, Evaluating and Updating the Plan

Implementation of the activities recommended by this plan will be monitored so the deadlines will be met. The Pamlico County Planner will be responsible for the tracking the activities outlined in this plan. Each person assigned a responsibility in this plan shall report to the County Planner by the last day of each quarter (March 31, June 30, September 30, December 31). The County Planner will report to the County Commissioners once each year, on the first week of hurricane season (June 1st). The report should review progress and recommend changes as needed. Also, the report will be released to the media and made available to the public.

When preparing the report to the County Commissioners, the County Planner will refer to the following questions to assess the effectiveness and appropriateness of the hazard mitigation plan:

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

- Did agencies and other partners participate as agreed?

If changes are necessary, the Hazard Mitigation Planning Committee will reconvene during the first week of June to receive a presentation on the progress of the plan. If convened, the Hazard Mitigation Planning Committee will prepare an evaluation report that will be submitted to the County Commissioners.

Implementation through Existing Programs
Pamlico County will incorporate the hazard mitigation goals and actions into other policy statements, and will address conflicts with other policies where possible. As with any planning process, the Hazard Mitigation Plan will be referenced when developing or updating other planning documents, such as the CAMA Land Use Plan and any other official documents regarding land use and emergency management. The main means of integration will take place through implementation of the actions listed in the plan.

Continued Public Involvement
Pamlico County is dedicated to involving the public directly in review and updates of the Hazard Mitigation Plan. Any amendment to the Hazard Mitigation Plan must be made by the County Commissioners. A public hearing will be required before any consideration of an amendment to the plan can be made. Pamlico County's current outreach methods, sent to property owners located in the 100-year floodplain, will be used to disseminate hazard mitigation information to citizens and property owners.

Additionally, properties located outside of known hazard zones will be informed of susceptibility to natural hazards through one of the County's numerous actions items addressing public information dissemination and involvement.

Copies of the plan will be available at the public library and at the Building and Inspections Office. Public comments and suggestions are always welcome, and should be addressed to the Floodplain Administrator. Also, the Floodplain Administrator will work toward displaying the plan on a website. The County does not presently have this capability.

Pamlico County will review and revise this plan every five years (as required by FEMA), and it will be resubmitted to the State Hazard Mitigation Office for review and approval. Changes to the County's portion of this multi-jurisdictional plan may change the policies and programs of the participating individual municipalities. Any substantial change to the plan will require participation from the individual municipalities, in the form of representation on all future meetings of the Hazard Mitigation Planning Committee, and the municipalities' subsequent adoption of the amended plan. Conversely, the policies and programs formulated by an individual municipality participating in this multi-jurisdictional plan may change those policies and programs at anytime without consultation with or the approval of any of the other jurisdictions.

SECTION 6: HURRICANES AND NOR'EASTERS

The primary source of flooding in Pamlico County is wind driven surge generated in the Atlantic Ocean by tropical storms and hurricanes. The surge propagates into Pamlico Sound and further propagates into Bay River, Big Porpoise Bay, Jones Bay, Kershaw Creek, Middle Bay, Morris Creek, Pamlico River, Pamlico Sound, Smith Creek, Thomas Creek, and Trent Creek. Flooding from heavy rainfall occurs on Greens Creek, Kershaw Creek, Morris Creek, North Prong Bay River, Smith Creek, South Prong Bay River, Thomas Creek, and Trent Creek. High winds associated with tropical storms can also produce extremely high waves that create higher than normal surge. The wave action during a tidal flood can be more damaging than the higher water level. Not all storms that pass close to Pamlico County produce extremely high surge. Similarly, storms that produce flooding conditions in one area may not necessarily produce flooding conditions in other parts of Pamlico County.

The contribution from nor'easters to the overall storm surge elevation in the Pamlico County area was found to be insignificant compared to hurricanes; therefore, only the effects of hurricane and tropical storm induced surge elevations were considered. In other areas of North Carolina, particularly the Outer Banks area of the northern part of the state, nor'easters were found to provide a significant contribution to the overall storm surge.

These storms present three types of hazards: wind, storm surge, and rain. The following is a description of these three hazards:

<u>High winds</u>: Storms with wind speed ranging from over 74 mph up to 155 + mph are classified as hurricanes. These winds can blow roofs off of buildings and destroy mobile homes. All evacuation activities must be completed prior to onshore winds reaching tropical storm status (40 mph).

A related problem is tornadoes spawned by hurricanes, which will develop fast, inflict tremendous destruction, and vanish as fast as they appeared.

<u>Storm surge</u>: This is a great dome of water caused by winds and pressure differences in the air. Areas are flooded by water that can be up to 18 feet higher than normal sea levels, although such a surge is not likely in Pamlico County. In Pamlico County, the maximum storm surge is experienced north of where the hurricane's eye makes landfall. This surge especially when coupled with the breaking waves causes great destruction and accounts for most hurricane deaths.

<u>Rainfall</u>: Six to twelve inches of rainfall generally accompanies a hurricane. This causes flooding of streets before and during the worst part of a hurricane and river flooding inland after the storm passes. Flooding can be aggravated where drainage-ways are blocked by hurricane-blown debris.

Characteristics of Coastal Storms:

Storm Surge: The most dangerous and damaging feature of a coastal storm is storm surge. Storm surges are large waves of ocean water that sweep across coastlines where a storm makes landfall. The greatest height of the water is when the storm is more intense. The higher the storm surge the greater the damage to the coastline. Storm surges inundate coastal areas, wash out dunes, cause backwater flooding in rivers, and can flood streets and buildings in coastal communities. Storm surge areas can be mapped by the probability of storm surge occurrences using Sea, Lake, and Overland Surges from Hurricanes modeling (SLOSH) (see discussion of SLOSH).

Storm Tide: If a storm surge occurs at the same time as high tide, the water height will be even greater. Storm tide is the combination of the storm surge and the normal tide. For example, a 15-foot storm surge along with the normal 2-foot high tide creates a storm tide of 17 feet.

Inland Flooding: In recent years, most deaths related to hurricane and tropical storm activity have been the result of inland flooding. As hurricanes move across land bringing torrential rains and backwater flooding from the ocean, rivers and streams overflow. Hurricanes and tropical storms have been known to cause floods whose elevations represent greater than a 500-year probability of occurring in inland areas.

Water Force: During hurricanes and other coastal storms, coastal areas will experience flooding with velocity or “wave action,” defined as areas subject to receiving waves on top of the rising water from coastal flooding. The velocity and the force of the water make flooding even more destructive. The velocity and wave action knocks over buildings, move debris, erode dunes, scour the shoreline, and displace and redeposit sand. Areas subject to coastal flooding with velocity are designated as V or VE zones on FIRMs.

Wind Velocity: The higher the wind speed, the greater the damage. Hurricane force winds can travel hundreds of miles inland, creating substantial damage to buildings, vegetation, and infrastructure.

Coastal Erosion: Coastal erosion is the wearing away of coastal land. It is commonly used to describe the horizontal retreat of the shoreline along the ocean. Erosion is considered a function of larger processes of shoreline change, which includes erosion and accretion. Erosion results when more sediment is lost along a particular shoreline than is re-deposited by the water body. Accretion results when more sediment is deposited along a particular shoreline than is lost. When these two processes are balanced, the shoreline is said to be stable.

Hurricanes

Hurricanes are tropical cyclones with winds that exceed 74 miles per hour (mph) and circulate counter-clockwise about their centers in the Northern Hemisphere (clockwise in the Southern Hemisphere). Hurricanes are formed from simple complexes of

thunderstorms, commonly known as convection. However, these thunderstorms can only grow to hurricane strength with cooperation from both the ocean and the atmosphere. First, the ocean water itself must be warmer than 81 degrees Fahrenheit. The heat and moisture from this warm water is ultimately the source of energy for hurricanes. Hurricanes will weaken rapidly when they travel over land or colder ocean waters -- locations with insufficient heat and/or moisture.

Using SLOSH Maps

SLOSH is a computerized model run by the National Hurricane Center to estimate storm surge heights and winds resulting from historical, hypothetical, or predicted hurricanes by taking into account pressure, size, forward speed, track and winds. The SLOSH boundaries may differ from the base flood boundary on the FIRM. The SLOSH flood areas are determined by compositing the model surge values from 200-300 hypothetical hurricanes. The point of a hurricane's landfall is crucial to determining which areas will be inundated by the storm surge. Where the hurricane forecast track is inaccurate, SLOSH model results will be inaccurate. As a result, the SLOSH model is best used for defining the potential maximum surge for a location.

High Risk Factors

The following conditions may exacerbate the effects of coastal storms:

Coastal shape: Concave shoreline sections sustain more damage because the water is driven into a confined area by the advancing storm, thus increasing storm surge height and storm surge flooding.

Storm center velocity: The slower the storm moves, the greater the damage. The worst possible situation is a storm that stalls along a coast, through several high tides.

Nature of coast: Damage is most severe on low-lying barrier island shorelines because they are easily over washed by storm waves and storm surge.

Previous storm damage: A coast weakened by even a previous minor storm may be subject to proportionately greater damage in a subsequent storm.

Human activity: With increased development, property damage increases, multiplying the amount of floating debris available to damage or destroy other structures.

Hardened sand and flood control structures: Structures such as groins, jetties, or seawalls exacerbate localized scour and erosion and can be undermined, resulting in collapse (particularly seawalls).

Hurricane intensity is measured using the Saffir-Simpson Scale, ranging from 1 (minimal) to 5 (catastrophic). The scale categorizes hurricane intensity linearly based upon maximum sustained winds; minimum barometric pressure and storm surge potential, which are combined to estimate the potential flooding and damage to property

given a hurricane's estimated intensity (see Saffir-Simpson Scale and Damage tables below).

Some hurricanes are characterized primarily by water — a rainy or wet hurricane (such as Hurricane Floyd, which landed in North Carolina in 1999) — while others are primarily characterized by wind — a windy or dry hurricane (such as Hurricane Fran in 1996). Wet hurricanes can flood both coastal and inland areas, even as the storm dissipates in wind strength, while windy hurricanes primarily affect coastal areas with their high winds and storm surge. Inland communities will be most conceded with the flooding aspect of coastal storms. Torrential rains of even Category One hurricanes and tropical storms have been known to cause 500-year floods (which have a 0.2% chance of occurring each year) and greater flooding in inland communities. Pamlico County can determine how severe the high winds, storm surge and erosion could be from their storm surge inundation map.

Hurricane Categories (Saffir-Simpson scale)

Category 1: Winds 74-95 mph. Some examples are damage to shrubbery, trees, unanchored mobile homes, and some signs with a storm surge 5-7 feet above normal. Some damage to piers, exposed small craft, and low-lying buildings.

Category 2: Winds 96-110 mph. Some examples are some trees blown down, major damage to mobile homes and signs, some damage to building roofs and windows with a storm surge 8-10 feet. Other examples are considerable damage to piers, marinas, small craft, and low-lying buildings.

Category 3: Winds 111-130 mph. Some examples are large trees and many signs blown down, mobile homes substantially damaged, some structural damage to small buildings with a storm surge 11-12 feet. In addition to water damage, structures severely damaged by waves and floating debris.

Category 4: Winds 131-155 mph. Some examples are all signs blown down, mobile homes destroyed, extensive damage to roofing, windows, and doors with a storm surge of 13-18 feet above normal water levels.

Category 5: Winds over 155 mph. Some complete building failures, major damage to structures less than 15 feet above sea level within 500 yards of shore with a storm surge over 18 feet.

Historical Occurrences
North Carolina has a long and notorious history of destruction by hurricanes. Ever since the first expeditions to Roanoke Island in 1586, hurricanes are recorded to have caused tremendous damage to the state. The state's protruding coastline makes it a favorable target for tropical cyclones that curve northward in the western Atlantic Ocean.

According to the State Climate Office of North Carolina, 39 tropical cyclones have made direct landfall in North Carolina since 1886. Of these, 10 were tropical storms, 23 were minor hurricanes and 6 were major hurricanes. Another 56 tropical cyclones have impacted North Carolina since 1886 by either entering from another state or by passing in proximity to the coast but remaining offshore. Of these, 41 were tropical storms, 8 were minor hurricanes and 7 were major hurricanes. According to the State Climate Office, the coast of North Carolina can expect to receive a land falling tropical cyclone once every four years and be affected by one every 1.3 years.

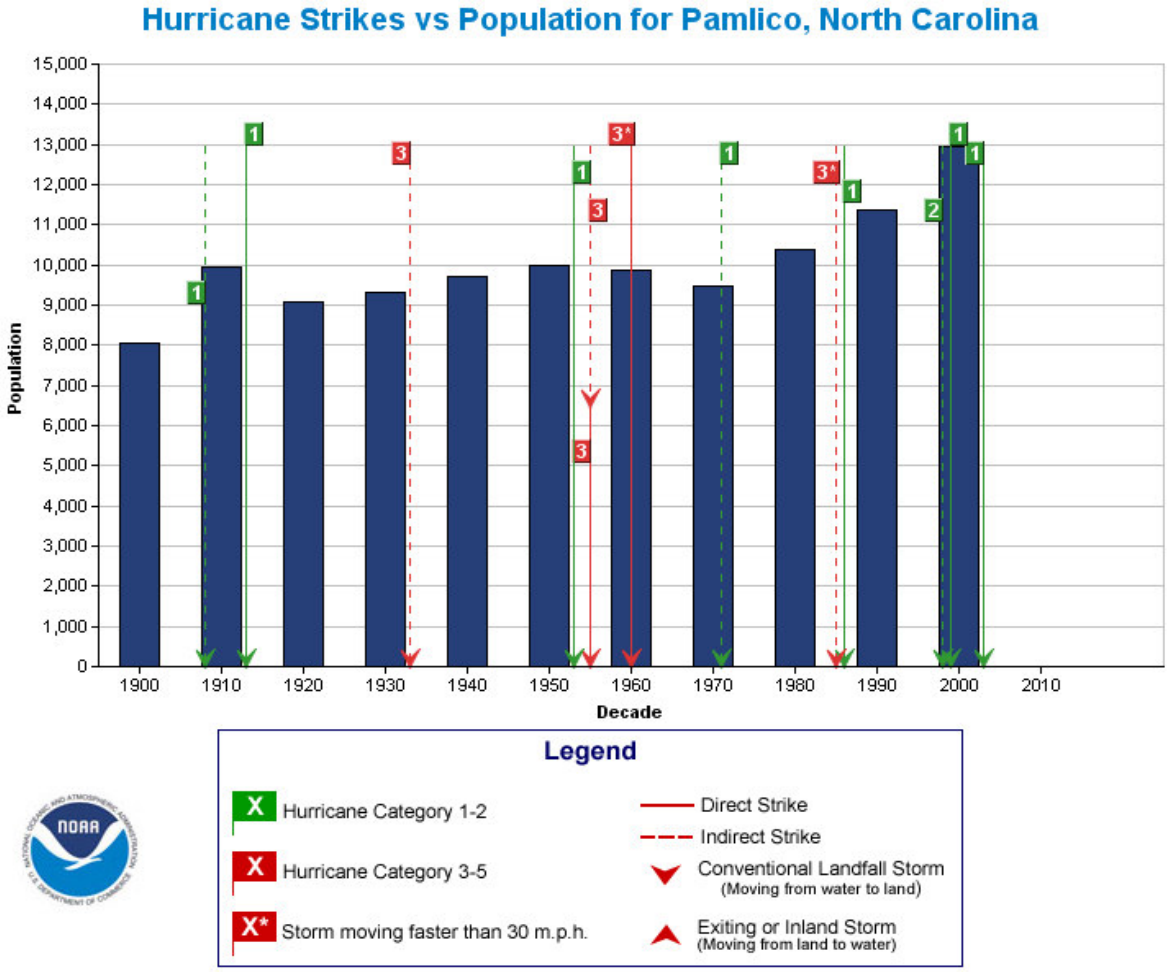
Table 7 lists all hurricanes and tropical storms that have made direct landfall in North Carolina since 1800. Approximate location of landfall and estimated wind speed and storm surge at landfall are also listed.

Table 7. Direct Land falling Hurricanes and Tropical Storms in North Carolina Since 1886

Approximate Date of Landfall	Storm Name	Saffir-Simpson Intensity at Landfall	Approximate Location of Landfall	Estimated Wind Speed (kt)	Storm Surge (ft)	Estimated Damages in Pamlico County
8/31/06	Ernesto	Trop. Storm	Onlsow/Carteret	60	2-3	$22,200,000
9/13/05	Ophelia	1	Atlantic Beach	85	6-8	$11,500,000
8/14/04	Charley	Trop. Storm	Onslow County	60	2-3	$2,900,000
8/03/04	Alex	2	Ocracoke	100	4-6	
9/18/03	Isabel	2	Core Banks	100	6-8	$14,300,000
9/16/99	Floyd	2	Topsail Island	95		$413,600,000
9/4/99	Dennis	Trop. Storm	Core Banks	60		$39,900,000
8/26/98	Bonnie	3	Cape Fear	100	6-8	$117,000,000
9/6/96	Fran	3	Cape Fear	100	8-12	
7/13/96	Bertha	2	Topsail Beach	90	5	$127,000,000
6/20/96	Arthur	Trop. Storm	Morehead	35		
8/18/86	Charley	1	Morehead	70		
9/26/85	Gloria	2	Hatteras	90	6-8	
9/9/84	Diana	1	Long Beach	80	5-6	
9/30/71	Ginger	1	Atlantic Beach	65	4	
8/27/71	Doria	Trop. Storm	Atlantic Beach	55		
10/16/64	Isabell	1	Morehead	65		
9/11/60	Donna	2	Carolina Beach	95	6-8	
9/19/55	Ione	2	Salter Path	90	3-10	
8/17/55	Diane	1	Carolina Beach	75	5-9	
8/12/55	Connie	1	Cape Lookout	70	7	
10/15/54	Hazel	4	NC/SC border	125	10-20	$28,400
8/30/54	Carol	2	Hatteras	85		
8/13/53	Barbara	2	Cape Lookout	90		
7/6/46		Trop. Storm	Wilmington	60		
6/25/45		Trop. Storm	Hatteras	55		
8/1/44		1	Southport	80		
9/18/36		2	Hatteras	85		
9/16/33		3	Ocracoke	100		

Approximate Date of Landfall	Storm Name	Saffir-Simpson Intensity at Landfall	Approximate Location of Landfall	Estimated Wind Speed (kt)	Storm Surge (ft)	Estimated Damages in Pamlico County
8/23/33		2	Hatteras	85		
12/2/25		1	Wilmington	65		
9/22/20		1	Topsail Beach	65		
8/25/1918		Trop. Storm	Morehead	50		
9/6/1916		Trop. Storm	Southport	35		
9/3/1913		1	Hatteras	70	10	
7/31/1908		2	Morehead	85		
11/13/1904		3	Hatteras	100		
7/11/1901		1	Hatteras	65		
10/13/1900		Trop. Storm	Hatteras			
10/31/1899		1	Wrightsville	80	8	
8/16/1899		4	Hatteras	115	4-10	
10/26/1897		Trop. Storm	Hatteras	55		
10/22/1893		Trop. Storm	Hatteras	50		

Figure 7.



Hurricane Strike Data: National Hurricane Center
Population Data: U.S. Census Bureau
NOTE: Population values may be missing in some counties, particularly for earlier periods. This is most often attributable to the fact that the county had not yet been established.
NOTE: There may be discrepancies between the strike data shown in this chart and the HURDAT strike data used in the Historical Hurricanes Tracks Tool. The National Hurricane Center is currently updating the strike data used for these charts. For more information visit http://www.aoml.noaa.gov/hrd/data_sub/re_anal.html
NOTE: Population data is current as of 2000 U.S. Census. X-axis on graphs depict years through 2010 to illustrate storms that have occurred from 2000-2006.

Figure 8.

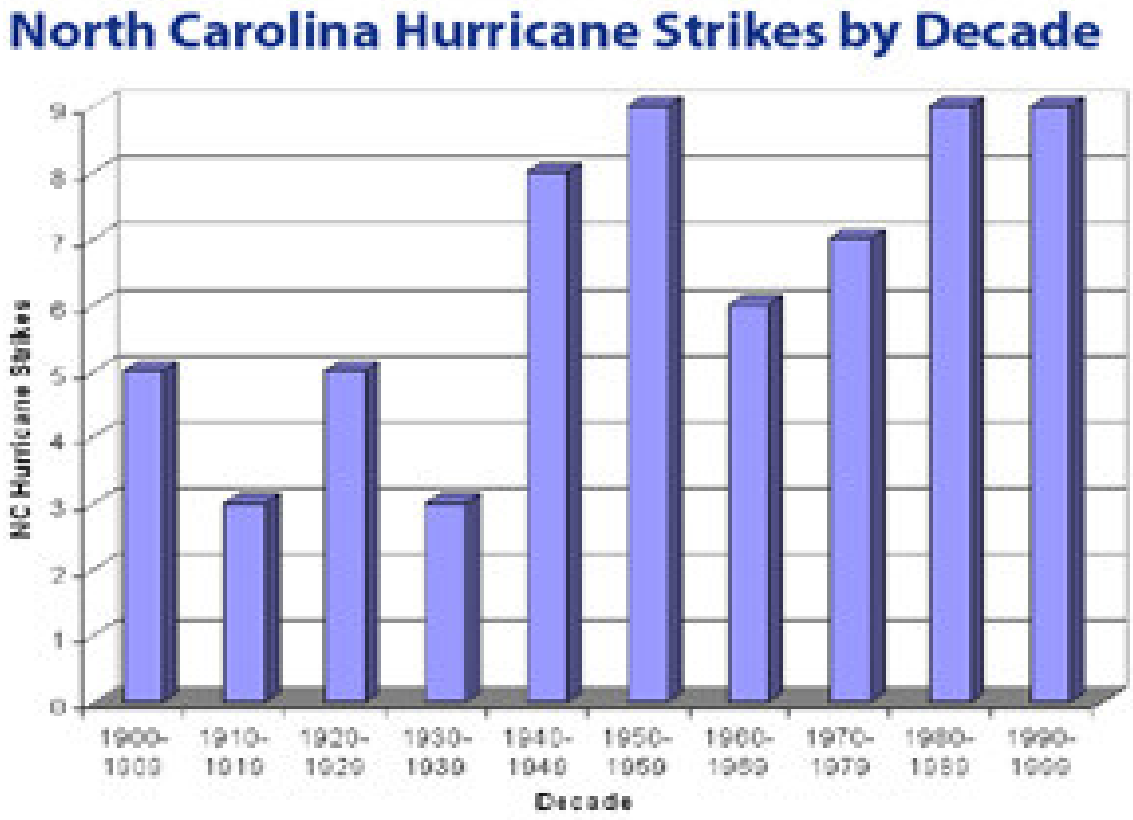
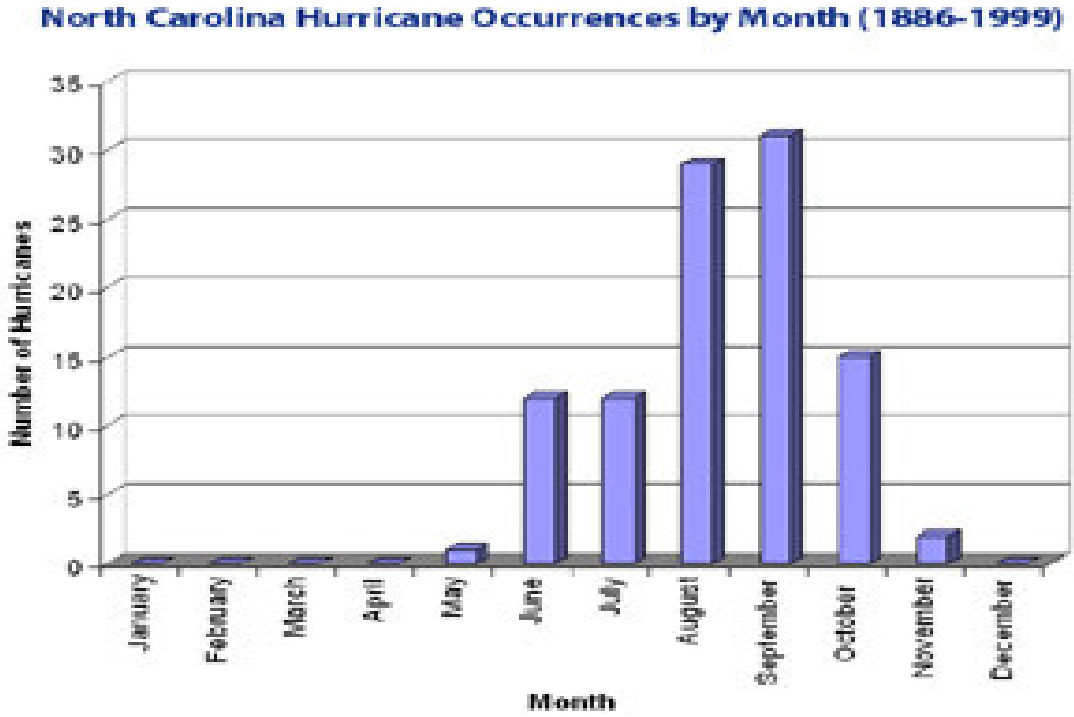


Figure 9.



Source: North Carolina State Climate Office Website

Figure 10. Probability of a Named Storm

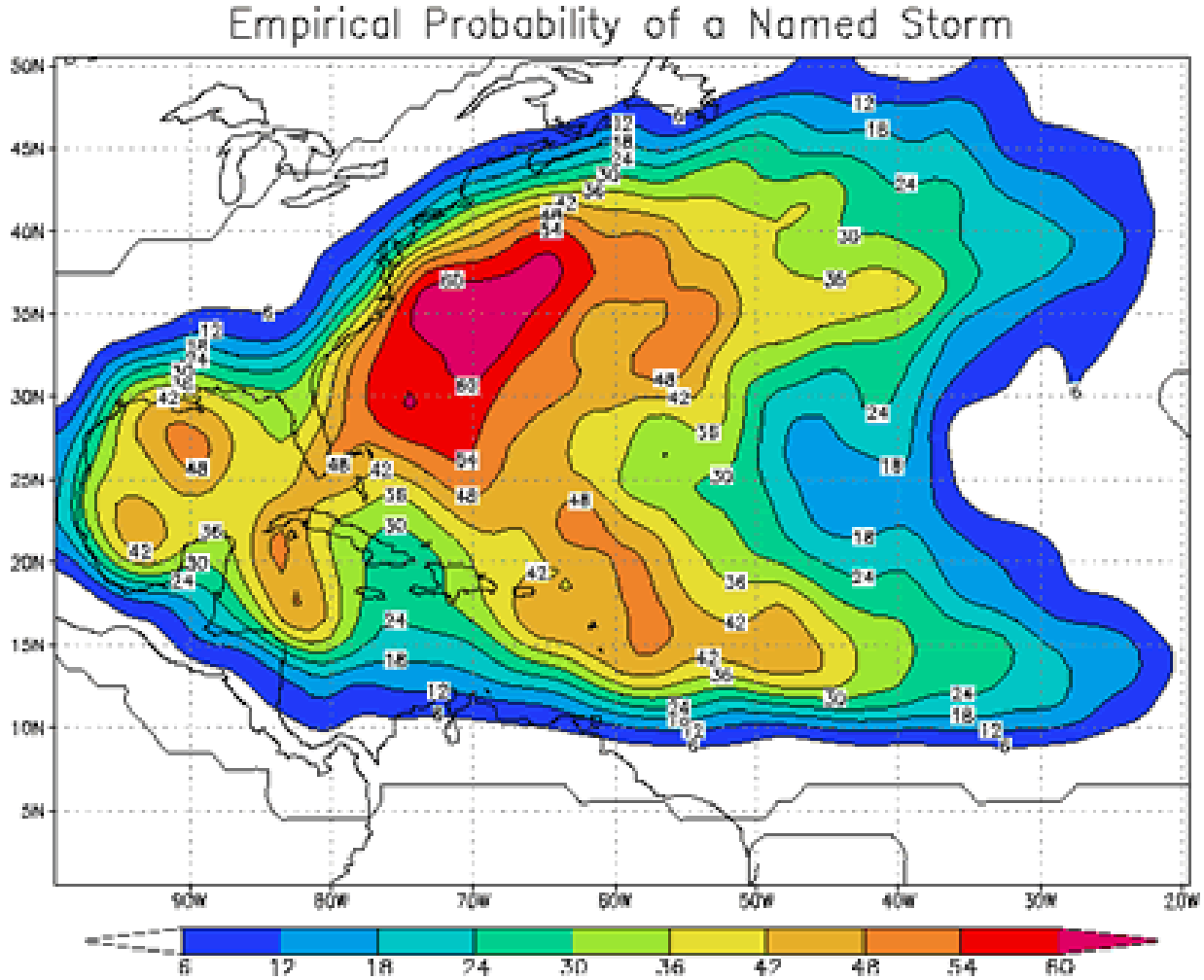


Figure 6 shows for any particular location what the chance is that a tropical storm or hurricane will affect the area sometime during the Atlantic hurricane season. The figure was created by Todd Kimberlain of the National Oceanic and Atmospheric Administration's Hurricane Research Division. In creating the graphic, he utilities the years of 1944 to 199 in the analysis and counted hits when a storm or hurricane was within about 100 miles (165 km) of each location. The figure shows that Pamlico County faces a 36-48% annual chance that a tropical storm or hurricane will affect the area.

Pamlico County has a storied past with hurricanes and tropical storms. While detailed damage data is not available for most of the 20th century, the period from 1993-2009 is well chronicled. Hurricane Floyd, in 1999, is the most costly hurricane in Pamlico County's history with $413,600,000 in damages. Hurricane Bertha in 1996 was the second most costly hurricane, with $127,000,000 in damages. Hurricane Bonnie, a slow-moving storm in 1998, is the third most costly hurricane in Pamlico County with $117,000,000 in damages.

Source: http://www.nc-climate.ncsu.edu/products_old/wx/events/events.php

Nor'easters

Although nor'easters are listed as a major threat to Pamlico County, the effects of a nor'easter are not felt with the same severity as they are in parts of the state that border the open ocean. Still, nor'easters can bring high winds and storm surges to Pamlico County. Unlike a hurricane that may pass over a coastal location in less than a day, a nor'easter, or a severe extra tropical cyclone, may blow from the same direction and over long distances for several days. Although nor'easters are more diffuse and less intense than hurricanes, they occur more frequently and cover larger areas and longer coastal reaches at one time. Nor'easters form near the Atlantic coast, generally over coastal areas where there is a large temperature gradient in wintertime between air over a cold landmass and air over relatively warm ocean waters. The presence of the Gulf Stream off the eastern seaboard in the winter season acts to dramatically enhance the surface horizontal temperature gradients within the coastal zone. This is particularly true off the North Carolina coastline where, on average, the Gulf Stream is closest to land north of 32 degrees latitude. During winter offshore cold periods, these horizontal temperature gradients can result in rapid and intense destabilization of the atmosphere directly above and shoreward of the Gulf Stream. This air mass modification or conditioning period often precedes wintertime coastal extra-tropical cyclone development.

When jet stream disturbances (which create lift) move over this temperature gradient, surface low-pressure systems can form. Because of the abundant moisture from the ocean and temperature gradient of the coastal front, these storms can develop explosively.

It is the temperature structure of the continental air mass and the position of the temperature gradient along the Gulf Stream that drives this cyclone development. As a low pressure deepens, winds and waves can uninhibitedly increase and cause serious damage to coastal areas as the storm generally moves to the northeast.

The coastal counties of North Carolina are most vulnerable to the impacts of nor'easters. Since the storms typically make landfall with less warning than hurricanes (due to their rapid formation right along the coast), residents may be caught at home unprepared. On the other hand, nor'easters typically occur during the off-season when fewer non-residents are visiting the coast. As with hurricanes, vulnerability is proportional to structural strength, with mobile homes particularly vulnerable.

A scale, similar to the Saffir-Simpson scale for hurricanes, has been developed by Robert Davis and Robert Dolan (1993). Although beach erosion and dune erosion by nor'easters is not a serious threat to Pamlico County as it is in other coastal areas, this scale gives you an idea of the intensity of various nor'easters. The Dolan-Davis scale is shown below.

Table 9. Dolan-Davis Nor'easter Scale

Storm Class	Beach Erosion	Dune Erosion	Over wash	Property Damage	Duration (measured in number of tidal cycles)
1 (Weak)	Minor changes	None	No	No	Up to 1 tide
2 (Moderate)	Modest; mostly to lower beach	Minor	No	Modest	Up to 2 tides
3 (Significant)	Erosion extends across beach	Can be significant	No	Loss of many structures at local level	2 to 3 tides
4 (Severe)	Severe beach erosion and recession	Severe dune erosion or destruction	On low beaches	Loss of structures at community-scale	3 to 4 tides
5 (Extreme)	Extreme beach erosion	Dunes destroyed over extensive areas	Massive in sheets and channels	Extensive at regional-scale; millions of dollars	4 to 5 tides

Table 10. Nor'easters from 1942 to 1984

Storm Class	Number of Storms	Percentage of Total
1 – Weak	670	49.7
2 – Moderate	340	25.2
3 – Significant	298	22.1
4 – Severe	32	2.4
5 - Extreme	7	0.1

Source: Dolan, Robert and Robert E. Davis. "An Intensity Scale for Atlantic Coast Northeast Storms." Journal of Coastal Research. Vol. 8:4, pp. 840-853.

Unfortunately, no data source exists, which details or describes damages in Pamlico County due to nor'easters. This data limitation precludes information on previous occurrences. Pamlico County will include, as a mitigation action, a request to the NC Climate Office's Storm Events Database (http://www.nc-climate.ncsu.edu/monitoring/events.html) to include "nor'easters" in the list of various types of storms.

SECTION 7: WILDFIRE

Wildfire

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the air for miles around. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires. A wild land fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines and similar facilities. An Urban-Wild land Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wild land or vegetative fuels.

People start more than four out of every five wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires.

North Carolina, with its large amount of wooded areas, is included among the states with a high risk of wildfire. As development has spread into areas of North Carolina which were previously rural, new residents have been relatively unaware of the hazards posed by wildfires and have used highly flammable material for constructing buildings. This has increased the threat of loss of life and property, and has also resulted in a greater population of people less prepared to cope with wildfire hazards. The southern coastal plain is particularly vulnerable to the wildfire hazard. The mountain region has also experienced wildfires.

Wildfire behavior is based on three primary factors: fuel, topography and weather:

Fuel: The type and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. The continuity of fuels, expressed in both horizontal and vertical components is also a factor, in that it expresses the pattern of vegetative growth and open areas.

Topography (slope) is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. In general terms, the steeper the slope of the land, the faster a fire can spread up the slope. A topographic map can help identify areas of the community with slopes less than 40%, between 41% and 60%, and greater than 61%, corresponding to low, moderate and steep gradients relative to the spread of wildfires.

Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity, and wind (both short and long term) affect the severity and duration of wildfires. Critical Fire Weather Frequency is a set of weather conditions, usually a combination of low relative humidity and wind, whose effects on fire behavior make control difficult and threaten firefighter safety. The average number of days per year of critical fire weather experienced in the community can be obtained from the local or state fire marshal, forestry department, or department of natural resources. The

National Weather Service or NOAA Websites can help determine past weather conditions.

To determine fire hazard severity for the community, the Fire Hazard Severity Table below was used. There may be more than one classification in the community depending on the degrees of the slope and fuel models.

Table 11. Fire Hazard Severity

Fuel Classification	Critical Fire Weather Frequency								
	<1 Day / Year			2 to 7 Days/Year			>8 Days/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 inches in diameter
M = Moderate Hazard; **H** = High Hazard; **E** = Extreme Hazard
(Source: FEMA Report No. 386-2)

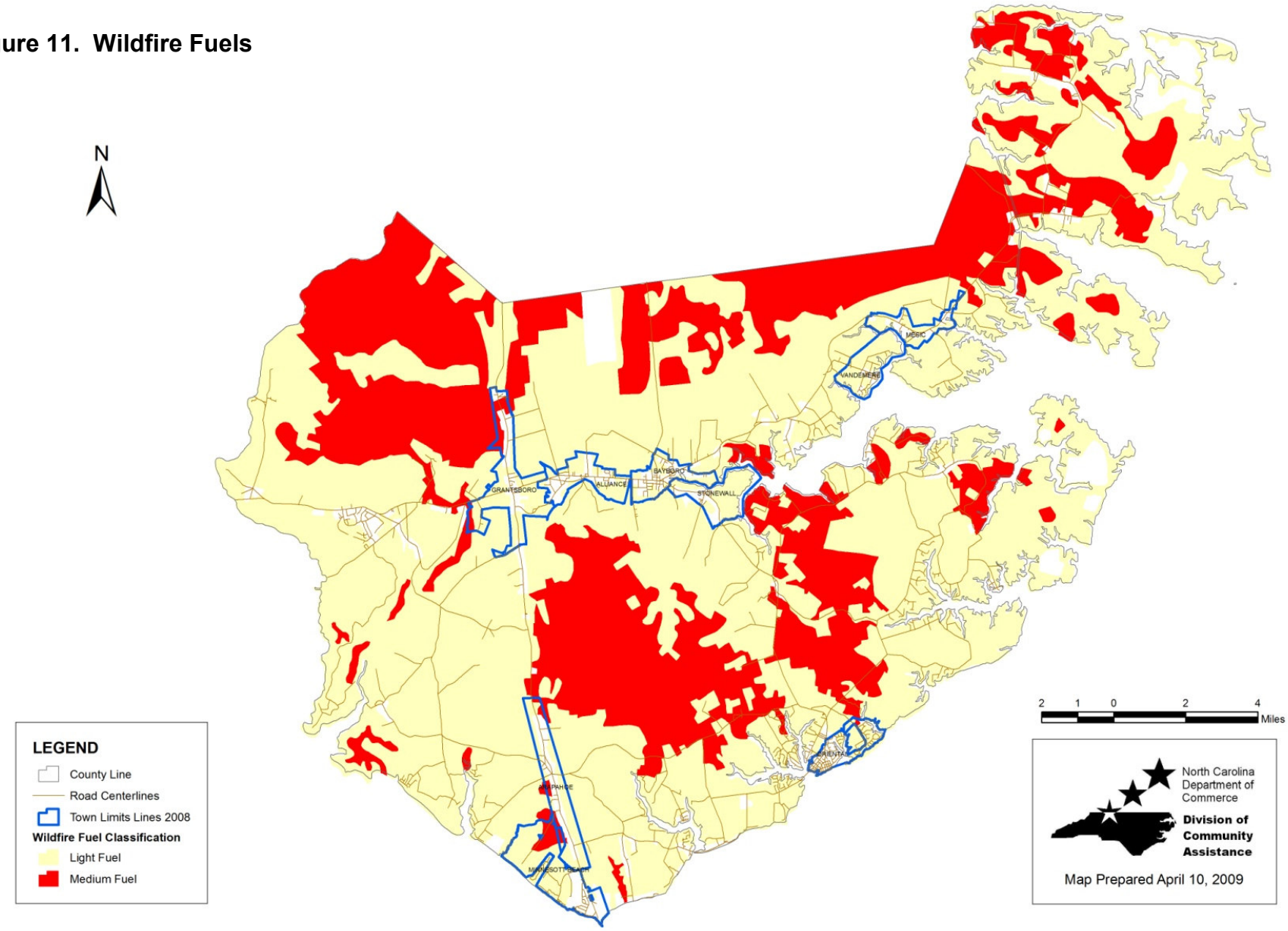
In Pamlico County, the types of vegetative fuels are cropland and pasture, forested lands, wetlands, and rangeland. The following table is a vulnerability assessment of the county, in regard to wildfire.

Unfortunately, no data source exists that detail or describes damages in Pamlico County due to wildfires. This data limitation precludes information on previous occurrences. Pamlico County will include, as a mitigation action, a request to the NC Climate Office's Storm Events Database (http://www.nc-climate.ncsu.edu/monitoring/events.html) to include "wildfires" in the list of various types of storms.

Table 12. Wildfire Vulnerability

Type of Fuel	Fuel Classification	Acres
Cropland and pasture	Light	45,684
Deciduous forest	Light	982
Evergreen forest	Light	45,507
Mixed forest	Light	27,424
Non-forested wetlands	Light	25,074
Forested wetlands	Medium	62,910
Shrub and brush rangeland	Medium	1,973

Figure 11. Wildfire Fuels



SECTION 8: THUNDERSTORMS

Thunderstorms

Thunderstorms are the result of convection in the atmosphere. They are typically the by-product of atmospheric instability, which promotes the vigorous rising of air parcels that form cumulus and, eventually, the cumulonimbus (thunderstorm) cloud. Instability can be caused either by surface heating or upper-troposphere (~50,000 feet) divergence of air (rising air parcels can also result from air flows over mountainous areas). Generally, the former “air mass” thunderstorms form on warm-season afternoons and are not severe. The latter “dynamically-driven” thunderstorms generally form in association with a cold front or other regional-scaled atmospheric disturbance. These storms can become severe, producing strong winds, frequent lightning, hail, downbursts and even tornadoes.

A typical thunderstorm may be three miles wide at its base, rise to between 40,000 to 60,000 feet in the troposphere, and contain half a million tons of condensed water. Conglomerations of thunderstorms along cold fronts (with squall lines) can extend for hundreds of miles. Thunderstorms contain tremendous amounts of energy derived from condensation of water. The half million tons of condensed water release 300 trillion calories of energy, equivalent to about 100 million kilowatt-hours of electricity, or several Hiroshima-sized atomic bombs.

According to the National Weather service, a severe thunderstorm is one that produces tornadoes, hail 0.75 inches or more in diameter, or winds of 50 knots (58 mph) or more. Structural wind damage may imply the occurrence of a severe thunderstorm. Hail, formed by the accretion of super cooled liquid water on ice particles in a thunderstorm updraft, can pose a serious threat to agriculture and exposed objects. Likewise, strong winds can potentially wreak havoc on fragile or flimsy structures, or yield secondary damage through the downing of trees. Lightning associated with thunderstorms poses a threat to people and animals in unsheltered areas. The tornado, however, is by far the greatest natural hazard threat from a severe thunderstorm.

Thunderstorms are common throughout North Carolina and have occurred in all months of the year. Thunderstorm-related deaths and injuries in North Carolina peak during July and August. Visitors fishing on the open waters, golfing or swimming at the beach are at risk.

Table 13. Severe Thunderstorm Events and Damage

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 PAMLICO	06/13/1974	1330	Tstm Wind	0 kts.	0	0	0	0
2 PAMLICO	07/11/1981	1050	Tstm Wind	0 kts.	0	0	0	0
3 Near Bayboro	08/05/1994	1647	Thunderstorm Winds	0 kts.	0	0	0	0
4 Whortonsville	10/14/1994	2227	Thunderstorms Winds	N/A	0	0	0	0
5 Stonewall	11/07/1995	1915	Thunderstorm Winds	0 kts.	0	0	1K	0
6 Grantsboro	04/26/1996	02:14 PM	Tstm Wind	0 kts.	0	0	0	0
7 Bayboro	06/14/1997	02:45 PM	Tstm Wind	50 kts.	0	0	0	0
8 Vandemere	01/08/1998	11:00 AM	Tstm Wind	0 kts.	0	0	5K	0
9 Reelsboro	05/23/1998	12:20 PM	Tstm Wind	61 kts.	0	0	0	0
10 Oriental	03/12/2000	03:20 AM	Tstm Wind	61 kts.	0	0	0	0
11 Grantsboro	05/22/2000	09:28 PM	Tstm Wind	67 kts.	0	0	20K	0
12 Florence	08/16/2000	11:15 PM	Tstm Wind	0 kts.	0	0	30K	0
13 Olympia	08/18/2000	06:55 PM	Tstm Wind	52 kts.	0	0	0	0
14 Grantsboro	05/28/2001	11:10 AM	Tstm Wind	62 kts.	0	0	0	0
15 Vandemere	07/10/2002	03:07 PM	Tstm Wind	62 kts.	0	0	0	0
16 Pamlico	03/07/2004	09:30 PM	High Wind	60 kts.	0	0	29K	0
17 Arapahoe	06/11/2004	11:00 PM	Tstm Wind	50 kts.	0	0	0	0
18 Countywide	03/08/2005	11:42 AM	Tstm Wind	55 kts.	0	0	10K	0

19 Alliance	06/12/2007	16:45 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
20 Merritt	08/10/2007	17:20 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
21 Whortonville	03/05/2008	01:50 AM	Thunderstorm Wind	56 kts.	0	0	0K	0K
22 Kennel Beach	07/08/2008	15:39 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
23 Scotts Store	06/26/2009	15:27 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
TOTALS:					0	0	95K	0

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Source: http://www.nc-climate.ncsu.edu/products_old/wx/events/events.php

Over the past 40 years, Pamlico County has experienced a number of severe thunderstorm events. The most damaging event was in Florence in 1980 ($30,000), followed by an event that impacted the entire county in 2004 ($29,000 in damages). Fortunately, no deaths have been reported in Pamlico County due to thunderstorms in the past 40 years. Data prior to 1974 is not available.

SECTION 9: COASTAL EROSION

In assessing the erosion hazard in Pamlico County, it is important to realize that there is a temporal or time aspect associated with the average rate at which a shoreline is either eroding or accreting. Over a long-term period (years), a shoreline is considered eroding, accreting, or stable. When evaluating coastal erosion in the community, it is important to focus on the long-term erosion situation. However, it is important to understand that storms can erode a shoreline that is, over the long-term, classified as accreting, and vice versa.

Erosion is measured as a rate, with respect to either a linear retreat (i.e., feet of shoreline recession per year) or volumetric loss (i.e., cubic yards of eroded sediment per linear foot of shoreline frontage per year). Erosion rates are not uniform, and vary over time at any single location. Annual variations are the result of seasonal changes in wave action and water levels.

Erosion is caused by coastal storms and flood events; changes in the geometry of tidal inlets, river outlets, and bay entrances; man-made structures and human activities such as shore protection structures and dredging; long-term erosion; and local scour around buildings and other structures.

Shoreline erosion is a natural hazard within Pamlico County. Of the county's 348 miles of bay and estuarine shoreline, 54.7 miles are considered to be experiencing serious erosion problems. These areas are identified on Figure 8. The following defines the nine shoreline areas experiencing serious erosion problems (source: Pamlico County 1992 Land Use Plan Update).

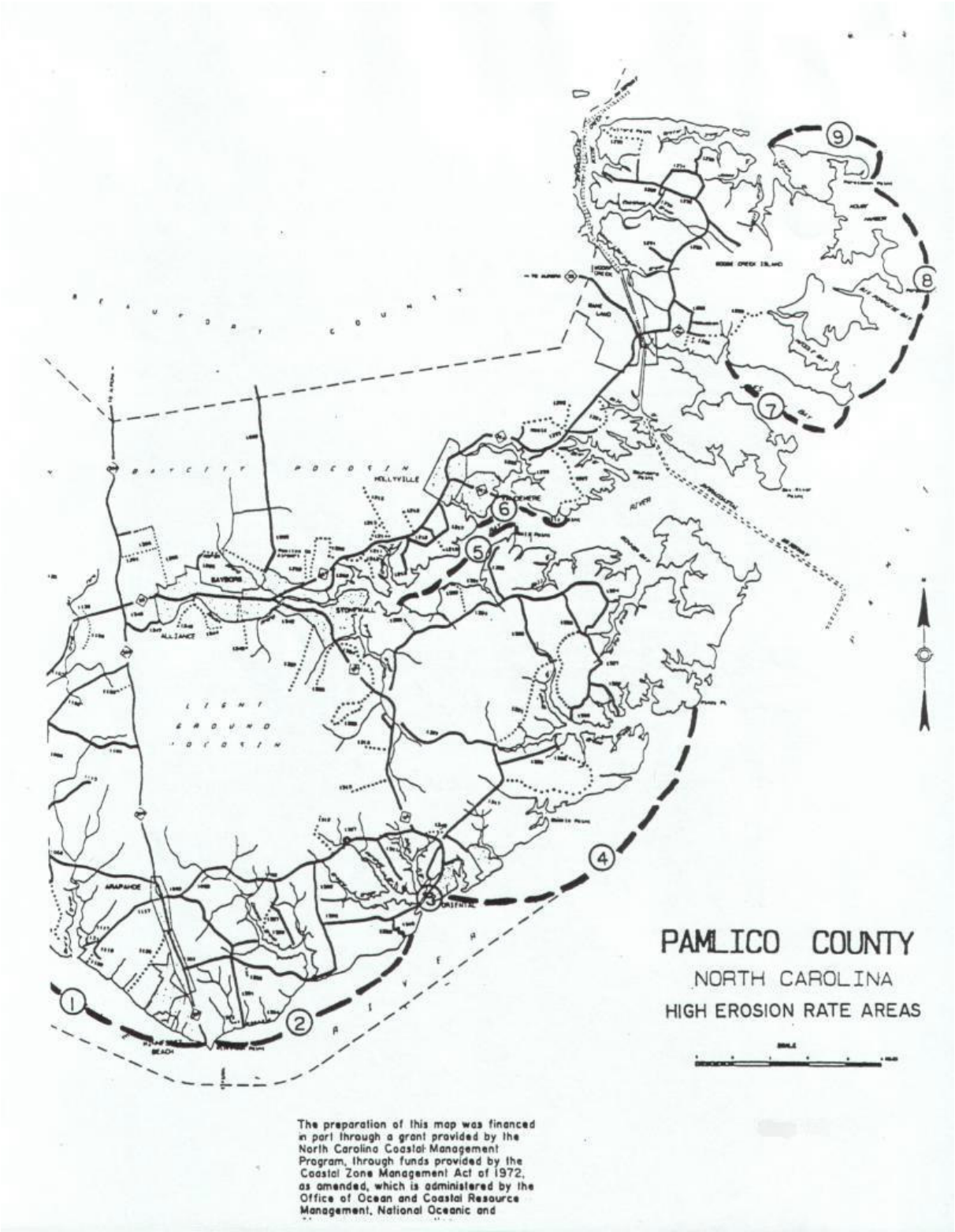
Reach No. 1	Average width lost to erosion	74.8 feet
	Average height of bank	14.3 feet
	Length of shoreline eroding	6.8 feet
	Length of shoreline accreting	0 miles
	Total length of shoreline	6.8 miles
Reach No. 2	Average width lost to erosion	159.2 feet
	Average height of bank	8.4 feet
	Length of shoreline eroding	7.5 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	7.5 miles
Reach No. 3	Average width lost to erosion	0 feet
	Average height of bank	0 feet
	Length of shoreline eroding	0 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	.5 miles

Reach No. 4	Average width lost to erosion	237.1 feet
	Average height of bank	4.8 feet
	Length of shoreline eroding	7.1 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	7.1 miles
Reach No. 5	Average width lost to erosion	52 feet
	Average height of bank	4.0 feet
	Length of shoreline eroding	4.4 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	7.1 miles
Reach No. 6	Average width lost to erosion	95.4 feet
	Average height of bank	2.9 feet
	Length of shoreline eroding	2.3 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	2.3 miles
Reach No. 7	Average width lost to erosion	76.3 feet
	Average height of bank	3.8 feet
	Length of shoreline eroding	2.8 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	2.8 miles
Reach No. 8	Average width lost to erosion	85.5 feet
	Average height of bank	3.3 feet
	Length of shoreline eroding	19.4 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	19.5 miles
Reach No. 9	Average width lost to erosion	98.3 feet
	Average height of bank	2.6 feet
	Length of shoreline eroding	3.9 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	3.9 miles

Some areas of rapid erosion may be found along stretches of the Intracoastal Waterway which are caused by boat induced wave action.

Unfortunately, coastal erosion data has not been collected since 1992. Pamlico County will incorporate new data into future updates of the hazard mitigation plan as it becomes available.

Figure 12. Excessive Erosion Areas
Source: Pamlico County 1992 Land Use Plan Update



SECTION 10: TORNADOES

A tornado is a violently rotating column of air extending to the ground. Over water, a tornado is called a *waterspout.* The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of 1 mile wide and 50 miles long.

Tornadoes are among the most unpredictable of weather phenomena. Tornado season runs ordinarily from March through August; however, tornadoes can strike at any time of the year if the essential conditions are present.

Thunderstorms and hurricanes spawn tornadoes when cold air overrides a layer of warm air, causing the warm air to rise rapidly. The winds produced from hurricanes, earthquake-induced fires, and wildfires have been known to produce tornadoes as well.

The nature of tornadoes is that they strike at random. While it is known that some areas of the country experience tornadoes more than others, predicting exactly what parts of the community have a greater chance of being struck by a tornado is difficult. In order to determine the likelihood and potential severity of tornado events in the community, the community should ascertain the number and intensity of tornadoes that have affected the area in the past. Take note, however, that the past number and severity of events is not necessarily a predictor of future occurrences.

Historical Occurrences

The majority of tornadoes (71%) reported in North Carolina have been classified as weak, 28% as strong, and about 1% as violent. Weak tornadoes have caused 3% of North Carolina tornado deaths, similar to the national figure. Strong tornadoes were responsible for 49% of North Carolina deaths (compared to 70% for the nation). Based on state tornado statistics (SERCC, 1996), there have been 941 confirmed tornadoes in the state since 1950. North Carolina ranks 22nd in total number of tornadoes and 18th in tornado deaths for the period 1953-1995.

Although tornadoes have been reported in North Carolina throughout the year, most of them have occurred in the spring, with 13% in March, 11% in April, 22% in May and 14% in June. The most severe tornadoes have also taken place during the spring, with more than half of all F2 or stronger storms occurring in that season.

The mountains and northern piedmont of North Carolina experience the lowest frequency of tornadoes because of less favorable conditions for severe thunderstorm activity in those regions. The highest frequency of tornadoes historically has occurred in the southeastern portion of the State.

Table 14. Tornadoes in Pamlico County

Tornadoes in Pamlico County (1950-July 31, 2003)						
Location	**Date**	**Type**	**Magnitude**	**Deaths**	**Injuries**	**Property Damage**
Pamlico County	9/29/1963	Tornado	F2	0	0	25K
Pamlico County	3/17/1965	Tornado	F3	1	40	2.5M
Pamlico County	3/21/1983	Tornado	F0	0	0	25K
Pamlico County	4/19/1988	Tornado	F1	0	0	25K
Pamlico County	11/28/1988	Tornado	F1	0	5	2.5M
Oriental	8/26/1998	Tornado	F0	0	0	0
Arapahoe	9/15/1999	Funnel Cloud	N/A	0	0	0
Grantsboro	9/15/1999	Tornado	F0	0	0	0
Bayboro	9/15/1999	Tornado	F0	0	0	0
Hobucken	9/15/1999	Tornado	F2	0	0	700K
Bayboro	9/15/1999	Tornado	F0	0	0	0
Bayboro	6/23/04	Tornado	F0	0	0	0
Grantsboro	10/12/04	Tornado	F0	0	0	0
Merritt	10/13/04	Tornado	F0	0	0	0
TOTALS:				1	45	$5,775,000

Source: National Climatic Data Center

Since 1963, tornadoes in Pamlico County have caused $5,775,000 in damages. The most costly tornadoes in Pamlico County were: 1) a F3 event in 1965 that affected the entire county, resulting in $2,500,000 in damages, 1 death, and 40 injuries; and 2) a F1 event in 1998 that affected much of the county, resulting in $2,500,000 in damages and

injuring 5 persons. These two events make up the majority of the damages in Pamlico County from tornadoes.

Scale
Tornadoes are characterized by damage pattern, FO through F5 on the Fujita-Pearson Tornado Scale. The table below shows the tornado category, expected damages, and corresponding wind speed.

Table 15. Fujita-Pearson Tornado Scale

F-Scale	Damage	Winds (mph)	Path Length (miles)	Mean Width (miles)
F0 (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	≥ 100	> 1.0

SECTION 11: MOSQUITOES

Mosquitoes also affect the entire county. While not typically included in hazard mitigation discussions, mosquitoes can be a nuisance in Pamlico County.

The life cycle of a mosquito can vary from one to several weeks depending upon the species (the adult, mated females of some species can survive the winter in cool, damp places until spring, when they will lay their eggs and die.) The females lay their eggs in water and the larva and pupa stages live entirely in water. During the late summer and early fall, Pamlico County receives some of the greatest rainfall totals of the year, providing ample breeding grounds for mosquitoes.

Since the mosquito hazard is unique to Pamlico County, there is no available data depicting previous occurrences in the county.

SECTION 12: LANDSLIDES

Common throughout the mountainous Appalachian region, landslides are described as downward movement of a slope and materials under the force of gravity. The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways), and natural factors (geology, precipitation, and topography).

Mudflows (or debris flows) are flows of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt, changing the earth into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. Other types of landslides include: rock slides, slumps, mudslides, and earth flows. All of these differ in terms of content and flow.

Landslides occur when masses of rock, earth, or debris move down a slope. Therefore, gravity acting on an overly steep slope is the primary cause of a landslide. They are activated by storms, fires, and by human modifications to the land. New landslides can result from heavy rainstorms, earthquakes, and various human activities.

The best predictor of future landslides is past landslides because they tend to occur in the same places. Existing or old landslides may be found in the following areas:

- On or at the base of slopes;
- In or at the base of minor drainage hollows;
- At the base or top of an old fill slope;
- At the base or top of a steep cut slope; or
- Developed hillsides where leach field septic systems are used.

The following conditions may exacerbate the effects of landslides:

<u>Erosion</u>: Erosion caused by rivers, glaciers, or ocean waves created by overly steep slopes.

<u>Unstable Slopes</u>: Rock and soil slopes are weakened through saturation by snowmelt or heavy rains.

<u>Earthquakes</u>: The shaking from earthquakes creates stress that makes weak slopes fail.

<u>Vibrations</u>: Machinery, traffic, blasting, and even thunder may cause vibrations that trigger failure of weak slopes.

Increase of Load: Weight of rain/snow, fills, vegetation, stockpiling of rock or ore from waste piles, or from man-made structures may cause weak slopes to fail.

Hydrologic Factors: Rain, high water tables, little or no ground cover, and numerous freeze/thaw cycles may cause weak slopes to fail.

Human Activity: These include development activities such as cutting and filling along roads and removal of forest vegetation. Such activities are capable of greatly altering slope form and ground water conditions which can cause weak slopes to fail.

Removal of Lateral and Underlying Support: Erosion, previous slides, road cuts and quarries can trigger failure of weak slopes.

Increase of Lateral Pressures: Hydraulic pressures, tree roots, crystallization, swelling of clay soil may cause weak slopes to fail.

Regional Tilting: Geologic movements can trigger weak slopes to fail.

The three most useful types of landslide maps are: 1) landslide inventories; 2) landslide susceptibility maps; and 3) landslide hazard maps.

Landslide Inventories: Landslide inventories identify areas that appear to have failed due to landslides, including debris flows and cut-and-fill failures. Detailed inventories depict and classify each landslide and show scarps, zones of depletion and accumulation, active versus inactive slides, geological age, rate of movement, and other pertinent data on the depth and type of materials involved in sliding. Overlaying a geologic map with an inventory map that shows existing landslides can identify specific landslide-prone geologic units. For this reason, a landslide inventory is essential for preparing a landslide susceptibility map.

Landslide Susceptibility Maps: Landslide susceptibility maps depict areas that have the potential for landslides by correlating some of the principal factors that contribute to landslides - steep slopes, geologic units that lose strength when saturated, and poorly drained rock or soil - with the past distribution of landslides. These maps indicate the relative stability of slopes; however, they do not make absolute predictions. More complex maps may include additional information such as slope angle, and drainage.

Landslide Hazard Maps: Landslide hazard maps show the real extent of the threat: where landslides have occurred in the past, where they are likely to occur now, and where they could occur in the future. They contain detailed information on the types of landslides, extent of slope subject to failure, and probable maximum extent of ground movement. These maps can be used to predict the relative degree of hazard in a landslide area.

Landslide Areas in Pamlico County
Because of the relatively flat topography of the area, Pamlico County is not susceptible to landslide. However, there are a few areas along the northern bank of the Neuse River that are characterized by high bluffs at the waters edge. Storms cause elevated water levels and damaging waves in the Neuse River. Breaking waves can overtop existing bulkheads and rip rap. Older bulkheads can be undermined with an associated loss of backfill.

Sinkholes do not threaten Pamlico County.

Since landslides and sinkholes do not threaten Pamlico County, no data regarding previous occurrences exists.

SECTION 13: SEVERE WINTER STORMS

Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, blizzards, freezing rain and ice pellets and extreme cold. Extreme snow events are the most potentially disruptive to society, for they can bring down power lines, trees and lead to roof collapses. All forms of severe winter weather can make traveling treacherous. Severe winter storms are extra-tropical cyclones fueled by strong temperature gradients and an active upper-level jet stream. The winter storms that impact North Carolina generally form in the Gulf of Mexico or off the southeast Atlantic Coast. Few of these storms result in blizzard conditions, defined by the presence of winds in excess of *35* mph, falling and blowing snow, and a maximum temperature of 20^0 Fahrenheit.

While the frequency and magnitude of snow events are highest in the mountains due to elevation, the geographical orientation of the mountains and Piedmont contribute to a regular occurrence of freezing precipitation events (e.g., ice pellets and freezing rain) in the Piedmont. Such ice events (up to and including ice storms) are often the result of cold air damming (CAD). CAD is a 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 (liquid below the melting point of water) or re-freezes. In the former case, super cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet).

The entire state of North Carolina has a likelihood of experiencing severe winter weather. The threat varies by location and by type of storm. Coastal areas typically face their greatest threat from nor'easters and other severe winter coastal storms. These storms can contain strong waves and result in extensive beach erosion and flooding. Freezing rain and ice storms typically occur once every several years at coastal locations and severe snowstorms have been recorded occasionally in coastal areas.

Cold air damming contributes to elevated freezing rain and ice storm events in the Piedmont of North Carolina. These events occur at least as often as moderate or severe snow events in this region.

The mountains of North Carolina usually receive several snowfalls of 4 to 6 inches in a given winter weather season. There has been at least one severe winter storm at some location in the mountains each year for the past several decades. The western area of the state is more likely to experience greater and more frequent snowfalls and blizzards than other locations in the state. The mountains also have the highest number of extreme one-day snowfalls.

Unfortunately, no data source exists that detail or describes damages in Pamlico County due to severe winter storms. While there is statewide data on winter storms, county-specific data is not available. This data limitation precludes information on

previous occurrences within the county's boundaries. Pamlico County will include, as a mitigation action, a request to the NC Climate Office's Storm Events Database (http://www.nc-climate.ncsu.edu/monitoring/events.html) to include county-specific information in the severe winter storm database.

SECTION 14: EARTHQUAKES

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of Earth's tectonic plates. The severity of these effects is dependent on the amount of energy released from the fault or epicenter. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and after just a few seconds can cause massive damage and extensive casualties.

The variables that characterize earthquakes are ground motion, surface faulting, ground failure, and seismic activity.

Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.

Surface faulting is the differential movement of two sides of a fracture - in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.

Liquefaction is the phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength. Lateral spreads develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies. Loss of bearing strength results when the soil supporting structures liquefies. This can cause structures to tip and topple.

Earthquakes are measured in terms of their magnitude and intensity. There are several different scales that are commonly used, including Richter Magnitude, Modified Mercalli Intensity (MMI), Moment Magnitude and Peak Ground Acceleration (PGA), among others.

Magnitude is measured using the Richter scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. Each unit increase in magnitude on the Richter scale corresponds to a ten-fold increase in wave amplitude, or a 244-fold increase in energy.

Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale. It is a twelve-level scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using Roman numerals, with a I corresponding to imperceptible (instrumental) events, IV corresponding to moderate (felt by people awake), to XII for catastrophic (total destruction). A detailed description of the Modified Mercalli Scale of Earthquake Intensity (and its correspondence to the Richter scale) is below.

Earthquakes are relatively infrequent but not uncommon in North Carolina. Epicenters of North Carolina earthquakes are generally concentrated in the active Eastern Tennessee Seismic Zone, which is second in activity in the eastern United States only to the New Madrid Fault.

The Eastern Tennessee Seismic Zone is part of a crescent of moderate seismic activity risk extending from Charleston, South Carolina northwestward into eastern Tennessee and then curving northeastward into central Virginia. While there have not been any earthquakes with a MMI intensity greater than IV since 1928 in this area, it has the potential to produce an earthquake of significant intensity in the future.

North Carolina's vulnerability to earthquakes decreases from west to east in relation to the Eastern Tennessee Seismic Zone. Generally, there are three different zones of seismic risk in North Carolina that correspond to different effective peak velocity-related accelerations of ground movement. The eastern portion of the State faces minimal effects from seismic activity. Locations in the middle and southeastern areas of the State face a moderate hazard from seismic activity, while the area from Mecklenburg County west through the Blue Ridge faces the greatest risk from seismic activity. These different levels of risk correspond to proximity to areas with historical seismic activity and changes in topography.

The steep topography of western North Carolina exacerbates the potential for damage from this area of seismic activity. There could be significant ground movement on steep slopes from seismic activity, which could result in human injuries, damage to property, and road closures, which would add to the difficulty of bringing in relief supplies and fire protection equipment.

An earthquake in eastern North Carolina is unlikely but possible. In 1994, a weak earthquake impacted Pamlico County. Any damage from the event was negligible as no structural damage was reported. That quake registered a 3.4 on the Richter scale of intensity. It is not possible to ascertain the impact of an earthquake in the area; as such estimates would depend strongly upon where the epicenter is located and to how powerful the earthquake event actually is.

Table 16. 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 shelves	<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

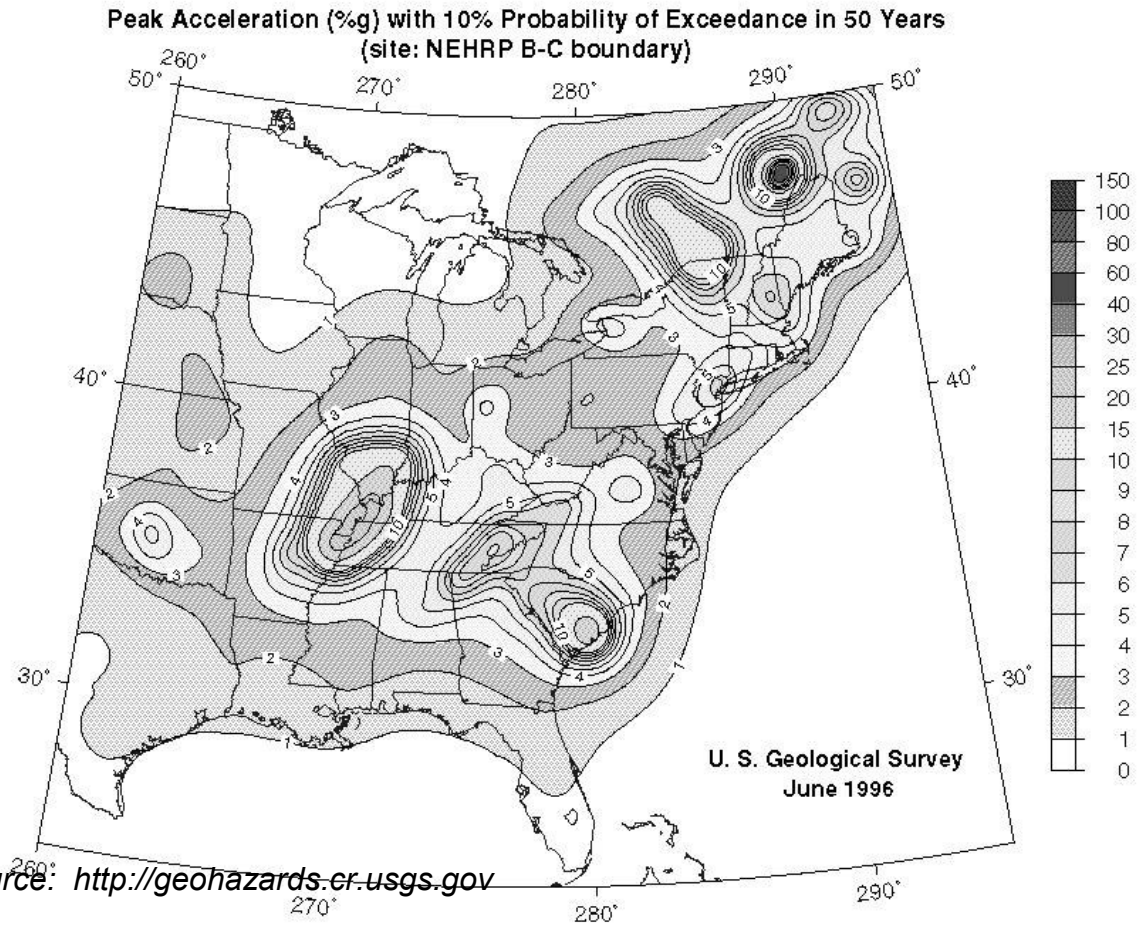
One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. If you're standing on the surface of the earth and drop an object (ignoring wind resistance) it will fall toward the earth faster and faster, until it reaches terminal velocity. This principle is known as acceleration and represents the rate at which speed is increasing. The acceleration due to gravity is often called "g", a term you may have heard associated with roller coasters, rockets, or even stock car racing. The acceleration due to gravity at the earth's surface is 9.8 meters (980 centimeters) per second squared. That means that every second that something falls

toward the surface of earth its velocity increases 9.8 meters per second. A 100% g earthquake is very severe.

An analogy would be if you floor your car's gas pedal and your groceries get smashed against the back of the trunk. The quicker you press on the gas, the more eggs are likely to get broken. That's because the quick acceleration caused the contents of your trunk to shift rapidly and violently, not slowly and smoothly. In fact, the eggs might not have moved at all if you had sped up slowly. The same thing is true in an earthquake. If ground acceleration is rapid, more things tend to break than if the shaking is relatively slow, even if the ground moves the same distance.

The map shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected, the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity.

Figure 13. Peak Acceleration (%g) with 10% Probability of Exceeding in 50 Years



Source: http://geohazards.cr.usgs.gov

SECTION 15: FLOODING

What Is A Flood?

A flood is a natural event for rivers, streams and coastal areas. Excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers, lakes and oceans that are subject to recurring floods. Flooding is the most common hazard in North Carolina, and thousands of households are located within floodplains. Floods can occur at any time of the year, and at any time of day or night. Most injuries and deaths occur when people are swept away by flood currents, often when attempting to traverse floodwaters in a vehicle. Most property damage results from inundation by sediment-filled water, or by debris in floodwaters that acts as "battering rams."

Floods generally fall into two *categories: flashfloods,* the product of heavy localized precipitation in a short period over a given location, or caused by a dam break or levee failure; and *general floods,* which can occur in riverine, coastal, and urban settings. There are also areas in North Carolina that are subject to long-term or permanent inundation.

Flash Flooding: Flash floods occur within a few minutes or hours of heavy amounts of rainfall, from a dam or levee failure, or from a sudden release of water held by an ice jam. In North Carolina, most flash flooding is caused by slow-moving thunderstorms, repeated thunderstorms in a local area, or by heavy rains from hurricanes and tropical storms. Areas subject to rapid floodwater inundation pose special threats to life and property because there is insufficient time for warning, evacuation, emergency flood proofing, or other protective measures. Flash floods can destroy buildings and bridges, uproot trees, and scour out new drainage channels. Heavy rains that produce flash floods can also trigger mudslides. Suddenness is a serious problem in the following areas:

- Steep rivers and streams in mountainous or hilly areas subject to sudden rainfall and rapid runoff;
- Areas with steep slopes and little or no vegetative ground cover;
- Areas behind dams or levees subject to failure or overtopping;
- Barrier islands and other areas along the coast which may be subject to relatively rapid hurricane storm surge; and
- Urban areas where much of the ground is covered by impervious surfaces, or where fixed drainage channels may be unable to contain the runoff that is generated by intense rainfall events.

Riverine Flooding: Riverine flooding occurs when stream flow exceeds the capacity of the normal watercourse, and is a function of precipitation levels and water runoff volumes within the watershed of the stream or river. The severity of a flooding event is determined by a combination of river basin physiographic, local thunderstorm movement, past soil moisture conditions, and the degree of vegetative clearing. Abnormal weather patterns may also contribute to flooding of a local area.

Coastal Flooding: Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall. These conditions are produced by hurricanes during the summer and fall, and nor' Easters and other large coastal storms during the winter and spring. Storm surges may overrun barrier islands and push seawater up coastal rivers and inlets, blocking the downstream flow of inland runoff. Thousands of acres of crops and forestlands may be inundated by both saltwater and freshwater. Escape routes, particularly from barrier islands, may be cut off quickly, stranding residents in flooded areas and hampering rescue efforts.

Urban Flooding: Urban flooding occurs where there has been development within stream floodplains. This is partly a result of the use of waterways for transportation in earlier times. Sites adjacent to rivers and coastal inlets provided convenient places to ship and receive commodities. Floodplains are also attractive for development since they provide flat areas for building. The price of this accessibility and convenience has been increased flooding of the ensuing urban areas. 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.

Long-Term or Permanent Inundation: Unlike the normal riverine or coastal flood situation where flood waters rise and fall relatively quickly, certain areas are subject to long term or essentially permanent flooding. In such areas, structures elevated on pilings or flood proofed are often permanently unusable, and must be abandoned unless there are specially designed for long-term inundation with adequate access and utility services. Long-term flood areas include:

- 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 the land is destroyed;
- Areas subject to subsidence by ground water or oil and gas withdrawals;
- Areas behind dikes and levees where high ground water levels may persist for months or years.

High Risk Factors*:*
The following conditions may exacerbate the effects of floods: impermeable surfaces, steeply sloped watersheds, constrictions, obstructions, debris, contamination, soil saturation, and velocity.

Impermeable surfaces: Excessive amounts of paved areas or other surfaces upstream or in the community can increase the amount and rate of water runoff. Development affects the runoff of storm water when buildings and parking lots replace the natural vegetation, which normally would absorb water. When rain falls in an undeveloped area, as much as 90 percent of it will infiltrate the ground; in a highly developed area, as much as 90 percent of rainfall will run off.

Steeply sloped watersheds: In hilly and mountainous areas, a flood may occur minutes after a heavy rain. These flash floods allow little or no warning time, and are characterized by high velocities.

Constrictions: Re-grading or filling within or on the edge of floodplains obstructs flood flows, backing up floodwaters onto upstream and adjacent properties. It also reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels. This also increases floodwater's velocity downstream of the constriction.

Obstructions: Bridges, culverts and other obstructions can block flood flow and trap debris, causing increased flooding upstream and increased velocity downstream.

Debris: Debris from the watershed, such as trees, rocks, and parts of damaged buildings, increases the hazard posed by moving water. Moving water will float, drag or roll objects, which then act as battering rams that can knock holes in walls and further exacerbate the effects of debris.

Contamination: Few floods have clear floodwater, and the water will pick up whatever was on the ground within the floodplain, such as soil, road oil, farm and lawn chemicals, and animal waste. In addition, if a wastewater treatment plant was inundated, the floodwaters will likely include untreated sewage. Contamination is also caused by the presence of hazardous material storage in the floodplain and in the community, as well as upstream from the community.

Soil saturation: Rainfall in areas already saturated with water will increase the runoff.

Velocity: Flood velocity is the speed of moving water, measured in feet per second. Velocity is determined by slope, waves, and several other factors. The damage potential of flood waters increases dramatically, sometimes exponentially, with velocity. High velocities (greater than 5 feet per second) can erode stream banks, lift buildings off their foundations, and scour away soils around bridge supports and buildings. Water velocity is a major cause of damage in the following areas:

Areas subject to coastal wave action (velocity zones);

- 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;
- Areas behind levees or dams where the protective structure suddenly fails or the design capacity is suddenly exceeded.

Flood Frequency

100-Year Flood

Floodplain managers use the term "100-year flood" to describe a flood that has a one-percent chance of occurring in any given year. Many people find it helpful to think of the 100-year flood risk as a bag of 100 marbles: 99 clear marbles and one black marble. Depending on weather conditions, a community may draw one or more marbles, or floods, from the bag. Most of these—the clear marbles—will be minor floods. It is possible, however, to draw the black marble, representing the 100-year flood, at any time. Because the marbles must be returned to the bag after they are drawn, it is even possible to draw the black marble several times in a row. Just because a community has suffered a 100-year flood *does not* mean that it will not face a flood of similar magnitude for another 99 years.

The location of the 100-year floodplain is often indicated on maps, such as the National Flood Insurance Program's Flood Insurance Rate Maps (FIRMs). In practice, the location of the 100-year flood should be judged in part by community experience as well. Where the water goes in a flood depends on many changing variables, including land use that may not be accurately reflected by a map in every instance.

Flood Insurance Rate Maps (FIRMs)**:**

Fortunately, most of the known floodplains in the United States have been mapped by FEMA, which administers the National Flood Insurance Program (NFIP). When a flood study is completed for the NFIP, the information and maps are assembled into a Flood Insurance Study (FIS). An FIS is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community and include causes of flooding.

The FIS report and associated maps delineate Special Flood Hazard Areas (SFHAs), designate flood risk zones, and establish base flood elevations (BFEs), based on the flood that has a 1% chance of occurring annually, or the 100-year flood. The study may have three components:

- The FIS - Flood Insurance Study text;
- The FIRM - Flood Insurance Rate Map; and
- A separate Flood Boundary and Floodway Map (FBFM) that was issued as a component of the FIS for each community studied prior to 1986. No BFE or flood zone names are shown on the floodway map and people often confuse the white floodway with the white area representing land that is free from flooding. FIS reports published since 1986 have corrected this problem by delineating the floodways as diagonally hatched areas on the FIRMs.

New Flood Maps using LIDAR:

Light Detection and Ranging (LIDAR) is being used by the North Carolina Floodplain Mapping Program to generate digital elevation data. These highly accurate topographic data are then used with other digital information and field data to analyze flood hazards and delineate floodplain boundaries, which are depicted on Flood Insurance Rate Maps. Data Acquisition using Airborne LIDAR sensors emit between 5,000 and 50,000 laser pulses per second in a scanning array. The most common scanning arrays go back and forth sideways relative to the points measured on the ground. The scan angle and flying height determine the average point spacing in the cross-flight direction, whereas the flying height and the airspeed determine the average point spacing in the in-flight direction. Each laser pulse has a pulse width (typically between 0.5 and 1 meter in diameter) and a pulse length (equivalent to the short time lapse between the time the laser pulse was turned on and off). Therefore, each laser pulse is actually like a cylinder of light with diameter and length.

Several technologies operate for LIDAR to survey high-accuracy data points on the ground:

Airborne Global Positioning System (GPS) is needed to determine the x, y, and z coordinates of the moving LIDAR sensor in the air, surveyed relative to one or more GPS base stations. The Inertial Measuring Unit (IMU) directly measures the roll, pitch, and heading of the aircraft, establishing the angular orientation of the LIDAR sensor about the x, y, and z axes in flight. The LIDAR sensor measures the scan angle of the laser pulses. Combined with the IMU data, this establishes the angular orientation of each laser pulse. The LIDAR sensor measures the time needed for each emitted pulse to reflect off the ground (or features thereon) and return to the sensor.

LIDAR sensors are capable of receiving multiple returns, some up to five returns per pulse. This means that a 30-KHz sensor (30,000 pulses per second) must be capable of recording up to 150,000 returns per second. The "first return" recorded by a LIDAR sensor is the first thing hit by a laser pulse. This could be a treetop, roof, ground point, or a bird in flight. When a laser pulse hits a soft target (e.g., a forest canopy), the first return represents the top of that feature. However, a portion of the laser light beam might continue downward below the soft target and hit a tree branch. This would provide a second return. Theoretically, the last return represents the bare earth terrain, but this is sometimes not the case. Some vegetation is so thick that no portion of the laser pulse penetrates to the ground. This is usually the case with sawgrass, mangrove, and dense forests where a person on the ground cannot see the sky through the canopy. LIDAR for the North Carolina Floodplain Mapping Program was flown during "leaf off" conditions to favor the acquisition of bare earth data.

The existing flood maps for Pamlico County were updated since the initial Hazard Mitigation Plan for Pamlico County. LIDAR mapping technology was used. The new flood hazard maps use the following zones:

Coastal:

Zone AE is subject to flooding by the base or 1% annual chance (100-year) flood, and waves less than 3 feet high, (formerly called Zones A1-A30).

Unshaded Zone X is the area of minimal flood risk outside the 500-year floodplain, formerly called Zone C.

Shaded Zone X is subject to flooding by the 0.2% annual chance (500-year) flood, formerly called Zone B.

Zone VE is where wave heights are expected to be 3 feet or more.

Base Flood Elevation (BFE) is the water surface elevation (in feet above the vertical datum shown on the map).

Shoreline Riverine:

Zone A (unnumbered) is the flood hazard area without BFEs.

Cross Section location:

Shaded Zone X is the 0.2% annual chance (500-year) floodplain (formerly Zone B).

Base Flood Elevation (BFE) is the water surface elevation of the base flood at approximate locations (in feet above the vertical datum shown on the map).

Zone AE is the 1% annual chance (100-year) floodplain with BFEs (formerly Zones A1-A30).

The **Floodway** is the cross-hatched area.

Unshaded Zone X is all other areas considered low risk (formerly Zone C)

The primary source of flooding in Pamlico County is wind driven surge generated in the Atlantic Ocean by tropical storms and hurricanes. The surge propagates into Pamlico Sound and further propagates into Bay River, Big Porpoise Bay, Jones Bay, Kershaw Creek, Middle Bay, Morris Creek, Pamlico River, Pamlico Sound, Smith Creek, Thomas Creek, and Trent Creek. Flooding from heavy rainfall occurs on Greens Creek, Kershaw Creek, Morris Creek, North Prong Bay River, Smith Creek, South Prong Bay River, Thomas Creek, and Trent Creek. High winds associated with tropical storms can also produce extremely high waves that create higher than normal surge. The wave

action during a tidal flood can be more damaging than the higher water level. Not all storms that pass close to Pamlico County produce extremely high surge. Similarly, storms that produce flooding conditions in one area may not necessarily produce flooding conditions in other parts of Pamlico County.

The contribution from nor'easters to the overall storm surge elevation in the Pamlico County area was found to be insignificant compared to hurricanes; therefore, only the effects of hurricane and tropical storm induced surge elevations were considered. In other areas of North Carolina, particularly the Outer Banks area of the northern part of the state, nor'easters were found to provide a significant contribution to the overall storm surge.

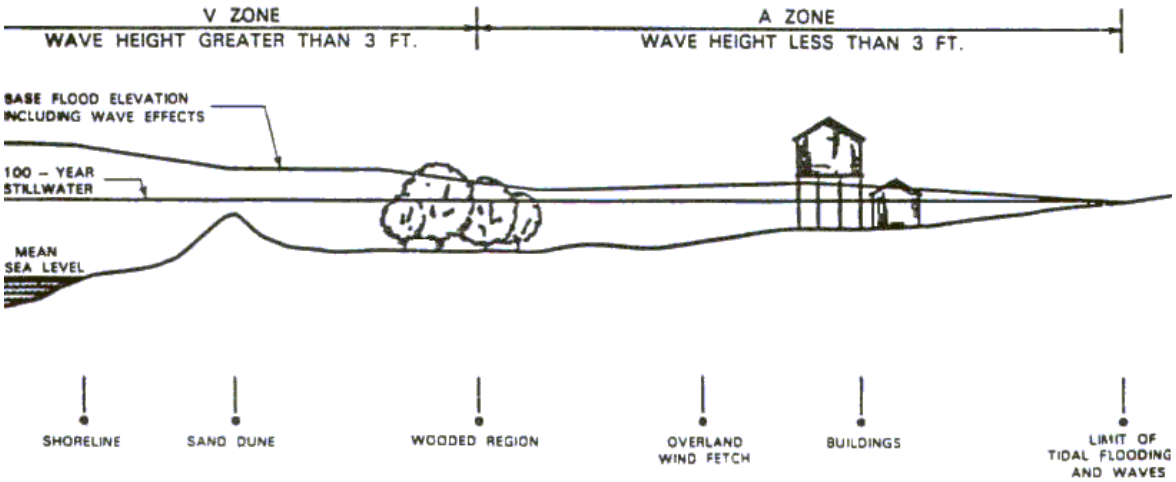
One representation of Pamlico County's flood hazard area is illustrated by the Flood Insurance Rate Map (FIRM). Flood hazard areas in coastal regions are determined using statistical analyses of records of storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. A FIRM usually is issued following a flood risk assessment conducted in connection with the community's conversion to the Regular Phase of the NFIP. If a detailed assessment, termed a Flood Insurance Study, has been performed, the FIRM will show base flood elevations and insurance risk zones in addition to floodplain boundaries. After the effective date of the FIRM, the community's floodplain management ordinance must be in compliance with the appropriate Regular Phase requirements. Actuarial rates, based on the risk zone designations shown on the FIRM, are then applied for newly constructed, substantially improved, and substantially damaged buildings.

Table 17. Base Flood Elevation

Flooding Source and Transect	**Location**	**Stillwater Elevations (Feet NGVD)**				**Zone**	**Base Flood Elevation (Feet NGVD)**
		10-year	50-year	100-year	500-year		
Atlantic Ocean / Pamlico Sound / Pamlico River	Pamlico Sound, including Mouse Harbor	4.5	6.1	6.7	7.7	VE	9-10

Flooding		Stillwater Elevations (Feet NGVD)					Base Flood
Atlantic Ocean / Pamlico Sound / Jones Bay / Middle Bay / Porpoise Bay	Pamlico Sound, including Jones Bay, Middle Bay and Porpoise Bay	5.1	7.0	7.5	8.7	VE	9-11
Atlantic Ocean / Pamlico Sound / Kershaw Creek / Smith Creek / Green's Creek / Morris Creek	Pamlico Sound, including Piney Point and Maw Point	5.2	6.9	7.6	8.7	VE	10-11
Atlantic Ocean / Pamlico Sound / Kershaw Creek / Smith Creek / Green's Creek / Morris Creek	Pamlico Sound, including Bay River Point	5.2	7.2	7.7	9.0	VE	10-11

Figure 14. Flood Insurance Study Schematic



Historical Floods

Coastal North Carolina has a storied hurricane history. The area suffered storms during the 19th century in 1837, 1846, 1856, 1879, 1883, and 1899.

September 16, 1933

This hurricane formed east of the Leeward Islands, moved northwest and then northward, increasing in intensity and striking the coast a little west of Hatteras about 8 a.m. on September 16. It was reported that hardly a building was left standing in several coastal towns. High winds, waves, and the piling up of water in Pamlico and Albemarle Sounds caused 21 deaths. An estimated high tide of 7 feet above mean sea level occurred at Ocracoke.

October 5, 1954 – Hazel

Hurricane Hazel was the most destructive storm in the history of North Carolina. The storm crossed the coast just north of Myrtle Beach, South Carolina, as hurricane force winds hit the Atlantic coast between Georgetown, South Carolina and Cape Lookout. Storm tides (i.e. hurricane surge) devastated the immediate oceanfront of this stretch of coast. Storm surge of 16.6 feet above MSL was observed at Holden Beach and Calabash, North Carolina.

August 12, 1955 – Connie

Hurricane Connie entered the North Carolina coastline close to Cape Lookout. The prolonged pounding of high waves against the coast caused tremendous beach erosion estimated to have been worse than that caused by Hurricane Hazel, a storm that severely affected the southern North Carolina coast in 1954. Water in sounds and near the mouths of rivers was 5 to 8 feet above normal. At Fort Macon, winds of 75 mph, gusts of 100 mph, and a barometric pressure of 962 mb were reported. The storm also brought torrential rains with the maximum rainfall, around 12 inches in 48 hours,

occurring near Morehead City. Total damage throughout the state was estimated at $50 million.

September 19, 1955 – Ione
Hurricane Ione, moving from the south, crossed the North Carolina coast near Salter Path, about 10 miles west of Morehead City. It then slowly curved to the northeast, passing out to sea near the Virginia State Line early on September 20. When Ione entered North Carolina, highest winds were a little over 100 mph. Heavy rains accompanied Ione. At the same time, prolonged easterly winds drove tide water onto the beaches and the sounds to a height of 3 to 10 feet above MSL. The result was inundation of the greatest area of eastern North Carolina ever recorded. At New Bern, the depth of the flood was the greatest ever recorded, about 10.5 feet above mean low water. Forty city blocks were flooded with up to 4 feet of water. A high tide of 6.9 feet NGVD was reported at Atlantic Beach, North Carolina.

September 27, 1958 – Helene
Hurricane Helene was one of the most powerful storms of recent history and, fortunately for North Carolina, the storm center moved up the coast staying well out at sea, on September 26 – 27. Even so, the highest winds of record were noted in Wilmington, with peak gusts of 135 mph. There was some beach erosion due to the seas and tides but this was minimized by the passage of the storm at the time of low astronomical tide. The highest tides on ocean beaches were estimated at 3 to 5 feet above normal. Tides were higher on the southern edge of Pamlico Sound, where a sudden rise following the wind shift as the center passed brought the tides to 7 to 8 feet above normal.

August 31, 1993 – Emily
Hurricane Emily, a Category 3 hurricane, grazed Hatteras Island on August 31, 1993. The eye of the hurricane came within 20 miles of Cape Hatteras, but did not pass over the Outer Banks. When the winds shifted from the northeast to the northwest, water was forced onto the island from Pamlico Sound, washing several homes from their foundations. Wind measuring equipment recorded wind gusts of up to 107 miles per hour.

July 13, 1996 – Bertha
Hurricane Bertha came ashore around the Cape Fear area during the early morning hours of July 13, 1996. This early season storm was a Category 2 when it made landfall, quickly dropping below hurricane strength when it moved inland over eastern North Carolina. Coastal storm surge flood heights, from Florida through New England, ranged from 1 to 4 feet, but values to 5 feet were estimated on the North Carolina coast from Cape Fear to Cape Lookout. A storm surge of 6 feet or a little higher is indicated near Swansboro, where 5 to 6 feet of water was "inside of businesses on the waterfront". The primary effects in North Carolina were to the coastal counties and included storm surge flooding and beach erosion, roof damage, piers washed away, fallen trees, and damage to crops. A survey indicated over 5000 homes damaged, mostly from storm surge. A Federal Emergency Management Agency estimate of the number of persons in South and North Carolina who evacuated is 750,000. Minor wind

damage and flooding also spread along the path of the storm all the way to New England.

September 6, 1996 – Fran
Fran was moving northward near 15 knots when it made landfall on the North Carolina coast. The center moved over the Cape Fear area on the morning of September 6, 1996, but the circulation and radius of maximum winds were large and hurricane force winds likely extended over much of the North Carolina coastal areas of Brunswick, New Hanover, Pender, Onslow and Carteret counties. At landfall, the minimum central pressure is estimated at 954 mb and the maximum sustained surface winds are estimated at 100 knots. The strongest winds likely occurred in streaks within the deep convective areas north and northeast of the center. Storm surge on the North Carolina coast destroyed or seriously damaged numerous beachfront houses. Widespread wind damage to trees and roofs as well as downed power lines occurred as Fran moved inland over North Carolina and Virginia. Extensive flooding was responsible for additional damage in the Carolinas, Virginia, West Virginia, Maryland, Ohio and Pennsylvania. Nearly a half-million tourists and residents were ordered to evacuate the coast in North and South Carolina. Press reports from Reuters News Service stated that 4.5 million people in the Carolinas and Virginia were left without power. The Property Claim Services Division of the American Insurance Services Group reports that Fran caused an estimated $1.6 billion dollars in insured property damage to the United States. This estimate includes $1.275 billion in North Carolina, $20 million in South Carolina, $175 million in Virginia, $50 million in Maryland, $20 million in West Virginia, $40 million in Pennsylvania and $20 million in Ohio. A conservative ratio between total damage and insured property damage, compared to past land falling hurricanes, is two to one. Therefore, the total U.S. damage estimate is $3.2 billion.

August 27, 1998 - Bonnie
Hurricane Bonnie was a Category 2 storm when it came to shore on August 27, 1998, near Cape Fear. Storm tides of 5 to 8 feet above normal were reported mainly in eastern beaches of Brunswick County NC, while a storm surge of 6 feet was reported at Pasquotank Three people died as a consequence of Bonnie. A 12-year old girl was killed when a large tree fell on her home in Currituck County, NC. Another person was caught in rip currents and drowned in Rehoboth Beach, Delaware. The third person died in Cape Cod in a rowboat accident when choppy seas overturned the boat. The last one may have been indirectly related to Bonnie. The Property Claim Services Division of the American Insurance Services Group reports that Bonnie caused an estimated $ 360 million in insured property damage to the United States. This estimate includes $ 240 million in North Carolina, $ 95 million in Georgia, and $ 25 million in South Carolina. A conservative ratio between total damage and insured property damage, compared to past land falling hurricanes, is two to one. Therefore, the total U.S. damage estimate is $ 720 million.

August 30, 1999 – Dennis
Hurricane Dennis's first pass near the coast of the Carolinas on August 30, 1999, caused sustained tropical storm force winds with gusts to hurricane force in coastal

North Carolina and gusts to tropical storm force in coastal South Carolina from Charleston northward. Dennis drifted just east of the North Carolina Outer Banks for several days before coming ashore again on September 4, 1999. Dennis was just below hurricane strength when it made landfall over the Cape Lookout National Seashore just east of Harkers Island, NC. Storm tides of 3 to 5 ft above normal were reported along much of the North Carolina coast on both August 30th and September 4th. Areas along the Neuse River reported tides of 8 to 10 ft above normal tide level on August 30th, while areas along the Pamlico River reported similar values on September 4th. Portions of the South Carolina and southeastern Virginia coast experienced 2 to 4 ft above normal tides during Dennis. Since Dennis meandered off the North Carolina coast for several days, the above normal tides were unusually prolonged. This led to extensive beach erosion along portions of the North Carolina and southeastern Virginia coasts. The Property Claims Services Division of the Insurance Services Office reports insured losses due to Dennis totaled $60 million in North Carolina and Virginia. Press reports indicate that agricultural losses in North Carolina and Virginia were $37 million. Combining these reports gives a total estimated damage from Dennis of $157 million.

September 16, 1999 – Floyd
Hurricane Floyd made landfall near Cape Fear, North Carolina in the early morning hours of September 16, 1999, as a Category 2 hurricane with estimated maximum winds near 90 knots. Floyd was losing its eye wall structure as it made landfall. Continuing to accelerate north-northeastward, Floyd's center passed over extreme eastern North Carolina on the morning of the 16th and over the greater Norfolk, Virginia area in the afternoon. Storm surge values as high as 9 to 10 feet were reported along the North Carolina coast. Rainfall totals as high as 15 to 20 inches were recorded in portions of eastern North Carolina and Virginia. A number of tornadoes were sighted in eastern North Carolina. There was a confirmed tornado in Bertie County and another in Perquimans County. The latter tornado destroyed two houses and damaged three or four others. At least ten tornadoes were reported by spotters in the Newport/Morehead City County Warning area, and these apparently caused some structural damage. Four tornadoes or funnel clouds were seen in the Wilmington area, but no damage was apparent. Total damage estimates range from 3 to over 6 billion dollars.

September 17, 2003 – Isabel
Hurricane Isabel made landfall early in the afternoon on September 18th as a category two hurricane across core banks in extreme eastern Carteret County. Isabel moved north northwest near 20 mph across eastern North Carolina during the afternoon. Areas mainly near and east of the storm center experienced significant wind and storm surge effects. Major over wash and beach erosion occurred along the North Carolina Outer Banks where waves up to 20 feet accompanied a 6 to 8 foot storm surge. Almost 350 million dollars in damage occurred in Dare County alone where several thousand homes and businesses, several piers, and sections of Highway 12 were damaged or washed away. Eastern Carteret, eastern Pamlico, southern Craven, Beaufort and Hyde counties experienced significant storm surge damage with hundreds of homes flooded in most of these counties. The highest storm surges were experienced in the lower

reached of the Neuse River where water levels rose to as high as 10.5 feet at the mouth of Adams Creek. Storm surge values ranged from 6 to 10 feet across eastern Pamlico County with the highest water levels recorded near Oriental.

Structures Subject to Hazards

There are 156,150 acres within the boundaries of Pamlico County. This analysis included incorporated and unincorporated areas of the county. Susceptibility of property in Pamlico County was analyzed using three different flooding scenarios: 100-year, SLOSH – Slow, and SLOSH – Fast.

The Pamlico County GIS data used for this analysis did not contain a land use code. Therefore, analysis of residential, commercial, and institutional properties was not possible without conducting a detailed land use survey of the entire county. However, the GIS data included a field for Total Value and a field for Current Land Value. By subtracting the Current Land Value from the Total Value, it was possible to determine how many developed properties were located within the study area and the value of those structures. Projections of potential damage were not included with this analysis. Pamlico County is sparsely developed and has numerous environmental constraints on development. Therefore, projections made by using average structure values and application to undeveloped properties would not be useful.

Using the 100-year flood models (the FIRM model, or the model insurance rates are based on); the A Zone contains 4,237 acres of developed property. The AE Zone contains 27,733 acres of developed property. The VE Zone contains 645 acres of developed property. According to the Pamlico County tax records, the developed properties in the A Zone contain structures that (the total property value minus the land value) amount to $58,233,584. The developed properties in the AE Zone contain structures amount to $215,049,229. The VE Zone contains structures amounting to $3,076,955.

The SLOSH Slow Storm Zone contains 35,842 developed acres that would be affected by a Category 1 or Category 2 hurricane. A storm of this magnitude would affect 2,209 structures worth $254,389,602. A Category 3 storm would affect 6,153 developed acres more, for a total building value of $344,966,369. A Category 4 or 5 storms would affect 6,816 developed acres more than the previous three categories and total building values of $ 379,938,963.

The SLOSH Fast Storm Zone contains 32,571 developed acres that would be affected by a Category 1 or Category 2 hurricane. A storm of this magnitude would affect 2,404 structures worth $210,013,479. A Category 3 storm would affect 5,815 developed acres more, for a total building value of $306,968,348. A Category 4 or 5 storms would affect 7,718 developed acres more than the previous three categories and total building values of $343,835,881.

Individual analyses for each Geographic Planning Area are included in separate sections.

While Pamlico County has a long history with flooding, detailed information regarding the extent of previous occurrences of coastal flooding is unavailable. Also, damage estimates from flooding associated with hurricanes, tropical storms, and nor'easters is not separated from wind damage. Therefore, it is not possible to estimate the amount of damage due to flooding alone in previous events. Pamlico County will endeavor to more accurately record flood damage in future events.

No parcel specific data available to identify existing structures to assess vulnerability.

Figure 15. Hurricane Evacuation Routes

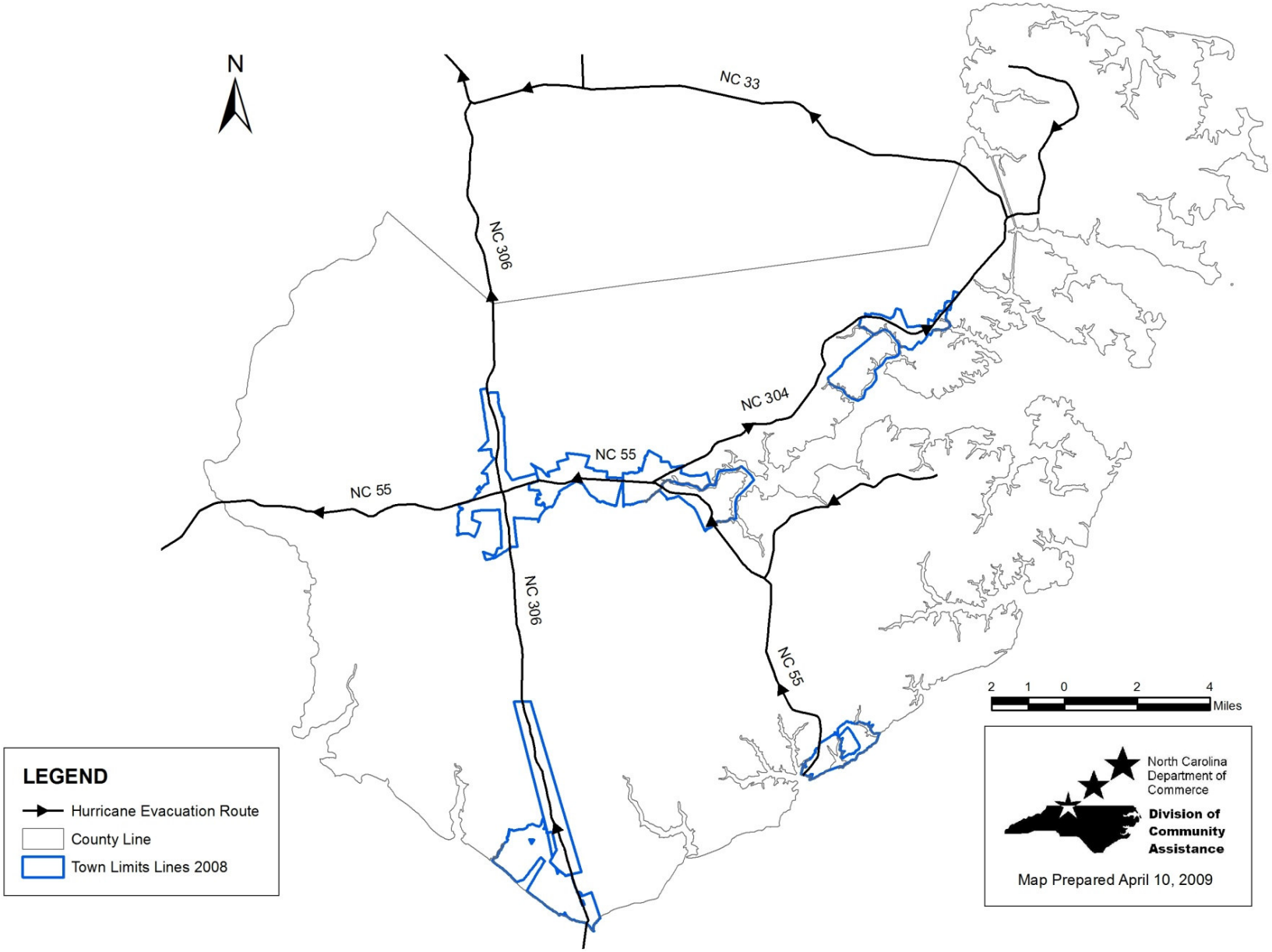


Figure 16. Slow Moving (<15 mph) Tropical Systems

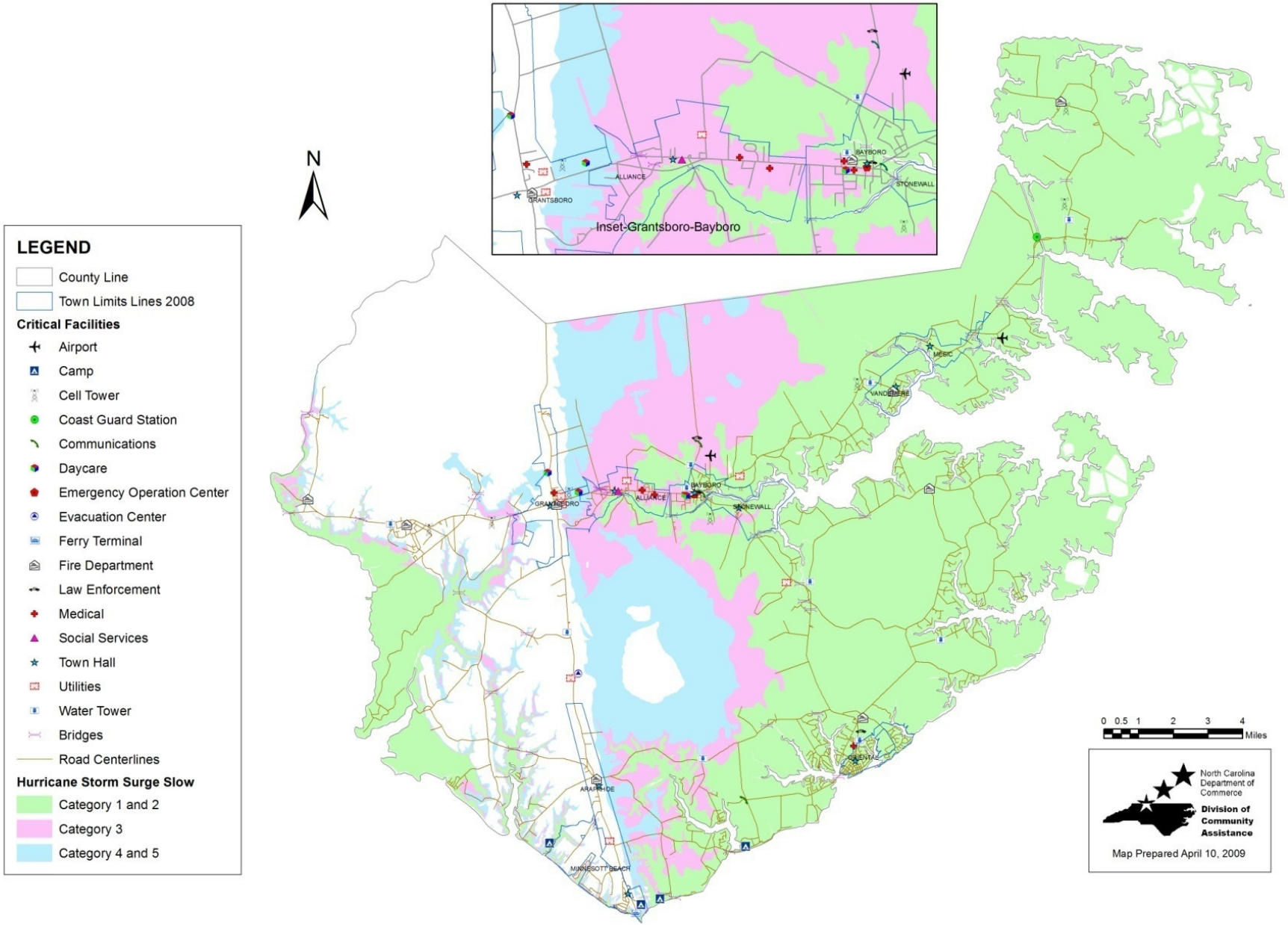


Table 17. Pamlico County Present Vulnerability

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	Potential Losses*
Inundation - Slow							
Category 1 & 2	82,960	23,868	106,828	358,667,931	357,166,959	715,834,890	1,624,771,600
Category 3	25,127	4,348	29,475	57,294,542	46,098,759	103,393,301	492,112,295
Category 4 & 5	2,085	5,001	7,086	22,178,190	27,981,244	50,159,434	40,834,725
Total	110,172	33,217	143,389	438,140,663	431,246,962	869,387,625	2,157,718,620
Inundation - Fast							
Category 1 & 2	75,555	20,227	95,782	309,902,577	326,565,584	636,468,161	1,479,744,675
Category 3	18,556	4,756	23,312	86,216,822	56,419,465	142,636,287	363,419,260
Category 4 & 5	22,399	5,893	28,292	29,366,862	34,203,131	63,569,993	438,684,415
Total	116,510	30,876	147,386	425,486,261	417,188,180	842,674,441	2,281,848,350
100-Year Floodplain							
AE	68,409	20,346	88,755	258,388,158	286,019,198	544,407,356	1,339,790,265
VE	183	24	207	1,737,518	2,023,023	3,760,541	3,584,055
Total	68,592	20,370	88,962	260,125,676	288,042,221	548,167,897	1,343,374,320

* *Potential Losses* was calculated by multiplying *Vacant Acres* by the average value per acre in the county ($19,585), determined by dividing the *Total Value of Developed Properties* in the county by *Total Developed Acres*

Figure 17. Hazard Areas

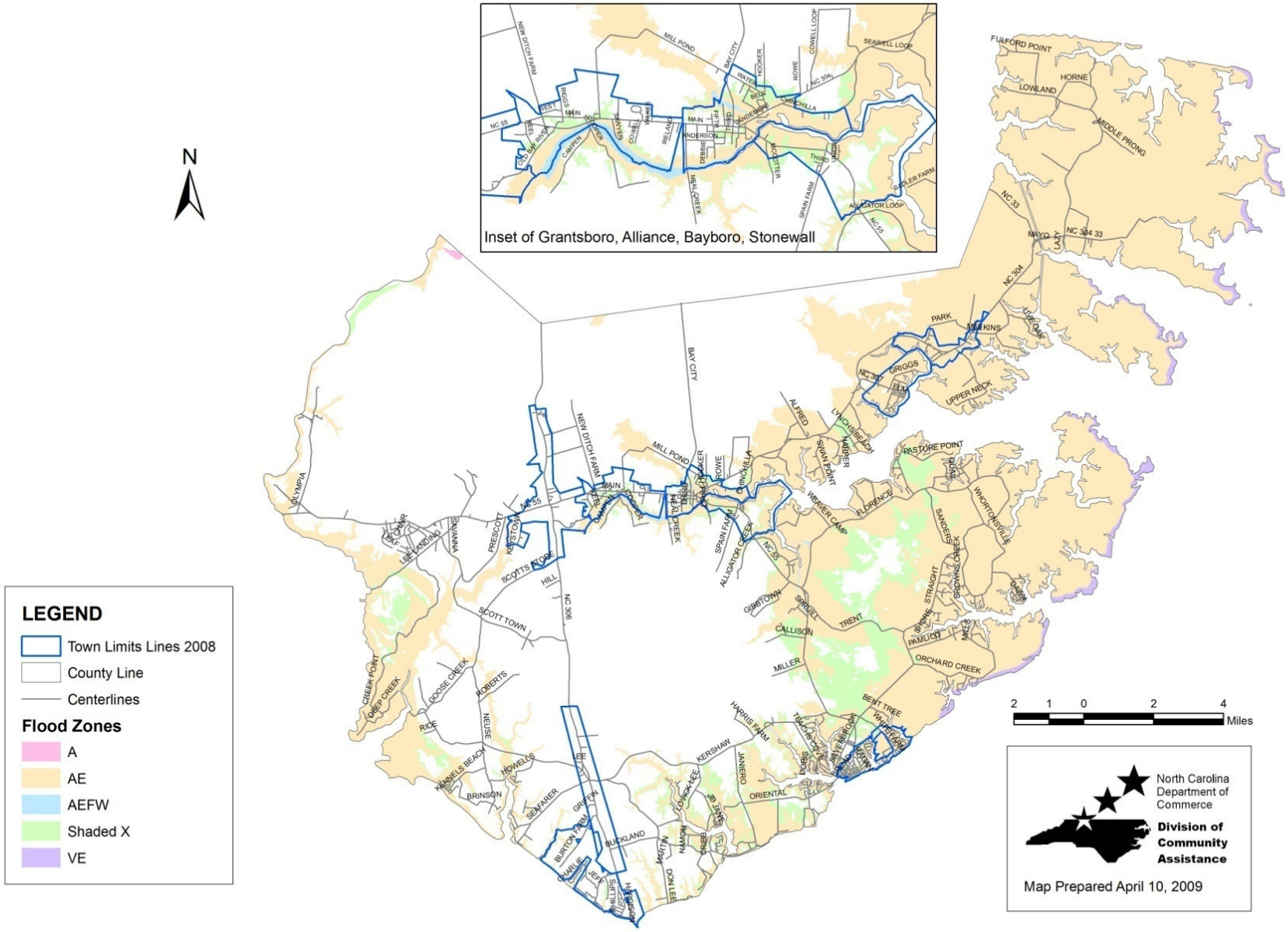


Figure 18. Topographical Map 2 Foot Elevation Intervals

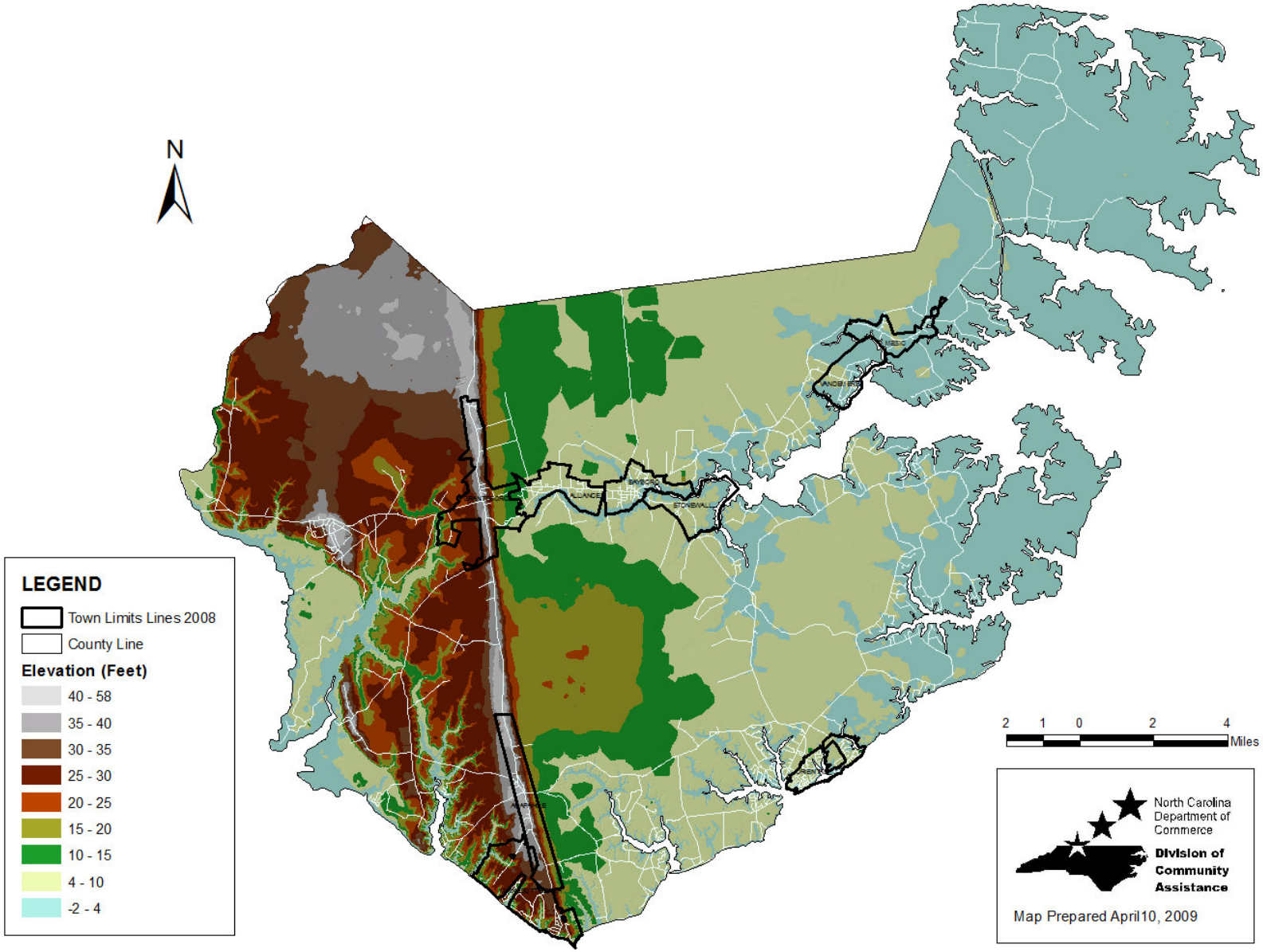
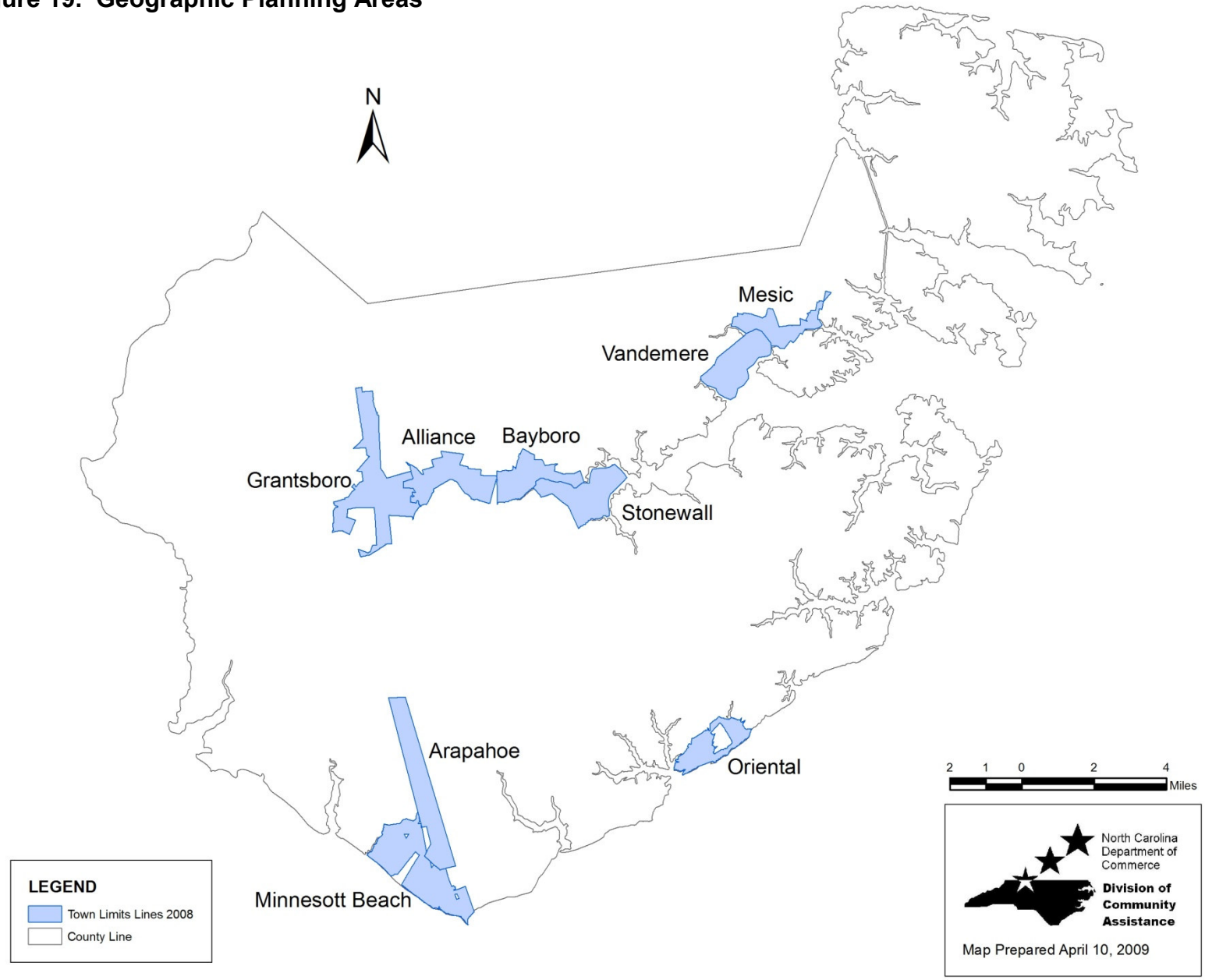


Figure 19. Geographic Planning Areas



SECTION 16: MITIGATION CAPABILITIES ASSESSMENT

Staff and Organizational Capability

Pamlico County has limited staff and organizational capability to implement hazard mitigation strategies. Pamlico County is governed by a seven-member **Board of Commissioners** who bear the responsibility of serving the people and improving the quality of life in the county. The county is divided into five townships, with one commissioner elected from each township and two at-large commissioners. Terms on the board are staggered with elections held every two years. A **County Manager** hired by the commissioners, acts on their behalf and manages County finances and services. More specifically, the County Manager directs and supervises the administration of all county offices, boards, commissions and agencies under the general control of the Board.

Pamlico County has a number of professional staff departments to serve the residents of the county and to carry out day-to-day administrative activities. These include the following:

County Manager	Tax Office	Farm Service
Planning Department	Finance Department	Sheriff's Department
Magistrate's Office	Clerk of Court	Building Inspections
Register of Deeds	Board of Elections	Emergency Management
Social Services	Veteran's Services	Health Department
Recreation Department	Maintenance & Grounds	Cooperative Extension
Soil & Water Conservation	Water Department	Senior Services
Bay River Sewerage		

The **County Manager** is responsible for overseeing the general operation of county government and the implementation of all policies, procedures and regulations mandated by the Board of Commissioners. As Chief Budget Officer, the County Manager is responsible for all financial aspects of county government and for the sound investment of money for the good of all county citizens. All major projects are overseen by the County Manager.

The **Planning Department** seeks to provide effective and efficient services in the form of planning and sound economic development for the future of Pamlico County. In an effort to achieve these goals, the Planning Department implements the land use ordinances of the county. This includes several plans and regulations, such as the 1992 Land Use Plan, the Pamlico County Subdivision Regulations, the Pamlico County Water Supply System Extension Policy, the Pamlico County Environmental Impact Statement Ordinance and the Pamlico County Mobile Home Park Ordinance.

The **Magistrate's Office** is a state department that serves the public as the judge in small claims court, by issuing arrest warrants, orders for arrest, bonds and by setting

pre-trial release conditions. Individuals may also pay waived traffic tickets early at the Magistrate's Office.

The office of the **Register of Deeds** contains all of the real estate transfers for Pamlico County from 1872 until present. Birth and death records were not recorded until the latter part of 1913. Marriage records began in 1872. The office is the custodian of these records, plus it issues copies or certified copies of these records to the appropriate person according to the General Statutes. The office also issues marriage licenses to persons who are going to get married in Pamlico County. Citizens must get their marriage license in the county in which they are going to be married. The Register of Deeds office issues beer and wine licenses to the establishments that have been approved by the NC A.L.E. office to sell alcoholic beverages. They also record UCCs, survey maps and discharges from all branches of the service. The office can give the Oath of Office to all notaries who have been commissioned for Pamlico County and they must retain a record of these acts. This office is also in charge of the Jury Maintenance Program.

The Department of **Social Services** is dedicated to assisting and providing opportunities for individuals and families in need of basic economic support and services to becoming self-supporting and self-reliant. In addition, Social Services advocates and encourages individuals' right to select actions appropriate to their needs. Furthermore, they recognize their responsibility through teamwork and professional effort to assist in this process. The Department of Social Services cooperates with other public and private entities and seeks to identify needs, devise and focus resources and deliver services responsibly and compassionately.

The **Recreation Department** is dedicated to providing as much leisure and athletic activity as possible for all citizens of Pamlico County. The basic objective of the Recreation Department is to provide a variety of recreational opportunities to enhance the lives of Pamlico County citizens and to direct and educate citizens for more positive use of leisure time. Recreation is a function of county government available to each and every person. Youth activities are especially popular and participation is on an upswing. Recreation league activities involve the most staff hours and attract the most participants of any other area of programming. The Recreation Department is proud of the popularity of its programs and of its ability to provide quality recreation to all Pamlico County citizens.

The Bay River **Soil and Water Conservation** District is a governmental subdivision of state government with the local responsibilities for developing annual and long-range programs of conservation and resource development within the boundaries of the district. Its main goals are to carry out a broad program of assistance to farmers, ranchers and land users. This includes soil and water conservation, watershed protection, flood prevention, farm forestry, urban and rural area development, education, technical assistance and cost sharing.

The **Bay River Metropolitan Sewerage District** is an independent local government agency which provides and administers the sewage collection and treatment systems which are located inside the district's boundaries. The service area includes Grantsboro, Alliance, Bayboro, Stonewall, Oriental, Maribel, Vandemere, Cash Corner, and Mesic. The Bay River Metropolitan Sewerage District's purpose is to promote the general health and welfare of the local government and to protect the Bay River from pollution caused by failing septic fields and illegal discharges.

The **Tax Office** is the primary source of revenue of local revenue for county government operation. The office provides information to the public on all records concerning real estate recording, assessment and taxes. The office also provides information on situs, tax jurisdictions, parcel locations, size and shape, special assessment and transfer of title ownership. The tax office is responsible for personal property assessment and situs. The office is an information center for realtors, attorneys, developers, paralegal staff and property owners. They interact with the various departments such as the Department of Social Services, Register of Deeds, Inspections Department, County Planner's Office, Agriculture Extension Services and Enhanced 911 through the Sheriff's Department. The Tax Office has the responsibility and the duty to act in strict accordance with the General Statutes of North Carolina which are found in the Machinery Act. The Tax Office maintains and operates the central computer system and is the focal point for public information and special requests of data bases. The office is also responsible for Geographic Information Systems. It provides spatial data information and delineations of political subdivisions and other special boundaries.

The **Finance Department** is responsible for all planning, coordinating and directing all aspects of county financial management and administration. This office is unique in that it handles the county financial dealings and is not directly involved with the public.

The office of the **Clerk of Superior Court** consists of the Clerk and three full time employees and one part time employee. This office will hold citizens' wills for safekeeping and only that citizen may remove this will from safekeeping. The Clerk's office also files estates when a person dies. Another function of the Clerk of Court is to file and handle special proceedings, which in many instances are hearings before the Clerk on subjects ranging from partitions to foreclosures and cart ways. Criminal citations, summons, and warrants are filed in the Clerk's office. Calendars and record checks concerning these files are open to the general public. Waivers are also entered with the Clerk concerning these cases. Civil cases are also filed in the Clerk's Office, summons issued and costs collected. The most important part of the Clerk's office is the management of money for different cases. All jury notices originate in the Clerk's office, though they are distributed by the Sheriff's office. Child support cases are filed in the Clerk's office and money is paid through this office. Finally, waived traffic violations can be paid at this office.

The purpose of the **Board of Elections** is to conduct honest and fair elections on the local, state, and federal level. The Board of Elections consists of one full-time employee, the Director of Elections and about fifty part-time employees. The part-time

employees are precinct officials and a three member board. The board members represent the two major parties in the state. The chairmen of each political party recommend persons from their party to the State Board of Elections and the appointment is made by the State Board of Elections for a term of two years. The Board of Elections provides the public with several services. One of these services is to work directly with candidates, party chairmen, political parties, political organizations and civic organizations regarding voter registration, elections, and election information and elections laws. In addition, the Board of Elections receives all notices of candidacy for elective office and keeps records of all such notifications. The Board is responsible for setting up all municipal, county, state, national and other elections required to be held in Pamlico County. Also, the preparation of all ballots for voting machines, the supervision of the counting and reporting of voting results are done by this office.

The primary program of the **Veteran's Services** Department is the deliverance of service in procuring benefits available from the Department of Veteran's Affairs for Pamlico County's veterans, widows, and their dependent children. Currently, there are approximately 1,700 veterans in the county. Veterans with their dependents comprise about 4,300 citizens of the county, about one third of the total county population.

The **Maintenance and Grounds Department** is an in-house maintenance department that serves the maintenance needs of the county offices.

The **Water department** or the Pamlico County Water System (PCWS) was founded in 1980 with the mission of supplying clean, safe drinking water to the citizens of Pamlico County. The system had a customer base of 2,650 and had approximately 200 miles of distribution lines. Water was supplied via two newly built treatment facilities and the "Old Town of Bayboro" plant. The source of the water supply is currently from ground water that is pumped from the Castle Hayne aquifer. The water is then treated from five water treatment facilities and distributed county-wide to customers through approximately 300 plus miles of water distribution lines. PCWS currently provides service to more than 5,000 homes and businesses. Pamlico County Water System is a self-supporting agency which depends on customer rates and fees to support its operation. No tax dollars are used to pay for PCWS's operations.

The **Farm Service** administers programs to farmers that are written by Congress. These programs are designed to ensure that farmers get full benefits of these programs. Programs deal with issues such as environmental practices concerning soil, air and water pollution; loans on commodities such as corn, soybeans and cotton; the measuring of crop land; the acreage of each crop that has been planted; disaster insurance for crops that have been insured; and the tracking of tobacco quotas and marketing.

The **Sheriff's Department**'s foremost goal is to protect and to serve the public. To this end, it is diligent in protecting lives, property, and information. In addition, it also serves the public in day to day concerns or needs. In order to receive a permit to purchase a handgun or carry a concealed handgun, citizens must go through the Sheriff's

Department. Finger printing for child protective services and day care providers is also done at the Sheriff's Department. Escorts to and from funerals and tours of the jail for schools can be provided. DARE officers visit schools to educate youth on various safety issues or law enforcement issues? A k-9 unit has been added to the Department. An animal control officer is also on duty to assist citizens with any animal problems.

The **Building Inspections Department** enforces all state building, electrical, plumbing, insulation, structural and mechanical codes to ensure compliance with minimum construction standards. In addition to these codes, the Department is also involved in the National Flood Insurance Program and administers this program to citizens. In compliance with the Coastal Area Management Act (CAMA), the Pamlico County Building Inspector issues permits for all developments which meet CAMA regulatory definition of a minor permit. The Building Inspector is also responsible for conducting fire inspections of county schools twice a year to ensure their compliance with all fire regulations.

The **Emergency Management** office is dedicated to sound emergency management of all aspects. Responsibilities of this office include general emergency management and the Fire Marshall. Under FEMA regulations, the Emergency Management Office is responsible for the following functions: the development and maintenance of programs and systems for effective coordination of community resources in all phases of emergency management; the planning and preparation for population protection, including evacuation and sheltering; the appropriate response to national security emergencies; disaster response and recovery and the promotion of public awareness. As Fire Marshall, the Emergency Management Coordinator works to keep the County Manager and the Board of Commissioners informed of the status of rural fire departments, areas of concern and fire prevention planning. The Fire Marshall also assists with the coordination of fire alarms in the county, the development of Arson Task Forces, the organization of fire prevention programs and the procurement of funds for rural fire departments. In addition, the Fire Marshall maintains all fire incident reports and assists with the inspection of fire scenes.

The **Health Department** strives to promote the optimal health of Pamlico County citizens by providing high quality professional services, fostering public trust, minimizing identified public health risks and ensuring the safety of the environment for future generations. The agency receives state funding for sixteen different programs for public health.

The **Cooperative Extension Service** is an educational organization. It receives support from three levels of government – state, federal, and county – and has close ties to the state's two land grant universities: North Carolina State University in Raleigh and North Carolina A&T University in Greensboro. County extension agents have obtained field faculty status as a link to NC State University. This unique partnership allows the Cooperative Extension Service to serve as a bridge between the people of

North Carolina and the scientists of the US Department of Agriculture and the land grant universities.

Senior Services is a department of county government with offices located in the Senior Center in Alliance. Its purpose is to promote and improve the well-being of older adults and to develop and provide appropriate facilities and services to older adults to enhance their quality of life. A 12 member advisory committee appointed by the Board of County Commissioners advises the staff and makes recommendations to the Board of Commissioners on the development, implementation, and administration of services for older adults in Pamlico County. The Center provides several programs for older adults including: Senior Companion, Senior Health Insurance Information Program; classes, information, and referral; respite; nutrition; transportation; and physical fitness.

Technical Capability

Pamlico County has limited technical capability to implement hazard mitigation strategies.

Technical Expertise
Pamlico County does have a full time planner, emergency manager, and building inspector on staff to administer the County's hazard mitigation programs. The County does not have a licensed engineer or related technical expert on staff, and has in the past relied upon outside contractors/consultants to perform a majority of any required technical work.

Geographic Information Systems (GIS)
GIS systems can best be described as a set of tools (hardware, software, and people) used to collect, manage, analyze, and display spatially-referenced data. Many local governments are now incorporating GIS systems into their existing planning and management operations. Pamlico County currently has GIS capability, and a full time administrator of the system.

Fiscal Capability

Pamlico County has limited fiscal capability to implement hazard mitigation strategies. The majority of the County's annual budget is obligated to human services and education. Pamlico County receives most of its revenues through Ad Valorem taxes and through restricted intergovernmental contributions (federal and state pass through dollars).

It is highly unlikely that Pamlico County could afford to provide the local match for the existing hazard mitigation grant programs if the State of North Carolina did not do so itself. Considering the current budget deficits at both the State and local government level, combined with the apparent increased reliance on local accountability by the Federal government, this is a significant and growing concern for Pamlico County.

The North Carolina Department of Commerce classifies counties into one of three tiers, with Tier 1 representing the most economically disadvantaged and Tier 3 three the most prosperous. Pamlico County is currently classified as a Tier 2 county, which makes it easier for the County to access a special utilities fund and priority status for Community Development Block Grant funds for economic development.

Policy and Program Capability

This part of the capabilities assessment includes the identification and evaluation of existing plans, policies, practices, programs, or activities that either increase or decrease the community's vulnerability to natural hazards. Positive activities, which decrease hazard vulnerability, should be sustained and enhanced if possible. Hazard vulnerability should become targeted for reconsideration and be thoroughly addressed within the mitigation strategies when negative activities are increased.

Recent Hazard Mitigation Efforts
Pamlico County has undertaken a few specific hazard mitigation efforts in the past.

Community Rating System Activities
Communities that regulate development in floodplains are able to participate in the National Flood Insurance Program (NFIP). In return, the NFIP makes federally-backed flood insurance policies available for properties in the community. The Community Rating System (CRS) was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. There are ten CRS classes: Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction.

Pamlico County participates in the Community Rating System as a Class 9 community. This allows County residents to receive a 5% discount on their flood insurance premiums for policies purchased under the NFIP.

In 2006, a total of 917 credit points were verified by Insurance Services Office, Inc. (ISO) which results in a recommendation to the Federal Insurance Administrator that Pamlico County be classified as a CRS Class 9 community. The following is a summary of ISO's findings with the total credit points for each activity noted in parentheses:

Activity 310 – Elevation Certificates: Pamlico County Building Inspections Department maintains elevation certificates for new and substantially improved buildings. (56 points)

Activity 320 – Map Information Service: Credit is provided for furnishing inquirers with flood zone information from the community's latest Flood Insurance Rate Map (FIRM), publicizing the service annually and maintaining records. (140 points)

Activity 340 – Hazard Disclosure: Credit is provided for community and state regulations requiring disclosure of flood hazards. (5 points)

Activity 350 – Flood Protection Information: Documents relating to floodplain management are available in the reference section of the Pamlico County Library. (28 points)

Activity 410 – Additional Flood Data: Credit is provided for a cooperating technical partnership agreement with FEMA and the State of North Carolina. (11 points)

Activity 420 – Open Space Preservation: Credit is provided for preserving more than five acres in the Special Flood Hazard Area (SFHA) as open space. (38 points)

Activity 430 – Higher Regulatory Standards: Credit is provided for enforcing regulations that require freeboard for new and substantial improvement construction and protection of the natural and beneficial functions of floodplains. Credit is also provided for enforcing state mandated regulatory standards, adopting the International Building and Residential Codes and for a Building Code Effectiveness Grading Schedule (BCEGS) Classification of 5/5. (242 points)

Activity 440 – Flood Data Maintenance: Credit is provided for maintaining and using GIS maps in the day to day management of the floodplain. Credit is also provided for maintaining copies of all previous FIRMs and Flood Insurance Study Reports. (114 points)

Activity 450 – Stormwater Management: The community enforces regulations for soil and erosion control. (32 points)

Activity 510 – Floodplain Management Planning: Based on the updates made to the NFIP Report of Repetitive Losses as of April 30, 2006, Pamlico County has 147 repetitive loss properties and is a Category C community for CRS purposes. All requirements for the 2006 cycle have been met. Credit is provided for the adoption and implementation of the Floodplain Management/Hazard Mitigation Plan. Since Pamlico County is a Category C community with an approved Floodplain Management/Hazard Mitigation Plan, a progress report must be submitted on an annual basis. (178 points)

Activity 540 – Drainage System Maintenance: The community enforces a regulation prohibiting dumping in the drainage system. (15 points)

Activity 630 – Dam Safety: All North Carolina communities currently receive CRS credit for the state's dam safety program. (58 points)

Emergency Operations Plan
Pamlico County has developed and adopted an Emergency Operations Plan which predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. For the most part, the plan describes the County's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster.

The plan does not specifically address hazard mitigation, but it does identify the specific operations to be undertaken by the County to protect lives and property immediately before, during, and immediately following an emergency. There are no foreseeable conflicts between this hazard mitigation plan and Pamlico County's Emergency Operations Plan, primarily because they are each focused on two separate phases of emergency management.

Floodplain Management Plan
Pamlico County currently has a separate floodplain management plan for purposes of the National Flood Insurance Program's Community Rating System. The Flood Damage Prevention Ordinance serves in this capacity and was adopted on June, 21, 2004. This Hazard Mitigation Plan is intended to fulfill the CRS planning requirement when it becomes adopted, and will be maintained as such.

County Ordinances
Pamlico County has adopted several ordinances that are relevant to hazard mitigation. These ordinances were listed and evaluated according to effectiveness in Section 3 of this plan.

Legal Capability
Local governments in North Carolina only have the legal authority that is granted to them to exercise by the state. This principle is commonly known as "Dillon's Rule," where all power is vested in the state and can only be exercised to the extent delegated. This rule applies to all of North Carolina's counties and cities.

The North Carolina General Statutes grants legal authority to the counties and cities enabling legislation. Local regulations that are enacted within the state's enabling authority do not automatically meet judicial acceptance. All regulations placed by local governments on land use and building practices must meet the procedural requirements of the 14th Amendment to the U.S. Constitution, or they may be found invalid. Constitutional protections apply to federal and state governments, as well as all municipalities. All mitigation measures taken by local governments in a regulatory sense must be worded and enforced in a manner that is consistent with the parameters set by the state and federal constitutions.

Local governments have a variety of mitigation measures that are consistent with all constitutional protections and within the limits of Dillon's Rule. All local government powers fall within one of four basic groups of powers: regulation, acquisition, taxation,

and spending. Mitigation measures may be carried out under each of the four types of powers.

Regulations

General Police Powers

North Carolina's local governments possess a broad range of regulatory powers at their disposal. North Carolina General Statutes grant general police powers to counties and cities, allowing them to adopt and enforce ordinances that define, prohibit, regulate, or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances, including public health nuisances. Some hazard mitigation measures can be included under the general police power available to local governments. Counties and cities may also use their police powers to abate nuisances that could include, by definition, any activities or conditions that make people or property more vulnerable to hazards.

Pamlico County has enacted and enforces regulatory ordinances designed to promote the public health, safety, and general welfare of its citizens. These ordinances are listed and further discussed in Section 3 of this plan.

Building Codes/Inspections

A number of mitigation measures involve structural modifications and retrofitting homes to be less susceptible to natural hazards. Many of these measures are accomplished through use of the building code. North Carolina has a mandatory building code (NCGS 143-138) imposed throughout the state. Counties and cities are granted the authority to adopt more stringent local building code requirements, but they may not adopt regulations that are less restrictive than the state building code.

Pamlico County has adopted the state building code, and has established a Building Inspections Department to carry out its building inspections.

Land Use

Regulatory authority granted to local governments by the state is the most commonly used manner that counties and towns use to control the use of land within its jurisdiction. Using various land use regulations, a local government may control the amount, timing, density, quality, and location of new development. Land use regulatory authority includes the power to adopt and enforce zoning ordinances, floodplain ordinances, and subdivision regulations.

Planning. In order to exercise the regulatory powers granted by the North Carolina General Statutes, local governments are required to designate a planning agency. The planning agency may perform a number of duties, including: make studies of the area; determine objectives; prepare and adopt plans for achieving those objectives; develop and recommend policies; ordinances and administrative means to implement plans; and perform other related duties.

Subdivision Regulations. Subdivision regulations govern the division of land for development or sale. These regulations can be used for mitigation purposes in various ways. They may prohibit the subdivision of land subject to flooding. Subdivision regulations may also set a standard for public infrastructure that ensures it is adequate for the assessed risk. They may require that developments be built in a hazard-resilient manner, such as requiring "deep" lots in shorefront areas to remedy shoreline erosion. However, subdivision regulations are not as broad as zoning and only indirectly affect the quality and type of development that occurs on subdivided land. Since these regulations apply only when land is subdivided and sold, they do not address development of small or undivided parcels of land.

Pamlico County has adopted a Subdivision Ordinance, which is further discussed in Section 3 of this plan.

Floodplain Regulations. Structures built in the floodplain are subject to damage by rising waters. In addition to increasing the number of properties at risk, development in the floodplain reduces the flood storage capacity of these areas, resulting in greater flood heights. Communities should consider the relocation, elevation or acquisition of buildings in the floodplain. At a minimum, elevation and relocation guidelines should meet NFIP standards.

Pamlico County is in good standing with the National Flood Insurance Program. The County has adopted and enforces a Flood Damage Prevention Ordinance, which is further discussed in Section 3 of this plan.

Spending

Hazard mitigation principles should be made a routine part of all spending decisions made by local governments. The most common forms of hazard mitigation-related spending techniques is capital improvements programming (CIP) and limiting government expenditures in high-hazard areas.

Capital Improvements Programs (CIP)

Capital improvements programs are timetables that define when, where, and what level of municipal services a government will supply. Typically a part of the comprehensive plan, the CIP sets public spending on improvements for the ensuing five to ten years. Timetables can be effective at managing growth because it is rarely feasible for a developer to provide water, sewer and other services without a public subsidy.

Limiting Government Expenditures in High-Hazard Areas

Regional and local governments can limit their expenditures for roads and other infrastructure in high-hazard areas. This technique will discourage development in these areas, which can greatly reduce disaster-related damage and recovery costs. Government facilities, especially those that house emergency services, should not be located in high-hazard areas. By avoiding these areas, local governments can help ensure these facilities will function during and in the immediate aftermath of an emergency. They can also reduce the cost of post-disaster repairs to public structures.

Acquisition
In the long run, it is less expensive to acquire and demolish a building than to repeatedly provide for its reconstruction. In addition to reducing the public cost of recovery and reconstruction, acquisition can be a tool for accomplishing other community goals. It can help increase floodplain storage capacity, preserve wetlands, maritime forests, estuaries and other natural habitats, and provide open space, beach access, and parks and recreation areas. There are several alternative ways to approach acquisition of flood prone properties.

1. Fee Simple Acquisition of Land and Damaged Structures
Land ownership is often defined as a bundle of rights, of which the right to develop is only one. When one person owns all the rights associated with a parcel of land, they are said to own the land "in fee simple." Acquiring a property in fee simple provides a local government with the greatest level of control over the use and disposition of a parcel. Fee simple purchase is usually the most expensive method of land acquisition. In addition to the cost of buying the property, a local government must delete the property from its property tax rolls and assume its maintenance costs.

There are four types of buyouts where built property is involved. *Basic buyouts* are community-run programs without a relocation element. *Buyout and infill* programs are designed to encourage the relocation of families and structures from the floodplain to vacant lots in less hazard-prone neighborhoods. Communities operating *buyout and reorganization* plans often create new subdivisions into which they actively relocate houses and businesses. The community will usually sponsor the planning and installation of infrastructure. *Buyout and complete relocation* is the construction of a new town using new or relocated old buildings.

2. Easements
The owner of an easement has one or more of the rights in a property, leaving the rest of the "bundle" in the hands of the land owner. Easements either grant an affirmative right to use property, such as a right of access, or restrict the land owner's right to use the property in a particular way. Easements can be written either to allow public access or to prohibit it. They must be clear about the restrictions placed on the property. They should also allow inspection by public officials to ensure compliance with the easement provisions. An administrative process for policing easements should be established. The best incentive for encouraging the donation of a conservation easement is the fact that the donation may qualify the donor for tax credits.

3. Relocation of Existing Development
Relocation means moving a building or facility to a less hazard-prone area, either within the same parcel or on a new parcel. This technique is typically used to avoid coastal or riverine flood hazards. "Relocating" can also be used to describe the process of demolishing a building and reconstructing it outside the hazard area.

Taxation
The power of taxation extends beyond merely the collection of revenue. A number of communities set preferential tax rates for areas that are unsuitable for development and can be used to discourage development in hazardous areas.

Differential Assessment
Differential taxation is a technique for reducing the tax burden on land facing development pressure by recognizing that undeveloped properties require fewer public services. This technique can moderate the pressure to develop land at its "highest and best" use in one of several ways; by reducing the assessed value of land to a percentage of urban land; or by assessing the value of land based on its income-producing capacity, as opposed to its market value.

Special Assessment Districts
Special assessment districts apply to property owners who directly benefit from a specific public improvement. These owners of both new and existing development in the district are charged a fee that is proportional to the benefits received from the improvement. There are a number of ways to apply this technique, from temporary assessments that raise revenue for a specific improvement to indefinite assessments that fund independent, special purpose governmental entities.

Pamlico County does levy property taxes, but does not use any preferential tax districts or special assessments for purposes of guiding growth and development.

Funding Sources

Although all mitigation techniques will likely save money be avoiding losses, many projects are costly to implement. Pamlico County will continue to seek outside funding assistance for mitigation projects in both the pre- and post-disaster environment. This section identifies the Federal and State grant programs for Pamlico County to consider, and discusses local and non-governmental funding sources.

Federal
The following federal grant programs have been identified as funding sources which specifically target hazard mitigation projects:

Title: Pre-Disaster Mitigation Program
Agency: Federal Emergency Management Agency
Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential disaster declaration. The Pre-Disaster Mitigation (PDM) Program provides funding to states and communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program, and reduce injuries, loss of life, and damage and destruction of property.

The funding is based upon a 75 percent Federal share, 25 percent non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination. Special accommodations will be made for "small and impoverished communities," who will be eligible for 90% Federal share, 10% non-Federal.

FEMA provides PDM grants to states that, in turn, can provide sub-grants to local governments for accomplishing the following eligible mitigation activities:

- State and local hazard mitigation planning
- Technical assistance [e.g. risk assessments, project development]
- Mitigation projects
- Acquisition or relocation of vulnerable properties
- Hazard retrofits
- Minor structural hazard control or protection projects
- Community outreach and education (up to 10% state allocation)

Title: Flood Mitigation Assistance Program
Agency: Federal Emergency Management Agency

FEMA's Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP.

FMA is a pre-disaster grant program, and is made available to states on an annual basis. This funding is available for mitigation planning and implementation of mitigation measures only, and is based upon a 75 percent Federal share, 25 percent non-Federal share. States administer the FMA program and are responsible for selecting projects for funding from the applicants submitted by all communities within the state. The state then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local governments may submit an application on their behalf.

Title: Hazard Mitigation Grant Program
Agency: Federal Emergency Management Agency

The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration.

To meet these objectives, FEMA can fund up to 75 percent of the eligible costs of each project. The state or local cost-share match does not need to be cash; in kind services or materials may also be used. With the passage of the Hazard Mitigation and Relocation Assistance Act of 1993, federal funding under the HMGP is now based on

15 percent of the federal funds spent on the Public and Individual Assistance programs (minus administrative expenses) for each disaster.

The HMGP can be used to fund projects to protect either public or private property, so long as the projects in question fit within the state and local government's overall mitigation strategy for the disaster area, and comply with program guidelines. Examples of projects that may be funded include the acquisition or relocation of structures from hazard-prone areas, the retrofitting of existing structures to protect them from future damages; and the development of state or local standards designed to protect buildings from future damages.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMGP project funding on behalf of their citizens. In turn, applicants must work through their state, since the state is responsible for setting priorities for funding and administering the program.

Title: Public Assistance (Infrastructure) Program, Section 406
Agency: Federal Emergency Management Agency

FEMA's Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential disaster declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure. The mitigation measures must be related to eligible disaster-related damages and must directly reduce the potential of future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.

Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility, and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility's operation or risk from another hazard.

Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include:

- Roads, bridges, and culverts
- Draining and irrigation channels
- Schools, city halls and other buildings
- Water, power and sanitary systems
- Airports and parks

Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following:

- Universities and other schools
- Hospitals and clinics
- Volunteer fire and ambulance
- Power cooperatives and other utilities
- Custodial care and retirement facilities
- Museums and community centers

Title: SBA Disaster Assistance Program
Agency: U.S. Small Business Administration

The SBA Disaster Assistance Program provides low-interest loans to businesses following a Presidential disaster declaration. The loans target businesses to repair or replace uninsured disaster damages to property owned by the business, including real estate, machinery and equipment, inventory and supplies. Businesses of any size are eligible, along with non-profit organizations.

SBA loans can be utilized by their recipients to incorporate mitigation techniques into the repair and restoration of their business.

Title: Community Development Block Grant
Agency: U.S. Department of Housing and Urban Development

The Community Development Block Grant (CDBG) program provides grants to local governments for community and economic development projects that primarily benefit low and moderate income people. The CDBG program also provides grants for post-disaster hazard mitigation and recovery following a Presidential disaster declaration. Funds can be used for activities such as acquisition, rehabilitation or reconstruction of damaged properties and facilities and for the redevelopment of disaster areas.

The North Carolina Division of Emergency Management (NCEM) recently identified over 300 federal "disaster-related" funding sources. This listing includes mostly federal government grant programs that do not necessarily target hazard mitigation projects, but are certainly related and should be considered as good resources for potential mitigation funding. The listing of these funding sources will continue to be used as a reference but was not included within this plan due to space limitations.

State
The following State grant programs have been identified as the primary funding sources to support hazard mitigation projects within the State of North Carolina:

Title: Water and Sewer Grant Programs
Agency: North Carolina Rural Economic Development Center, Inc.

The Rural Center administers three programs to help rural communities develop the water and sewer systems they need to support local economic growth and ensure a reliable supply of clean water. The programs are made possible through appropriations

from the North Carolina General Assembly and through proceeds from the Clean Water Bonds, approved by the voters of North Carolina in November 1998.

The Supplemental Grants Program enables local governments and qualified non-profit corporations to improve local water and sewer systems. Projects may address public health, environmental, and/or economic development critical needs. The maximum grant amount for this program is now $400,000. Rural Center funds must be used to match other project funds.

The Capacity Building Grants Program provides funding for local governments to undertake planning efforts that support strategic investments in water and sewer facilities. Funds typically are used to prepare preliminary engineering reports, master water/sewer plans, capital improvement plans, water/sewer feasibility studies, rate studies and grant applications. The maximum grant amount for this program is generally $40,000.

The Unsewered Communities Grant Program provides funding for the planning and construction of new central, publicly owned sewer systems. Qualified communities must be not served by wastewater, collection or treatment systems. Unsewered community's grants are designed to cover 90 percent of the total cost of a project, but will not exceed $3 million.

There are two application deadlines per year. Applications must be received by 5:00 p.m. on the last business day of March and September. Funding announcements are generally in August and February.

Title: Clean Water Management Trust Fund
Agency: Board of Trustees, Clean Water Management Trust Fund

Created in 1996, the Clean Water Management Trust Fund (CWMTF) makes grants to local governments, state agencies and conservation non-profits to help finance projects that address water pollution problems. Specifically, CWMTF will fund projects that: (1) enhance or restore degraded waters; (2) protect unpolluted waters; and/or (3) contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits.

At the end of each fiscal year, 6.5% of the unreserved credit balance in North Carolina's General Fund (or a minimum of $30 million) will go into the CWMTF. Revenues from the CWMTF will then be allocated in the form of grants to local governments, state agencies and conservation non-profits to help finance projects that specifically address water pollution problems. The 18 member, independent, CWMTF Board of Trustees has full responsibility over the allocation of money from the Fund.

Title: CAMA Local Planning and Management Grants Program
Agency: North Carolina Department of Environment and Natural Resources, Division of Coastal Management

The Division of Coastal Management helps local governments in the 20 coastal counties fund local land-use planning and management projects through the CAMA Local Planning and Management Grants Program.

The Division accepts grant applications in the spring of each year. Local governments are encouraged to apply for funds for projects that will help them carry out their land- and water-use goals and objectives. Projects that are eligible for funds include new or updated CAMA land-use plans and implementation projects. Examples include local land-use ordinances, beach/waterfront access plans, storm water management plans, storm-hazard mitigation plans and capital facilities plans.

Some local governments may want to work together on a project designed to address land- and water-use issues on a regional basis. Examples of regional projects include a plan to protect or develop shared resources and other projects to enhance basin wide water-quality protection, economic development, regional transportation, and solid waste or wastewater disposal. For regional projects, one local government must serve as "project sponsor" and administer the grant funds on behalf of the other cooperating local governments. There is a special application for regional projects.

Title: Water Resources Development Grant Program
Agency: North Carolina Department of Environment and Natural Resources, Division of Water Resources

Applications for grants may be made for the non-federal share of water resources development projects for the following purposes in amounts not to exceed the percentage of the non-federal costs indicated:

- General navigation projects that are sponsored by local governments – 80%;
- Recreational navigation projects – 25%;
- Construction costs for water management (flood control and drainage) purposes, including utility and road relocations not funded by the State Department of Transportation – 66 2/3%, but only of that portion of the project specifically allocated for such flood control or drainage purposes;
- Stream restoration – 66 2/3%;
- Protection of privately owned beaches where public access is allowed and provided for – 75%;
- Land acquisition and facility development for water-based recreation sites operated by local governments – 50%;
- Aquatic weed control projects sponsored by local governments – 50%.

Local

Local governments depend upon local property taxes as their primary source of revenue. These taxes are typically used to finance services that must be available and delivered on a routine and regular basis to the general public. If local budgets allow, these funds may be used for other purposes in the general public interest. Many times

these funds are used to match Federal or State grant programs when required for large-scale projects.

Non-governmental
Another potential source of revenue for implementing local mitigation projects are monetary contributions from non-governmental organizations, such as private sector companies, churches, charities, community relief funds, the Red Cross, hospitals, Land Trusts and other non-profit organizations.

Political Willpower

Most Pamlico County residents are quite knowledgeable about the potential hazards that their community faces, and in recent years, they have become more familiar with the practices and principles of mitigation. Many flood prone structures have become elevated and to a lesser extent, acquired and relocated or replaced out of harm's way. It is strongly believed that such tangible and visual changes within the community have created a greater sense of awareness among local residents, and that hazard mitigation is a concept that they are beginning to readily accept and support.

Because of this fact, coupled with Pamlico County's history with natural disasters, it is expected that the current and future political climates are favorable for supporting and advancing future hazard mitigation strategies.

SECTION 17: ALLIANCE

Profile
Alliance is located along NC Highway 55, between the incorporated towns of Grantsboro and Bayboro. Incorporated in 1965, Alliance has a land area of 2 square miles.

Alliance has a population of 739 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Alliance residents is 24.7 minutes. The average household size in Alliance is 2.40 persons per household. The following statistics are based on the 2000 Census.

Table 19. Alliance Population Data

Subject	Number	Percent
Total Population	781	100
Sex and Age		
Male	355	45.5
Female	426	54.5
Under 5 years	47	6.0
5 to 9 years	55	7.0
10 to 14 years	35	4.5
15 to 19 years	49	6.3
20 to 24 years	33	4.2
25 to 34 years	73	9.3
35 to 44 years	118	15.1
45 to 54 years	95	12.2
55 to 59 years	44	5.6
60 to 64 years	39	5.0
65 to 74 years	78	10.0
75 to 84 years	55	7.0
85 years and over	60	7.7
Median age (years)	43.3	
65 years and over	193	24.7
RACE		
White	622	79.6
Black or African American	138	17.7
Hispanic	6	0.8
American Indian and Alaska Native	9	1.2

Subject	Number	Percent
Asian	4	0.5
Native Hawaiian / Pacific Islander	0	0
Some other race	2	0.3
Two or more races	6	0.8
SOCIAL CHARACTERISTICS		
Population 25 years and over	561	100.0
High school graduate or higher	136	80.4
Bachelor's degree or higher	19	5.5
Disability status (population 21 to 64 years)		
Foreign born	15	2.0
Now married (population 15 years and older)	347	55.4
Speak a language other than English at home	15	2.2
HOUSING CHARACTERISTICS		
Total housing units	304	100.0
Occupied housing units	288	94.7
Owner-occupied housing units	214	74.3
Renter-occupied housing units	74	25.7
Vacant housing units	16	5.3
YEAR STRUCTURE BUILT		
1999 to March 2000	4	1.3
1995 to 1998	39	12.8
1990 to 1994	29	9.5
1980 to 1989	57	18.8
1970 to 1979	78	25.7
1960 to 1969	37	12.2
1940 to 1959	40	13.2
1939 or earlier	20	6.6

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 3.3% were unemployed and looking for work. The sales and occupation sector employs the largest number of town residents (30.2%), followed by management and related occupations (27.5%) and production and transportation occupations (18.0%).

Table 20. Alliance Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	70	27.5
Service occupations	16	6.3
Sales and office occupations	77	30.2

Farming, fishing, and forestry	3	1.2
Construction, extraction and maintenance	43	16.9
Production and transportation	46	18.0
TOTAL WORKFORCE	255	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $15,951. The most recent poverty estimates indicate that 17.3% of Alliance residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Alliance's Capability

Alliance partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Alliance participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections. Alliance does not have any repetitive loss properties.

Alliance will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Alliance is located in Table 21.

Table 21. Alliance Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those floodplain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Alliance worked with the North Carolina Division of Community Assistance to revise the community's action plan. Alliance currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Alliance identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect life and property from public nuisance such as: unmaintained junk yards, overgrown properties and other public health hazards which include uncontrolled, vicious dogs.

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Alliance to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 22. Alliance Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Ensure that the County has responsibility for storm water detention regulations.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Medium Technically feasible and environmentally sound
2	Continue to address drainage issues as the need arises, to prevent pondering of water	Flooding, Hurricanes and Tropical Storms, Nor'easters Mosquitoes	Town Funds	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
3	Continue an active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Continue to rely upon the television and radio outlets for news and weather updates.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Local TV Stations and Local Radio Stations	ongoing	High Cost effective, technically feasible and environmentally sound
5	Closely monitor the development in hazard areas to ensure buildings meet construction regulations.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
6	Enforce CAMA buffer rules to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
7	Remove debris as	Flooding,	FEMA	Town	ongoing	Medium

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	soon as possible after the event.	Hurricanes and Tropical Storms, Nor'easters		Commissioners		Technically feasible and environmentally sound
10	Keep culverts and drains free of debris with the help of prisoners	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections (hired by Town)	ongoing	High Cost effective, technically feasible and environmentally sound
11	Ensure the county continues to provide technical assistance to property owners on how to protect their property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornados	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
12	County has established building codes which address Base Flood Elevations. Monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
13	Contact the NFIP office to request information on the Community Rating System	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	January 1, 2011	High Cost effective, technically feasible and environmentally sound
14	Continue to work with Tideland Electric and Progress Energy to provide electric power to the	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	community and continue their program of tree trimming					
15	Monitor the National Weather Service reports of wind speeds and storm conditions	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	National Weather Service	ongoing	High Cost effective, technically feasible and environmentally sound
16	Continue working with the state for snow removal	Nor'easters, Severe Winter Storms	DOT (Dept. of Transportation) county Road Funds	DOT (Department of Transportation)	ongoing	High Cost effective, technically feasible and environmentally sound
17	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Technically feasible
18	Seek assistance from the NC Forestry Service which has an ongoing wildfire education program, annually	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
19	Monitor NC Forestry Service tower posts for fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
21	Continue to administer a Public Nuisance Ordinance	Unmaintained junk yards, Public Health Issues,	Town Funds	Town	ongoing	High Cost effective, technically feasible

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	and Animal Control Ordinance	Uncontrolled and vicious dogs				and environmentally sound
22	Continue maintenance on town roads	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town	ongoing	Low Technically feasible
23	Continue to provide Local Fire Protection	Structure fires, i.e.: lightning strikes, automobile accidents	Town Funds	Town and Volunteer Fire Department	ongoing	High Cost effective, technically feasible and environmentally sound
24	Continue to provide Trash Pickup and Large Item Pickup	Flooding, Hurricanes and Tropical Storms, Nor'easters and Public Health Issues	50% Town Funds 50% Citizens	Town	ongoing	High Cost effective, technically feasible and environmentally sound
25	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Manager	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 20. Alliance FIRM Flood Zones

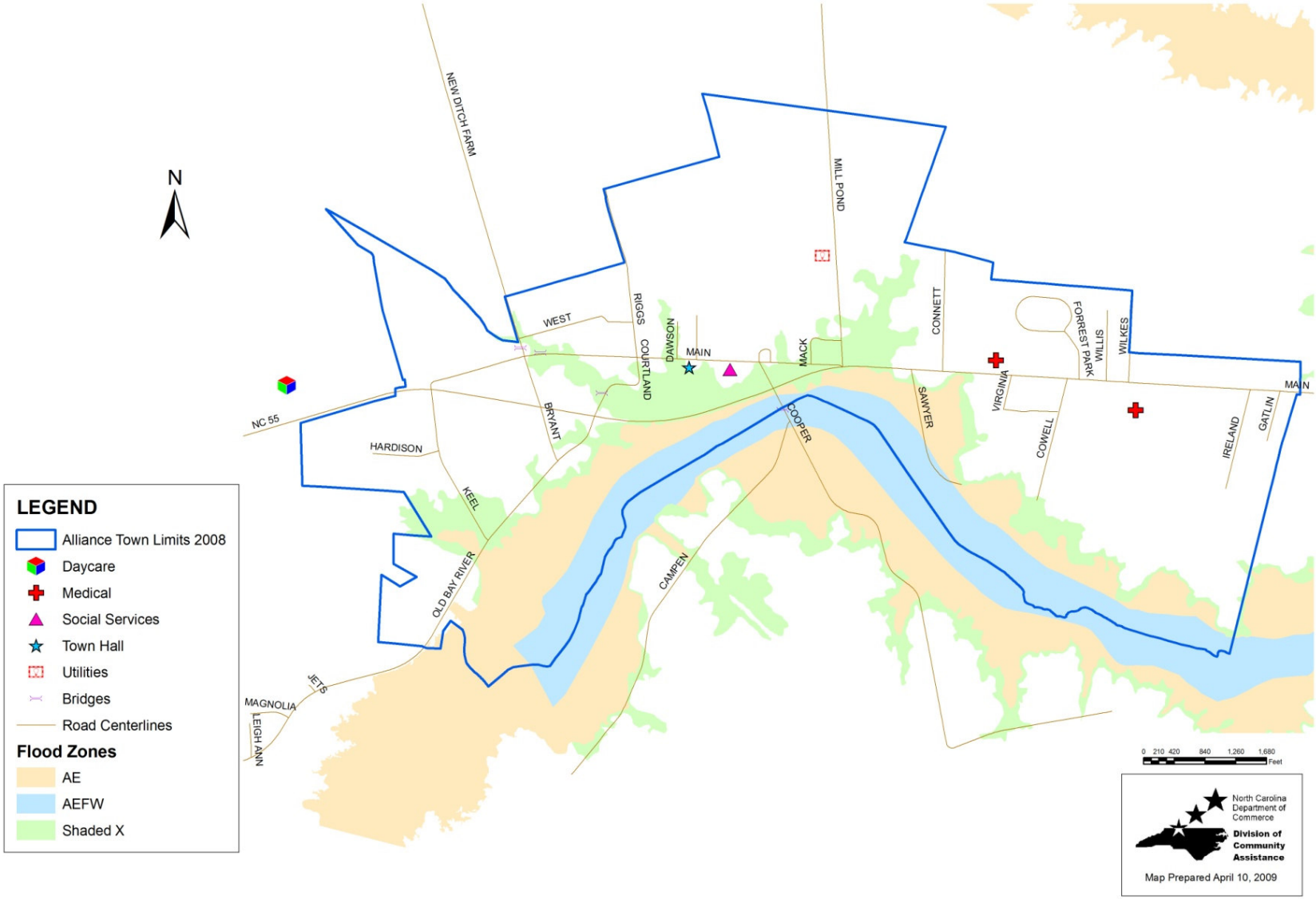


Figure 21. Alliance Storm Surge Inundation by Hurricane Category

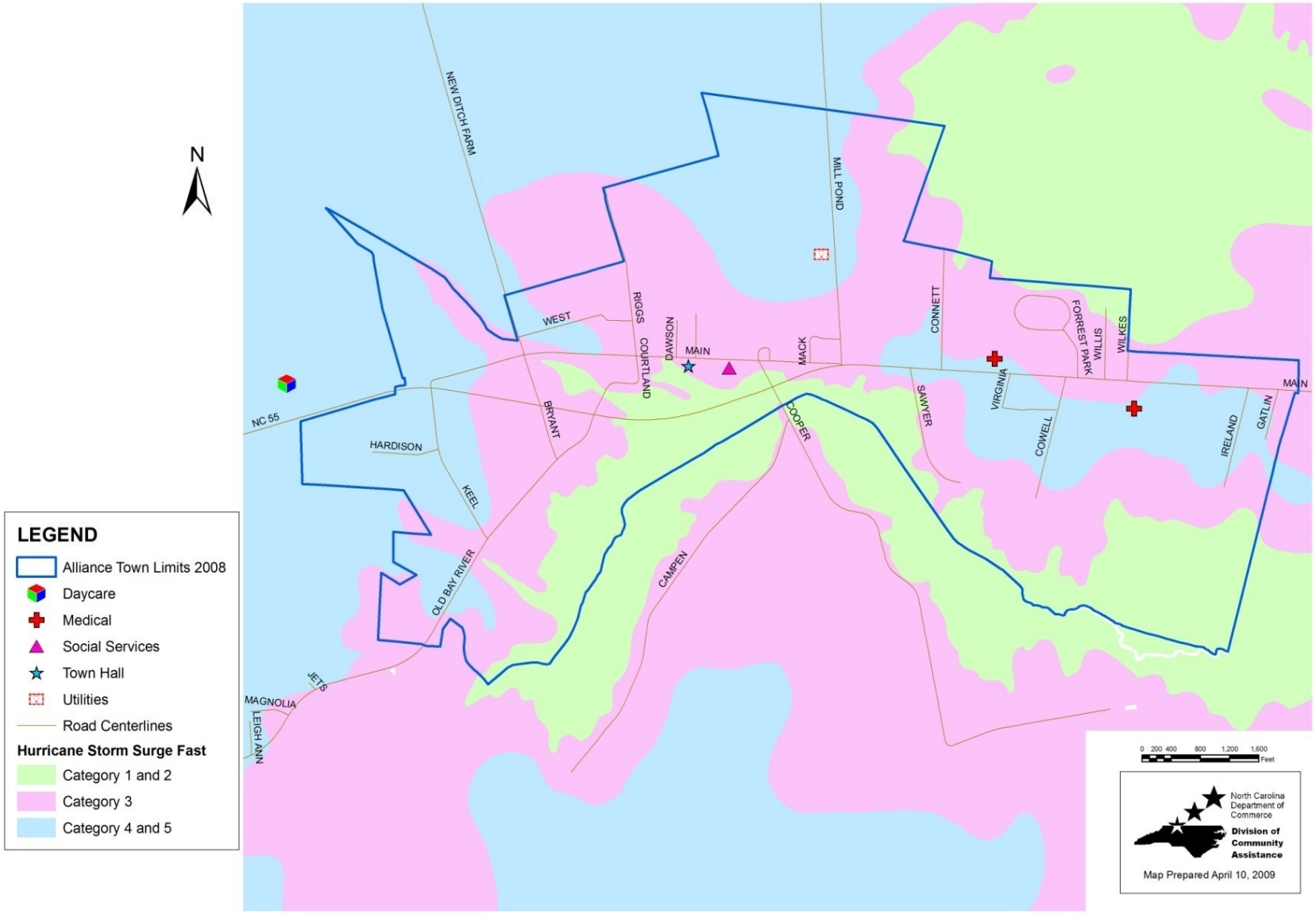


Table 23. Alliance Vulnerability Assessment

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	106	186	292	2,748,513	1,014,810	3,763,323	5,444,160
Category 3	323	419	742	20,614,636	8,327,517	28,942,153	16,589,280
Category 4 & 5	30	20	50	1,453,456	423,091	1,876,547	1,540,800
Total	459	625	1,084	24,816,605	9,765,418	34,582,023	23,574,240
Inundation - Fast							
Category 1 & 2	74	162	236	1,477,442	832,206	2,309,648	3,800,640
Category 3	213	312	525	11,640,616	4,981,012	16,621,628	10,939,680
Category 4 & 5	172	150	322	11,698,547	3,952,200	15,650,747	8,833,920
Total	0	624	1,083	24,816,605	9,765,418	34,582,023	23,574,240
100-Year Floodplain							
AE	72	99	171	1,295,686	710,221	2,005,907	3,697,920
Total	72	99	171	1,295,686	710,221	2,005,907	3,697,920
Inundation - Slow							
Category 1 & 2	106	186	292	2,748,513	1,014,810	3,763,323	5,444,160

* Future Development was calculated by multiplying Vacant Acres by the average value per acre in Alliance ($51,360), determined by dividing the Total Value of Developed Properties in Alliance by Total Developed Acres

SECTION 18: ARAPAHOE

Profile
Arapahoe is located along NC Highway 306, between the incorporated towns of Grantsboro and Minnesott Beach. Incorporated in 1969, Arapahoe has a land area of 0.89 square miles.

Arapahoe has a population of 427 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Arapahoe residents is 32.1 minutes. The average household size in Arapahoe is 2.32 persons per household.[1] The following statistics are based on the 2000 Census.

Table 24. Arapahoe Population Data

Subject	Number	Percent
Total Population	436	100
Sex and Age		
Male	216	49.5
Female	220	50.5
Under 5 years	23	5.3
5 to 9 years	29	6.7
10 to 14 years	20	4.6
15 to 19 years	26	6.0
20 to 24 years	22	5.0
25 to 34 years	57	13.1
35 to 44 years	51	11.7
45 to 54 years	78	17.9
55 to 59 years	29	6.7
60 to 64 years	28	6.4
65 to 74 years	36	8.3
75 to 84 years	30	6.9
85 years and over	7	1.6
Median age (years)	41.8	
65 years and over	73	16.7
RACE		
White	392	89.9
Black or African American	27	6.2

[1] US 2000 Census

Subject	Number	Percent
Hispanic	24	5.5
American Indian and Alaska Native	1	0.2
Asian	5	1.1
Native Hawaiian / Pacific Islander	0	0
Some other race	11	2.5
Two or more races	0	0
SOCIAL CHARACTERISTICS		
Population 25 years and over	309	100.0
High school graduate or higher	115	79.6
Bachelor's degree or higher	25	9.7
Disability status (population 21 to 64 years)	50	18.8
Foreign born	14	3.2
Now married (population 15 years and older)	197	54.9
Speak a language other than English at home	23	5.5
HOUSING CHARACTERISTICS		
Total housing units	214	100.0
Occupied housing units	188	87.9
Owner-occupied housing units	142	75.5
Renter-occupied housing units	46	24.5
Vacant housing units	26	12.1
YEAR STRUCTURE BUILT		
1999 to March 2000	5	2.3
1995 to 1998	17	8.0
1990 to 1994	20	9.4
1980 to 1989	26	12.2
1970 to 1979	41	19.2
1960 to 1969	18	8.5
1940 to 1959	36	16.9
1939 or earlier	50	23.5

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 1.7% was unemployed and looking for work. The sales and office occupations sector employs the largest number of town residents (30.1%), followed by production and transportation (20.4%) and management and related occupations (18.4%).

Table 25. Arapahoe Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	38	18.4

Service occupations	20	9.7
Sales and office occupations	62	30.1
Farming, fishing, and forestry	10	4.9
Construction, extraction and maintenance	34	16.5
Production and transportation	42	20.4
TOTAL WORKFORCE	206	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $17,073. The most recent poverty estimates indicate that 10.9% of Arapahoe residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Arapahoe's Capability

In its hazard mitigation strategy Arapahoe partners with many local, state, and federal agencies. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Arapahoe does not have mapped hazard areas within its jurisdiction. Therefore, Arapahoe will continue to work with the County to lessen the impacts of natural hazards on people and property.

Arapahoe does not participate in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). Arapahoe does not have any repetitive loss properties.

Arapahoe will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Arapahoe is located in Table 26.

Table 26. Arapahoe Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and erosion control. Through its roadway requirements,	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water management.	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance (Arapahoe is not a member of the National Flood Insurance Program)	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and moving structures away from shorelines	Any changes to the buffer rules and regulations should be incorporated in future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Natural Hazards Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people	Continue outreach

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			often ignore outreach material	projects and expand them where practical

Action Plan
Arapahoe worked with the North Carolina Division of Community Assistance to revise the community's action plan. Arapahoe currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Arapahoe identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Arapahoe to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 27. Arapahoe Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Ensure that the County has responsibility for storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Monitor and address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
3	Continue an active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
5	Remove debris as soon as possible after the event.	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
6	Monitor culverts and drains and keep them free of debris	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Dept of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
7	Provide technical	Flooding, Hurricanes and	County's	Pamlico County	ongoing	High

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	assistance to property owners regarding protecting their property	Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	General Fund	Emergency Management, Building Inspections		Cost effective, technically feasible and environmentally sound
8	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress	ongoing	High Cost effective, technically feasible and environmentally sound
9	Pursue State assistance in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	NC Dept of Transportation	NC Dept of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
10	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Technically feasible
11	Seek assistance from the NC Forestry Service has an ongoing wildfire education program, annually	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
12	Monitor NC Forestry Service posts for fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound

Figure 22. Arapahoe FIRM Flood Zones & Critical Facilities

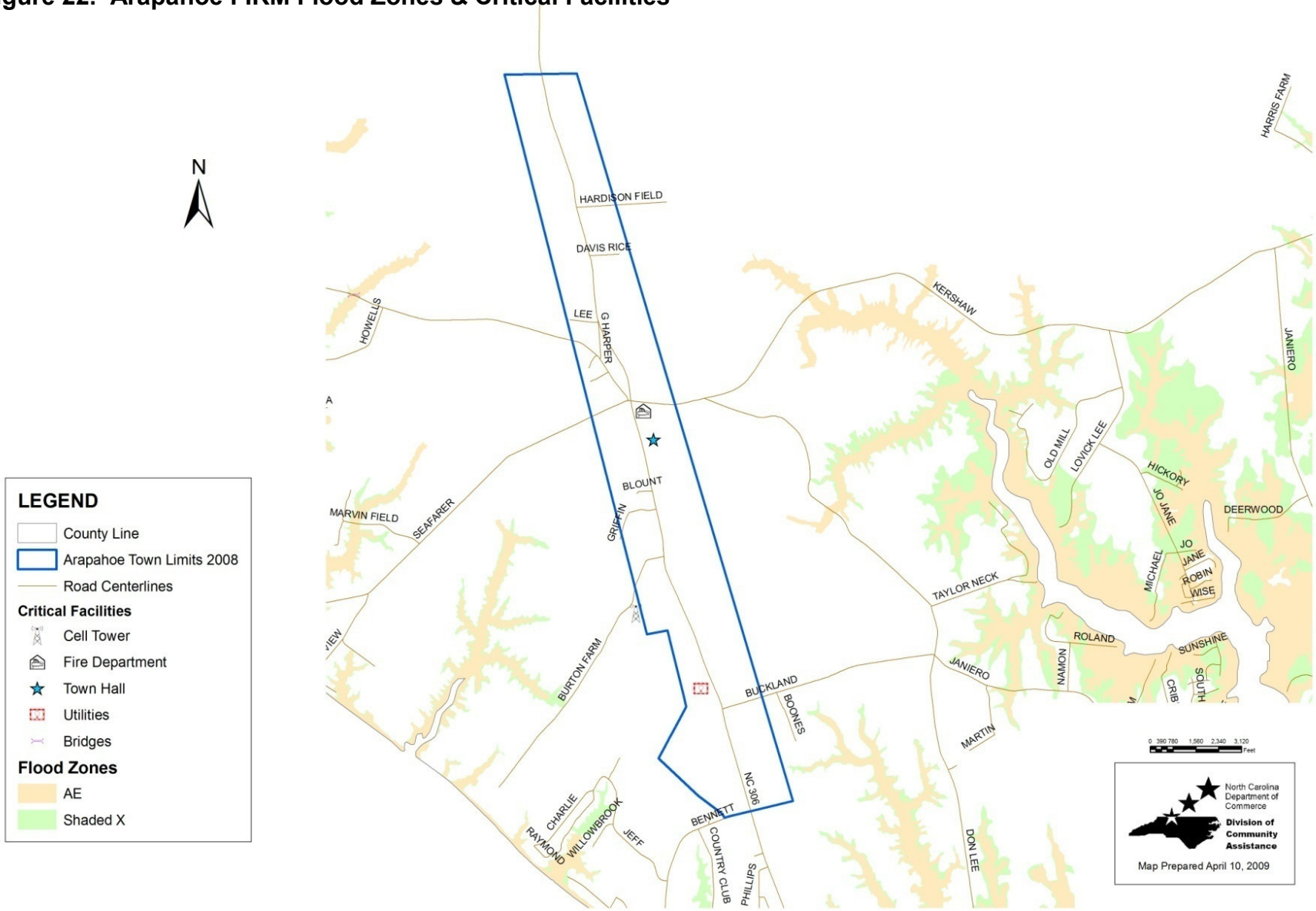


Figure 23. Arapahoe Storm Surge Inundation by Hurricane Category

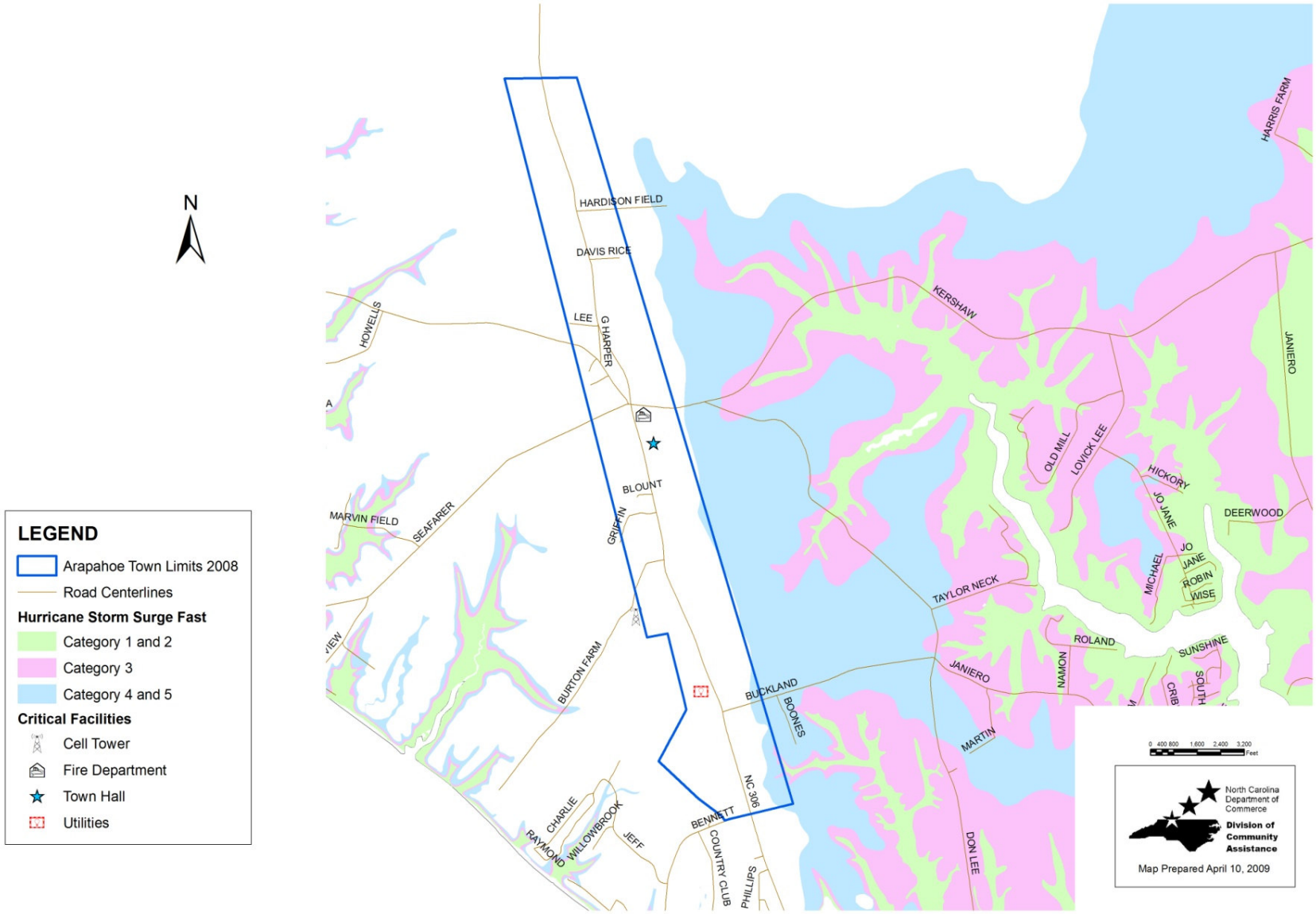


Table 28. Arapahoe Vulnerability Assessment

	Vacant Acres	Developed Acres	Total Acres	Structures	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow								Inundation - Slow
Category 1 & 2	0	0	0	0	0	0	0	Category 1 & 2
Category 3	0		0	0	0	0	0	Category 3
Category 4 & 5	101	1	102	73,329	190,739	264,068	2,415,718	Category 4 & 5
Total	101	1	102	73,329	190,739	264,068	2,415,718	Total
Inundation - Fast								Inundation - Fast
Category 1 & 2	0	0	0	0	0	0	0	Category 1 & 2
Category 3	0	0	0	0	0	0	0	Category 3
Category 4 & 5	93	0	0	0	153,642	153,642	2,224,374	Category 4 & 5
Total	93	0	0	0	153,642	153,642	2,224,374	Total
100-Year Floodplain								100-Year Floodplain
AE	0	0	0	0	0	0	0	AE
Total	0	0	0	0	0	0	0	Total
Inundation - Slow								Inundation - Slow
Category 1 & 2	0	0	0	0	0	0	0	Category 1 & 2

* Future Development was calculated by multiplying Vacant Acres by the average value per acre in Arapahoe ($23.918), determined by dividing the Total Value of Developed Properties in Arapahoe by Total Developed Acres

SECTION 20: BAYBORO

Profile
Bayboro is located along NC Highway 55, between the incorporated towns of Alliance and Stonewall. Incorporated in 1881, Bayboro has a land area of 1 square mile.

Bayboro has a population of 732 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Bayboro residents is 22.5 minutes. The average household size in Bayboro is 2.36 persons per household.[2] The following statistics are based on the 2000 Census.

Table 29. Bayboro Population Data

Subject	Number	Percent
Total Population	741	100
Sex and Age		
Male	361	48.7
Female	380	51.3
Under 5 years	39	5.3
5 to 9 years	55	7.4
10 to 14 years	55	7.4
15 to 19 years	58	7.8
20 to 24 years	29	3.9
25 to 34 years	63	8.5
35 to 44 years	129	17.4
45 to 54 years	98	13.2
55 to 59 years	40	5.4
60 to 64 years	34	4.6
65 to 74 years	96	13.0
75 to 84 years	33	4.5
85 years and over	12	1.6
Median age (years)	41.0	
65 years and over	141	19.0
RACE		
White	346	46.7
Black or African American	379	51.1
Hispanic	11	1.5

[2] US 2000 Census

Subject	Number	Percent
American Indian and Alaska Native	3	0.4
Asian	3	0.4
Native Hawaiian / Pacific Islander	0	0
Some other race	7	0.9
Two or more races	3	0.4
SOCIAL CHARACTERISTICS		
Population 25 years and over	518	100.0
High school graduate or higher	146	71.6
Bachelor's degree or higher	38	13.3
Disability status (population 21 to 64 years)	129	32.3
Foreign born	6	0.8
Now married (population 15 years and older)	254	42.0
Speak a language other than English at home	42	5.9
HOUSING CHARACTERISTICS		
Total housing units	340	100.0
Occupied housing units	301	88.5
Owner-occupied housing units	220	73.1
Renter-occupied housing units	81	26.9
Vacant housing units	39	11.5
YEAR STRUCTURE BUILT		
1999 to March 2000	29	8.6
1995 to 1998	33	9.7
1990 to 1994	21	6.2
1980 to 1989	39	11.5
1970 to 1979	73	21.5
1960 to 1969	76	22.4
1940 to 1959	54	15.9
1939 or earlier	14	4.1

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 3.5% were unemployed and looking for work. The sales and occupation sector employs the largest number of town residents (25%), followed by production and transportation (23.1%) and management and related occupations (19.8%).

Table 30. Bayboro Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	61	19.8
Service occupations	57	18.5

Sales and office occupations	77	25.0
Farming, fishing, and forestry	5	1.6
Construction, extraction and maintenance	37	12.0
Production and transportation	71	23.1
TOTAL WORKFORCE	308	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $13,709. The most recent poverty estimates indicate that 28.5% of Bayboro residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Bayboro's Capability

Bayboro partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Bayboro participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Bayboro will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Bayboro is located in Table 30.

Table 31. Bayboro Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections)	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Bayboro worked with the North Carolina Division of Community Assistance to revise the community's action plan. Bayboro currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Bayboro identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Bayboro to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 32. Bayboro Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to administer storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Address drainage issues as needed	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners, NC DOT	ongoing	Medium Technically feasible and environmentally sound
3	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
4	Continue to enforce State and CAMA buffer rules to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
4	Execute debris removal following an event.	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
6	Monitor culverts and drains maintain them	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High Cost effective, technically

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
						feasible and environmentally sound
7	Continue to provide technical assistance to property owners regarding protection of property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
8	Address Base Flood Elevations and monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
8	Contact the local NFIP representative to determine the status of the Community Rating, the Flood Plain Administrator designation, and the status of the Flood Damage Prevention Ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High Cost effective, technically feasible and environmentally sound
10	Address the storm water runoff issues as necessary	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners, NC DOT	ongoing	Medium Technically feasible and environmentally sound
11	Perform routine maintenance of culverts, ditches, and streams	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
12	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally sound
13	Seek assistance from the state in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	NC DOT	NC DOT	ongoing	High Cost effective, technically feasible and environmentally sound
14	Continue to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Technically feasible
15	Monitor the NC Forestry posts regarding fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
16	Request the NC Forestry Service brief local fire departments on common concerns, annually, prior to fire season	Wildfire	NC Forestry Service	NC Forestry Service, Pamlico County Emergency Management Director	Annually by July 1	High Cost effective, technically feasible and environmentally sound
17	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Commissioners	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 24. Bayboro FIRM Flood Zones & Critical Facilities

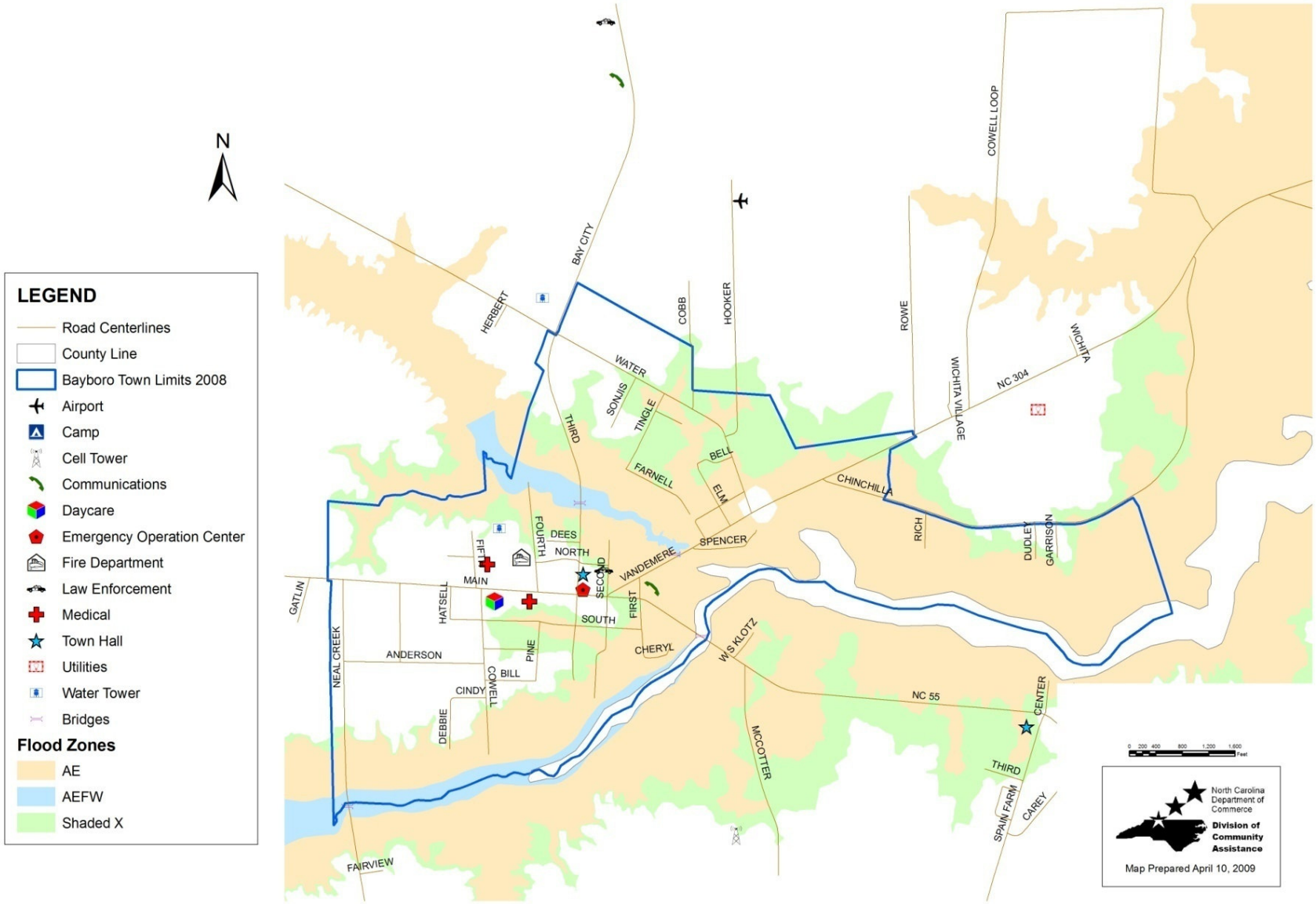


Figure 25. Bayboro Storm Surge Inundation by Hurricane Category

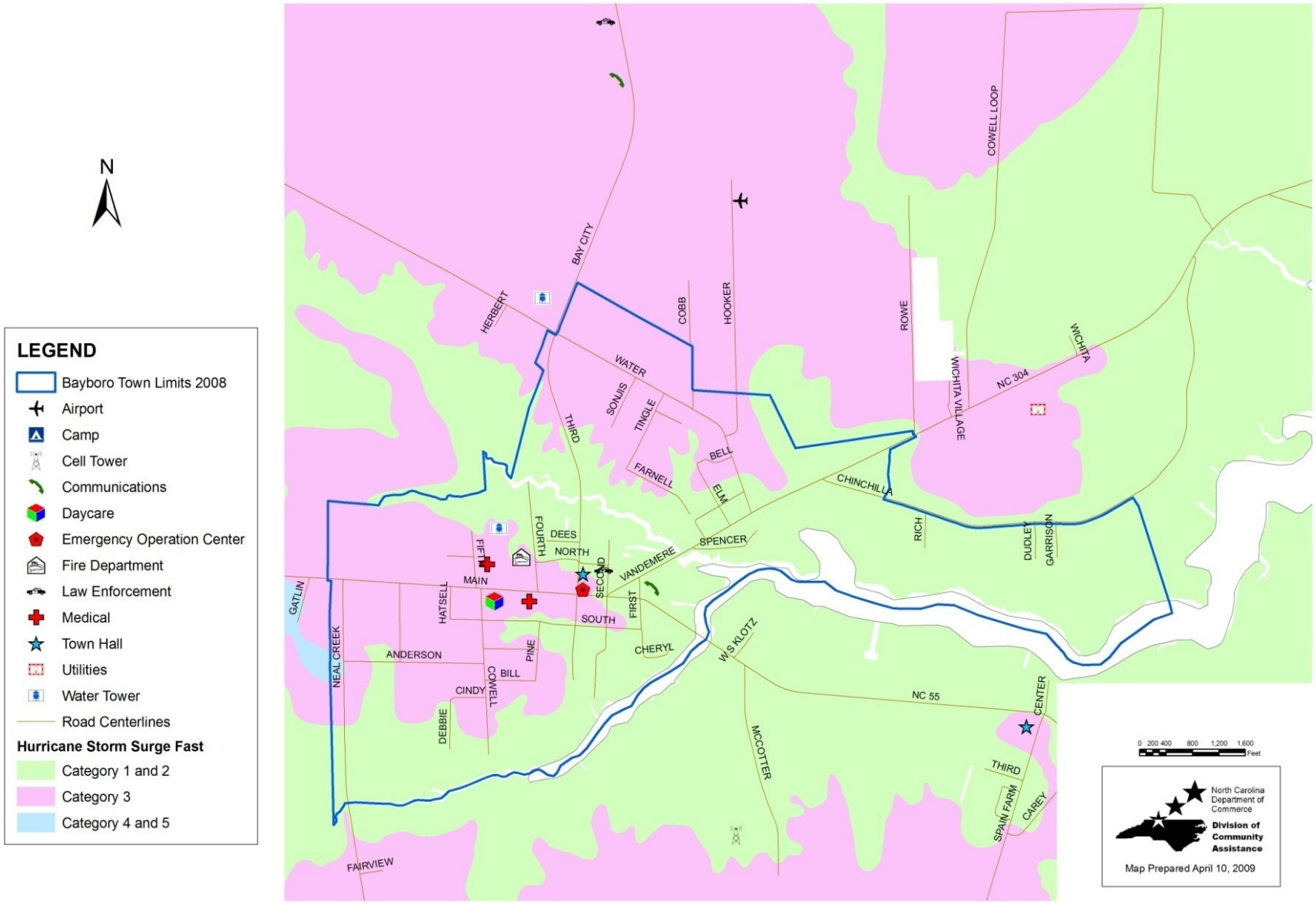


Table 32. Bayboro Vulnerability Assessment

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	310	310	620	21,885,855	6,143,966	28,029,821	28,364,070
Category 3	70	129	199	13,554,510	3,665,912	17,220,422	6,404,790
Category 4 & 5	0	0	0	0	0	0	0
Total	380	439	819	35,440,365	9,809,878	45,250,243	34,768,860
Inundation - Fast							
Category 1 & 2	238	248	486	17,313,609	4,592,327	21,905,936	21,776,286
Category 3	142	192	334	18,115,255	5,198,575	23,313,830	12,992,574
Category 4 & 5	1	1	2	11,501	18,976	30,477	91,497
Total	0	441	822	35,440,365	9,809,878	45,250,243	34,860,357
100-Year Floodplain							
AE	199	224	423	7,806,378	3,476,027	11,282,405	18,207,903
Total	199	224	423	7,806,378	3,476,027	11,282,405	18,207,903
Inundation - Slow							
Category 1 & 2	310	310	620	21,885,855	6,143,966	28,029,821	28,364,070

* Future Development was calculated by multiplying Vacant Acres by the average value per acre in Bayboro ($91,497), determined by dividing the Total Value of Developed Properties in Bayboro by Total Developed Acres

Section 20: Grantsboro

Profile

Grantsboro is located at the intersection of Highway 306 and Highway 55. Incorporated in 1997, Grantsboro has a land area of 3.68 square miles.

During the 2000 Census, the Town of Grantsboro was inadvertently missed during the survey. The error was not picked up until after the Census had been completed. Therefore, detailed socio-economic data is not available for Grantsboro. Some statistics have been generated, however, for voting and state funding purposes.

Grantsboro has a population of 754 persons. There are 322 total housing units in the town, of which 28 are vacant. There are 2.56 persons per household in the town.

Analysis of Grantsboro Capabilities

Grantsboro partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Grantsboro does not have mapped hazard areas within its jurisdiction. Therefore, Grantsboro will continue to work with the County to lessen the impacts of natural hazards on people and property.

Grantsboro does not participate in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). Grantsboro does not have any repetitive loss properties.

Grantsboro will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Grantsboro is located in Table 34.

Table 34. Grantsboro Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water management.	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance (Grantsboro is not a member of the National Flood	N/A	High	High because well-insured structures can be	Continue to participate in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
Insurance Program)			reconstructed	programs that provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it	Any changes to the buffer rules and regulations should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			reaches streams and moving structures away from shorelines	be incorporated in future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				County's action plan.
5. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Natural Hazards Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach material	Continue outreach projects and expand them where practical

Action Plan
Grantsboro worked with the North Carolina Division of Community Assistance to revise the community's action plan. Grantsboro currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Grantsboro identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Grantsboro to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 35. Grantsboro Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to administer storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
3	Continue its participation in the county's active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
5	Enforce State and CAMA buffer rules are enforced to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
6	Develop a municipal zoning code which will address erosion concerns.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	January 1, 2010	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
7	Execute debris removal following an event with assistance from NC Department of Transportation	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA/ NC Department of Transportation	NC Department of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
8	Monitor culverts and drains and maintain through prison labor	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
9	Address Base Flood Elevation and monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
10	Address the storm water runoff issues as necessary	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
11	Establish a more formalized system of routine cleaning of culverts, ditches, streams and the like which impede the flow of water	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	June 1, 2010	Medium Technically feasible and environmentally sound
12	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	tree trimming					sound
13	Monitor the National Weather Service for reports of wind speeds and storm conditions	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	National Weather Service	ongoing	High Cost effective, technically feasible and environmentally sound
14	Seek assistance from the state in clearing the roads after a snow event	Nor'easters, Severe Winter Storms, earthquakes	NC Department of Transportation	NC Department of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
15	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Cost effective
16	Monitor the NC Forestry posts regarding fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound

Figure 26. Grantsboro FIRM Flood Zones & Critical Facilities

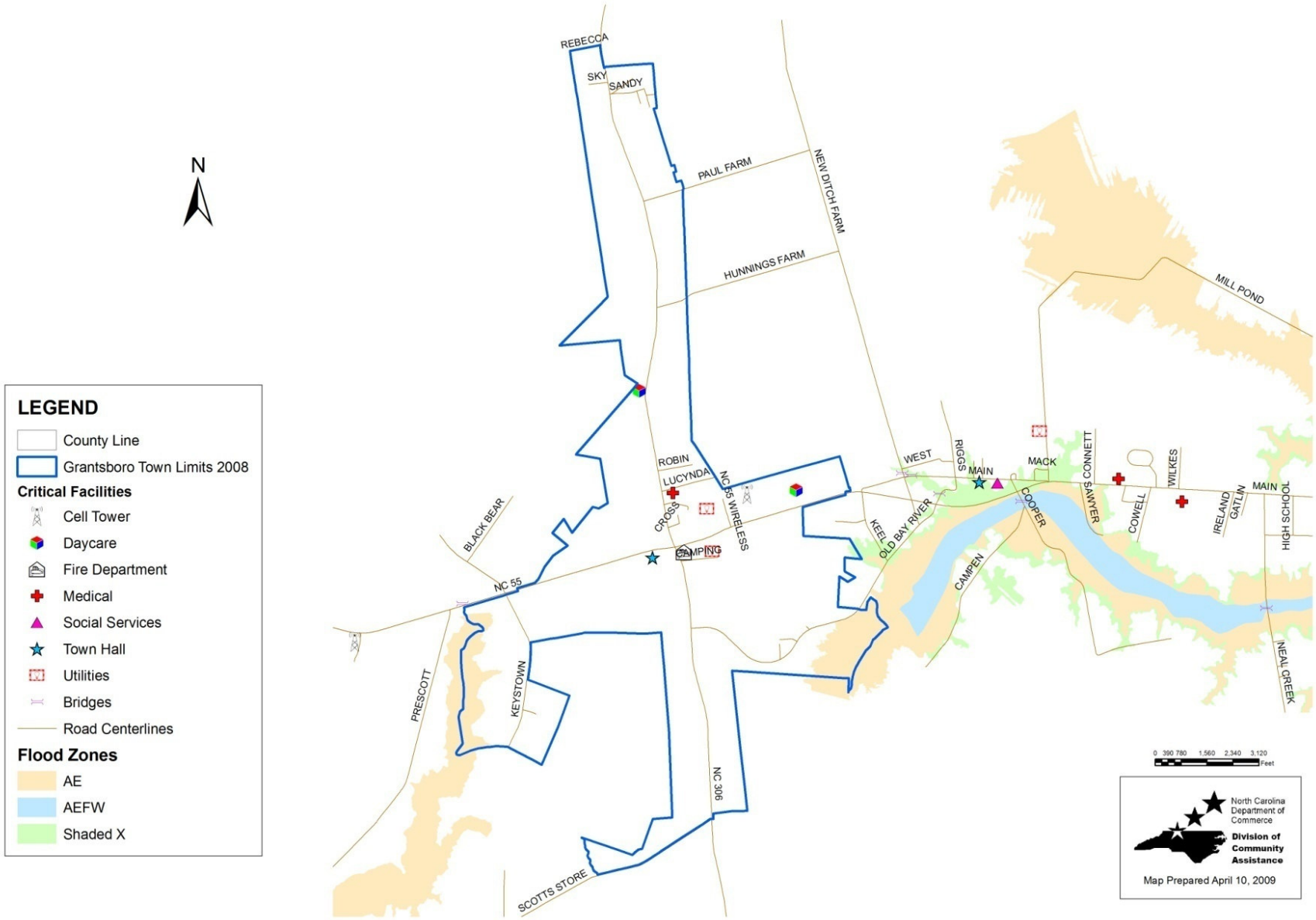


Figure 27. Grantsboro Storm Surge Inundation by Hurricane Category

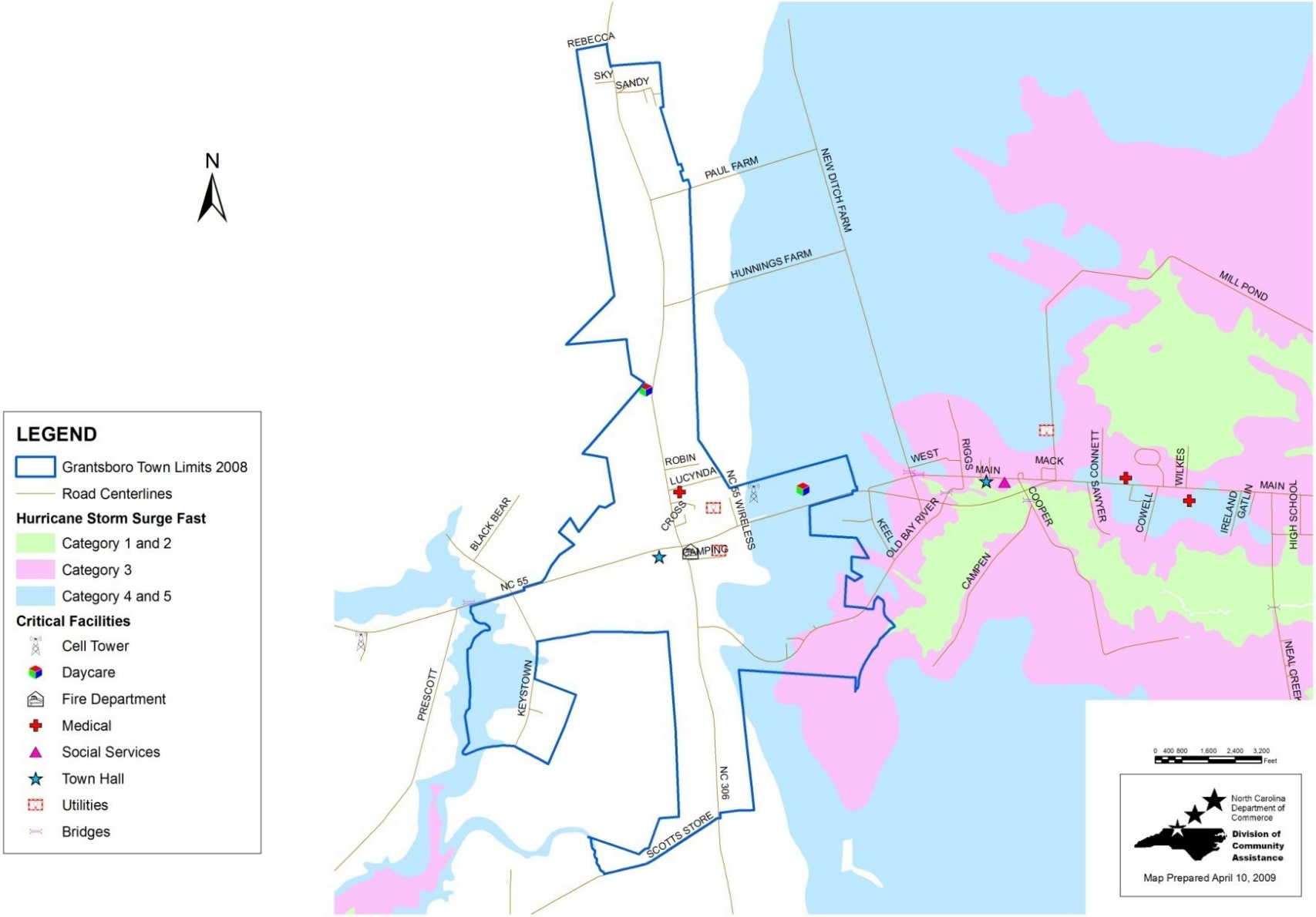


Table 36. Grantsboro Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	0	0	0	0	0	0	0
Category 3	174	15	189	1,810,218	580,937	2,391,155	5,738,346
Category 4 & 5	335	57	392	3,907,457	1,525,956	5,433,413	11,047,965
Total	509	72	581	5,717,675	2,106,893	7,824,568	16,786,311
Inundation - Fast							
Category 1 & 2	0	0	0	0	0	0	0
Category 3	90	3	93	258,448	232,113	490,561	2,968,110
Category 4 & 5	361	43	404	5,117,048	1,684,000	6,801,048	11,905,419
Total	0	46	497	5,375,496	1,916,113	7,291,609	14,873,529
100-Year Floodplain							
AE	112	2	114	199,047	208,718	407,765	3,693,648
Total	112	2	114	199,047	208,718	407,765	3,693,648
Inundation - Slow							
Category 1 & 2	0	0	0	0	0	0	0

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Grantsboro ($32,979), determined by dividing the Total Value of Developed Properties in Grantsboro by Total Developed Acres*

SECTION 21: MESIC

Profile
Mesic is located near the Pamlico County/Beaufort County border in the northeastern part of the county on Highway 304. Incorporated in 1971, Mesic has a land area of 1 square mile.

Mesic has a population of 243 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Mesic residents is 35.9 minutes. The average household size in Mesic is 2.42 persons per household.[3] The following statistics are based on the 2000 Census.

Table 37. Mesic Population Data

Subject	Number	Percent
Total Population	257	100
Sex and Age		
Male	117	45.5
Female	140	54.5
Under 5 years	5	1.9
5 to 9 years	14	5.4
10 to 14 years	26	10.1
15 to 19 years	20	7.8
20 to 24 years	7	2.7
25 to 34 years	14	5.4
35 to 44 years	34	13.2
45 to 54 years	40	15.6
55 to 59 years	11	4.3
60 to 64 years	21	8.2
65 to 74 years	30	11.7
75 to 84 years	24	9.3
85 years and over	11	4.3
Median age (years)	46.3	
65 years and over	65	25.3
RACE		
White	76	29.6
Black or African American	176	68.5

[3] US 2000 Census

Subject	Number	Percent
Hispanic	0	0
American Indian and Alaska Native	0	0
Asian	2	0.8
Native Hawaiian / Pacific Islander	0	0
Some other race	0	0
Two or more races	3	1.2
SOCIAL CHARACTERISTICS		
Population 25 years and over	178	100.0
High school graduate or higher	52	53.9
Bachelor's degree or higher	4	4.5
Disability status (population 21 to 64 years)	43	38.4
Foreign born	0	0.0
Now married (population 15 years and older)	119	58.3
Speak a language other than English at home	6	2.5
HOUSING CHARACTERISTICS		
Total housing units	146	100.0
Occupied housing units	106	72.6
Owner-occupied housing units	94	88.7
Renter-occupied housing units	12	11.3
Vacant housing units	40	27.4
YEAR STRUCTURE BUILT		
1999 to March 2000	8	5.5
1995 to 1998	16	11.0
1990 to 1994	5	3.4
1980 to 1989	24	16.4
1970 to 1979	26	17.8
1960 to 1969	24	16.4
1940 to 1959	25	17.1
1939 or earlier	18	12.3

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 2.6% were unemployed and looking for work. The construction, extraction and maintenance sector employs the largest number of town residents (24.7%), followed by sales and occupation sector and service occupations employ the largest number of town residents (23.5% each).

Table 38. Mesic Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	20	23.5

Service occupations	20	23.5
Sales and office occupations	10	11.8
Farming, fishing, and forestry	0	0
Construction, extraction and maintenance	21	24.7
Production and transportation	14	16.5
TOTAL WORKFORCE	85	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $15,253. The most recent poverty estimates indicate that 27.4% of Mesic residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Mesic Capabilities

In its hazard mitigation strategy, Mesic partners with many local, state, and federal agencies. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Mesic participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Mesic will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Mesic is located in Table 39.

Table 39. Mesic Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those floodplain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water management.	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to	Drainage system maintenance is an

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			better drainage during storm events	ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that provide insurance for natural hazards to residents

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and moving structures away from shorelines	Any changes to the buffer rules and regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of	Health and Safety Maintenance

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			rapid response	capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should include breakwaters and bulkheads as effective mitigation tools.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach material	Continue outreach projects and expand them where practical
Elevation markers	N/A	High	High because an elevation marker program would	All communities should consider an

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			inform the public	elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Mesic worked with the North Carolina Division of Community Assistance to revise the community's action plan. Mesic currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Mesic identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Mesic to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 40. Mesic Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to administer storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Address drainage issues as needed.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Council	ongoing	Medium Technically feasible and environmentally sound
3	Continue participation in the County's beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Continue to rely upon the television and radio outlets for news and weather updates.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Emergency Alert System	ongoing	High Cost effective, technically feasible and environmentally sound
5	Review culverts along Park Avenue and Hollyville Mobile Home Park in Cash Corner to diminish the risk of flooding	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	NC Department of Transportation	November 2010	Medium Technically feasible and environmentally sound
6	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
7	Enforce State and CAMA buffer rules to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Local CAMA Officer	ongoing	High Cost effective, technically feasible and environmentally sound
8	Consider developing a zoning ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Council	ongoing	High Cost effective, technically feasible and environmentally sound
9	Remove debris as soon as possible after the event.	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Council	ongoing	Medium Technically feasible and environmentally sound
10	Keep culverts and drains free of debris with the help of prisoners	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Transportation	ongoing	Medium Technically feasible and environmentally sound
11	Ensure the county continues to provide technical assistance to property owners on how to protect their property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
12	Address Base Flood Elevation and monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
13	Contact the NFIP representative to determine the status of the Community Rating, the Flood Plain Administrator designation, and the status of the Flood Damage Prevention Ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
14	Address the storm water runoff issue	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Medium Technically feasible and environmentally sound
15	Establish a more formalized system of routine cleaning of culverts, ditches, streams and the like which impede the flow of water	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Council, NC Department of Transportation	June 1, 2010	Medium Technically feasible and environmentally sound
16	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and CP&L	ongoing	Medium Technically feasible and environmentally sound
17	Monitor the National Weather Service reports of wind speeds and storm conditions	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	National Weather Service	ongoing	High Cost effective, technically feasible and environmentally sound
18	Seek State assistance in	Nor'easters, Severe Winter	NC Division of	Pamlico County	ongoing	High

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	clearing the roads after a snow event	Storms, earthquakes	Emergency Management	Emergency Management		Cost effective, technically feasible and environmentally sound
19	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services, Coastal Community Action Agency	ongoing	Low Cost effective
20	Seek assistance from the NC Forestry Service for wildfire education program annually	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
21	Monitor NC Forestry Service posts for fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
22	Send written request to the NC Forestry service requesting that they meet with the local fire units prior to fire season to discuss common concerns. The Emergency Management Director for the County will be asked to facilitate the meeting	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
23	Request that the issue of	Flooding, Hurricanes and	General budget	Town Council	November	Medium

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	occluded drainage canals which surround the town be addressed in the county's future hazard mitigation plan updates	Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes			2010	technically feasible and environmentally sound
24	Arrange for the documentation and of grave sites in town and for photographs of the headstones	Flooding, Hurricanes and Tropical Storms, Nor'easters	General budget	Town Council	ongoing	Low Technically feasible
25	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	General budget	Town Council	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 28. Mesic FIRM Flood Zones & Critical Facilities

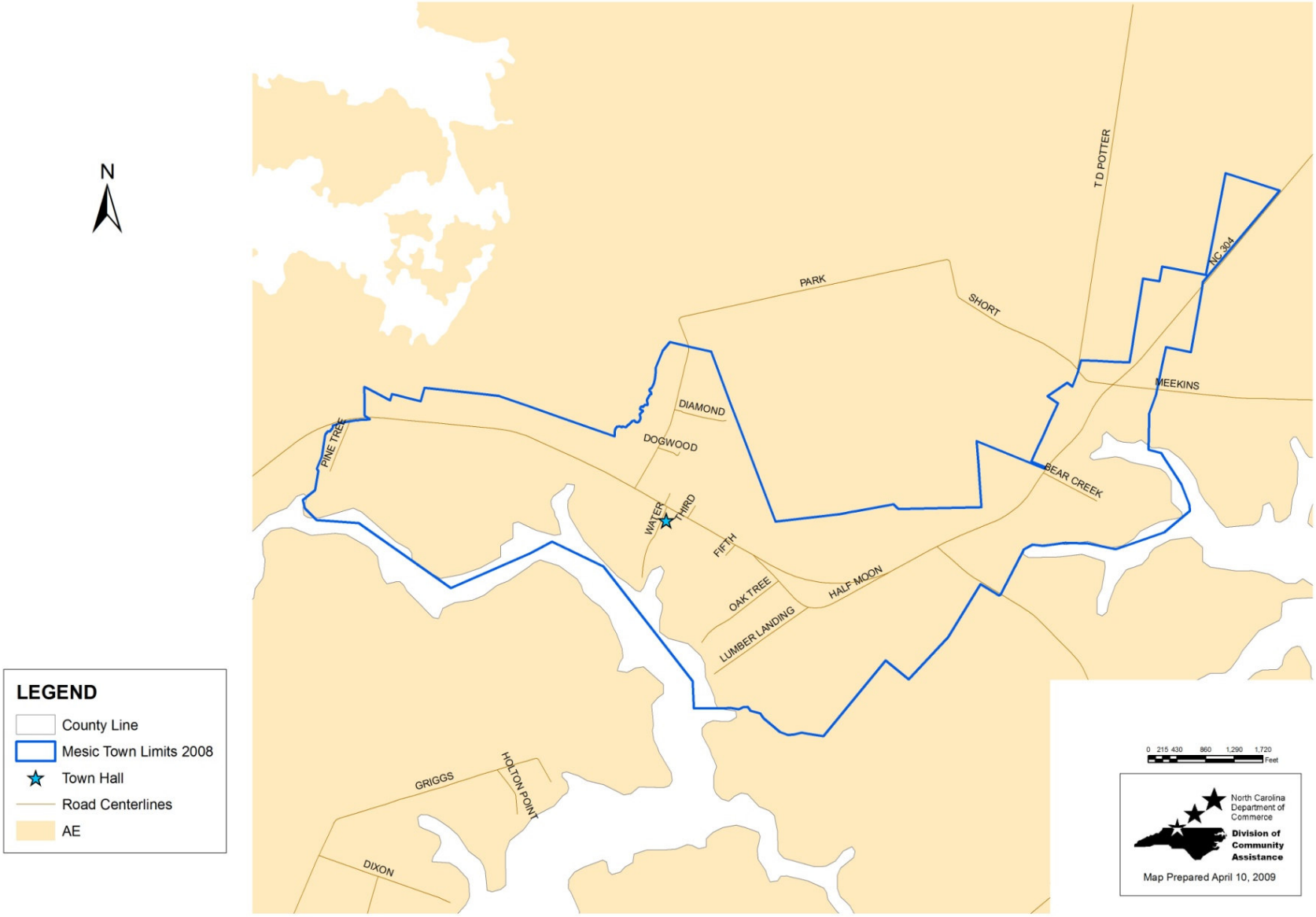


Figure 29. Mesic Storm Surge Inundation

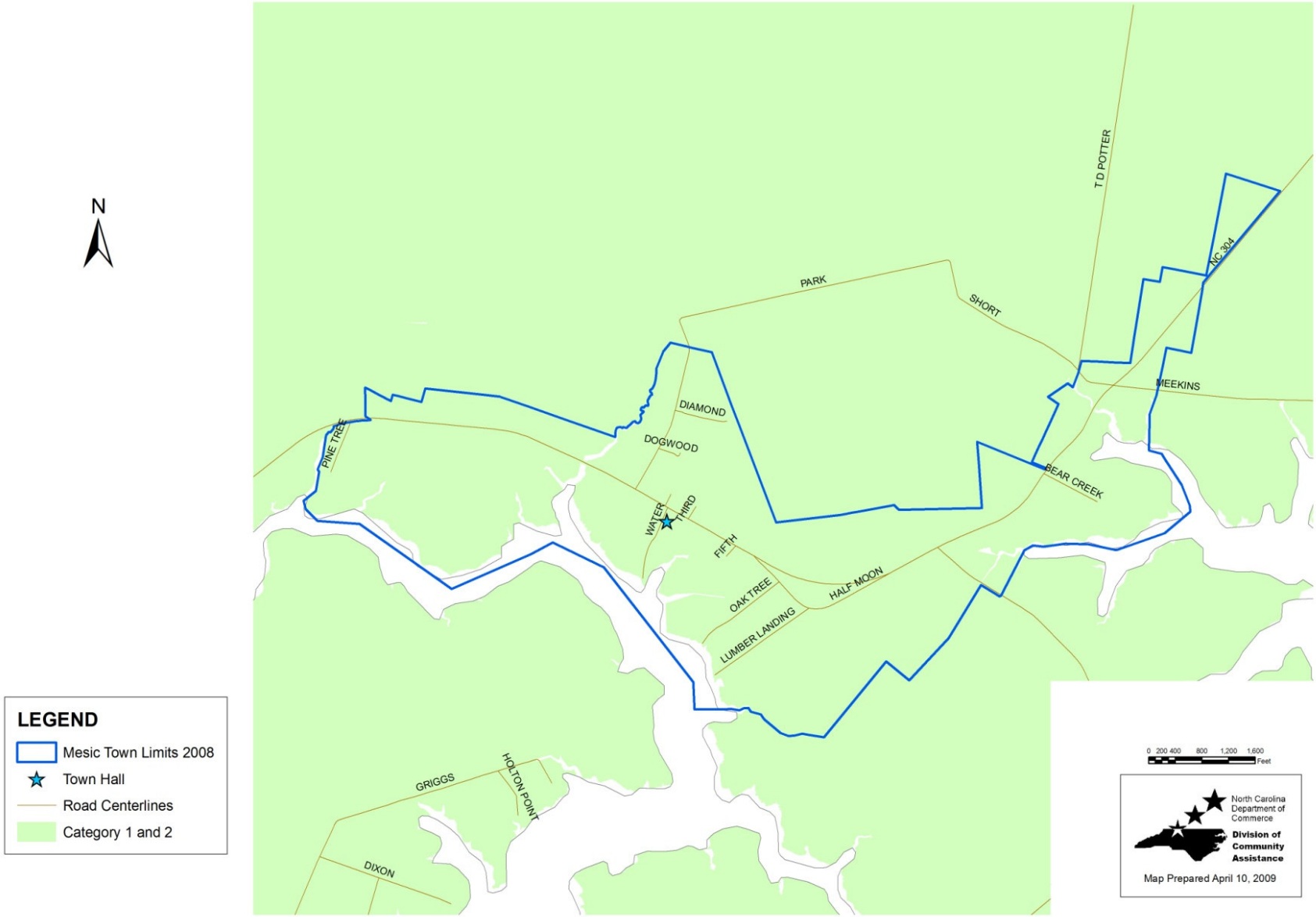


Table 41. Mesic Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409
Inundation - Fast							
Category 1 & 2	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	0	237	686	5,833,309	3,169,738	9,003,047	13,488,409
100-Year Floodplain							
AE	449	267	716	6,026,675	3,232,259	9,258,934	13,488,409
Total	449	267	716	6,026,675	3,232,259	9,258,934	13,488,409
Inundation - Slow							
Category 1 & 2	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Mesic ($30,041), determined by dividing the Total Value of Developed Properties in Mesic by Total Developed Acres*

SECTION 22: MINNESOTT BEACH

Profile
Minnesott Beach is located along the Neuse River, to the southeast of Arapahoe, on Highway 306. Incorporated in 1971, Minnesott Beach has a land area of 3.3 square miles.

Minnesott Beach has a population of 366 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Minnesott Beach residents is 32.7 minutes. The average household size in Minnesott Beach is 2.06 persons per household (US 2000 Census). The following statistics are based on the 2000 Census.

Table 42. Minnesott Beach Population Data

Subject	Number	Percent
Total Population	311	100
Sex and Age		
Male	152	48.9
Female	159	51.1
Under 5 years	6	1.9
5 to 9 years	6	1.9
10 to 14 years	16	5.1
15 to 19 years	10	3.2
20 to 24 years	10	3.2
25 to 34 years	18	5.8
35 to 44 years	37	11.9
45 to 54 years	56	18.0
55 to 59 years	31	10.0
60 to 64 years	31	10.0
65 to 74 years	49	15.8
75 to 84 years	35	11.3
85 years and over	6	1.9
Median age (years)	54.3	
65 years and over	90	28.9
RACE		
White	297	95.5
Black or African American	11	3.5
Hispanic	3	1.0

Subject	Number	Percent
American Indian and Alaska Native	0	0
Asian	2	0.6
Native Hawaiian / Pacific Islander	0	0
Some other race	0	0
Two or more races	1	0.3
SOCIAL CHARACTERISTICS		
Population 25 years and over	268	100.0
High school graduate or higher	56	88.1
Bachelor's degree or higher	44	28.0
Disability status (population 21 to 64 years)	21	10.8
Foreign born	4	1.3
Now married (population 15 years and older)	206	71.5
Speak a language other than English at home	11	3.6
HOUSING CHARACTERISTICS		
Total housing units	230	100.0
Occupied housing units	151	65.7
Owner-occupied housing units	134	88.7
Renter-occupied housing units	17	11.3
Vacant housing units	79	34.3
YEAR STRUCTURE BUILT		
1999 to March 2000	3	1.3
1995 to 1998	8	3.4
1990 to 1994	44	18.6
1980 to 1989	50	21.1
1970 to 1979	92	38.8
1960 to 1969	20	8.4
1940 to 1959	18	7.6
1939 or earlier	2	0.8

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 0.7% was unemployed and looking for work. The management and related occupations sector employs the largest number of town residents (36.7%), followed by sales and occupation sector (27.9%) and production and transportation (11.6%) employ the largest number of town residents.

Table 43. Minnesott Beach Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	54	36.7
Service occupations	14	9.5

Sales and office occupations	41	27.9
Farming, fishing, and forestry	7	4.8
Construction, extraction and maintenance	14	9.5
Production and transportation	17	11.6
TOTAL WORKFORCE	147	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $27,259. The most recent poverty estimates indicate that 2.3% of Minnesott Beach residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Minnesott Beach Capabilities

Minnesott Beach partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Minnesott Beach participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Minnesott Beach will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Minnesott Beach is located in Table 43.

Table 44. Minnesott Beach Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Minnesott Beach worked with the North Carolina Division of Community Assistance to revise the community's action plan. Minnesott Beach currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Minnesott Beach identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Minnesott Beach to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 45. Minnesott Beach Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Commissioners	ongoing	Medium This action is: 1) environmentally sound; and 2) technically feasible.
2	Continue to work with the County on its active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Clerk	ongoing	Medium This action is: 1) cost effective and 2) technically feasible.
3	Continue to enforce the zoning ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
4	Continue to meet all minimum FEMA requirements to remain eligible for debris removal assistance funding from FEMA	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
5	Continue to work with NC Continue to work with the Department of Corrections to provide labor for debris removal from culverts and	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3)

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	drains					technically feasible.
6	Contact the County Floodplain Administrator and the NFIP office to request information on the CRS	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	January 1, 2010	Low This action is technically feasible
7	Continue to work with State and County for assistance in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	County's General Fund, NC Division of Emergency Management	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
8	Continue to work with Pamlico County Health Department and DSS to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low This action is technically feasible
9	Contact the NC Forestry Service once a year to get information about their wildfire education program	Wildfire	NC Forestry Service	Town Clerk	ongoing	Low This action is technically feasible
10	Monitor nearby NC Forestry Service tower posts fire risk for area	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
11	Hold a meeting with NC Forestry service to discuss common concerns. The Emergency Management Director for the County will be asked to facilitate the	Wildfire	NC Forestry Service	Pamlico County Emergency Management	June 1, 2009	Medium This action is 1) cost effective; and 2) technically feasible

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	meeting					
12	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Commissioners	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 30. Minnesott Beach FIRM Flood Zones & Critical Facilities

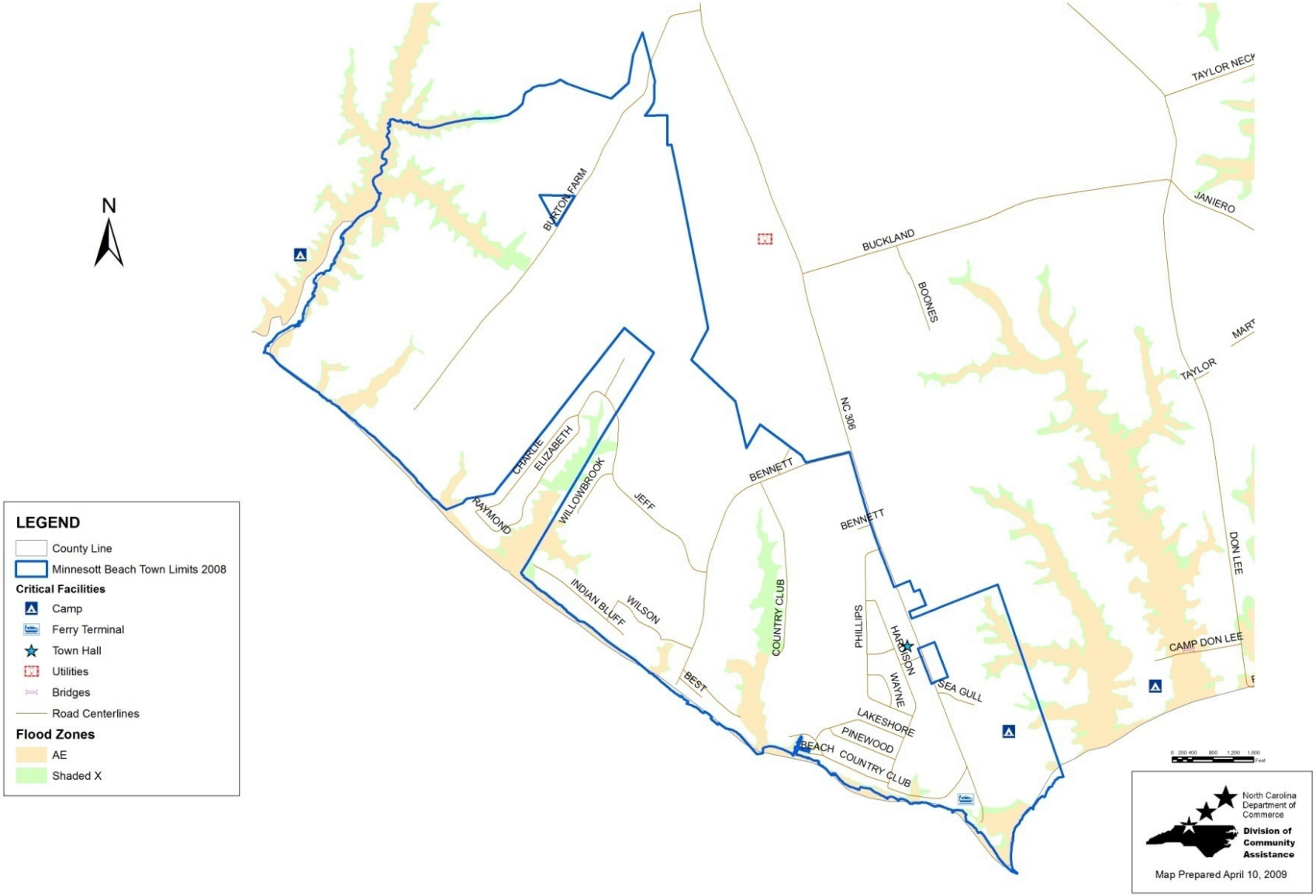


Figure 31. Minnesott Beach Storm Surge Inundation

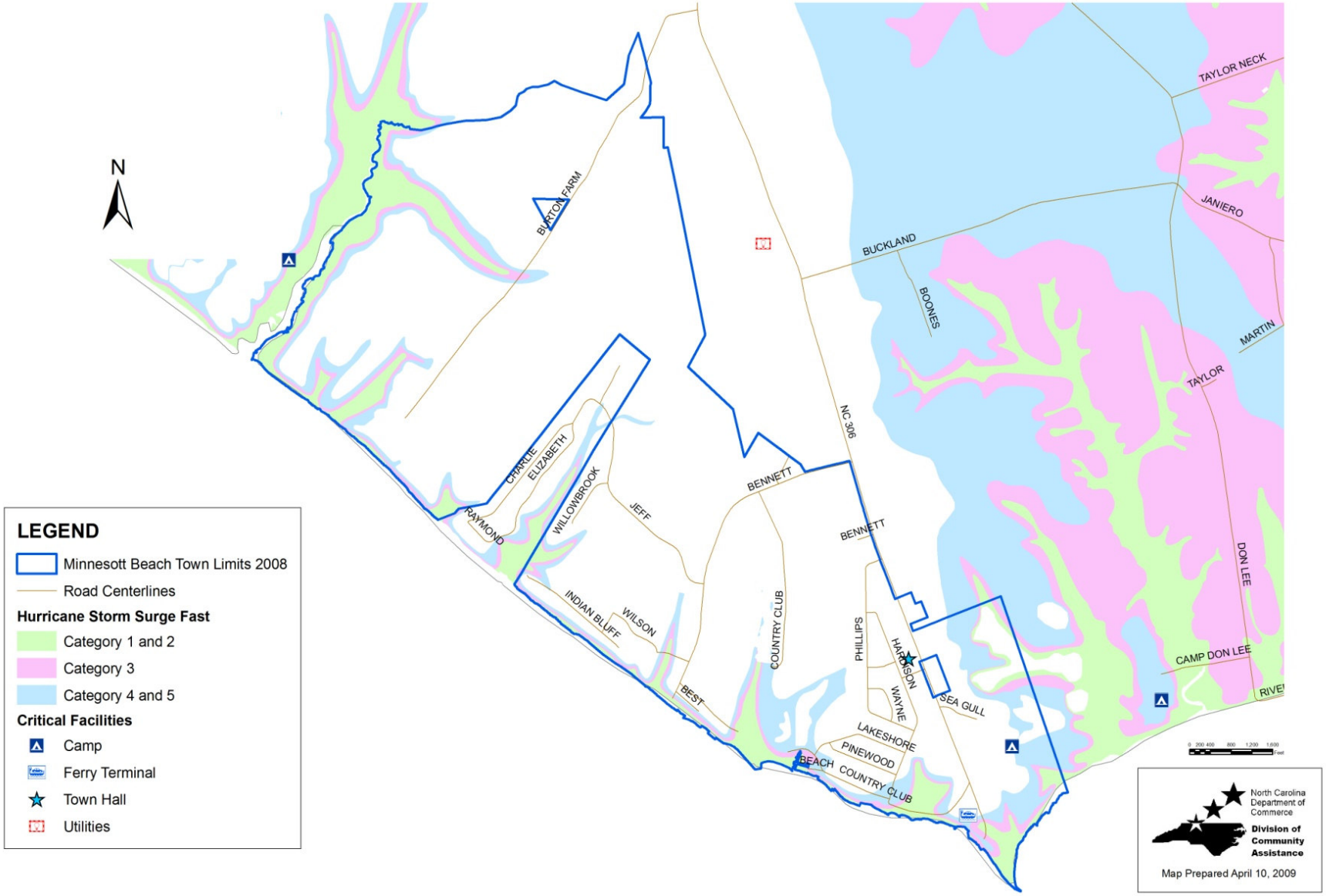


Table 46. Minnesott Beach Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	3	33	36	1,804,154	1,891,783	3,695,937	227,751
Category 3	11	17	28	2,619,330	216,740	2,836,070	835,087
Category 4 & 5	14	77	91	7,593,697	5,017,250	12,610,947	1,062,838
Total	28	127	155	12,017,181	7,125,773	19,142,954	2,125,676
Inundation - Fast							
Category 1 & 2	4	28	32	1,300,669	1,499,749	2,800,418	303,668
Category 3	1	9	10	1,461,868	1,669,515	3,131,383	75,917
Category 4 & 5	15	30	42	5,245,750	211,426	5,457,176	1,138,755
Total	20	67	84	8,008,287	3,380,690	11,388,977	1,518,340
100-Year Floodplain							
AE	1	6	7	385,527	546,332	931,859	75,917
Total	1	6	7	385,527	546,332	931,859	75,917
Inundation - Slow							
Category 1 & 2	3	33	36	1,804,154	1,891,783	3,695,937	227,751

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Minnesott Beach ($75,917), determined by dividing the Total Value of Developed Properties in Minnesott Beach by Total Developed Acres*

SECTION 23: ORIENTAL

Profile
Oriental is located along the Neuse River in the southeastern portion of the county on Highway 55. Incorporated in 1899, Oriental has a land area of 5 square miles.

Oriental has a population of 813 persons as of July 2007, according to the NC Office of State Management and Budget. The main travel time to work for Oriental residents is 30.8 minutes. The average household size in Oriental is 1.98 persons per household. The following statistics are based on the 2000 Census.

Table 47. Oriental Population Data

Subject	Number	Percent
Total Population	875	100
Sex and Age		
Male	419	47.9
Female	456	52.1
Under 5 years	19	2.2
5 to 9 years	26	3.0
10 to 14 years	31	3.5
15 to 19 years	24	2.7
20 to 24 years	24	2.7
25 to 34 years	47	5.4
35 to 44 years	86	9.8
45 to 54 years	145	16.6
55 to 59 years	82	9.4
60 to 64 years	78	8.9
65 to 74 years	181	20.7
75 to 84 years	104	11.9
85 years and over	28	3.2
Median age (years)	57.2	
65 years and over	313	35.8
RACE		
White	794	90.7
Black or African American	64	7.3
Hispanic	12	1.4
American Indian and Alaska Native	1	0.1
Asian	3	0.3

Subject	Number	Percent
Native Hawaiian / Pacific Islander	0	0
Some other race	4	0.5
Two or more races	9	1.0
SOCIAL CHARACTERISTICS		
Population 25 years and over	752	100.0
High school graduate or higher	158	89.1
Bachelor's degree or higher	166	35.2
Disability status (population 21 to 64 years)	97	21.6
Foreign born	40	4.6
Now married (population 15 years and older)	541	67.6
Speak a language other than English at home	43	5.0
HOUSING CHARACTERISTICS		
Total housing units	576	100.0
Occupied housing units	440	76.4
Owner-occupied housing units	353	80.2
Renter-occupied housing units	87	19.8
Vacant housing units	136	23.6
YEAR STRUCTURE BUILT		
1999 to March 2000	23	4.0
1995 to 1998	64	11.0
1990 to 1994	75	12.9
1980 to 1989	142	24.4
1970 to 1979	89	15.3
1960 to 1969	26	4.5
1940 to 1959	46	7.9
1939 or earlier	116	20.0

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 2.5% were unemployed and looking for work. The management and related occupations sector employs the largest number of town residents (42.5%), followed by sales and occupation sector (28.9%) and service occupations (10.3%) employ the largest number of town residents.

Table 48. Oriental Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	116	42.5
Service occupations	28	10.3
Sales and office occupations	79	28.9
Farming, fishing, and forestry	7	2.6

Construction, extraction and maintenance	21	7.7
Production and transportation	22	8.1
TOTAL WORKFORCE	273	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $25,949. The most recent poverty estimates indicate that 8.4% of Oriental residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Oriental Capabilities

In its hazard mitigation strategy, Oriental partners with many local, state, and federal agencies. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Oriental participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Oriental will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Oriental is located in Table 48.

Table 49. Oriental Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Growth Management Ordinance	Adopted July, 1997	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those floodplain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Oriental worked with the North Carolina Division of Community Assistance to revise the community's action plan. Oriental currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Oriental identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Oriental to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 50. Oriental Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
2	Continue to work with the County on its active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
3	Continue to enforce the growth management ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
4	Continue to meet all minimum FEMA requirements to remain eligible for debris removal assistance funding from FEMA	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
5	Continue to work with NC Department of Corrections to provide labor for debris removal from culverts and drains	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
6	Continue to work with State and County for assistance	Nor'easters, Severe Winter Storms	County's General	Pamlico County Emergency	ongoing	Medium This action is 1) cost

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	in clearing the roads after a snow event		Fund, NC Division of Emergency Management	Management		effective; and 2) technically feasible
7	Continue to work with Pamlico County Health Department and DSS to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
8	Contact the NC Forestry Service once a year to get information about their wildfire education program	Wildfire	NC Forestry Service	Town Manager	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
9	Monitor nearby NC Forestry Service tower posts fire risk for area	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
10	Hold a meeting with NC Forestry service to discuss common concerns. The Emergency Management Director for the County will be asked to facilitate the meeting	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
11	Research storm water management and recommend strategies	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Planning Board	July 2012	Medium This action is: 1) environmentally sound; and 2) technically feasible.
12	Establish a more formalized system of routine cleaning of culverts, ditches, streams and the like which impede the flow	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Town Commissioners	June 1, 2010	Medium This action is: 1) environmentally sound; and 2) technically feasible.

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	of water					
13	Determine the number of repetitive loss properties within the town's jurisdiction and develop strategies to mitigate future risk	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Planning Board	January 2012	Medium This action is: 1) environmentally sound; and 2) technically feasible.
14	Continue the wellhead protection program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town General Fund	Town Manager	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible
15	Evaluate and address boat yards in the 100 flood plain which use hazardous material	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Manager	January 1, 2011	Medium This action is: 1) environmentally sound; and 2) technically feasible.
16	Contact the County Floodplain Administrator and the NFIP office to request information on the CRS	Flooding, Hurricanes and Tropical Storms, Hurricanes, Nor'easters, floods	N/A	Town Manager	January 1, 2010	Medium Low This action is 1) cost effective; and 2) technically feasible
17	Oriental will continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Manager	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 32. Oriental FIRM

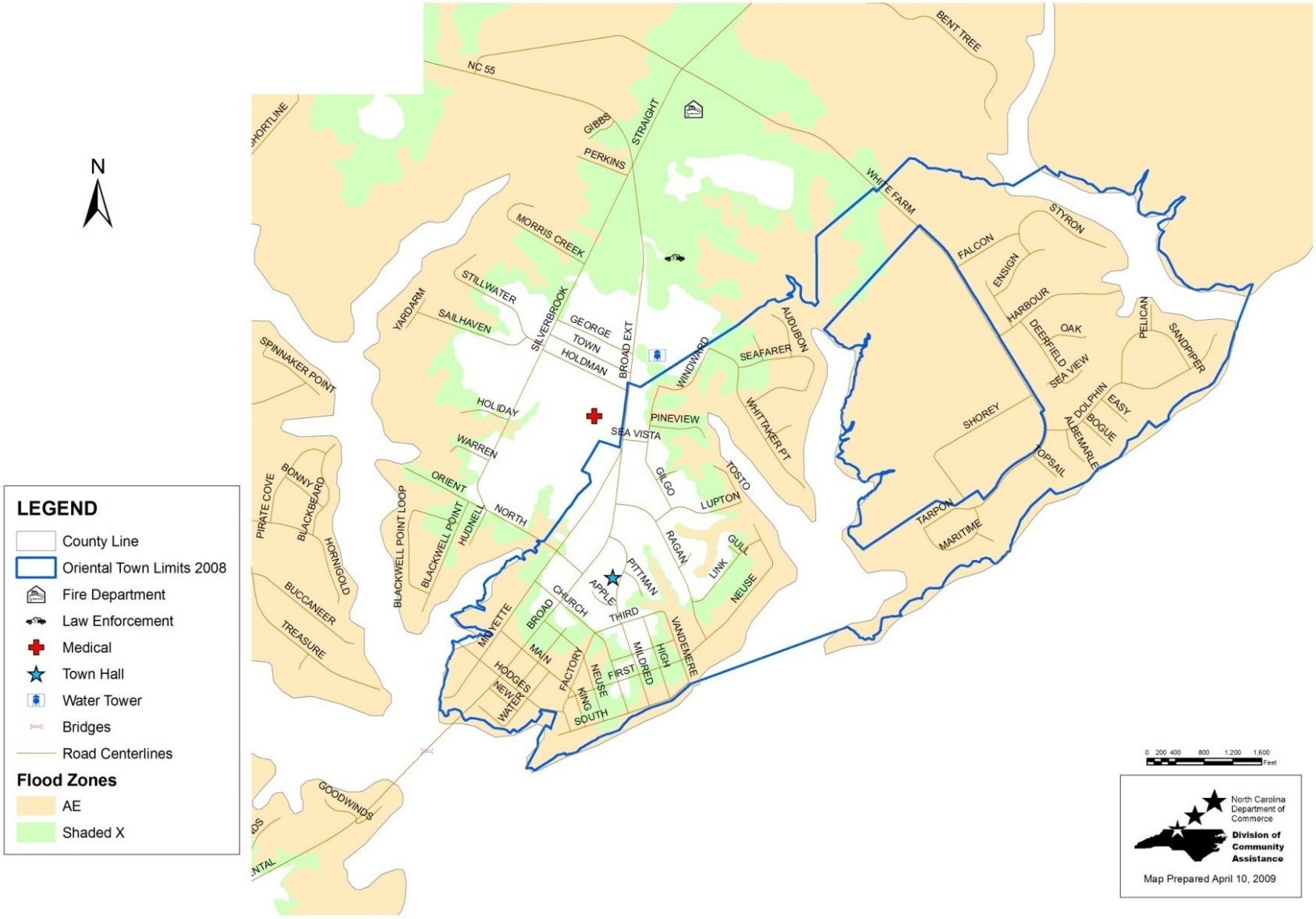


Figure 33. Oriental Storm Surge Inundation

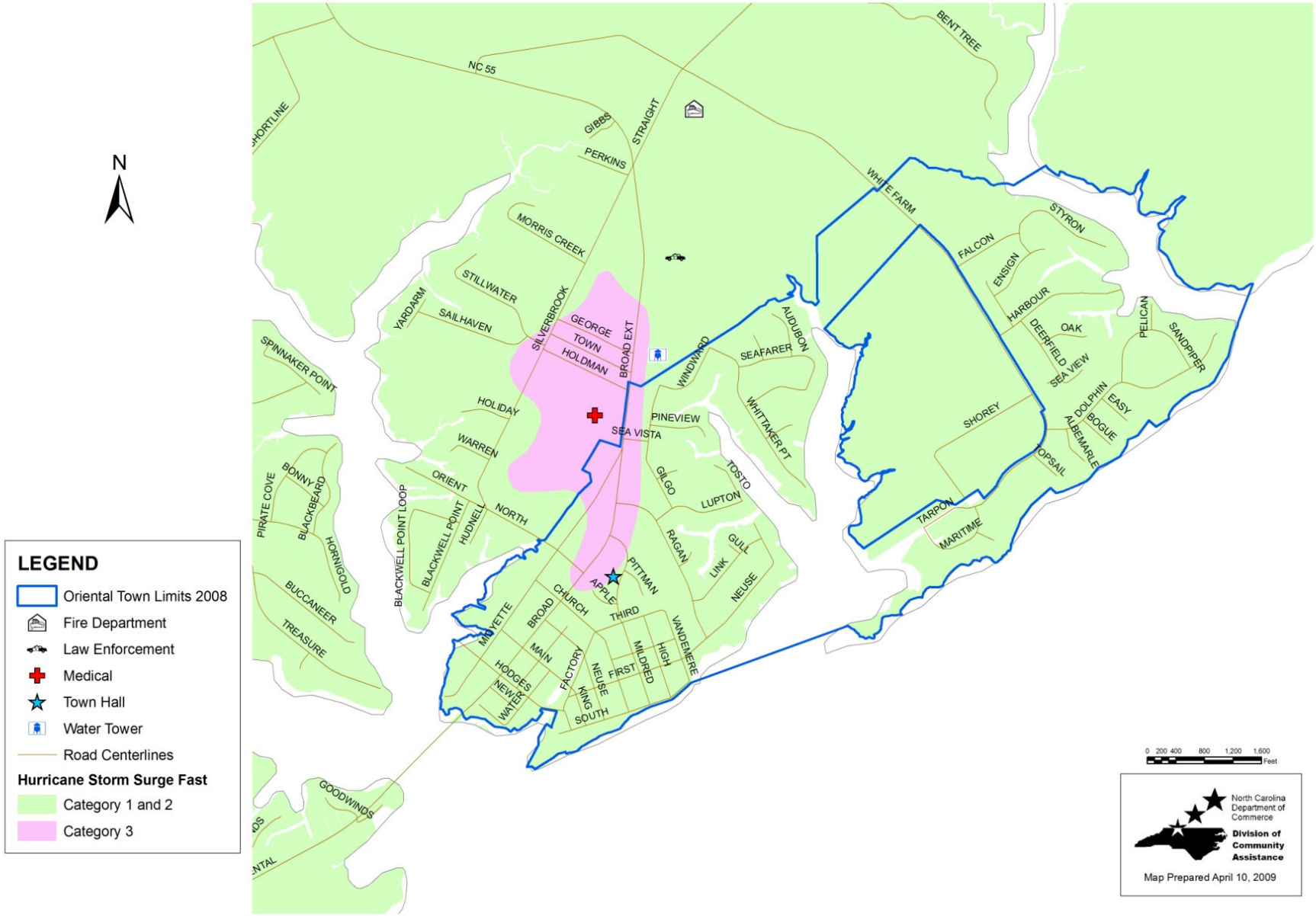


Table 51. Oriental Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	207	384	591	77,755,654	66,412,768	144,168,422	73,435,527
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	207	384	591	77,755,654	66,412,768	144,168,422	73,435,527
Inundation - Fast							
Category 1 & 2	199	364	563	74,616,062	63,438,718	138,054,780	70,597,439
Category 3	7	20	27	3,139,592	2,974,050	6,113,642	2,483,327
Category 4 & 5	0	0	0	0	0	0	0
Total	0	384	590	77,755,654	66,412,768	144,168,422	73,080,766
100-Year Floodplain							
AE	173	261	434	53,012,879	46,664,982	99,677,861	61,373,653
Total	173	261	434	53,012,879	46,664,982	99,677,861	61,373,653
Inundation - Slow							
Category 1 & 2	207	384	591	77,755,654	66,412,768	144,168,422	73,435,527

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Oriental ($354,761), determined by dividing the Total Value of Developed Properties in Oriental by Total Developed Acres*

SECTION 24: STONEWALL

Profile
Stonewall is located along Highway 55, just to the east of Bayboro. Stonewall has a land area of 1.96 square miles.

Stonewall has a population of 282 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Stonewall residents is 25.9 minutes. The average household size in Stonewall is 2.42 persons per household.[4] The following statistics are based on the 2000 Census.

Table 52. Stonewall Population Data

Subject	Number	Percent
Total Population	285	100
Sex and Age		
Male	141	49.5
Female	144	50.5
Under 5 years	15	5.3
5 to 9 years	16	5.6
10 to 14 years	25	8.8
15 to 19 years	21	7.4
20 to 24 years	11	3.9
25 to 34 years	36	12.6
35 to 44 years	37	13.0
45 to 54 years	48	16.8
55 to 59 years	25	8.8
60 to 64 years	16	5.6
65 to 74 years	22	7.7
75 to 84 years	8	2.8
85 years and over	5	1.8
Median age (years)	40.3	
65 years and over	35	12.3
RACE		
White	212	74.4
Black or African American	63	22.1
Hispanic	3	1.1

[4] US 2000 Census

Subject	Number	Percent
American Indian and Alaska Native	0	0
Asian	2	0.7
Native Hawaiian / Pacific Islander	0	0
Some other race	2	0.7
Two or more races	6	2.1
SOCIAL CHARACTERISTICS		
Population 25 years and over	178	100.0
High school graduate or higher	57	73.0
Bachelor's degree or higher	9	8.4
Disability status (population 21 to 64 years)	43	26.2
Foreign born	0	0.0
Now married (population 15 years and older)	112	51.1
Speak a language other than English at home	12	5.0
HOUSING CHARACTERISTICS		
Total housing units	133	100.0
Occupied housing units	118	88.7
Owner-occupied housing units	96	81.4
Renter-occupied housing units	22	18.6
Vacant housing units	15	11.3
YEAR STRUCTURE BUILT		
1999 to March 2000	2	1.5
1995 to 1998	12	9.2
1990 to 1994	8	6.1
1980 to 1989	11	8.4
1970 to 1979	24	18.3
1960 to 1969	12	9.2
1940 to 1959	28	21.4
1939 or earlier	34	26.0

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 2.8% were unemployed and looking for work. The sales and office occupations sector employs the largest number of town residents (25.9%), followed by the production and transportation sector (23.7%) and service occupations (18.5%) employ the largest number of town residents.

Table 53. Stonewall Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	29	21.6
Service occupations	20	14.9

Sales and office occupations	32	23.9
Farming, fishing, and forestry	2	1.5
Construction, extraction and maintenance	40	29.9
Production and transportation	11	8.2
TOTAL WORKFORCE	131	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $16,425. The most recent poverty estimates indicate that 5.5% of Stonewall residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Stonewall Capabilities

Stonewall partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Stonewall participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Stonewall will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Stonewall is located in Table 54.

Table 54. Stonewall Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Stonewall worked with the North Carolina Division of Community Assistance to revise the community's action plan. Stonewall currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Stonewall identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Stonewall to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 55. Stonewall Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to use the Pamlico County storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Continue to address drainage issues as needed	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners, NC DOT	ongoing	Medium Technically feasible and environmentally sound
3	Continue to abide by State building codes that establish specifications for construction.	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
4	Continue to ensure that State and CAMA buffer rules are enforced to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
5	Continue working with the County on enforcement of land use regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Town Commissioners, Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
5	Continue to remove debris following an event.	Flooding, Hurricanes and Tropical Storms,	FEMA	Town Commissioners	ongoing	Medium Technically

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
		Nor'easters				feasible and environmentally sound
7	Continue working with the NC DOC to maintain ditches	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High Cost effective, technically feasible and environmentally sound
8	Continue to seek assistance from the county to provide property owners strategies to protect property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
9	County building code addresses Base Flood Elevations, continue to monitor for effectiveness	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
10	Contact the local NFIP representative to determine the status of their Community Rating, the Flood Plain Administrator designation, and the status of the Flood Damage Prevention Ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High Cost effective, technically feasible and environmentally sound
11	Continue to address the storm water runoff issue	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners, NC DOT	June 1, 2004	Medium Technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
12	Continue routine maintenance of culverts, ditches, and streams	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	June 1, 2004	Medium Technically feasible and environmentally sound
13	Continue to work with Tideland Electric and Progress Energy and their continuous program for tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally sound
14	Seek assistance from the state for snow removal	Nor'easters, Severe Winter Storms	NC DOT	NC DOT	ongoing	High Cost effective, technically feasible and environmentally sound
15	Continue working with the County Health Department and DSS provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Cost effective
16	Monitor the NC Forestry Service displays of fire risk for the area	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
17	Request the NC Forestry Service brief local fire departments on common concerns, annually, prior to fire season	Wildfire	NC Forestry Service	NC Forestry Service, Pamlico County Emergency Management Director	Annually by July 1	High Cost effective, technically feasible and environmentally sound

Figure 34. Stonewall FIRM

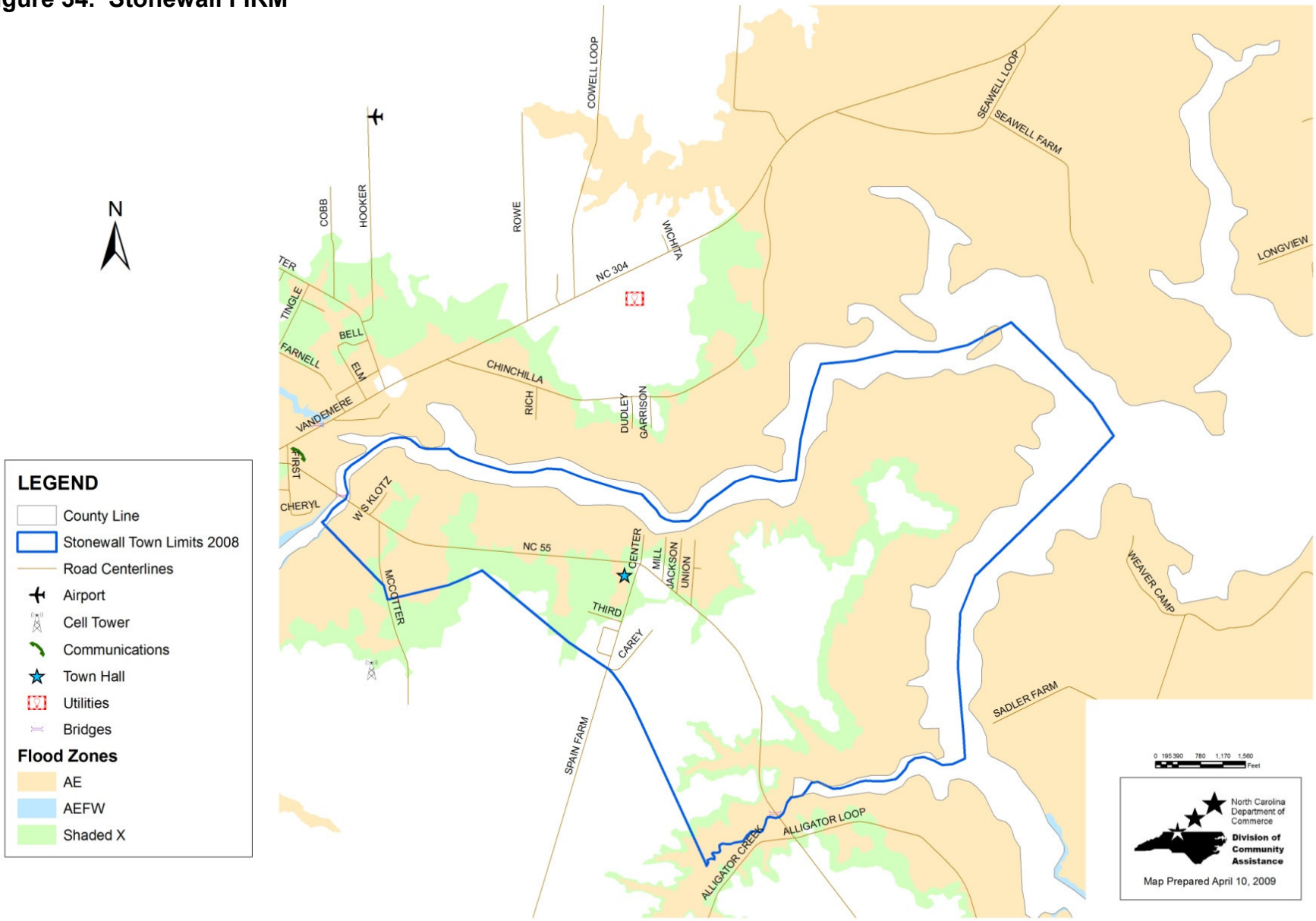


Figure 35. Stonewall Storm Surge Inundation

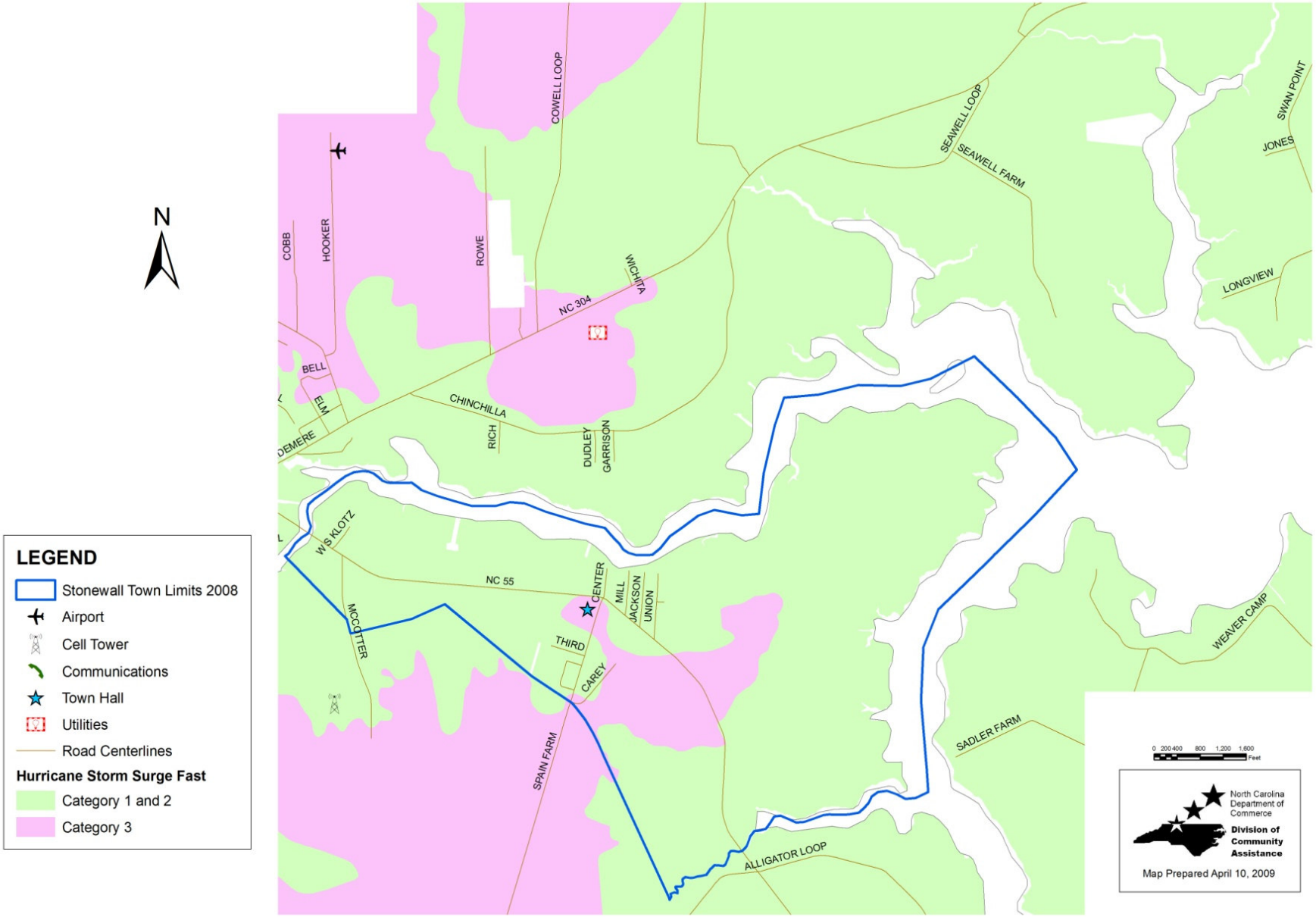


Table 56. Stonewall Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	658	247	905	7,460,484	3,937,912	11,398,396	26,048,246
Category 3	65	35	100	1,493,418	658,112	2,151,530	2,573,155
Category 4 & 5	0	0	0	0	0	0	0
Total	723	282	1,005	8,953,902	4,596,024	13,549,926	28,621,401
Inundation - Fast							
Category 1 & 2	658	254	912	7,777,569	3,995,111	11,772,680	26,048,246
Category 3	64	28	92	1,176,333	600,913	1,777,246	2,533,568
Category 4 & 5	0	0	0	0	0	0	0
Total	0	282	1,004	8,953,902	4,596,024	13,549,926	28,581,814
100-Year Floodplain							
AE	54	152	206	4,592,410	1,814,674	6,407,084	2,137,698
Total	54	152	206	4,592,410	1,814,674	6,407,084	2,137,698
Inundation - Slow							
Category 1 & 2	658	247	905	7,460,484	3,937,912	11,398,396	26,048,246

* *Future Development* was calculated by multiplying *Vacant Acres* by the average value per acre in Stonewall ($39,587), determined by dividing the *Total Value of Developed Properties* in Stonewall by *Total Developed Acres*

SECTION 25: VANDEMERE

Profile
Vandemere is located along Highway 304, near the Town of Mesic. Incorporated in 1895, Vandemere has a land area of 5 square miles.

Vandemere has a population of 280 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Vandemere residents is 25.5 minutes. The average household size in Vandemere is 2.35 persons per household (US 2000 Census). The following statistics are based on the 2000 Census.

Table 57. Vandemere Population Data

Subject	Number	Percent
Total Population	289	100
Sex and Age		
Male	129	44.6
Female	160	55.4
Under 5 years	11	3.8
5 to 9 years	19	6.6
10 to 14 years	20	6.9
15 to 19 years	19	6.6
20 to 24 years	14	4.8
25 to 34 years	28	9.7
35 to 44 years	34	11.8
45 to 54 years	46	15.9
55 to 59 years	20	6.9
60 to 64 years	18	6.2
65 to 74 years	36	12.5
75 to 84 years	20	6.9
85 years and over	4	1.4
Median age (years)	44.9	
65 years and over	60	20.8
RACE		
White	134	46.4
Black or African American	153	52.9
Hispanic	6	2.1
American Indian and Alaska Native	1	0.3

Subject	Number	Percent
Asian	0	0
Native Hawaiian / Pacific Islander	0	0
Some other race	0	0
Two or more races	1	0.3
SOCIAL CHARACTERISTICS		
Population 25 years and over	217	100.0
High school graduate or higher	64	69.1
Bachelor's degree or higher	15	9.2
Disability status (population 21 to 64 years)	55	32.0
Foreign born	9	2.8
Now married (population 15 years and older)	117	46.2
Speak a language other than English at home	15	4.9
HOUSING CHARACTERISTICS		
Total housing units	153	100.0
Occupied housing units	123	80.4
Owner-occupied housing units	103	83.7
Renter-occupied housing units	20	16.3
Vacant housing units	30	19.6
YEAR STRUCTURE BUILT		
1999 to March 2000	4	2.5
1995 to 1998	21	12.9
1990 to 1994	4	2.5
1980 to 1989	25	15.3
1970 to 1979	25	15.3
1960 to 1969	22	13.5
1940 to 1959	27	16.6
1939 or earlier	35	21.5

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 5.7% were unemployed and looking for work. The sales and office occupations sector employs the largest number of town residents (25.9%), followed by the production and transportation sector (23.7%) and service occupations (18.5%) employ the largest number of town residents.

Table 58. Vandemere Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	20	14.8
Service occupations	25	18.5
Sales and office occupations	35	25.9

Farming, fishing, and forestry	1	0.7
Construction, extraction and maintenance	22	16.3
Production and transportation	32	23.7
TOTAL WORKFORCE	130	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $13,570. The most recent poverty estimates indicate that 21.6% of Vandemere residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Vandemere Capabilities

Vandemere partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Vandemere participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Vandemere will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Vandemere is located in Table 60.

Table 59. Vandemere Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Vandemere worked with the North Carolina Division of Community Assistance to revise the community's action plan. Vandemere currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Vandemere identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Vandemere to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 60. Vandemere Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
2	Continue to enforce the zoning ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
3	Continue to meet all minimum FEMA requirements to remain eligible for debris removal assistance funding from FEMA	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
4	Continue to work with NC Department of Corrections to provide labor for debris removal from culverts and drains	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
5	Contact the County Floodplain Administrator and the NFIP office to request information on	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	January 1, 2012	Medium This action is 1) cost effective; and 2)

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	the CRS					technically feasible
6	Continue to work with State and County for assistance in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	County's General Fund, NC Division of Emergency Management	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
7	Continue to work with Pamlico County Health Department and DSS to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
8	Contact the NC Forestry Service once a year to get information about their wildfire education program	Wildfire	NC Forestry Service	Town Clerk	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
9	Monitor nearby NC Forestry Service tower posts fire risk for area	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
10	Research storm water management and recommend strategies	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Planning Board	Ongoing	Medium This action is: 1) environmentally sound; and 2) technically feasible.
11	Establish a more formalized system of	Flooding, Hurricanes and Tropical Storms,	N/A	Town Commissioners	Ongoing	Medium This action is: 1)

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	routine cleaning of culverts, ditches, streams and the like which impede the flow of water	Nor'easters				environmentally sound; and 2) technically feasible.
12	Request that the issue of occluded drainage canals which surround the town be addressed in the next update of the county's hazard mitigation plan	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	General budget	Town Commissioners	January 2011	Medium This action is: 1) environmentally sound; and 2) technically feasible.
13	Determine the number of repetitive loss properties within the town's jurisdiction and develop strategies to mitigate future risk	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Planning Board	January 2010	Medium This action is: 1) environmentally sound; and 2) technically feasible.
14	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Commissioners	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 36. Vandemere FIRM Flood Zones & Critical Facilities

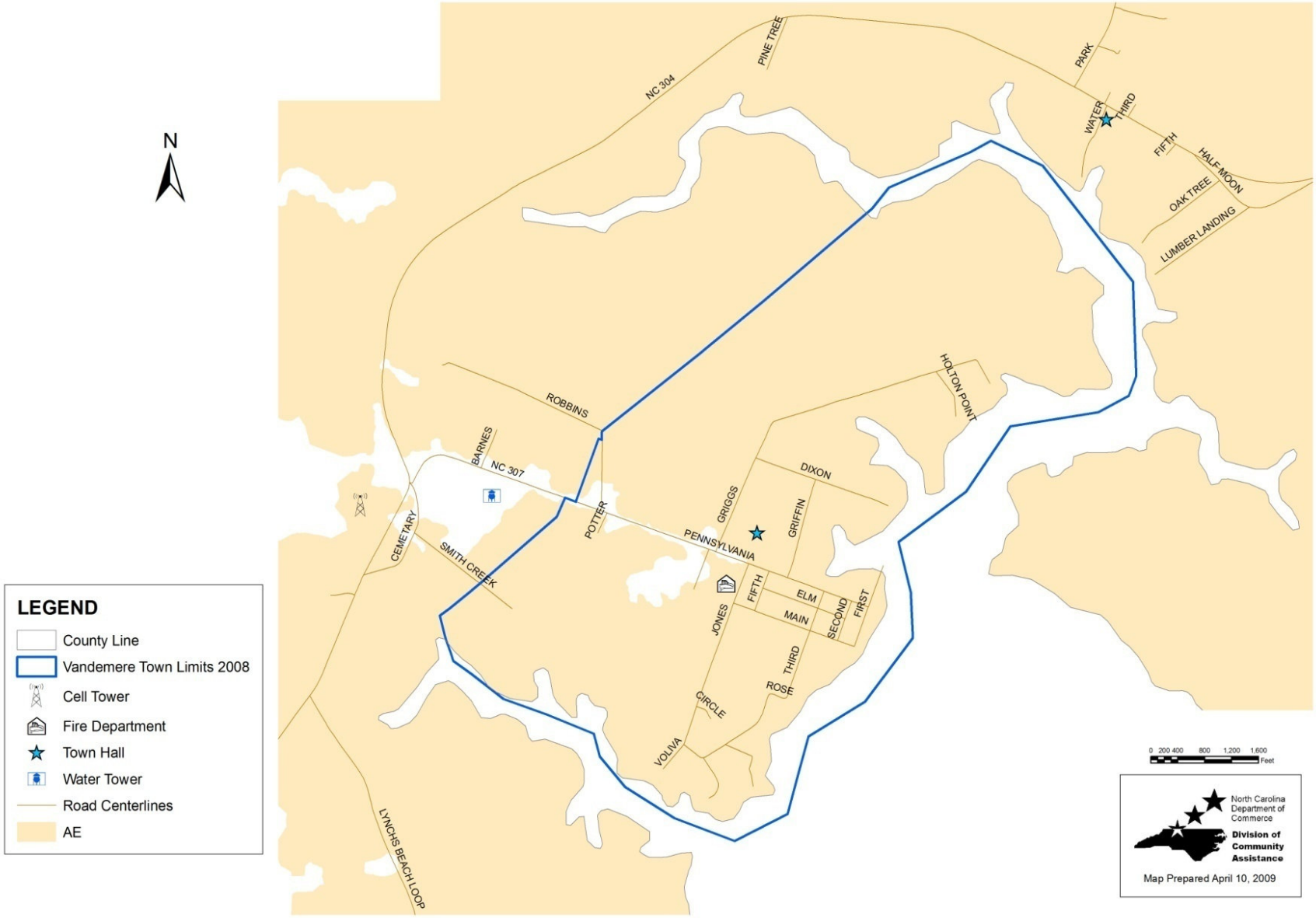


Figure 37. Vandemere Storm Surge Inundation

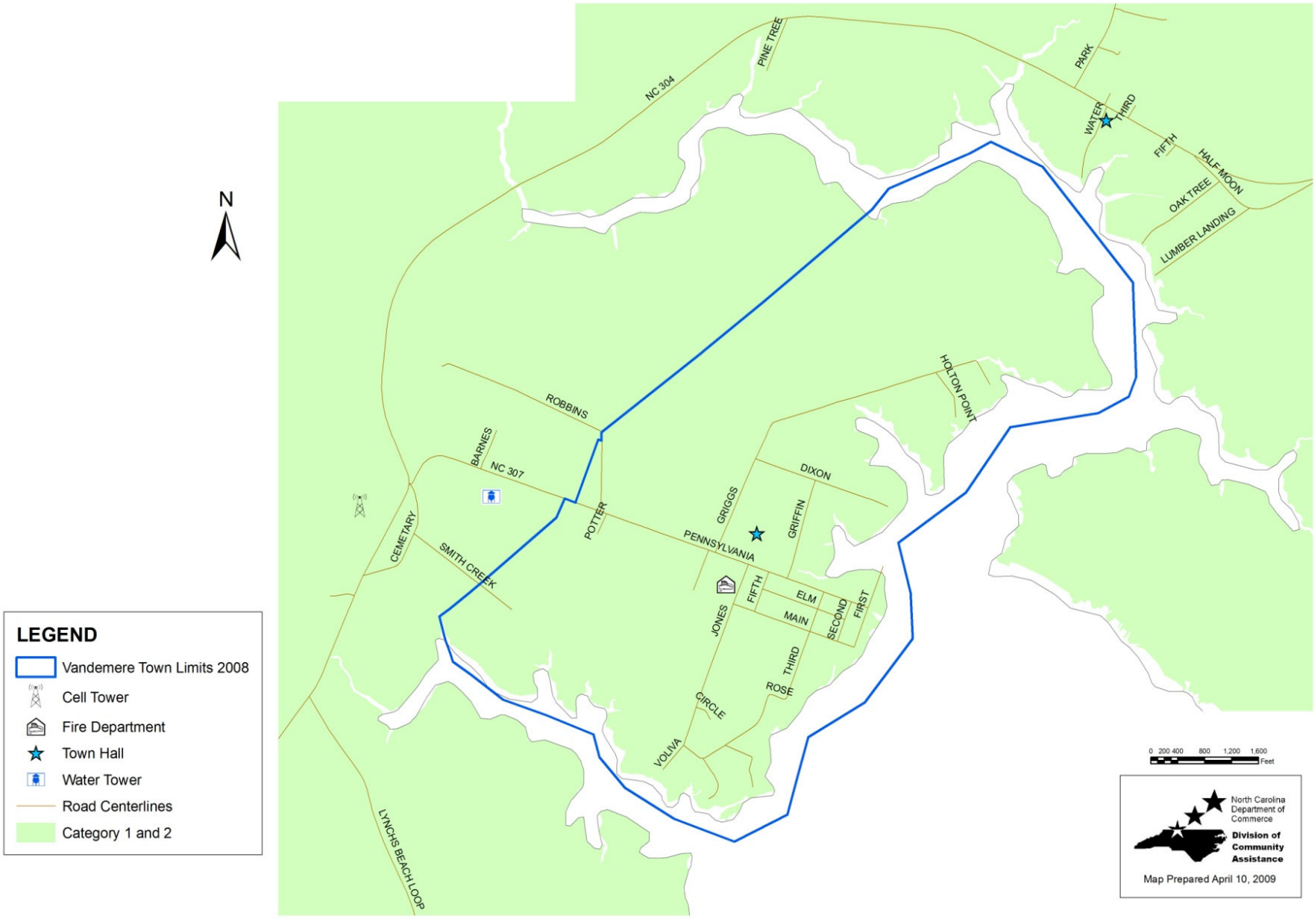
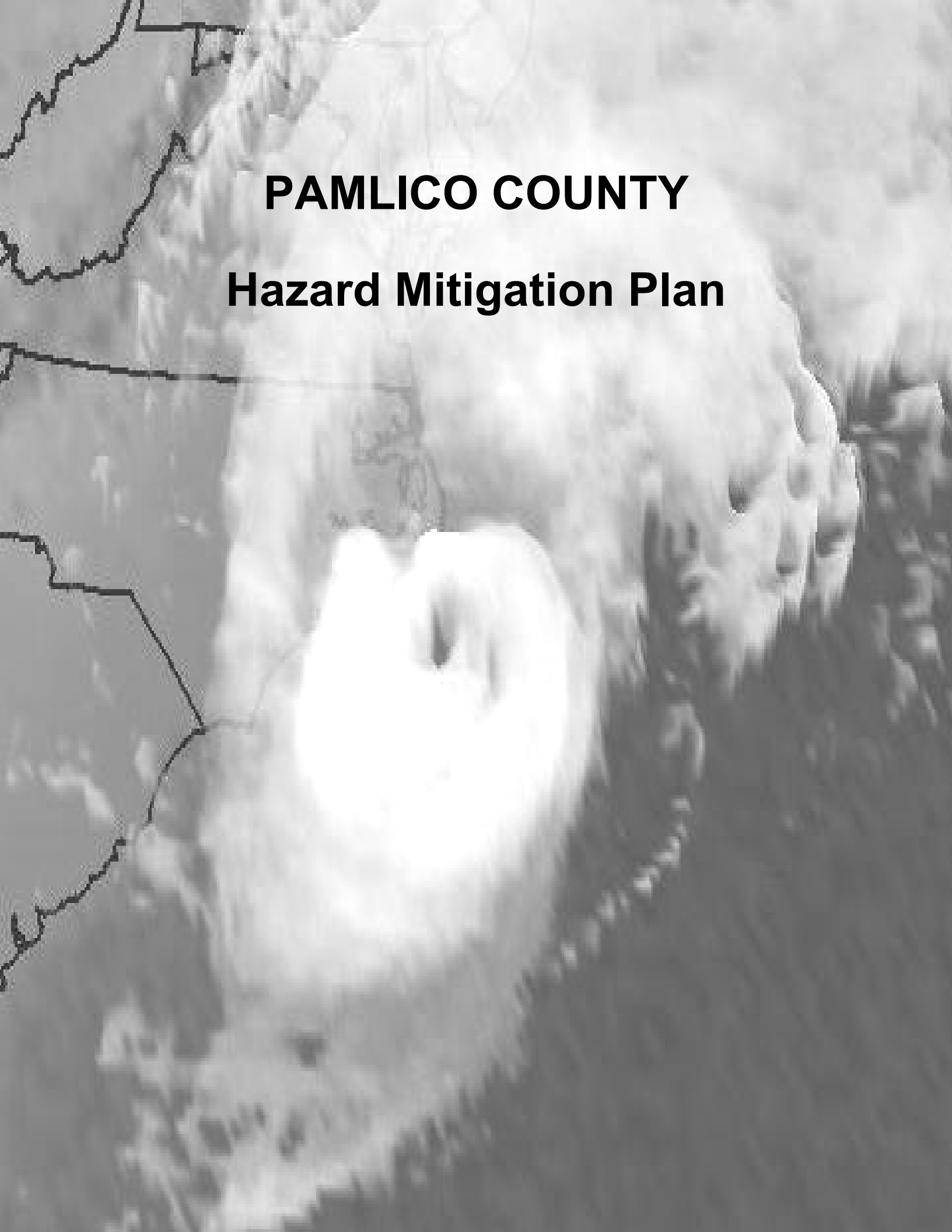


Table 61. Vandemere Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460
Inundation - Fast							
Category 1 & 2	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	0	219	924	9,283,591	7,705,915	16,989,506	47,525,460
100-Year Floodplain							
AE	704	216	920	8,887,443	7,845,195	16,732,638	47,458,048
Total	704	216	920	8,887,443	7,845,195	16,732,638	47,458,048
Inundation - Slow							
Category 1 & 2	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460

* *Future Development* was calculated by multiplying *Vacant Acres* by the average value per acre in Vandemere ($67,412), determined by dividing the *Total Value of Developed Properties* in Vandemere by *Total Developed Acres*



PAMLICO COUNTY

Hazard Mitigation Plan

Pamlico County Hazard Mitigation Plan

Adopted by the Pamlico County Commissioners on
June 21, 2010

Pamlico County Commissioners

Paul Delamar, III, Chairman
Ann Holton, Vice-Chairman
Roy Brinson, Sr.
Christine Mele
Jimmy Spain
Carl J. Ollison
Kenny Heath

Pamlico County Hazard Mitigation Planning Committee

Bronte Jones, Citizen, Bayboro
Ron Kilburn, Citizen, Oriental
Jerry Prescott, Citizen, Grantsboro
Nick Santoro, Citizen, Merritt
Barbara Baker, Deputy Town Clerk, Bayboro
Wyatt Cutler, Town Manager (retired), Oriental
Mark Howell, Town of Bayboro, Bayboro
Booker T. Jones, Mayor, Mesic
Josh Potter, Mayor, Minnesott Beach
Pat Prescott, Town Clerk, Grantsboro

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Technical Assistance Provided By:
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Division of Community Assistance
Northeast Regional Office (NERO)

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EXECUTIVE SUMMARY

This document is the Pamlico County Hazard Mitigation Plan. It has been prepared to meet the requirements of the federal government's Stafford Act as amended by the Federal Disaster Mitigation Act of 2000 (DMA2K). North Carolina Senate Bill 300 requires local hazard mitigation plans to be in compliance with the federal legislation. Senate Bill 300, passed by the NC Legislature in the summer of 2001, required local governments to have an approved and locally adopted hazard mitigation plan in place by August 1, 2002 in order to be eligible for state disaster funds to remedy disasters that occur after August 1, 2002. Additionally, the Disaster Mitigation Act of 2000 passed by the US Congress and signed into law by the President, required local governments to have a FEMA-approved and locally adopted hazard mitigation plan in place by November 1, 2004 in order to be eligible for federal disaster funds. This document is an updated version of the plan adopted in 2004.

Pamlico County is vulnerable to coastal flooding, high winds, winter ice and snow storms and wildfire. This document identifies the vulnerability of Pamlico County and its municipalities to these natural hazards and sets goals to mitigate damage. **It is the intent of the plan to meet all requirements of the Federal Disaster Mitigation Act of 2000 (DMA2K) for Pamlico County and its municipalities in regard to hazard mitigation planning requirements.**

Each municipality will formally adopt this multi-jurisdictional planning document. In addition to adopting this countywide approach to hazard mitigation, each municipality has a separate action plan, establishing goals for their jurisdiction.

Mission Statement

> *Pamlico County, through hazard mitigation planning, seeks to maintain or lower the community's flood insurance rating, qualify for future disaster funding, identify potential problems, minimize repetitive losses, and educate the public on Pamlico County's vulnerability to natural hazards.*

Goals, Objectives, and Actions

The plan *goals* describe the overall direction that Pamlico County can take to minimize the impacts of natural hazards. The goals are stepping-stones between the broad direction of the mission statement and the specific recommendations that are outlined in the action items.

Mitigation objectives are designed to support and correspond directly with the goals established in the previous subsection. These objectives were established to provide Pamlico County with some measurable, mid-range benchmarks (2-5 years).

The *action items* are a listing of activities the County and the citizens can be engaged to reduce risk.

Goal 1: Improve Pamlico County's fiscal and operational capabilities to adequately mitigate the effects of natural hazards.

Goal 2: Enhance existing or implement new County policies that will reduce susceptibility to natural hazards without conflicting with other community goals.

Goal 3: Protect Pamlico County's buildings, critical facilities, and infrastructure through the implementation of cost-effective and technically feasible mitigation projects.

Goal 4: Promote public health, safety, and welfare by increasing the public awareness of existing hazards and fostering individual and public responsibility in mitigating risks due to those hazards.

Monitoring, Evaluating and Updating the Plan
Implementation of the activities recommended by this plan will be monitored so the deadlines will be met. Where possible, each activity should be monitored in terms of dollar value of its flood loss reduction benefits.

The Pamlico County Planner will be responsible for the tracking the activities outlined in this plan. Each person assigned a responsibility in this plan shall report to the Pamlico County Planner by the last day of each quarter (March 31, June 30, September 30, December 31). The Pamlico County Planner will report to the County Commissioners once each year, on the first week of hurricane season (June 1st). The report should review progress and recommend changes as needed.

If changes are necessary, the Hazard Mitigation Planning Committee will reconvene during the first week of June to receive a presentation on the progress of the plan. If convened, the Hazard Mitigation Planning Committee will prepare an evaluation report that will be submitted to the County Commissioners.

Implementation through Existing Programs
Pamlico County will incorporate the hazard mitigation goals and actions into other policy statements, and will address conflicts with other policies where possible. As with any planning process, the Hazard Mitigation Plan will be referenced when developing or updating other planning documents, such as the CAMA Land Use Plan and any other official documents regarding land use and emergency management.

Continued Public Involvement
Pamlico County is dedicated to involving the public directly in review and updates of the Hazard Mitigation Plan. Any amendment to the Hazard Mitigation Plan must be made by the County Commissioners. A public hearing will be required before any consideration of an amendment to the plan can be made. Pamlico County's current outreach methods will be used to disseminate hazard mitigation information to citizens and property owners.

SECTION 1: INTRODUCTION

North Carolina faces extreme hazard and consequence from natural hazards. Between 1989 and 2000, there were 14 federally declared disasters. Damages from Hurricane Floyd alone reached $3.5 billion. With Hurricane Floyd, 4,117 uninsured and under-insured homes were destroyed. The State's vulnerability to natural hazards makes it crucial that communities and property owners have accurate, up-to-date information about the risk.

Natural hazards, such as floods, hurricanes, tornadoes, winter storms, earthquakes, wildfires, and other hazardous natural events occur every year and are an essential component of the earth's natural systems. These events damage the ecological environment, but the natural environment possesses remarkable recuperative capabilities, restoring plant and animal habitat in a short time.

The built, or manmade, environment does not possess these recuperative capabilities. When these natural hazards interact with the built environment, disasters occur. The frequency of disasters is increasing, not necessarily because natural hazards are occurring more frequently, but as the result of more people living in harm's way. Since the 1960's, increasing numbers of people are choosing to live and work in and visit areas at risk from coastal storms and repetitive flooding. By 2010, the number of people living in hurricane-prone counties will likely double (*Local Hazard Mitigation Planning* Manual. 1998). this realization makes it imperative that coastal and riverine communities undertake floodplain management and hazard mitigation.

This document is Pamlico County's Hazard Mitigation Plan. It has been prepared to meet the requirements of the federal government's Stafford Act as amended by the Federal Disaster Mitigation Act of 2000 (DMA2K). North Carolina Senate Bill 300 requires local hazard mitigation plans comply with the federal legislation. Senate Bill 300, passed by the NC Legislature in the summer of 2001, required local governments to have an approved and locally adopted hazard mitigation plan in place by August 1, 2002 in order to be eligible for state disaster funds to remedy disasters that occur after August 1, 2002. Additionally, the Disaster Mitigation Act of 2000 passed by the US Congress and signed into law by the President, required local governments to have a FEMA-approved and locally adopted hazard mitigation plan in place by November 1, 2004 in order to be eligible for federal disaster funds.

The County is vulnerable to coastal flooding, high winds, winter ice and snow storms and wildfire. This document identifies Pamlico County's vulnerability to several natural hazards and sets goals to mitigate damage from these hazards. The planning process includes problem perception, definition, assessment, solution / mitigation alternatives, strategy, goals, objectives, and establishing performance measurement tools for implementation.

Each municipality will formally adopt this multi-jurisdictional planning document. In addition to adopting this countywide approach to hazard mitigation, each municipality has a separate action plan, establishing goals for the jurisdiction.

It is the intent of this plan to meet all requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2K) for Pamlico County and the municipalities of Bayboro, Grantsboro, Alliance, Stonewall, Oriental, Mesic, Vandemere, Arapahoe, and Minnesott Beach in regard to hazard mitigation planning.

Why Develop a Mitigation Plan?
Planning is one of the best ways to anticipate and mitigate the destructive impact of identified hazards. The objective of planning is to produce a program of activities that will best tackle the community's hazard problems and meet other community needs. A well-prepared plan will guide a community's development efforts so that they are implemented more economically and in ways more attuned to the needs and objectives of the community and its residents. A well-prepared and executed plan should result in reduced hazard losses. Risks not eliminated or mitigated through construction techniques have traditionally been offset through insurance (flood, wind, and fire). However, the magnitude of losses faced by the insurance industry in recent years and resulting policy premium increases warrants reevaluation of the balance of risk to be insured against.

Originally, this document was prepared to qualify as a "Floodplain Management Plan" to be credited by Insurance Services Office (ISO) Community Rating System (CRS) program of the National Flood Insurance Program (NFIP). The NFIP provides federally supported flood insurance in communities that regulate development in their floodplains. The CRS reduces flood insurance premiums in those communities that do more than implement the minimum regulatory requirements. Pamlico County participates in the NFIP and is currently certified under the CRS as a Class 9 Community. The County has developed this plan in order to limit life and property losses due to a major flood. Additional credit is provided if the activities are implemented based on a floodplain management plan that meets the criteria in Section 511 of the *CRS Coordinator's Manual*. The approach selected for preparing this plan was taken from Section 511 and some of this plan's section headings coincide with Section 511's headings.

Since then, there have been state and federal requirements placed on municipalities and counties regarding hazard mitigation. This planning document strives to meet those requirements.

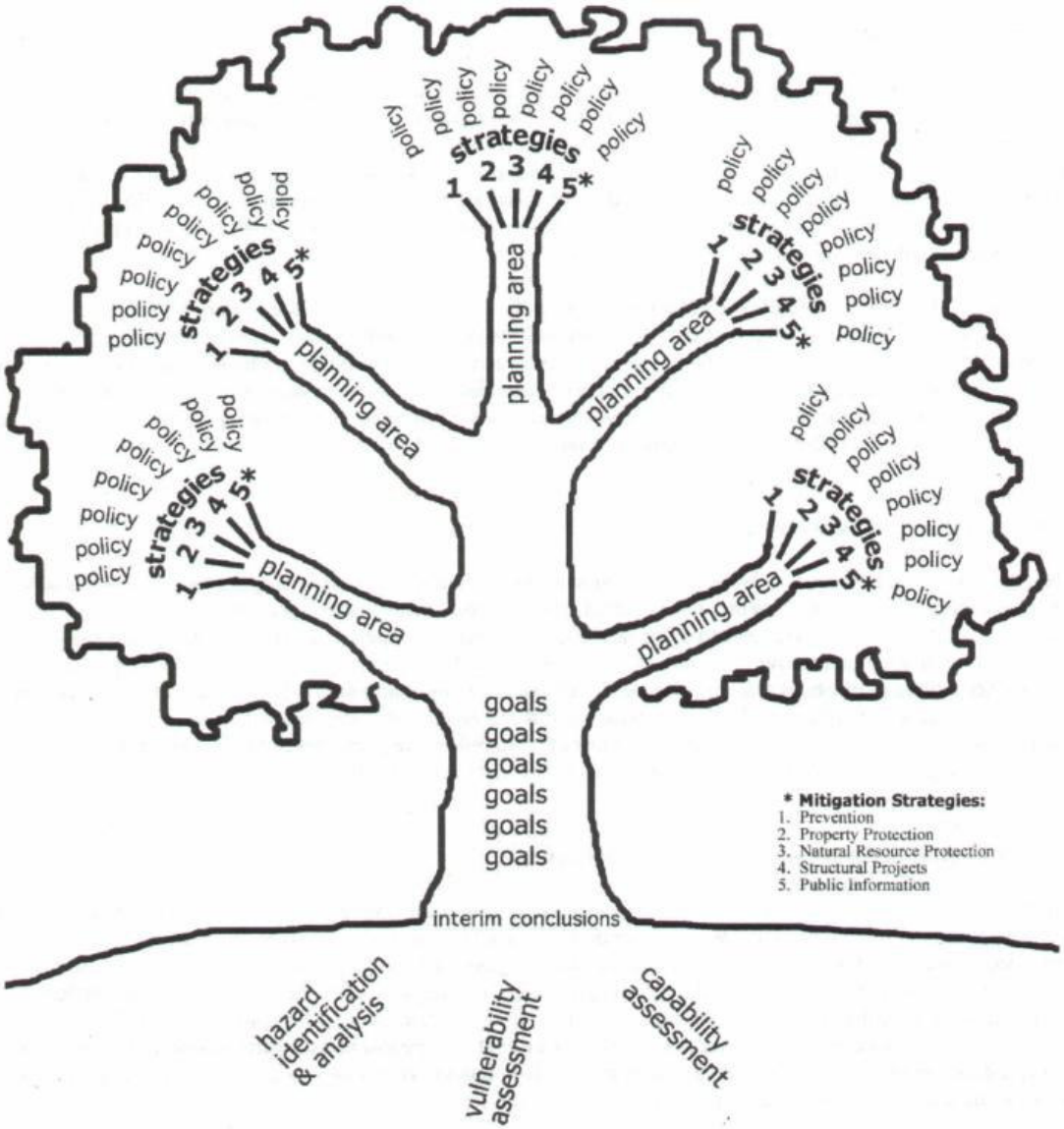
Plan Methodology
Planning is one of the best ways to correct shortcomings associated with natural hazards. The objective of planning is to produce a program of activities that will best tackle the community's problems with hazards and meet other community needs. A well-prepared plan will guide a community's hazard mitigation activities so that they are implemented more economically and in ways more attuned to the needs and objectives of the community and its residents.

A hazard mitigation plan, one that is carefully researched to reflect local needs and conditions, can provide many benefits to a community. This is especially true of plans that are prepared in advance of a hazard event, not in the aftermath of a disaster. Many communities have engaged in mitigation activities on a project-by project basis by incorporating such projects into the context of a comprehensive plan that considers multiple aspects of the community. A local government can avoid the often inconsistent and uncoordinated results of this ad hoc approach to mitigation by developing a mitigation plan. A local hazard mitigation plan can be effective for establishing the community's commitment to mitigation goals, objectives, policies and programs. By articulating what the community hopes to achieve, the plan can serve to establish an important connection between the public interest and mitigation measures to be employed.

Description of the Planning Process

In order to help the reader visualize the nature of the planning process, a "mitigation planning tree" is used. By comparing the planning process to a living, growing being, emphasizes is placed on the interrelationships between each step and the dynamism of the final plan itself. Each step is designed to be supported by the previous step, and in turn, provides support for the next. Some of the steps in the planning process are "root" steps. These essential analytical steps provide the necessary background data and justification for the action part of the plan. Next, the "ground" level steps will be pursued, followed by the "branch" steps, or actions and policies.

Figure 1. Planning Tree



This plan has been drafted using the guidelines and recommendations promulgated by both the North Carolina Emergency Management Division (NCEM) and the Federal Emergency Management Agency (FEMA). The essential planning steps are:

Identify the hazards - The first of the "root" steps requires the community to identify the natural hazards that affect the area and analyze them in terms of likelihood, magnitude, and potential impact.

Assess vulnerability of people and property – The next "root" step is made up of multiple tasks, or sub-steps, that helps the community to assess the vulnerability to the hazards

identified in Step 1. During the vulnerability assessment, the areas within the community where the hazards are likely to occur will be identified.

Assess community capability – The final "root" step asks Pamlico County to assess the community's current mitigation practices, as well as its potential to engage in mitigation activities. While few communities in North Carolina have a dedicated mitigation strategy, most do have policies that affect construction and land-use in hazard-prone areas.

Form interim conclusions – At this level, the County has established a strong root system that identifies the problems Pamlico County faces, where those problems are located, and the tools at the County's disposal to address them. Step 4 gives the community an opportunity to look at these background analyses and determine whether or not it should move forward with the planning process.

Establish values and goals – Pamlico County now determines how mitigation fits into the community's vision of its future, and formulates goal statements to express that vision. Picture the goal statements as forming the "trunk" of the Mitigation Planning Tree. The goals and values are the central supporting element of the entire plan – they shape and determine all the mitigation policies that will be created as a result of the plan.

Set policy selection criteria – Current and potential policies will be examined by: 1) Effectiveness; and 2) Cost. Effectiveness will be determined by the perception of the Hazard Mitigation Plan Committee as High, Medium, or Low. Cost will be determined by the Committee and rated as High, Medium, or Low. The cost will be the expense of implementation and administration to the community.

Formulate mitigation strategies and policies – Step 7 is where all the previous steps have been leading up to. The mitigation policies are the "branches" of the Mitigation Planning Tree. The policies will put into action the goals established for reducing vulnerability.

Preparation of the final plan – The draft plan will be assembled and meet all minimum requirements of a Floodplain Management Plan that meets Section 510 of the Community Rating System as required by the National Flood Insurance Program. The plan will also meet all minimum requirements of Senate Bill 300 and keep Pamlico Count eligible for state public assistance funds, effective for state-declared disasters after August 1, 2002. Also, this plan will meet requirements of the Disaster Mitigation Act of 2000, passed by the US Congress and signed into law by the President.

Assign implementation responsibilities – Each action step outlined in the plan will be assigned to an individual or a County department. A 5-year implementation schedule is included for every action step.

Establish procedures for monitoring, evaluation, and reporting progress – An effective plan is dynamic and evolving. A community must periodically monitor its implementation, evaluate its effectiveness, and report on the progress of the plan.

Establish procedures for revisions and updates – This step calls for establishing procedures to see that the annual evaluation report results in revisions and updates of the plan, when warranted.

Purpose of the Plan

This hazard mitigation plan assesses Pamlico County's current natural hazard risk and sets forth goals and schedules for 2004 and beyond to eliminate, reduce, and mitigate this risk. After conducting a few meetings, the committee developed a mission statement, or purpose for the plan. The purpose of this plan is:

Pamlico County, through hazard mitigation planning, seeks to maintain or lower the community's flood insurance rating, qualify for future disaster funding, identify potential problems, minimize repetitive losses, and educate the public on Pamlico County's vulnerability to natural hazards.

This document is Pamlico County's Hazard Mitigation Plan. It is prepared to guide policy in the County's vulnerable areas and to assist state and federal funding efforts. This document has also been prepared to qualify as a "floodplain management plan" to be credited under the Community Rating System (CRS) of the National Flood Insurance Program (NFIP).

Pamlico County participates in the NFIP and is certified under the CRS. The NFIP provides federally supported flood insurance in communities that regulate development in their floodplains. The CRS reduces flood insurance premiums in those communities that do more than implement the minimum regulatory requirements. The County has developed this plan in order to limit life and property losses due to a major flood.

Additional credit is provided if the activities are implemented based on a floodplain management plan that meets the criteria in Section 511 of the *CRS Coordinator's Manual*. The approach selected for preparing this plan was taken from Section 511 and this plan's section headings coincide with Section 511's headings.

The benefits of hazard mitigation planning are:

Saves lives and property – Pamlico County can save lives and reduce property damage from natural hazards through mitigation actions, such as moving families and their homes out of harm's way.

Reduces vulnerability to future hazards – By having a mitigation plan in place, Pamlico County is prepared to take steps that will permanently reduce the risk of future losses. This opportunity is often lost when we build communities without regard to natural hazards or when we rebuild them after a disaster "just like they were before."

Saves money – Pamlico County will experience cost savings by not having to provide emergency services, rescue operations, or recovery measures to areas that are dangerous to people in the event of a hazard.

Facilitates post-disaster funding – By identifying and ranking projects before the next disaster, Pamlico County is in a better position to obtain post-disaster funding because much of the background work necessary for applying for federal and state aid will already be done.

Speeds recovery – By developing a mitigation plan, Pamlico County can identify post-disaster mitigation opportunities in advance of a disaster. By having this strategy in advance, Pamlico County can be ready to respond quickly after a disaster.

Demonstrates commitment to improving community health and safety – A mitigation strategy demonstrates a community's commitment to safeguarding its citizens and protecting its economic, social, and environmental well-being.

Who Was Involved

The North Carolina Division of Community Assistance provided Pamlico County with professional planners to draft this plan, with input from a planning committee, the Hazard Mitigation Planning Committee, established by the Pamlico County Commissioners. All towns in the County were notified of the planning meetings and encouraged to attend. The Hazard Mitigation Planning Committee membership included:

Bronte Jones, Citizen, Bayboro
Jerry Prescott, Citizen, Grantsboro
Barbara Baker, Deputy Town Clerk, Bayboro
Mark Howell, Town of Bayboro, Bayboro
Josh Potter, Mayor, Minnesott Beach
Jayne Robb, Pamlico County Planner
David Spruill, Pamlico County Emergency Management
Tim Buck, Pamlico County Manager
Ron Kilburn, Citizen, Oriental
Nick Santoro, Citizen, Merritt
Wyatt Cutler, Town Manager (retired), Oriental
Booker T. Jones, Mayor, Mesic
Pat Prescott, Town Clerk, Grantsboro
Skip Lee, Pamlico County Building Inspector
Amy Spruill, Pamlico County Floodplain Coordinator
Miriam Prescott, Pamlico County GIS Coordinator

In addition to being invited to all meetings, each individual town updated and revised the draft section of the plan pertaining to their respective jurisdictions, with the assistance of the North Carolina Division of Community Assistance. These draft action plans were developed to meet the state requirements of Senate Bill 300. These draft plans were adopted locally and they were incorporated into this planning document.

Each municipality participated in the drafting of this document by: 1) developing draft action plans; and 2) being invited to participate in the County's multi-jurisdictional hazard mitigation plan. No attendance policy was implemented at the plan's committee meetings.

All decisions and recommendations of the Plan Committee were accomplished through reaching consensus on the goals, objectives, and action items.

No subcommittees were formed to execute any particular tasks.

How the Public Was Involved
The Committee held five committee meetings, on November 5, 2008; December 3, 2008; January 7, 2009; February 4, 2009 and March 4, 2009, during the preparation of the plan update.

Elements of the public participation plan included:

- Holding two public information meetings on April 23, 2009 at 7:00 p.m. and April 27, 2009 at 7:00 p.m. to describe the planning process to interested citizens and listen to citizen suggestions and concerns.

- Copies of the Draft Hazard Mitigation Plan were made available at the Pamlico County Building Inspections Office for public review and;

- On June 7**,** 2010, and June 21, 2010 public hearings were held on the amended Hazard Mitigation Plan.

At the two public information meetings, the public was given the opportunity to contribute ideas and concerns about hazard mitigation activities in Pamlico County. Some significant ideas were offered, and some action items were generated or changed to address these comments. A cross-section of the community attended the public information meetings, including residents, business leaders, and government agency officials.

How Do I Use the Plan?
Each section of the mitigation plan provides information and resources to assist people in understanding Pamlico County and the hazard-related issues facing municipalities, citizens, businesses, and the environment. Combined, the sections of the plan work together to create a multi-jurisdictional document that guides the mission to reduce risk and prevent loss from future natural hazard events.

The structure of the plan enables people to use a section of interest to them. It also allows the County to review and update sections when new data becomes available. The ability to update individual sections of the mitigation plan places less of a financial burden on Pamlico County. Decision-makers can allocate funding and staff resources to selected pieces in need of review, thereby avoiding a full update, which can be costly and time-consuming. New data can be easily incorporated, resulting in a natural hazards mitigation plan that remains current and relevant to Pamlico County.

How will the County and Local Municipalities Use the Plan?
Pamlico County will maintain, review and revise this plan as it becomes necessary. The plan will be reviewed by County officials when progress is made in the implementation of the plan. Updated or revised mitigations strategies will be reviewed by the Pamlico County Hazard Mitigation Planning Committee at such times revision is deemed necessary and will be adopted and incorporated into the existing plan after pubic review and a public hearing.

County and Municipal officials will also refer to the plan when considering the development or amendment to any regulation or policy pertaining to the physical development of land in Pamlico County and the municipalities located within.

SECTION 2: COMMUNITY PROFILE

Why Plan for Natural Hazards in Pamlico County?

Natural hazards impact citizens, visitors, property, the environment, and the economy of Pamlico County. Flooding, hurricanes, nor'easters, wildfire, thunderstorms, tornadoes, heat waves, and coastal erosion have exposed Pamlico County's residents and businesses to the financial and emotional costs of recovering after natural disasters. The risk associated with natural hazards increases as more people move to areas affected by natural hazards. The inevitability of natural hazards, and the growing population and activity within the County create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future natural hazard events. Identifying risks posed by natural hazards, and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses can work together with the County to create a natural hazards mitigation plan that addresses the potential impacts of hazard events.

Geography and the Environment

Pamlico County, a peninsula reaching out into the Pamlico Sound, was formed from part of Craven County in 1872 and from parts of Beaufort County in 1874 and 1875. The County had a 2001 population of 12,934 permanent residents (North Carolina State Demographics). It has a total area of 562 square miles and is bordered by water: Upper Broad Creek forms the county's western boundary with Craven County; Goose Creek separates Beaufort County and Pamlico County; Pamlico Sound lies to the east; and the Neuse River to the south. Of the 562 square miles, only 337 square miles are land area.

The topography of Pamlico County is relatively flat with elevations ranging from sea level to 50 feet. The highest elevations are west of the beach ridge which is parallel to NC 306. In this area of the County, elevations range from 25 to 50 feet. The larger portion of the county lying east of the beach ridge has elevations from 1 to 25 feet with most of the elevations ranging from 2 to 15 feet.

Farming is an important source of income in Pamlico County. Grain, tobacco, potatoes, livestock, and poultry are currently the principal farm income sources. Commercial forestland occupies more land than any other land use in the County. Forestry, like agriculture, is another important source of income in the area.

Pamlico County's climate is characterized by mild winters and warm summers. The average annual temperature is approximately 64 degrees Fahrenheit. Average annual precipitation of the region is approximately 56 inches, with the heaviest rain usually occurring during the summer months.

Demographic Profile

In terms of populations, Pamlico County ranks 91st in the state with a current population of 12, 934 people. Most of the county's residents are widely dispersed throughout the

county, with a significant portion of the population living in and around the towns that are located along Highway NC 55. The average population density for the entire county is 39.09 people per square mile (NC Department of Commerce, Economic Development Information System).

Unlike many of North Carolina's counties, Pamlico County is not experiencing rapid population growth. North Carolina, between the years of 1990 and 2000, experienced an average population growth of 21%, while Pamlico County grew only at 14% during this same period.

There are reasons for Pamlico County's slower growth rate. First, there are limited employment opportunities within the county. This lack of opportunity has forced non-retired people to look elsewhere for a place to live and work. Secondly, while other areas have seen significant economic growth, Pamlico County remains rural and is isolated from mainstream shopping, medical facilities, and daily routines. This isolation has driven some residents to relocate to other areas where much needed goods and services are more easily accessible.

Table 1. Pamlico County Population Data

Subject	Number	Percent
Total Population	12,934	100
Sex and Age		
Male	6,513	50
Female	6,421	50
Under 5 years	643	5
5 to 9 years	728	5.6
10 to 14 years	833	6.9
15 to 17 years	522	4
18 and 19 years	245	1.9
20 years	103	0.8
21 years	105	0.8
22 to 24 years	373	2.9
25 to 29 years	671	5.2
30 to 34 years	724	5.6
35 to 39 years	926	7.2
40 to 44 years	1,016	7.9
45 to 49 years	971	7.5
50 to 54 years	991	7.7
55 to 59 years	848	6.6
60 and 61 years	327	2.5
62 to 64 years	479	3.7
65 and 66 years	353	2.7

Subject	Number	Percent
67 to 69 years	434	3.4
70 to 74 years	668	5.2
75 to 79 years	447	3.5
80 to 84 years	275	2.1
85 years and over	252	1.9
Median age (years)	42.9	
65 years and over	2,429	18.8
RACE		
White	9,384	72
Black or African American	3,167	24
Hispanic	342	2
American Indian and Alaska Native	66	0.005
Asian	49	0.003
Native Hawaiian / Pacific Islander	2	0.0001
Some other race	9	0.0007
Two or more races	86	0.006
HOUSEHOLD SIZE		
1-Person	1,294	25.0
2-Person	2,101	40.6
3-Person	820	15.8
4-Person	612	11.8
5-Person	251	4.8
6-Person	67	1.3
7 or more Person	33	0.6
YEAR STRUCTURE BUILT	6,781	100.0
1999 to March 2000	229	3.4
1995 to 1998	685	10.1
1990 to 1994	659	9.7
1980 to 1989	1,334	19.7
1970 to 1979	1,433	21.1
1960 to 1969	861	12.7
1940 to 1959	921	13.6
1939 or earlier	659	9.7

Source: US Census 2000 Summary File 1

Economic Profile

Pamlico County's rural population, combined with a lack of major transportation infrastructure, makes economic development more difficult than the more urban areas in

the state. Agriculture, commercial fishing, and forestry have been the traditional industries for many years, but their dominance is not as great as it once was. Although farming is still a big business in Pamlico County, many county residents have looked toward other economic sectors for employment.

During the year 2001, 4.6% were unemployed and looking for work. The government sector employs the largest number of county residents (30%), followed by service employment (25%) and retail trade (19%).

Table 2. Pamlico County Workforce by Industry (2001)

Industry	Number	Percent
Agriculture	110	3.6
Construction	196	6.5
Finance/Insurance/Real Estate	39	1.3
Government	917	30.4
Manufacturing	255	8.4
Retail Trade	583	19.3
Wholesale Trade	84	2.8
Service	743	24.6
Transportation/Communications/Public Util.	93	3.1
TOTAL WORKFORCE	3,020	100

Source: NC Department of Commerce, Economic Policy and Research Division, 2002

Although retail trade provides a large share of the local employment base, Pamlico County ranks 91st out of the state's 100 counties in gross retail sales for fiscal year 2000-2001, with $65,300,609. Pamlico County's largest manufacturers are all part of the seafood industry. *Garland Fulcher Seafood* in Oriental and *Diamond Shoal Seafood* in Oriental employ between 70-80 persons each, while *Fulcher's Point Pride Seafood* and *Normans Seafood* in Oriental employs around 50 persons each (*NC Department of Commerce, Economic Policy and Research Division, 2002)*.

In 2000, the county's per capita personal income was $22,788, which ranked 48th in the state. In 2002, the county's median family income was $45,500, which ranked 51st in the state (*NC Department of Commerce, Economic Policy and Research Division, 2002)*. The most recent poverty estimates indicate that 17.3% of Pamlico County residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

The North Carolina Department of Commerce classifies counties into one of five tiers, with Tier 1 representing the most economically disadvantaged and Tier 5 the most prosperous. Tiers 1, 2, and 3 are considered "distressed" based on various economic and demographic characteristics. Pamlico County is currently classified as a **Tier 2** county.

Distressed counties can access state-provided business incentive programs under the William S. Lee Quality Jobs and Business Expansion Act, and other agencies such as the North Carolina Rural Economic Development Center also use this tier system to determine eligibility for certain programs. Companies that choose to locate a new business or expand existing operations in Tier 1 counties are eligible for credits toward their state taxes. Other offerings for these counties include access to a special utilities fund, priority status for Community Development Block Grant funds for economic development, and a waiver of local matching fund requirements for CDBG funds and Industrial Development Fund loans and grants.

Natural, Historic, and Cultural Resources

Pamlico County is a haven for those seeking a quieter way of life. With miles of back roads, opportunities exist for unmatched outdoor experiences such as freshwater fishing, bird watching, canoeing, kayaking, hunting, and boating. The area's most abundant natural resource may arguably be the water. Pamlico County is a peninsula surrounded by the Neuse River, Pamlico Sound, the Bay River, and the Pamlico River. Pamlico County was formed from part of Craven County in 1872 and from parts of Beaufort County in 1874 and 1875. The first permanent European settlers arrived in the early 1700's. The area was inhabited by the Pampticoe Indians, part of the Algonquin Indian Nation, from whom Pamlico got its name. These Indians referred to the area as "TaTakua" or where the land and sea meet the sky. After the Tuscarora War in 1711, Scotch and English colonists came to the area. Settlement was slow, however, because the county is on an isolated peninsula. The earliest settlements were at the heads of the rivers, creeks, and bays. The interior of the county was settled as the road system was developed.

Historical sites can be a significant tourist attraction if properly developed and maintained. The State of North Carolina has submitted and listed the following building on the National Register for Historic Places:
China Grove – added in 1973

This private single-family dwelling was built by William S. Sparrow. The period of significance 1800-1824 is an example of Federal architectural style. This structure is located 3 miles southwest of Oriental on SR 1302.

Development Trends and Implications

Pamlico County is located within a region which ranks below the state average for population growth, employment growth, business failure rate, and business startup rate *(NC Department of Commerce, Economic Policy and Research Division)*.

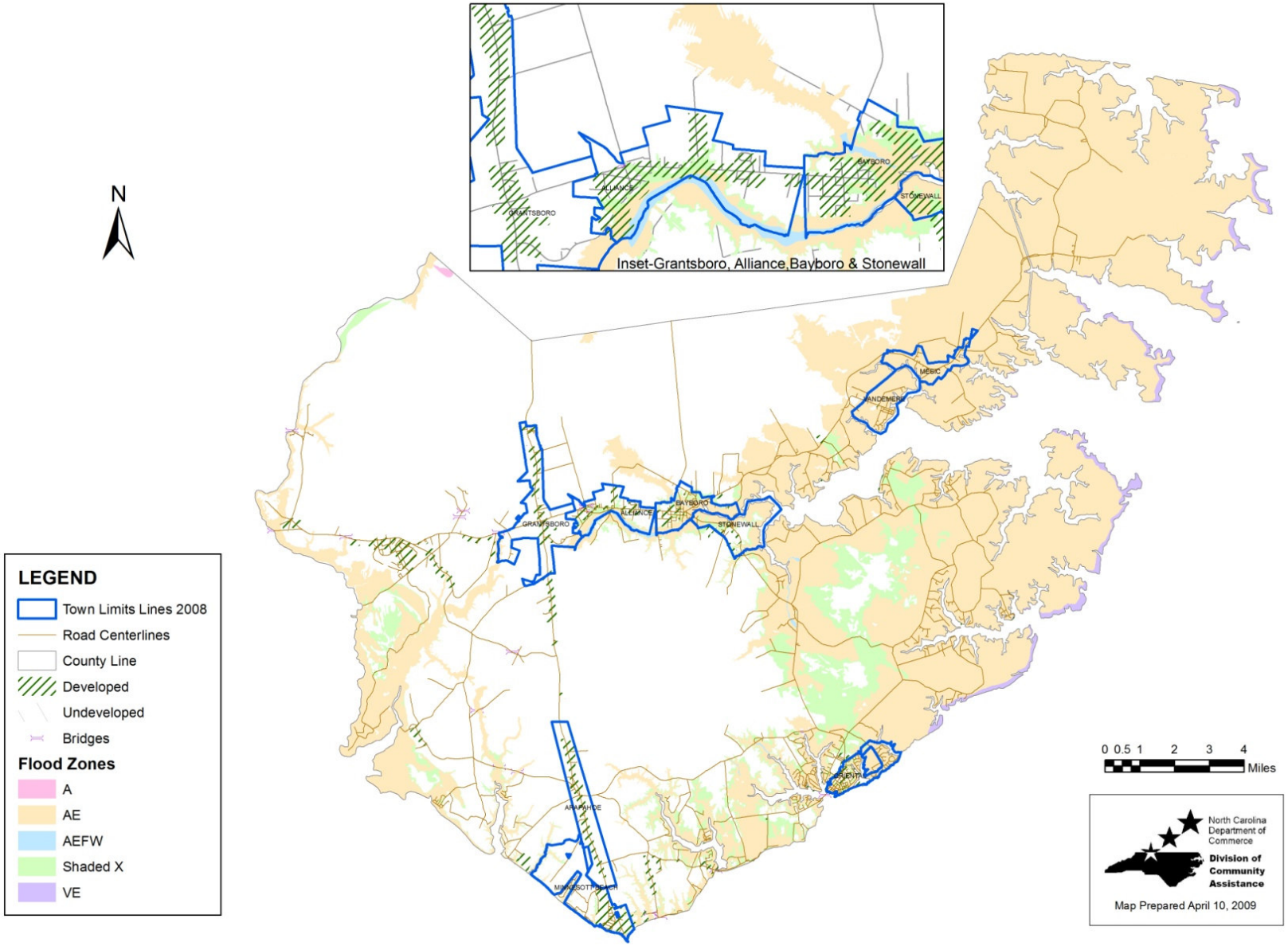
Pamlico County grew 13.9% in population between 1992 and 2002, ranking 91st in the state (the state's average population growth was 21.4%). Over the next twenty years, the county is projected to grow in population by another 16.8% (the state's average is projected to grow another 26.6%). Pamlico County has a population density of 39.09 persons per square mile (the state average is 165.25). This population density is

expected to increase to 44.87 persons per square mile in 2020 *(NC State Demographics Unit, 2002)*.

Pamlico County's residential development is mostly located within the incorporated municipalities, and along primary and secondary roads. There is some residential development expected within the next 20 years. The NC State Demographics Unit projects that 1,938 people will be living in Pamlico County in the year 2020, so it is projected that there will be a small number of housing starts to accommodate the new residents. Similarly, according to the NC Department of Commerce, it is unlikely that Pamlico County will see significant commercial or industrial development in the next 20 years.

With a few exceptions, land use patterns in Pamlico County have remained unchanged for many years. Relatively built up areas continue to be located in the towns of Oriental and Minnesott Beach, with smaller concentrations located in other areas. Commercial land uses are primarily limited to the incorporated municipalities. Some major factors that limit the development potential for Pamlico County include the lack of readily available goods and services and soil limitations for septic tank usage in areas not served by sewer.

Figure 2. Existing Land Use with Floodplain Overlay



SECTION 3: RISK ASSESSMENT

What is a Risk Assessment?

Conducting a risk assessment can provide information on the location of hazards, the value of existing land and property in hazard locations, and an analysis of risk to life, property, and the environment that may result from natural hazard events. Specifically, the five levels of a risk assessment are as follows:

1 – ***Hazard Identification*** identifies the geographic extent and intensity of the hazard, the intensity of the hazard, and the probability of its occurrence. Maps are frequently used to display hazard identification data. Pamlico County identified nine major hazards that consistently affect this geographic area. These hazards - flooding, hurricanes, nor'easters, earthquakes/tsunamis, landslides, thunderstorms, tornadoes/waterspouts, wildfire, severe winter storms, coastal erosion, and mosquitoes – were identified through an extensive process that utilized input from the Hazard Mitigation Planning Committee, as well as recommendations from North Carolina Emergency Management. The geographic extent of each of the identified hazards has been identified using the best available data.

2 – ***Profiling Hazard Events*** describes the causes and characteristics of each hazard, how it has affected Pamlico County in the past, and what part of Pamlico County's population, infrastructure, and environment has historically been vulnerable to each specific hazard. A profile of each hazard discussed in this plan is provided in each hazard section. For a full description of the history of hazard specific events, please see the appropriate hazard chapter.

3 – ***Vulnerability Assessment/Inventorying Assets*** combine's hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard. Critical facilities are of particular concern because these entities provide essential products and services to the general public that are necessary to preserve the welfare and quality of life in the county and fulfill important public safety, emergency response, and/or disaster recovery functions. The critical facilities have been identified, mapped, and are illustrated in Figure 3 at the end of this section. A description of the critical facilities in the county is also provided in this section.

4 – ***Risk Analysis/Estimating Potential Losses*** involves estimating the damage, injuries, and financial losses likely to be sustained in a geographic area over a given period of time. Describing vulnerability in terms of dollar losses provides the community with a common framework to measure the effects of hazards on assets. For each hazard where data was available, quantitative estimates for potential losses are included in the hazard assessment.

5 – ***Assessing Vulnerability/Analyzing Development Trends*** provides a general description of land uses and development trends within the county so that mitigation options can be considered in land use planning and future land use decisions. Analyzing these trends can help in identifying potential problem areas and can serve as

a guide for incorporating the goals and ideas contained in this mitigation plan into other community development plans.

Note: The information on the maps in this plan was derived from Pamlico County's GIS. Care was taken in the creation of these maps, but is provided "as is." Pamlico County cannot accept any responsibility for any errors, omissions or positional accuracy, and therefore, there are no warranties that accompany these products (the maps). Although information from land surveys may have been used in the creation of these products, in no way does this product represent or constitute a land survey. Users are cautioned to field verify information on this product before making any decisions.

Hazard assessments are subject to the availability of hazard-specific data. Gathering data for a hazard assessment requires a commitment of resources on the part of participating organizations and agencies. Each hazard-specific section of the plan includes a section on hazard identification using data and information from local, county, state, or federal agency sources.

Pamlico County conducted a vulnerability assessment for the flood hazard using Geographic Information Systems (GIS) to identify the geographic extent of the hazard and assess the land use and value at risk from the flood hazard. Insufficient data exists to conduct vulnerability assessments and risk analyses for all the hazards listed and addressed in the plan.

Regardless of the data available for hazard assessments, there are numerous strategies the county can take to reduce risk. These strategies are described in the action items detailed in each hazard section of this plan. Mitigation strategies can further reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure. Action items throughout the hazard sections provide recommendations to collect further data to map hazard locations and conduct hazard assessments.

Table 3. Federal Criteria for Risk Assessment

Section 322 Requirement	How is This Addressed?
Identifying Hazards	Each hazard section includes an inventory of the best available data sources that identify hazard areas. To the extent GIS data are available, the county developed maps identifying the location of the hazard in the county. The Executive Summary and the Risk Assessment sections of the plan include a list of the hazard maps.
Profiling Hazard Events	Each hazard section includes documentation of the history, and causes and characteristics of the hazard in the county.

Assessing Vulnerability: Identifying Assets	Where data is available, the vulnerability assessment for each hazard addressed in the mitigation plan includes an inventory of all publicly owned land within hazardous areas. Each hazard section also identifies potential mitigation strategies.
Assessing Vulnerability: Estimating Potential Losses	The Risk Assessment Section of this mitigation plan identifies key critical facilities and lifelines in the county and includes a map of these facilities. Vulnerability assessments have been completed for the hazards addressed in the plan, and quantitative estimates were made for each hazard where data was available.
Assessing Vulnerability: Analyzing Development Trends	The Pamlico County Profile Section of this plan provides a description of the development trends in the county, including the geography and environment, population, and land use and development.

Storm Events in Pamlico County

Pamlico County has been susceptible to many types of storm events over the past 50 years. The table below contains the type and number of events, and the associated deaths and injuries, along with property and crop damage.

Table 4. Summary of Reported Storm-Related Damage and Casualties in Pamlico County

Events	Numbers	Deaths	Injuries
Pamlico			
Extreme Cold	1	0	0
Hail	36	0	0
Flash Flood	4	0	0
Thunderstorm	2	0	0
Thunderstorm Wind	19	0	0
Funnel Cloud	1	0	0
Tornado	13	1	45
Subtotal	76	1	45
Hurricanes	10	20	19
Tropical Storms	5	0	1
Winter Storms	9	11	179
Subtotal	24	31	199

Events	*Property Damage	*Crop Damage	*Total Damage
Pamlico			
Extreme Cold	$0	$378,344	$378,344
Hail	$133,098	$0	$133,098
Flash Flood	$0	$0	$0
Thunderstorm	$0	$0	$0
Thunderstorm Wind	$68,059	$0	$68,059
Funnel Cloud	$0	$0	$0
Tornado	$17,639,398	$0	$17,639,398
Subtotal	$17,840,555	$378,344	$18,218,899
Hurricanes, Tropical Storms & Winter Storms (multi-county events that affected Pamlico)			
Hurricanes	$1,976,373,464	$731,186,200	$2,707,559,664
Tropical Storms	$24,612,367	$63,953,307	$88,565,674
Winter Storms	$25,021,537	$0	$25,021,537
Subtotal	$2,026,007,368	$795,139,507	$2,821,146,875

Source: NOAA, National Climatic Data Center (Reports from National Weather Service in Categories)

*Damages are in 2008 US dollars, adjusted using the consumer price index (US Bureau of Labor Statistics, March 2003-USDL-02-222,

**Period of Record: Storms (1/1993-7/1999 except 6-7/1993); Tornadoes (1/1950-12/1992); Wind and hail (1/1959-12/1992) ** Numbers Include 1/1/03-8/31/08 for all totals (National Climatic Data Center)

***Hurricane, tropical storm, and winter storm damages are multi-county estimates and storm-specific

Critical Facilities, Infrastructure and Vulnerable Populations

Facilities critical to government response and recovery activities (i.e., life safety and property and environmental protection) include: emergency operations centers, police and fire stations, public facilities, roads, and to a lesser extent, drug stores and grocery stores. Facilities that, if damaged, could cause serious secondary impacts may also be considered "critical." Critical and essential facilities are those facilities that are vital to the continued delivery of key government services or that may significantly impact the public's ability to recover from the emergency. Figure 3 illustrates the critical facilities, essential facilities, public infrastructure, and emergency transportation routes within Pamlico County.

According to the Local Multi-Hazard Mitigation Planning Guidance provided by FEMA on July 1, 2008, critical facilities may include emergency serve facilities, such as

hospitals and other medical facilities, jails and juvenile detention centers, police and fire stations, emergency operation centers, public works facilities, evacuation shelters, schools, and other uses that house special needs populations.

Critical facilities and Vulnerable Populations for Pamlico County are:

Health / Medical Facilities
Pamlico Medical Center – Bayboro
Oriental Medical Center – Oriental
Pamlico County Health Department – Bayboro
Pamlico Pediatrics – Alliance
Britthaven of Pamlico – Grantsboro
Continuum Home Care – Grantsboro
Holland Drive Home – Reelsboro
Hospice of Pamlico County, Inc. – Grantsboro
Neuse Center for MH/DD/SAS – Alliance
Social Services of Pamlico County – Bayboro
Pamlico County Group Home – Grantsboro
Pine Haven Home Health Care – Olympia
TASC/CJP-Pamlico – Alliance
The Gardens of Pamlico – Scotts Store

Public Buildings
Pamlico County Courthouse - Bayboro
Pamlico County Senior Services - Alliance
Pamlico County Farm Services Agency – Alliance
Mesic Town Hall, Hwy 304, Mesic
Vandemere Town Hall, Pennsylvania Avenue, Vandemere
Oriental Town Hall, Church Street, Oriental
Minnesott Beach Town Hall, Hwy 306, Minnesott Beach
Arapahoe Town Hall, Hwy 306, Arapahoe
Grantsboro Town Hall, Hwy 306, Grantsboro
Alliance Town Hall, Hwy 55, Alliance
Bayboro Town Hall, 3rd Street, Bayboro
Stonewall Town Hall, Hwy 55, Stonewall
Pamlico County Chamber of Commerce, Hwy 55, Grantsboro

Emergency Services Facilities
Pamlico County Rescue Squad - Bayboro
Triangle Volunteer Fire Department – Bayboro
Grantsboro / Silverhill Volunteer Fire Department – Grantsboro
Olympia Volunteer Fire Department – Olympia
Southeast Volunteer Fire Department – Oriental
Florence / Whortonsville Volunteer Fire Department – Florence
Arapahoe Volunteer Fire Department – Arapahoe
Goose Creek Volunteer Fire Department – Hobucken

Vandemere Volunteer Fire Department – Vandemere
Reelsboro Volunteer Fire Department – Reelsboro

Water Distribution / Wastewater Facilities
Bay River Metropolitan Sewerage District – Bayboro
Bay River Sewerage Lagoon – Bayboro
Bay River Sewerage Spray Site – Grantsboro
Pamlico County Water Department - Bayboro

Water Tower Locations
Lowland Road – Hobucken
Hwy 306 South – Arapahoe
McCotter Road – Stonewall
Hwy 55 – Grantsboro
Hwy 304 – Vandemere
Pamlico Road -- Eastern Pamlico County
Hwy 55 -- Merritt
Broad Street – Oriental
Kershaw Road – Eastern Pamlico County
Leaf Land – Reelsboro
Bay City Road – Bayboro
Dees Avenue – Bayboro

Communication Towers
Kershaw Road – Oriental
Lowland Road – Lowland
Lowland Road – Hobucken
Hwy 304 – Vandemere
Burton Farm Road – Minnesott Beach
Hwy 55 – Reelsboro
Hale Road – Reelsboro
Hwy 55 – Western Pamlico County
Bay City Road – Bayboro
Hwy 55 – Grantsboro
Hwy 55 – Stonewall

Law Enforcement and Detention Centers
Oriental Police Department, Broad St, Oriental
Pamlico County Sheriff's Department, Hwy 55, Bayboro
NC Department of Corrections, Bay City Road, Bayboro

Utility Facilities
Gibbtown Road -- Merritt
Hwy 306 -- Minnesott Beach
Hwy 306 -- Arapahoe
Hwy 306 -- Grantsboro

Hwy 55 – Grantsboro
New Ditch Road – Alliance
Hwy 304 – Bayboro

Airports
Meekins Road – Mesic
Hooker Road – Bayboro

Camps
Jones Street – Vandemere
Janiero Road – Pamlico County
Camp Don Lee Road – Pamlico County
Hwy 306 – Minnesott Beach
Seafarer Road – Minnesott Beach

Daycare and Pre-School Facilities
Hwy 306 – Grantsboro
Hwy 55 – Grantsboro
Hwy 55 – Bayboro

Public and Charter Schools
Arapahoe Charter School – Arapahoe
Pamlico Primary School – Bayboro
Fred Anderson Elementary – Bayboro
Pamlico Middle School – Stonewall
Pamlico High School – Bayboro
Pamlico Community College – Hwy 306

Evacuation Centers
Pamlico Community College – Hwy 306 (located between Grantsboro and Arapahoe)

Pamlico County used a 5 year planning horizon (consistent with the County's Land Use Plan) when generating the list of critical facilities. For purposes of projecting land use estimates in special hazard areas, a 5 year planning horizon will be used.

Figure 3. Critical Facilities and FIRM Flood Zones

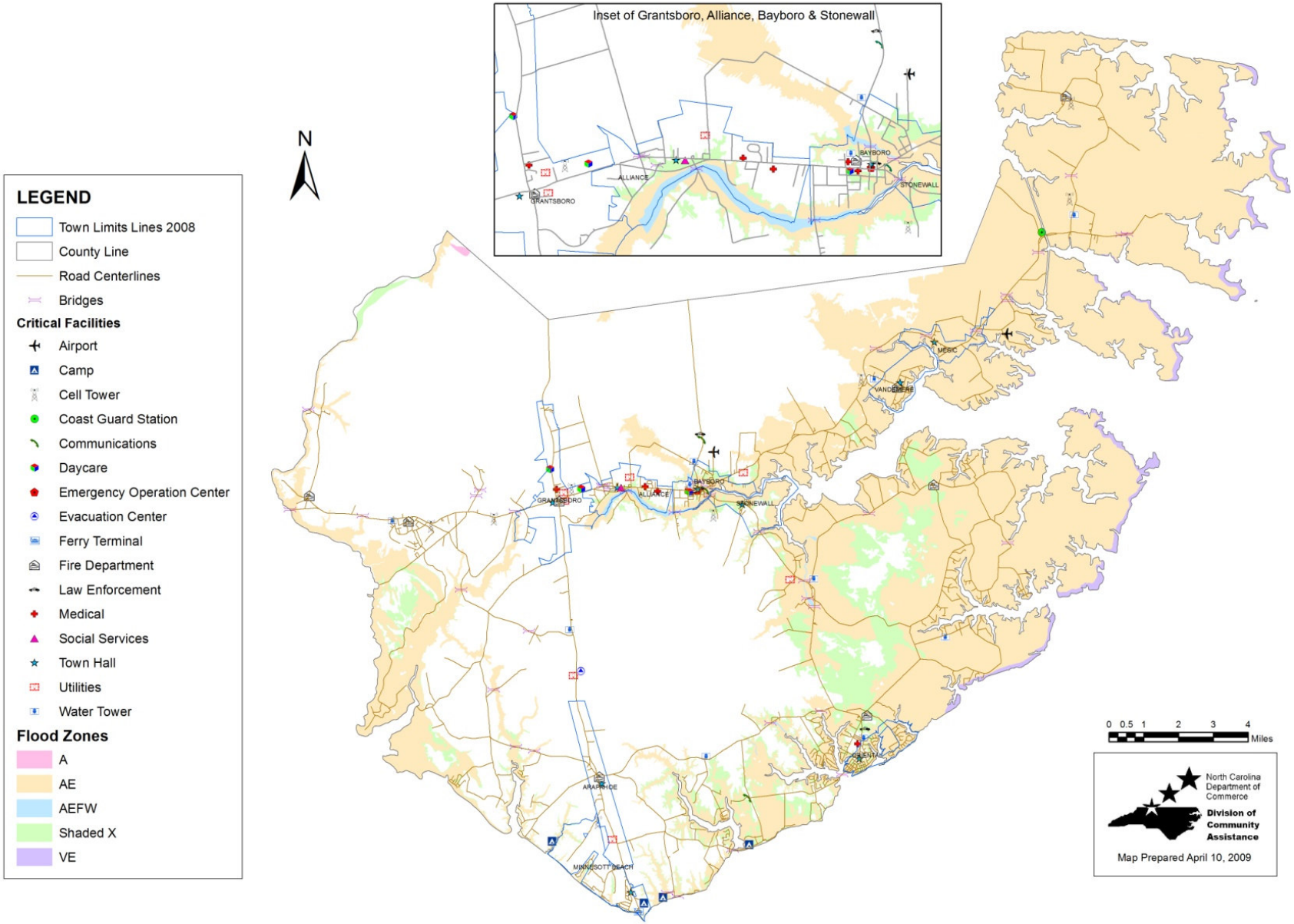
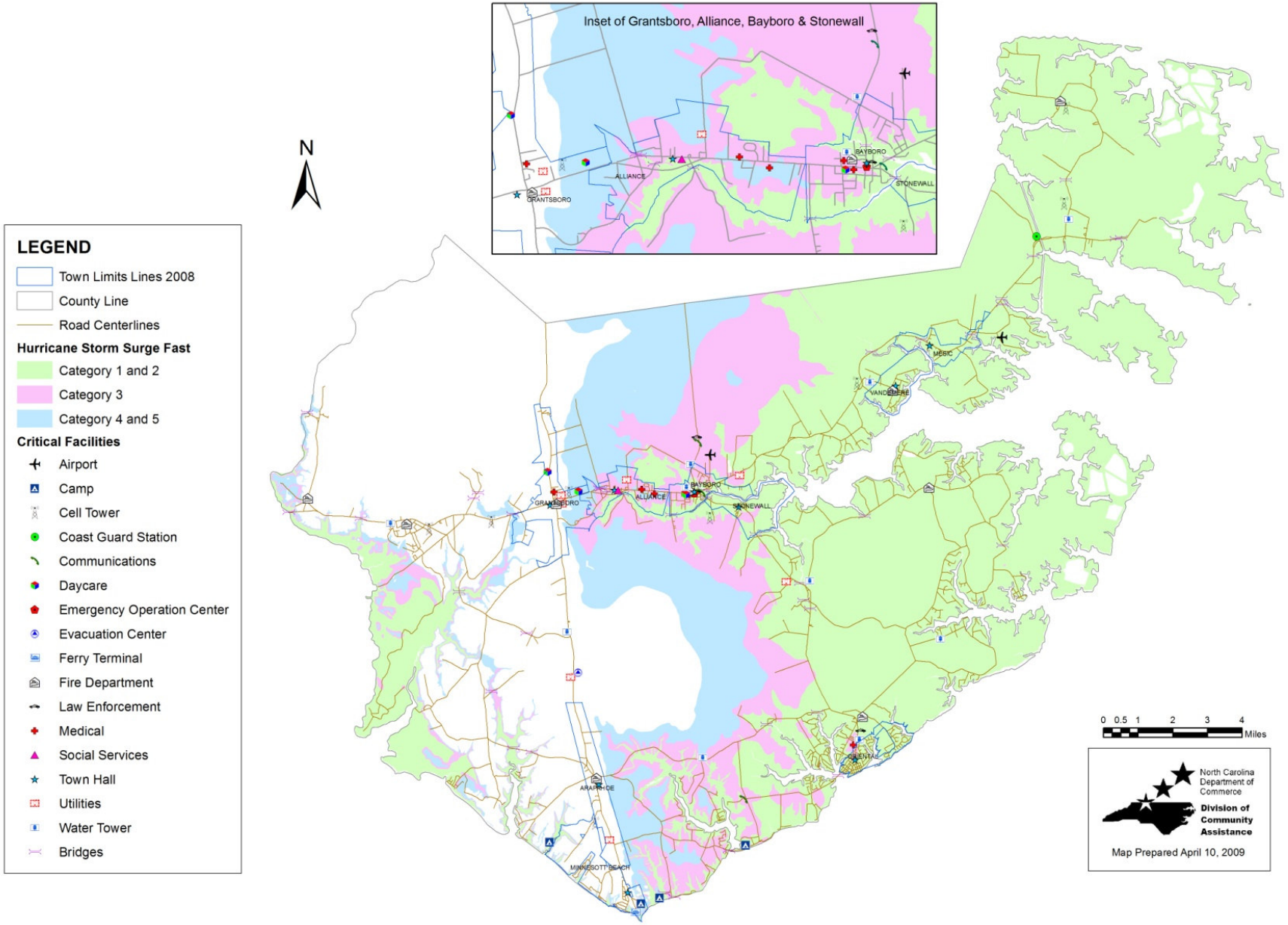


Figure 4. Storm Surge Inundation and Critical Facilities



Repetitive Loss Properties
Over 2.5 million buildings are insured by the National Flood Insurance Program (NFIP), but a fraction of them (less than 2%) account for 33% of the flood insurance claims paid since 1978. This is because these few properties have been flooded more than once, and some of them have been flooded numerous times. Repetitive loss properties are defined by FEMA as properties for which two or more claims of at least $1,000 have been paid by the NFIP within any 10-year period since 1978. (*CRS Coordinator's Manual* 1999, Federal Emergency Management Agency, National Flood Insurance Program, Community Rating System p. 500-3.)

Pamlico County has 263 repetitive loss properties within its jurisdiction, according to a recent FEMA list of repetitive loss properties. 259 of these properties are located with A Zones; 4 of these properties are located in B or X Zones. 182 of the repetitive loss buildings are insured. There were 582 total repetitive losses in the county; 396 of these losses were insured.

Repetitive loss payments were $9,100,297. Of this total, $7,232,228 was for building loss; $1,868,069 was for contents. $5,790,982 of these total losses was insured; $4,626,203 was for insured buildings and $1,164,779 was for insured contents.

There were 73 post-FIRM repetitive loss buildings (buildings constructed after the floodplain regulations were established) in the county. 5 buildings have been damaged by floods at least 4 times. 3 buildings that have been flooded 2-3 times have received more in total insurance damages than the value of the building.

Table 5. Repetitive Loss Data

Pamlico County and All Municipalities as of 6/30/07				
Repetitive Loss (RL) Data				
	AE, A1-30, AO, AH, A	**VE, V1-30, V**	**B, C, X**	**TOTAL**
RL Nonresidential	13	0	1	14
RL Single family	235	0	3	238
RL Condominium	6	0	0	6
RL 2-4 family	1	0	0	1
RL Other residential	4	0	0	4
RL Buildings (Total)	259	0	4	263
RL Buildings (Insured)	178	0	4	182
RL Losses (Total)	573	0	9	582
RL Losses (Insured)	387	0	9	396
RL Payments (Total)	9,014,743	0	85,554	100,297
Building	7,158,486	0	73,742	7,232,228
Contents	1,856,257	0	11,812	1,868,069
RL Payments (Insured)	5,705,428	0	85,554	5,790,982
Building	4,552,461	0	73,742	4,626,203
Contents	1,152,967	0	11,812	1,164,779
Post-FIRM SFHA RL Buildings:				73
Insured Buildings with 4 or More Losses:				5
Insured Buildings with 2-3 Losses > Building Value:				3

Pamlico County's repetitive loss areas are shown on Figure 5.

Figure 5. Repetitive Loss Areas

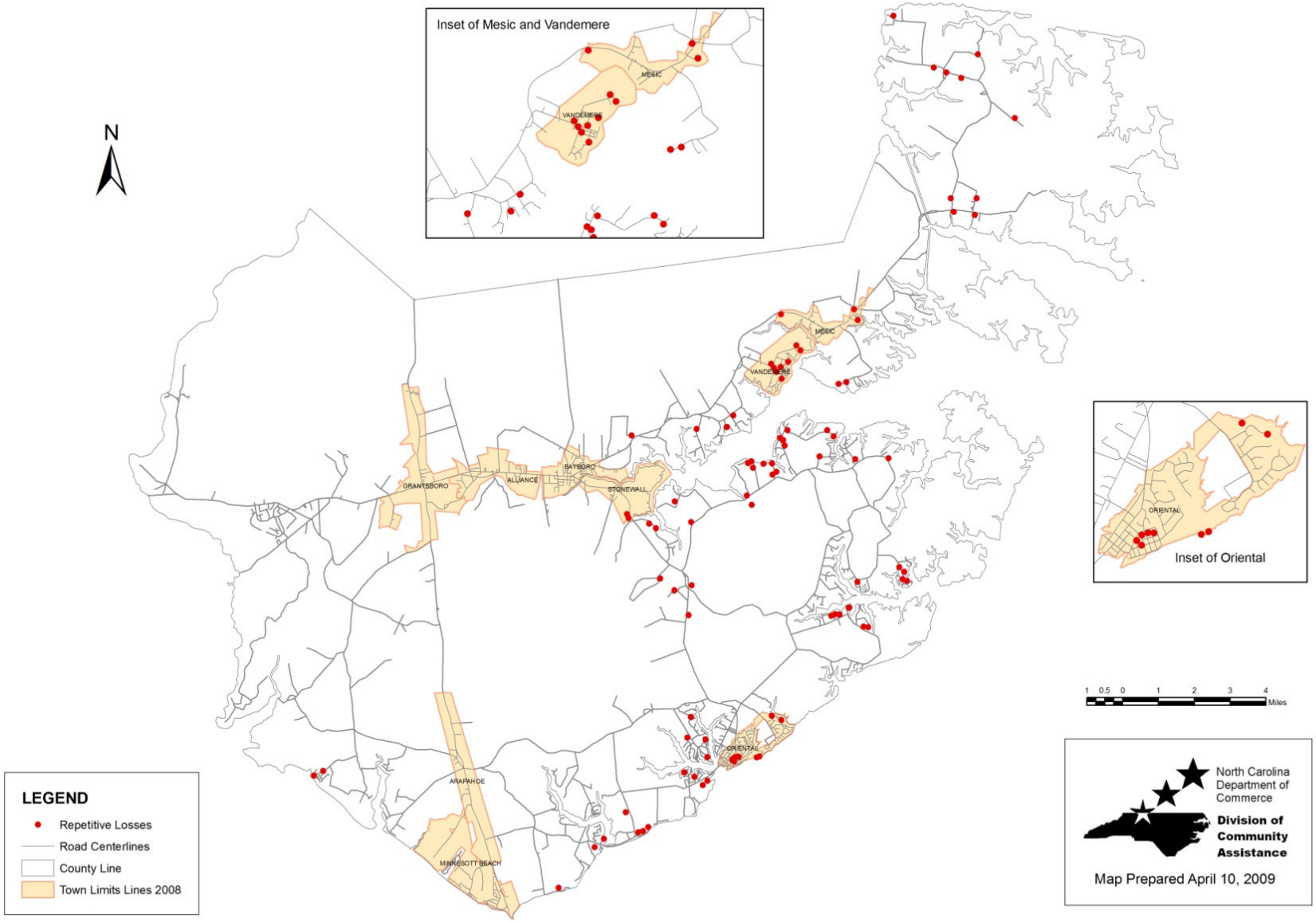


Figure 6. Vulnerable Populations

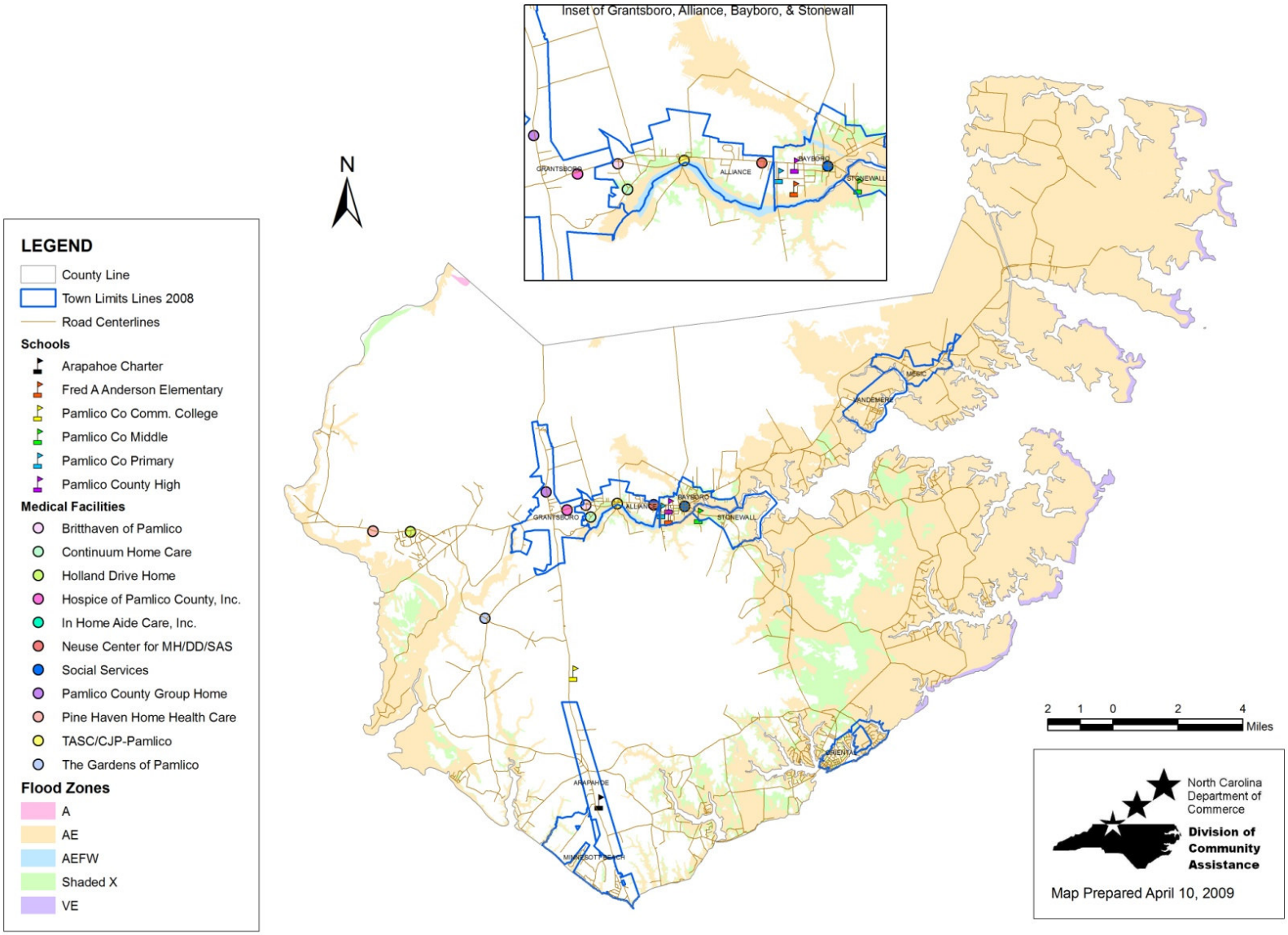
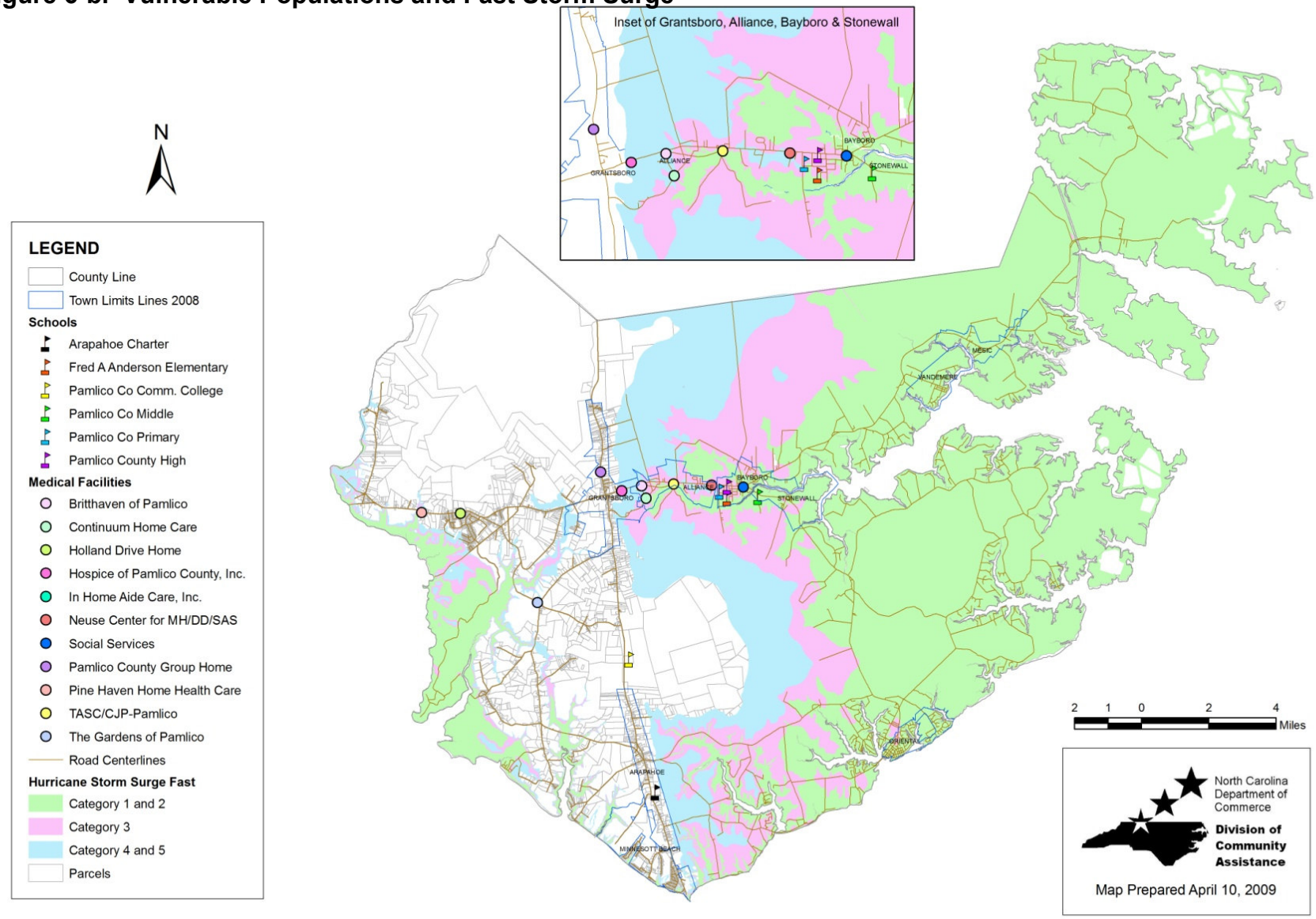


Figure 6-b. Vulnerable Populations and Fast Storm Surge



Identifying Hazards
The county is vulnerable to several natural hazards. Using Tables 4 (Summary of Reported Storm Related Damage and Casualties in Pamlico County) and 5, below, the Plan Committee identified the natural hazards that have occurred previously in Pamlico County. Additionally, the Plan Committee identified other hazards that occur in the county's jurisdiction. The committee identified and analyzed each specific hazard as required by FEMA, even if the hazard does not pertain, or is very unlikely to occur in Pamlico County. The hazards were ranked by importance to the County, taking into consideration, the likelihood of occurrence, the severity of past events and the County's ability to respond.

The Plan Committee, after identifying each hazard, and evaluated each hazard, using their knowledge of previous natural hazard occurrences.

A '4' is the highest score for a hazard, and represents the highest threat to the community. Conversely, a '1' indicates that the Plan Committee did not rate that hazard as a significant threat.

Table 5 represents the Hazard Identification and Analysis matrix and the corresponding determined by the planning committee at the January 7, 2009 meeting.

Table 6. Hazard Identification and Analysis

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
North Carolina Greater Hazards					
FLOODING					
Flooding*	4				
10-49 year event	4	High	Limited	Structures located in low lying areas not within 100 year flood plain	44.1%
50-100 year event	4	Moderate	Critical	Structures located within 100 year flood plain	52.3%
>100 year event	4	Low	Critical	Structures located within 500 year flood event	60.3%
Riverine Flooding*	1	Low	Limited	Structures located in close proximity to main water body's with the County	
Flash Flooding	3	Moderate	Limited	All structures	100%
Tidal Flooding	1	Low	Limited	Structures located in close proximity to main water body's	

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Ice Jam Flooding	1	Very Low	Limited		
Local Drainage or High Groundwater Levels	3	Moderate	Limited	All Structures	
Fluctuating Lake Levels	1	Very Low	Limited		
Coastal Flooding*	3	Moderate	Critical	All Structures in close proximity to main water body's	
Urban Flooding*	1	Low	Limited	All Structures located within an urban area	
EARTHQUAKES				All Structures	
Earthquake*	1	Very Low	Limited		
Ground Motion	1	Very Low	Limited		
Seismic Activity	1	Very Low	Limited		
Surface Faulting	1	Very Low	Limited		
Earthquake-related Ground Failure	1	Very Low	Limited		
HURRICANES/COASTAL HAZARDS				All Structures	
Hurricane*	4				
-Tropical Storm	4	High	Limited		
-Category 1	4	High	Limited		13.7%
-Category 2	4	Moderate	Critical		16.6%
-Category 3	4	Low	Critical		18.2%
-Category 4	4	Low	Catastrophic		21.0%
-Category 5	4	Very Low	Catastrophic		23.7%
Storm Surge*	4	Moderate	Critical		23.7%
High Wind*	4	High	Critical		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Torrential Rain*	4	High	Limited		
Tornado*	4	Low	Limited		
Nor'easter*	4				
-1 (weak)	4	High	Limited		5.2%
-2 (Moderate)	4	Moderate	Limited		7.6%
-3 (Significant)	4	Moderate	Critical		9.3%
-4 (Severe)	4	Low	Critical		13.4%
-5 (Extreme)	4	Very Low	Catastrophic		16.4%
Storm Surge*	4	Moderate	Critical		
High Wind*	4	High	Critical		
Severe Winter Weather*	2	Low	Limited		
Tsunami*	1	Low	Catastrophic		
Coastal Erosion*	3	Moderate	Critical		
Rip Current*	1	Very Low	Limited		
SEVERE WINTER WEATHER				All Structures	100%
Severe Winter Weather*	2				
Freezing Rain*	2	Low	Limited		
Snowstorms*	2	Low	Limited		
Blizzard*	1	Low	Limited		
Wind Chill*	1	Low	Limited		
Extreme Cold*	1	Low	Limited		
WILDFIRE				All Structures	100%
Wildfire*	3	Moderate	Limited		
Wild-land Fires	1	Low	Limited		
Interface of Intermix Fires	1	Low	Limited		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Firestorms	1	Low	Limited		
Prescribed Fires and Prescribed Natural Fires	1	Low	Limited		
Dam Failure				All Structures	100%
Dam Failure*	< 1	N/A	N/A		
Drought				All Structures	100%
Drought*	3				
Meteorological*	3	Moderate	Limited		
Hydrologic*	2	Moderate	Limited		
Agriculture*	3	Moderate	Limited		
Socioeconomic*	1	Moderate	Limited		
Heat Wave*	1	Moderate	Limited		
Infectious Diseases				All Structures	100%
Infectious Disease*	2	Low	Limited		
Human Contact*	2	Low	Limited		
Animal Contact*	2	Low	Limited		
Food-borne*	1	Low	Limited		
Water-borne*	1	Low	Limited		
Human Respiratory*	2	Low	Limited		
Animal Respiratory*	1	Low	Limited		
Vector-borne*	1	Low	Limited		
Geological				All Structures	100%
Landslide/Debris Flow*	1	Low	Limited		
Subsidence*	1	Low	Limited		
Acidic Soil*	1	Low	Limited		
Geochemical-related*	1	Low	Limited		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Mine Collapse*	1	Low	Limited		
Sinkholes*	1	Low	Limited		
Expansive Soil*	1	Low	Limited		
Tornado/Thunderstorm				All Structures	100%
Severe Thunderstorm*	3	High	Limited		
Hailstorm*	2	High	Limited		
Torrential Rain*	2	High	Critical		
Thunderstorm-related Wind*	2	High	Limited		
Lightning*	3	High	Limited		
Tornado*	2				
-F0	2	High	Limited		
-F1	2	Moderate	Limited		
-F2	2	Low	Critical		
-F3	2	Very Low	Critical		
-F4	2	Very Low	Catastrophic		
-F5	2	Very Low	Catastrophic		
-F6	2	Very Low	Catastrophic		
Waterspout*	1	Low	Limited		
High Wind/Wind Storm*	2	Moderate	Limited		
Fog*	1	Moderate	Limited		
OTHER HAZARDS				All Structures	
Snow Avalanches	1	Very Low	Limited		
Extreme Summer Weather	1	High	Limited		
Fires				All structures	100%
Structure Fires	2	Moderate	Limited		
Outdoor Fires	1	Low	Limited		

Hazard	Local Rank of Importance, 1-4	Likelihood Of Occurrence	Impacts	General description of the types of structures affected by each hazard	Hazards impact to % of vulnerable structures
	1 = Least Important 2 = Somewhat Important 3 = Important 4= Very Important	**Very Low-High**	**Limited-Catastrophic**		
Man-Made Hazards/HAZMAT Events				All structures	100%
Fixed-Site Facilities	2	Low	Limited		
Highway and rail Transportation	1	Very Low	Limited		
Marine Transportation	2	Low	Limited		
Air Transportation	1	Very Low	Limited		
Pipeline Transportation	2	Low	Limited		
Natural Hazards	1	Very Low	Limited		
Nuclear Accidents				All Structures	100%
Criticality Accidents	1	Very Low	Catastrophic		
Loss-of-Coolant Accidents	1	Very Low	Catastrophic		
Loss-of-Containment Accidents	1	Very Low	Catastrophic		
Other Technological Hazards				All Structures	100%
National Security Hazards	1	Very Low	Limited		
Power failures	3	Moderate	Critical		
Telecommunications Failures	2	Low	Limited		
Volcanic Hazards				All Structures	100%
Volcano Eruption	1	Very Low	Limited		

The Hazard Identification allowed the Hazard Mitigation Committee to prioritize the natural hazards in Pamlico County. Hurricanes and nor'easters were determined to be the major threat, mainly because of flooding concerns. Wildfire and thunderstorms/lightning constitute the other major natural hazard that affect the county. All natural hazards listed will be discussed, but emphasis on planning will focus on these high-ranking natural hazards.

While not normally considered as a "natural hazard," mosquitoes were included in the list. Anyone that has spent time in Pamlico County during the summer and fall will agree that mosquitoes can be quite bothersome and create discomfort for residents and visitors. While there is literature describing the spread of disease and mosquitoes, such narrative is not included in this plan. However, the Plan Committee felt that mosquitoes were a significant nuisance in the County, and decided to include them in the list of hazards.

Assessing Vulnerability

The Committee also evaluated the County's current programs and policies, along with potential programs and policies that could reduce Pamlico County's susceptibility to natural hazards.

Current and potential policies were examined by: 1) Effectiveness; and 2) Cost. Effectiveness was determined by the perception of the Hazard Mitigation Plan Committee as High, Medium, or Low. Cost was determined by the Committee and rated as High, Medium, or Low. The cost is the expense of implementation and administration to the community.

An inventory of Pamlico County ordinances and policies relevant to hazard mitigation was conducted and tabulated in Table 6. Pamlico County administers many of its ordinances within the corporate limits of the individual incorporated towns. The sections that pertain to the individual towns will include any local ordinances that are related to hazard mitigation. The bulk of hazard mitigation policies and programs are geared toward hurricanes and nor'easters, and associated flooding, since those hazards were identified as the highest ranking natural hazards affecting the county and its municipalities.

The table identifies the program or policy, the document reference, effectiveness, cost, and a rationale for effectiveness.

Table 6. Inventory of Local Policies and Programs Relevant to Hazard Mitigation

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
1. Preventive – keep flood problems from getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Group Housing Ordinance	Adopted June 2006	Medium	Medium because the group housing ordinance regulates the height and density of multi-family developments, particularly in or near flood hazards	Any amendments to the GHO should be incorporated in future updates of the Hazard Mitigation Plan
Subdivision regulations	Adopted February 2, 1992, Updated January 2006	High	High because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and	Any amendments to the subdivision regulations should be incorporated into future updates of the Hazard Mitigation Plan

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
			erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985 Updated in 2003	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible that flood plain area will be delineated with updated topography, and that base flood elevations will be recalculated. All municipalities in Pamlico County have adopted the County's ordinance and	The Hazard Mitigation Plan will serve as the community's floodplain management plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
			the County administers the ordinance for all municipalities.	
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface regulations	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the NC Department of Water Quality
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Building elevation	Floodplain Regulations	High	High because the ordinance requires new construction to be built at two (2) feet above BFE	Any amendments to the Floodplain regulations should be incorporated into future updates of the

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
				Hazard Mitigation Plan.
Flood relief (venting)	NC State Building Code Volume 1	High	High because floodwaters actually reduce the pressure exerted by deep water	n/a
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that provide insurance for natural hazards to citizens.
3. Natural Resource Protection – preserves or restores natural areas or the natural functions of floodplain and watershed areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protections should be a component of any future hazard mitigation document.
Best management practices	N/A	High	High because BMPs can be used to collect a number of techniques into a single directive for action	BMPs can help limit runoff and flash-flooding in a storm event.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
				regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are highly effective at removing nitrogen before it reaches streams	Natural buffers can slow the flow and rise of water in a flood event
4. Emergency Services – taken during a flood to minimize its impact. These measures are the responsibility of city or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Citizen notification is an ongoing action strategy in the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Changes in policy should be incorporated into future updates of the Hazard mitigation Plan.
Critical facilities protection	Emergency Operations Plan	Medium	Medium because County facilities are well-	The plan includes a list and a map of

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
			protected	locations of all critical facilities.
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Public health and safety are an important component of a Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	Evacuation routes should be clearly marked in case of an emergency.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	Breakwaters and bulkheads are effective mitigation tools.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMS play a major role in Hazard Mitigation.
Library (Hazard related)	N/A	Low	Low because people do not take advantage of the library	Hazard library is located at the County building Inspector's office.
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies when addressing Hazard Mitigation.
Outreach projects	N/A	Medium	Medium because people often ignore outreach material and are generally unaware.	Continue outreach projects highlighted as an action step in this plan.
Real estate disclosure	N/A	Low	Low because there is no federal or state requirement	
Elevation markers (stating the	N/A	High	High because an	All communities

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating into Hazard Mitigation Strategy
altitude above sea-level)			elevation marker program would inform the public	should consider an elevation marker program to inform residents and visitors about flood levels.

Risk Assessment Summary

Natural hazard mitigation strategies can reduce the impacts concentrated at large concentrations of people, public infrastructure, and critical facilities. Natural hazard mitigation for citizens and visitors may include developing relationships with emergency management services and their employees before disaster strikes, and establishing mitigation strategies together. Collaboration among the public and private sector to create mitigation plans and actions can reduce the impacts of natural hazards.

SECTION 4: MULTI-HAZARD GOALS AND ACTION ITEMS

This section provides information on the process used to develop goals and action items that pertain to the natural hazards addressed in the mitigation plan. It also describes the framework that focuses the plan on developing successful mitigation strategies. The framework is made up of three parts: the *Mission, Goals,* and *Action Items*.

Mission

Pamlico County, through hazard mitigation planning, seeks to maintain or lower the community's flood insurance rating, qualify for future disaster funding, identify potential problems, minimize repetitive losses, and educate the public on Pamlico County's vulnerability to natural hazards.

Public Comments and Participation

The Hazard Mitigation Plan Committee met on November 5, 2008 as a first step in this year's review and developed a plan to include public participation in the planning process. Elements of the public participation plan included:

Holding two public information meetings on April 23, 2009 at 7:00 p.m. and April 27, 2009 at 7:00 p.m. to describe the planning process to interested citizens and listen to citizen suggestions and concerns;
Copies of the Draft Hazard Mitigation Plan were made available at the Pamlico County Building Inspections Office for public review and
On June 7, 2010 and June 21, 2010, public hearings were held on the amended Hazard Mitigation Plan.

Coordination with Other Agencies

There are two reasons to involve agencies and private organizations in planning efforts. First, they may be implementing or planning to implement activities that can affect flood damage or some of the other interests and concerns. The Committee wanted to make sure that their efforts were not going to be in conflict with a government program or duplicate the efforts of another organization. Second, the Committee wanted to involve other agencies to see if they could assist their efforts. Help may be in the form of flood hazard data, technical information on various measures, guidance on regulatory requirements, advice and assistance in the planning effort, implementation of a recommended measure, and financial assistance to help implement a recommended measure.

During the initial research period at the beginning of the planning process, the Committee members discussed various outside agencies to contact.

- US Army Corps of Engineers
- Federal Emergency Management Agency
- Pamlico County Floodplain Manager
- Pamlico County Management Information Specialist

- Soil and Water Conservation District
- NC Division of Coastal Management
- NC Division of Emergency Management

These agencies were invited to attend the two public input meetings, held on April 23, 2009 at 7:00 p.m. and April 27, 2009 at 7:00 p.m. Both meetings gave the public and outside agencies an opportunity to comment on a draft of the hazard mitigation plan. Several action items were added to the draft plan as a result of public comment and outside agency participation.

In addition to coordination with outside agencies, Pamlico County reviewed existing plans, studies, reports, and technical information to assist in the preparation of this plan. These existing resources included:

- Pamlico County Land Use Plan
- Flood Insurance Study
- Flood Insurance Rate Maps

Integration of goals, objectives, and action items from the hazard mitigation plan will occur in future updates of the land use plan, flood insurance study, and other planning documents. The main means by which integration will take place is through implementation of the actions listed in this plan.

Goals

Each goal is meant to be general and broad, and can only be achieved through the long-term implementation of more specific objectives. It is intended that each goal listed below will be more specifically addressed and realized through the implementation of short-term mitigation objectives and action steps established later in this section.

The Hazard Mitigation Plan Committee had previously generated and recommended a floodplain management plan and a State hazard mitigation plan that contained goals and action steps. The Committee reviewed the previous plans and amended the goals for purposes of this plan.

The Hazard Mitigation Plan Committee developed 4 goals to mitigate hazards and to protect life and property in Pamlico County.

Goal 1 Improve Pamlico County's fiscal and operational capabilities to adequately mitigate the effects of natural hazards.

Goal 2 Enhance existing or implement new County policies that will reduce susceptibility to natural hazards without conflicting with other community goals.

Goal 3 Protect Pamlico County's buildings, critical facilities, and infrastructure through the implementation of cost-effective and technically feasible mitigation projects.

Goal 4 Promote public health, safety, and welfare by increasing the public awareness of existing hazards and fostering individual and public responsibility in mitigating risks due to those hazards.

These goals were presented at the public input meetings on March 4, 2004 and March 6, 2004. No changes were made to the goal statements as a result of these public meetings and the goals did not change for the plan update.

Objectives and Action Items

Mitigation *objectives* are designed to support and correspond directly with the goals established in the previous subsection, and was established to provide Pamlico County with some measurable, mid-range benchmarks (2-5 years). Each objective is numbered (i.e., "1.1"), with the first digit representing the corresponding goal.

The *action items* are short-term, specific measures to be undertaken by Pamlico County in order to achieve the identified objectives. Most of these actions are also hazard-specific. Each action identifies the objective(s) it is intended to achieve, includes some general background information to justify the proposed action, and provides measures to assure successful and timely implementation.

The mitigation plan identifies action items developed through data collection and research, surveys, and the public participation process. Mitigation plan activities may be considered for funding through federal and state grant programs, and when other funds are made available. To help insure activity implementation, each action item includes information on the timeline and the responsible party. Upon implementation, the responsible person(s) may look to partner organizations for resources and technical assistance.

Responsible Person: The responsible person(s) is the person or entity that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Responsible person(s) may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

Deadline: Each action item includes an estimate of the timeline for implementation.

Funding: Each action item will include a possible source of funding. Implementation ideas may include grant programs or human resources.

Mitigation Objectives

Objective 1.1 Handle/filter storm water runoff to lessen pollutants into tributaries of the Neuse River

Objective 1.2	Establish clear evacuation procedures and routes
Objective 1.3	Improve communication between the County and towns as to recommendations to evacuate or not to evacuate areas
Objective 2.1	Monitor the effectiveness of the Base Flood Elevation (BFE) as needed.
Objective 3.1	Improve storm water drainage system in vulnerable areas
Objective 4.1	Educate the public on how to minimize flood damage to their property.
Objective 4.2	Increase knowledge, understanding, and awareness of the National Flood Insurance Program (NFIP)

Mitigation Actions
In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Pamlico County to the effects of natural hazards. In general, all of these activities fall into one of the following broad categories of mitigation techniques. The Committee reviewed each goal and developed action items to fulfill each stated goal and objective.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

Available Mitigation Techniques

Prevention
Preventative activities are intended to keep hazard problems from getting worse. They are particularly effective in reducing a community's future vulnerability, especially in

areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

Planning and Zoning

- Open space preservation
- Floodplain regulations
- Storm water management
- Drainage system maintenance
- Capital improvements programming
- Shoreline / riverine / fault zone setbacks

Property Protection

Property protection measures protect existing structures by modifying the building to withstand hazardous events, or removing structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (i.e., wind proofing, flood proofing, seismic design standards, etc.)
- Insurance
- Safe rooms

Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their mitigate functions. Such areas include floodplains, wetlands, and dunes. Parks, recreation, or conservation agencies and organizations often implement these measures. Examples include:

- Floodplain protection
- Beach and dune preservation
- Riparian buffers
- Fire resistant landscaping
- Fuel breaks
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Levees / dikes / floodwalls / seawalls
- Diversions / detention / retention
- Channel modification

- Beach nourishment
- Storm sewers

Emergency Services
Although not typically considered a "mitigation technique," emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Sandbagging for flood protection
- Installing shutters for wind protection

Public Information and Awareness
Public information and awareness activities are used to advise residents, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children education
- Hazard expositions

Mitigation Actions
The mitigation action steps proposed for Pamlico County to undertake are listed on the pages that follow. Each has been designed to achieve the goals and objectives listed in this plan. Each proposed action step includes:

1 – The appropriate category for the mitigation technique;
2 – The hazard it is designed to mitigate;
3 – The objective(s) it is intended to help achieve;
4 – Some general background information;
5 – The person responsible for the implementation of the action;
6 – A deadline in which the action is to be implemented;
7 – The funding source for the action; and
8 – The priority given to the action.

Action #1

Monitor and review damage assessments in the County during and after future events to evaluate the effectiveness of the increased BFE.

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	2.1
Background	Pamlico County currently requires new construction to be elevated to two (2) feet above Base Flood Elevation (BFE). This increase not only gives property owners additional vertical protection, but also qualifies them for a discount on flood insurance through the National Flood Insurance Program (NFIP). This action is consistent with an action item in the Land Use Plan.
Responsibility	Hazard Mitigation Committee
Deadline	Continuous monitoring, ongoing
Funding Sources	N/A
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #2

Identify vulnerable areas and prioritize the critical drainage ditches

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	Drainage in Pamlico County, mainly because of the flat topography, remains an important issue. This action proposes to identify the areas in the County that are vulnerable to flooding and identify critical drainage ditches. Once the critical drainage ditches are identified, the maintenance of these ditches should be prioritized. By identifying the vulnerable areas and the critical drainage ditches, priorities can be established to better protect these areas.
Responsibility	Hazard Mitigation Committee, North Carolina Department of Transportation
Deadline	June 1, 2010
Funding Sources	County's General Fund
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #3

Explore grant funding for storm water management plans

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	Pamlico County will research potential grant sources in order to create a storm water management plan to highlight and address the County's current storm water drainage needs.
Responsibility	Hazard Mitigation Committee
Deadline	ongoing
Funding Sources	NC Division of Emergency Management
Priority	Medium. This action is: 1) cost effective; and 2) technically feasible.

Action #4

Continue participation in the community service program to clean ditches and petition the State of North Carolina to continue the community service program

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	Pamlico County participates in the community service program, which provides the County with labor to clean ditches, thereby increasing the efficiency of storm water management. With fiscal pressures increasing at the state level, the County wants state legislators and administrators to know that the community service program is vital to the health, safety, and welfare of Pamlico County citizens.
Responsibility	Pamlico County Commissioners
Deadline	Ongoing
Funding Sources	N/A
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #5

Make public aware of the importance of drainage areas and the link to the proliferation of mosquitoes

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1, 4.1, 4.2
Background	Because of the flat topography and many acres of low lying areas, Pamlico County has a large population of mosquitoes during certain times of the year. Mosquitoes breed in areas of standing and/or stagnant water, so the need to promote awareness regarding storm water drainage is great. By involving the public (i.e., encouraging people to report problem drainage areas to the County), the County can better address the issue of standing water and mosquito proliferation.
Responsibility	Hazard Mitigation Committee
Deadline	ongoing
Funding Sources	County's General Fund
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #6

Coordinate with the State Forest Service / NC DOT concerning drainage ditches and tree-cutting activities

Category	Prevention
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.1, 3.1
Background	The forestry industry is important to Pamlico County. Because of the scale of forestry in the County, there are numerous instances where trucks hauling cut trees from a job site drive over the drainage ditches and damage the ditch cuts. This damage, in turn, greatly affects storm water drainage.
Responsibility	Pamlico County Manager
Deadline	ongoing
Funding Sources	N/A
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #7

Meet with insurance agents, realtors, and bankers to coordinate public education activities

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire
Objective(s) Addressed	4.1, 4.2
Background	When purchasing property, many prospective homeowners' only contact the officials that are familiar with natural hazard protection, insurance agents, realtors, and bankers. The County wishes to get these groups of professionals involved in the public education and awareness programs, to better serve the public and to make potential homeowners aware of the hazards to which they are susceptible.
Responsibility	Floodplain Coordinator
Deadline	ongoing
Funding Sources	Research potential grant funding
Priority	Medium This action is: 1) cost effective; and 2) technically feasible.

Action #8

Create a publication or brochure in order to communicate the potential of natural hazards in the area to potential landowners and residents

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.1, 4.2
Background	The publication will contain important information related to the County's susceptibility to potential natural hazards that occur in the area. It should also contain information pertaining to flood zones as well as storm surge potential displayed graphically on a map. The publication also will contain information related to the Coastal Area Management Act (CAMA).
Responsibility	Floodplain Coordinator, County Planner
Deadline	ongoing
Funding Sources	N/A
Priority	Medium This action is: 1) cost effective; and 2) technically feasible.

Action #9

Pursue placemats containing information about flood zones

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.1, 4.2
Background	In conjunction with Action #8, by distributing placemats to area restaurants containing flood zone information and information about storm surge associated with hurricanes, tropical storms, and nor'easters would be an original and unique method of communicating information to the public. Also, the low cost of printing (on recycled paper) the informative placemats makes this action cost-beneficial.
Responsibility	Floodplain Coordinator, County Planner
Deadline	ongoing
Funding Sources	NC Division of Emergency Management, FEMA
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #10

Meet with schools, churches and other community organizations to disseminate information

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.1, 4.2
Background	Communicating with churches and schools is a great way of disseminating information and promoting awareness of a subject. Hazard mitigation efforts should be taken to these arenas. By working with these organizations, the County can more effectively communicate information and solicit public input.
Responsibility	Floodplain Coordinator
Deadline	Ongoing, immediately following an event
Funding Sources	County's General Fund
Priority	Medium This action is: 1) cost effective; and 2) technically feasible.

Action #11

Recommend annual review by towns of storm readiness coordinated by County Emergency Management

Category	Property Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes
Objective(s) Addressed	1.3
Background	An annual review of storm readiness will keep the municipalities' plans regarding hazard mitigation updated and current. This review can be coordinated at the County Emergency Management level, and will allow the County to more proficient in the delivery of emergency services in the event of a natural hazard.
Responsibility	Pamlico County Emergency Management
Deadline	Ongoing
Funding Sources	County's General Fund
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #12

Support State efforts to develop guidelines to reduce nonpoint source water pollution that originates from new construction and use of fertilizers

Category	Natural Resource Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning
Objective(s) Addressed	1.1
Background	Nonpoint source water pollution has been an ongoing problem in the Neuse River Basin. The Neuse River and its water quality are vital to the quality of life and the economy in Pamlico County. Reducing the amount of nitrogen and phosphorus has been shown to increase water quality and usability. Additionally, new construction is often a source of sediment transport into the river. Guidelines would help make people aware of the water quality concerns and promote better water quality, improving the quality of life in Pamlico County.
Responsibility	NC Division of Water Quality
Deadline	July 1, 2006
Funding Sources	NC Division of Emergency Management, NC Division of Coastal Management, NC Division of Water Quality
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #13

Seek upstream river monitoring by the NC Division of Water Quality

Category	Natural Resource Protection
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning
Objective(s) Addressed	1.1
Background	Nonpoint source water quality has been and will continue to be a significant concern in Pamlico County and the Neuse River. Studies have indicated that upstream development can contribute to decreased water quality in the Neuse River, as it runs along the southern border of Pamlico County. Upstream river monitoring will give the County a source of information about water quality problems upstream, and potentially allow the County to act proactively or to disseminate information pertaining to expected decreases in water quality.
Responsibility	Hazard Mitigation Committee
Deadline	ongoing
Funding Sources	N/A
Priority	Medium This action is: 1) environmentally sound; and 2) technically feasible.

Action #14

Map preferable secondary roads to be used for evacuation and place more evacuation route signs on roads throughout the County

Category	Emergency Services
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	1.2, 1.3
Background	All of the major roads in Pamlico County have "EVACUATION ROUTE" signs, depicting the route for citizens to take in case of an impending natural hazard. The secondary routes, however, are not marked as evacuation routes. The Hazard Mitigation Committee identified the marking of secondary as a need, to assist county residents and visitors with evacuation.
Responsibility	Pamlico County Emergency Management
Deadline	June 1, 2010
Funding Sources	County's General Fund, NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #15

Develop flood marker program and pursue a grant to fund the program

Category	Public Information
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters, Coastal Erosion
Objective(s) Addressed	4.2
Background	A flood marker program is a series of strategically placed poles or signs in heavily visited areas of the County that would inform citizens and visitors of flood elevations during various categories of storms. For example, a Category 1 hurricane could cause a 5-7' storm surge. The sign or pole would identify the various flood elevations and inform the public of the potential for flooding from storm surge.
Responsibility	Floodplain Administrator
Deadline	June 1, 2011
Funding Sources	NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #16

Develop the County's floodplain map for public dissemination in the brochure to be developed in Action #8 of this plan

Category	Public Information
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.2
Background	Knowledge of the location of flood zones is key to improving safety during a storm event. If citizens are aware of what flood zone they live in, and the expected flood elevation for a particular storm event, they can better make decisions regarding whether or not to evacuate or not. This action step proposes to create a user-friendly flood zone map that can be easily interpreted by most people. This step further proposes to circulate this flood map in different manners, including placement on the County's website.
Responsibility	Floodplain Administrator
Deadline	June 1, 2010
Funding Sources	County's General Fund, NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #17

Research methods to address repetitive loss properties

Category	Preventive
Hazard	Flooding, Hurricanes and Tropical Storms, Nor'easters
Objective(s) Addressed	4.2
Background	Various techniques for mitigating or addressing repetitive loss properties exist, including but not limited to the Increased Cost Compliance program, acquisition, elevation, and relocation.
Responsibility	Floodplain Administrator
Deadline	ongoing
Funding Sources	County's General Fund, NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

Action #18

Request the NC Climate Office in their Storm Events Database to include nor'easters, wildfires, and severe winter storms (damage estimates by county) in the list of various types of storms

Category	Public Information and Awareness
Hazard	Nor'easters, Wildfires, Severe Winter Storms
Objective(s) Addressed	4.1
Background	Data on nor'easters, wildfires, and severe winter storms historically affecting Pamlico County. This request will ensure the North Carolina counties will be able to include previous occurrences of these natural hazards in future updates of the hazard mitigation plan
Responsibility	Floodplain Administrator
Deadline	July 2011
Funding Sources	NC Division of Emergency Management
Priority	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.

SECTION 5: PLAN MAINTENANCE

The plan maintenance section of this document details the formal process that will ensure that the Pamlico County Hazard Mitigation Plan remains an active and relevant document.

Plan Maintenance Process

The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing a plan revision every five years. This section describes how Pamlico County and its municipalities will integrate public participation throughout the plan maintenance process.

Plan Adoption

The Pamlico County Commissioners will be responsible for adopting the Pamlico County Hazard Mitigation Plan. This governing body has the authority to promote sound public policy regarding natural hazards. Once the plan has been adopted, the Floodplain Administrator will be responsible for submitting it to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management. NC Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Pamlico County will remain eligible for Hazard Mitigation Grant Program funds.

Additionally, each municipality in Pamlico County will need to formally adopt this document. This plan will include a copy of the executed resolution formally adopted by the governing bodies of each of the jurisdictions requesting approval of the plan.

Monitoring, Evaluating and Updating the Plan

Implementation of the activities recommended by this plan will be monitored so the deadlines will be met. The Pamlico County Planner will be responsible for the tracking the activities outlined in this plan. Each person assigned a responsibility in this plan shall report to the County Planner by the last day of each quarter (March 31, June 30, September 30, December 31). The County Planner will report to the County Commissioners once each year, on the first week of hurricane season (June 1st). The report should review progress and recommend changes as needed. Also, the report will be released to the media and made available to the public.

When preparing the report to the County Commissioners, the County Planner will refer to the following questions to assess the effectiveness and appropriateness of the hazard mitigation plan:

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

- Did agencies and other partners participate as agreed?

If changes are necessary, the Hazard Mitigation Planning Committee will reconvene during the first week of June to receive a presentation on the progress of the plan. If convened, the Hazard Mitigation Planning Committee will prepare an evaluation report that will be submitted to the County Commissioners.

Implementation through Existing Programs
Pamlico County will incorporate the hazard mitigation goals and actions into other policy statements, and will address conflicts with other policies where possible. As with any planning process, the Hazard Mitigation Plan will be referenced when developing or updating other planning documents, such as the CAMA Land Use Plan and any other official documents regarding land use and emergency management. The main means of integration will take place through implementation of the actions listed in the plan.

Continued Public Involvement
Pamlico County is dedicated to involving the public directly in review and updates of the Hazard Mitigation Plan. Any amendment to the Hazard Mitigation Plan must be made by the County Commissioners. A public hearing will be required before any consideration of an amendment to the plan can be made. Pamlico County's current outreach methods, sent to property owners located in the 100-year floodplain, will be used to disseminate hazard mitigation information to citizens and property owners.

Additionally, properties located outside of known hazard zones will be informed of susceptibility to natural hazards through one of the County's numerous actions items addressing public information dissemination and involvement.

Copies of the plan will be available at the public library and at the Building and Inspections Office. Public comments and suggestions are always welcome, and should be addressed to the Floodplain Administrator. Also, the Floodplain Administrator will work toward displaying the plan on a website. The County does not presently have this capability.

Pamlico County will review and revise this plan every five years (as required by FEMA), and it will be resubmitted to the State Hazard Mitigation Office for review and approval. Changes to the County's portion of this multi-jurisdictional plan may change the policies and programs of the participating individual municipalities. Any substantial change to the plan will require participation from the individual municipalities, in the form of representation on all future meetings of the Hazard Mitigation Planning Committee, and the municipalities' subsequent adoption of the amended plan. Conversely, the policies and programs formulated by an individual municipality participating in this multi-jurisdictional plan may change those policies and programs at anytime without consultation with or the approval of any of the other jurisdictions.

SECTION 6: HURRICANES AND NOR'EASTERS

The primary source of flooding in Pamlico County is wind driven surge generated in the Atlantic Ocean by tropical storms and hurricanes. The surge propagates into Pamlico Sound and further propagates into Bay River, Big Porpoise Bay, Jones Bay, Kershaw Creek, Middle Bay, Morris Creek, Pamlico River, Pamlico Sound, Smith Creek, Thomas Creek, and Trent Creek. Flooding from heavy rainfall occurs on Greens Creek, Kershaw Creek, Morris Creek, North Prong Bay River, Smith Creek, South Prong Bay River, Thomas Creek, and Trent Creek. High winds associated with tropical storms can also produce extremely high waves that create higher than normal surge. The wave action during a tidal flood can be more damaging than the higher water level. Not all storms that pass close to Pamlico County produce extremely high surge. Similarly, storms that produce flooding conditions in one area may not necessarily produce flooding conditions in other parts of Pamlico County.

The contribution from nor'easters to the overall storm surge elevation in the Pamlico County area was found to be insignificant compared to hurricanes; therefore, only the effects of hurricane and tropical storm induced surge elevations were considered. In other areas of North Carolina, particularly the Outer Banks area of the northern part of the state, nor'easters were found to provide a significant contribution to the overall storm surge.

These storms present three types of hazards: wind, storm surge, and rain. The following is a description of these three hazards:

<u>High winds</u>: Storms with wind speed ranging from over 74 mph up to 155 + mph are classified as hurricanes. These winds can blow roofs off of buildings and destroy mobile homes. All evacuation activities must be completed prior to onshore winds reaching tropical storm status (40 mph).

A related problem is tornadoes spawned by hurricanes, which will develop fast, inflict tremendous destruction, and vanish as fast as they appeared.

<u>Storm surge</u>: This is a great dome of water caused by winds and pressure differences in the air. Areas are flooded by water that can be up to 18 feet higher than normal sea levels, although such a surge is not likely in Pamlico County. In Pamlico County, the maximum storm surge is experienced north of where the hurricane's eye makes landfall. This surge especially when coupled with the breaking waves causes great destruction and accounts for most hurricane deaths.

<u>Rainfall</u>: Six to twelve inches of rainfall generally accompanies a hurricane. This causes flooding of streets before and during the worst part of a hurricane and river flooding inland after the storm passes. Flooding can be aggravated where drainage-ways are blocked by hurricane-blown debris.

Characteristics of Coastal Storms:

Storm Surge: The most dangerous and damaging feature of a coastal storm is storm surge. Storm surges are large waves of ocean water that sweep across coastlines where a storm makes landfall. The greatest height of the water is when the storm is more intense. The higher the storm surge the greater the damage to the coastline. Storm surges inundate coastal areas, wash out dunes, cause backwater flooding in rivers, and can flood streets and buildings in coastal communities. Storm surge areas can be mapped by the probability of storm surge occurrences using Sea, Lake, and Overland Surges from Hurricanes modeling (SLOSH) (see discussion of SLOSH).

Storm Tide: If a storm surge occurs at the same time as high tide, the water height will be even greater. Storm tide is the combination of the storm surge and the normal tide. For example, a 15-foot storm surge along with the normal 2-foot high tide creates a storm tide of 17 feet.

Inland Flooding: In recent years, most deaths related to hurricane and tropical storm activity have been the result of inland flooding. As hurricanes move across land bringing torrential rains and backwater flooding from the ocean, rivers and streams overflow. Hurricanes and tropical storms have been known to cause floods whose elevations represent greater than a 500-year probability of occurring in inland areas.

Water Force: During hurricanes and other coastal storms, coastal areas will experience flooding with velocity or “wave action,” defined as areas subject to receiving waves on top of the rising water from coastal flooding. The velocity and the force of the water make flooding even more destructive. The velocity and wave action knocks over buildings, move debris, erode dunes, scour the shoreline, and displace and redeposit sand. Areas subject to coastal flooding with velocity are designated as V or VE zones on FIRMs.

Wind Velocity: The higher the wind speed, the greater the damage. Hurricane force winds can travel hundreds of miles inland, creating substantial damage to buildings, vegetation, and infrastructure.

Coastal Erosion: Coastal erosion is the wearing away of coastal land. It is commonly used to describe the horizontal retreat of the shoreline along the ocean. Erosion is considered a function of larger processes of shoreline change, which includes erosion and accretion. Erosion results when more sediment is lost along a particular shoreline than is re-deposited by the water body. Accretion results when more sediment is deposited along a particular shoreline than is lost. When these two processes are balanced, the shoreline is said to be stable.

Hurricanes

Hurricanes are tropical cyclones with winds that exceed 74 miles per hour (mph) and circulate counter-clockwise about their centers in the Northern Hemisphere (clockwise in the Southern Hemisphere). Hurricanes are formed from simple complexes of

thunderstorms, commonly known as convection. However, these thunderstorms can only grow to hurricane strength with cooperation from both the ocean and the atmosphere. First, the ocean water itself must be warmer than 81 degrees Fahrenheit. The heat and moisture from this warm water is ultimately the source of energy for hurricanes. Hurricanes will weaken rapidly when they travel over land or colder ocean waters -- locations with insufficient heat and/or moisture.

Using SLOSH Maps

SLOSH is a computerized model run by the National Hurricane Center to estimate storm surge heights and winds resulting from historical, hypothetical, or predicted hurricanes by taking into account pressure, size, forward speed, track and winds. The SLOSH boundaries may differ from the base flood boundary on the FIRM. The SLOSH flood areas are determined by compositing the model surge values from 200-300 hypothetical hurricanes. The point of a hurricane's landfall is crucial to determining which areas will be inundated by the storm surge. Where the hurricane forecast track is inaccurate, SLOSH model results will be inaccurate. As a result, the SLOSH model is best used for defining the potential maximum surge for a location.

High Risk Factors

The following conditions may exacerbate the effects of coastal storms:

Coastal shape: Concave shoreline sections sustain more damage because the water is driven into a confined area by the advancing storm, thus increasing storm surge height and storm surge flooding.

Storm center velocity: The slower the storm moves, the greater the damage. The worst possible situation is a storm that stalls along a coast, through several high tides.

Nature of coast: Damage is most severe on low-lying barrier island shorelines because they are easily over washed by storm waves and storm surge.

Previous storm damage: A coast weakened by even a previous minor storm may be subject to proportionately greater damage in a subsequent storm.

Human activity: With increased development, property damage increases, multiplying the amount of floating debris available to damage or destroy other structures.

Hardened sand and flood control structures: Structures such as groins, jetties, or seawalls exacerbate localized scour and erosion and can be undermined, resulting in collapse (particularly seawalls).

Hurricane intensity is measured using the Saffir-Simpson Scale, ranging from 1 (minimal) to 5 (catastrophic). The scale categorizes hurricane intensity linearly based upon maximum sustained winds; minimum barometric pressure and storm surge potential, which are combined to estimate the potential flooding and damage to property

given a hurricane's estimated intensity (see Saffir-Simpson Scale and Damage tables below).

Some hurricanes are characterized primarily by water — a rainy or wet hurricane (such as Hurricane Floyd, which landed in North Carolina in 1999) — while others are primarily characterized by wind — a windy or dry hurricane (such as Hurricane Fran in 1996). Wet hurricanes can flood both coastal and inland areas, even as the storm dissipates in wind strength, while windy hurricanes primarily affect coastal areas with their high winds and storm surge. Inland communities will be most conceded with the flooding aspect of coastal storms. Torrential rains of even Category One hurricanes and tropical storms have been known to cause 500-year floods (which have a 0.2% chance of occurring each year) and greater flooding in inland communities. Pamlico County can determine how severe the high winds, storm surge and erosion could be from their storm surge inundation map.

Hurricane Categories (Saffir-Simpson scale)

Category 1: Winds 74-95 mph. Some examples are damage to shrubbery, trees, unanchored mobile homes, and some signs with a storm surge 5-7 feet above normal. Some damage to piers, exposed small craft, and low-lying buildings.

Category 2: Winds 96-110 mph. Some examples are some trees blown down, major damage to mobile homes and signs, some damage to building roofs and windows with a storm surge 8-10 feet. Other examples are considerable damage to piers, marinas, small craft, and low-lying buildings.

Category 3: Winds 111-130 mph. Some examples are large trees and many signs blown down, mobile homes substantially damaged, some structural damage to small buildings with a storm surge 11-12 feet. In addition to water damage, structures severely damaged by waves and floating debris.

Category 4: Winds 131-155 mph. Some examples are all signs blown down, mobile homes destroyed, extensive damage to roofing, windows, and doors with a storm surge of 13-18 feet above normal water levels.

Category 5: Winds over 155 mph. Some complete building failures, major damage to structures less than 15 feet above sea level within 500 yards of shore with a storm surge over 18 feet.

Historical Occurrences
North Carolina has a long and notorious history of destruction by hurricanes. Ever since the first expeditions to Roanoke Island in 1586, hurricanes are recorded to have caused tremendous damage to the state. The state's protruding coastline makes it a favorable target for tropical cyclones that curve northward in the western Atlantic Ocean.

According to the State Climate Office of North Carolina, 39 tropical cyclones have made direct landfall in North Carolina since 1886. Of these, 10 were tropical storms, 23 were minor hurricanes and 6 were major hurricanes. Another 56 tropical cyclones have impacted North Carolina since 1886 by either entering from another state or by passing in proximity to the coast but remaining offshore. Of these, 41 were tropical storms, 8 were minor hurricanes and 7 were major hurricanes. According to the State Climate Office, the coast of North Carolina can expect to receive a land falling tropical cyclone once every four years and be affected by one every 1.3 years.

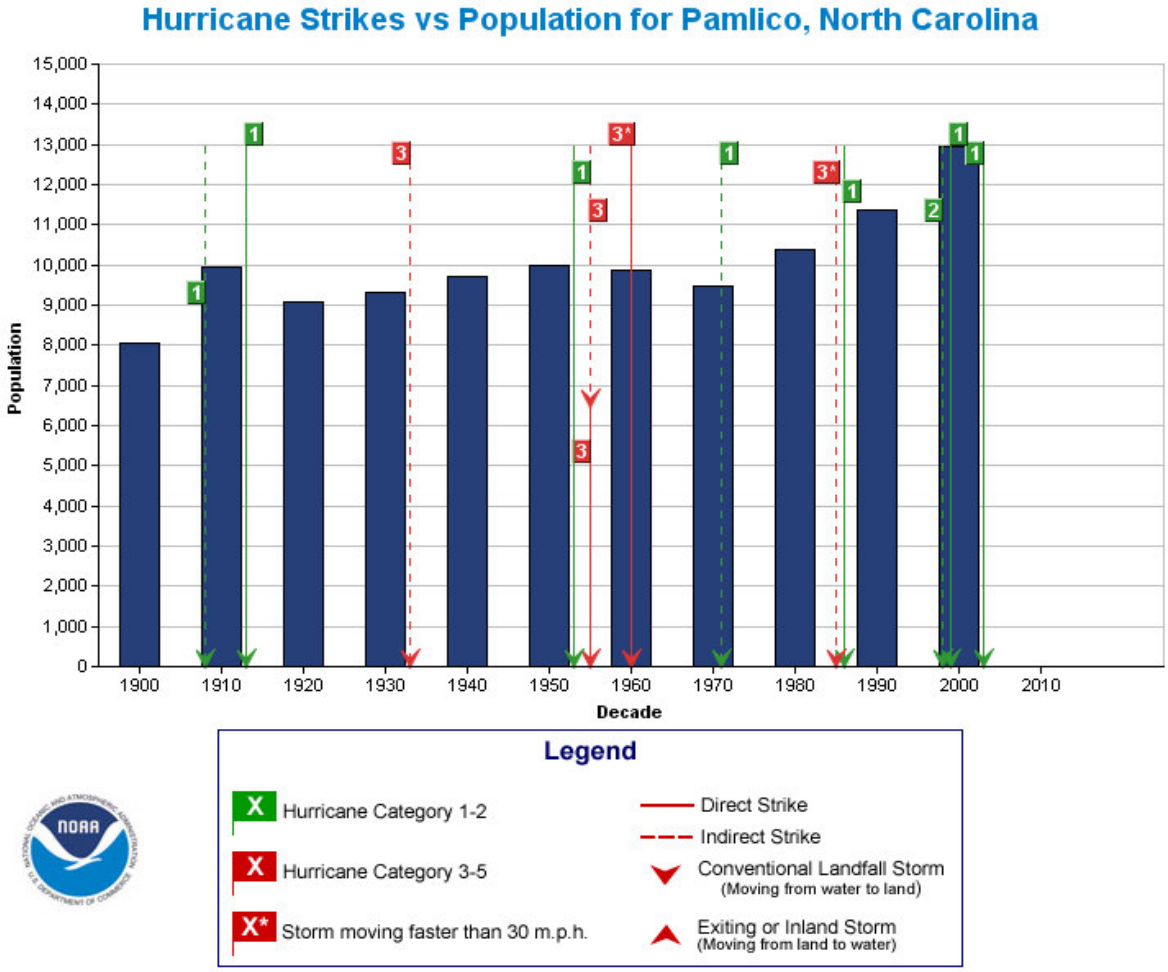
Table 7 lists all hurricanes and tropical storms that have made direct landfall in North Carolina since 1800. Approximate location of landfall and estimated wind speed and storm surge at landfall are also listed.

Table 7. Direct Land falling Hurricanes and Tropical Storms in North Carolina Since 1886

Approximate Date of Landfall	Storm Name	Saffir-Simpson Intensity at Landfall	Approximate Location of Landfall	Estimated Wind Speed (kt)	Storm Surge (ft)	Estimated Damages in Pamlico County
8/31/06	Ernesto	Trop. Storm	Onlsow/Carteret	60	2-3	$22,200,000
9/13/05	Ophelia	1	Atlantic Beach	85	6-8	$11,500,000
8/14/04	Charley	Trop. Storm	Onslow County	60	2-3	$2,900,000
8/03/04	Alex	2	Ocracoke	100	4-6	
9/18/03	Isabel	2	Core Banks	100	6-8	$14,300,000
9/16/99	Floyd	2	Topsail Island	95		$413,600,000
9/4/99	Dennis	Trop. Storm	Core Banks	60		$39,900,000
8/26/98	Bonnie	3	Cape Fear	100	6-8	$117,000,000
9/6/96	Fran	3	Cape Fear	100	8-12	
7/13/96	Bertha	2	Topsail Beach	90	5	$127,000,000
6/20/96	Arthur	Trop. Storm	Morehead	35		
8/18/86	Charley	1	Morehead	70		
9/26/85	Gloria	2	Hatteras	90	6-8	
9/9/84	Diana	1	Long Beach	80	5-6	
9/30/71	Ginger	1	Atlantic Beach	65	4	
8/27/71	Doria	Trop. Storm	Atlantic Beach	55		
10/16/64	Isabell	1	Morehead	65		
9/11/60	Donna	2	Carolina Beach	95	6-8	
9/19/55	Ione	2	Salter Path	90	3-10	
8/17/55	Diane	1	Carolina Beach	75	5-9	
8/12/55	Connie	1	Cape Lookout	70	7	
10/15/54	Hazel	4	NC/SC border	125	10-20	$28,400
8/30/54	Carol	2	Hatteras	85		
8/13/53	Barbara	2	Cape Lookout	90		
7/6/46		Trop. Storm	Wilmington	60		
6/25/45		Trop. Storm	Hatteras	55		
8/1/44		1	Southport	80		
9/18/36		2	Hatteras	85		
9/16/33		3	Ocracoke	100		

Approximate Date of Landfall	Storm Name	Saffir-Simpson Intensity at Landfall	Approximate Location of Landfall	Estimated Wind Speed (kt)	Storm Surge (ft)	Estimated Damages in Pamlico County
8/23/33		2	Hatteras	85		
12/2/25		1	Wilmington	65		
9/22/20		1	Topsail Beach	65		
8/25/1918		Trop. Storm	Morehead	50		
9/6/1916		Trop. Storm	Southport	35		
9/3/1913		1	Hatteras	70	10	
7/31/1908		2	Morehead	85		
11/13/1904		3	Hatteras	100		
7/11/1901		1	Hatteras	65		
10/13/1900		Trop. Storm	Hatteras			
10/31/1899		1	Wrightsville	80	8	
8/16/1899		4	Hatteras	115	4-10	
10/26/1897		Trop. Storm	Hatteras	55		
10/22/1893		Trop. Storm	Hatteras	50		

Figure 7.



Hurricane Strike Data: National Hurricane Center
Population Data: U.S. Census Bureau
NOTE: Population values may be missing in some counties, particularly for earlier periods. This is most often attributable to the fact that the county had not yet been established.
NOTE: There may be discrepancies between the strike data shown in this chart and the HURDAT strike data used in the Historical Hurricanes Tracks Tool. The National Hurricane Center is currently updating the strike data used for these charts. For more information visit http://www.aoml.noaa.gov/hrd/data_sub/re_anal.html
NOTE: Population data is current as of 2000 U.S. Census. X-axis on graphs depict years through 2010 to illustrate storms that have occurred from 2000-2006.

Figure 8.

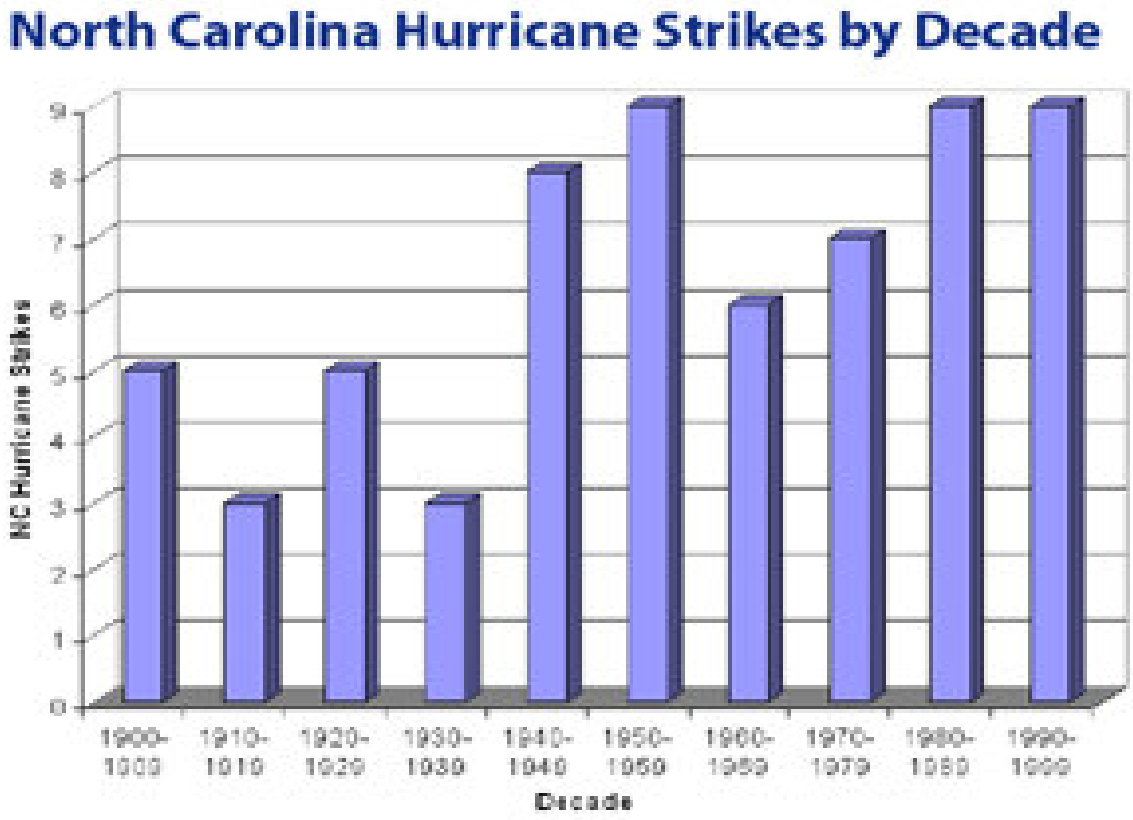
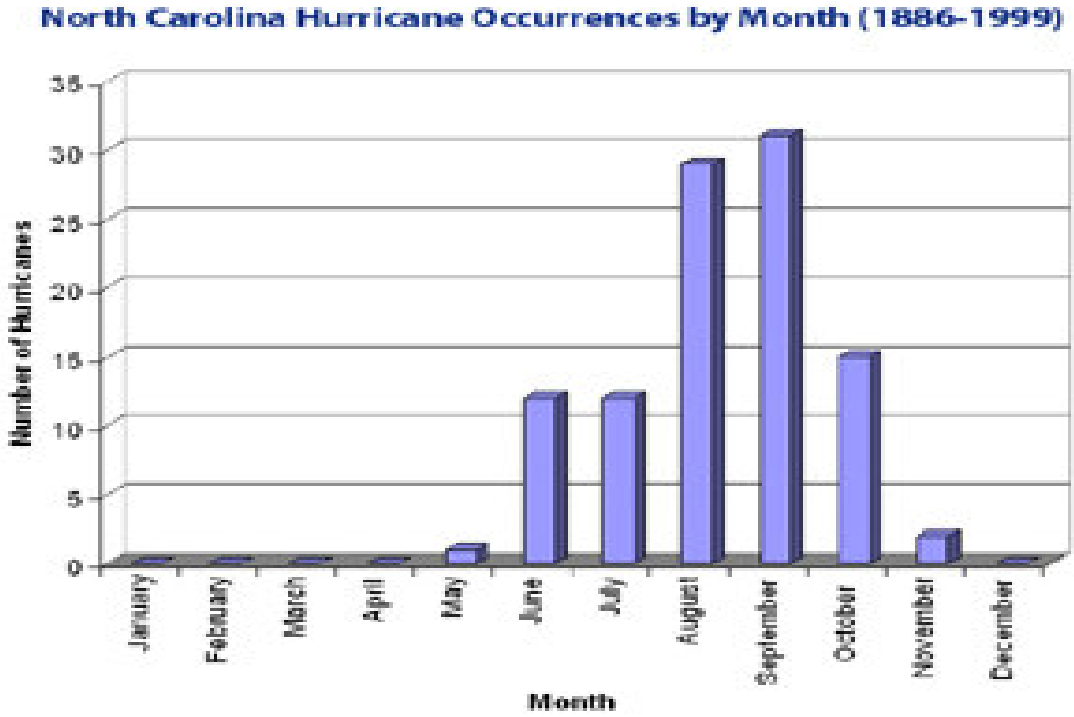


Figure 9.



Source: North Carolina State Climate Office Website

Figure 10. Probability of a Named Storm

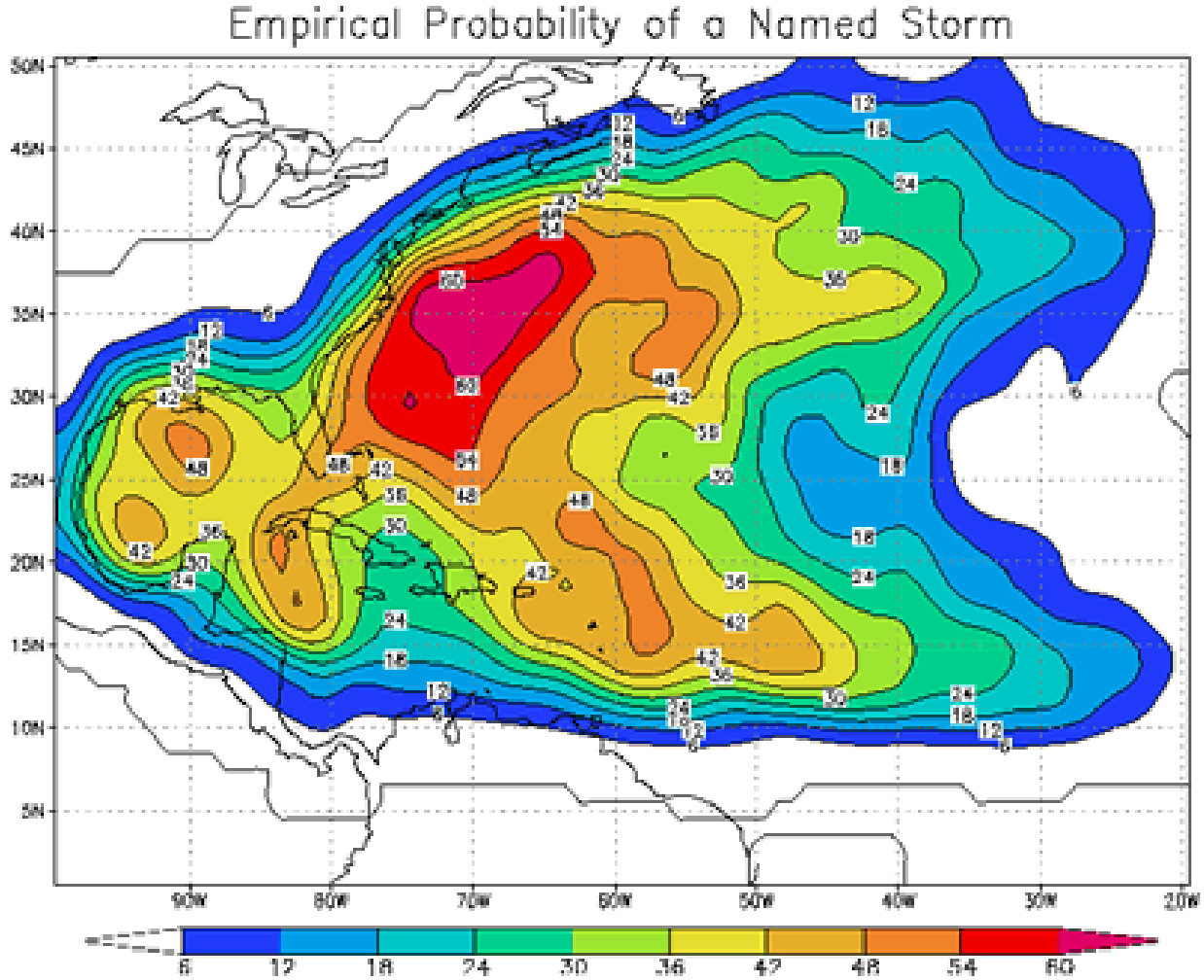


Figure 6 shows for any particular location what the chance is that a tropical storm or hurricane will affect the area sometime during the Atlantic hurricane season. The figure was created by Todd Kimberlain of the National Oceanic and Atmospheric Administration's Hurricane Research Division. In creating the graphic, he utilities the years of 1944 to 199 in the analysis and counted hits when a storm or hurricane was within about 100 miles (165 km) of each location. The figure shows that Pamlico County faces a 36-48% annual chance that a tropical storm or hurricane will affect the area.

Pamlico County has a storied past with hurricanes and tropical storms. While detailed damage data is not available for most of the 20th century, the period from 1993-2009 is well chronicled. Hurricane Floyd, in 1999, is the most costly hurricane in Pamlico County's history with $413,600,000 in damages. Hurricane Bertha in 1996 was the second most costly hurricane, with $127,000,000 in damages. Hurricane Bonnie, a slow-moving storm in 1998, is the third most costly hurricane in Pamlico County with $117,000,000 in damages.

Source: http://www.nc-climate.ncsu.edu/products_old/wx/events/events.php

Nor'easters

Although nor'easters are listed as a major threat to Pamlico County, the effects of a nor'easter are not felt with the same severity as they are in parts of the state that border the open ocean. Still, nor'easters can bring high winds and storm surges to Pamlico County. Unlike a hurricane that may pass over a coastal location in less than a day, a nor'easter, or a severe extra tropical cyclone, may blow from the same direction and over long distances for several days. Although nor'easters are more diffuse and less intense than hurricanes, they occur more frequently and cover larger areas and longer coastal reaches at one time. Nor'easters form near the Atlantic coast, generally over coastal areas where there is a large temperature gradient in wintertime between air over a cold landmass and air over relatively warm ocean waters. The presence of the Gulf Stream off the eastern seaboard in the winter season acts to dramatically enhance the surface horizontal temperature gradients within the coastal zone. This is particularly true off the North Carolina coastline where, on average, the Gulf Stream is closest to land north of 32 degrees latitude. During winter offshore cold periods, these horizontal temperature gradients can result in rapid and intense destabilization of the atmosphere directly above and shoreward of the Gulf Stream. This air mass modification or conditioning period often precedes wintertime coastal extra-tropical cyclone development.

When jet stream disturbances (which create lift) move over this temperature gradient, surface low-pressure systems can form. Because of the abundant moisture from the ocean and temperature gradient of the coastal front, these storms can develop explosively.

It is the temperature structure of the continental air mass and the position of the temperature gradient along the Gulf Stream that drives this cyclone development. As a low pressure deepens, winds and waves can uninhibitedly increase and cause serious damage to coastal areas as the storm generally moves to the northeast.

The coastal counties of North Carolina are most vulnerable to the impacts of nor'easters. Since the storms typically make landfall with less warning than hurricanes (due to their rapid formation right along the coast), residents may be caught at home unprepared. On the other hand, nor'easters typically occur during the off-season when fewer non-residents are visiting the coast. As with hurricanes, vulnerability is proportional to structural strength, with mobile homes particularly vulnerable.

A scale, similar to the Saffir-Simpson scale for hurricanes, has been developed by Robert Davis and Robert Dolan (1993). Although beach erosion and dune erosion by nor'easters is not a serious threat to Pamlico County as it is in other coastal areas, this scale gives you an idea of the intensity of various nor'easters. The Dolan-Davis scale is shown below.

Table 9. Dolan-Davis Nor'easter Scale

Storm Class	Beach Erosion	Dune Erosion	Over wash	Property Damage	Duration (measured in number of tidal cycles)
1 (Weak)	Minor changes	None	No	No	Up to 1 tide
2 (Moderate)	Modest; mostly to lower beach	Minor	No	Modest	Up to 2 tides
3 (Significant)	Erosion extends across beach	Can be significant	No	Loss of many structures at local level	2 to 3 tides
4 (Severe)	Severe beach erosion and recession	Severe dune erosion or destruction	On low beaches	Loss of structures at community-scale	3 to 4 tides
5 (Extreme)	Extreme beach erosion	Dunes destroyed over extensive areas	Massive in sheets and channels	Extensive at regional-scale; millions of dollars	4 to 5 tides

Table 10. Nor'easters from 1942 to 1984

Storm Class	Number of Storms	Percentage of Total
1 – Weak	670	49.7
2 – Moderate	340	25.2
3 – Significant	298	22.1
4 – Severe	32	2.4
5 - Extreme	7	0.1

Source: Dolan, Robert and Robert E. Davis. "An Intensity Scale for Atlantic Coast Northeast Storms." Journal of Coastal Research. Vol. 8:4, pp. 840-853.

Unfortunately, no data source exists, which details or describes damages in Pamlico County due to nor'easters. This data limitation precludes information on previous occurrences. Pamlico County will include, as a mitigation action, a request to the NC Climate Office's Storm Events Database (http://www.nc-climate.ncsu.edu/monitoring/events.html) to include "nor'easters" in the list of various types of storms.

SECTION 7: WILDFIRE

Wildfire

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the air for miles around. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires. A wild land fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines and similar facilities. An Urban-Wild land Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wild land or vegetative fuels.

People start more than four out of every five wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires.

North Carolina, with its large amount of wooded areas, is included among the states with a high risk of wildfire. As development has spread into areas of North Carolina which were previously rural, new residents have been relatively unaware of the hazards posed by wildfires and have used highly flammable material for constructing buildings. This has increased the threat of loss of life and property, and has also resulted in a greater population of people less prepared to cope with wildfire hazards. The southern coastal plain is particularly vulnerable to the wildfire hazard. The mountain region has also experienced wildfires.

Wildfire behavior is based on three primary factors: fuel, topography and weather:

Fuel: The type and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. The continuity of fuels, expressed in both horizontal and vertical components is also a factor, in that it expresses the pattern of vegetative growth and open areas.

Topography (slope) is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. In general terms, the steeper the slope of the land, the faster a fire can spread up the slope. A topographic map can help identify areas of the community with slopes less than 40%, between 41% and 60%, and greater than 61%, corresponding to low, moderate and steep gradients relative to the spread of wildfires.

Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity, and wind (both short and long term) affect the severity and duration of wildfires. Critical Fire Weather Frequency is a set of weather conditions, usually a combination of low relative humidity and wind, whose effects on fire behavior make control difficult and threaten firefighter safety. The average number of days per year of critical fire weather experienced in the community can be obtained from the local or state fire marshal, forestry department, or department of natural resources. The

National Weather Service or NOAA Websites can help determine past weather conditions.

To determine fire hazard severity for the community, the Fire Hazard Severity Table below was used. There may be more than one classification in the community depending on the degrees of the slope and fuel models.

Table 11. Fire Hazard Severity

Fuel Classification	Critical Fire Weather Frequency								
	<1 Day / Year			2 to 7 Days/Year			>8 Days/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 inches in diameter
M = Moderate Hazard; **H** = High Hazard; **E** = Extreme Hazard
(Source: FEMA Report No. 386-2)

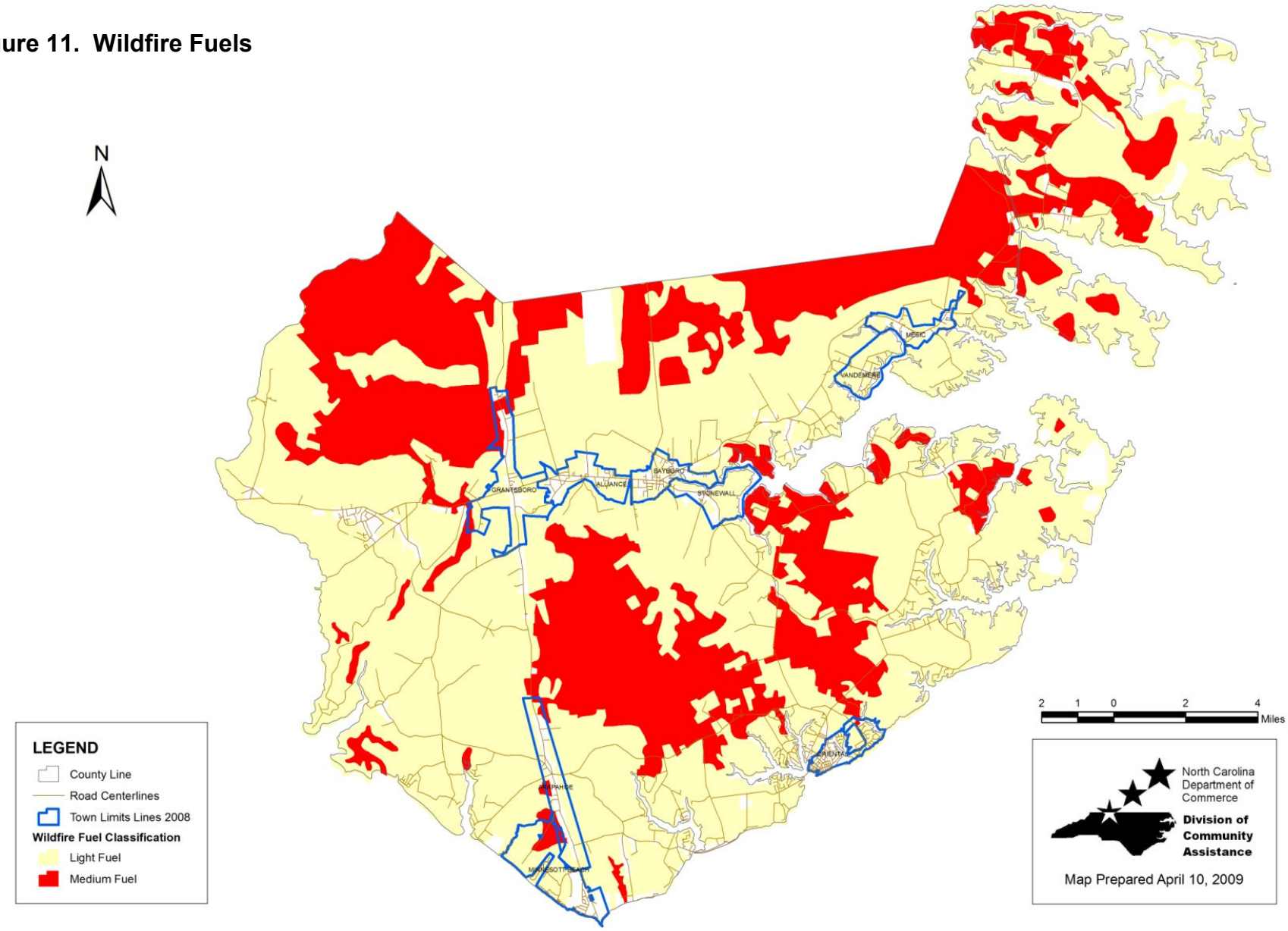
In Pamlico County, the types of vegetative fuels are cropland and pasture, forested lands, wetlands, and rangeland. The following table is a vulnerability assessment of the county, in regard to wildfire.

Unfortunately, no data source exists that detail or describes damages in Pamlico County due to wildfires. This data limitation precludes information on previous occurrences. Pamlico County will include, as a mitigation action, a request to the NC Climate Office's Storm Events Database (http://www.nc-climate.ncsu.edu/monitoring/events.html) to include "wildfires" in the list of various types of storms.

Table 12. Wildfire Vulnerability

Type of Fuel	Fuel Classification	Acres
Cropland and pasture	Light	45,684
Deciduous forest	Light	982
Evergreen forest	Light	45,507
Mixed forest	Light	27,424
Non-forested wetlands	Light	25,074
Forested wetlands	Medium	62,910
Shrub and brush rangeland	Medium	1,973

Figure 11. Wildfire Fuels



SECTION 8: THUNDERSTORMS

Thunderstorms

Thunderstorms are the result of convection in the atmosphere. They are typically the by-product of atmospheric instability, which promotes the vigorous rising of air parcels that form cumulus and, eventually, the cumulonimbus (thunderstorm) cloud. Instability can be caused either by surface heating or upper-troposphere (~50,000 feet) divergence of air (rising air parcels can also result from air flows over mountainous areas). Generally, the former “air mass” thunderstorms form on warm-season afternoons and are not severe. The latter “dynamically-driven” thunderstorms generally form in association with a cold front or other regional-scaled atmospheric disturbance. These storms can become severe, producing strong winds, frequent lightning, hail, downbursts and even tornadoes.

A typical thunderstorm may be three miles wide at its base, rise to between 40,000 to 60,000 feet in the troposphere, and contain half a million tons of condensed water. Conglomerations of thunderstorms along cold fronts (with squall lines) can extend for hundreds of miles. Thunderstorms contain tremendous amounts of energy derived from condensation of water. The half million tons of condensed water release 300 trillion calories of energy, equivalent to about 100 million kilowatt-hours of electricity, or several Hiroshima-sized atomic bombs.

According to the National Weather service, a severe thunderstorm is one that produces tornadoes, hail 0.75 inches or more in diameter, or winds of 50 knots (58 mph) or more. Structural wind damage may imply the occurrence of a severe thunderstorm. Hail, formed by the accretion of super cooled liquid water on ice particles in a thunderstorm updraft, can pose a serious threat to agriculture and exposed objects. Likewise, strong winds can potentially wreak havoc on fragile or flimsy structures, or yield secondary damage through the downing of trees. Lightning associated with thunderstorms poses a threat to people and animals in unsheltered areas. The tornado, however, is by far the greatest natural hazard threat from a severe thunderstorm.

Thunderstorms are common throughout North Carolina and have occurred in all months of the year. Thunderstorm-related deaths and injuries in North Carolina peak during July and August. Visitors fishing on the open waters, golfing or swimming at the beach are at risk.

Table 13. Severe Thunderstorm Events and Damage

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 PAMLICO	06/13/1974	1330	Tstm Wind	0 kts.	0	0	0	0
2 PAMLICO	07/11/1981	1050	Tstm Wind	0 kts.	0	0	0	0
3 Near Bayboro	08/05/1994	1647	Thunderstorm Winds	0 kts.	0	0	0	0
4 Whortonsville	10/14/1994	2227	Thunderstorms Winds	N/A	0	0	0	0
5 Stonewall	11/07/1995	1915	Thunderstorm Winds	0 kts.	0	0	1K	0
6 Grantsboro	04/26/1996	02:14 PM	Tstm Wind	0 kts.	0	0	0	0
7 Bayboro	06/14/1997	02:45 PM	Tstm Wind	50 kts.	0	0	0	0
8 Vandemere	01/08/1998	11:00 AM	Tstm Wind	0 kts.	0	0	5K	0
9 Reelsboro	05/23/1998	12:20 PM	Tstm Wind	61 kts.	0	0	0	0
10 Oriental	03/12/2000	03:20 AM	Tstm Wind	61 kts.	0	0	0	0
11 Grantsboro	05/22/2000	09:28 PM	Tstm Wind	67 kts.	0	0	20K	0
12 Florence	08/16/2000	11:15 PM	Tstm Wind	0 kts.	0	0	30K	0
13 Olympia	08/18/2000	06:55 PM	Tstm Wind	52 kts.	0	0	0	0
14 Grantsboro	05/28/2001	11:10 AM	Tstm Wind	62 kts.	0	0	0	0
15 Vandemere	07/10/2002	03:07 PM	Tstm Wind	62 kts.	0	0	0	0
16 Pamlico	03/07/2004	09:30 PM	High Wind	60 kts.	0	0	29K	0
17 Arapahoe	06/11/2004	11:00 PM	Tstm Wind	50 kts.	0	0	0	0
18 Countywide	03/08/2005	11:42 AM	Tstm Wind	55 kts.	0	0	10K	0

19 Alliance	06/12/2007	16:45 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
20 Merritt	08/10/2007	17:20 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
21 Whortonville	03/05/2008	01:50 AM	Thunderstorm Wind	56 kts.	0	0	0K	0K
22 Kennel Beach	07/08/2008	15:39 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
23 Scotts Store	06/26/2009	15:27 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
TOTALS:					0	0	95K	0

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Source: http://www.nc-climate.ncsu.edu/products_old/wx/events/events.php

Over the past 40 years, Pamlico County has experienced a number of severe thunderstorm events. The most damaging event was in Florence in 1980 ($30,000), followed by an event that impacted the entire county in 2004 ($29,000 in damages). Fortunately, no deaths have been reported in Pamlico County due to thunderstorms in the past 40 years. Data prior to 1974 is not available.

SECTION 9: COASTAL EROSION

In assessing the erosion hazard in Pamlico County, it is important to realize that there is a temporal or time aspect associated with the average rate at which a shoreline is either eroding or accreting. Over a long-term period (years), a shoreline is considered eroding, accreting, or stable. When evaluating coastal erosion in the community, it is important to focus on the long-term erosion situation. However, it is important to understand that storms can erode a shoreline that is, over the long-term, classified as accreting, and vice versa.

Erosion is measured as a rate, with respect to either a linear retreat (i.e., feet of shoreline recession per year) or volumetric loss (i.e., cubic yards of eroded sediment per linear foot of shoreline frontage per year). Erosion rates are not uniform, and vary over time at any single location. Annual variations are the result of seasonal changes in wave action and water levels.

Erosion is caused by coastal storms and flood events; changes in the geometry of tidal inlets, river outlets, and bay entrances; man-made structures and human activities such as shore protection structures and dredging; long-term erosion; and local scour around buildings and other structures.

Shoreline erosion is a natural hazard within Pamlico County. Of the county's 348 miles of bay and estuarine shoreline, 54.7 miles are considered to be experiencing serious erosion problems. These areas are identified on Figure 8. The following defines the nine shoreline areas experiencing serious erosion problems (source: Pamlico County 1992 Land Use Plan Update).

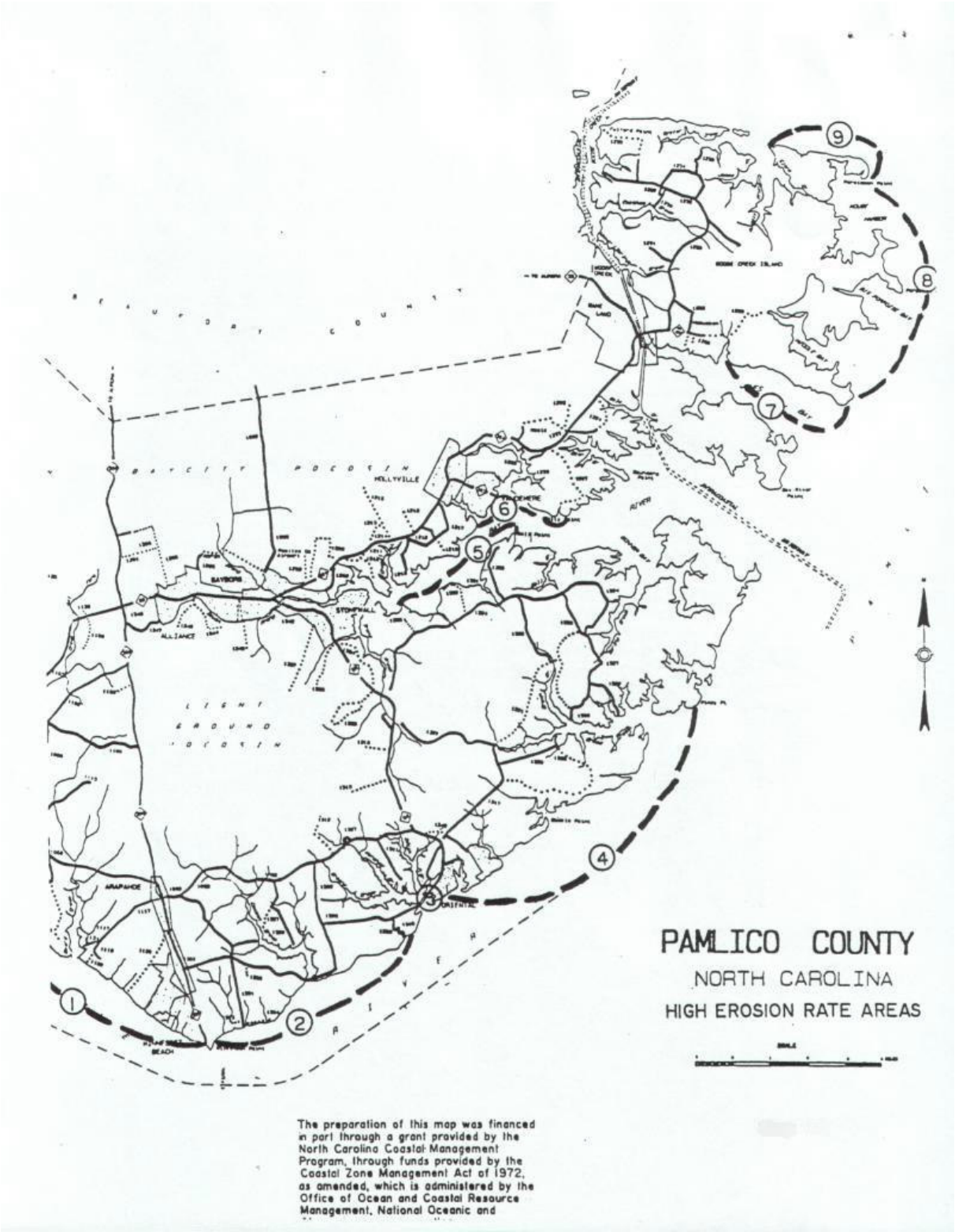
Reach No. 1	Average width lost to erosion	74.8 feet
	Average height of bank	14.3 feet
	Length of shoreline eroding	6.8 feet
	Length of shoreline accreting	0 miles
	Total length of shoreline	6.8 miles
Reach No. 2	Average width lost to erosion	159.2 feet
	Average height of bank	8.4 feet
	Length of shoreline eroding	7.5 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	7.5 miles
Reach No. 3	Average width lost to erosion	0 feet
	Average height of bank	0 feet
	Length of shoreline eroding	0 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	.5 miles

Reach No. 4	Average width lost to erosion	237.1 feet
	Average height of bank	4.8 feet
	Length of shoreline eroding	7.1 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	7.1 miles
Reach No. 5	Average width lost to erosion	52 feet
	Average height of bank	4.0 feet
	Length of shoreline eroding	4.4 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	7.1 miles
Reach No. 6	Average width lost to erosion	95.4 feet
	Average height of bank	2.9 feet
	Length of shoreline eroding	2.3 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	2.3 miles
Reach No. 7	Average width lost to erosion	76.3 feet
	Average height of bank	3.8 feet
	Length of shoreline eroding	2.8 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	2.8 miles
Reach No. 8	Average width lost to erosion	85.5 feet
	Average height of bank	3.3 feet
	Length of shoreline eroding	19.4 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	19.5 miles
Reach No. 9	Average width lost to erosion	98.3 feet
	Average height of bank	2.6 feet
	Length of shoreline eroding	3.9 miles
	Length of shoreline accreting	0 miles
	Total length of shoreline	3.9 miles

Some areas of rapid erosion may be found along stretches of the Intracoastal Waterway which are caused by boat induced wave action.

Unfortunately, coastal erosion data has not been collected since 1992. Pamlico County will incorporate new data into future updates of the hazard mitigation plan as it becomes available.

Figure 12. Excessive Erosion Areas
Source: Pamlico County 1992 Land Use Plan Update



SECTION 10: TORNADOES

A tornado is a violently rotating column of air extending to the ground. Over water, a tornado is called a *waterspout.* The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of 1 mile wide and 50 miles long.

Tornadoes are among the most unpredictable of weather phenomena. Tornado season runs ordinarily from March through August; however, tornadoes can strike at any time of the year if the essential conditions are present.

Thunderstorms and hurricanes spawn tornadoes when cold air overrides a layer of warm air, causing the warm air to rise rapidly. The winds produced from hurricanes, earthquake-induced fires, and wildfires have been known to produce tornadoes as well.

The nature of tornadoes is that they strike at random. While it is known that some areas of the country experience tornadoes more than others, predicting exactly what parts of the community have a greater chance of being struck by a tornado is difficult. In order to determine the likelihood and potential severity of tornado events in the community, the community should ascertain the number and intensity of tornadoes that have affected the area in the past. Take note, however, that the past number and severity of events is not necessarily a predictor of future occurrences.

Historical Occurrences

The majority of tornadoes (71%) reported in North Carolina have been classified as weak, 28% as strong, and about 1% as violent. Weak tornadoes have caused 3% of North Carolina tornado deaths, similar to the national figure. Strong tornadoes were responsible for 49% of North Carolina deaths (compared to 70% for the nation). Based on state tornado statistics (SERCC, 1996), there have been 941 confirmed tornadoes in the state since 1950. North Carolina ranks 22nd in total number of tornadoes and 18th in tornado deaths for the period 1953-1995.

Although tornadoes have been reported in North Carolina throughout the year, most of them have occurred in the spring, with 13% in March, 11% in April, 22% in May and 14% in June. The most severe tornadoes have also taken place during the spring, with more than half of all F2 or stronger storms occurring in that season.

The mountains and northern piedmont of North Carolina experience the lowest frequency of tornadoes because of less favorable conditions for severe thunderstorm activity in those regions. The highest frequency of tornadoes historically has occurred in the southeastern portion of the State.

Table 14. Tornadoes in Pamlico County

Tornadoes in Pamlico County (1950-July 31, 2003)						
Location	**Date**	**Type**	**Magnitude**	**Deaths**	**Injuries**	**Property Damage**
Pamlico County	9/29/1963	Tornado	F2	0	0	25K
Pamlico County	3/17/1965	Tornado	F3	1	40	2.5M
Pamlico County	3/21/1983	Tornado	F0	0	0	25K
Pamlico County	4/19/1988	Tornado	F1	0	0	25K
Pamlico County	11/28/1988	Tornado	F1	0	5	2.5M
Oriental	8/26/1998	Tornado	F0	0	0	0
Arapahoe	9/15/1999	Funnel Cloud	N/A	0	0	0
Grantsboro	9/15/1999	Tornado	F0	0	0	0
Bayboro	9/15/1999	Tornado	F0	0	0	0
Hobucken	9/15/1999	Tornado	F2	0	0	700K
Bayboro	9/15/1999	Tornado	F0	0	0	0
Bayboro	6/23/04	Tornado	F0	0	0	0
Grantsboro	10/12/04	Tornado	F0	0	0	0
Merritt	10/13/04	Tornado	F0	0	0	0
TOTALS:				1	45	$5,775,000

Source: National Climatic Data Center

Since 1963, tornadoes in Pamlico County have caused $5,775,000 in damages. The most costly tornadoes in Pamlico County were: 1) a F3 event in 1965 that affected the entire county, resulting in $2,500,000 in damages, 1 death, and 40 injuries; and 2) a F1 event in 1998 that affected much of the county, resulting in $2,500,000 in damages and

injuring 5 persons. These two events make up the majority of the damages in Pamlico County from tornadoes.

Scale
Tornadoes are characterized by damage pattern, FO through F5 on the Fujita-Pearson Tornado Scale. The table below shows the tornado category, expected damages, and corresponding wind speed.

Table 15. Fujita-Pearson Tornado Scale

F-Scale	Damage	Winds (mph)	Path Length (miles)	Mean Width (miles)
F0 (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	≥ 100	> 1.0

SECTION 11: MOSQUITOES

Mosquitoes also affect the entire county. While not typically included in hazard mitigation discussions, mosquitoes can be a nuisance in Pamlico County.

The life cycle of a mosquito can vary from one to several weeks depending upon the species (the adult, mated females of some species can survive the winter in cool, damp places until spring, when they will lay their eggs and die.) The females lay their eggs in water and the larva and pupa stages live entirely in water. During the late summer and early fall, Pamlico County receives some of the greatest rainfall totals of the year, providing ample breeding grounds for mosquitoes.

Since the mosquito hazard is unique to Pamlico County, there is no available data depicting previous occurrences in the county.

SECTION 12: LANDSLIDES

Common throughout the mountainous Appalachian region, landslides are described as downward movement of a slope and materials under the force of gravity. The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways), and natural factors (geology, precipitation, and topography).

Mudflows (or debris flows) are flows of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt, changing the earth into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. Other types of landslides include: rock slides, slumps, mudslides, and earth flows. All of these differ in terms of content and flow.

Landslides occur when masses of rock, earth, or debris move down a slope. Therefore, gravity acting on an overly steep slope is the primary cause of a landslide. They are activated by storms, fires, and by human modifications to the land. New landslides can result from heavy rainstorms, earthquakes, and various human activities.

The best predictor of future landslides is past landslides because they tend to occur in the same places. Existing or old landslides may be found in the following areas:

- On or at the base of slopes;
- In or at the base of minor drainage hollows;
- At the base or top of an old fill slope;
- At the base or top of a steep cut slope; or
- Developed hillsides where leach field septic systems are used.

The following conditions may exacerbate the effects of landslides:

<u>Erosion</u>: Erosion caused by rivers, glaciers, or ocean waves created by overly steep slopes.

<u>Unstable Slopes</u>: Rock and soil slopes are weakened through saturation by snowmelt or heavy rains.

<u>Earthquakes</u>: The shaking from earthquakes creates stress that makes weak slopes fail.

<u>Vibrations</u>: Machinery, traffic, blasting, and even thunder may cause vibrations that trigger failure of weak slopes.

Increase of Load: Weight of rain/snow, fills, vegetation, stockpiling of rock or ore from waste piles, or from man-made structures may cause weak slopes to fail.

Hydrologic Factors: Rain, high water tables, little or no ground cover, and numerous freeze/thaw cycles may cause weak slopes to fail.

Human Activity: These include development activities such as cutting and filling along roads and removal of forest vegetation. Such activities are capable of greatly altering slope form and ground water conditions which can cause weak slopes to fail.

Removal of Lateral and Underlying Support: Erosion, previous slides, road cuts and quarries can trigger failure of weak slopes.

Increase of Lateral Pressures: Hydraulic pressures, tree roots, crystallization, swelling of clay soil may cause weak slopes to fail.

Regional Tilting: Geologic movements can trigger weak slopes to fail.

The three most useful types of landslide maps are: 1) landslide inventories; 2) landslide susceptibility maps; and 3) landslide hazard maps.

Landslide Inventories: Landslide inventories identify areas that appear to have failed due to landslides, including debris flows and cut-and-fill failures. Detailed inventories depict and classify each landslide and show scarps, zones of depletion and accumulation, active versus inactive slides, geological age, rate of movement, and other pertinent data on the depth and type of materials involved in sliding. Overlaying a geologic map with an inventory map that shows existing landslides can identify specific landslide-prone geologic units. For this reason, a landslide inventory is essential for preparing a landslide susceptibility map.

Landslide Susceptibility Maps: Landslide susceptibility maps depict areas that have the potential for landslides by correlating some of the principal factors that contribute to landslides - steep slopes, geologic units that lose strength when saturated, and poorly drained rock or soil - with the past distribution of landslides. These maps indicate the relative stability of slopes; however, they do not make absolute predictions. More complex maps may include additional information such as slope angle, and drainage.

Landslide Hazard Maps: Landslide hazard maps show the real extent of the threat: where landslides have occurred in the past, where they are likely to occur now, and where they could occur in the future. They contain detailed information on the types of landslides, extent of slope subject to failure, and probable maximum extent of ground movement. These maps can be used to predict the relative degree of hazard in a landslide area.

Landslide Areas in Pamlico County
Because of the relatively flat topography of the area, Pamlico County is not susceptible to landslide. However, there are a few areas along the northern bank of the Neuse River that are characterized by high bluffs at the waters edge. Storms cause elevated water levels and damaging waves in the Neuse River. Breaking waves can overtop existing bulkheads and rip rap. Older bulkheads can be undermined with an associated loss of backfill.

Sinkholes do not threaten Pamlico County.

Since landslides and sinkholes do not threaten Pamlico County, no data regarding previous occurrences exists.

SECTION 13: SEVERE WINTER STORMS

Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, blizzards, freezing rain and ice pellets and extreme cold. Extreme snow events are the most potentially disruptive to society, for they can bring down power lines, trees and lead to roof collapses. All forms of severe winter weather can make traveling treacherous. Severe winter storms are extra-tropical cyclones fueled by strong temperature gradients and an active upper-level jet stream. The winter storms that impact North Carolina generally form in the Gulf of Mexico or off the southeast Atlantic Coast. Few of these storms result in blizzard conditions, defined by the presence of winds in excess of *35* mph, falling and blowing snow, and a maximum temperature of 20^0 Fahrenheit.

While the frequency and magnitude of snow events are highest in the mountains due to elevation, the geographical orientation of the mountains and Piedmont contribute to a regular occurrence of freezing precipitation events (e.g., ice pellets and freezing rain) in the Piedmont. Such ice events (up to and including ice storms) are often the result of cold air damming (CAD). CAD is a 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 (liquid below the melting point of water) or re-freezes. In the former case, super cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet).

The entire state of North Carolina has a likelihood of experiencing severe winter weather. The threat varies by location and by type of storm. Coastal areas typically face their greatest threat from nor'easters and other severe winter coastal storms. These storms can contain strong waves and result in extensive beach erosion and flooding. Freezing rain and ice storms typically occur once every several years at coastal locations and severe snowstorms have been recorded occasionally in coastal areas.

Cold air damming contributes to elevated freezing rain and ice storm events in the Piedmont of North Carolina. These events occur at least as often as moderate or severe snow events in this region.

The mountains of North Carolina usually receive several snowfalls of 4 to 6 inches in a given winter weather season. There has been at least one severe winter storm at some location in the mountains each year for the past several decades. The western area of the state is more likely to experience greater and more frequent snowfalls and blizzards than other locations in the state. The mountains also have the highest number of extreme one-day snowfalls.

Unfortunately, no data source exists that detail or describes damages in Pamlico County due to severe winter storms. While there is statewide data on winter storms, county-specific data is not available. This data limitation precludes information on

previous occurrences within the county's boundaries. Pamlico County will include, as a mitigation action, a request to the NC Climate Office's Storm Events Database (http://www.nc-climate.ncsu.edu/monitoring/events.html) to include county-specific information in the severe winter storm database.

SECTION 14: EARTHQUAKES

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of Earth's tectonic plates. The severity of these effects is dependent on the amount of energy released from the fault or epicenter. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and after just a few seconds can cause massive damage and extensive casualties.

The variables that characterize earthquakes are ground motion, surface faulting, ground failure, and seismic activity.

Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.

Surface faulting is the differential movement of two sides of a fracture - in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.

Liquefaction is the phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength. Lateral spreads develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies. Loss of bearing strength results when the soil supporting structures liquefies. This can cause structures to tip and topple.

Earthquakes are measured in terms of their magnitude and intensity. There are several different scales that are commonly used, including Richter Magnitude, Modified Mercalli Intensity (MMI), Moment Magnitude and Peak Ground Acceleration (PGA), among others.

Magnitude is measured using the Richter scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. Each unit increase in magnitude on the Richter scale corresponds to a ten-fold increase in wave amplitude, or a 244-fold increase in energy.

Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale. It is a twelve-level scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using Roman numerals, with a I corresponding to imperceptible (instrumental) events, IV corresponding to moderate (felt by people awake), to XII for catastrophic (total destruction). A detailed description of the Modified Mercalli Scale of Earthquake Intensity (and its correspondence to the Richter scale) is below.

Earthquakes are relatively infrequent but not uncommon in North Carolina. Epicenters of North Carolina earthquakes are generally concentrated in the active Eastern Tennessee Seismic Zone, which is second in activity in the eastern United States only to the New Madrid Fault.

The Eastern Tennessee Seismic Zone is part of a crescent of moderate seismic activity risk extending from Charleston, South Carolina northwestward into eastern Tennessee and then curving northeastward into central Virginia. While there have not been any earthquakes with a MMI intensity greater than IV since 1928 in this area, it has the potential to produce an earthquake of significant intensity in the future.

North Carolina's vulnerability to earthquakes decreases from west to east in relation to the Eastern Tennessee Seismic Zone. Generally, there are three different zones of seismic risk in North Carolina that correspond to different effective peak velocity-related accelerations of ground movement. The eastern portion of the State faces minimal effects from seismic activity. Locations in the middle and southeastern areas of the State face a moderate hazard from seismic activity, while the area from Mecklenburg County west through the Blue Ridge faces the greatest risk from seismic activity. These different levels of risk correspond to proximity to areas with historical seismic activity and changes in topography.

The steep topography of western North Carolina exacerbates the potential for damage from this area of seismic activity. There could be significant ground movement on steep slopes from seismic activity, which could result in human injuries, damage to property, and road closures, which would add to the difficulty of bringing in relief supplies and fire protection equipment.

An earthquake in eastern North Carolina is unlikely but possible. In 1994, a weak earthquake impacted Pamlico County. Any damage from the event was negligible as no structural damage was reported. That quake registered a 3.4 on the Richter scale of intensity. It is not possible to ascertain the impact of an earthquake in the area; as such estimates would depend strongly upon where the epicenter is located and to how powerful the earthquake event actually is.

Table 16. 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 shelves	<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

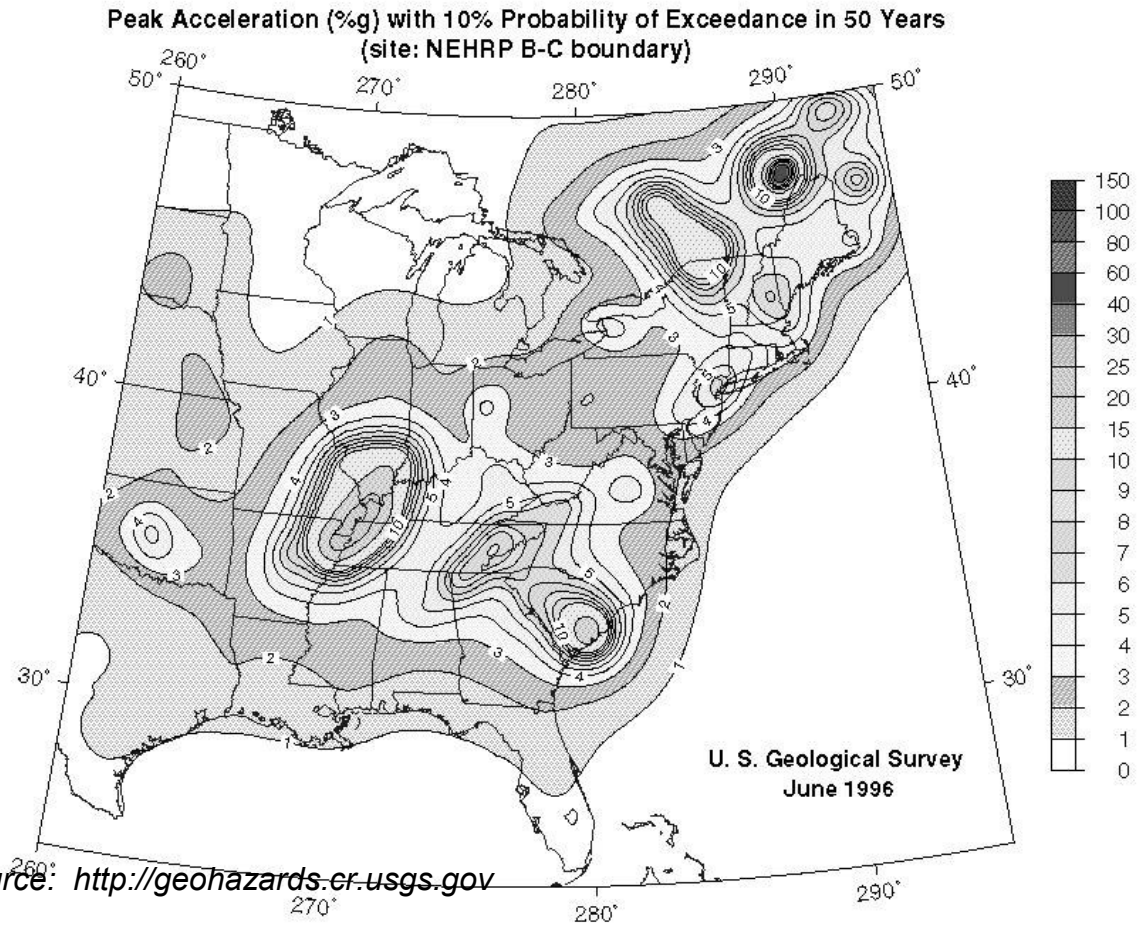
One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. If you're standing on the surface of the earth and drop an object (ignoring wind resistance) it will fall toward the earth faster and faster, until it reaches terminal velocity. This principle is known as acceleration and represents the rate at which speed is increasing. The acceleration due to gravity is often called "g", a term you may have heard associated with roller coasters, rockets, or even stock car racing. The acceleration due to gravity at the earth's surface is 9.8 meters (980 centimeters) per second squared. That means that every second that something falls

toward the surface of earth its velocity increases 9.8 meters per second. A 100% g earthquake is very severe.

An analogy would be if you floor your car's gas pedal and your groceries get smashed against the back of the trunk. The quicker you press on the gas, the more eggs are likely to get broken. That's because the quick acceleration caused the contents of your trunk to shift rapidly and violently, not slowly and smoothly. In fact, the eggs might not have moved at all if you had sped up slowly. The same thing is true in an earthquake. If ground acceleration is rapid, more things tend to break than if the shaking is relatively slow, even if the ground moves the same distance.

The map shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected, the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity.

Figure 13. Peak Acceleration (%g) with 10% Probability of Exceeding in 50 Years



Source: http://geohazards.cr.usgs.gov

SECTION 15: FLOODING

What Is A Flood?

A flood is a natural event for rivers, streams and coastal areas. Excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers, lakes and oceans that are subject to recurring floods. Flooding is the most common hazard in North Carolina, and thousands of households are located within floodplains. Floods can occur at any time of the year, and at any time of day or night. Most injuries and deaths occur when people are swept away by flood currents, often when attempting to traverse floodwaters in a vehicle. Most property damage results from inundation by sediment-filled water, or by debris in floodwaters that acts as "battering rams."

Floods generally fall into two *categories: flashfloods,* the product of heavy localized precipitation in a short period over a given location, or caused by a dam break or levee failure; and *general floods,* which can occur in riverine, coastal, and urban settings. There are also areas in North Carolina that are subject to long-term or permanent inundation.

Flash Flooding: Flash floods occur within a few minutes or hours of heavy amounts of rainfall, from a dam or levee failure, or from a sudden release of water held by an ice jam. In North Carolina, most flash flooding is caused by slow-moving thunderstorms, repeated thunderstorms in a local area, or by heavy rains from hurricanes and tropical storms. Areas subject to rapid floodwater inundation pose special threats to life and property because there is insufficient time for warning, evacuation, emergency flood proofing, or other protective measures. Flash floods can destroy buildings and bridges, uproot trees, and scour out new drainage channels. Heavy rains that produce flash floods can also trigger mudslides. Suddenness is a serious problem in the following areas:

- Steep rivers and streams in mountainous or hilly areas subject to sudden rainfall and rapid runoff;
- Areas with steep slopes and little or no vegetative ground cover;
- Areas behind dams or levees subject to failure or overtopping;
- Barrier islands and other areas along the coast which may be subject to relatively rapid hurricane storm surge; and
- Urban areas where much of the ground is covered by impervious surfaces, or where fixed drainage channels may be unable to contain the runoff that is generated by intense rainfall events.

Riverine Flooding: Riverine flooding occurs when stream flow exceeds the capacity of the normal watercourse, and is a function of precipitation levels and water runoff volumes within the watershed of the stream or river. The severity of a flooding event is determined by a combination of river basin physiographic, local thunderstorm movement, past soil moisture conditions, and the degree of vegetative clearing. Abnormal weather patterns may also contribute to flooding of a local area.

Coastal Flooding: Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall. These conditions are produced by hurricanes during the summer and fall, and nor' Easters and other large coastal storms during the winter and spring. Storm surges may overrun barrier islands and push seawater up coastal rivers and inlets, blocking the downstream flow of inland runoff. Thousands of acres of crops and forestlands may be inundated by both saltwater and freshwater. Escape routes, particularly from barrier islands, may be cut off quickly, stranding residents in flooded areas and hampering rescue efforts.

Urban Flooding: Urban flooding occurs where there has been development within stream floodplains. This is partly a result of the use of waterways for transportation in earlier times. Sites adjacent to rivers and coastal inlets provided convenient places to ship and receive commodities. Floodplains are also attractive for development since they provide flat areas for building. The price of this accessibility and convenience has been increased flooding of the ensuing urban areas. 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.

Long-Term or Permanent Inundation: Unlike the normal riverine or coastal flood situation where flood waters rise and fall relatively quickly, certain areas are subject to long term or essentially permanent flooding. In such areas, structures elevated on pilings or flood proofed are often permanently unusable, and must be abandoned unless there are specially designed for long-term inundation with adequate access and utility services. Long-term flood areas include:

- 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 the land is destroyed;
- Areas subject to subsidence by ground water or oil and gas withdrawals;
- Areas behind dikes and levees where high ground water levels may persist for months or years.

High Risk Factors*:*
The following conditions may exacerbate the effects of floods: impermeable surfaces, steeply sloped watersheds, constrictions, obstructions, debris, contamination, soil saturation, and velocity.

Impermeable surfaces: Excessive amounts of paved areas or other surfaces upstream or in the community can increase the amount and rate of water runoff. Development affects the runoff of storm water when buildings and parking lots replace the natural vegetation, which normally would absorb water. When rain falls in an undeveloped area, as much as 90 percent of it will infiltrate the ground; in a highly developed area, as much as 90 percent of rainfall will run off.

Steeply sloped watersheds: In hilly and mountainous areas, a flood may occur minutes after a heavy rain. These flash floods allow little or no warning time, and are characterized by high velocities.

Constrictions: Re-grading or filling within or on the edge of floodplains obstructs flood flows, backing up floodwaters onto upstream and adjacent properties. It also reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels. This also increases floodwater's velocity downstream of the constriction.

Obstructions: Bridges, culverts and other obstructions can block flood flow and trap debris, causing increased flooding upstream and increased velocity downstream.

Debris: Debris from the watershed, such as trees, rocks, and parts of damaged buildings, increases the hazard posed by moving water. Moving water will float, drag or roll objects, which then act as battering rams that can knock holes in walls and further exacerbate the effects of debris.

Contamination: Few floods have clear floodwater, and the water will pick up whatever was on the ground within the floodplain, such as soil, road oil, farm and lawn chemicals, and animal waste. In addition, if a wastewater treatment plant was inundated, the floodwaters will likely include untreated sewage. Contamination is also caused by the presence of hazardous material storage in the floodplain and in the community, as well as upstream from the community.

Soil saturation: Rainfall in areas already saturated with water will increase the runoff.

Velocity: Flood velocity is the speed of moving water, measured in feet per second. Velocity is determined by slope, waves, and several other factors. The damage potential of flood waters increases dramatically, sometimes exponentially, with velocity. High velocities (greater than 5 feet per second) can erode stream banks, lift buildings off their foundations, and scour away soils around bridge supports and buildings. Water velocity is a major cause of damage in the following areas:

Areas subject to coastal wave action (velocity zones);

- 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;
- Areas behind levees or dams where the protective structure suddenly fails or the design capacity is suddenly exceeded.

Flood Frequency

100-Year Flood

Floodplain managers use the term "100-year flood" to describe a flood that has a one-percent chance of occurring in any given year. Many people find it helpful to think of the 100-year flood risk as a bag of 100 marbles: 99 clear marbles and one black marble. Depending on weather conditions, a community may draw one or more marbles, or floods, from the bag. Most of these—the clear marbles—will be minor floods. It is possible, however, to draw the black marble, representing the 100-year flood, at any time. Because the marbles must be returned to the bag after they are drawn, it is even possible to draw the black marble several times in a row. Just because a community has suffered a 100-year flood *does not* mean that it will not face a flood of similar magnitude for another 99 years.

The location of the 100-year floodplain is often indicated on maps, such as the National Flood Insurance Program's Flood Insurance Rate Maps (FIRMs). In practice, the location of the 100-year flood should be judged in part by community experience as well. Where the water goes in a flood depends on many changing variables, including land use that may not be accurately reflected by a map in every instance.

Flood Insurance Rate Maps (FIRMs)**:**

Fortunately, most of the known floodplains in the United States have been mapped by FEMA, which administers the National Flood Insurance Program (NFIP). When a flood study is completed for the NFIP, the information and maps are assembled into a Flood Insurance Study (FIS). An FIS is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community and include causes of flooding.

The FIS report and associated maps delineate Special Flood Hazard Areas (SFHAs), designate flood risk zones, and establish base flood elevations (BFEs), based on the flood that has a 1% chance of occurring annually, or the 100-year flood. The study may have three components:

- The FIS - Flood Insurance Study text;
- The FIRM - Flood Insurance Rate Map; and
- A separate Flood Boundary and Floodway Map (FBFM) that was issued as a component of the FIS for each community studied prior to 1986. No BFE or flood zone names are shown on the floodway map and people often confuse the white floodway with the white area representing land that is free from flooding. FIS reports published since 1986 have corrected this problem by delineating the floodways as diagonally hatched areas on the FIRMs.

New Flood Maps using LIDAR:

Light Detection and Ranging (LIDAR) is being used by the North Carolina Floodplain Mapping Program to generate digital elevation data. These highly accurate topographic data are then used with other digital information and field data to analyze flood hazards and delineate floodplain boundaries, which are depicted on Flood Insurance Rate Maps. Data Acquisition using Airborne LIDAR sensors emit between 5,000 and 50,000 laser pulses per second in a scanning array. The most common scanning arrays go back and forth sideways relative to the points measured on the ground. The scan angle and flying height determine the average point spacing in the cross-flight direction, whereas the flying height and the airspeed determine the average point spacing in the in-flight direction. Each laser pulse has a pulse width (typically between 0.5 and 1 meter in diameter) and a pulse length (equivalent to the short time lapse between the time the laser pulse was turned on and off). Therefore, each laser pulse is actually like a cylinder of light with diameter and length.

Several technologies operate for LIDAR to survey high-accuracy data points on the ground:

Airborne Global Positioning System (GPS) is needed to determine the x, y, and z coordinates of the moving LIDAR sensor in the air, surveyed relative to one or more GPS base stations. The Inertial Measuring Unit (IMU) directly measures the roll, pitch, and heading of the aircraft, establishing the angular orientation of the LIDAR sensor about the x, y, and z axes in flight. The LIDAR sensor measures the scan angle of the laser pulses. Combined with the IMU data, this establishes the angular orientation of each laser pulse. The LIDAR sensor measures the time needed for each emitted pulse to reflect off the ground (or features thereon) and return to the sensor.

LIDAR sensors are capable of receiving multiple returns, some up to five returns per pulse. This means that a 30-KHz sensor (30,000 pulses per second) must be capable of recording up to 150,000 returns per second. The "first return" recorded by a LIDAR sensor is the first thing hit by a laser pulse. This could be a treetop, roof, ground point, or a bird in flight. When a laser pulse hits a soft target (e.g., a forest canopy), the first return represents the top of that feature. However, a portion of the laser light beam might continue downward below the soft target and hit a tree branch. This would provide a second return. Theoretically, the last return represents the bare earth terrain, but this is sometimes not the case. Some vegetation is so thick that no portion of the laser pulse penetrates to the ground. This is usually the case with sawgrass, mangrove, and dense forests where a person on the ground cannot see the sky through the canopy. LIDAR for the North Carolina Floodplain Mapping Program was flown during "leaf off" conditions to favor the acquisition of bare earth data.

The existing flood maps for Pamlico County were updated since the initial Hazard Mitigation Plan for Pamlico County. LIDAR mapping technology was used. The new flood hazard maps use the following zones:

Coastal:

Zone AE is subject to flooding by the base or 1% annual chance (100-year) flood, and waves less than 3 feet high, (formerly called Zones A1-A30).

Unshaded Zone X is the area of minimal flood risk outside the 500-year floodplain, formerly called Zone C.

Shaded Zone X is subject to flooding by the 0.2% annual chance (500-year) flood, formerly called Zone B.

Zone VE is where wave heights are expected to be 3 feet or more.

Base Flood Elevation (BFE) is the water surface elevation (in feet above the vertical datum shown on the map).

Shoreline Riverine:

Zone A (unnumbered) is the flood hazard area without BFEs.

Cross Section location:

Shaded Zone X is the 0.2% annual chance (500-year) floodplain (formerly Zone B).

Base Flood Elevation (BFE) is the water surface elevation of the base flood at approximate locations (in feet above the vertical datum shown on the map).

Zone AE is the 1% annual chance (100-year) floodplain with BFEs (formerly Zones A1-A30).

The **Floodway** is the cross-hatched area.

Unshaded Zone X is all other areas considered low risk (formerly Zone C)

The primary source of flooding in Pamlico County is wind driven surge generated in the Atlantic Ocean by tropical storms and hurricanes. The surge propagates into Pamlico Sound and further propagates into Bay River, Big Porpoise Bay, Jones Bay, Kershaw Creek, Middle Bay, Morris Creek, Pamlico River, Pamlico Sound, Smith Creek, Thomas Creek, and Trent Creek. Flooding from heavy rainfall occurs on Greens Creek, Kershaw Creek, Morris Creek, North Prong Bay River, Smith Creek, South Prong Bay River, Thomas Creek, and Trent Creek. High winds associated with tropical storms can also produce extremely high waves that create higher than normal surge. The wave

action during a tidal flood can be more damaging than the higher water level. Not all storms that pass close to Pamlico County produce extremely high surge. Similarly, storms that produce flooding conditions in one area may not necessarily produce flooding conditions in other parts of Pamlico County.

The contribution from nor'easters to the overall storm surge elevation in the Pamlico County area was found to be insignificant compared to hurricanes; therefore, only the effects of hurricane and tropical storm induced surge elevations were considered. In other areas of North Carolina, particularly the Outer Banks area of the northern part of the state, nor'easters were found to provide a significant contribution to the overall storm surge.

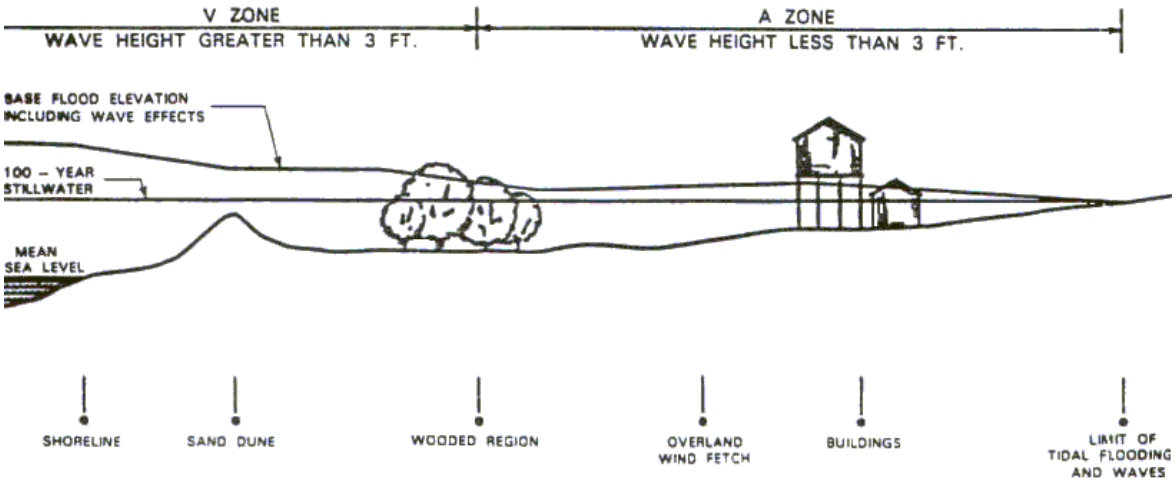
One representation of Pamlico County's flood hazard area is illustrated by the Flood Insurance Rate Map (FIRM). Flood hazard areas in coastal regions are determined using statistical analyses of records of storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. A FIRM usually is issued following a flood risk assessment conducted in connection with the community's conversion to the Regular Phase of the NFIP. If a detailed assessment, termed a Flood Insurance Study, has been performed, the FIRM will show base flood elevations and insurance risk zones in addition to floodplain boundaries. After the effective date of the FIRM, the community's floodplain management ordinance must be in compliance with the appropriate Regular Phase requirements. Actuarial rates, based on the risk zone designations shown on the FIRM, are then applied for newly constructed, substantially improved, and substantially damaged buildings.

Table 17. Base Flood Elevation

Flooding Source and Transect	**Location**	**Stillwater Elevations (Feet NGVD)**				**Zone**	**Base Flood Elevation (Feet NGVD)**
		10-year	50-year	100-year	500-year		
Atlantic Ocean / Pamlico Sound / Pamlico River	Pamlico Sound, including Mouse Harbor	4.5	6.1	6.7	7.7	VE	9-10

Flooding		Stillwater Elevations (Feet NGVD)					Base Flood
Atlantic Ocean / Pamlico Sound / Jones Bay / Middle Bay / Porpoise Bay	Pamlico Sound, including Jones Bay, Middle Bay and Porpoise Bay	5.1	7.0	7.5	8.7	VE	9-11
Atlantic Ocean / Pamlico Sound / Kershaw Creek / Smith Creek / Green's Creek / Morris Creek	Pamlico Sound, including Piney Point and Maw Point	5.2	6.9	7.6	8.7	VE	10-11
Atlantic Ocean / Pamlico Sound / Kershaw Creek / Smith Creek / Green's Creek / Morris Creek	Pamlico Sound, including Bay River Point	5.2	7.2	7.7	9.0	VE	10-11

Figure 14. Flood Insurance Study Schematic



Historical Floods

Coastal North Carolina has a storied hurricane history. The area suffered storms during the 19th century in 1837, 1846, 1856, 1879, 1883, and 1899.

September 16, 1933

This hurricane formed east of the Leeward Islands, moved northwest and then northward, increasing in intensity and striking the coast a little west of Hatteras about 8 a.m. on September 16. It was reported that hardly a building was left standing in several coastal towns. High winds, waves, and the piling up of water in Pamlico and Albemarle Sounds caused 21 deaths. An estimated high tide of 7 feet above mean sea level occurred at Ocracoke.

October 5, 1954 – Hazel

Hurricane Hazel was the most destructive storm in the history of North Carolina. The storm crossed the coast just north of Myrtle Beach, South Carolina, as hurricane force winds hit the Atlantic coast between Georgetown, South Carolina and Cape Lookout. Storm tides (i.e. hurricane surge) devastated the immediate oceanfront of this stretch of coast. Storm surge of 16.6 feet above MSL was observed at Holden Beach and Calabash, North Carolina.

August 12, 1955 – Connie

Hurricane Connie entered the North Carolina coastline close to Cape Lookout. The prolonged pounding of high waves against the coast caused tremendous beach erosion estimated to have been worse than that caused by Hurricane Hazel, a storm that severely affected the southern North Carolina coast in 1954. Water in sounds and near the mouths of rivers was 5 to 8 feet above normal. At Fort Macon, winds of 75 mph, gusts of 100 mph, and a barometric pressure of 962 mb were reported. The storm also brought torrential rains with the maximum rainfall, around 12 inches in 48 hours,

occurring near Morehead City. Total damage throughout the state was estimated at $50 million.

September 19, 1955 – Ione
Hurricane Ione, moving from the south, crossed the North Carolina coast near Salter Path, about 10 miles west of Morehead City. It then slowly curved to the northeast, passing out to sea near the Virginia State Line early on September 20. When Ione entered North Carolina, highest winds were a little over 100 mph. Heavy rains accompanied Ione. At the same time, prolonged easterly winds drove tide water onto the beaches and the sounds to a height of 3 to 10 feet above MSL. The result was inundation of the greatest area of eastern North Carolina ever recorded. At New Bern, the depth of the flood was the greatest ever recorded, about 10.5 feet above mean low water. Forty city blocks were flooded with up to 4 feet of water. A high tide of 6.9 feet NGVD was reported at Atlantic Beach, North Carolina.

September 27, 1958 – Helene
Hurricane Helene was one of the most powerful storms of recent history and, fortunately for North Carolina, the storm center moved up the coast staying well out at sea, on September 26 – 27. Even so, the highest winds of record were noted in Wilmington, with peak gusts of 135 mph. There was some beach erosion due to the seas and tides but this was minimized by the passage of the storm at the time of low astronomical tide. The highest tides on ocean beaches were estimated at 3 to 5 feet above normal. Tides were higher on the southern edge of Pamlico Sound, where a sudden rise following the wind shift as the center passed brought the tides to 7 to 8 feet above normal.

August 31, 1993 – Emily
Hurricane Emily, a Category 3 hurricane, grazed Hatteras Island on August 31, 1993. The eye of the hurricane came within 20 miles of Cape Hatteras, but did not pass over the Outer Banks. When the winds shifted from the northeast to the northwest, water was forced onto the island from Pamlico Sound, washing several homes from their foundations. Wind measuring equipment recorded wind gusts of up to 107 miles per hour.

July 13, 1996 – Bertha
Hurricane Bertha came ashore around the Cape Fear area during the early morning hours of July 13, 1996. This early season storm was a Category 2 when it made landfall, quickly dropping below hurricane strength when it moved inland over eastern North Carolina. Coastal storm surge flood heights, from Florida through New England, ranged from 1 to 4 feet, but values to 5 feet were estimated on the North Carolina coast from Cape Fear to Cape Lookout. A storm surge of 6 feet or a little higher is indicated near Swansboro, where 5 to 6 feet of water was "inside of businesses on the waterfront". The primary effects in North Carolina were to the coastal counties and included storm surge flooding and beach erosion, roof damage, piers washed away, fallen trees, and damage to crops. A survey indicated over 5000 homes damaged, mostly from storm surge. A Federal Emergency Management Agency estimate of the number of persons in South and North Carolina who evacuated is 750,000. Minor wind

damage and flooding also spread along the path of the storm all the way to New England.

September 6, 1996 – Fran
Fran was moving northward near 15 knots when it made landfall on the North Carolina coast. The center moved over the Cape Fear area on the morning of September 6, 1996, but the circulation and radius of maximum winds were large and hurricane force winds likely extended over much of the North Carolina coastal areas of Brunswick, New Hanover, Pender, Onslow and Carteret counties. At landfall, the minimum central pressure is estimated at 954 mb and the maximum sustained surface winds are estimated at 100 knots. The strongest winds likely occurred in streaks within the deep convective areas north and northeast of the center. Storm surge on the North Carolina coast destroyed or seriously damaged numerous beachfront houses. Widespread wind damage to trees and roofs as well as downed power lines occurred as Fran moved inland over North Carolina and Virginia. Extensive flooding was responsible for additional damage in the Carolinas, Virginia, West Virginia, Maryland, Ohio and Pennsylvania. Nearly a half-million tourists and residents were ordered to evacuate the coast in North and South Carolina. Press reports from Reuters News Service stated that 4.5 million people in the Carolinas and Virginia were left without power. The Property Claim Services Division of the American Insurance Services Group reports that Fran caused an estimated $1.6 billion dollars in insured property damage to the United States. This estimate includes $1.275 billion in North Carolina, $20 million in South Carolina, $175 million in Virginia, $50 million in Maryland, $20 million in West Virginia, $40 million in Pennsylvania and $20 million in Ohio. A conservative ratio between total damage and insured property damage, compared to past land falling hurricanes, is two to one. Therefore, the total U.S. damage estimate is $3.2 billion.

August 27, 1998 - Bonnie
Hurricane Bonnie was a Category 2 storm when it came to shore on August 27, 1998, near Cape Fear. Storm tides of 5 to 8 feet above normal were reported mainly in eastern beaches of Brunswick County NC, while a storm surge of 6 feet was reported at Pasquotank Three people died as a consequence of Bonnie. A 12-year old girl was killed when a large tree fell on her home in Currituck County, NC. Another person was caught in rip currents and drowned in Rehoboth Beach, Delaware. The third person died in Cape Cod in a rowboat accident when choppy seas overturned the boat. The last one may have been indirectly related to Bonnie. The Property Claim Services Division of the American Insurance Services Group reports that Bonnie caused an estimated $ 360 million in insured property damage to the United States. This estimate includes $ 240 million in North Carolina, $ 95 million in Georgia, and $ 25 million in South Carolina. A conservative ratio between total damage and insured property damage, compared to past land falling hurricanes, is two to one. Therefore, the total U.S. damage estimate is $ 720 million.

August 30, 1999 – Dennis
Hurricane Dennis's first pass near the coast of the Carolinas on August 30, 1999, caused sustained tropical storm force winds with gusts to hurricane force in coastal

North Carolina and gusts to tropical storm force in coastal South Carolina from Charleston northward. Dennis drifted just east of the North Carolina Outer Banks for several days before coming ashore again on September 4, 1999. Dennis was just below hurricane strength when it made landfall over the Cape Lookout National Seashore just east of Harkers Island, NC. Storm tides of 3 to 5 ft above normal were reported along much of the North Carolina coast on both August 30th and September 4th. Areas along the Neuse River reported tides of 8 to 10 ft above normal tide level on August 30th, while areas along the Pamlico River reported similar values on September 4th. Portions of the South Carolina and southeastern Virginia coast experienced 2 to 4 ft above normal tides during Dennis. Since Dennis meandered off the North Carolina coast for several days, the above normal tides were unusually prolonged. This led to extensive beach erosion along portions of the North Carolina and southeastern Virginia coasts. The Property Claims Services Division of the Insurance Services Office reports insured losses due to Dennis totaled $60 million in North Carolina and Virginia. Press reports indicate that agricultural losses in North Carolina and Virginia were $37 million. Combining these reports gives a total estimated damage from Dennis of $157 million.

September 16, 1999 – Floyd
Hurricane Floyd made landfall near Cape Fear, North Carolina in the early morning hours of September 16, 1999, as a Category 2 hurricane with estimated maximum winds near 90 knots. Floyd was losing its eye wall structure as it made landfall. Continuing to accelerate north-northeastward, Floyd's center passed over extreme eastern North Carolina on the morning of the 16th and over the greater Norfolk, Virginia area in the afternoon. Storm surge values as high as 9 to 10 feet were reported along the North Carolina coast. Rainfall totals as high as 15 to 20 inches were recorded in portions of eastern North Carolina and Virginia. A number of tornadoes were sighted in eastern North Carolina. There was a confirmed tornado in Bertie County and another in Perquimans County. The latter tornado destroyed two houses and damaged three or four others. At least ten tornadoes were reported by spotters in the Newport/Morehead City County Warning area, and these apparently caused some structural damage. Four tornadoes or funnel clouds were seen in the Wilmington area, but no damage was apparent. Total damage estimates range from 3 to over 6 billion dollars.

September 17, 2003 – Isabel
Hurricane Isabel made landfall early in the afternoon on September 18th as a category two hurricane across core banks in extreme eastern Carteret County. Isabel moved north northwest near 20 mph across eastern North Carolina during the afternoon. Areas mainly near and east of the storm center experienced significant wind and storm surge effects. Major over wash and beach erosion occurred along the North Carolina Outer Banks where waves up to 20 feet accompanied a 6 to 8 foot storm surge. Almost 350 million dollars in damage occurred in Dare County alone where several thousand homes and businesses, several piers, and sections of Highway 12 were damaged or washed away. Eastern Carteret, eastern Pamlico, southern Craven, Beaufort and Hyde counties experienced significant storm surge damage with hundreds of homes flooded in most of these counties. The highest storm surges were experienced in the lower

reached of the Neuse River where water levels rose to as high as 10.5 feet at the mouth of Adams Creek. Storm surge values ranged from 6 to 10 feet across eastern Pamlico County with the highest water levels recorded near Oriental.

Structures Subject to Hazards

There are 156,150 acres within the boundaries of Pamlico County. This analysis included incorporated and unincorporated areas of the county. Susceptibility of property in Pamlico County was analyzed using three different flooding scenarios: 100-year, SLOSH – Slow, and SLOSH – Fast.

The Pamlico County GIS data used for this analysis did not contain a land use code. Therefore, analysis of residential, commercial, and institutional properties was not possible without conducting a detailed land use survey of the entire county. However, the GIS data included a field for Total Value and a field for Current Land Value. By subtracting the Current Land Value from the Total Value, it was possible to determine how many developed properties were located within the study area and the value of those structures. Projections of potential damage were not included with this analysis. Pamlico County is sparsely developed and has numerous environmental constraints on development. Therefore, projections made by using average structure values and application to undeveloped properties would not be useful.

Using the 100-year flood models (the FIRM model, or the model insurance rates are based on); the A Zone contains 4,237 acres of developed property. The AE Zone contains 27,733 acres of developed property. The VE Zone contains 645 acres of developed property. According to the Pamlico County tax records, the developed properties in the A Zone contain structures that (the total property value minus the land value) amount to $58,233,584. The developed properties in the AE Zone contain structures amount to $215,049,229. The VE Zone contains structures amounting to $3,076,955.

The SLOSH Slow Storm Zone contains 35,842 developed acres that would be affected by a Category 1 or Category 2 hurricane. A storm of this magnitude would affect 2,209 structures worth $254,389,602. A Category 3 storm would affect 6,153 developed acres more, for a total building value of $344,966,369. A Category 4 or 5 storms would affect 6,816 developed acres more than the previous three categories and total building values of $ 379,938,963.

The SLOSH Fast Storm Zone contains 32,571 developed acres that would be affected by a Category 1 or Category 2 hurricane. A storm of this magnitude would affect 2,404 structures worth $210,013,479. A Category 3 storm would affect 5,815 developed acres more, for a total building value of $306,968,348. A Category 4 or 5 storms would affect 7,718 developed acres more than the previous three categories and total building values of $343,835,881.

Individual analyses for each Geographic Planning Area are included in separate sections.

While Pamlico County has a long history with flooding, detailed information regarding the extent of previous occurrences of coastal flooding is unavailable. Also, damage estimates from flooding associated with hurricanes, tropical storms, and nor'easters is not separated from wind damage. Therefore, it is not possible to estimate the amount of damage due to flooding alone in previous events. Pamlico County will endeavor to more accurately record flood damage in future events.

No parcel specific data available to identify existing structures to assess vulnerability.

Figure 15. Hurricane Evacuation Routes

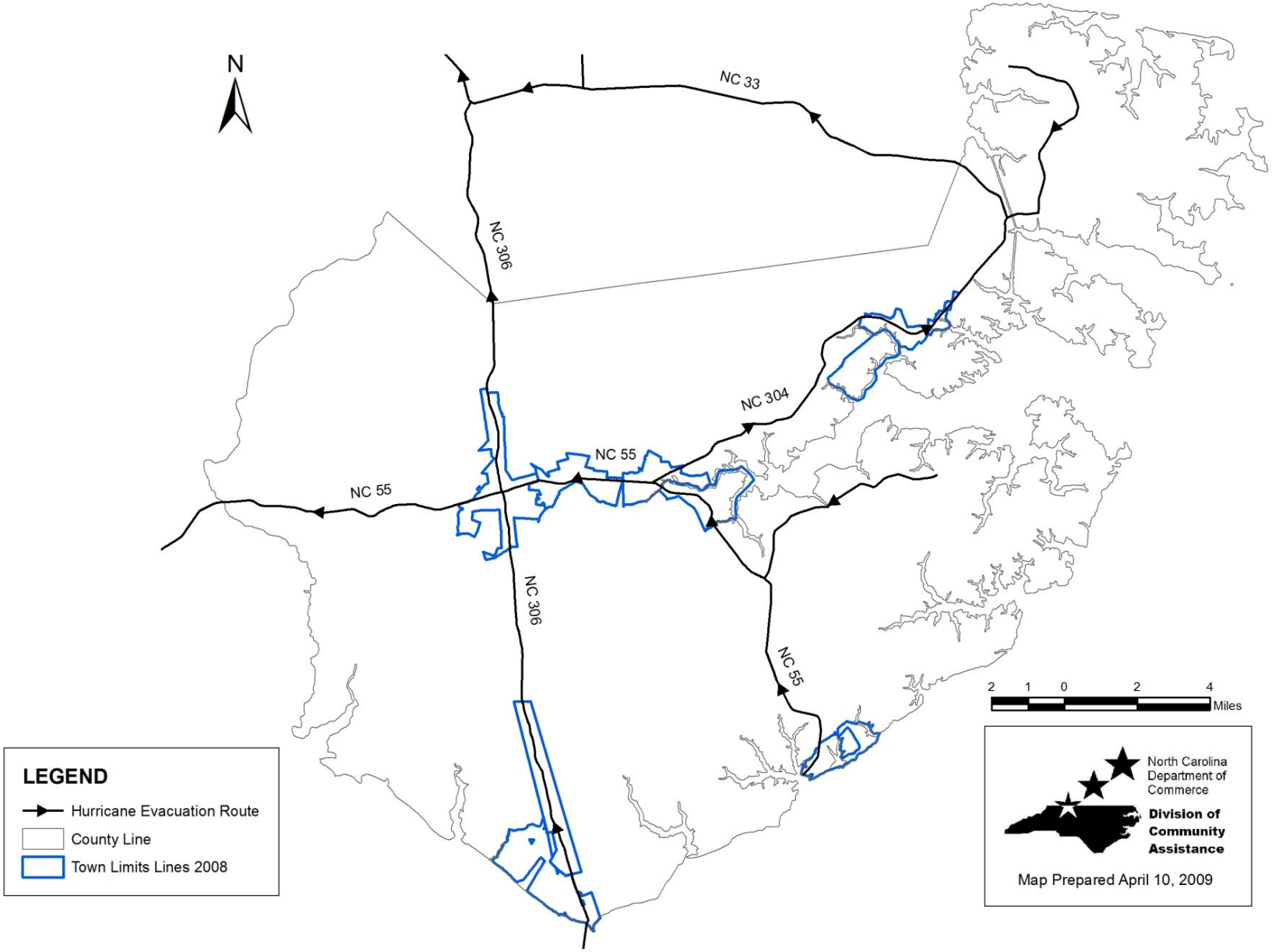


Figure 16. Slow Moving (<15 mph) Tropical Systems

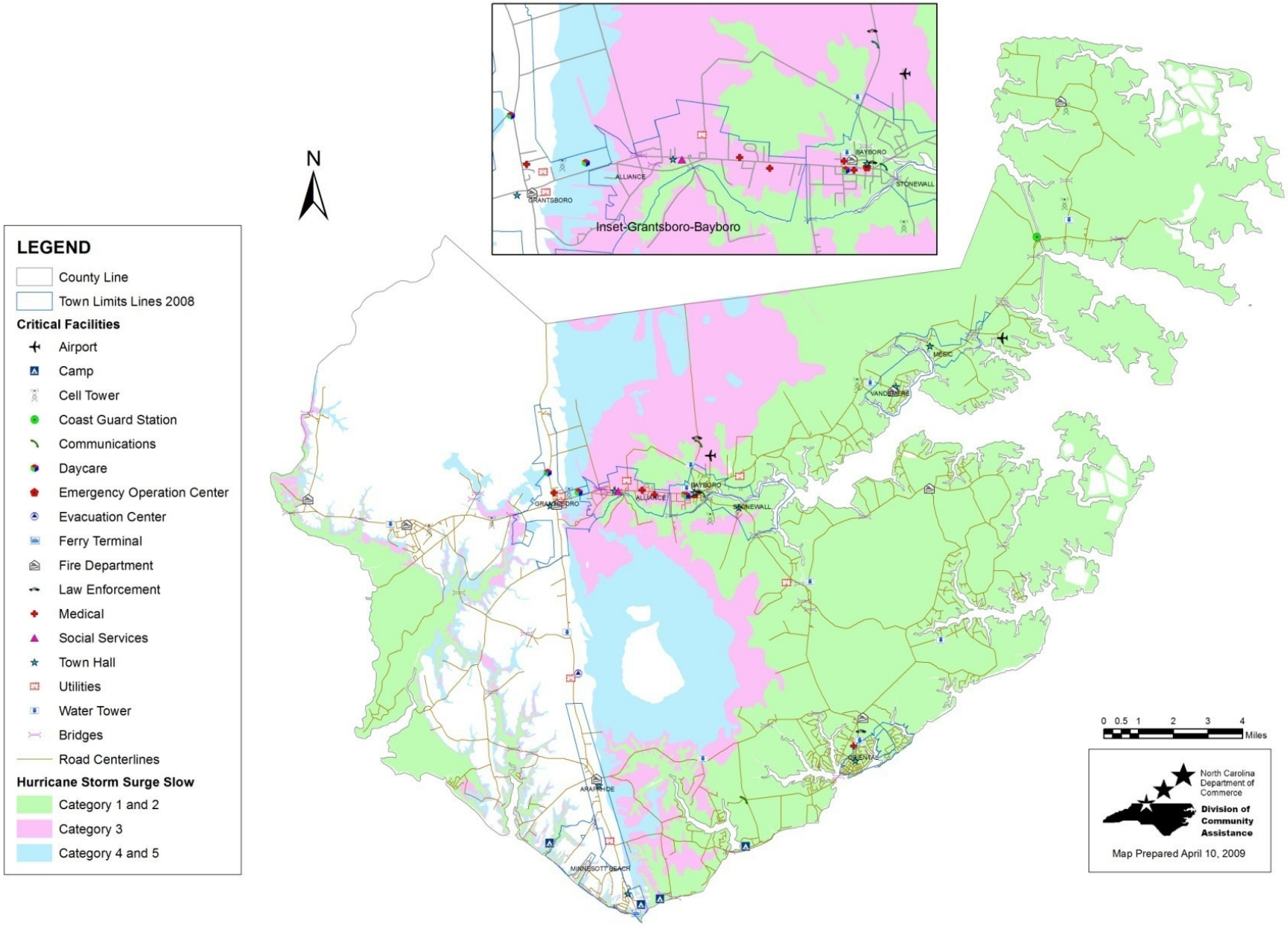


Table 17. Pamlico County Present Vulnerability

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	Potential Losses*
Inundation - Slow							
Category 1 & 2	82,960	23,868	106,828	358,667,931	357,166,959	715,834,890	1,624,771,600
Category 3	25,127	4,348	29,475	57,294,542	46,098,759	103,393,301	492,112,295
Category 4 & 5	2,085	5,001	7,086	22,178,190	27,981,244	50,159,434	40,834,725
Total	110,172	33,217	143,389	438,140,663	431,246,962	869,387,625	2,157,718,620
Inundation - Fast							
Category 1 & 2	75,555	20,227	95,782	309,902,577	326,565,584	636,468,161	1,479,744,675
Category 3	18,556	4,756	23,312	86,216,822	56,419,465	142,636,287	363,419,260
Category 4 & 5	22,399	5,893	28,292	29,366,862	34,203,131	63,569,993	438,684,415
Total	116,510	30,876	147,386	425,486,261	417,188,180	842,674,441	2,281,848,350
100-Year Floodplain							
AE	68,409	20,346	88,755	258,388,158	286,019,198	544,407,356	1,339,790,265
VE	183	24	207	1,737,518	2,023,023	3,760,541	3,584,055
Total	68,592	20,370	88,962	260,125,676	288,042,221	548,167,897	1,343,374,320

* *Potential Losses* was calculated by multiplying *Vacant Acres* by the average value per acre in the county ($19,585), determined by dividing the *Total Value of Developed Properties* in the county by *Total Developed Acres*

Figure 17. Hazard Areas

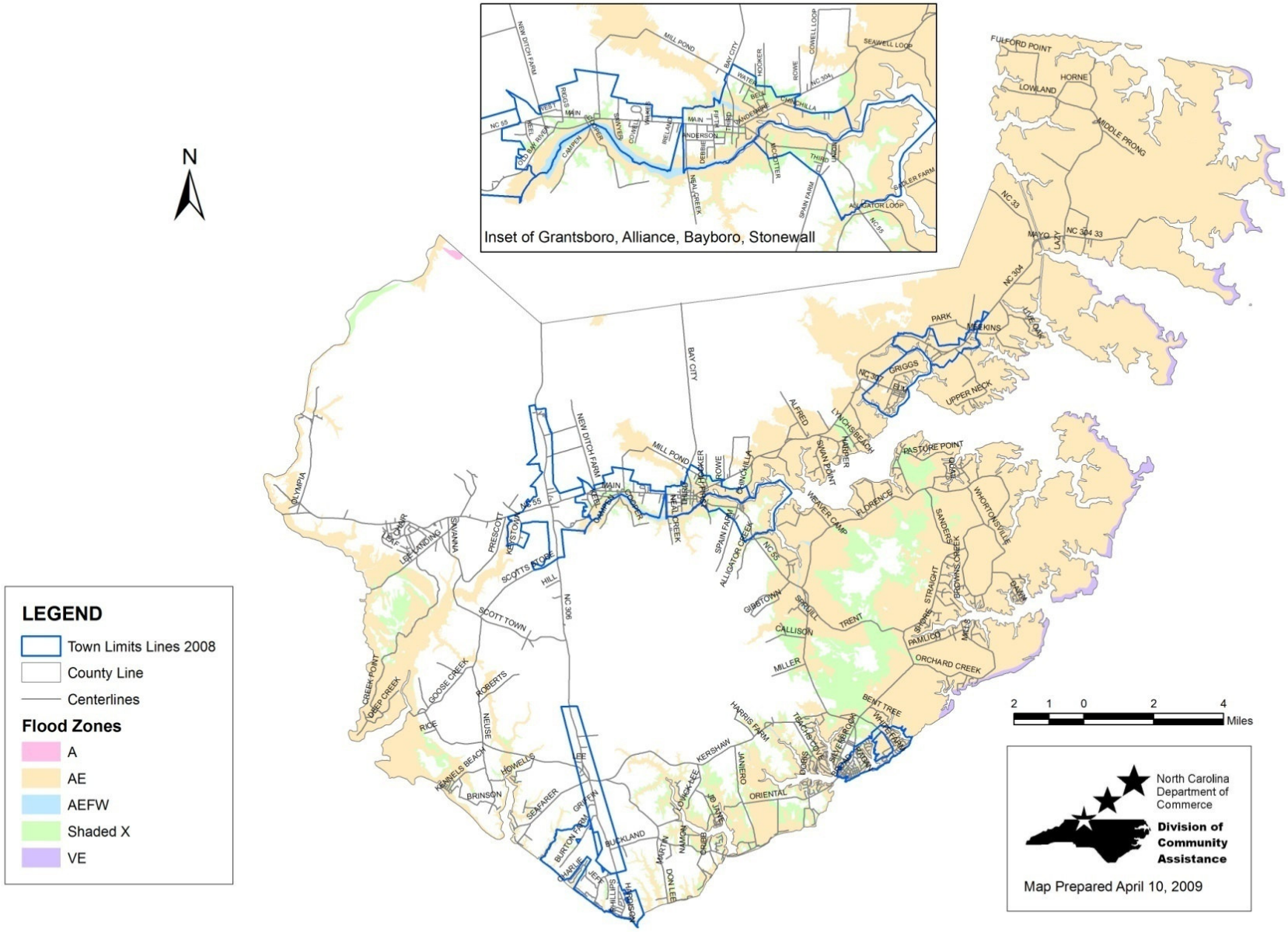


Figure 18. Topographical Map 2 Foot Elevation Intervals

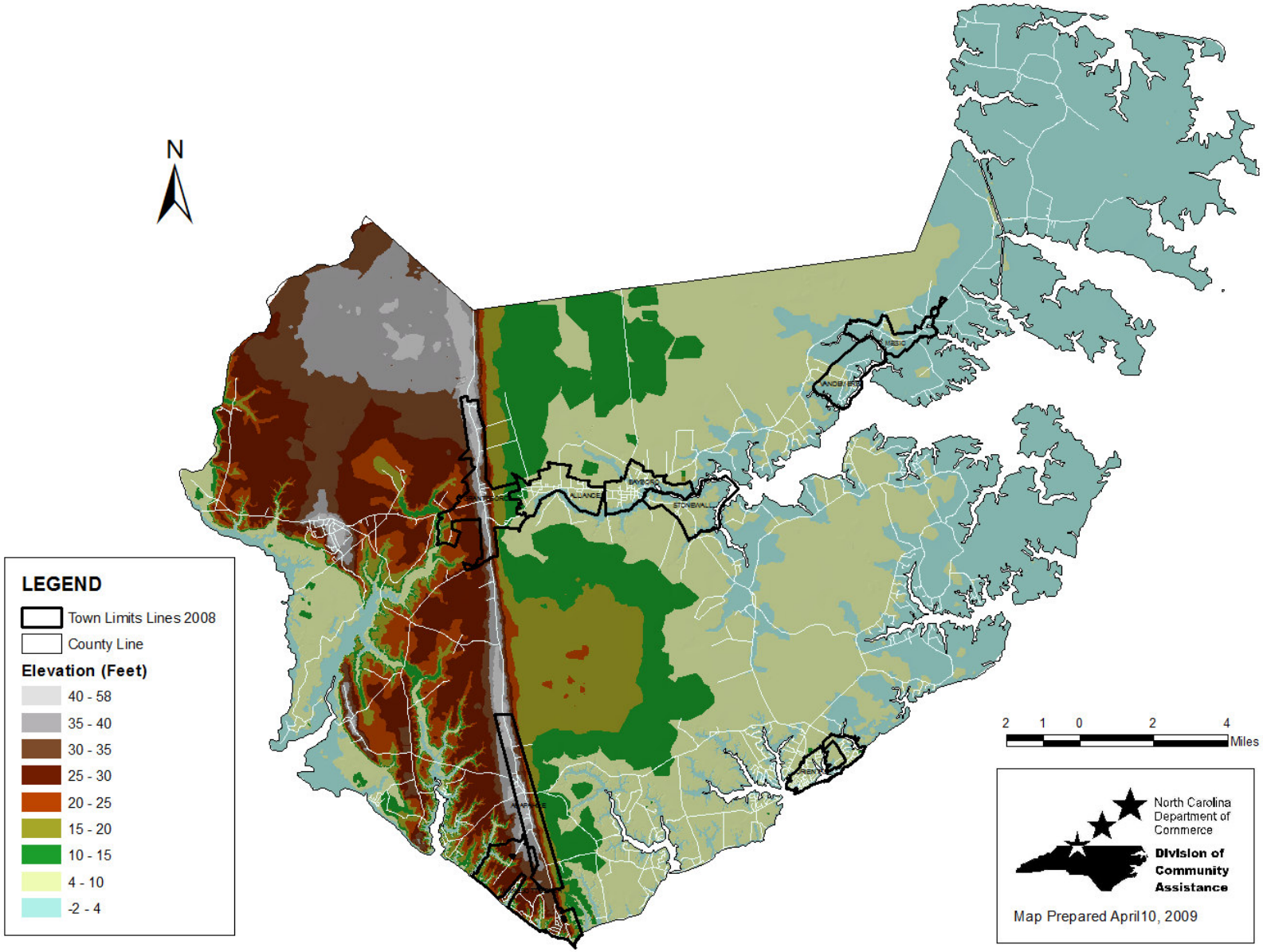
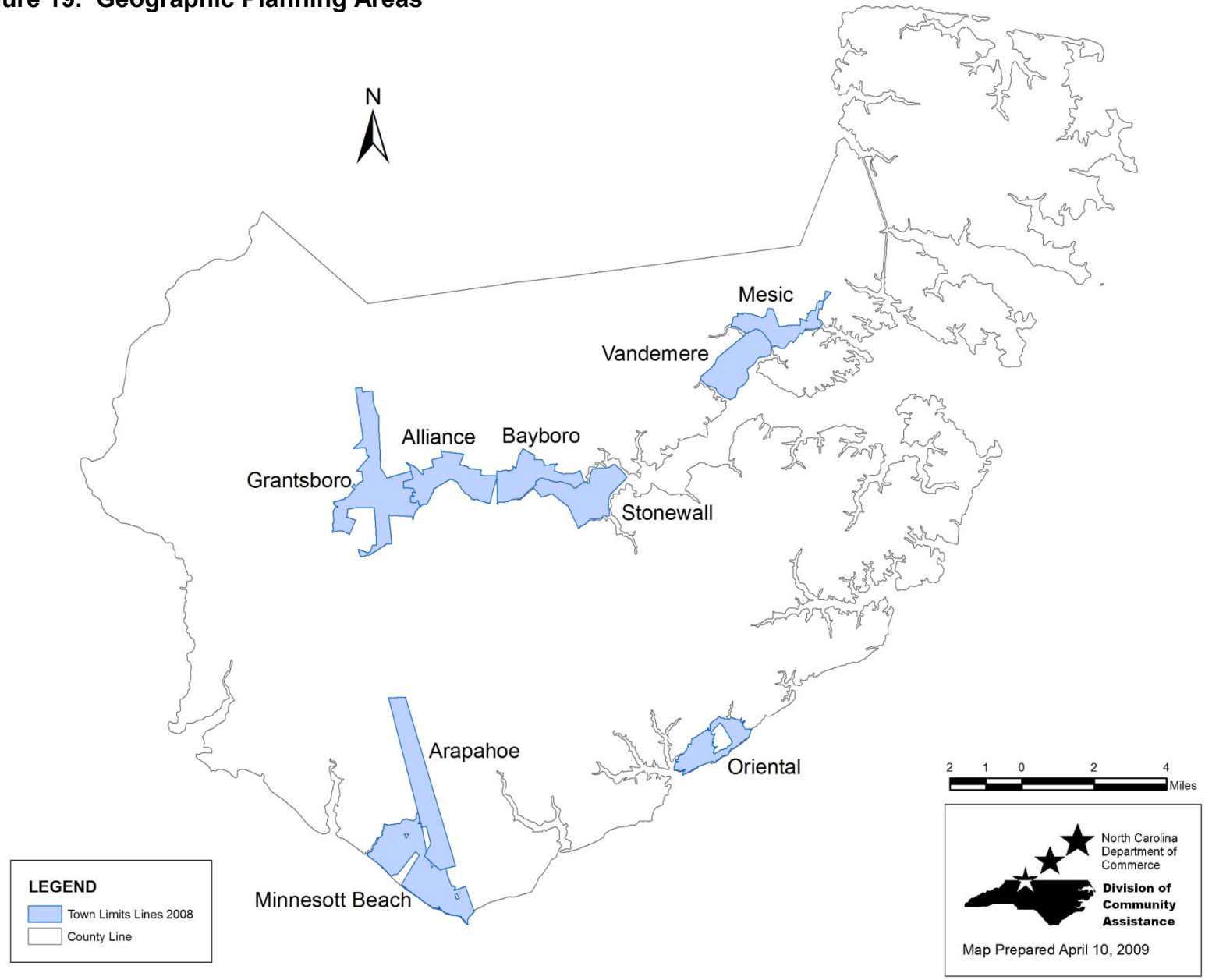


Figure 19. Geographic Planning Areas



SECTION 16: MITIGATION CAPABILITIES ASSESSMENT

Staff and Organizational Capability

Pamlico County has limited staff and organizational capability to implement hazard mitigation strategies. Pamlico County is governed by a seven-member **Board of Commissioners** who bear the responsibility of serving the people and improving the quality of life in the county. The county is divided into five townships, with one commissioner elected from each township and two at-large commissioners. Terms on the board are staggered with elections held every two years. A **County Manager** hired by the commissioners, acts on their behalf and manages County finances and services. More specifically, the County Manager directs and supervises the administration of all county offices, boards, commissions and agencies under the general control of the Board.

Pamlico County has a number of professional staff departments to serve the residents of the county and to carry out day-to-day administrative activities. These include the following:

County Manager	Tax Office	Farm Service
Planning Department	Finance Department	Sheriff's Department
Magistrate's Office	Clerk of Court	Building Inspections
Register of Deeds	Board of Elections	Emergency Management
Social Services	Veteran's Services	Health Department
Recreation Department	Maintenance & Grounds	Cooperative Extension
Soil & Water Conservation	Water Department	Senior Services
Bay River Sewerage		

The **County Manager** is responsible for overseeing the general operation of county government and the implementation of all policies, procedures and regulations mandated by the Board of Commissioners. As Chief Budget Officer, the County Manager is responsible for all financial aspects of county government and for the sound investment of money for the good of all county citizens. All major projects are overseen by the County Manager.

The **Planning Department** seeks to provide effective and efficient services in the form of planning and sound economic development for the future of Pamlico County. In an effort to achieve these goals, the Planning Department implements the land use ordinances of the county. This includes several plans and regulations, such as the 1992 Land Use Plan, the Pamlico County Subdivision Regulations, the Pamlico County Water Supply System Extension Policy, the Pamlico County Environmental Impact Statement Ordinance and the Pamlico County Mobile Home Park Ordinance.

The **Magistrate's Office** is a state department that serves the public as the judge in small claims court, by issuing arrest warrants, orders for arrest, bonds and by setting

pre-trial release conditions. Individuals may also pay waived traffic tickets early at the Magistrate's Office.

The office of the **Register of Deeds** contains all of the real estate transfers for Pamlico County from 1872 until present. Birth and death records were not recorded until the latter part of 1913. Marriage records began in 1872. The office is the custodian of these records, plus it issues copies or certified copies of these records to the appropriate person according to the General Statutes. The office also issues marriage licenses to persons who are going to get married in Pamlico County. Citizens must get their marriage license in the county in which they are going to be married. The Register of Deeds office issues beer and wine licenses to the establishments that have been approved by the NC A.L.E. office to sell alcoholic beverages. They also record UCCs, survey maps and discharges from all branches of the service. The office can give the Oath of Office to all notaries who have been commissioned for Pamlico County and they must retain a record of these acts. This office is also in charge of the Jury Maintenance Program.

The Department of **Social Services** is dedicated to assisting and providing opportunities for individuals and families in need of basic economic support and services to becoming self-supporting and self-reliant. In addition, Social Services advocates and encourages individuals' right to select actions appropriate to their needs. Furthermore, they recognize their responsibility through teamwork and professional effort to assist in this process. The Department of Social Services cooperates with other public and private entities and seeks to identify needs, devise and focus resources and deliver services responsibly and compassionately.

The **Recreation Department** is dedicated to providing as much leisure and athletic activity as possible for all citizens of Pamlico County. The basic objective of the Recreation Department is to provide a variety of recreational opportunities to enhance the lives of Pamlico County citizens and to direct and educate citizens for more positive use of leisure time. Recreation is a function of county government available to each and every person. Youth activities are especially popular and participation is on an upswing. Recreation league activities involve the most staff hours and attract the most participants of any other area of programming. The Recreation Department is proud of the popularity of its programs and of its ability to provide quality recreation to all Pamlico County citizens.

The Bay River **Soil and Water Conservation** District is a governmental subdivision of state government with the local responsibilities for developing annual and long-range programs of conservation and resource development within the boundaries of the district. Its main goals are to carry out a broad program of assistance to farmers, ranchers and land users. This includes soil and water conservation, watershed protection, flood prevention, farm forestry, urban and rural area development, education, technical assistance and cost sharing.

The **Bay River Metropolitan Sewerage District** is an independent local government agency which provides and administers the sewage collection and treatment systems which are located inside the district's boundaries. The service area includes Grantsboro, Alliance, Bayboro, Stonewall, Oriental, Maribel, Vandemere, Cash Corner, and Mesic. The Bay River Metropolitan Sewerage District's purpose is to promote the general health and welfare of the local government and to protect the Bay River from pollution caused by failing septic fields and illegal discharges.

The **Tax Office** is the primary source of revenue of local revenue for county government operation. The office provides information to the public on all records concerning real estate recording, assessment and taxes. The office also provides information on situs, tax jurisdictions, parcel locations, size and shape, special assessment and transfer of title ownership. The tax office is responsible for personal property assessment and situs. The office is an information center for realtors, attorneys, developers, paralegal staff and property owners. They interact with the various departments such as the Department of Social Services, Register of Deeds, Inspections Department, County Planner's Office, Agriculture Extension Services and Enhanced 911 through the Sheriff's Department. The Tax Office has the responsibility and the duty to act in strict accordance with the General Statutes of North Carolina which are found in the Machinery Act. The Tax Office maintains and operates the central computer system and is the focal point for public information and special requests of data bases. The office is also responsible for Geographic Information Systems. It provides spatial data information and delineations of political subdivisions and other special boundaries.

The **Finance Department** is responsible for all planning, coordinating and directing all aspects of county financial management and administration. This office is unique in that it handles the county financial dealings and is not directly involved with the public.

The office of the **Clerk of Superior Court** consists of the Clerk and three full time employees and one part time employee. This office will hold citizens' wills for safekeeping and only that citizen may remove this will from safekeeping. The Clerk's office also files estates when a person dies. Another function of the Clerk of Court is to file and handle special proceedings, which in many instances are hearings before the Clerk on subjects ranging from partitions to foreclosures and cart ways. Criminal citations, summons, and warrants are filed in the Clerk's office. Calendars and record checks concerning these files are open to the general public. Waivers are also entered with the Clerk concerning these cases. Civil cases are also filed in the Clerk's Office, summons issued and costs collected. The most important part of the Clerk's office is the management of money for different cases. All jury notices originate in the Clerk's office, though they are distributed by the Sheriff's office. Child support cases are filed in the Clerk's office and money is paid through this office. Finally, waived traffic violations can be paid at this office.

The purpose of the **Board of Elections** is to conduct honest and fair elections on the local, state, and federal level. The Board of Elections consists of one full-time employee, the Director of Elections and about fifty part-time employees. The part-time

employees are precinct officials and a three member board. The board members represent the two major parties in the state. The chairmen of each political party recommend persons from their party to the State Board of Elections and the appointment is made by the State Board of Elections for a term of two years. The Board of Elections provides the public with several services. One of these services is to work directly with candidates, party chairmen, political parties, political organizations and civic organizations regarding voter registration, elections, and election information and elections laws. In addition, the Board of Elections receives all notices of candidacy for elective office and keeps records of all such notifications. The Board is responsible for setting up all municipal, county, state, national and other elections required to be held in Pamlico County. Also, the preparation of all ballots for voting machines, the supervision of the counting and reporting of voting results are done by this office.

The primary program of the **Veteran's Services** Department is the deliverance of service in procuring benefits available from the Department of Veteran's Affairs for Pamlico County's veterans, widows, and their dependent children. Currently, there are approximately 1,700 veterans in the county. Veterans with their dependents comprise about 4,300 citizens of the county, about one third of the total county population.

The **Maintenance and Grounds Department** is an in-house maintenance department that serves the maintenance needs of the county offices.

The **Water department** or the Pamlico County Water System (PCWS) was founded in 1980 with the mission of supplying clean, safe drinking water to the citizens of Pamlico County. The system had a customer base of 2,650 and had approximately 200 miles of distribution lines. Water was supplied via two newly built treatment facilities and the "Old Town of Bayboro" plant. The source of the water supply is currently from ground water that is pumped from the Castle Hayne aquifer. The water is then treated from five water treatment facilities and distributed county-wide to customers through approximately 300 plus miles of water distribution lines. PCWS currently provides service to more than 5,000 homes and businesses. Pamlico County Water System is a self-supporting agency which depends on customer rates and fees to support its operation. No tax dollars are used to pay for PCWS's operations.

The **Farm Service** administers programs to farmers that are written by Congress. These programs are designed to ensure that farmers get full benefits of these programs. Programs deal with issues such as environmental practices concerning soil, air and water pollution; loans on commodities such as corn, soybeans and cotton; the measuring of crop land; the acreage of each crop that has been planted; disaster insurance for crops that have been insured; and the tracking of tobacco quotas and marketing.

The **Sheriff's Department**'s foremost goal is to protect and to serve the public. To this end, it is diligent in protecting lives, property, and information. In addition, it also serves the public in day to day concerns or needs. In order to receive a permit to purchase a handgun or carry a concealed handgun, citizens must go through the Sheriff's

Department. Finger printing for child protective services and day care providers is also done at the Sheriff's Department. Escorts to and from funerals and tours of the jail for schools can be provided. DARE officers visit schools to educate youth on various safety issues or law enforcement issues? A k-9 unit has been added to the Department. An animal control officer is also on duty to assist citizens with any animal problems.

The **Building Inspections Department** enforces all state building, electrical, plumbing, insulation, structural and mechanical codes to ensure compliance with minimum construction standards. In addition to these codes, the Department is also involved in the National Flood Insurance Program and administers this program to citizens. In compliance with the Coastal Area Management Act (CAMA), the Pamlico County Building Inspector issues permits for all developments which meet CAMA regulatory definition of a minor permit. The Building Inspector is also responsible for conducting fire inspections of county schools twice a year to ensure their compliance with all fire regulations.

The **Emergency Management** office is dedicated to sound emergency management of all aspects. Responsibilities of this office include general emergency management and the Fire Marshall. Under FEMA regulations, the Emergency Management Office is responsible for the following functions: the development and maintenance of programs and systems for effective coordination of community resources in all phases of emergency management; the planning and preparation for population protection, including evacuation and sheltering; the appropriate response to national security emergencies; disaster response and recovery and the promotion of public awareness. As Fire Marshall, the Emergency Management Coordinator works to keep the County Manager and the Board of Commissioners informed of the status of rural fire departments, areas of concern and fire prevention planning. The Fire Marshall also assists with the coordination of fire alarms in the county, the development of Arson Task Forces, the organization of fire prevention programs and the procurement of funds for rural fire departments. In addition, the Fire Marshall maintains all fire incident reports and assists with the inspection of fire scenes.

The **Health Department** strives to promote the optimal health of Pamlico County citizens by providing high quality professional services, fostering public trust, minimizing identified public health risks and ensuring the safety of the environment for future generations. The agency receives state funding for sixteen different programs for public health.

The **Cooperative Extension Service** is an educational organization. It receives support from three levels of government – state, federal, and county – and has close ties to the state's two land grant universities: North Carolina State University in Raleigh and North Carolina A&T University in Greensboro. County extension agents have obtained field faculty status as a link to NC State University. This unique partnership allows the Cooperative Extension Service to serve as a bridge between the people of

North Carolina and the scientists of the US Department of Agriculture and the land grant universities.

Senior Services is a department of county government with offices located in the Senior Center in Alliance. Its purpose is to promote and improve the well-being of older adults and to develop and provide appropriate facilities and services to older adults to enhance their quality of life. A 12 member advisory committee appointed by the Board of County Commissioners advises the staff and makes recommendations to the Board of Commissioners on the development, implementation, and administration of services for older adults in Pamlico County. The Center provides several programs for older adults including: Senior Companion, Senior Health Insurance Information Program; classes, information, and referral; respite; nutrition; transportation; and physical fitness.

Technical Capability

Pamlico County has limited technical capability to implement hazard mitigation strategies.

Technical Expertise
Pamlico County does have a full time planner, emergency manager, and building inspector on staff to administer the County's hazard mitigation programs. The County does not have a licensed engineer or related technical expert on staff, and has in the past relied upon outside contractors/consultants to perform a majority of any required technical work.

Geographic Information Systems (GIS)
GIS systems can best be described as a set of tools (hardware, software, and people) used to collect, manage, analyze, and display spatially-referenced data. Many local governments are now incorporating GIS systems into their existing planning and management operations. Pamlico County currently has GIS capability, and a full time administrator of the system.

Fiscal Capability

Pamlico County has limited fiscal capability to implement hazard mitigation strategies. The majority of the County's annual budget is obligated to human services and education. Pamlico County receives most of its revenues through Ad Valorem taxes and through restricted intergovernmental contributions (federal and state pass through dollars).

It is highly unlikely that Pamlico County could afford to provide the local match for the existing hazard mitigation grant programs if the State of North Carolina did not do so itself. Considering the current budget deficits at both the State and local government level, combined with the apparent increased reliance on local accountability by the Federal government, this is a significant and growing concern for Pamlico County.

The North Carolina Department of Commerce classifies counties into one of three tiers, with Tier 1 representing the most economically disadvantaged and Tier 3 three the most prosperous. Pamlico County is currently classified as a Tier 2 county, which makes it easier for the County to access a special utilities fund and priority status for Community Development Block Grant funds for economic development.

Policy and Program Capability

This part of the capabilities assessment includes the identification and evaluation of existing plans, policies, practices, programs, or activities that either increase or decrease the community's vulnerability to natural hazards. Positive activities, which decrease hazard vulnerability, should be sustained and enhanced if possible. Hazard vulnerability should become targeted for reconsideration and be thoroughly addressed within the mitigation strategies when negative activities are increased.

Recent Hazard Mitigation Efforts
Pamlico County has undertaken a few specific hazard mitigation efforts in the past.

Community Rating System Activities
Communities that regulate development in floodplains are able to participate in the National Flood Insurance Program (NFIP). In return, the NFIP makes federally-backed flood insurance policies available for properties in the community. The Community Rating System (CRS) was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. There are ten CRS classes: Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction.

Pamlico County participates in the Community Rating System as a Class 9 community. This allows County residents to receive a 5% discount on their flood insurance premiums for policies purchased under the NFIP.

In 2006, a total of 917 credit points were verified by Insurance Services Office, Inc. (ISO) which results in a recommendation to the Federal Insurance Administrator that Pamlico County be classified as a CRS Class 9 community. The following is a summary of ISO's findings with the total credit points for each activity noted in parentheses:

Activity 310 – Elevation Certificates: Pamlico County Building Inspections Department maintains elevation certificates for new and substantially improved buildings. (56 points)

Activity 320 – Map Information Service: Credit is provided for furnishing inquirers with flood zone information from the community's latest Flood Insurance Rate Map (FIRM), publicizing the service annually and maintaining records. (140 points)

Activity 340 – Hazard Disclosure: Credit is provided for community and state regulations requiring disclosure of flood hazards. (5 points)

Activity 350 – Flood Protection Information: Documents relating to floodplain management are available in the reference section of the Pamlico County Library. (28 points)

Activity 410 – Additional Flood Data: Credit is provided for a cooperating technical partnership agreement with FEMA and the State of North Carolina. (11 points)

Activity 420 – Open Space Preservation: Credit is provided for preserving more than five acres in the Special Flood Hazard Area (SFHA) as open space. (38 points)

Activity 430 – Higher Regulatory Standards: Credit is provided for enforcing regulations that require freeboard for new and substantial improvement construction and protection of the natural and beneficial functions of floodplains. Credit is also provided for enforcing state mandated regulatory standards, adopting the International Building and Residential Codes and for a Building Code Effectiveness Grading Schedule (BCEGS) Classification of 5/5. (242 points)

Activity 440 – Flood Data Maintenance: Credit is provided for maintaining and using GIS maps in the day to day management of the floodplain. Credit is also provided for maintaining copies of all previous FIRMs and Flood Insurance Study Reports. (114 points)

Activity 450 – Stormwater Management: The community enforces regulations for soil and erosion control. (32 points)

Activity 510 – Floodplain Management Planning: Based on the updates made to the NFIP Report of Repetitive Losses as of April 30, 2006, Pamlico County has 147 repetitive loss properties and is a Category C community for CRS purposes. All requirements for the 2006 cycle have been met. Credit is provided for the adoption and implementation of the Floodplain Management/Hazard Mitigation Plan. Since Pamlico County is a Category C community with an approved Floodplain Management/Hazard Mitigation Plan, a progress report must be submitted on an annual basis. (178 points)

Activity 540 – Drainage System Maintenance: The community enforces a regulation prohibiting dumping in the drainage system. (15 points)

Activity 630 – Dam Safety: All North Carolina communities currently receive CRS credit for the state's dam safety program. (58 points)

Emergency Operations Plan
Pamlico County has developed and adopted an Emergency Operations Plan which predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. For the most part, the plan describes the County's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster.

The plan does not specifically address hazard mitigation, but it does identify the specific operations to be undertaken by the County to protect lives and property immediately before, during, and immediately following an emergency. There are no foreseeable conflicts between this hazard mitigation plan and Pamlico County's Emergency Operations Plan, primarily because they are each focused on two separate phases of emergency management.

Floodplain Management Plan
Pamlico County currently has a separate floodplain management plan for purposes of the National Flood Insurance Program's Community Rating System. The Flood Damage Prevention Ordinance serves in this capacity and was adopted on June, 21, 2004. This Hazard Mitigation Plan is intended to fulfill the CRS planning requirement when it becomes adopted, and will be maintained as such.

County Ordinances
Pamlico County has adopted several ordinances that are relevant to hazard mitigation. These ordinances were listed and evaluated according to effectiveness in Section 3 of this plan.

Legal Capability
Local governments in North Carolina only have the legal authority that is granted to them to exercise by the state. This principle is commonly known as "Dillon's Rule," where all power is vested in the state and can only be exercised to the extent delegated. This rule applies to all of North Carolina's counties and cities.

The North Carolina General Statutes grants legal authority to the counties and cities enabling legislation. Local regulations that are enacted within the state's enabling authority do not automatically meet judicial acceptance. All regulations placed by local governments on land use and building practices must meet the procedural requirements of the 14th Amendment to the U.S. Constitution, or they may be found invalid. Constitutional protections apply to federal and state governments, as well as all municipalities. All mitigation measures taken by local governments in a regulatory sense must be worded and enforced in a manner that is consistent with the parameters set by the state and federal constitutions.

Local governments have a variety of mitigation measures that are consistent with all constitutional protections and within the limits of Dillon's Rule. All local government powers fall within one of four basic groups of powers: regulation, acquisition, taxation,

and spending. Mitigation measures may be carried out under each of the four types of powers.

Regulations

General Police Powers

North Carolina's local governments possess a broad range of regulatory powers at their disposal. North Carolina General Statutes grant general police powers to counties and cities, allowing them to adopt and enforce ordinances that define, prohibit, regulate, or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances, including public health nuisances. Some hazard mitigation measures can be included under the general police power available to local governments. Counties and cities may also use their police powers to abate nuisances that could include, by definition, any activities or conditions that make people or property more vulnerable to hazards.

Pamlico County has enacted and enforces regulatory ordinances designed to promote the public health, safety, and general welfare of its citizens. These ordinances are listed and further discussed in Section 3 of this plan.

Building Codes/Inspections

A number of mitigation measures involve structural modifications and retrofitting homes to be less susceptible to natural hazards. Many of these measures are accomplished through use of the building code. North Carolina has a mandatory building code (NCGS 143-138) imposed throughout the state. Counties and cities are granted the authority to adopt more stringent local building code requirements, but they may not adopt regulations that are less restrictive than the state building code.

Pamlico County has adopted the state building code, and has established a Building Inspections Department to carry out its building inspections.

Land Use

Regulatory authority granted to local governments by the state is the most commonly used manner that counties and towns use to control the use of land within its jurisdiction. Using various land use regulations, a local government may control the amount, timing, density, quality, and location of new development. Land use regulatory authority includes the power to adopt and enforce zoning ordinances, floodplain ordinances, and subdivision regulations.

Planning. In order to exercise the regulatory powers granted by the North Carolina General Statutes, local governments are required to designate a planning agency. The planning agency may perform a number of duties, including: make studies of the area; determine objectives; prepare and adopt plans for achieving those objectives; develop and recommend policies; ordinances and administrative means to implement plans; and perform other related duties.

Subdivision Regulations. Subdivision regulations govern the division of land for development or sale. These regulations can be used for mitigation purposes in various ways. They may prohibit the subdivision of land subject to flooding. Subdivision regulations may also set a standard for public infrastructure that ensures it is adequate for the assessed risk. They may require that developments be built in a hazard-resilient manner, such as requiring "deep" lots in shorefront areas to remedy shoreline erosion. However, subdivision regulations are not as broad as zoning and only indirectly affect the quality and type of development that occurs on subdivided land. Since these regulations apply only when land is subdivided and sold, they do not address development of small or undivided parcels of land.

Pamlico County has adopted a Subdivision Ordinance, which is further discussed in Section 3 of this plan.

Floodplain Regulations. Structures built in the floodplain are subject to damage by rising waters. In addition to increasing the number of properties at risk, development in the floodplain reduces the flood storage capacity of these areas, resulting in greater flood heights. Communities should consider the relocation, elevation or acquisition of buildings in the floodplain. At a minimum, elevation and relocation guidelines should meet NFIP standards.

Pamlico County is in good standing with the National Flood Insurance Program. The County has adopted and enforces a Flood Damage Prevention Ordinance, which is further discussed in Section 3 of this plan.

Spending

Hazard mitigation principles should be made a routine part of all spending decisions made by local governments. The most common forms of hazard mitigation-related spending techniques is capital improvements programming (CIP) and limiting government expenditures in high-hazard areas.

Capital Improvements Programs (CIP)

Capital improvements programs are timetables that define when, where, and what level of municipal services a government will supply. Typically a part of the comprehensive plan, the CIP sets public spending on improvements for the ensuing five to ten years. Timetables can be effective at managing growth because it is rarely feasible for a developer to provide water, sewer and other services without a public subsidy.

Limiting Government Expenditures in High-Hazard Areas

Regional and local governments can limit their expenditures for roads and other infrastructure in high-hazard areas. This technique will discourage development in these areas, which can greatly reduce disaster-related damage and recovery costs. Government facilities, especially those that house emergency services, should not be located in high-hazard areas. By avoiding these areas, local governments can help ensure these facilities will function during and in the immediate aftermath of an emergency. They can also reduce the cost of post-disaster repairs to public structures.

Acquisition
In the long run, it is less expensive to acquire and demolish a building than to repeatedly provide for its reconstruction. In addition to reducing the public cost of recovery and reconstruction, acquisition can be a tool for accomplishing other community goals. It can help increase floodplain storage capacity, preserve wetlands, maritime forests, estuaries and other natural habitats, and provide open space, beach access, and parks and recreation areas. There are several alternative ways to approach acquisition of flood prone properties.

1. Fee Simple Acquisition of Land and Damaged Structures
Land ownership is often defined as a bundle of rights, of which the right to develop is only one. When one person owns all the rights associated with a parcel of land, they are said to own the land "in fee simple." Acquiring a property in fee simple provides a local government with the greatest level of control over the use and disposition of a parcel. Fee simple purchase is usually the most expensive method of land acquisition. In addition to the cost of buying the property, a local government must delete the property from its property tax rolls and assume its maintenance costs.

There are four types of buyouts where built property is involved. *Basic buyouts* are community-run programs without a relocation element. *Buyout and infill* programs are designed to encourage the relocation of families and structures from the floodplain to vacant lots in less hazard-prone neighborhoods. Communities operating *buyout and reorganization* plans often create new subdivisions into which they actively relocate houses and businesses. The community will usually sponsor the planning and installation of infrastructure. *Buyout and complete relocation* is the construction of a new town using new or relocated old buildings.

2. Easements
The owner of an easement has one or more of the rights in a property, leaving the rest of the "bundle" in the hands of the land owner. Easements either grant an affirmative right to use property, such as a right of access, or restrict the land owner's right to use the property in a particular way. Easements can be written either to allow public access or to prohibit it. They must be clear about the restrictions placed on the property. They should also allow inspection by public officials to ensure compliance with the easement provisions. An administrative process for policing easements should be established. The best incentive for encouraging the donation of a conservation easement is the fact that the donation may qualify the donor for tax credits.

3. Relocation of Existing Development
Relocation means moving a building or facility to a less hazard-prone area, either within the same parcel or on a new parcel. This technique is typically used to avoid coastal or riverine flood hazards. "Relocating" can also be used to describe the process of demolishing a building and reconstructing it outside the hazard area.

Taxation
The power of taxation extends beyond merely the collection of revenue. A number of communities set preferential tax rates for areas that are unsuitable for development and can be used to discourage development in hazardous areas.

Differential Assessment
Differential taxation is a technique for reducing the tax burden on land facing development pressure by recognizing that undeveloped properties require fewer public services. This technique can moderate the pressure to develop land at its "highest and best" use in one of several ways; by reducing the assessed value of land to a percentage of urban land; or by assessing the value of land based on its income-producing capacity, as opposed to its market value.

Special Assessment Districts
Special assessment districts apply to property owners who directly benefit from a specific public improvement. These owners of both new and existing development in the district are charged a fee that is proportional to the benefits received from the improvement. There are a number of ways to apply this technique, from temporary assessments that raise revenue for a specific improvement to indefinite assessments that fund independent, special purpose governmental entities.

Pamlico County does levy property taxes, but does not use any preferential tax districts or special assessments for purposes of guiding growth and development.

Funding Sources

Although all mitigation techniques will likely save money be avoiding losses, many projects are costly to implement. Pamlico County will continue to seek outside funding assistance for mitigation projects in both the pre- and post-disaster environment. This section identifies the Federal and State grant programs for Pamlico County to consider, and discusses local and non-governmental funding sources.

Federal
The following federal grant programs have been identified as funding sources which specifically target hazard mitigation projects:

Title: Pre-Disaster Mitigation Program
Agency: Federal Emergency Management Agency
Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential disaster declaration. The Pre-Disaster Mitigation (PDM) Program provides funding to states and communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program, and reduce injuries, loss of life, and damage and destruction of property.

The funding is based upon a 75 percent Federal share, 25 percent non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination. Special accommodations will be made for "small and impoverished communities," who will be eligible for 90% Federal share, 10% non-Federal.

FEMA provides PDM grants to states that, in turn, can provide sub-grants to local governments for accomplishing the following eligible mitigation activities:

- State and local hazard mitigation planning
- Technical assistance [e.g. risk assessments, project development]
- Mitigation projects
- Acquisition or relocation of vulnerable properties
- Hazard retrofits
- Minor structural hazard control or protection projects
- Community outreach and education (up to 10% state allocation)

Title: Flood Mitigation Assistance Program
Agency: Federal Emergency Management Agency

FEMA's Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP.

FMA is a pre-disaster grant program, and is made available to states on an annual basis. This funding is available for mitigation planning and implementation of mitigation measures only, and is based upon a 75 percent Federal share, 25 percent non-Federal share. States administer the FMA program and are responsible for selecting projects for funding from the applicants submitted by all communities within the state. The state then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local governments may submit an application on their behalf.

Title: Hazard Mitigation Grant Program
Agency: Federal Emergency Management Agency

The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration.

To meet these objectives, FEMA can fund up to 75 percent of the eligible costs of each project. The state or local cost-share match does not need to be cash; in kind services or materials may also be used. With the passage of the Hazard Mitigation and Relocation Assistance Act of 1993, federal funding under the HMGP is now based on

15 percent of the federal funds spent on the Public and Individual Assistance programs (minus administrative expenses) for each disaster.

The HMGP can be used to fund projects to protect either public or private property, so long as the projects in question fit within the state and local government's overall mitigation strategy for the disaster area, and comply with program guidelines. Examples of projects that may be funded include the acquisition or relocation of structures from hazard-prone areas, the retrofitting of existing structures to protect them from future damages; and the development of state or local standards designed to protect buildings from future damages.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMGP project funding on behalf of their citizens. In turn, applicants must work through their state, since the state is responsible for setting priorities for funding and administering the program.

Title: Public Assistance (Infrastructure) Program, Section 406
Agency: Federal Emergency Management Agency

FEMA's Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential disaster declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure. The mitigation measures must be related to eligible disaster-related damages and must directly reduce the potential of future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.

Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility, and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility's operation or risk from another hazard.

Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include:

- Roads, bridges, and culverts
- Draining and irrigation channels
- Schools, city halls and other buildings
- Water, power and sanitary systems
- Airports and parks

Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following:

- Universities and other schools
- Hospitals and clinics
- Volunteer fire and ambulance
- Power cooperatives and other utilities
- Custodial care and retirement facilities
- Museums and community centers

Title: SBA Disaster Assistance Program
Agency: U.S. Small Business Administration

The SBA Disaster Assistance Program provides low-interest loans to businesses following a Presidential disaster declaration. The loans target businesses to repair or replace uninsured disaster damages to property owned by the business, including real estate, machinery and equipment, inventory and supplies. Businesses of any size are eligible, along with non-profit organizations.

SBA loans can be utilized by their recipients to incorporate mitigation techniques into the repair and restoration of their business.

Title: Community Development Block Grant
Agency: U.S. Department of Housing and Urban Development

The Community Development Block Grant (CDBG) program provides grants to local governments for community and economic development projects that primarily benefit low and moderate income people. The CDBG program also provides grants for post-disaster hazard mitigation and recovery following a Presidential disaster declaration. Funds can be used for activities such as acquisition, rehabilitation or reconstruction of damaged properties and facilities and for the redevelopment of disaster areas.

The North Carolina Division of Emergency Management (NCEM) recently identified over 300 federal "disaster-related" funding sources. This listing includes mostly federal government grant programs that do not necessarily target hazard mitigation projects, but are certainly related and should be considered as good resources for potential mitigation funding. The listing of these funding sources will continue to be used as a reference but was not included within this plan due to space limitations.

State
The following State grant programs have been identified as the primary funding sources to support hazard mitigation projects within the State of North Carolina:

Title: Water and Sewer Grant Programs
Agency: North Carolina Rural Economic Development Center, Inc.

The Rural Center administers three programs to help rural communities develop the water and sewer systems they need to support local economic growth and ensure a reliable supply of clean water. The programs are made possible through appropriations

from the North Carolina General Assembly and through proceeds from the Clean Water Bonds, approved by the voters of North Carolina in November 1998.

The Supplemental Grants Program enables local governments and qualified non-profit corporations to improve local water and sewer systems. Projects may address public health, environmental, and/or economic development critical needs. The maximum grant amount for this program is now $400,000. Rural Center funds must be used to match other project funds.

The Capacity Building Grants Program provides funding for local governments to undertake planning efforts that support strategic investments in water and sewer facilities. Funds typically are used to prepare preliminary engineering reports, master water/sewer plans, capital improvement plans, water/sewer feasibility studies, rate studies and grant applications. The maximum grant amount for this program is generally $40,000.

The Unsewered Communities Grant Program provides funding for the planning and construction of new central, publicly owned sewer systems. Qualified communities must be not served by wastewater, collection or treatment systems. Unsewered community's grants are designed to cover 90 percent of the total cost of a project, but will not exceed $3 million.

There are two application deadlines per year. Applications must be received by 5:00 p.m. on the last business day of March and September. Funding announcements are generally in August and February.

Title: Clean Water Management Trust Fund
Agency: Board of Trustees, Clean Water Management Trust Fund

Created in 1996, the Clean Water Management Trust Fund (CWMTF) makes grants to local governments, state agencies and conservation non-profits to help finance projects that address water pollution problems. Specifically, CWMTF will fund projects that: (1) enhance or restore degraded waters; (2) protect unpolluted waters; and/or (3) contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits.

At the end of each fiscal year, 6.5% of the unreserved credit balance in North Carolina's General Fund (or a minimum of $30 million) will go into the CWMTF. Revenues from the CWMTF will then be allocated in the form of grants to local governments, state agencies and conservation non-profits to help finance projects that specifically address water pollution problems. The 18 member, independent, CWMTF Board of Trustees has full responsibility over the allocation of money from the Fund.

Title: CAMA Local Planning and Management Grants Program
Agency: North Carolina Department of Environment and Natural Resources, Division of Coastal Management

The Division of Coastal Management helps local governments in the 20 coastal counties fund local land-use planning and management projects through the CAMA Local Planning and Management Grants Program.

The Division accepts grant applications in the spring of each year. Local governments are encouraged to apply for funds for projects that will help them carry out their land- and water-use goals and objectives. Projects that are eligible for funds include new or updated CAMA land-use plans and implementation projects. Examples include local land-use ordinances, beach/waterfront access plans, storm water management plans, storm-hazard mitigation plans and capital facilities plans.

Some local governments may want to work together on a project designed to address land- and water-use issues on a regional basis. Examples of regional projects include a plan to protect or develop shared resources and other projects to enhance basin wide water-quality protection, economic development, regional transportation, and solid waste or wastewater disposal. For regional projects, one local government must serve as "project sponsor" and administer the grant funds on behalf of the other cooperating local governments. There is a special application for regional projects.

Title: Water Resources Development Grant Program
Agency: North Carolina Department of Environment and Natural Resources, Division of Water Resources

Applications for grants may be made for the non-federal share of water resources development projects for the following purposes in amounts not to exceed the percentage of the non-federal costs indicated:

- General navigation projects that are sponsored by local governments – 80%;
- Recreational navigation projects – 25%;
- Construction costs for water management (flood control and drainage) purposes, including utility and road relocations not funded by the State Department of Transportation – 66 2/3%, but only of that portion of the project specifically allocated for such flood control or drainage purposes;
- Stream restoration – 66 2/3%;
- Protection of privately owned beaches where public access is allowed and provided for – 75%;
- Land acquisition and facility development for water-based recreation sites operated by local governments – 50%;
- Aquatic weed control projects sponsored by local governments – 50%.

Local

Local governments depend upon local property taxes as their primary source of revenue. These taxes are typically used to finance services that must be available and delivered on a routine and regular basis to the general public. If local budgets allow, these funds may be used for other purposes in the general public interest. Many times

these funds are used to match Federal or State grant programs when required for large-scale projects.

Non-governmental
Another potential source of revenue for implementing local mitigation projects are monetary contributions from non-governmental organizations, such as private sector companies, churches, charities, community relief funds, the Red Cross, hospitals, Land Trusts and other non-profit organizations.

Political Willpower

Most Pamlico County residents are quite knowledgeable about the potential hazards that their community faces, and in recent years, they have become more familiar with the practices and principles of mitigation. Many flood prone structures have become elevated and to a lesser extent, acquired and relocated or replaced out of harm's way. It is strongly believed that such tangible and visual changes within the community have created a greater sense of awareness among local residents, and that hazard mitigation is a concept that they are beginning to readily accept and support.

Because of this fact, coupled with Pamlico County's history with natural disasters, it is expected that the current and future political climates are favorable for supporting and advancing future hazard mitigation strategies.

SECTION 17: ALLIANCE

Profile
Alliance is located along NC Highway 55, between the incorporated towns of Grantsboro and Bayboro. Incorporated in 1965, Alliance has a land area of 2 square miles.

Alliance has a population of 739 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Alliance residents is 24.7 minutes. The average household size in Alliance is 2.40 persons per household. The following statistics are based on the 2000 Census.

Table 19. Alliance Population Data

Subject	Number	Percent
Total Population	781	100
Sex and Age		
Male	355	45.5
Female	426	54.5
Under 5 years	47	6.0
5 to 9 years	55	7.0
10 to 14 years	35	4.5
15 to 19 years	49	6.3
20 to 24 years	33	4.2
25 to 34 years	73	9.3
35 to 44 years	118	15.1
45 to 54 years	95	12.2
55 to 59 years	44	5.6
60 to 64 years	39	5.0
65 to 74 years	78	10.0
75 to 84 years	55	7.0
85 years and over	60	7.7
Median age (years)	43.3	
65 years and over	193	24.7
RACE		
White	622	79.6
Black or African American	138	17.7
Hispanic	6	0.8
American Indian and Alaska Native	9	1.2

Subject	Number	Percent
Asian	4	0.5
Native Hawaiian / Pacific Islander	0	0
Some other race	2	0.3
Two or more races	6	0.8
SOCIAL CHARACTERISTICS		
Population 25 years and over	561	100.0
High school graduate or higher	136	80.4
Bachelor's degree or higher	19	5.5
Disability status (population 21 to 64 years)		
Foreign born	15	2.0
Now married (population 15 years and older)	347	55.4
Speak a language other than English at home	15	2.2
HOUSING CHARACTERISTICS		
Total housing units	304	100.0
Occupied housing units	288	94.7
Owner-occupied housing units	214	74.3
Renter-occupied housing units	74	25.7
Vacant housing units	16	5.3
YEAR STRUCTURE BUILT		
1999 to March 2000	4	1.3
1995 to 1998	39	12.8
1990 to 1994	29	9.5
1980 to 1989	57	18.8
1970 to 1979	78	25.7
1960 to 1969	37	12.2
1940 to 1959	40	13.2
1939 or earlier	20	6.6

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 3.3% were unemployed and looking for work. The sales and occupation sector employs the largest number of town residents (30.2%), followed by management and related occupations (27.5%) and production and transportation occupations (18.0%).

Table 20. Alliance Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	70	27.5
Service occupations	16	6.3
Sales and office occupations	77	30.2

Farming, fishing, and forestry	3	1.2
Construction, extraction and maintenance	43	16.9
Production and transportation	46	18.0
TOTAL WORKFORCE	255	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $15,951. The most recent poverty estimates indicate that 17.3% of Alliance residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Alliance's Capability

Alliance partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Alliance participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections. Alliance does not have any repetitive loss properties.

Alliance will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Alliance is located in Table 21.

Table 21. Alliance Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those floodplain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Alliance worked with the North Carolina Division of Community Assistance to revise the community's action plan. Alliance currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Alliance identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect life and property from public nuisance such as: unmaintained junk yards, overgrown properties and other public health hazards which include uncontrolled, vicious dogs.

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Alliance to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 22. Alliance Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Ensure that the County has responsibility for storm water detention regulations.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Medium Technically feasible and environmentally sound
2	Continue to address drainage issues as the need arises, to prevent pondering of water	Flooding, Hurricanes and Tropical Storms, Nor'easters Mosquitoes	Town Funds	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
3	Continue an active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Continue to rely upon the television and radio outlets for news and weather updates.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Local TV Stations and Local Radio Stations	ongoing	High Cost effective, technically feasible and environmentally sound
5	Closely monitor the development in hazard areas to ensure buildings meet construction regulations.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
6	Enforce CAMA buffer rules to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
7	Remove debris as	Flooding,	FEMA	Town	ongoing	Medium

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	soon as possible after the event.	Hurricanes and Tropical Storms, Nor'easters		Commissioners		Technically feasible and environmentally sound
10	Keep culverts and drains free of debris with the help of prisoners	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections (hired by Town)	ongoing	High Cost effective, technically feasible and environmentally sound
11	Ensure the county continues to provide technical assistance to property owners on how to protect their property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornados	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
12	County has established building codes which address Base Flood Elevations. Monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
13	Contact the NFIP office to request information on the Community Rating System	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	January 1, 2011	High Cost effective, technically feasible and environmentally sound
14	Continue to work with Tideland Electric and Progress Energy to provide electric power to the	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	community and continue their program of tree trimming					
15	Monitor the National Weather Service reports of wind speeds and storm conditions	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	National Weather Service	ongoing	High Cost effective, technically feasible and environmentally sound
16	Continue working with the state for snow removal	Nor'easters, Severe Winter Storms	DOT (Dept. of Transportation) county Road Funds	DOT (Department of Transportation)	ongoing	High Cost effective, technically feasible and environmentally sound
17	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Technically feasible
18	Seek assistance from the NC Forestry Service which has an ongoing wildfire education program, annually	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
19	Monitor NC Forestry Service tower posts for fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
21	Continue to administer a Public Nuisance Ordinance	Unmaintained junk yards, Public Health Issues,	Town Funds	Town	ongoing	High Cost effective, technically feasible

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	and Animal Control Ordinance	Uncontrolled and vicious dogs				and environmentally sound
22	Continue maintenance on town roads	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town	ongoing	Low Technically feasible
23	Continue to provide Local Fire Protection	Structure fires, i.e.: lightning strikes, automobile accidents	Town Funds	Town and Volunteer Fire Department	ongoing	High Cost effective, technically feasible and environmentally sound
24	Continue to provide Trash Pickup and Large Item Pickup	Flooding, Hurricanes and Tropical Storms, Nor'easters and Public Health Issues	50% Town Funds 50% Citizens	Town	ongoing	High Cost effective, technically feasible and environmentally sound
25	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Manager	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 20. Alliance FIRM Flood Zones

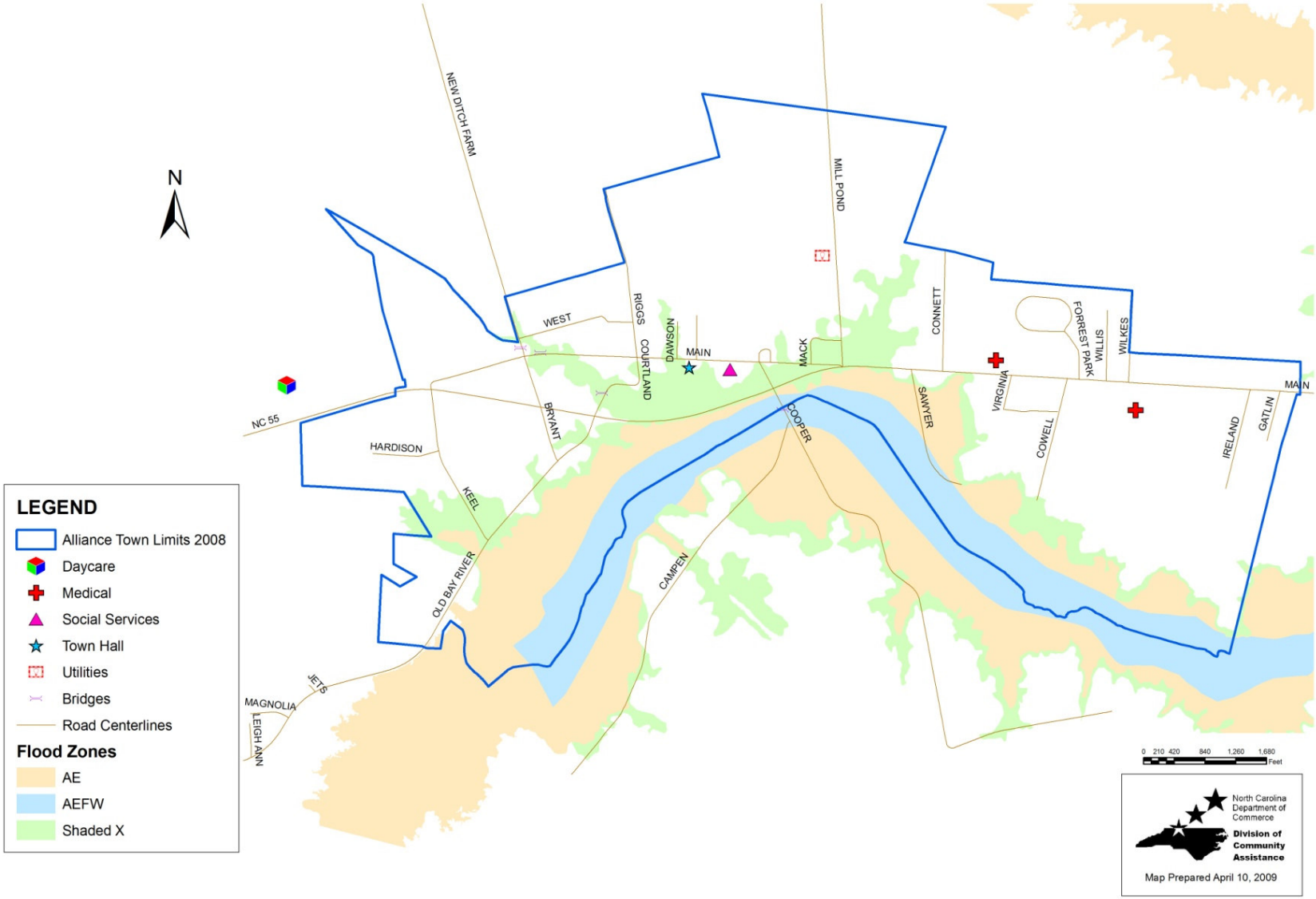


Figure 21. Alliance Storm Surge Inundation by Hurricane Category

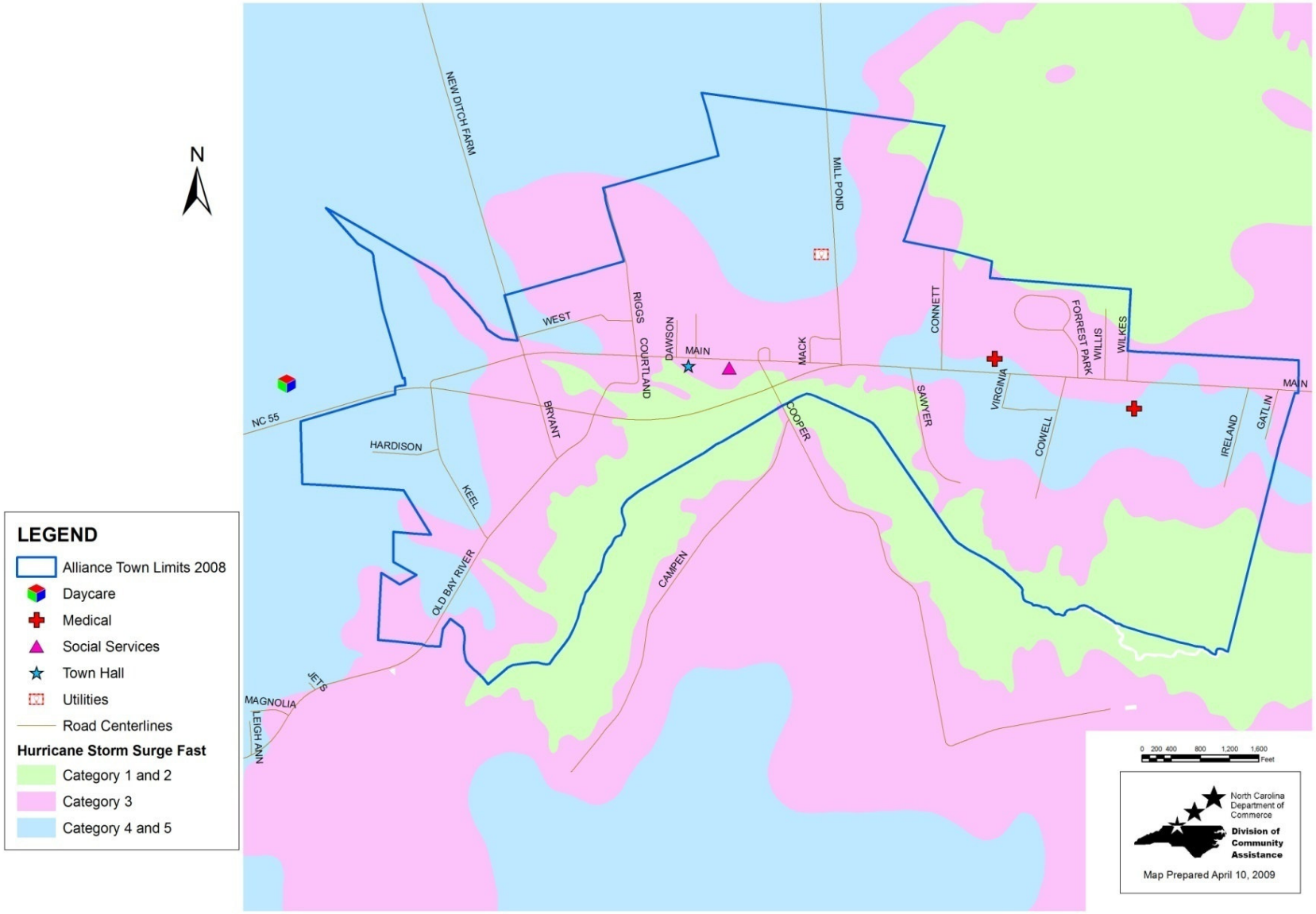


Table 23. Alliance Vulnerability Assessment

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	106	186	292	2,748,513	1,014,810	3,763,323	5,444,160
Category 3	323	419	742	20,614,636	8,327,517	28,942,153	16,589,280
Category 4 & 5	30	20	50	1,453,456	423,091	1,876,547	1,540,800
Total	459	625	1,084	24,816,605	9,765,418	34,582,023	23,574,240
Inundation - Fast							
Category 1 & 2	74	162	236	1,477,442	832,206	2,309,648	3,800,640
Category 3	213	312	525	11,640,616	4,981,012	16,621,628	10,939,680
Category 4 & 5	172	150	322	11,698,547	3,952,200	15,650,747	8,833,920
Total	0	624	1,083	24,816,605	9,765,418	34,582,023	23,574,240
100-Year Floodplain							
AE	72	99	171	1,295,686	710,221	2,005,907	3,697,920
Total	72	99	171	1,295,686	710,221	2,005,907	3,697,920
Inundation - Slow							
Category 1 & 2	106	186	292	2,748,513	1,014,810	3,763,323	5,444,160

* Future Development was calculated by multiplying Vacant Acres by the average value per acre in Alliance ($51,360), determined by dividing the Total Value of Developed Properties in Alliance by Total Developed Acres

SECTION 18: ARAPAHOE

Profile
Arapahoe is located along NC Highway 306, between the incorporated towns of Grantsboro and Minnesott Beach. Incorporated in 1969, Arapahoe has a land area of 0.89 square miles.

Arapahoe has a population of 427 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Arapahoe residents is 32.1 minutes. The average household size in Arapahoe is 2.32 persons per household.[1] The following statistics are based on the 2000 Census.

Table 24. Arapahoe Population Data

Subject	Number	Percent
Total Population	436	100
Sex and Age		
Male	216	49.5
Female	220	50.5
Under 5 years	23	5.3
5 to 9 years	29	6.7
10 to 14 years	20	4.6
15 to 19 years	26	6.0
20 to 24 years	22	5.0
25 to 34 years	57	13.1
35 to 44 years	51	11.7
45 to 54 years	78	17.9
55 to 59 years	29	6.7
60 to 64 years	28	6.4
65 to 74 years	36	8.3
75 to 84 years	30	6.9
85 years and over	7	1.6
Median age (years)	41.8	
65 years and over	73	16.7
RACE		
White	392	89.9
Black or African American	27	6.2

[1] US 2000 Census

Subject	Number	Percent
Hispanic	24	5.5
American Indian and Alaska Native	1	0.2
Asian	5	1.1
Native Hawaiian / Pacific Islander	0	0
Some other race	11	2.5
Two or more races	0	0
SOCIAL CHARACTERISTICS		
Population 25 years and over	309	100.0
High school graduate or higher	115	79.6
Bachelor's degree or higher	25	9.7
Disability status (population 21 to 64 years)	50	18.8
Foreign born	14	3.2
Now married (population 15 years and older)	197	54.9
Speak a language other than English at home	23	5.5
HOUSING CHARACTERISTICS		
Total housing units	214	100.0
Occupied housing units	188	87.9
Owner-occupied housing units	142	75.5
Renter-occupied housing units	46	24.5
Vacant housing units	26	12.1
YEAR STRUCTURE BUILT		
1999 to March 2000	5	2.3
1995 to 1998	17	8.0
1990 to 1994	20	9.4
1980 to 1989	26	12.2
1970 to 1979	41	19.2
1960 to 1969	18	8.5
1940 to 1959	36	16.9
1939 or earlier	50	23.5

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 1.7% was unemployed and looking for work. The sales and office occupations sector employs the largest number of town residents (30.1%), followed by production and transportation (20.4%) and management and related occupations (18.4%).

Table 25. Arapahoe Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	38	18.4

Service occupations	20	9.7
Sales and office occupations	62	30.1
Farming, fishing, and forestry	10	4.9
Construction, extraction and maintenance	34	16.5
Production and transportation	42	20.4
TOTAL WORKFORCE	206	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $17,073. The most recent poverty estimates indicate that 10.9% of Arapahoe residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Arapahoe's Capability

In its hazard mitigation strategy Arapahoe partners with many local, state, and federal agencies. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Arapahoe does not have mapped hazard areas within its jurisdiction. Therefore, Arapahoe will continue to work with the County to lessen the impacts of natural hazards on people and property.

Arapahoe does not participate in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). Arapahoe does not have any repetitive loss properties.

Arapahoe will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Arapahoe is located in Table 26.

Table 26. Arapahoe Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and erosion control. Through its roadway requirements,	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water management.	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance (Arapahoe is not a member of the National Flood Insurance Program)	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and moving structures away from shorelines	Any changes to the buffer rules and regulations should be incorporated in future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Natural Hazards Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people	Continue outreach

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			often ignore outreach material	projects and expand them where practical

Action Plan
Arapahoe worked with the North Carolina Division of Community Assistance to revise the community's action plan. Arapahoe currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Arapahoe identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Arapahoe to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 27. Arapahoe Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Ensure that the County has responsibility for storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Monitor and address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
3	Continue an active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
5	Remove debris as soon as possible after the event.	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
6	Monitor culverts and drains and keep them free of debris	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Dept of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
7	Provide technical	Flooding, Hurricanes and	County's	Pamlico County	ongoing	High

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	assistance to property owners regarding protecting their property	Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	General Fund	Emergency Management, Building Inspections		Cost effective, technically feasible and environmentally sound
8	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress	ongoing	High Cost effective, technically feasible and environmentally sound
9	Pursue State assistance in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	NC Dept of Transportation	NC Dept of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
10	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Technically feasible
11	Seek assistance from the NC Forestry Service has an ongoing wildfire education program, annually	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
12	Monitor NC Forestry Service posts for fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound

Figure 22. Arapahoe FIRM Flood Zones & Critical Facilities

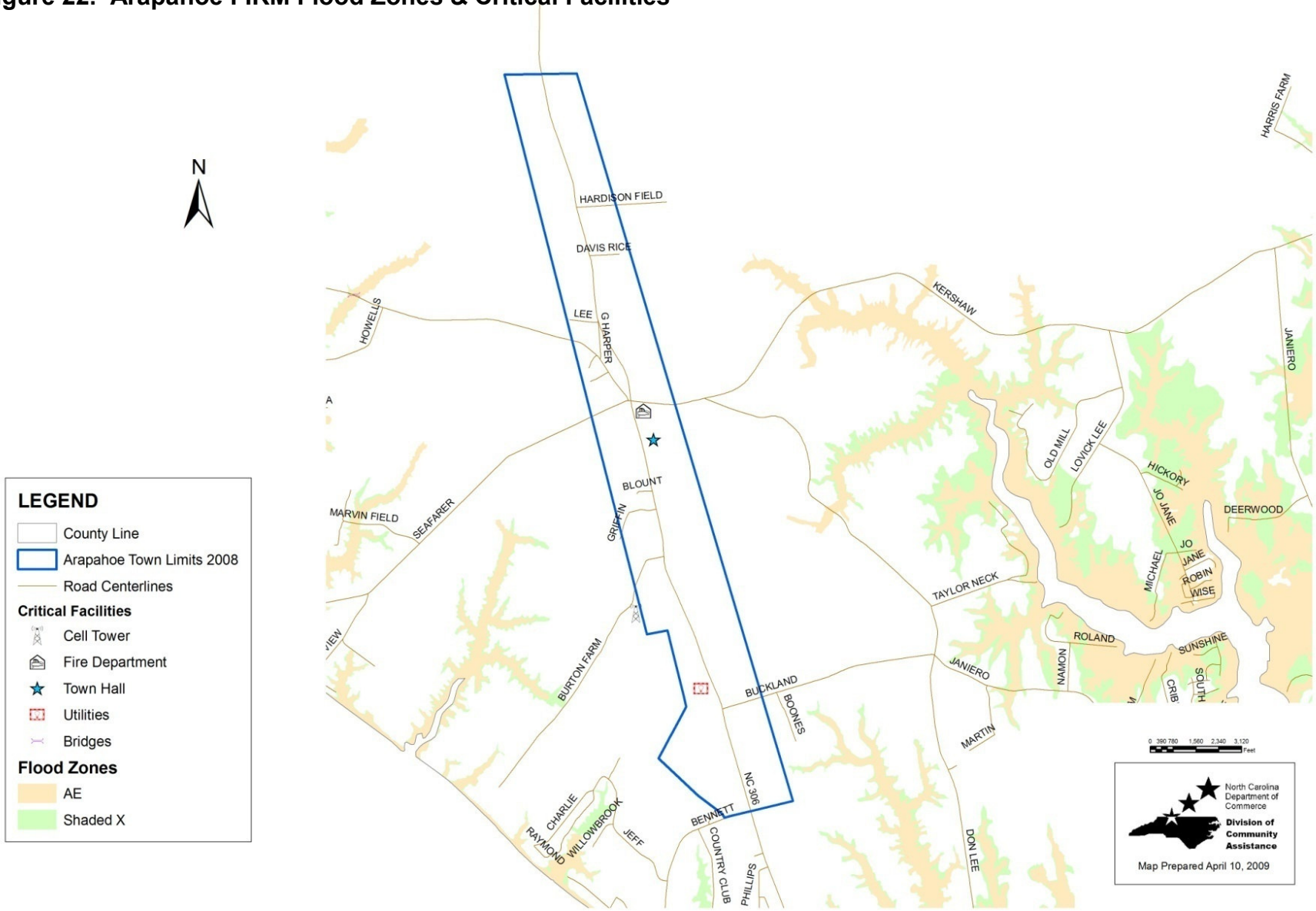


Figure 23. Arapahoe Storm Surge Inundation by Hurricane Category

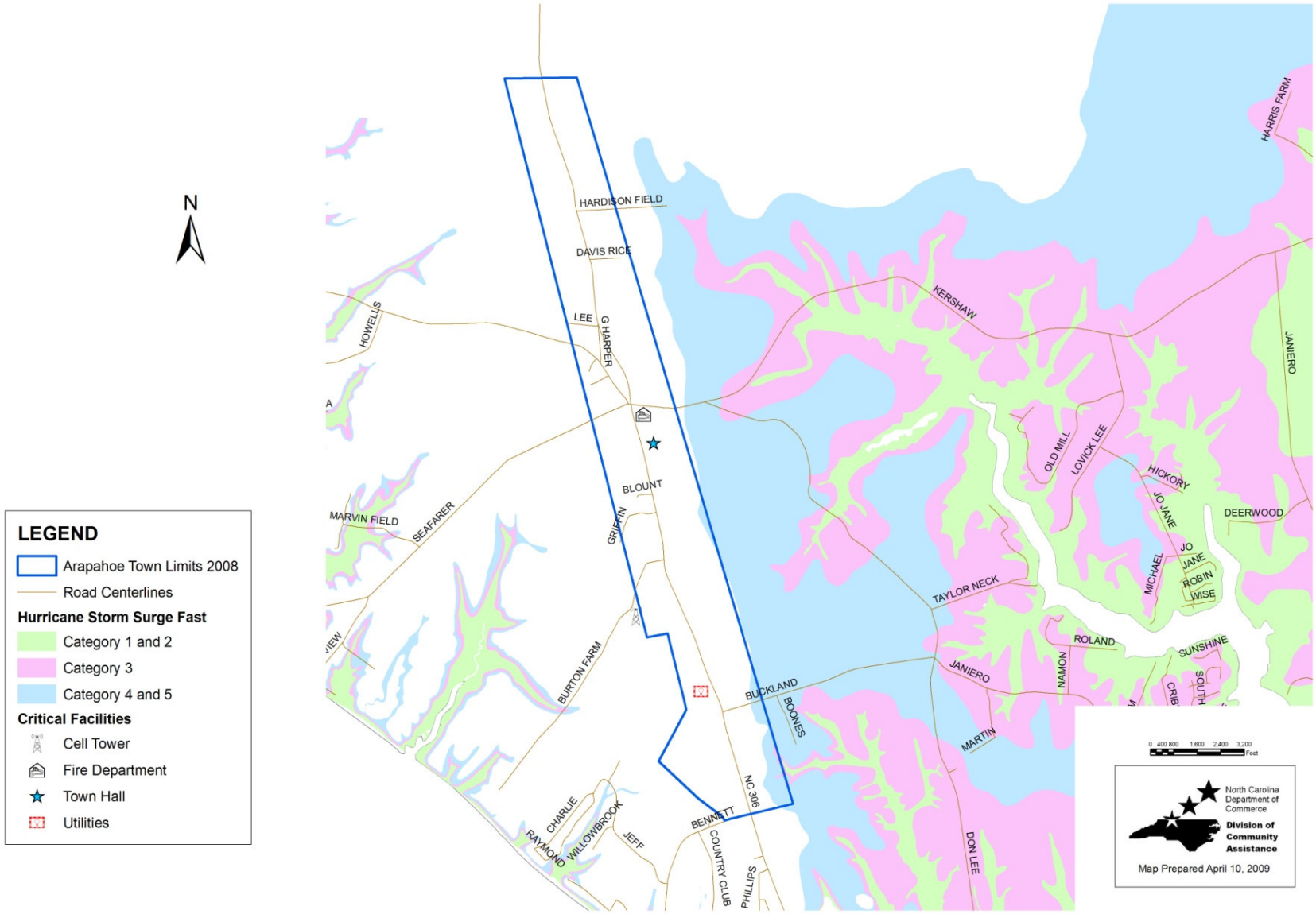


Table 28. Arapahoe Vulnerability Assessment

	Vacant Acres	Developed Acres	Total Acres	Structures	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow								Inundation - Slow
Category 1 & 2	0	0	0	0	0	0	0	Category 1 & 2
Category 3	0		0	0	0	0	0	Category 3
Category 4 & 5	101	1	102	73,329	190,739	264,068	2,415,718	Category 4 & 5
Total	101	1	102	73,329	190,739	264,068	2,415,718	Total
Inundation - Fast								Inundation - Fast
Category 1 & 2	0	0	0	0	0	0	0	Category 1 & 2
Category 3	0	0	0	0	0	0	0	Category 3
Category 4 & 5	93	0	0	0	153,642	153,642	2,224,374	Category 4 & 5
Total	93	0	0	0	153,642	153,642	2,224,374	Total
100-Year Floodplain								100-Year Floodplain
AE	0	0	0	0	0	0	0	AE
Total	0	0	0	0	0	0	0	Total
Inundation - Slow								Inundation - Slow
Category 1 & 2	0	0	0	0	0	0	0	Category 1 & 2

* Future Development was calculated by multiplying Vacant Acres by the average value per acre in Arapahoe ($23.918), determined by dividing the Total Value of Developed Properties in Arapahoe by Total Developed Acres

SECTION 20: BAYBORO

Profile
Bayboro is located along NC Highway 55, between the incorporated towns of Alliance and Stonewall. Incorporated in 1881, Bayboro has a land area of 1 square mile.

Bayboro has a population of 732 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Bayboro residents is 22.5 minutes. The average household size in Bayboro is 2.36 persons per household.[2] The following statistics are based on the 2000 Census.

Table 29. Bayboro Population Data

Subject	Number	Percent
Total Population	741	100
Sex and Age		
Male	361	48.7
Female	380	51.3
Under 5 years	39	5.3
5 to 9 years	55	7.4
10 to 14 years	55	7.4
15 to 19 years	58	7.8
20 to 24 years	29	3.9
25 to 34 years	63	8.5
35 to 44 years	129	17.4
45 to 54 years	98	13.2
55 to 59 years	40	5.4
60 to 64 years	34	4.6
65 to 74 years	96	13.0
75 to 84 years	33	4.5
85 years and over	12	1.6
Median age (years)	41.0	
65 years and over	141	19.0
RACE		
White	346	46.7
Black or African American	379	51.1
Hispanic	11	1.5

[2] US 2000 Census

Subject	Number	Percent
American Indian and Alaska Native	3	0.4
Asian	3	0.4
Native Hawaiian / Pacific Islander	0	0
Some other race	7	0.9
Two or more races	3	0.4
SOCIAL CHARACTERISTICS		
Population 25 years and over	518	100.0
High school graduate or higher	146	71.6
Bachelor's degree or higher	38	13.3
Disability status (population 21 to 64 years)	129	32.3
Foreign born	6	0.8
Now married (population 15 years and older)	254	42.0
Speak a language other than English at home	42	5.9
HOUSING CHARACTERISTICS		
Total housing units	340	100.0
Occupied housing units	301	88.5
Owner-occupied housing units	220	73.1
Renter-occupied housing units	81	26.9
Vacant housing units	39	11.5
YEAR STRUCTURE BUILT		
1999 to March 2000	29	8.6
1995 to 1998	33	9.7
1990 to 1994	21	6.2
1980 to 1989	39	11.5
1970 to 1979	73	21.5
1960 to 1969	76	22.4
1940 to 1959	54	15.9
1939 or earlier	14	4.1

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 3.5% were unemployed and looking for work. The sales and occupation sector employs the largest number of town residents (25%), followed by production and transportation (23.1%) and management and related occupations (19.8%).

Table 30. Bayboro Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	61	19.8
Service occupations	57	18.5

Sales and office occupations	77	25.0
Farming, fishing, and forestry	5	1.6
Construction, extraction and maintenance	37	12.0
Production and transportation	71	23.1
TOTAL WORKFORCE	308	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $13,709. The most recent poverty estimates indicate that 28.5% of Bayboro residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Bayboro's Capability

Bayboro partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Bayboro participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Bayboro will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Bayboro is located in Table 30.

Table 31. Bayboro Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections)	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Bayboro worked with the North Carolina Division of Community Assistance to revise the community's action plan. Bayboro currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Bayboro identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Bayboro to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 32. Bayboro Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to administer storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Address drainage issues as needed	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners, NC DOT	ongoing	Medium Technically feasible and environmentally sound
3	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
4	Continue to enforce State and CAMA buffer rules to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
4	Execute debris removal following an event.	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
6	Monitor culverts and drains maintain them	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High Cost effective, technically

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
						feasible and environmentally sound
7	Continue to provide technical assistance to property owners regarding protection of property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
8	Address Base Flood Elevations and monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
8	Contact the local NFIP representative to determine the status of the Community Rating, the Flood Plain Administrator designation, and the status of the Flood Damage Prevention Ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High Cost effective, technically feasible and environmentally sound
10	Address the storm water runoff issues as necessary	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners, NC DOT	ongoing	Medium Technically feasible and environmentally sound
11	Perform routine maintenance of culverts, ditches, and streams	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
12	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally sound
13	Seek assistance from the state in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	NC DOT	NC DOT	ongoing	High Cost effective, technically feasible and environmentally sound
14	Continue to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Technically feasible
15	Monitor the NC Forestry posts regarding fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
16	Request the NC Forestry Service brief local fire departments on common concerns, annually, prior to fire season	Wildfire	NC Forestry Service	NC Forestry Service, Pamlico County Emergency Management Director	Annually by July 1	High Cost effective, technically feasible and environmentally sound
17	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Commissioners	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 24. Bayboro FIRM Flood Zones & Critical Facilities

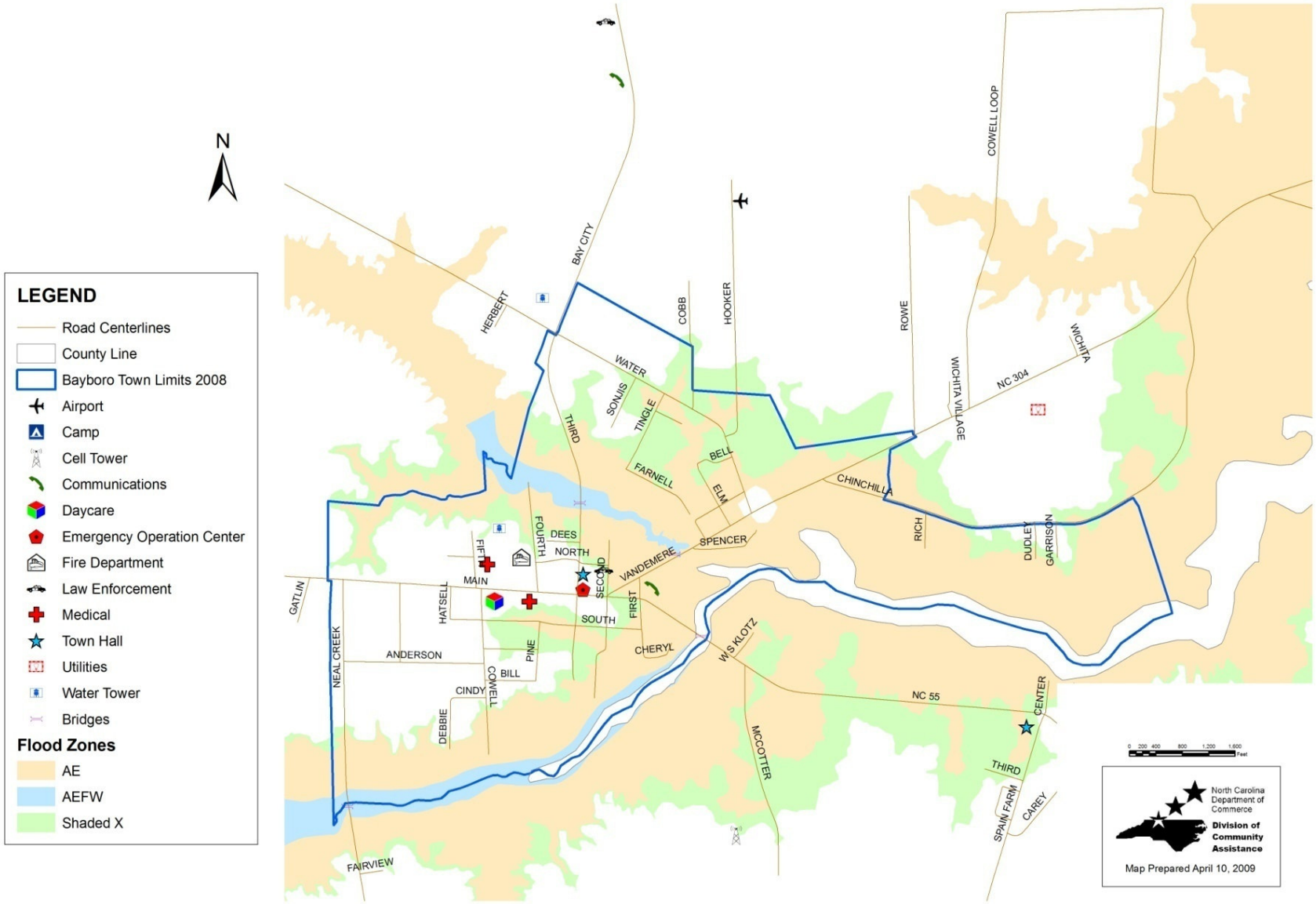


Figure 25. Bayboro Storm Surge Inundation by Hurricane Category

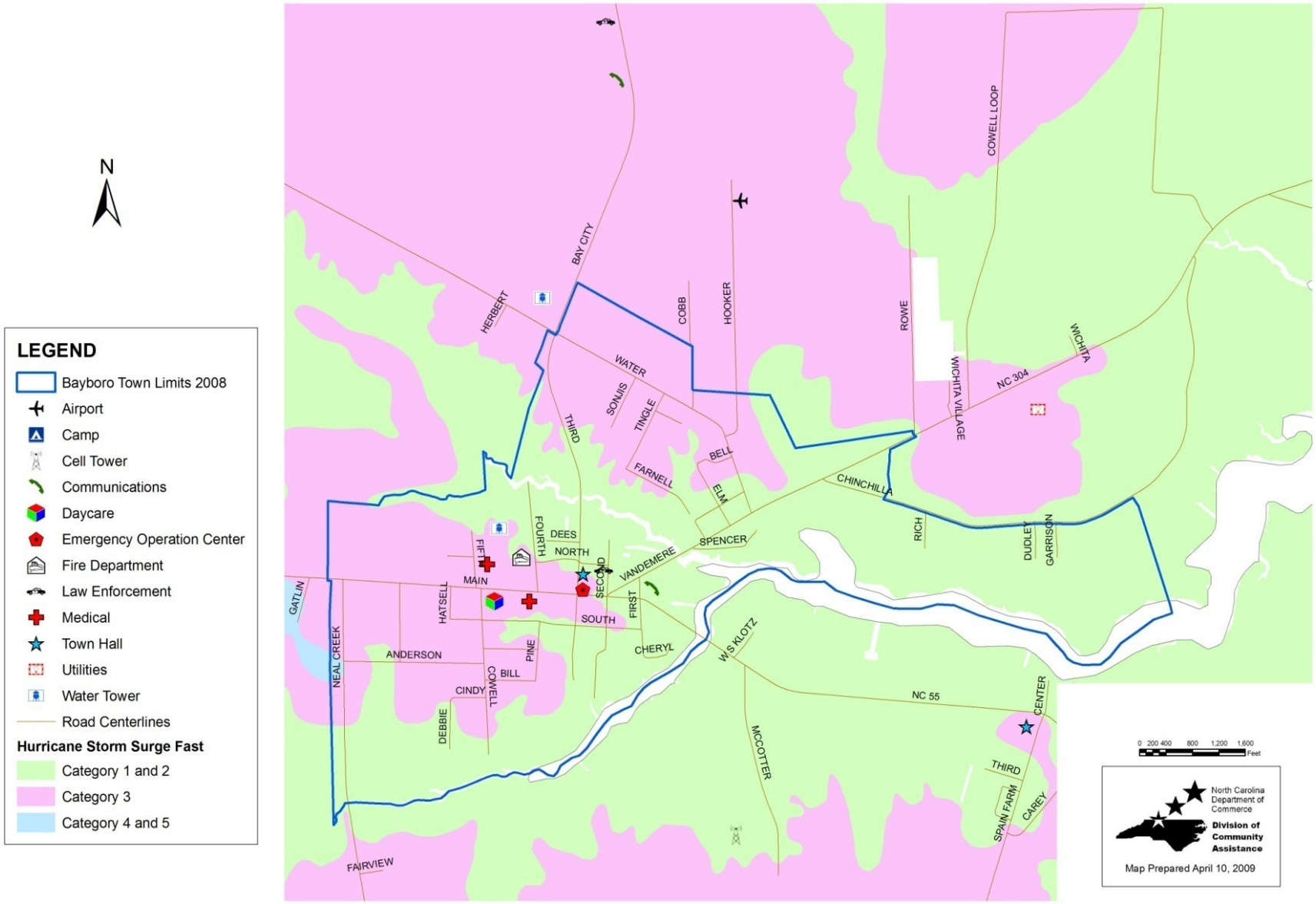


Table 32. Bayboro Vulnerability Assessment

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	310	310	620	21,885,855	6,143,966	28,029,821	28,364,070
Category 3	70	129	199	13,554,510	3,665,912	17,220,422	6,404,790
Category 4 & 5	0	0	0	0	0	0	0
Total	380	439	819	35,440,365	9,809,878	45,250,243	34,768,860
Inundation - Fast							
Category 1 & 2	238	248	486	17,313,609	4,592,327	21,905,936	21,776,286
Category 3	142	192	334	18,115,255	5,198,575	23,313,830	12,992,574
Category 4 & 5	1	1	2	11,501	18,976	30,477	91,497
Total	0	441	822	35,440,365	9,809,878	45,250,243	34,860,357
100-Year Floodplain							
AE	199	224	423	7,806,378	3,476,027	11,282,405	18,207,903
Total	199	224	423	7,806,378	3,476,027	11,282,405	18,207,903
Inundation - Slow							
Category 1 & 2	310	310	620	21,885,855	6,143,966	28,029,821	28,364,070

* Future Development was calculated by multiplying Vacant Acres by the average value per acre in Bayboro ($91,497), determined by dividing the Total Value of Developed Properties in Bayboro by Total Developed Acres

Section 20: Grantsboro

Profile

Grantsboro is located at the intersection of Highway 306 and Highway 55. Incorporated in 1997, Grantsboro has a land area of 3.68 square miles.

During the 2000 Census, the Town of Grantsboro was inadvertently missed during the survey. The error was not picked up until after the Census had been completed. Therefore, detailed socio-economic data is not available for Grantsboro. Some statistics have been generated, however, for voting and state funding purposes.

Grantsboro has a population of 754 persons. There are 322 total housing units in the town, of which 28 are vacant. There are 2.56 persons per household in the town.

Analysis of Grantsboro Capabilities

Grantsboro partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Grantsboro does not have mapped hazard areas within its jurisdiction. Therefore, Grantsboro will continue to work with the County to lessen the impacts of natural hazards on people and property.

Grantsboro does not participate in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). Grantsboro does not have any repetitive loss properties.

Grantsboro will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Grantsboro is located in Table 34.

Table 34. Grantsboro Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water management.	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance (Grantsboro is not a member of the National Flood	N/A	High	High because well-insured structures can be	Continue to participate in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
Insurance Program)			reconstructed	programs that provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it	Any changes to the buffer rules and regulations should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			reaches streams and moving structures away from shorelines	be incorporated in future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				County's action plan.
5. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Natural Hazards Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach material	Continue outreach projects and expand them where practical

Action Plan
Grantsboro worked with the North Carolina Division of Community Assistance to revise the community's action plan. Grantsboro currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Grantsboro identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Grantsboro to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 35. Grantsboro Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to administer storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
3	Continue its participation in the county's active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
5	Enforce State and CAMA buffer rules are enforced to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
6	Develop a municipal zoning code which will address erosion concerns.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	January 1, 2010	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
7	Execute debris removal following an event with assistance from NC Department of Transportation	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA/ NC Department of Transportation	NC Department of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
8	Monitor culverts and drains and maintain through prison labor	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
9	Address Base Flood Elevation and monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
10	Address the storm water runoff issues as necessary	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	Medium Technically feasible and environmentally sound
11	Establish a more formalized system of routine cleaning of culverts, ditches, streams and the like which impede the flow of water	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	June 1, 2010	Medium Technically feasible and environmentally sound
12	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	tree trimming					sound
13	Monitor the National Weather Service for reports of wind speeds and storm conditions	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	National Weather Service	ongoing	High Cost effective, technically feasible and environmentally sound
14	Seek assistance from the state in clearing the roads after a snow event	Nor'easters, Severe Winter Storms, earthquakes	NC Department of Transportation	NC Department of Transportation	ongoing	High Cost effective, technically feasible and environmentally sound
15	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Cost effective
16	Monitor the NC Forestry posts regarding fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound

Figure 26. Grantsboro FIRM Flood Zones & Critical Facilities

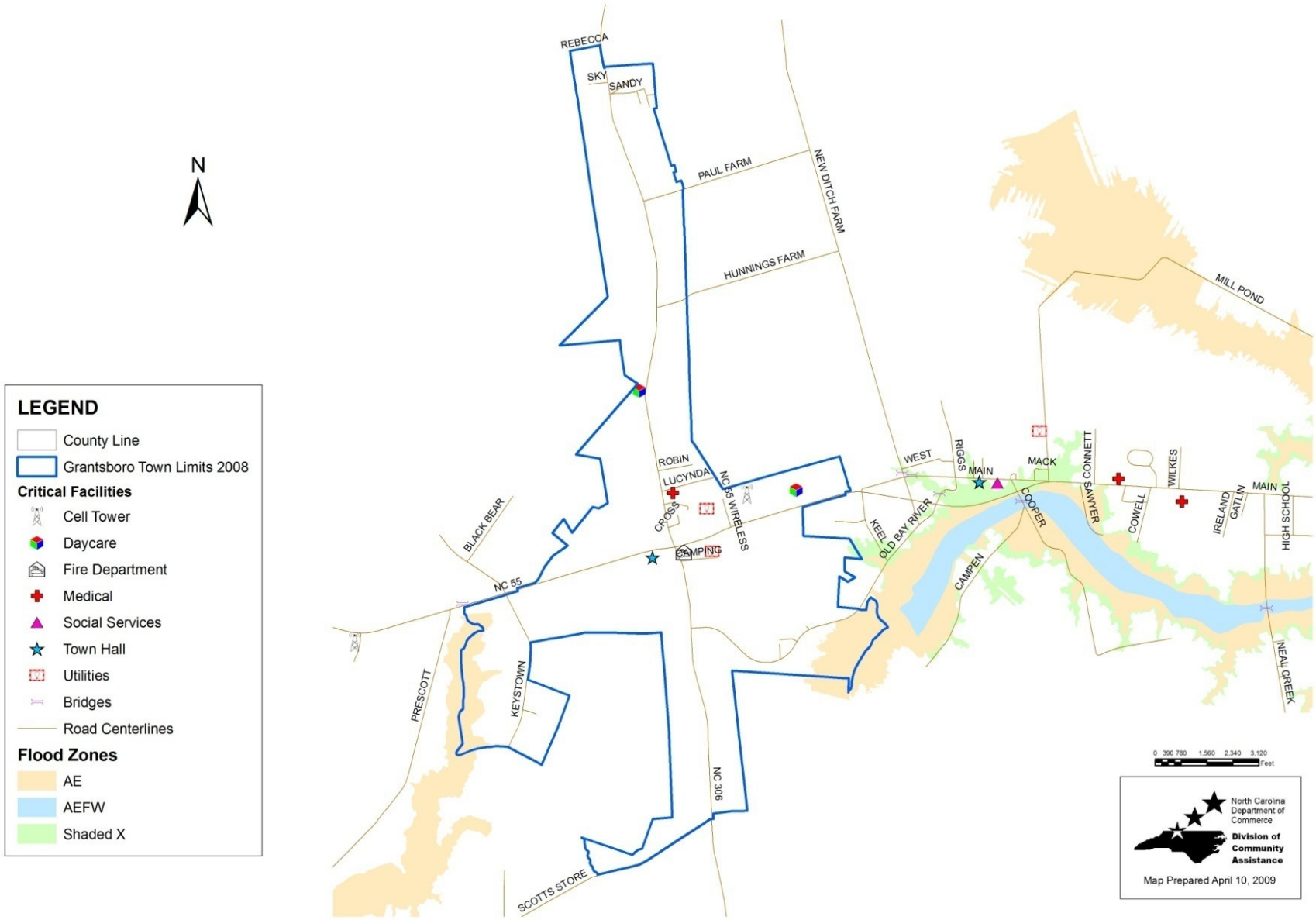


Figure 27. Grantsboro Storm Surge Inundation by Hurricane Category

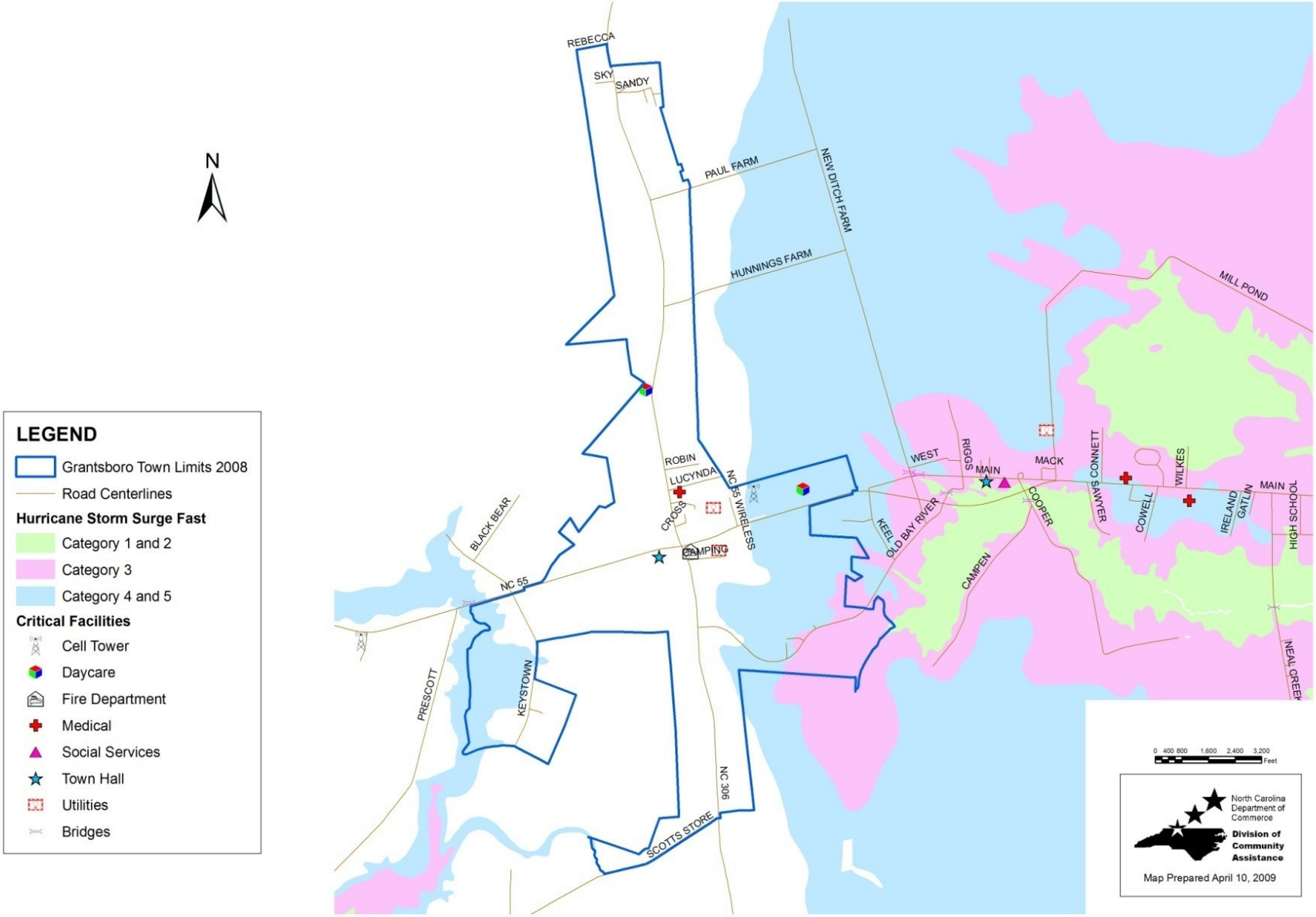


Table 36. Grantsboro Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	0	0	0	0	0	0	0
Category 3	174	15	189	1,810,218	580,937	2,391,155	5,738,346
Category 4 & 5	335	57	392	3,907,457	1,525,956	5,433,413	11,047,965
Total	509	72	581	5,717,675	2,106,893	7,824,568	16,786,311
Inundation - Fast							
Category 1 & 2	0	0	0	0	0	0	0
Category 3	90	3	93	258,448	232,113	490,561	2,968,110
Category 4 & 5	361	43	404	5,117,048	1,684,000	6,801,048	11,905,419
Total	0	46	497	5,375,496	1,916,113	7,291,609	14,873,529
100-Year Floodplain							
AE	112	2	114	199,047	208,718	407,765	3,693,648
Total	112	2	114	199,047	208,718	407,765	3,693,648
Inundation - Slow							
Category 1 & 2	0	0	0	0	0	0	0

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Grantsboro ($32,979), determined by dividing the Total Value of Developed Properties in Grantsboro by Total Developed Acres*

SECTION 21: MESIC

Profile
Mesic is located near the Pamlico County/Beaufort County border in the northeastern part of the county on Highway 304. Incorporated in 1971, Mesic has a land area of 1 square mile.

Mesic has a population of 243 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Mesic residents is 35.9 minutes. The average household size in Mesic is 2.42 persons per household.[3] The following statistics are based on the 2000 Census.

Table 37. Mesic Population Data

Subject	Number	Percent
Total Population	257	100
Sex and Age		
Male	117	45.5
Female	140	54.5
Under 5 years	5	1.9
5 to 9 years	14	5.4
10 to 14 years	26	10.1
15 to 19 years	20	7.8
20 to 24 years	7	2.7
25 to 34 years	14	5.4
35 to 44 years	34	13.2
45 to 54 years	40	15.6
55 to 59 years	11	4.3
60 to 64 years	21	8.2
65 to 74 years	30	11.7
75 to 84 years	24	9.3
85 years and over	11	4.3
Median age (years)	46.3	
65 years and over	65	25.3
RACE		
White	76	29.6
Black or African American	176	68.5

[3] US 2000 Census

Subject	Number	Percent
Hispanic	0	0
American Indian and Alaska Native	0	0
Asian	2	0.8
Native Hawaiian / Pacific Islander	0	0
Some other race	0	0
Two or more races	3	1.2
SOCIAL CHARACTERISTICS		
Population 25 years and over	178	100.0
High school graduate or higher	52	53.9
Bachelor's degree or higher	4	4.5
Disability status (population 21 to 64 years)	43	38.4
Foreign born	0	0.0
Now married (population 15 years and older)	119	58.3
Speak a language other than English at home	6	2.5
HOUSING CHARACTERISTICS		
Total housing units	146	100.0
Occupied housing units	106	72.6
Owner-occupied housing units	94	88.7
Renter-occupied housing units	12	11.3
Vacant housing units	40	27.4
YEAR STRUCTURE BUILT		
1999 to March 2000	8	5.5
1995 to 1998	16	11.0
1990 to 1994	5	3.4
1980 to 1989	24	16.4
1970 to 1979	26	17.8
1960 to 1969	24	16.4
1940 to 1959	25	17.1
1939 or earlier	18	12.3

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 2.6% were unemployed and looking for work. The construction, extraction and maintenance sector employs the largest number of town residents (24.7%), followed by sales and occupation sector and service occupations employ the largest number of town residents (23.5% each).

Table 38. Mesic Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	20	23.5

Service occupations	20	23.5
Sales and office occupations	10	11.8
Farming, fishing, and forestry	0	0
Construction, extraction and maintenance	21	24.7
Production and transportation	14	16.5
TOTAL WORKFORCE	85	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $15,253. The most recent poverty estimates indicate that 27.4% of Mesic residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Mesic Capabilities

In its hazard mitigation strategy, Mesic partners with many local, state, and federal agencies. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Mesic participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Mesic will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Mesic is located in Table 39.

Table 39. Mesic Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those floodplain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-214.7(c)	High	High because the regulations require new developments to provide for storm water management.	Any storm water management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to	Drainage system maintenance is an

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			better drainage during storm events	ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that provide insurance for natural hazards to residents

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and moving structures away from shorelines	Any changes to the buffer rules and regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of	Health and Safety Maintenance

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			rapid response	capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should include breakwaters and bulkheads as effective mitigation tools.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach material	Continue outreach projects and expand them where practical
Elevation markers	N/A	High	High because an elevation marker program would	All communities should consider an

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			inform the public	elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Mesic worked with the North Carolina Division of Community Assistance to revise the community's action plan. Mesic currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Mesic identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Mesic to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 40. Mesic Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to administer storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Address drainage issues as needed.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Council	ongoing	Medium Technically feasible and environmentally sound
3	Continue participation in the County's beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Low Cost effective
4	Continue to rely upon the television and radio outlets for news and weather updates.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Emergency Alert System	ongoing	High Cost effective, technically feasible and environmentally sound
5	Review culverts along Park Avenue and Hollyville Mobile Home Park in Cash Corner to diminish the risk of flooding	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	NC Department of Transportation	November 2010	Medium Technically feasible and environmentally sound
6	Closely monitor development in hazard areas and ensure new construction is built to state building codes	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
7	Enforce State and CAMA buffer rules to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Local CAMA Officer	ongoing	High Cost effective, technically feasible and environmentally sound
8	Consider developing a zoning ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Council	ongoing	High Cost effective, technically feasible and environmentally sound
9	Remove debris as soon as possible after the event.	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Council	ongoing	Medium Technically feasible and environmentally sound
10	Keep culverts and drains free of debris with the help of prisoners	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Transportation	ongoing	Medium Technically feasible and environmentally sound
11	Ensure the county continues to provide technical assistance to property owners on how to protect their property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
12	Address Base Flood Elevation and monitor BFEs to ensure they are appropriate	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
13	Contact the NFIP representative to determine the status of the Community Rating, the Flood Plain Administrator designation, and the status of the Flood Damage Prevention Ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
14	Address the storm water runoff issue	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	Medium Technically feasible and environmentally sound
15	Establish a more formalized system of routine cleaning of culverts, ditches, streams and the like which impede the flow of water	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Council, NC Department of Transportation	June 1, 2010	Medium Technically feasible and environmentally sound
16	Continue to work with Tideland Electric and Progress provide electric power to the community and their program of tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and CP&L	ongoing	Medium Technically feasible and environmentally sound
17	Monitor the National Weather Service reports of wind speeds and storm conditions	Flooding, Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	National Weather Service	ongoing	High Cost effective, technically feasible and environmentally sound
18	Seek State assistance in	Nor'easters, Severe Winter	NC Division of	Pamlico County	ongoing	High

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	clearing the roads after a snow event	Storms, earthquakes	Emergency Management	Emergency Management		Cost effective, technically feasible and environmentally sound
19	Provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services, Coastal Community Action Agency	ongoing	Low Cost effective
20	Seek assistance from the NC Forestry Service for wildfire education program annually	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
21	Monitor NC Forestry Service posts for fire risk	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
22	Send written request to the NC Forestry service requesting that they meet with the local fire units prior to fire season to discuss common concerns. The Emergency Management Director for the County will be asked to facilitate the meeting	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
23	Request that the issue of	Flooding, Hurricanes and	General budget	Town Council	November	Medium

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	occluded drainage canals which surround the town be addressed in the county's future hazard mitigation plan updates	Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes			2010	technically feasible and environmentally sound
24	Arrange for the documentation and of grave sites in town and for photographs of the headstones	Flooding, Hurricanes and Tropical Storms, Nor'easters	General budget	Town Council	ongoing	Low Technically feasible
25	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	General budget	Town Council	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 28. Mesic FIRM Flood Zones & Critical Facilities

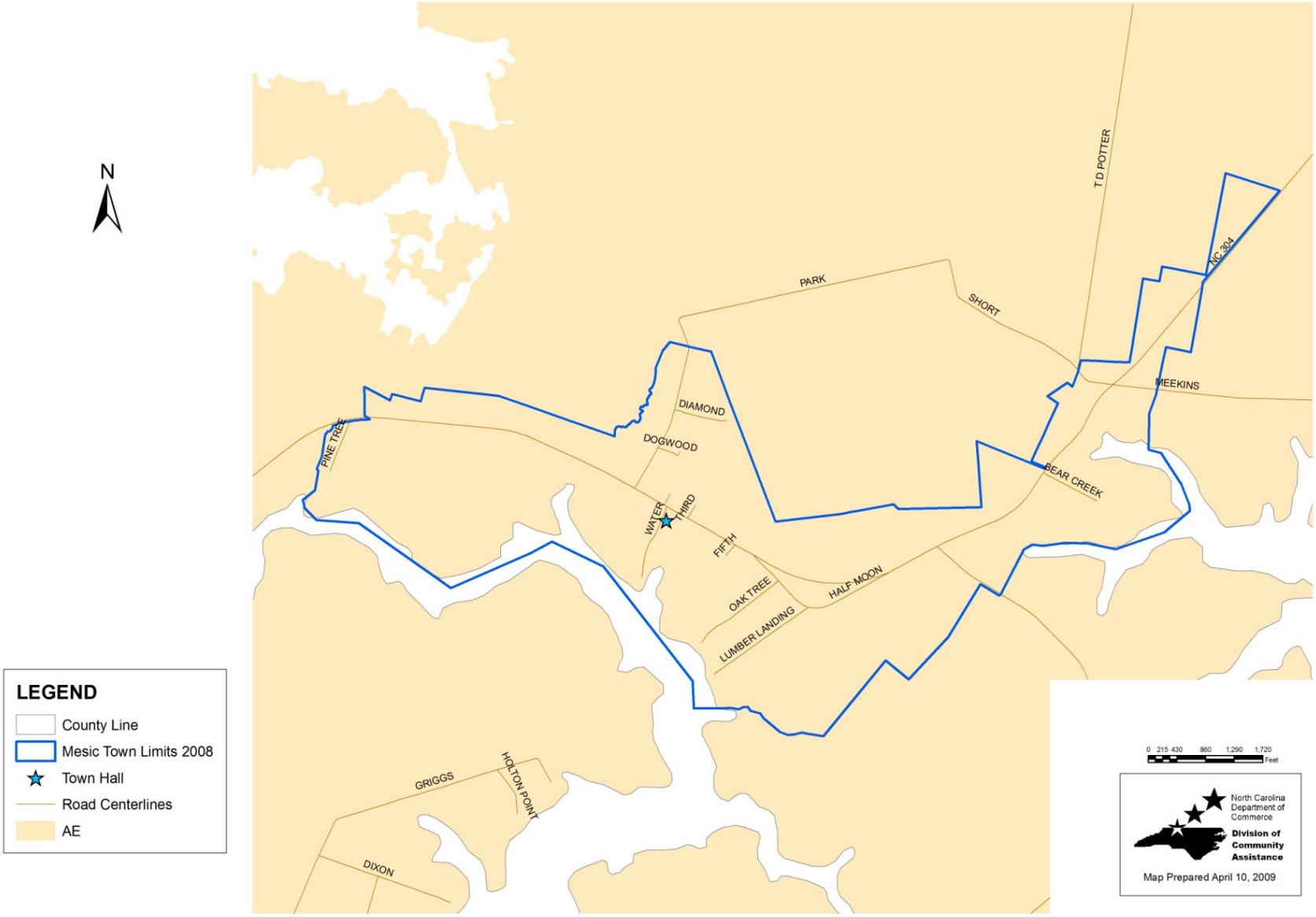


Figure 29. Mesic Storm Surge Inundation

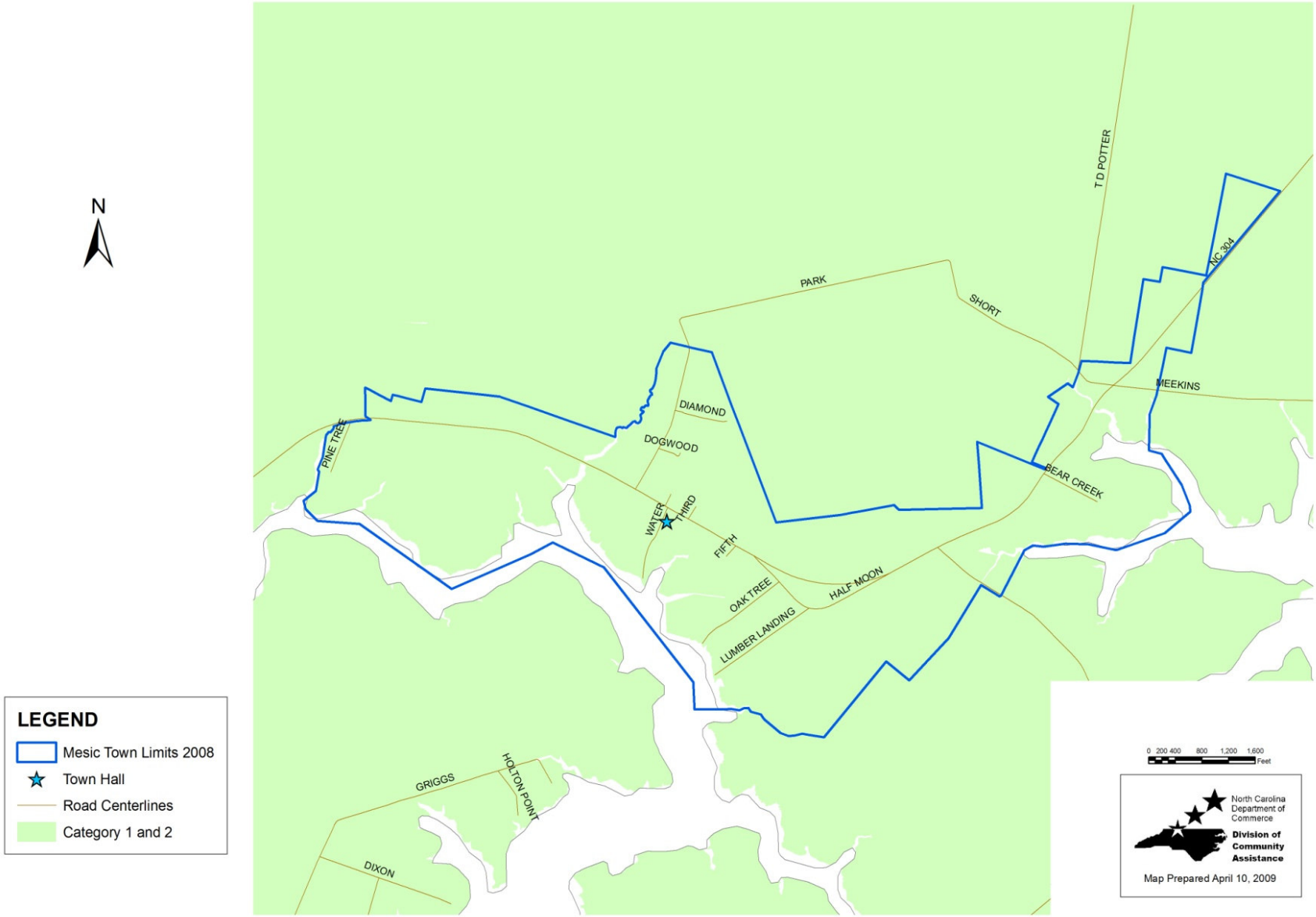


Table 41. Mesic Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409
Inundation - Fast							
Category 1 & 2	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	0	237	686	5,833,309	3,169,738	9,003,047	13,488,409
100-Year Floodplain							
AE	449	267	716	6,026,675	3,232,259	9,258,934	13,488,409
Total	449	267	716	6,026,675	3,232,259	9,258,934	13,488,409
Inundation - Slow							
Category 1 & 2	449	237	686	5,833,309	3,169,738	9,003,047	13,488,409

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Mesic ($30,041), determined by dividing the Total Value of Developed Properties in Mesic by Total Developed Acres*

SECTION 22: MINNESOTT BEACH

Profile
Minnesott Beach is located along the Neuse River, to the southeast of Arapahoe, on Highway 306. Incorporated in 1971, Minnesott Beach has a land area of 3.3 square miles.

Minnesott Beach has a population of 366 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Minnesott Beach residents is 32.7 minutes. The average household size in Minnesott Beach is 2.06 persons per household (US 2000 Census). The following statistics are based on the 2000 Census.

Table 42. Minnesott Beach Population Data

Subject	Number	Percent
Total Population	311	100
Sex and Age		
Male	152	48.9
Female	159	51.1
Under 5 years	6	1.9
5 to 9 years	6	1.9
10 to 14 years	16	5.1
15 to 19 years	10	3.2
20 to 24 years	10	3.2
25 to 34 years	18	5.8
35 to 44 years	37	11.9
45 to 54 years	56	18.0
55 to 59 years	31	10.0
60 to 64 years	31	10.0
65 to 74 years	49	15.8
75 to 84 years	35	11.3
85 years and over	6	1.9
Median age (years)	54.3	
65 years and over	90	28.9
RACE		
White	297	95.5
Black or African American	11	3.5
Hispanic	3	1.0

Subject	Number	Percent
American Indian and Alaska Native	0	0
Asian	2	0.6
Native Hawaiian / Pacific Islander	0	0
Some other race	0	0
Two or more races	1	0.3
SOCIAL CHARACTERISTICS		
Population 25 years and over	268	100.0
High school graduate or higher	56	88.1
Bachelor's degree or higher	44	28.0
Disability status (population 21 to 64 years)	21	10.8
Foreign born	4	1.3
Now married (population 15 years and older)	206	71.5
Speak a language other than English at home	11	3.6
HOUSING CHARACTERISTICS		
Total housing units	230	100.0
Occupied housing units	151	65.7
Owner-occupied housing units	134	88.7
Renter-occupied housing units	17	11.3
Vacant housing units	79	34.3
YEAR STRUCTURE BUILT		
1999 to March 2000	3	1.3
1995 to 1998	8	3.4
1990 to 1994	44	18.6
1980 to 1989	50	21.1
1970 to 1979	92	38.8
1960 to 1969	20	8.4
1940 to 1959	18	7.6
1939 or earlier	2	0.8

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 0.7% was unemployed and looking for work. The management and related occupations sector employs the largest number of town residents (36.7%), followed by sales and occupation sector (27.9%) and production and transportation (11.6%) employ the largest number of town residents.

Table 43. Minnesott Beach Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	54	36.7
Service occupations	14	9.5

Sales and office occupations	41	27.9
Farming, fishing, and forestry	7	4.8
Construction, extraction and maintenance	14	9.5
Production and transportation	17	11.6
TOTAL WORKFORCE	147	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $27,259. The most recent poverty estimates indicate that 2.3% of Minnesott Beach residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Minnesott Beach Capabilities

Minnesott Beach partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Minnesott Beach participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Minnesott Beach will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Minnesott Beach is located in Table 43.

Table 44. Minnesott Beach Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Minnesott Beach worked with the North Carolina Division of Community Assistance to revise the community's action plan. Minnesott Beach currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Minnesott Beach identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability Minnesott Beach to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 45. Minnesott Beach Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Commissioners	ongoing	Medium This action is: 1) environmentally sound; and 2) technically feasible.
2	Continue to work with the County on its active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Clerk	ongoing	Medium This action is: 1) cost effective and 2) technically feasible.
3	Continue to enforce the zoning ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
4	Continue to meet all minimum FEMA requirements to remain eligible for debris removal assistance funding from FEMA	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
5	Continue to work with NC Continue to work with the Department of Corrections to provide labor for debris removal from culverts and	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3)

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	drains					technically feasible.
6	Contact the County Floodplain Administrator and the NFIP office to request information on the CRS	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Building Inspections	January 1, 2010	Low This action is technically feasible
7	Continue to work with State and County for assistance in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	County's General Fund, NC Division of Emergency Management	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
8	Continue to work with Pamlico County Health Department and DSS to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low This action is technically feasible
9	Contact the NC Forestry Service once a year to get information about their wildfire education program	Wildfire	NC Forestry Service	Town Clerk	ongoing	Low This action is technically feasible
10	Monitor nearby NC Forestry Service tower posts fire risk for area	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
11	Hold a meeting with NC Forestry service to discuss common concerns. The Emergency Management Director for the County will be asked to facilitate the	Wildfire	NC Forestry Service	Pamlico County Emergency Management	June 1, 2009	Medium This action is 1) cost effective; and 2) technically feasible

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	meeting					
12	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Commissioners	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 30. Minnesott Beach FIRM Flood Zones & Critical Facilities

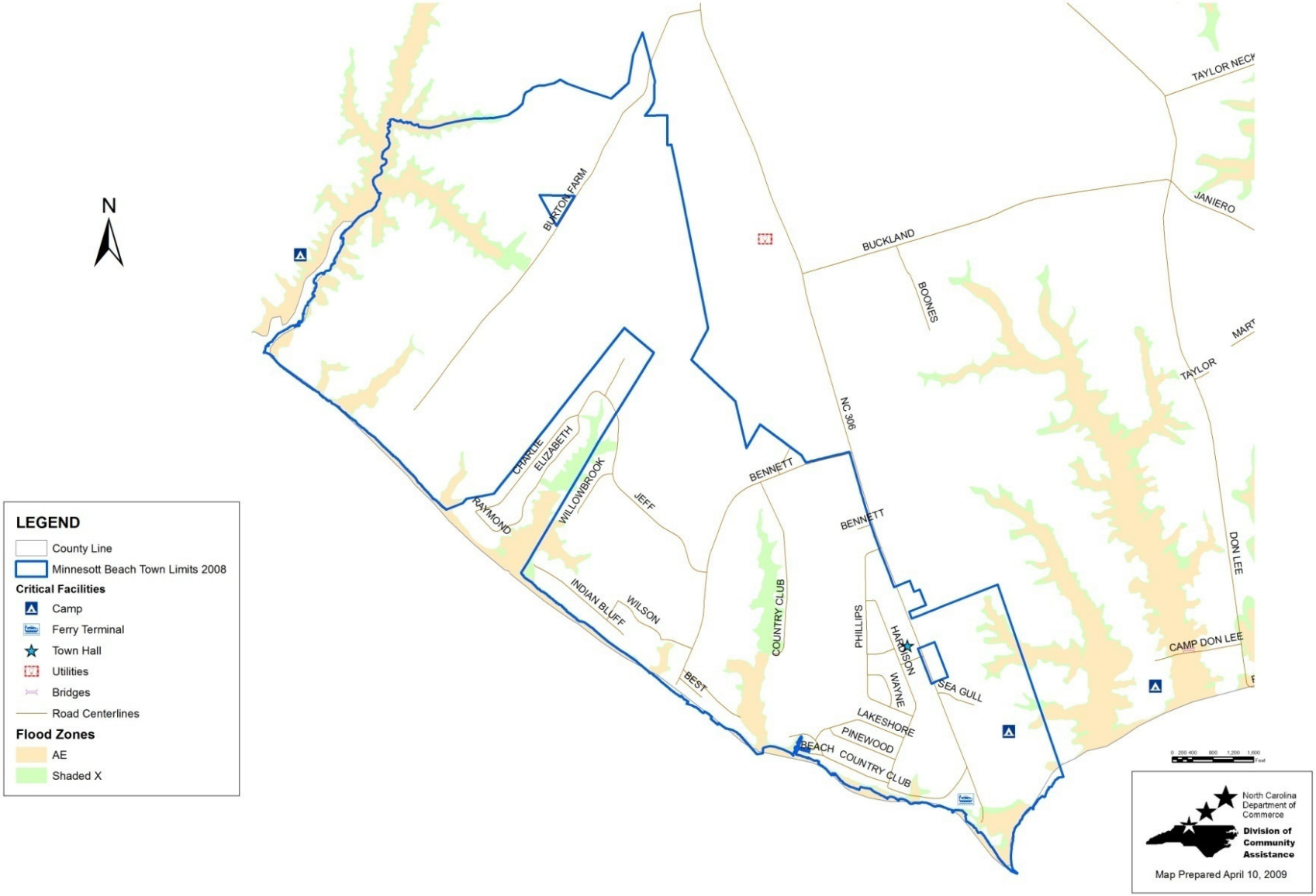


Figure 31. Minnesott Beach Storm Surge Inundation

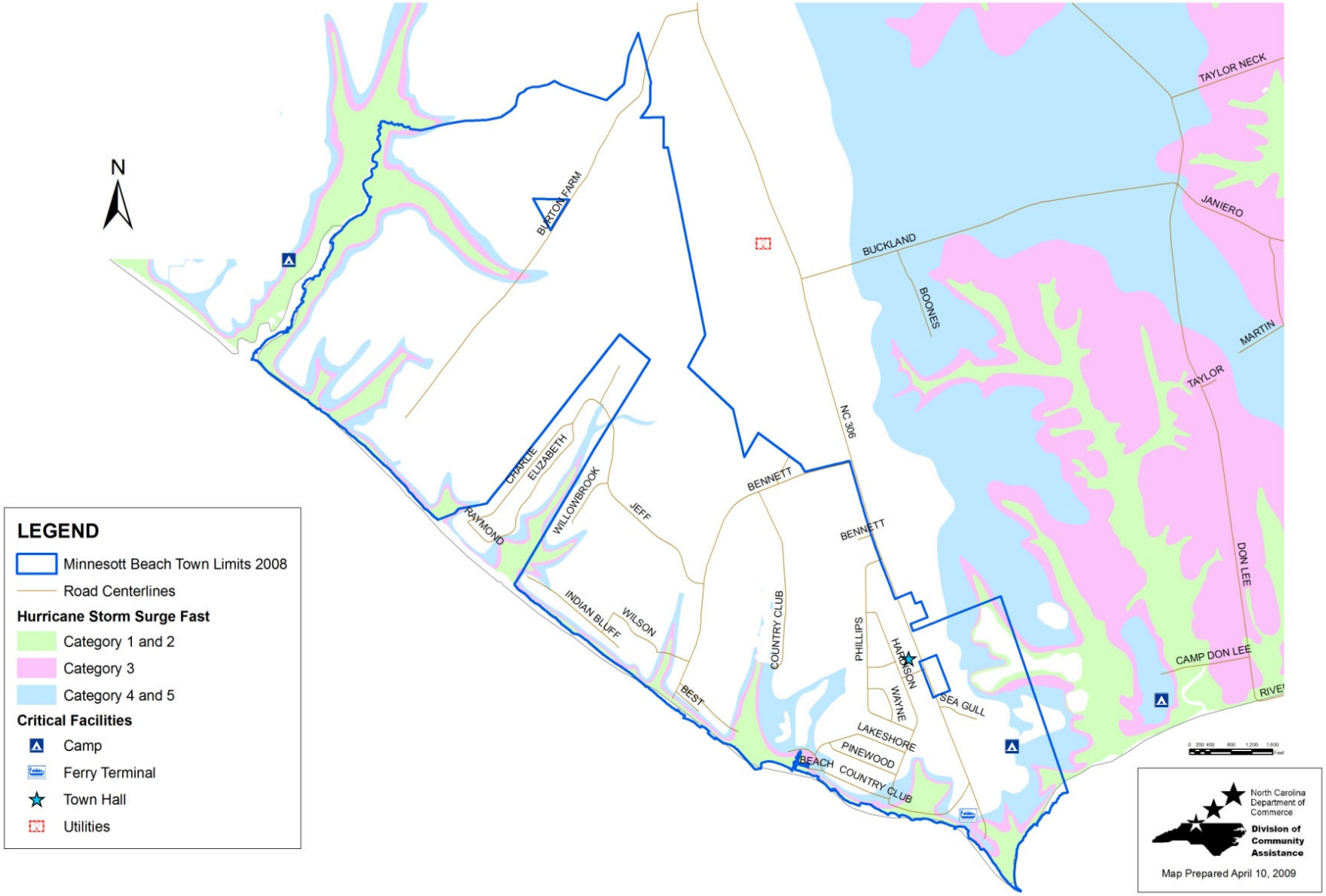


Table 46. Minnesott Beach Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	3	33	36	1,804,154	1,891,783	3,695,937	227,751
Category 3	11	17	28	2,619,330	216,740	2,836,070	835,087
Category 4 & 5	14	77	91	7,593,697	5,017,250	12,610,947	1,062,838
Total	28	127	155	12,017,181	7,125,773	19,142,954	2,125,676
Inundation - Fast							
Category 1 & 2	4	28	32	1,300,669	1,499,749	2,800,418	303,668
Category 3	1	9	10	1,461,868	1,669,515	3,131,383	75,917
Category 4 & 5	15	30	42	5,245,750	211,426	5,457,176	1,138,755
Total	20	67	84	8,008,287	3,380,690	11,388,977	1,518,340
100-Year Floodplain							
AE	1	6	7	385,527	546,332	931,859	75,917
Total	1	6	7	385,527	546,332	931,859	75,917
Inundation - Slow							
Category 1 & 2	3	33	36	1,804,154	1,891,783	3,695,937	227,751

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Minnesott Beach ($75,917), determined by dividing the Total Value of Developed Properties in Minnesott Beach by Total Developed Acres*

SECTION 23: ORIENTAL

Profile
Oriental is located along the Neuse River in the southeastern portion of the county on Highway 55. Incorporated in 1899, Oriental has a land area of 5 square miles.

Oriental has a population of 813 persons as of July 2007, according to the NC Office of State Management and Budget. The main travel time to work for Oriental residents is 30.8 minutes. The average household size in Oriental is 1.98 persons per household. The following statistics are based on the 2000 Census.

Table 47. Oriental Population Data

Subject	Number	Percent
Total Population	875	100
Sex and Age		
Male	419	47.9
Female	456	52.1
Under 5 years	19	2.2
5 to 9 years	26	3.0
10 to 14 years	31	3.5
15 to 19 years	24	2.7
20 to 24 years	24	2.7
25 to 34 years	47	5.4
35 to 44 years	86	9.8
45 to 54 years	145	16.6
55 to 59 years	82	9.4
60 to 64 years	78	8.9
65 to 74 years	181	20.7
75 to 84 years	104	11.9
85 years and over	28	3.2
Median age (years)	57.2	
65 years and over	313	35.8
RACE		
White	794	90.7
Black or African American	64	7.3
Hispanic	12	1.4
American Indian and Alaska Native	1	0.1
Asian	3	0.3

Subject	Number	Percent
Native Hawaiian / Pacific Islander	0	0
Some other race	4	0.5
Two or more races	9	1.0
SOCIAL CHARACTERISTICS		
Population 25 years and over	752	100.0
High school graduate or higher	158	89.1
Bachelor's degree or higher	166	35.2
Disability status (population 21 to 64 years)	97	21.6
Foreign born	40	4.6
Now married (population 15 years and older)	541	67.6
Speak a language other than English at home	43	5.0
HOUSING CHARACTERISTICS		
Total housing units	576	100.0
Occupied housing units	440	76.4
Owner-occupied housing units	353	80.2
Renter-occupied housing units	87	19.8
Vacant housing units	136	23.6
YEAR STRUCTURE BUILT		
1999 to March 2000	23	4.0
1995 to 1998	64	11.0
1990 to 1994	75	12.9
1980 to 1989	142	24.4
1970 to 1979	89	15.3
1960 to 1969	26	4.5
1940 to 1959	46	7.9
1939 or earlier	116	20.0

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 2.5% were unemployed and looking for work. The management and related occupations sector employs the largest number of town residents (42.5%), followed by sales and occupation sector (28.9%) and service occupations (10.3%) employ the largest number of town residents.

Table 48. Oriental Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	116	42.5
Service occupations	28	10.3
Sales and office occupations	79	28.9
Farming, fishing, and forestry	7	2.6

Construction, extraction and maintenance	21	7.7
Production and transportation	22	8.1
TOTAL WORKFORCE	273	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $25,949. The most recent poverty estimates indicate that 8.4% of Oriental residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Oriental Capabilities

In its hazard mitigation strategy, Oriental partners with many local, state, and federal agencies. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Oriental participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Oriental will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Oriental is located in Table 48.

Table 49. Oriental Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Growth Management Ordinance	Adopted July, 1997	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those floodplain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Oriental worked with the North Carolina Division of Community Assistance to revise the community's action plan. Oriental currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Oriental identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Oriental to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 50. Oriental Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
2	Continue to work with the County on its active beaver control program.	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
3	Continue to enforce the growth management ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
4	Continue to meet all minimum FEMA requirements to remain eligible for debris removal assistance funding from FEMA	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
5	Continue to work with NC Department of Corrections to provide labor for debris removal from culverts and drains	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
6	Continue to work with State and County for assistance	Nor'easters, Severe Winter Storms	County's General	Pamlico County Emergency	ongoing	Medium This action is 1) cost

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	in clearing the roads after a snow event		Fund, NC Division of Emergency Management	Management		effective; and 2) technically feasible
7	Continue to work with Pamlico County Health Department and DSS to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
8	Contact the NC Forestry Service once a year to get information about their wildfire education program	Wildfire	NC Forestry Service	Town Manager	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
9	Monitor nearby NC Forestry Service tower posts fire risk for area	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
10	Hold a meeting with NC Forestry service to discuss common concerns. The Emergency Management Director for the County will be asked to facilitate the meeting	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
11	Research storm water management and recommend strategies	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Planning Board	July 2012	Medium This action is: 1) environmentally sound; and 2) technically feasible.
12	Establish a more formalized system of routine cleaning of culverts, ditches, streams and the like which impede the flow	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Town Commissioners	June 1, 2010	Medium This action is: 1) environmentally sound; and 2) technically feasible.

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	of water					
13	Determine the number of repetitive loss properties within the town's jurisdiction and develop strategies to mitigate future risk	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Planning Board	January 2012	Medium This action is: 1) environmentally sound; and 2) technically feasible.
14	Continue the wellhead protection program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town General Fund	Town Manager	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible
15	Evaluate and address boat yards in the 100 flood plain which use hazardous material	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Manager	January 1, 2011	Medium This action is: 1) environmentally sound; and 2) technically feasible.
16	Contact the County Floodplain Administrator and the NFIP office to request information on the CRS	Flooding, Hurricanes and Tropical Storms, Hurricanes, Nor'easters, floods	N/A	Town Manager	January 1, 2010	Medium Low This action is 1) cost effective; and 2) technically feasible
17	Oriental will continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Manager	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 32. Oriental FIRM

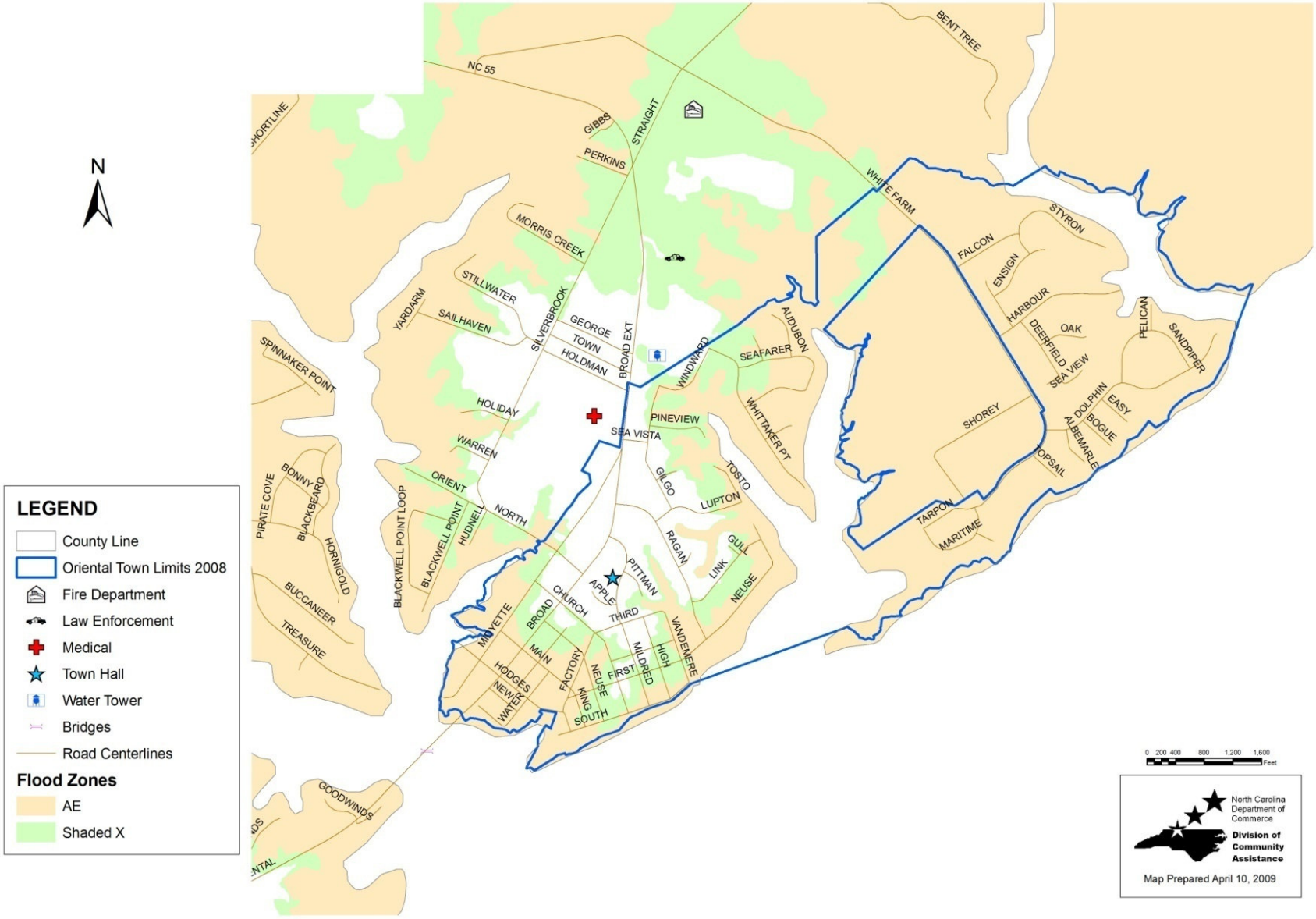


Figure 33. Oriental Storm Surge Inundation

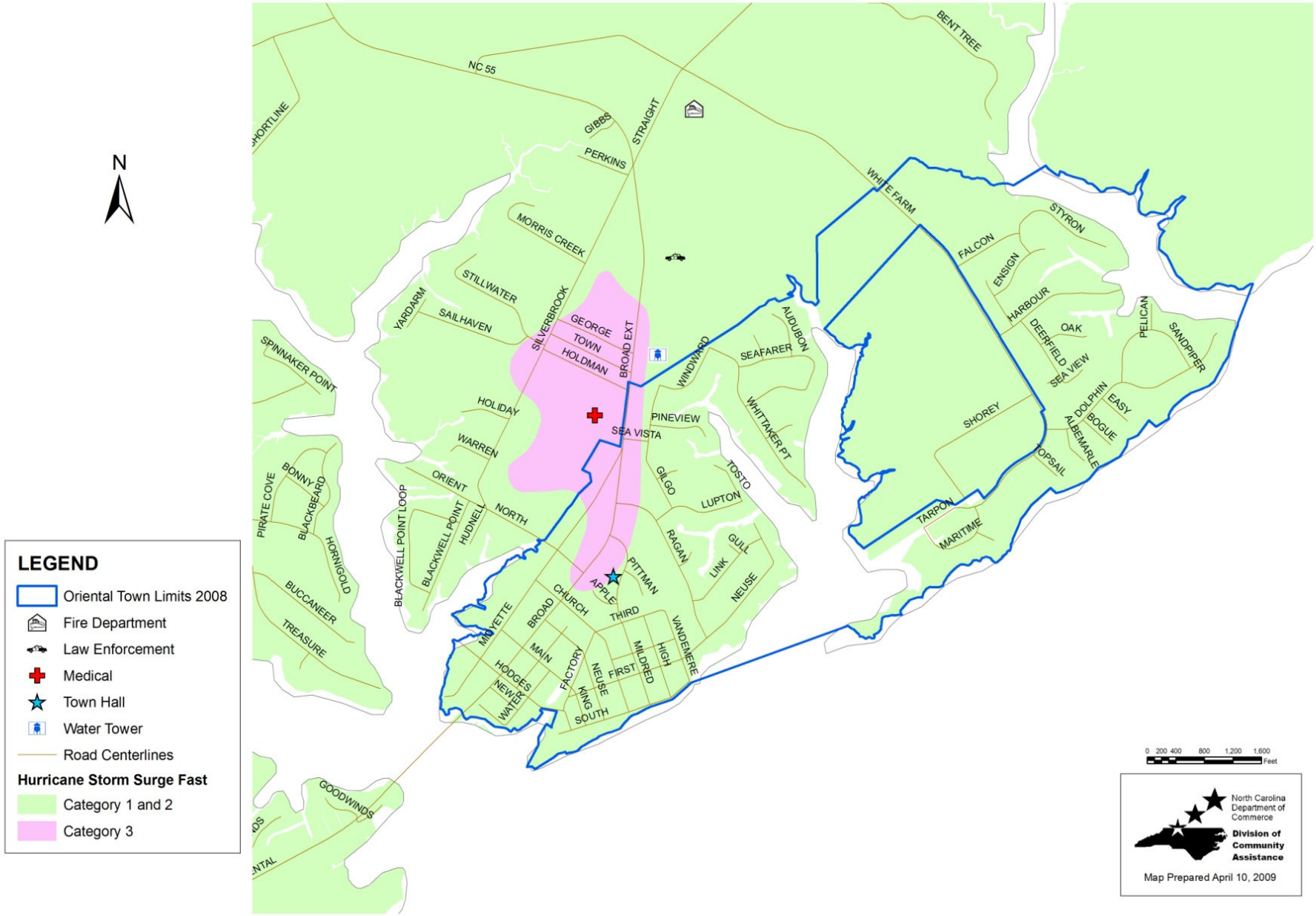


Table 51. Oriental Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	207	384	591	77,755,654	66,412,768	144,168,422	73,435,527
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	207	384	591	77,755,654	66,412,768	144,168,422	73,435,527
Inundation - Fast							
Category 1 & 2	199	364	563	74,616,062	63,438,718	138,054,780	70,597,439
Category 3	7	20	27	3,139,592	2,974,050	6,113,642	2,483,327
Category 4 & 5	0	0	0	0	0	0	0
Total	0	384	590	77,755,654	66,412,768	144,168,422	73,080,766
100-Year Floodplain							
AE	173	261	434	53,012,879	46,664,982	99,677,861	61,373,653
Total	173	261	434	53,012,879	46,664,982	99,677,861	61,373,653
Inundation - Slow							
Category 1 & 2	207	384	591	77,755,654	66,412,768	144,168,422	73,435,527

** Future Development was calculated by multiplying Vacant Acres by the average value per acre in Oriental ($354,761), determined by dividing the Total Value of Developed Properties in Oriental by Total Developed Acres*

SECTION 24: STONEWALL

Profile
Stonewall is located along Highway 55, just to the east of Bayboro. Stonewall has a land area of 1.96 square miles.

Stonewall has a population of 282 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Stonewall residents is 25.9 minutes. The average household size in Stonewall is 2.42 persons per household.[4] The following statistics are based on the 2000 Census.

Table 52. Stonewall Population Data

Subject	Number	Percent
Total Population	285	100
Sex and Age		
Male	141	49.5
Female	144	50.5
Under 5 years	15	5.3
5 to 9 years	16	5.6
10 to 14 years	25	8.8
15 to 19 years	21	7.4
20 to 24 years	11	3.9
25 to 34 years	36	12.6
35 to 44 years	37	13.0
45 to 54 years	48	16.8
55 to 59 years	25	8.8
60 to 64 years	16	5.6
65 to 74 years	22	7.7
75 to 84 years	8	2.8
85 years and over	5	1.8
Median age (years)	40.3	
65 years and over	35	12.3
RACE		
White	212	74.4
Black or African American	63	22.1
Hispanic	3	1.1

[4] US 2000 Census

Subject	Number	Percent
American Indian and Alaska Native	0	0
Asian	2	0.7
Native Hawaiian / Pacific Islander	0	0
Some other race	2	0.7
Two or more races	6	2.1
SOCIAL CHARACTERISTICS		
Population 25 years and over	178	100.0
High school graduate or higher	57	73.0
Bachelor's degree or higher	9	8.4
Disability status (population 21 to 64 years)	43	26.2
Foreign born	0	0.0
Now married (population 15 years and older)	112	51.1
Speak a language other than English at home	12	5.0
HOUSING CHARACTERISTICS		
Total housing units	133	100.0
Occupied housing units	118	88.7
Owner-occupied housing units	96	81.4
Renter-occupied housing units	22	18.6
Vacant housing units	15	11.3
YEAR STRUCTURE BUILT		
1999 to March 2000	2	1.5
1995 to 1998	12	9.2
1990 to 1994	8	6.1
1980 to 1989	11	8.4
1970 to 1979	24	18.3
1960 to 1969	12	9.2
1940 to 1959	28	21.4
1939 or earlier	34	26.0

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 2.8% were unemployed and looking for work. The sales and office occupations sector employs the largest number of town residents (25.9%), followed by the production and transportation sector (23.7%) and service occupations (18.5%) employ the largest number of town residents.

Table 53. Stonewall Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	29	21.6
Service occupations	20	14.9

Sales and office occupations	32	23.9
Farming, fishing, and forestry	2	1.5
Construction, extraction and maintenance	40	29.9
Production and transportation	11	8.2
TOTAL WORKFORCE	131	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $16,425. The most recent poverty estimates indicate that 5.5% of Stonewall residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Stonewall Capabilities

Stonewall partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Stonewall participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Stonewall will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Stonewall is located in Table 54.

Table 54. Stonewall Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
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Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
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Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Stonewall worked with the North Carolina Division of Community Assistance to revise the community's action plan. Stonewall currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Stonewall identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Stonewall to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 55. Stonewall Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to use the Pamlico County storm water detention regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Pamlico County Planning Department	ongoing	High Cost effective, technically feasible and environmentally sound
2	Continue to address drainage issues as needed	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Town Commissioners, NC DOT	ongoing	Medium Technically feasible and environmentally sound
3	Continue to abide by State building codes that establish specifications for construction.	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
4	Continue to ensure that State and CAMA buffer rules are enforced to improve the quality of storm water runoff.	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire	N/A	Pamlico County Floodplain Coordinator	ongoing	High Cost effective, technically feasible and environmentally sound
5	Continue working with the County on enforcement of land use regulations	Flooding, Hurricanes and Tropical Storms, Nor'easters, earthquakes	N/A	Town Commissioners, Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
5	Continue to remove debris following an event.	Flooding, Hurricanes and Tropical Storms,	FEMA	Town Commissioners	ongoing	Medium Technically

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
		Nor'easters				feasible and environmentally sound
7	Continue working with the NC DOC to maintain ditches	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High Cost effective, technically feasible and environmentally sound
8	Continue to seek assistance from the county to provide property owners strategies to protect property	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	County's General Fund	Pamlico County Emergency Management, Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
9	County building code addresses Base Flood Elevations, continue to monitor for effectiveness	Flooding, Hurricanes and Tropical Storms, Nor'easters	County's General Fund	Pamlico County Building Inspections	ongoing	High Cost effective, technically feasible and environmentally sound
10	Contact the local NFIP representative to determine the status of their Community Rating, the Flood Plain Administrator designation, and the status of the Flood Damage Prevention Ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High Cost effective, technically feasible and environmentally sound
11	Continue to address the storm water runoff issue	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners, NC DOT	June 1, 2004	Medium Technically feasible and environmentally sound

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
12	Continue routine maintenance of culverts, ditches, and streams	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	June 1, 2004	Medium Technically feasible and environmentally sound
13	Continue to work with Tideland Electric and Progress Energy and their continuous program for tree trimming	Hurricanes and Tropical Storms, Nor'easters, Thunderstorms/Lightning	N/A	Tideland Electric and Progress Energy	ongoing	High Cost effective, technically feasible and environmentally sound
14	Seek assistance from the state for snow removal	Nor'easters, Severe Winter Storms	NC DOT	NC DOT	ongoing	High Cost effective, technically feasible and environmentally sound
15	Continue working with the County Health Department and DSS provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Low Cost effective
16	Monitor the NC Forestry Service displays of fire risk for the area	Wildfire	NC Forestry Service	NC Forestry Service	ongoing	High Cost effective, technically feasible and environmentally sound
17	Request the NC Forestry Service brief local fire departments on common concerns, annually, prior to fire season	Wildfire	NC Forestry Service	NC Forestry Service, Pamlico County Emergency Management Director	Annually by July 1	High Cost effective, technically feasible and environmentally sound

Figure 34. Stonewall FIRM

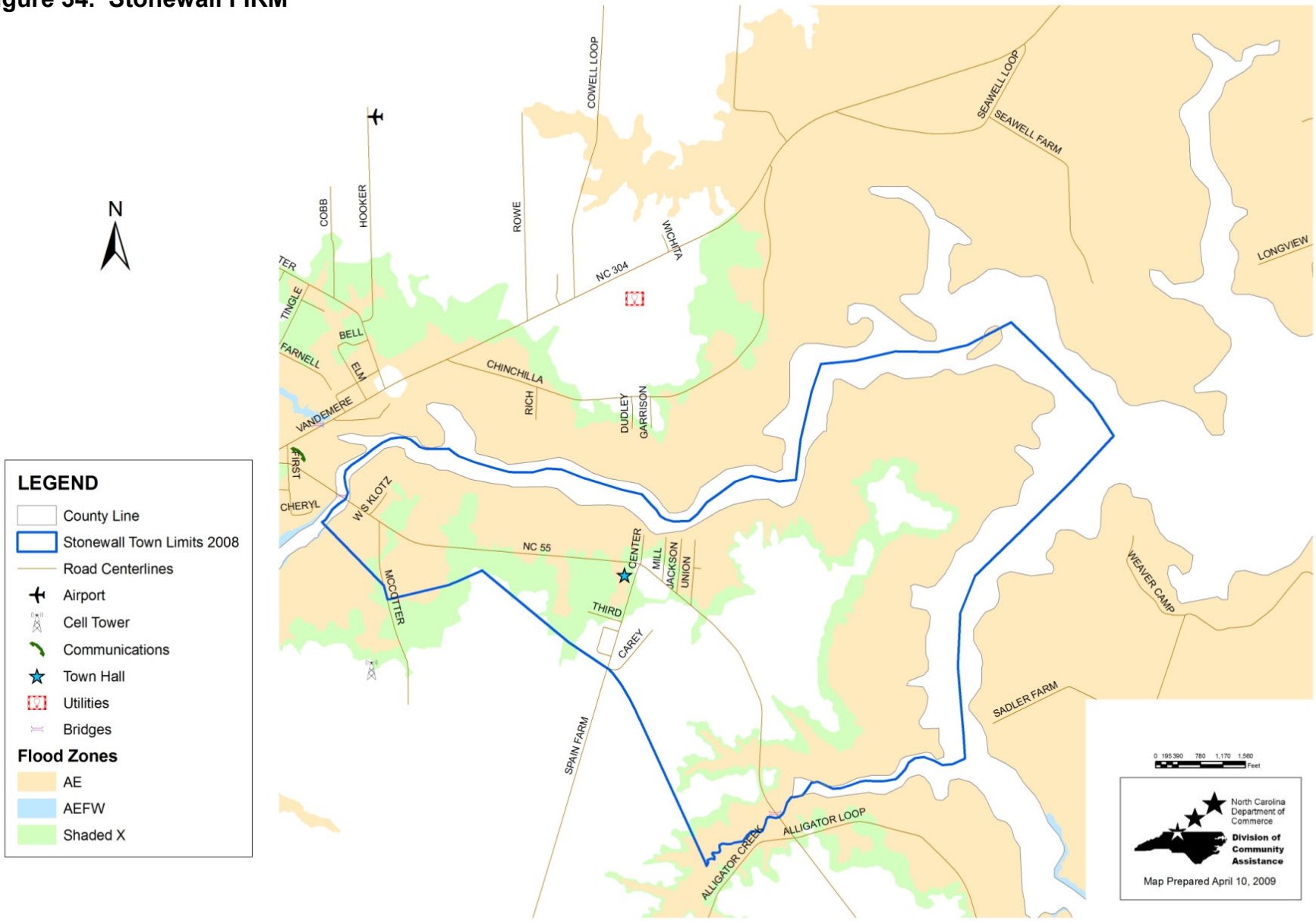

Figure 35. Stonewall Storm Surge Inundation

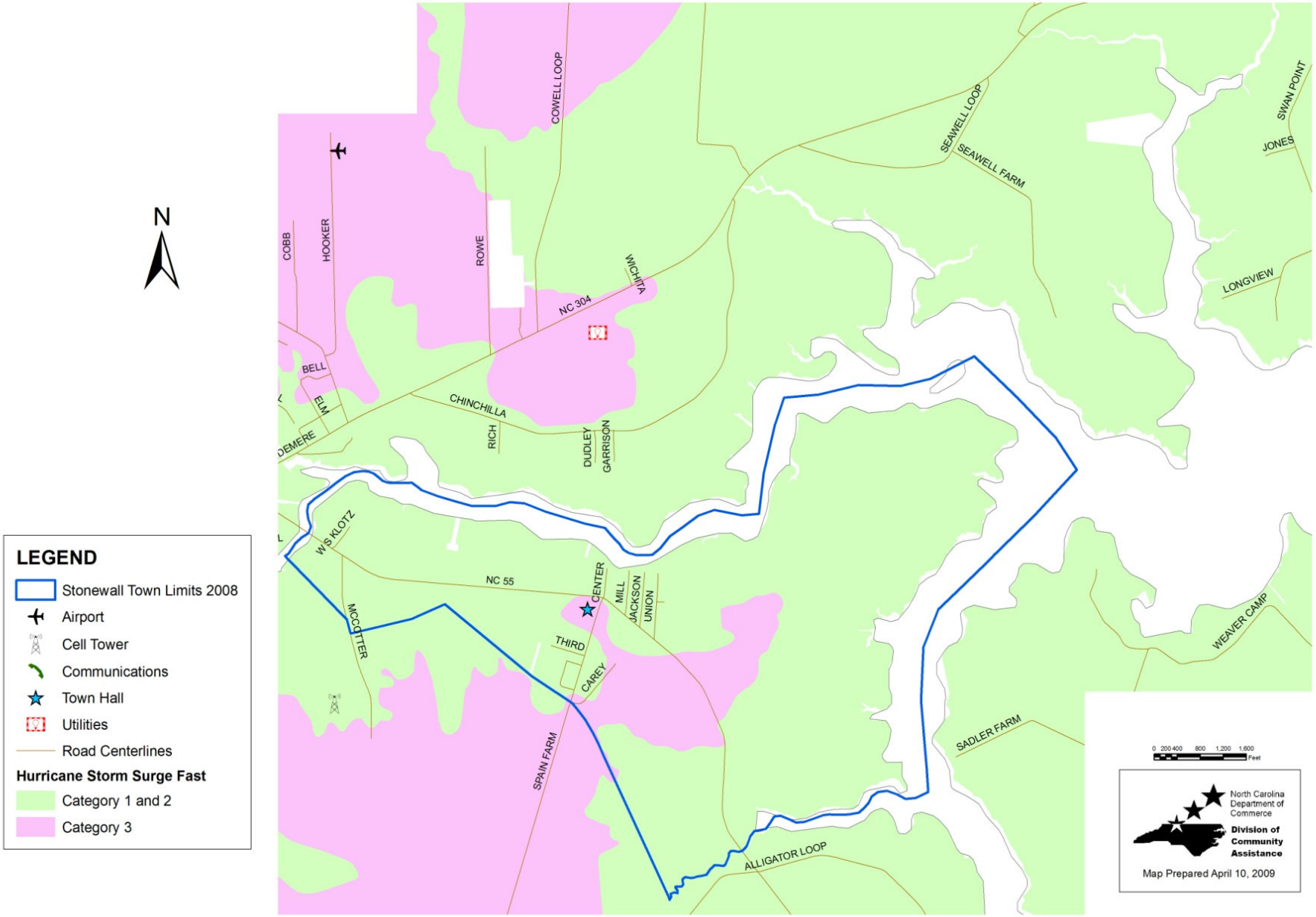

Table 56. Stonewall Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	658	247	905	7,460,484	3,937,912	11,398,396	26,048,246
Category 3	65	35	100	1,493,418	658,112	2,151,530	2,573,155
Category 4 & 5	0	0	0	0	0	0	0
Total	723	282	1,005	8,953,902	4,596,024	13,549,926	28,621,401
Inundation - Fast							
Category 1 & 2	658	254	912	7,777,569	3,995,111	11,772,680	26,048,246
Category 3	64	28	92	1,176,333	600,913	1,777,246	2,533,568
Category 4 & 5	0	0	0	0	0	0	0
Total	0	282	1,004	8,953,902	4,596,024	13,549,926	28,581,814
100-Year Floodplain							
AE	54	152	206	4,592,410	1,814,674	6,407,084	2,137,698
Total	54	152	206	4,592,410	1,814,674	6,407,084	2,137,698
Inundation - Slow							
Category 1 & 2	658	247	905	7,460,484	3,937,912	11,398,396	26,048,246

* *Future Development* was calculated by multiplying *Vacant Acres* by the average value per acre in Stonewall ($39,587), determined by dividing the *Total Value of Developed Properties* in Stonewall by *Total Developed Acres*

SECTION 25: VANDEMERE

Profile
Vandemere is located along Highway 304, near the Town of Mesic. Incorporated in 1895, Vandemere has a land area of 5 square miles.

Vandemere has a population of 280 persons as of July 2007, according to the NC Office of State Management and Budget. The mean travel time to work for Vandemere residents is 25.5 minutes. The average household size in Vandemere is 2.35 persons per household (US 2000 Census). The following statistics are based on the 2000 Census.

Table 57. Vandemere Population Data

Subject	Number	Percent
Total Population	289	100
Sex and Age		
Male	129	44.6
Female	160	55.4
Under 5 years	11	3.8
5 to 9 years	19	6.6
10 to 14 years	20	6.9
15 to 19 years	19	6.6
20 to 24 years	14	4.8
25 to 34 years	28	9.7
35 to 44 years	34	11.8
45 to 54 years	46	15.9
55 to 59 years	20	6.9
60 to 64 years	18	6.2
65 to 74 years	36	12.5
75 to 84 years	20	6.9
85 years and over	4	1.4
Median age (years)	44.9	
65 years and over	60	20.8
RACE		
White	134	46.4
Black or African American	153	52.9
Hispanic	6	2.1
American Indian and Alaska Native	1	0.3

Subject	Number	Percent
Asian	0	0
Native Hawaiian / Pacific Islander	0	0
Some other race	0	0
Two or more races	1	0.3
SOCIAL CHARACTERISTICS		
Population 25 years and over	217	100.0
High school graduate or higher	64	69.1
Bachelor's degree or higher	15	9.2
Disability status (population 21 to 64 years)	55	32.0
Foreign born	9	2.8
Now married (population 15 years and older)	117	46.2
Speak a language other than English at home	15	4.9
HOUSING CHARACTERISTICS		
Total housing units	153	100.0
Occupied housing units	123	80.4
Owner-occupied housing units	103	83.7
Renter-occupied housing units	20	16.3
Vacant housing units	30	19.6
YEAR STRUCTURE BUILT		
1999 to March 2000	4	2.5
1995 to 1998	21	12.9
1990 to 1994	4	2.5
1980 to 1989	25	15.3
1970 to 1979	25	15.3
1960 to 1969	22	13.5
1940 to 1959	27	16.6
1939 or earlier	35	21.5

Source: US Census 2000 Summary File 1

Economic Profile

During the year 2000, 5.7% were unemployed and looking for work. The sales and office occupations sector employs the largest number of town residents (25.9%), followed by the production and transportation sector (23.7%) and service occupations (18.5%) employ the largest number of town residents.

Table 58. Vandemere Workforce by Occupation (2000)

Industry	Number	Percent
Management and related occupations	20	14.8
Service occupations	25	18.5
Sales and office occupations	35	25.9

Farming, fishing, and forestry	1	0.7
Construction, extraction and maintenance	22	16.3
Production and transportation	32	23.7
TOTAL WORKFORCE	130	100

Source: US Census 2000 Summary File 1

In 2000, the town's per capita personal income was $13,570. The most recent poverty estimates indicate that 21.6% of Vandemere residents had income below the poverty level, compared with a poverty rate of 13.1% for North Carolina *(NC Department of Commerce, 2000 County and Regional Scans)*.

Analysis of Vandemere Capabilities

Vandemere partners with many local, state, and federal agencies in its hazard mitigation strategy. Section 16 of this plan lists the institutional, legal, fiscal, and political capabilities of Pamlico County and the individual municipalities.

Vandemere participates in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of these programs are administered by Pamlico County Building Inspections.

Vandemere will participate in any updates to the Hazard Mitigation by representation on the Hazard Mitigation Planning Committee, and the town will follow the procedures for updating the plan as described in Section 5 of this document.

A Community Capability Assessment for the Town of Vandemere is located in Table 60.

Table 59. Vandemere Community Capability Assessment

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
1. Preventive – keeps flood and natural hazard problems from occurring or getting worse. They are usually administered by building, zoning, planning, and/or code enforcement offices.				
Zoning Ordinance	Adopted ___	Medium	Medium because the zoning ordinance regulates low sizes and density and will determine what kind of development is allowed in hazard areas	Any amendments to the zoning ordinance should be incorporated in future updates of the Hazard Mitigation Plan.
Subdivision regulations (administered by the Count y Building Inspections))	Adopted February 2, 1992	Medium	Medium because, specifically for hazard mitigation purposes, this ordinance will prevent flood losses in tandem with the Flood Damage Prevention Ordinance. It will also minimize the adverse effects that development can have on storm water drainage through impervious	Any amendments to the subdivision regulations should be incorporated in future updates of the Hazard Mitigation Plan.

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			surface requirements and through sedimentation and erosion control. Through its roadway requirements, the ordinance also provides for adequate ingress and egress to subdivisions by emergency vehicles for fires or severe weather events.	
Floodplain regulations (All municipalities in Pamlico County have adopted the County's ordinance and the County administers the ordinance for all municipalities)	Adopted March 4, 1985	High	High because the regulations require the minimum standards of the National Flood Insurance Program (NFIP). The County's floodplain areas are currently being re-studied as part of the State's Floodplain Mapping Program. It is possible those flood plain areas will be delineated with updated topography, and that base flood elevations will be recalculated.	The Hazard Mitigation Plan will serve as the community's floodplain management plan.
Storm water regulations	NCGS 143-	High	High because the	Any storm water

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
	214.7(c)		regulations require new developments to provide for storm water management.	management studies should reference the Hazard Mitigation Plan.
Drainage system maintenance	N/A	High	High because maintenance leads to better drainage during storm events	Drainage system maintenance is an ongoing action item.
Impervious surface requirements	Coastal Area Management Act	Medium	Medium because CAMA limits impervious surface in AECs	Impervious surface requirements are enforced through the subdivision regulations and zoning
CAMA land use planning process	Coastal Area Management Act	High	High because the CAMA Land Use Plan contains a section on hazard mitigation	Continue to update the Hazard Mitigation Plan and the CAMA Land Use Plan on the same cycle (same year)
2. Property Protection – usually undertaken by property owners on a building-by-building or parcel basis.				
Insurance	N/A	High	High because well-insured structures can be reconstructed	Continue to participate in programs that

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				provide insurance for natural hazards to residents
3. Natural Resource Protection – preserve or restore natural areas or the natural functions of floodplain, watershed, and natural areas.				
Wetlands protection	Section 404, Clean Water Act of 1972	High	High because wetlands provide a natural function of the floodplain	Wetlands protection should be an important component of any future hazard mitigation document.
Erosion and sediment control	Sedimentation Pollution Control Act	Medium	Medium because this measure catches some surface runoff	Any changes to the erosion and sedimentation control regulations should be incorporated in future updates of the Hazard Mitigation Plan.
Buffer rules	15A NCAC 2B .0233	High	High because riparian areas are effective at removing nitrogen before it reaches streams and	Any changes to the buffer rules and regulations should be incorporated in

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			moving structures away from shorelines	future updates of the Hazard Mitigation Plan.
4. Emergency Services – taken during a hazard event to minimize its impact. These measures are the responsibility of town or county emergency management staff and the owners of critical facilities.				
Flood warning	Emergency Operations Plan	Medium	Medium because people often ignore warnings	Any changes to the flood warning system should be incorporated in future updates of the Hazard Mitigation Plan.
Flood response	Emergency Operations Plan	High	High because the County effects rapid response	Any changes to the flood response system should be incorporated in future updates of the Hazard Mitigation Plan.
Critical facilities protection	Emergency Operations Plan	High	High because County facilities are well-protected	The Hazard Mitigation Plan should always include a section

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				regarding critical facilities
Health and safety maintenance (sheriff, fire, rescue, Coast Guard)	N/A	High	High because these agencies have a history of rapid response	Health and Safety Maintenance capability should be incorporated in future updates of the Hazard Mitigation Plan.
Evacuation routes	Emergency Operations Plan	High	High because evacuation routes are marked throughout the County	An action item regarding evacuation routes is included in the County's action plan.
5. Structural Projects – keep flood waters away from an area with a levee, reservoir, or other flood control measure				
Channel modifications	N/A	Low	Low because channelization can significantly increase runoff	N/A
Breakwater and bulkhead	N/A	High	High because these measures can protect property against erosion	The Coastal Erosion section of future Hazard Mitigation Plan updates should

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
				include breakwaters and bulkheads as effective mitigation tools.
6. Public Information Activities – advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.				
Map information	F.I.R.M.s	High	High because the FIRMs are used before floodplain property is developed	FIRMs play a major role in all versions of the Hazard Mitigation Plan.
Library (located in the County Building Inspections office)	N/A	Low	Low because people do not take advantage of the library	The location of the hazard mitigation library will be included in all updates of the Hazard Mitigation Plan
Technical assistance	N/A	High	High because there is a number of local, state, and federal agencies	Continue to partner with local, state, and federal agencies
Outreach projects	N/A	Medium	Medium because people often ignore outreach	Continue outreach projects and expand

Policies & Programs	Document Reference	Effectiveness (High, Medium, Low)	Rationale For Effectiveness	Recommendations for Incorporating Into Hazard Mitigation Strategy
			material	them where practical
Elevation markers	N/A	High	High because an elevation marker program would inform the public	All communities should consider an elevation marker program (to inform residents and visitors about flood levels)

Action Plan
Vandemere worked with the North Carolina Division of Community Assistance to revise the community's action plan. Vandemere currently has many hazard mitigation strategies in place that are ongoing activities. The following table describes the Town's action plan.

Vandemere identified the following goals:

- To protect life and property from the effects of rising water
- To protect life and property from the effects of high winds
- To protect life and property from the effects of severe winter weather
- To protect life and property from the effects of a wildfire
- To protect assets and lives from the effects of a long term drought situation

In formulating a mitigation strategy, a wide range of activities were considered in order to help achieve the goals of the community and to lessen the vulnerability of Vandemere to the effects of natural hazards.

The plan will identify all implementation information, such as a timeline, funding, and a responsible party.

Each individual mitigation action will be prioritized. Prioritization will be based on the following three criteria:

- Is the action *cost effective*?
- Is the action environmentally sound?
- Is the action technically feasible?

If the action meets all three criteria, it will be given a *High* priority. If the action meets two of the criteria, it will be given a *Medium* priority. If the action only meets one criterion, it will be given a *Low* priority.

This prioritization will be used to ensure coordination with the individual municipalities in the County, considering that many of the hazard mitigation measures undertaken by the municipalities are administered by the County.

The mitigation actions that follow have been developed in order to protect and minimize the potential for damage to new and existing buildings, infrastructure, life and property. The action statements developed are for those hazards likely to impact this geographical area. Other hazards reviewed, but not specifically addressed in the following action plan are unlikely or have never occurred in Pamlico County in recorded history. Many of the actions are continuous in nature, therefore will remain relevant and necessary after 'completion.' These were given a timeframe of 'ongoing' to show the need for that specific action will not be altered. Resources are noted, if applicable.

Table 60. Vandemere Hazard Mitigation Action Plan

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
1	Continue to address drainage issues as the need arises.	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
2	Continue to enforce the zoning ordinance	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
3	Continue to meet all minimum FEMA requirements to remain eligible for debris removal assistance funding from FEMA	Flooding, Hurricanes and Tropical Storms, Nor'easters	FEMA	Town Commissioners	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
4	Continue to work with NC Department of Corrections to provide labor for debris removal from culverts and drains	Flooding, Hurricanes and Tropical Storms, Nor'easters	NC Community Service Program	NC Department of Corrections	ongoing	High This action is: 1) cost effective; 2) environmentally sound; and 3) technically feasible.
5	Contact the County Floodplain Administrator and the NFIP office to request information on	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Town Commissioners	January 1, 2012	Medium This action is 1) cost effective; and 2)

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	the CRS					technically feasible
6	Continue to work with State and County for assistance in clearing the roads after a snow event	Nor'easters, Severe Winter Storms	County's General Fund, NC Division of Emergency Management	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
7	Continue to work with Pamlico County Health Department and DSS to provide information on heating assistance	Nor'easters, Severe Winter Storms	County's General Fund	Pamlico County Health Department, Social Services	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
8	Contact the NC Forestry Service once a year to get information about their wildfire education program	Wildfire	NC Forestry Service	Town Clerk	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
9	Monitor nearby NC Forestry Service tower posts fire risk for area	Wildfire	NC Forestry Service	Pamlico County Emergency Management	ongoing	Medium This action is 1) cost effective; and 2) technically feasible
10	Research storm water management and recommend strategies	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town's General Fund	Planning Board	Ongoing	Medium This action is: 1) environmentally sound; and 2) technically feasible.
11	Establish a more formalized system of	Flooding, Hurricanes and Tropical Storms,	N/A	Town Commissioners	Ongoing	Medium This action is: 1)

#	Action	Hazard	Funding Sources	Responsibility	Target Completion Date	Priority
	routine cleaning of culverts, ditches, streams and the like which impede the flow of water	Nor'easters				environmentally sound; and 2) technically feasible.
12	Request that the issue of occluded drainage canals which surround the town be addressed in the next update of the county's hazard mitigation plan	Flooding, Hurricanes and Tropical Storms, Nor'easters, Wildfire, Thunderstorms/Lightning, Coastal Erosion, Tornadoes	General budget	Town Commissioners	January 2011	Medium This action is: 1) environmentally sound; and 2) technically feasible.
13	Determine the number of repetitive loss properties within the town's jurisdiction and develop strategies to mitigate future risk	Flooding, Hurricanes and Tropical Storms, Nor'easters	N/A	Planning Board	January 2010	Medium This action is: 1) environmentally sound; and 2) technically feasible.
14	Continue to monitor and review the community's status and participation in the National Flood Insurance Program	Flooding, Hurricanes and Tropical Storms, Nor'easters	Town Funds	Town Commissioners	Ongoing	High Cost effective, technically feasible and environmentally sound

Figure 36. Vandemere FIRM Flood Zones & Critical Facilities

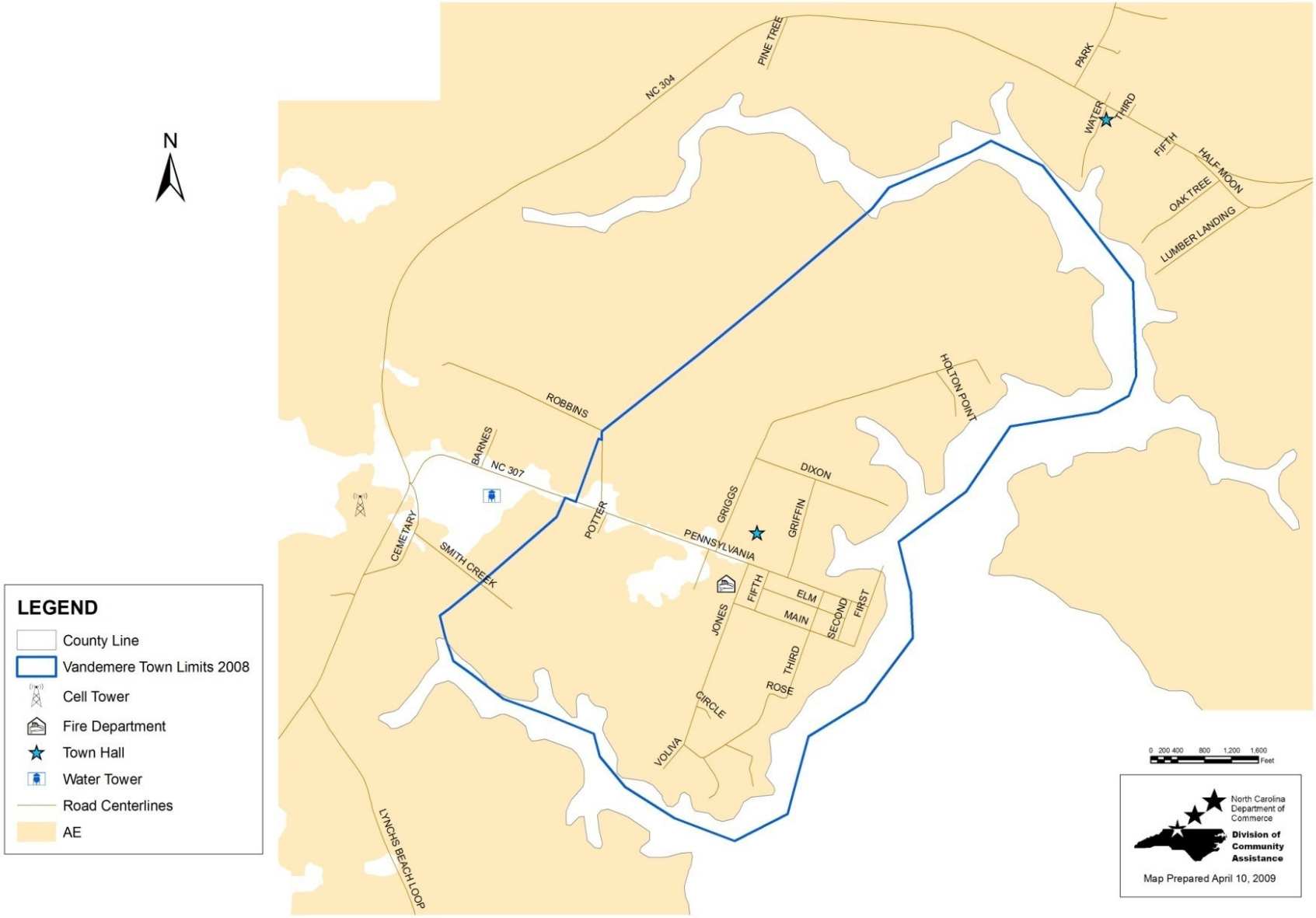

Figure 37. Vandemere Storm Surge Inundation

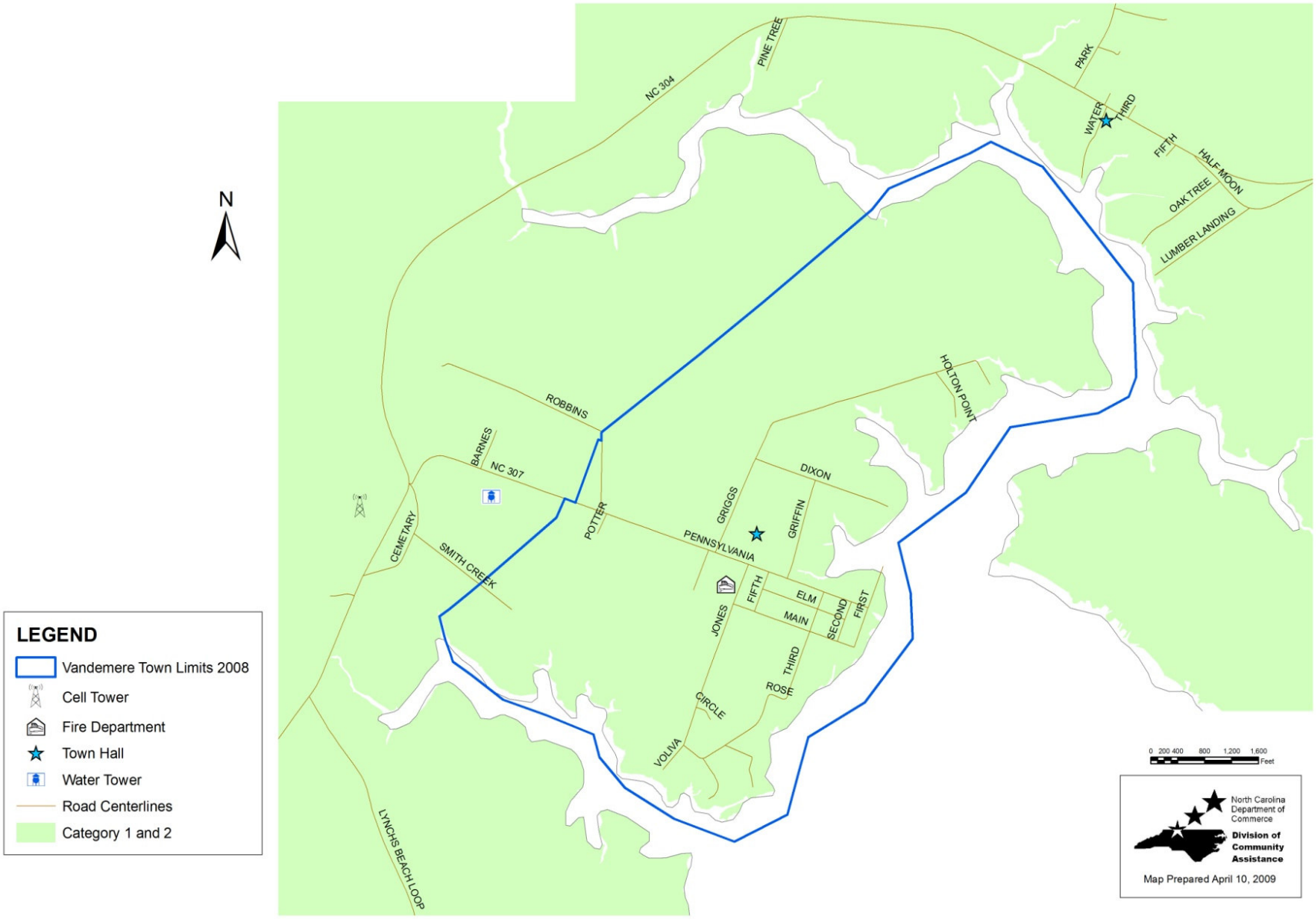

Table 61. Vandemere Vulnerability by Flood Zone

	Vacant Acres	Developed Acres	Total Acres	Building Value ($)	Land Value ($)	Total Value ($)	*Future Development
Inundation - Slow							
Category 1 & 2	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460
Inundation - Fast							
Category 1 & 2	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460
Category 3	0	0	0	0	0	0	0
Category 4 & 5	0	0	0	0	0	0	0
Total	0	219	924	9,283,591	7,705,915	16,989,506	47,525,460
100-Year Floodplain							
AE	704	216	920	8,887,443	7,845,195	16,732,638	47,458,048
Total	704	216	920	8,887,443	7,845,195	16,732,638	47,458,048
Inundation - Slow							
Category 1 & 2	705	219	924	9,283,591	7,705,915	16,989,506	47,525,460

* *Future Development* was calculated by multiplying *Vacant Acres* by the average value per acre in Vandemere ($67,412), determined by dividing the *Total Value of Developed Properties* in Vandemere by *Total Developed Acres*