

SECTION 1. INTRODUCTION

This Fiscal Year 2004/2005 - 2005/2006 Brunswick County Core CAMA Land Use Plan is prepared in accordance with the requirements of the North Carolina Coastal Area Management Act (CAMA). Specifically, this document complies with Subchapter 7B, "CAMA Land Use Planning Requirements," of the North Carolina Administrative Code, as amended, August 1, 2002. This plan was prepared at a time when Brunswick County was undergoing tremendous fiscal and social change. The policies and implementing actions included in Section 6 of this plan will be utilized to guide development in the CAMA major and minor permitting process.

The 7B guidelines provide that each of the twenty coastal counties and the municipalities within those counties prepare and adopt a Core CAMA Land Use Plan that meets the planning requirements adopted by the Coastal Resources Commission (CRC). If a County chooses not to prepare a plan, the guidelines specify that the CRC will prepare and adopt a CAMA Land Use Plan for that County and the municipalities in the County which choose not to prepare their own plan. Municipalities not preparing their own plan will be included in the plan for the County in which the municipality is located. The following municipalities participated in the development of this plan: Belville, Boiling Spring Lakes, Carolina Shores, Northwest, and Saint James.

In general, 7B requires that a plan include analysis of existing and emerging conditions, a plan for the future including specific land use/development goals/policies, and tools for managing development. The management tools must specify the actions that Brunswick County will take to implement this plan.

What is the CAMA Permit System?

The CAMA permit system is divided into major and minor permits, based on the size and possible impacts of a project. Major permits are required for activities that require other state or federal permits, for projects that cover more than 20 acres, or for construction covering more than 60,000 square feet. Applications for major permits are reviewed by ten state and four federal agencies before a decision is made, and this process is coordinated by the CRC. General permits are an expedited form of major permit used for routine projects that usually pose little or no threat to the environment. Minor permits are required for projects, such as single-family houses, that do not require major permits or general permits. They are reviewed, issued, and administered to CRC standards by the City of Washington under contract with the Division of Coastal Management (Source: Association of National Estuary Programs).

Brunswick County adopted a Citizen Participation Plan which is intended to ensure that all interested citizens have an opportunity to participate in the development of this plan through both oral and written comments. A copy of the Citizen Participation Plan is included as Appendix I. An ad hoc committee was appointed by Brunswick County to oversee the development of this plan. The committee included representatives of the participating municipalities, one Brunswick County Planning Board member and three at-large representatives from Brunswick County.

LAND USE PLAN COMMITTEE MEMBERS
Ms. Elizabeth Rollinson, (Belville)
Ms. Margaret Davis (Boiling Spring Lakes)
Dr. Joseph Gore (Brunswick County)
Mr. Bobby M. Long, Chair (Brunswick County)
Mr. Michael Loyack, Vice Chair (Brunswick County)
Mr. Charles Plunkett (Brunswick County)
Ms. Linda Herncane (Carolina Shores)
Ms. Joy Carroll (Carolina Shores)
Mr. James William McKoy (Northwest)

Following adoption of the plan by the Brunswick County Board of Commissioners, it was submitted to the CRC for certification. Certification of the plan was achieved on _____, 2006.

What is CAMA?

CAMA is the North Carolina Coastal Area Management Act (N.C.G.S. 113A-100, et seq.), which establishes a cooperative program of coastal area management between local and state governments. The Act, originally passed in 1974 and since amended, states that local governments shall have the initiative for planning, while the state government establishes areas of environmental concern. With regard to planning, the state government is directed to act primarily in a supportive, standard-setting, and review capacity, except in situations where local governments do not elect to exercise their initiative.

In addition, CAMA establishes the Coastal Resource Commission within the Department of Environment and Natural Resources, whose duties include approval of Coastal Habitat Protection Plans and designation of Areas of Environmental Concern (AEC). After designation of these areas, the Commission is responsible for issuing all permits (Source: National Oceanic and Atmospheric Administration, Coastal Services Center).



Counties covered by CAMA

SECTION 2. BRUNSWICK COUNTY HISTORY

Brunswick County was originally inhabited by natives we call Cape Fear Indians (we never learned what they called themselves, but they were kin to the Waccamaw and the Choctaw Indians). Their name for the area was Chicora. Chicora extended inland into present-day Columbus County and well into South Carolina (present-day Horry County).

The first European to land on Brunswick County soil was, in fact, an Italian, in 1524. Giovanni Verrazano, in the service of the King of France, landed on the coast in what he described as thirty-four degrees latitude. If true, this would be New Hanover County; but with imprecise instruments, he could very well have landed in Brunswick County.

In 1526, a Spaniard named Lucas Vasquez de Ayllon came to establish a colony. In what he described as latitude 33 degrees and 40 minutes, he entered a large river which he named the Rio Jordan, evidence of the first discovery of the Cape Fear River. De Ayllon did not settle along the Cape Fear, but went further south to Winyah Bay in South Carolina, then abandoned this settlement soon thereafter.

In 1629, King Charles I of England granted all of present-day North and South Carolina to proprietors, and this grant was named Carolana, Latin for Charles. The original proprietors never settled Carolana, and the grant expired.

In August 1662, William Hilton, of the Massachusetts Bay Colony reached the Cape Fear River, and he explored it deep into the interior of the colony. One of Hilton's explorations included the "sounding" of the "Indian River" (now Town Creek) with help from the local Indians. Hilton purchased a considerable tract of land along the Indian River, but never settled there.

On March 24, 1663, King Charles II signed the charter by which he granted to eight of his favorites all the land between 31 and 36 degrees latitude. This was named Carolina in his honor. Carolina extended from the Atlantic to the Pacific. William Hilton and John Vassal both brought settlers to the Brunswick area (originally named Clarendon County) in 1663, and within two years it was reported to have over 800 persons spread out for some sixty miles along the Cape Fear River. The center of the settlements was Charles Town, the first community of that name in Carolina. Charles Town was located on the west bank of the Cape Fear River at or near the mouth of what is now called Town Creek. By 1667, however, Clarendon County was completely abandoned. Settlers had become disillusioned with the harshness of the wilderness, and the local Indians made life difficult for them.

From 1667 to 1725, few Englishmen attempted to settle in Brunswick County. Thomas James was granted 1,000 acres on the west side of the Cape Fear River in 1714, but he and his family were murdered by the local Indians. In 1724, Jacob Johnson and his wife Ann were known to be living illegally in the area, but they did not stay long. There are hints of merchant activities in and around the area from 1700 to 1725, but there are no detailed records available to substantiate this.

The earliest legal grant was to Landgrave Thomas Smith on May 8, 1713, with the Conveyance of Smith Island (now Bald Head Island) and most of present-day Southport. In 1725, settlement began in earnest. Grants were dated June 3, 1725, with lands received by Maurice Moore, Samuel Swann, Charles Harrison, and Eleazar Allen. Maurice Moore transferred many acres to his brother, Roger Moore, who developed what is now called Orton Plantation.

Brunswick Town was the first County Seat of the newly formed Brunswick County. It remained so until 1779, well after the outbreak of the Revolutionary War. In 1779, Lockwood Folly was established as the County Seat, and the Court was convened at the house of John Bell until the courthouse was built in 1786. On November 28, 1808, the County Seat was moved to Smithville, a town established in 1792 at mouth of the Cape Fear River. Smithville was later named Southport, and the County Seat remained there until 1975, when it was moved to Bolivia, the current County Seat.

Brunswick County was divided into several districts since inception, but in 1812 these were stabilized into six: Northwest, Town Creek, Smithville, Shallotte, Lockwood Folly, and Waccamaw - all of which are current townships.

From the earliest settlement in Brunswick Town in 1726 to the late 1860s, towns began to spring up around Brunswick County. In the earliest reference, a traveler crossed the Little Charlotte River on a ferry to a settlement near the ferry called Little Charlotte. By 1807, a bridge spanned the Little Charlotte River where the ferry once was. By the 1830s, Little Charlotte was now called Shallotte, the river was now called the Shallotte River, and a post office was established there in 1837. Shallotte was incorporated in 1899. Recent findings of old maps of this area indicate that the Shallotte River was so named as early as 1747 and definitely by 1757, so the name of Shallotte probably goes back well before the 1830s.

In the early 1800s, roads were constructed from Wilmington to Shallotte and on to Georgetown, South Carolina, an important Naval Stores area. These roads were mostly sand and nearly impassable. Therefore, river trade was the easiest way. A trading post was established in the 1820s well up the Lockwood Folly River, near the new road between Wilmington and Shallotte. This trading post was originally called the "Old Georgetown Way, but locals finally named it Supply in the late 1860s.

The Town of Bolivia was established in the 1890s and was incorporated in 1911. In 1975, the County Seat was moved from Southport to Bolivia because Bolivia was closer to the center of the County and could provide better service to the population.

The US Army Corps of Engineers dredged the US Intracoastal Waterway in the 1930s. Upon completion of this, several "barrier islands" became attractive properties immediately after World War II. Development began in earnest in the 1950s, with the boom beginning in the 1960s. Ocean Isle Beach, Holden Beach, Sunset Beach, Long Beach, Yaupon Beach, and Caswell Beach have all been incorporated since the 1950s, and are tremendous vacation attractions today.

Further inland, other small towns sprang up. Exum came into being. Ash was home to Waccamaw High School until all schools were consolidated in 1973. Longwood, Grissettown, and Thomasboro came along in the southern part of the County, along with Calabash (home of world famous seafood) and Hickman's Crossroads. Boiling Springs Lakes was started in the 1960s, and is a favorite golfing community near Southport. On the northern end of the County, Maco, Bishop, Belville, and Winnabow grew into towns. In the middle of the County remains the ever-present Green Swamp, the largest swamp in North Carolina.

Brunswick County is located on the southeastern coast of North Carolina. It is bordered by New Hanover, Columbus, Pender, and Horry (South Carolina) counties, and by the Atlantic Ocean. It is one of the larger counties with an area of 856.51 square miles. It also boasts 47 miles of coastline. The County was formed from sections of New Hanover and Bladen counties. Brunswick County is named after the Town of Brunswick, which was located near present day Southport at the mouth of the Cape Fear River. Brunswick town was named in honor of King George I, Duke of Brunswick, and was established in 1745. It was made into a County in 1764. It was then and still is for the most part a mainly rural County.

SECTION 3. BRUNSWICK COUNTY REGIONAL SETTING

Brunswick County is located in extreme southeastern North Carolina. Map 1 depicts the county's regional location. The County ranks 7th in land area of the state's 100 counties and is composed of a collection of rural and coastal communities. Brunswick County is situated between the rapidly developing metropolitan areas of Wilmington, North Carolina and Myrtle Beach, South Carolina, and is served by US Highways 17, 74/76, and 211. The County has excellent highway access. Interstate 74 is a planned interstate from Rockingham, North Carolina to Brunswick County. In addition, the County is served by the CSX Railroad. There are two airports located within the County. The Brunswick County Airport is located in the southeastern portion of the County near Southport, and the Ocean Isle Beach Airport is located just north of Ocean Isle Beach on the mainland. Both airports have 4,000' x 75' runways. Commercial air carrier service is available at both the New Hanover County International Airport in Wilmington and the Myrtle Beach International Airport.

The County has excellent water access. The Cape Fear River, located on the north side of the County, is maintained by the US Army Corps of Engineers and has a mean low water depth of 42 feet from the Atlantic Ocean Bay to Wilmington. The Intracoastal Waterway is maintained at 12 feet mean low water depth by the US Army Corps of Engineers. The waterway serves barge traffic and pleasure craft along a north/south route on the east side of the County. The waterway is a major support to the economy of Brunswick County. Therefore, maintenance of a navigable depth is crucial.

Brunswick County is known for its natural assets and attractions, including nearly 50 miles of pristine shoreline along the county's five barrier islands.

MAP 1 - REGIONAL LOCATION

SECTION 4.
BRUNSWICK COUNTY
CONCERNS AND ASPIRATIONS

I. Key Issues

The following summarizes key issues confronting Brunswick County:

- ▶ Scattered and sprawling large lot subdivision activity.
- ▶ Unplanned commercial strip development.
- ▶ Sewage problems/sewage solutions.
- ▶ Concern with storm water runoff and drainage.

These issues were reviewed and supplemented at a public information meeting on December 5, 2005, attended by over 20 members of the public and Brunswick County officials. The following provides a listing of the key issues identified, ranked in priority order:

1. Evacuation plan – response time (potential flood)
2. Inadequate roads
3. Stormwater with drainage/flooding
4. Protection of water quality (surficial water)
5. Proper funding for infrastructure
6. Maintenance of ICW
7. (Cumulative impacts) – Define purpose of water, sewer, schools, fire in Technical Review Committee process – Review on regional level
8. Shoreline access
9. Inadequate emergency services (funding support)
10. Imposition of impact fees
11. Clean drinking water in rural areas
12. Impact of Skyway Bridge
13. Impact of third nuclear plant in Brunswick County
14. Provide affordable housing
15. Establish vegetative line on oceanfront property
16. Transportation – senior citizens

In November, 2005, a total of 4,580 surveys were randomly mailed to absentee property owners; this was approximately 10% of the absentee property owners. The following summarizes the survey distribution and responses received:

	<u>Mailed</u>	<u>Received</u>	<u>% Returned</u>
Northwest	48	7	(14.6%)
Belville	66	16	(24.2%)
Carolina Shores	354	92	(26.0%)
St. James	372	122	(32.8%)
Boiling Spring Lakes	567	124	(21.9%)
County	3,173	842	(26.5%)
TOTAL	4,580	1,203	(26.3%)

Source: Holland Consulting Planners, Inc.

The specific results of the surveys are summarized below. The itemized breakdown is included as Appendix II.

BRUNSWICK COUNTY

<u>KEY ISSUES</u>	<u>RANK</u>
Sewage problems/sewage solutions	1
Brunswick County should protect its natural environment	2
Responsible managed growth	3
Brunswick County should promote quality education for present and future generations	4
Preserve and protect wetlands from development pressure	5
Concern with stormwater runoff and drainage	6
Unplanned commercial strip development	7
Scattered and sprawling subdivision activity	8
Expand employment opportunities	9
Improve the availability of affordable housing	10

BELVILLE

<u>KEY ISSUES</u>	<u>RANK</u>
Brunswick County should promote quality education for present and future generations	1
Sewage problems/sewage solutions	2
Responsible managed growth	3
Concern with stormwater runoff and drainage	4
Expand employment opportunities	5
Scattered and sprawling subdivision activity	6
Brunswick County should protect its natural environment	7
Unplanned commercial strip development	8
Preserve and protect wetlands from development pressure	9
Improve the availability of affordable housing	10

BOILING SPRING LAKES

<u>KEY ISSUES</u>	<u>RANK</u>
Sewage problems/sewage solutions	1
Responsible managed growth	2
Brunswick County should promote quality education for present and future generations	3
Brunswick County should protect its natural environment	4
Unplanned commercial strip development	5
Scattered and sprawling subdivision activity	6
Concern with stormwater runoff and drainage	7
Expand employment opportunities	8
Preserve and protect wetlands from development pressure	9
Improve the availability of affordable housing	10

CAROLINA SHORES

<u>KEY ISSUES</u>	<u>RANK</u>
Responsible managed growth	1
Brunswick County should promote quality education for present and future generations	2
Sewage problems/sewage solutions	3
Brunswick County should protect its natural environment	4
Unplanned commercial strip development	5
Preserve and protect wetlands from development pressure	6
Concern with stormwater runoff and drainage	7
Scattered and sprawling subdivision activity	8
Expand employment opportunities	9
Improve the availability of affordable housing	10

NORTHWEST

<u>KEY ISSUES</u>	<u>RANK</u>
Sewage problems/sewage solutions	1
Brunswick County should promote quality education for present and future generations	2
Expand employment opportunities	3
Responsible managed growth	4
Concern with stormwater runoff and drainage	5
Brunswick County should protect its natural environment	6
Improve the availability of affordable housing	7
Unplanned commercial strip development	8
Preserve and protect wetlands from development pressure	9
Scattered and sprawling subdivision activity	10

ST. JAMES

<u>KEY ISSUES</u>	<u>RANK</u>
Responsible managed growth	1
Sewage problems/sewage solutions	2
Unplanned commercial strip development	3
Concern with stormwater runoff and drainage	4
Brunswick County should protect its natural environment	5
Brunswick County should promote quality education for present and future generations	6
Preserve and protect wetlands from development pressure	7
Scattered and sprawling subdivision activity	8
Expand employment opportunities	9
Improve the availability of affordable housing	10

There are similarities in the identification of the top ranked issues:

- Sewage problems/sewage solutions
- Managed growth
- Quality education
- Protection of natural environment
- Expanded employment opportunities

II. Brunswick County Vision Statement

Brunswick County prepared a 1998 CAMA Land Use Plan which was certified by the North Carolina Coastal Resources Commission on November 20, 1998. In addition, in 2003-2004, the County prepared the Brunswick Tomorrow plan which presents a future vision for Brunswick County. The following vision statement is a combination of these two efforts.

Brunswick County Vision Statement

Brunswick County shall seek to preserve and enhance its natural and human resources. The County will plan for and accommodate future growth while simultaneously maintaining the quality of life for current and future residents. Brunswick County will pursue accomplishment of the following mission statements:

- ❖ Set high standards for responsible, well managed growth, and guide development patterns through comprehensive planning and community involvement.
- ❖ Develop a high degree of cooperation among County government and municipal governments and citizens.
- ❖ Promote quality education and lifelong learning opportunities in Brunswick County.
- ❖ Identify goals and propose strategies for the development of new businesses and industries, agribusinesses, seafood products, tourism, and recreational and retirement areas in all parts of the County.
- ❖ Provide an infrastructure system that meets the present and future needs of its citizens, supports a vibrant economy, protects the environment, and adds to the overall quality of life.
- ❖ Provide county-wide services that enhance the health, safety, and quality of life for Brunswick County citizens.
- ❖ Enable Brunswick County residents to meet their needs for food, clean water, clothing, housing, employment, health care, and life enrichment activities.
- ❖ Preserve and protect our natural and man-made environment for present and future generations.

SECTION 5.
BRUNSWICK COUNTY
ANALYSIS OF EXISTING AND EMERGING CONDITIONS

I. POPULATION, HOUSING, AND ECONOMY

A. Population

1. North Carolina's Fastest Growing Counties 2000-2003

Brunswick County ranked fourth in the state for total population growth (11.9%) between 2000 and 2003 and also ranked fourth in the state for net migration (11.3%) during the same period. Net migration can be defined as new population moving into an area from other places. This figure is a more accurate indicator of true population growth versus the population growth estimate, which takes into account natural increase (births minus deaths). The location of Brunswick County on the coast makes it a popular destination. Table 1 provides population information for the ten fastest growing counties in North Carolina. Map 2 summarizes North Carolina's population growth from 1990 to 2000. From 2000 to 2003, North Carolina's population grew at a rate of 2.7% while Brunswick County grew at a rate of 11.3%

Table 1.
Fastest Growing Counties Population Change 2000-2003 by Percentage Growth and Net Migration

County	2000 Population	2003 Estimates	Growth	% Growth	Births	Deaths	Natural Growth	Net Migration	% Net Migration
Union	123,772	144,708	20,936	16.9%	7,494	2,837	4,657	16,279	13.2%
Camden	6,885	7,844	959	13.9%	257	208	49	910	13.2%
Currituck	18,190	20,598	2,408	13.2%	715	530	185	2,223	12.2%
Brunswick	73,141	81,810	8,669	11.9%	2,797	2,389	408	8,261	11.3%
Johnston	121,900	136,304	14,404	11.8%	6,836	3,164	3,672	10,732	8.8%
Wake	627,866	699,503	71,637	11.4%	34,954	10,926	24,028	47,609	7.6%
Dare	29,967	33,328	3,361	11.2%	1,185	848	337	3,024	10.1%
Hoke	33,646	36,990	3,344	9.9%	2,195	796	1,399	1,945	5.8%
Cabarrus	131,063	143,433	12,370	9.4%	7,108	3,706	3,402	8,968	6.8%
Franklin	47,260	51,652	4,392	9.3%	2,138	1,428	710	3,682	7.8%
North Carolina	8,046,807	8,418,090	371,283	4.6%	384,752	232,931	151,821	219,462	2.7%

Source: 2000 US Census.

MAP 2 - NC COUNTY POPULATION

2. Brunswick County and Municipal Population Change 1980-2003

Table 2 provides population growth for Brunswick County and its municipalities from 1980 to 2003. The municipalities that participated in the development of this plan are highlighted in bold print and delineated on Map 3. During this period, the total municipal population increased by 258.0% while the county's unincorporated areas grew at a rate of 85.5%. Overall the county's growth rate was 128.7%.

Table 2.
Brunswick County and Municipal Population Growth, 1980-2003

Municipality	Total Population				% Change			Overall 1980-2003
	1980	1990	2000	2003 Estimate	1980- 1990	1990- 2000	2000- 2003	
Bald Head Island*	0	78	173	205	0.0%	121.8%	18.5%	162.8%
Belville	102	66	363	407	-35.3%	450.0%	12.1%	299.0%
Boiling Spring Lakes	998	1,650	2,972	3,427	65.3%	80.1%	15.3%	243.4%
Bolivia	252	228	148	151	-9.5%	-35.1%	2.0%	-40.1%
Calabash	128	179	711	1,334	39.8%	297.2%	87.6%	942.2%
Carolina Shores*	0	1,031	1,482	2,120	N/A	43.7%	43.0%	105.6%
Caswell Beach	110	175	370	425	59.1%	111.4%	14.9%	286.4%
Holden Beach	232	626	787	836	169.8%	25.7%	6.2%	260.3%
Leland*	0	1,801	1,938	4,703	0.0%	7.6%	142.7%	161.1%
Long Beach**	1,844	3,816	0	0	106.9%	-100.0%	0.0%	-100.0%
Navassa	439	445	479	1,570	1.4%	7.6%	227.8%	257.6%
Northwest*	0	611	671	727	0.0%	9.8%	8.3%	19.0%
Oak Island**	0	0	6,570	7,120	0.0%	0.0%	8.4%	8.4%
Ocean Isle Beach	143	523	426	448	265.7%	-18.5%	5.2%	213.3%
Sandy Creek*	0	243	246	262	0.0%	1.2%	6.5%	7.8%
Shalotte	680	1,073	1,381	1,662	57.8%	28.7%	20.3%	144.4%
Southport	2,824	2,369	2,351	2,558	-16.1%	-0.8%	8.8%	-9.4%
St. James***	0	0	804	1,610	0.0%	0.0%	100.2%	100.2%
Sunset Beach	304	311	1,824	1,967	2.3%	486.5%	7.8%	547.0%
Varnamtown*	328	404	481	513	23.2%	19.1%	6.7%	56.4%
Yaupon Beach**	569	734	0	0	29.0%	-100.0%	0.0%	-100.0%
Total Municipalities	8,953	16,363	24,178	32,045	82.8%	47.3%	33.0%	258.0%
Total Unincorporated Areas	26,824	34,622	48,963	49,765	29.1%	41.6%	1.5%	85.5%
Total County	35,777	50,985	73,141	81,810	42.5%	43.5%	11.9%	128.7%

*This municipality incorporated or reactivated between the 1980 and 1990 censuses. The overall percent change reflects 1990-2003, except for Varnamtown.

**Long Beach and Yaupon Beach merged to form the Town of Oak Island in July, 1999. The percentage change for the Town of Oak Island represents 2000-2003.

***This municipality incorporated between the 1990 and 2000 censuses. The overall percent change reflects 2000-2003. (See first paragraph on page 17.)

Source: US Census Bureau.

MAP 3 - PARTICIPATING MUNICIPALITIES

It should be noted that the Town of Saint James paid for a special census to be completed as a result of some annexations that occurred after the 2000 Census was taken. The special census, dated June 10, 2004, reflects a census count of 1,831 persons. Municipalities may challenge a census count within three years of when the census is taken in order to have the population changed. The special census taken for Saint James was completed after that time period, and therefore the official decennial census count was not changed. However, the state demographer gave Saint James an updated census count of 1,814. This figure was based on the town's boundaries, including the 2001 annexed areas. (This information was obtained from the North Carolina State Data Center.)

In 2003, the municipalities of Belville, Boiling Springs Lakes, Carolina Shores, Northwest and Saint James had a total estimated population of 8,291 or 27.7% of the county's municipal population and 10.1% of the county's overall population. The largest municipalities in Brunswick County include Oak Island, Leland, Boiling Spring Lakes, Southport, Sunset Beach, and Shallotte. Since 1980 the fastest growing municipalities in the County have been Calabash and Sunset Beach, with growth rates of 942.2% and 547.0% respectively.

3. Brunswick County Seasonal Population

Based on information provided by the Brunswick County Economic Development Commission, the following provides estimated peak seasonal population by year for Brunswick County:

Year	Population
1990	153,000
1995	178,120
2000	190,480

Most of this peak seasonal population is attracted to the barrier island beach communities and the county's numerous golf course developments. In 2000 the estimated peak seasonal population was 2.6 times the county's total year-round population. Thus, the seasonal visitors in 2000 were approximately 117,339 visitors.

4. Brunswick County Day Visitors

It is difficult to estimate day visitor population for Brunswick County. However, it should be recognized that day visitors place a strain on law enforcement personnel and the county's transportation system. As an example of day visitor impact, the City of Southport estimated that the four-day 2004 Fourth of July Festival attracted 45,000-50,000 visitors. However, it is acknowledged that not all of those visitors came from outside of Brunswick County. Other festivals

and events that are conducted throughout the year also attract day visitors from outside of the County.

5. Brunswick County Population Profile

Table 3 summarizes the population change by race for Brunswick County since 1980. The overall percentage of the white population in Brunswick County increased by almost six percent (5.8%) between 1980 and 2000 while the non-white percentage decreased from 23.5% in 1980 to 17.7% in 2000. There is no stated comparison of Hispanic population from 1980 to 2000. However, in 1980, "other" population groups comprised 0.4% of the county's total population. This had declined to 0.2% by 1990. In 2000, those reporting Hispanic or Latin origin in the census totaled 2.7%. As in other areas of eastern North Carolina, the Hispanic or Latino population is rapidly increasing.

**Table 3.
Brunswick County Racial and Gender Composition, 1980-2000**

	Total	Percentage
1980 Population		
White	27,368	76.5%
Black	8,261	23.1%
Other	148	0.4%
Total Population	35,777	100.0%
1990 Population		
White	41,336	81.1%
Black	9,211	18.1%
Asian or Pacific Islander	81	0.2%
American Indian, Eskimo, Aleut	242	0.5%
Other	115	0.2%
Total Population	50,985	100.0%
2000 Population		
White	60,200	82.3%
Black	10,516	14.4%
Asian	198	0.3%
American Indian and Alaska Native	494	0.7%
Native Hawaiian & Other Pacific Islander	32	0.0%
Some Other Race	965	1.3%
Two or More Races	738	1.0%
Total Population	73,143	100.0%
Hispanic or Latino (of any race)*	1,960	2.7%

Table 3 (Continued)

	Total	Percentage
Male	35,965	49.2%
Female	37,178	50.8%

*Note: In the 2000 Census, Hispanic was not considered a race; it was considered an ethnic origin. However, this is the number of individuals who reported being of Hispanic origin.
 Source: 2000 US Census.

Historic population profile data is not available for the municipalities of Northwest, Carolina Shores, and Saint James. However, in 2000, Northwest’s population was 71.8% black or African American, Carolina Shores’ population was 99.3% white, and Saint James’ population was 97.9% white.

In 1980, Boiling Spring Lakes’ population was 2.4% black or African American and 97.6% white. In 2000, the black or African American population had increased to 3.3% of the town’s total population.

In 1990, only two black or African Americans lived in Belville. By 2000, the black population had increased to 41 or 14.4% of the town’s total population. This was largely due to annexations by the Town of Belville.

The change in the age composition of Brunswick County is provided in Table 4. Brunswick County experienced a population increase in every age group, but the percentage of the population under 35 decreased. The percentage for the 35 to 54 year age group increased slightly Brunswick County’s 65 and over population was 17.1%. It should be noted that Brunswick County’s population in 2000 was slightly older than that of the state. This is reflected in the municipalities as well.

Table 4.
Brunswick County Age Composition, 1990 and 2000

Age Groups	Brunswick County				North Carolina			
	1990 Total	% of Total	2000 Total	% of Total	1990 Total	% of Total	2000 Total	% of Total
0 to 14 years	9,880	19.4%	12,474	17.1%	1,336,076	20.2%	1,655,606	20.6%
15 to 34 years	13,982	27.4%	16,359	22.4%	2,191,296	33.1%	2,314,098	28.7%
35 to 54 years	13,251	26.0%	21,227	29.0%	1,713,376	25.8%	2,389,049	29.7%
55 to 64 years	6,411	12.6%	10,746	14.7%	585,832	8.8%	720,738	9.0%
65 to 74 years	5,244	10.3%	8,187	11.2%	486,119	7.3%	539,151	6.7%
75 and over	2,217	4.3%	4,150	5.7%	315,938	4.8%	431,271	5.4%
Total population	50,985	100.0%	73,143	100.0%	6,628,637	100.0%	8,049,913	100.0%
Median Age	37.2		42.2	N/A	33.2		35.3	
Population:								
School Age (5-18)	9,447	18.5%	11,891	16.3%	1,255,958	18.9%	2,069,959	25.7%
Working Age (16-64)	32,951	64.6%	46,968	64.2%	4,401,173	66.4%	5,320,796	66.1%
Elderly (65+)	7,461	14.6%	12,342	16.9%	802,057	12.1%	969,822	12.0%

Source: US Census.

Table 5 provides a summary of the 2000 educational attainment information for Brunswick County. The County's data summarizes the overall County educational attainment as well as that for the municipalities. In 2000, Brunswick County compared favorably with the State of North Carolina in educational achievement. In fact, Brunswick County has 33.4% of its population with high school degrees compared to 28.6% for the state. In addition, 5.2% of the county's population had graduate/professional degrees compared to 2.5% for the state's population.

Table 5.
Brunswick County Summary of Educational Attainment (population 25 years and over)

	Brunswick County		North Carolina	
	Total	% of Total	Total	% of Total
Less than 9 th grade	2,813	5.4%	413,495	7.8%
Ninth to twelfth grade, no diploma	8,098	15.5%	951,397	18.0%
High school graduate	17,482	33.4%	1,502,978	28.6%
Some college, no degree	11,821	22.6%	1,080,504	20.7%
Associate degree	3,417	6.7%	358,075	6.9%
Bachelor's degree	5,774	11.2%	808,070	15.5%
Graduate/Professional degree	2,676	5.2%	124,849	2.5%
Total population 25 years and over	52,605	100.0%	5,282,994	100.0%

Source: 2000 US Census.

6. Population Summary

- ▶ Brunswick County ranked fourth in the state for total population growth (11.9%) between 2000 and 2003 and also ranked fourth in the state for net migration (11.3%) during the same period.
- ▶ In 2003, the municipalities of Belville, Boiling Springs Lakes, Carolina Shores, Northwest and Saint James had a total estimated population of 8,291 or 27.7% of the county's municipal population and 10.1% of the county's overall population.
- ▶ The overall percentage of the white population in Brunswick County increased by almost six percent (5.8%) between 1980 and 2000 while the non-white percentage decreased from 23.5% in 1980 to 17.7% in 2000.
- ▶ Brunswick County experienced a population increase in every age group, but the percentage of the population under 35 decreased.
- ▶ 33.4% of Brunswick County's population had high school degrees compared to 28.6% for the state. In addition, 5.2% of the county's population had graduate/professional degrees compared to 2.5% for the state's population.

B. Housing

1. Brunswick County Housing Occupancy and Tenure

Table 6 provides the Brunswick County housing occupancy and tenure from 1990 to 2000. The total number of housing units increased from 37,114 in 1990 to 51,431 in 2000, an increase of 38.5%. It is surprising that the percentage of owner-occupied units in Brunswick County increased from 81.5% in 1990 to 82.2% in 2000.

Table 6.
Brunswick County Housing Occupancy and Tenure, 1990-2000

	Brunswick County 1990		Brunswick County 2000		North Carolina 2000	
	Total Units	% of Total	Total Units	% of Total	Total Units	% of Total
Total Housing Units	37,114		51,431		3,523,944	
Vacant	17,045	45.9%	20,993	40.8%	391,931	11.1%
For Rent	1,842	10.8%	2,108	10.0%	93,913	24.0%

Table 6 (Continued)

	Brunswick County 1990		Brunswick County 2000		North Carolina 2000	
	Total Units	% of Total	Total Units	% of Total	Total Units	% of Total
For Sale Only	765	4.5%	1,021	4.9%	52,080	13.3%
Rented or Sold, not occupied*	n/a	n/a	529	2.5%	32,792	8.4%
For Seasonal, Recreational or Occasional use	12,737	74.7%	16,376	78.0%	147,087	37.5%
For Migrant Workers	n/a	n/a	34	0.2%	2,137	0.5%
Other Vacant	1,701	10.0%	925	4.4%	63,922	16.3%
Occupied	20,069	54.1%	30,438	59.2%	3,132,013	88.9%
Owner-occupied	16,358	81.5%	25,020	82.2%	2,172,270	69.4%
Renter-Occupied	3,711	18.5%	5,418	17.8%	959,743	30.6%

Source: 2000 U.S. Census.

The County's seasonal and recreational housing increased from 12,737 in 1990 to 16,376 in 2000. The County's seasonal housing comprised 78.0% of the total housing inventory in 2000. By comparison, the state's seasonal housing was 37.5% of the total housing inventory. The County has a strong growth-oriented housing market.

The municipalities of Belville, Northwest, Boiling Spring Lakes, Saint James, and Carolina Shores do not have the same seasonal housing inventory as Brunswick County. Table 7 provides a summary of the 2000 housing occupancy for each municipality.

Table 7.
Brunswick County, Municipal Housing Occupancy

	Total Housing Units	Occupied	%	Vacant	%	Seasonal/ Recreation	%
Belville	176	137	76.1%	39	23.9%	0	0%
Boiling Spring Lakes	1,409	1,208	85.7%	201	14.3%	99	7.0%
Carolina Shores	838	766	91.4%	72	8.6%	44	5.3%
Northwest	293	260	88.7%	33	11.3%	2	0.7%
Saint James	618	385	62.3%	233	37.7%	61	9.9%

Source: 2000 U.S. Census.

2. Brunswick County Housing Characteristics Relative to Selected Counties

The following data was included in the 1998 Brunswick County Land Use Plan and was updated through the 2000 U.S. Census. Table 8 compares housing units in Brunswick County with housing units in several counties selected from the northern, central, and southern parts of coastal North Carolina. As indicated, Brunswick County has a higher than average percentage of its housing units in the form of mobile homes.

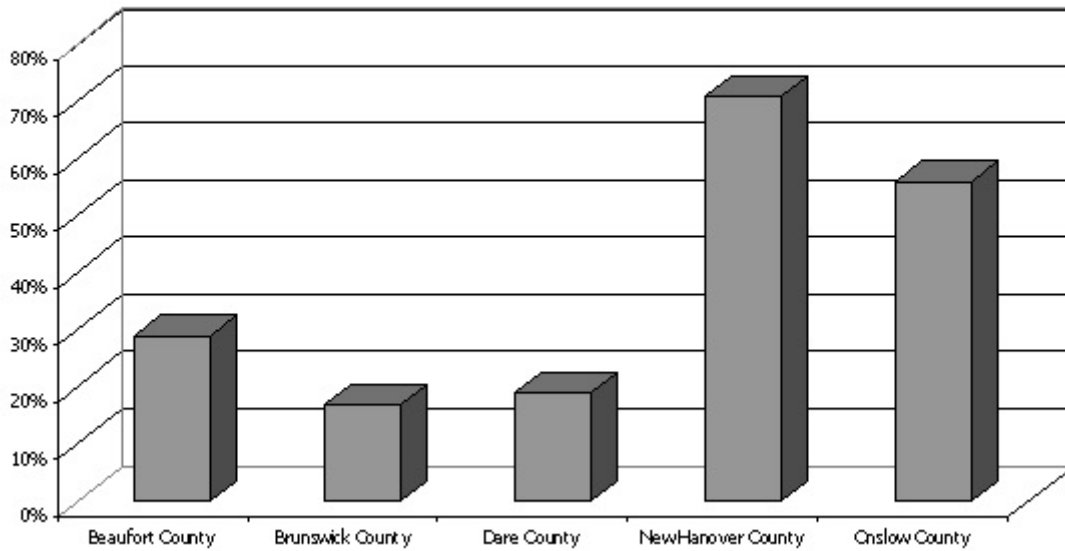
**Table 8.
Housing Characteristics, 2000
Brunswick County Compared to Other Selected Counties**

	Total Housing Units, 1990	% of Total Housing Tied to Public Sewers	% of Total Housing in Substandard Units	% of Total Housing in Mobile Homes
Beaufort County	22,139	29%	5%	27.5%
Brunswick County	51,431	17%	2%	36.0%
Dare County	26,671	19%	1%	8.1%
New Hanover County	79,616	71%	2%	6.1%
Onslow County	55,726	56%	4%	24.4%

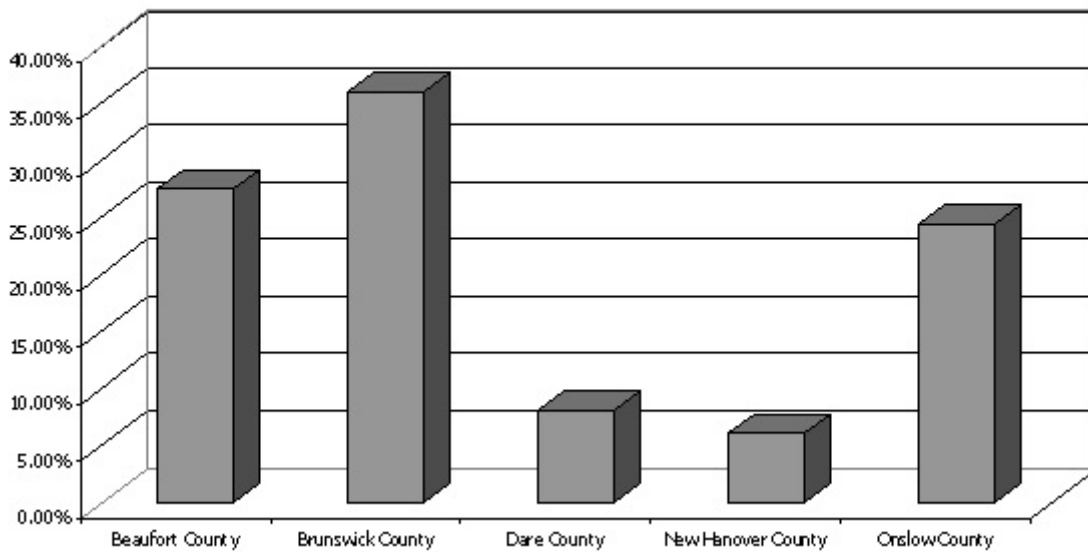
Source: 2000 U.S. Census.*

*Brunswick County ranks 76 out of 100 North Carolina counties in terms of housing cost for homeowners with a mortgage.

Graph 1.
Percent of Total Housing Tied to Public Sewers, 2000
Brunswick County Compared to Selected Coastal Counties



Graph 2.
Percent of Total Housing in Manufactured Homes, 2000
Brunswick County Compared to Selected Coastal Counties



3. Brunswick County Age of Housing

Because of the rapid growth in Brunswick County, 85.3% of the housing inventory has been constructed since 1970. In addition, the median year of the dwelling units constructed was 1986. By comparison, 64.6% of North Carolina's housing inventory has been constructed since 1970. It is anticipated that the overall age (percent 30 years old or older) of the County's housing inventory will continue to decline.

Table 9.
Brunswick County and North Carolina, Year Structure Built

Year	Brunswick County		North Carolina	
	# of Structures	% of Total	# of Structures	% of Total
1999 to March 2000	3,281	6.4%	112,902	3.5%
1995 to 1998	8,797	17.1%	391,032	12.5%
1990 to 1994	7,224	14.0%	336,741	10.8%
1980 to 1989	15,782	30.7%	610,391	19.5%
1970 to 1979	8,784	17.1%	572,335	18.3%
1960 to 1969	3,923	7.6%	400,740	12.8%
1950 to 1959	1,759	3.4%	309,887	9.9%
1940 to 1949	948	1.8%	172,723	5.5%
1939 or Earlier	933	1.8%	225,258	7.2%
Total Structures	51,431	100.0%	3,132,009	100.0%

Median Year Structure Built: 1986

Source: U.S. Census.

4. Brunswick County Occupancy Data

Table 10 provides a summary of the year in which householders moved into their dwelling unit. Based on this data, 51.1% of the Brunswick County population has moved into their dwelling units since 1995. This is further evidence of the rapid growth that is occurring within the County.

Table 10.
Brunswick County, Year Householder Moved Into Unit

Year	Total	% of Total
Total Occupied Units	30,438	
1999 to March 2000	6,062	19.9%
1995 to 1998	9,500	31.2%
1990 to 1994	5,322	17.5%
1980 to 1989	5,435	17.9%
1970 to 1979	2,332	7.7%
Before 1970	1,787	5.9%
		100.0%
Median Year Householder Moved into Unit:		1995

Source: 2000 U.S. Census.

5. Brunswick County Housing Needs

Based on the 2000 U.S. Census, there were 51,431 housing units in Brunswick, of which 30,438 were occupied and not for seasonal, recreational, or occasional use. Approximately 1,881 of these units were constructed prior to 1950. Today there are an estimated 1,029 substandard houses spread throughout the County. Over 83% of the County’s houses do not have access to public sewer facilities and 0.6% lack complete plumbing facilities. The County’s housing needs reflect the disparity of its population growth and economy. These needs are concentrated primarily in and surrounding several low- and moderate-income deteriorated areas: Ash, Supply, Leland, Varnamtown, Shallotte, Bolivia, and Southport. Concentrations of substandard septic tanks and individual wells, combined with a high water table in most of these areas, cause serious hazards to health and to sanitation. In addition, all of these areas include concentrations of dilapidated dwellings, many of which are vacant. These dilapidated dwellings pose fire and safety hazards to area residents, particularly considering the lack of fire protection in many of these areas.

Rapid population growth between 1990 and 2000 occurred, due to the County’s beaches and proximity to the Wilmington, NC MSA and Myrtle Beach, South Carolina, and has resulted in governmental and financial institution services being stressed to meet new housing needs at the expense of low- and moderate-income homeowners. The County’s 2002 unemployment rate was 6.7%, which was lower than the region’s unemployment rate of 7.0%. The lack of economic opportunity contributes to the further deterioration of housing for low income residents.

The primary housing need of the low- and moderate-income populace of Brunswick County is that existing single-family units affordable to low- and moderate-income households are often substandard and not effectively maintained by the owner-occupant or investor-owner. Many of these families have a female head of household, and the substantial repairs required to bring these houses up to standard living conditions are beyond the skill and financial ability of homeowners. According to the 2000 U.S. Census, the 1999 per capita income in Brunswick County was \$19,857 compared to \$20,307 for the state as a whole. Surveys of residents in past CDBG project areas have demonstrated that over 80% of households who occupy substandard housing in the County are low- and moderate-income. Traditional lending institutions are directing their resources to meet accelerated residential and resort development needs. There is a need to provide technical and financial assistance to low- and moderate-income residents to rehabilitate existing housing, when feasible, purchase standard/affordable homes, and generally expand accessibility to safe, standard, and affordable housing. Without rehabilitation assistance, the condition of these homes and neighborhoods will continue to deteriorate, hampering growth and the provision of safe and sanitary living conditions.

Approximately 0.6% of housing within the County does not have complete plumbing facilities. High groundwater tables, soil types, and improperly operating septic systems are a health and safety concern for homes throughout the County. This concern is especially true for many homes occupied by low- and moderate-income residents that occur in "clusters" often in close proximity to wells used for potable water. There is a need to extend water to rural communities throughout the County to eliminate the potential use of unsafe drinking water (wells near septic tanks) as well as improve fire protection.

6. Brunswick County Housing Summary

- ▶ Based on the 2000 U.S. Census, Brunswick County has a total of 51,431 dwelling units, an increase of 38.5% since 1990.
- ▶ The County's seasonal housing increased from 12,737 in 1990 to 16,376 in 2000.
- ▶ The municipalities of Belville, Boiling Spring Lakes, Carolina Shores, Northwest, and Saint James are primarily occupied by year-round residents.
- ▶ Compared to other selected North Carolina coastal counties, Brunswick County has a higher percentage of mobile homes in its housing inventory and a relatively lower percentage of dwelling units connected to public sewer.
- ▶ Brunswick County's housing inventory is very young, with 85.3% of the housing inventory constructed since 1970.

C. Employment and Economy

1. Introduction/Overview of General Economic Indicators

Based on second quarter 2004 data, Brunswick County does not compare favorably with many of North Carolina's 100 counties in terms of workforce/education and income/housing and poverty. The County ranged 66 in unemployed, a decline from 63 in 2003. The County ranked 46 in per capita personal income. However, this was a significant improvement from 1990 when the County ranked 62 in per capita income. Tables 11 and 12 provide a summary of significant economic data.

Table 11.
Workforce and Education
Brunswick County Rank

Workforce & Education	Brunswick County	County Rank
Employment, July 2004	36,608	30
Unemployed, July 2004	1,733	43
Percent Unemployed, July 2004	4.5	66
Percent Unemployed, 2003	6.1	63
Percent Unemployed, NC, July 2004	5.4	
Percent Unemployed, NC, 2003	6.5	
Percent High School Graduates, 2000	78.3	24
Percent High School Graduates, NC, 2000	78.1	
Average SAT Score, 2003	998	36
Average SAT Score, NC, 2003	1,001	
Percent Bachelor's Degree or Higher, 2003	16.1	33
Percent Bachelor's Degree or Higher, NC, 2003	22.5	

Source: U.S. Census and N.C. Employment Security Commission

Table 12.
Income, Housing, and Poverty – Brunswick County Rank

Income, Housing, and Poverty	Brunswick County	County Rank
Average Weekly Wage per Employee, 4Q2003	\$566	34
Median Household Income, 2000	\$35,888	42
Per Capita Personal Income, 1990	\$14,090	62
Per Capita Personal Income, 2002	\$23,908	46
Per Capita Personal Income, NC, 2002	\$27,785	
Median Value of Owner-Occupied Housing Units, 2000	\$95,078	25
Median Value of Owner-Occupied Housing Units, NC, 2000	\$108,300	
Percent in Poverty, 2000	12.6	62
Percent in Poverty, NC, 2000	12.3	

Source: U.S. Census and N.C. Employment Security Commission

2. Household Income

Based on the 2000 U.S. Census, Brunswick County compared favorably with the entire state of North Carolina. In fact, Brunswick County’s median income of \$42,037 exceeded the state’s median income of \$39,184. All income ranges are very close to those of the state. This is a significant improvement from the 1990 U.S. Census when Brunswick County’s median income was \$29,668, while the state’s was \$33,242. Table 13 provides a summary of the Brunswick County and North Carolina household income.

Table 13.
Household Income
Brunswick County and North Carolina

	Household Income, 1999			
	Brunswick County	% of Total	North Carolina	% of Total
Less than \$10,000	3,141	10.3%	328,770	10.5%
\$10,000 to \$14,999	2,336	7.7%	201,123	6.4%
\$15,000 to \$24,999	4,724	15.5%	431,701	13.8%
\$25,000 to \$34,999	4,644	15.2%	435,975	13.9%
\$35,000 to \$49,999	5,476	18.0%	553,041	17.7%

Table 13 (Continued)

	Household Income, 1999			
	Brunswick County	% of Total	North Carolina	% of Total
\$50,000 to \$74,999	5,667	18.6%	608,777	19.4%
\$75,000 to \$99,999	2,250	7.4%	279,020	8.9%
\$100,00 to \$149,999	1,406	4.6%	188,621	6.0%
\$150,000 to \$199,999	365	1.2%	50,650	1.6%
\$200,000 or more	455	1.5%	55,604	1.8%
Total Families	30,455	100.0%	3,133,282	100.0%
Median Income	\$42,037		\$39,184	

Source: U.S. Census

3. Employment by Industry

Table 14 provides a summary of employment by industry. The largest employment sector is construction at 16.6% of the employed workforce. This reflects the tremendous growth that is occurring in Brunswick County. The second largest employment category is retail trade, which is the result of the County's large tourism industry.

Table 14.
Employment by Industry
Brunswick County

Industry	# Employed	% Employed
Agriculture, Forestry, Fishing and Hunting, and Mining	422	1.3%
Construction	5,375	16.6%
Manufacturing	2,660	8.2%
Wholesale Trade	799	2.5%
Retail Trade	4,301	13.3%
Transportation, Warehousing, and Utilities	2,027	6.3%
Information	451	1.4%
Finance, Insurance, Real Estate, and Rental/Leasing	1,930	6.0%

Source: 2000 U.S. Census

A further analysis is provided in Table 15. The top six employment categories in Brunswick County include elementary and secondary schools, electric services, public golf courses, synthetic organic fibers, eating places, and grocery stores. The employment totals are summarized in Table 15. Golf course employment and eating place employment are significant indicators of Brunswick County’s attraction as a recreation/tourism area.

Table 15.
Employment Categories – Brunswick County

Category	# Employed
Elementary and Secondary Schools	2,258
Electric Services	1,237
Public Golf Courses	1,041
Synthetic Organic Fibers	900
Eating Places	963
Grocery Stores	670

Source: NC Manufacturers Directory

It should be noted that the agriculture, forestry, fishing, and mining employment data that has been provided is somewhat misleading because the figures reflect insured employment and do not include many seasonal migratory workers. Although the exact number of individuals employed in these industries is unknown, this sector of industry only employs a small number of individuals within Brunswick County. Beyond these figures, there is no quantitative method to track seasonal employment. Although farming is not a large employer within the County, it is a significant contributor to the County’s economy. Table 16 provides a summary of agricultural revenue data for Brunswick County.

Table 16.
Agricultural Revenue Data, 1998
Brunswick County and North Carolina

Category	Cash Receipts from Agriculture, 1998			
	County Per Capita	State Per Capita	% of County Total	% of State Total
Crops, Total	\$193	\$430	55.0%	44.5%
Tobacco	\$74	\$132	21.0%	13.7%
Other Crops	\$119	\$298	34.0%	30.9%
Livestock, Dairy, Poultry	\$155	\$519	44.0%	53.7%
Government Payments	\$3	\$17	1.0%	1.8%
Total Farm Income	\$351	\$966	100.0%	100.0%

Source: N.C. Department of Commerce, 2000 County Scan

4. Earnings by Industry

Based on second quarter 2004 data, the largest producers of income in Brunswick County were retail trade, construction, and accommodation/food services. These three accounted for 35.9% of the County's employment and approximately \$3,261,052 in average weekly wages. However, finance and insurance produced the highest average weekly wage of \$840. The Brunswick County and North Carolina earnings by sector data are summarized in Table 17.

Table 17.
Employment and Wages by Sector (4Q2003)
Brunswick County and North Carolina

Sector	Average Employment	% Total	Average Weekly Wage	Average Employment	% Total	Average Weekly Wage
Total All Industries	22,899	100.0%	\$566	3,761,541	100.0%	\$679
Total Government	4,285	18.7%	\$709	649,907	17.3%	\$753
Total Private Industry	18,614	81.3%	\$547	3,111,634	82.7%	\$677
Agriculture, Forestry, Fishing, and Hunting	156	0.7%	\$412	30,446	0.8%	\$496
Mining	n/a	n/a	n/a	3,956	0.1%	\$1,031
Utilities	n/a	n/a	n/a	14,892	0.4%	\$1,136
Construction	2,430	10.6%	\$558	214,248	5.7%	\$693
Manufacturing	1,450	6.3%	\$697	586,985	15.6%	\$801
Wholesale Trade	379	1.7%	\$633	163,875	4.4%	\$960
Retail Trade	3,428	15.0%	\$413	450,021	12.0%	\$439
Transportation and Warehousing	765	3.3%	\$755	133,589	3.6%	\$732
Information	289	1.3%	\$796	76,176	2.0%	\$928
Finance and Insurance	446	1.9%	\$840	139,874	3.7%	\$1,049
Real Estate and Rental & Leasing	990	4.3%	\$650	47,173	1.3%	\$638
Professional and Technical Services	835	3.6%	\$709	148,766	4.0%	\$1,095
Management of Companies and Enterprises	21	0.1%	\$561	60,925	1.6%	\$1,332
Administrative and Waste Services	747	3.3%	\$426	216,759	5.8%	\$460
Educational Services	2,220	9.7%	\$616	348,638	9.3%	\$655
Health Care and Social Assistance	2,111	9.2%	\$594	459,599	12.2%	\$716
Arts, Entertainment and Recreation	1,175	5.1%	\$296	48,301	1.3%	\$558
Accommodation and Food Services	2,364	10.3%	\$207	296,012	7.9%	\$241
Other Services excl. Public Admin.	377	1.6%	\$377	97,123	2.6%	\$453
Public Administration	1,617	7.1%	\$699	216,304	5.8%	\$692
Unclassified	103	0.4%	\$539	7,859	0.2%	\$635

Source: U.S. Census and N.C. Employment Security Commission

5. Employment Commuting Patterns

The 2000 mean travel time to work for Brunswick County residents was 24.6 minutes. Forty-five percent (45.4%) of the total population traveled less than 20 minutes to their place of employment. Many eastern North Carolina counties have mean travel times in excess of 30 minutes. The limited travel time for Brunswick County is the result of in-County employment opportunities and the Wilmington Metropolitan area. Table 18 provides a summary of travel time to work.

Table 18.
Travel Time to Work – Brunswick County

Travel Time to Work	Total Employed	% of Total
Total Workers 16 Years and Over	31,962	
Did Not Work At Home	30,870	
Travel Time:		
Less than 5 Minutes	1,023	3.3%
5 to 9 Minutes	3,136	10.2%
10 to 14 Minutes	4,693	15.2%
15 to 19 Minutes	5,156	16.7%
20 to 24 Minutes	4,867	15.8%
25 to 29 Minutes	1,803	5.8%
30 to 34 Minutes	4,714	15.3%
35 to 39 Minutes	617	2.0%
40 to 44 Minutes	836	2.7%
45 to 59 Minutes	2,245	7.3%
60 to 89 Minutes	1,095	3.5%
90 Minutes or More	685	2.2%
Mean Travel Time to Work	24.6 Minutes	
Worked at Home	1,092	

Source: 2000 U.S. Census.

6. Tourism

Travel and tourism are major contributors to Brunswick County’s economy. In 1999, the County was in the top 10 state counties for travel spending, travel wages, travel employment, and seasonal dwelling units. Table 19 provides a summary of the impact of the travel industry on Brunswick County.

Table 19.
Travel and Tourism, 1999 – Brunswick County

Indicator	Year	Total	Per Capita	County Score*
Travel Spending	1999	\$238,010,000	\$3,421	91
Travel Wages	1999	\$55,130,000	\$792	91
Travel Employment	1999	4,100	58.9 (per thousand people)	92
Seasonal Dwelling Units	1990	12,737	249.8 (per thousand people)	99

*County Score: compares per capita spending, wages, and per thousand employment and dwellings among counties from 1 (lowest) to 100 (highest).

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

7. Employment and Economic Summary

- ▶ While the County trails many other North Carolina counties in economic conditions, the economic indicators greatly improved from 1990 to 2000.
- ▶ In 2000, the County’s median income exceeded that of the state by \$2,853.
- ▶ The construction industry is the largest employer in Brunswick County.
- ▶ Based on second quarter 2004 data, the largest producers of income in Brunswick County were retail trade, construction, and accommodation/food services.
- ▶ Agriculture continues to be a significant contributor to the Brunswick County economy.
- ▶ Because of in-County employment opportunities, Brunswick County residents have a low mean travel time to work.
- ▶ Tourism is a major contributor to the Brunswick County economy.
- ▶ Brunswick County has a rapidly expanding industrial base.

8. Population Projections

a. Permanent Population

The population projections through 2020 for the entire County, the municipalities, and the unincorporated areas are provided in Table 20. However, the reader is cautioned that because of potential municipal annexation actions, it is extremely difficult to forecast municipal population growth. The County has stationary geographic/political boundaries. Because of annexations, this is not true for the municipalities. It is assumed, however, that the municipalities will grow within their current boundaries at the same rate of growth as the County.

Table 20.
Brunswick County Population Projections, 2000-2020

Location	2005	2010	% Incr.	2015	% Inc.	2020	% Incr.	2025	% Incr.
Total Municipalities	35,216	41,277	17.2%	47,165	14.3%	55,838	18.4%	65,051	16.5%
Total Unincorporated	53,410	57,977	8.6%	65,905	13.7%	70,852	7.5%	76,945	8.6%
Brunswick County	88,626	99,254	12.3%	113,070	13.6%	126,690	12.0%	142,906	12.8%

Source: N.C. Office of State Planning and Holland Consulting Planners, Inc.

b. Seasonal Population

It is assumed that the County's peak seasonal population will continue to increase at the same rate of growth as it has during the decade of the 1990s. This was an average annual increase of 2.44%. Based on that rate of growth, the following provides peak seasonal population forecasts through 2020:

Table 21.
Seasonal Population Forecasts – Brunswick County

Year	Population
2005	218,639
2010	248,734
2015	276,774
2020	302,618
2025	328,341

Source: Holland Consulting Planners, Inc.

It is expected that the county's peak seasonal population will significantly increase by 2020.

II. NATURAL SYSTEMS ANALYSIS

A. Mapping and Analysis of Natural Features

1. Climate

Brunswick County is hot and humid in summer, but the coast is frequently cooled by sea breezes. Winter is cool with occasional brief cold spells. Rain falls throughout the year and is fairly heavy. Annual precipitation is adequate for all crops. Every few years a hurricane crosses the area.

In winter, the average temperature is 47 degrees F, and the average daily minimum temperature is 37 degrees. The lowest temperature on record, which occurred at Southport on January 18, 1977, is 9 degrees. In summer, the average temperature is 78 degrees F, and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred on June 26, 1952, is 103 degrees.

Of the total annual precipitation, 32 inches, or 60%, usually falls in April through September. The growing season for most crops falls within this period. In two years out of 10, the rainfall in April through September is less than 25 inches. The heaviest one-day rainfall during the period of record was 9.24 inches at Southport on September 29, 1957. Thunderstorms occur on about 45 days each year, and most occur in summer.

Snowfall is rare. The average seasonal snowfall is less than one inch. However, snow in excess of one inch that lasts more than a day does occasionally occur. The greatest snow depth at any time during the period of record was 9 inches.

The average relative humidity in midafternoon is about 60%. Humidity is higher at night, and the average at dawn is about 85%. The sun shines 65% of the time possible in summer and 60% in winter. The prevailing wind is from the south-southwest. Average wind speed is highest, 11 miles per hour, late in winter and early in spring.

2. Physiography, Relief, and Drainage

Brunswick County is in the lower Coastal Plain and ranges in elevation from 75 feet to sea level. All of the soils in the County are formed by coastal plain sediment or by sediment deposited by streams flowing through the County. Most of the County is nearly level with short slopes along the main drainageways. The main streams are wide and shallow, and those near the ocean are

affected by tides. A short distance inland, the streams become narrow with broad interstream areas.

The County has three geomorphic surfaces: the Wicomico, Talbot, and Pamlico surfaces. The Wicomico surface covers about one-third of the County. It ranges from 75 to 45 feet above sea level. The Talbot surface covers more than one-half of the County. It ranges from 45 to 25 feet in elevation. The Pamlico surface covers a narrow strip of mainland near the ocean and Cape Fear River and also covers the floodplain of the Waccamaw River. It ranges from 25 feet to sea level.

The Green Swamp is a roughly circular area of about 175,000 acres in the north central part of the County. The east side is drained by the Cape Fear River, the west side by the Waccamaw River, and the south side drains to the Atlantic Ocean. It has the widest undissected interstream area in the County and the largest area of muck soils. This very poorly drained interstream area has an accumulated organic surface layer of variable thickness. The accumulations are thickest where they have filled in the Carolina bays and in drainageways. The accumulated organic matter blankets the landscape and has obliterated the landscape features outlining Carolina bays and the upper part of many drainageways.

The Cape Fear River is on the east side of the County. Within this drainage area are numerous irregularly-shaped ponds and lakes created by the dissolution and removal of underlying limestone. These lakes and ponds are particularly common near Boiling Spring Lakes. Much of the southeastern part of this area is undulating sand, and the rest is smooth or has convex slopes near drainageways.

The Waccamaw River drainage area is on the west and northwest sides of the County. It is dissected by shallow tributary streams and has broad interstream areas of poorly drained to moderately well drained soils. Coastal creeks drain the south side of the County. Numerous Carolina bays and low parallel sand ridges are in this area. A few of the bays have a thick organic surface layer.

A sinkhole is a naturally occurring, roughly circular depression in the land surface, formed most commonly in areas of limestone bedrock. Limestone is a type of rock composed entirely of the highly reactive mineral calcite (CaCO_3), which readily dissolves in the presence of slightly acidic groundwater. In areas of humid climate, rain water percolates downward through the soil cover into openings in the limestone bedrock, gradually dissolving the rock matrix. Void spaces in the subsurface will eventually form, ranging from microscopic to cavern size.

In most areas of Brunswick County, the limestone bedrock is not directly exposed at the surface, but is covered by a variable thickness of sand, silt, and clay. This overburden may bridge

subsurface cavities for long periods of time. Eventually a catastrophic collapse of the overburden into the subsurface cavity may occur, and a sinkhole is formed. This type of sinkhole is known as a cover collapse sinkhole. There are a substantial number of sinkholes located within Brunswick County. A majority of these are located in the southeastern portion of the County east of Boiling Spring Lakes.

3. Water Supply

Groundwater from the surficial deposits is of good quality but may have a high iron content. The surficial deposits are a valuable aquifer and furnish water for many rural residences. Generally, this aquifer is 10 to 30 feet thick, and 40 feet thick in some places south of U.S. Highway 17.

Below the surficial deposits is a limestone aquifer. It consists of phosphatic limestone with layers of sand, silt, and sandy marl. The limestone aquifer is an important source of water. It is underlain by sedimentary deposits that contain brackish water.

4. Flood Hazard Areas

Based on the Flood Insurance Rate Maps (FIRMs) for Brunswick County, approximately 67% of the County is located in a flood hazard area. The State of North Carolina, as part of the state's flood mapping program, is currently working towards an update of the Cape Fear River Basin's Flood Insurance Rate Maps. The maps for the portion of Brunswick County falling into the Lumber River Basin have been updated and were adopted in 2003. Until the Cape Fear River Basin maps have been updated, existing flood data will be utilized for the entire County, including portions of both the Lumber River and Cape Fear River basins.

The locations of flood zone areas within the County are shown on Map 4. Twenty-eight percent (28%) of the County falls within an A flood zone, approximately 8% falls within an AE zone, 0.3% in the ANI zone, 4% within the VE zone, 59% within the X zone, and 0.5% within the X500 zone. The floodplain designations listed above are defined as follows:

Zone A: An area inundated by 100-year flooding for which no base flood elevations (BFEs) have been established.

Zone AE: An area inundated by 100-year flooding for which BFEs have been determined.

Zone ANI: An area located within a community or County that is not mapped on any published FIRM.

Zone VE: An area inundated by 100-year flooding with velocity hazard (wave action); BFEs have been determined.

Zone X: An area that is determined to be outside the 100- and 500-year floodplains.

Zone X500: An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than one foot or with drainage areas less than one square mile; or an area protected by levees from 100-year flooding.

Acreage figures for portions of Brunswick County that fall within a FEMA-designated flood zone are provided in Table 22.

**Table 22.
Brunswick County Flood Hazard Areas**

	Brunswick County (Total Acres 573,642)		Lumber River Subbasins (Total Acres 318,269)		Cape Fear Subbasin (Total Acres 255,373)	
	Acres	% of Total	Acres	% of Total	Acres	% of Total
A	161,328.0	28.1%	116,026.5	36.5%	45,301.5	17.7%
AE	46,159.6	8.0%	15,165.6	4.8%	30,994.0	12.1%
ANI	1,632.9	0.3%	–	–	1,633.0	0.6%
VE	22,132.8	3.9%	7,041.3	2.2%	15,091.5	5.9%
X	339,511.6	59.2%	178,510.4	56.1%	161,001.2	63.1%
X500	2,876.9	0.5%	1,524.9	0.5%	1,352.0	0.5%
TOTAL	573,641.8	100.0%	318,268.7	100.0%	255,373.2	100.0%

* The data included regarding subbasins relates only to the portions of the subbasin located within Brunswick County.
Source: FEMA and Holland Consulting Planners, Inc. (October, 2004)

MAP 4 - FLOOD HAZARD AREAS

The greatest storm surge impact will occur from hurricanes. Map 5 shows the general areas of Brunswick County that may be affected by hurricane-generated storm surge.

While a considerable amount of Brunswick County lies within the floodplain, the greatest threat is flooding resulting from storm surge and local ponding of water. Approximately nine percent (9%) of the County would be inundated during a Category One and Category Two hurricane. Twelve percent (12%) of the County would be inundated during a Category Three hurricane and eighteen percent (18.4%) inundated during a Category Four and Category Five hurricane. The storm surge acreage/coverage data is summarized in Table 23.

Table 23.
Brunswick County Storm Surge Hurricane Inundation

	Acres	% of Total
Category 1 & 2	51,947.18	9.06%
Category 3	68,290.97	11.90%
Category 4 & 5	105,546.50	18.40%
TOTAL	105,546.50	18.40%

Source: U.S. Army Corps of Engineers.

The Saffir-Simpson Hurricane Scale is a rating system based on hurricane intensity. Within each category is a description of wind speed, storm surge, and estimated damages. Examples of each category are noted.

Category One Hurricane: Winds 74-95 mph. Storm surge generally 4-5 feet above normal. No significant damage to permanent structures. Damage limited to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed areas. Limited coastal road flooding and minor pier damage may occur. Hurricanes Allison and Noel of 1995 were Category One hurricanes at peak intensity.

Category Two Hurricane: Winds 96-110 mph. Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage to buildings. Considerable damage to shrubbery and trees. Some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before the arrival of the hurricane center. Small craft in unprotected anchorages break moorings. Hurricane Bertha of 1996 was a Category Two hurricane when it hit the North Carolina coast.

MAP 5 - STORM SURGE

Category Three Hurricane: Winds 111-130 mph. Storm surge generally 9-12 feet above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Foliage blown off trees. Large trees blown down. Mobile homes and poorly constructed signs are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain lower than five feet above mean sea level may be flooded eight miles inland. Evacuation of low-lying residences within several block of the shoreline may be required. Hurricane Fran of 1996 was a Category Three hurricane.

Category Four Hurricane: Winds 131-155 mph. Storm surge generally 13-18 feet above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be covered by rising water 3-5 hours before the arrival of the hurricane center. Major damage to the lower floors of structures near the shore. Terrain lower than ten feet above sea level may be flooded, requiring the massive evacuation of residential areas as far inland as six miles. Hurricanes Opal and Hugo were Category Four hurricanes at peak intensity when they struck the Florida and South Carolina coasts, respectively. Both storms eventually passed over the western part of North Carolina. At this time, wind speeds had dropped to tropical storm force winds.

Category Five Hurricane: Winds greater than 155 mph. Storm surge generally greater than 18 feet. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown down. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before the arrival of the hurricane center. Major damage to lower floors of all structures located less than 15 feet above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles of the shoreline may be required. Hurricane Gilbert of 1988 was a Category Five hurricane at peak intensity and is the strongest Atlantic tropical cyclone of record. Gilbert passed over Jamaica, the Yucatan Peninsula, and Northern Mexico.

5. Man-made Hazards/Restrictions

There are some significant manmade hazards within Brunswick County. The greatest concentrations of hazardous materials are the storage of gasoline and fuel oil. In addition to fuel storage, chemicals and pesticides are stored at a limited number of areas. The EPA requires that facilities report certain chemical substances located on site. Specifically, under this regulatory requirement, facilities with chemicals on the EPA's list of Extremely Hazardous Substances present in a quantity equal to or in excess of their established Threshold Planning Quantity or a 500 pound threshold (whichever number is less), as well as any hazardous chemical present on site in a quantity equal to or greater than 10,000 pounds must be included on an annual report called the

Tier II. This report must be submitted by March 1st of each year to the North Carolina Emergency Response Commission, the Local Emergency Planning Committee, and the local fire department with jurisdiction over the reporting facility. Table 24 provides a list of facilities in Brunswick County that submitted Tier II reports in 2004.

Table 24.
Tier II Reporters, 2004 -- Brunswick County

Facility	Address	Facility	Address
American Distillation	1690 NE Rouster Road Leland, NC 28451	Jenkin's Gas and Oil Company	8147 River Road Southport, NC 28460
Archer Daniels Midland Company	1730 E Moore Street Southport, NC 28461	K&B Systems, Inc. DBA Ina Oil	8147 River Road Southport, NC 28461
AT&T - Shallotte	6605 Funston Road Winnabow, NC 28470	Malmo Asphalt Plant	1516 Malmo Loop Road Leland, NC 28425
AT&T - Winnabow	6605 Funston Road Winnabow, NC 28470	Minuteman #12	116 Holden Beach Road Shallotte, NC 28459
Bald Head Island Marina	PO Box 3069 Bald Head Island, NC 28461	Minuteman #14	7300 Beach Drive Sunset Beach, NC 28468
Bellsouth - Bald Head Island	Edward Teach & Muscadine Bald Head Island, NC 28461	Minuteman #28	121 Causeway Drive Ocean Isle Beach, NC 28469
Bellsouth - Leland	106 Village Road Leland, NC 28451	NC Department of Transportation	Shallotte, NC 28459 Leland, NC 28451
Bellsouth - Leland #2	Railroad Road Leland, NC 28451	NC National Guard Armory	5050 Main Street Shallotte, NC 28459
Bellsouth - Oak Island	104 46 th Street Oak Island, NC 28461	Ocean Drive Gas and Appliance	827 Highway 17S N. Myrtle Beach, SC 29582
Bellsouth - Southport	254 E 11 th Street Southport, NC 28461	Pelican Pointe Marina, Inc.	2000 Somerset Road Ocean Isle Beach, NC 28469
Bellsouth - Town Creek	Hwy 133 Potter Property Town Creek, NC 28451	Pressure Chemical Company	2271 Andrew Jackson Hwy Leland, NC 28451
Brunswick Community College	50 College Road Bolivia, NC 28422	Progress Energy - Brunswick Steam Electric Plant	Hwy 87 2.5 mi. N of Southport, NC 28461
Coatings and Adhesives	1901 Popular Street Leland, NC 28451	Rampage Yachts	100 Quality Drive Navassa, NC 28451
Cogentrix of NC, Inc.	1281 Cogentrix Drive Southport, NC 28461	RD White & Sons - Ash Location	1123 Whiteville Road Ash, NC 28428
County Line Quick Mart	5201 Andrew Jackson Hwy Riegelwood, NC 28456	RD White & Sons - Shallotte Location	4737 Main Street Shallotte, NC 28459
Diversified Energy - Longwood	2125 Freedom Star Road Longwood, NC 28452	St. James Marina	2760 Long Bay Drive Southport, NC 28461

Table 24 (Continued)

Facility	Address	Facility	Address
Diversified Energy - Shallotte	2468 Ocean Highway Shallotte, NC 28459	Sunny Point Military Ocean Terminal	Highway 133 Southport, NC 28461
Diversified Energy - Southport	4282 Long Beach Road Southport, NC 28461	Superior Carriers, Inc.	215 Sampson Road Wilmington, NC 28401
Dixie Southport LP Gas Company	511 N Howe Street Southport, NC 28461	Technical Coating International, Inc.	150 Backhoe Road Leland, NC 28451
General Wood Preserving Company, Inc.	1901 Wood Treatment Road Leland, NC 28451	Town of Oak Island	SE 48 th Street Oak Island, NC 28465
Gogas #5 - Leland	114 Village Road Leland, NC 28451	Town of Ocean Isle Beach Waste Water Plant	6049 Yarbrough Street SW Ocean Isle Beach, NC 28469
Gogas #8 - Southport	1603 Howe Street Southport, NC 28461	Vitalue Company of America	2010 Enterprise Drive Leland, NC 28451
Gogas #9 - Shallotte	5058 Main Street Shallotte, NC 28470	Walex Products Company, Inc.	1949 Popular Street Leland, NC 28451
High Rise Service Company, Inc.	1690 NE Royster Road Leland, NC 28451	WalMart - Shallotte	4540 Main Street Shallotte, NC 28459
Home Depot #3648, The	150-1 Shallotte Crossing Pkwy Shallotte, NC 28459	WalMart - Southport	1675 N Howe Street Southport, NC 28461
Hydrochem Industrial Services	2304 Mercantile Drive Leland, NC 28451	Waste Industries	2809 Galloway Road Bolivia, NC 28422

Source: Brunswick County Emergency Management.

The second potential hazard would be the possibility of contamination of the Cape Fear River from the Port of Wilmington in the event of a large oil or chemical spill or from damage to a tanker traveling by Southport to the Port of Wilmington. Also, explosives are occasionally shipped on the Cape Fear River along the Southport shoreline to the Sunny Point Military Ocean Terminal. There is also a "blast zone" along the railroad line servicing the terminal. This rail line extends south through Brunswick County between NC 87 and NC 133. In any case, damage to marine life and the estuarine shoreline as well as Brunswick County could be extensive.

Although not presently a concern, there is the potential for the establishment of off-shore drilling operations that could present a hazard to Brunswick County beaches. Even though oil tankers which pass through Brunswick County to the Port of Wilmington probably present a greater threat to the County than that of an off-shore drilling operation, the presence of such would still be a concern to Brunswick County if one were constructed.

6. Soils

A detailed soils survey was issued for Brunswick County in November 1986. That report, Soil Survey of Brunswick County, North Carolina, identifies 38 soil series located in the County. The soil series are located on Map 6, and their characteristics are summarized in Table 25.

Thirty-three of the 38 soil series have severe limitations for septic tank usage. The Blanton (BnB) and Norfolk (NoB) soil types have moderate limitations for septic tank usage but can accommodate conventional septic tank systems. However, these two soil series occupy only small areas, 5.2% of the County's total area.

The soils with moderate limitations for septic tank usage are primarily scattered along the U.S. 17 corridor.

It is significant that 15 of the soil series in Brunswick County are hydric soils. Those 15 include: Bohicket silty clay loam, Carteret loamy fine sand, Croatan muck, Dorovan muck, Duckston fine sand, Grifton fine sandy loam, Lafitte muck, Leon fine sand, Lumbee fine sandy loam, Muckalee loam, Murville mucky fine sand, Pantego mucky loam, Rains fine sandy loam, Torhunta mucky fine sandy loam, and Woodington fine sandy loam. A total of 54.5% of the County's soils are hydric. A hydric soil is a soil which is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (anaerobic is defined as a situation in which molecular oxygen is absent from the environment). These soils may meet the definition of 404 wetland areas if found in combination with certain hydrophytic vegetation and require permitting by the U.S. Army Corps of Engineers' Wilmington Office prior to any disturbance.

MAP 6 - SOIL TYPES

**Table 25.
Brunswick County
Soil Series Characteristics**

Map Symbol	Soil Series	Slope	Depth to Seasonal High H ₂ O Table (ft)	Flooding Frequency (Surface)	Dwellings without Basements	Streets & Roads	Septic Tanks	Total Acreage	% of Each Soil
BaB	Baymeade fine sand	1-6%	4.0 - 5.0	None	Slight	Slight	Severe: poor filter	55,973	10.2%
BDC	Baymeade and Marvyn soils	6-12%	4.0 - 5.0 <6.0	None	Moderate: wetness, slope Moderate: slope	Moderate: slope	Severe: poor filter Moderate: percs slowly, slope	7,762	1.4%
BnB	Blanton fine sand	0-5%	5.0 - 6.0	None	Slight	Slight	Moderate: wetness	16,127	2.9%
BO*	Bohicket silty clay loam		+3 - 0	Frequent	Severe: flooding, ponding, shrink-swell	Severe: low strength, ponding, flooding	Severe: flooding, ponding, percs slowly	13,427	2.5%
BrB	Bragg fine sandy loam	2-6%	>6.0	None	Slight	Moderate: slope	Severe: percs slowly	2,165	0.4%
CA*	Carteret loamy fine sand		+ 3 - 1.0	Frequent	Severe: flooding, ponding	Severe: ponding, flooding	Severe: flooding, ponding, poor filter	1,085	0.2%
CH	Chowan silt loam		0 - 0.5	Frequent	Severe: flooding, wetness, low strength	Severe: low strength, wetness, flooding	Severe: flooding, wetness, percs slowly	5,033	0.9%
Co	Corolla fine sand		1.5 - 3.0	Rare	Severe: flooding	Moderate: flooding, wetness	Severe: wetness, poor filter	989	0.2%
CT*	Croatan muck		0 - 1.0	Rare	Severe: flooding, wetness, low strength	Severe: wetness, low strength	Severe: wetness, percs slowly	29,703	5.4%
DO*	Dorovan muck		+1 - 0.5	Frequent	Severe: flooding, ponding, low strength	Severe: ponding, flooding, low strength	Severe: flooding, ponding, poor filter	16,717	3.0%
Du*	Duckston fine sand		1.0 - 2.0	Occasional	Severe: flooding, wetness	Severe: flooding	Severe: flooding, wetness, poor filter	311	0.1%
Fo	Foreston loamy fine sand		2.5 - 3.5	None	Slight	Slight	Severe: wetness	26,692	4.9%

Table 25 (Continued)

Map Symbol	Soil Series	Slope	Depth to Seasonal High H ₂ O Table (ft)	Flooding Frequency (Surface)	Dwellings without Basements	Streets & Roads	Septic Tanks	Total Acreage	% of Each Soil
GoA	Goldsboro fine sandy loam	0-2%	2.0 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness	29,830	5.4%
Gt*	Grifton fine sandy loam		0.5 - 1.0	None	Severe: wetness	Severe: wetness	Severe: wetness	3,533	0.6%
Jo	Johns fine sandy loam		1.5 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness	3,116	0.6%
KrB	Kureb fine sand	1-8%	>6.0	None	Slight	Slight	Severe: poor filter	16,573	3.0%
LA*	Lafitte muck		0 - 0.5	Frequent	Severe: flooding, low strength	Severe: flooding, low strength	Severe: flooding	1,415	0.3%
Lo*	Leon fine sand	0-2%	0 - 1.0	None	Severe: wetness	Severe: wetness	Severe: wetness, poor filter	45,611	8.3%
Lu*	Lumbee fine sandy loam		0 - 1.5	Rare	Severe: flooding, wetness	Severe: wetness	Severe: wetness	4,127	0.7%
Ly	Lynchburg fine sandy loam		0.5 - 1.5	None	Severe: wetness	Severe: wetness	Severe: wetness	22,023	4.0%
Ma	Mandarin fine sand		1.5 - 3.5	None	Moderate: wetness	Moderate: wetness	Severe: wetness	15,415	2.8%
Mk*	Muckalee loam		0.5 - 1.5	Frequent	Severe: flooding, wetness	Severe: wetness, flooding	Severe: flooding, wetness	28,444	5.2%
Mu*	Murville mucky fine sand		0 - 1.0	None	Severe: ponding	Severe: ponding	Severe: ponding, poor filter	39,490	7.2%
NeE	Newhan fine sand	2-30%	>6.0	None	Severe: slope	Severe: slope	Severe: poor filter, slope	4,415	0.8%
NhE	Newhan fine sand, dredged	2-30%	>6.0	None	Severe: slope	Severe: slope	Severe: poor filter, slope	3,510	0.6%
NoB	Norfolk loamy fine sand	2-6%	4.0 - 6.0	None	Slight	Slight	Moderate: wetness	12,521	2.3%
On	Onslow fine sandy loam		1.5 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness	3,439	0.6%
PaA	Pactolus fine sand	0-2%	1.5 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness, poor filter	3,994	0.7%
Pn*	Pantego mucky loam		0 - 1.5	None	Severe: wetness	Severe: wetness	Severe: wetness	12,176	2.2%

Table 25 (Continued)

Map Symbol	Soil Series	Slope	Depth to Seasonal High H ₂ O Table (ft)	Flooding Frequency (Surface)	Dwellings without Basements	Streets & Roads	Septic Tanks	Total Acreage	% of Each Soil
Pt	Pits							818	0.1%
Ra*	Rains fine sandy loam		0 - 1.0	None	Severe: wetness	Severe: wetness	Severe: wetness	19,991	3.6%
Tm	Tomahawk loamy fine sand		1.5 - 3.0	None	Moderate: wetness	Moderate: wetness	Severe: wetness	4,975	0.9%
To*	Torhunta mucky fine sandy loam		0.5 - 1.5	None	Severe: wetness	Severe: wetness	Severe: wetness, poor filter	47,771	8.7%
Ur	Urban land							740	0.1%
WaB	Wando fine sand	0-6%	4.0 - 6.0	None	Slight	Slight	Severe: poor filter	8,305	1.5%
WdB	Wando-Urban Land Complex	0-6%	4.0 - 6.0	None	Slight	Slight	Severe: poor filter	634	0.1%
Wo*	Woodington fine sandy loam		0.5 - 1.0	None	Severe: wetness	Severe: wetness	Severe: wetness	35,619	6.5%
YaB	Yaupon silty clay loam	0-3%	2.0 - 4.0	None	Severe: wetness	Severe: low strength, shrink-swell	Severe: percs slowly, wetness	3,012	0.5%

*Hydric soils.

Source: Soil Survey of Brunswick County, North Carolina.

7. Prime Farmlands

Prime farmland is one of several kinds of important farmland defined by the US Department of Agriculture. It is of major importance in providing the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the US Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the US Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

About 75,598 acres, or about 14 percent of Brunswick County, meets the soil requirements for prime farmland. This farmland is mainly in the south-central, western, and north-eastern parts of the County. The main crops are corn, soybean, and tobacco.

The soils that make up prime farmland in Brunswick County are listed in this section. This list does not constitute a recommendation for a particular land use. The soils identified as prime farmland are:

- ▶ Fo Foreston loamy fine sand
- ▶ GoA Goldsboro fine sandy loam, 0 to 2 percent slopes
- ▶ Jo Johns fine sandy loam
- ▶ NoB Norfolk loamy fine sand, 2 to 6 percent slopes
- ▶ On Onslow fine sandy loam

8. Water

_____ Water is by far the most abundant natural resource in Brunswick County. Approximately five percent of Brunswick County's total acreage is comprised of surface water. The principal sources of water for Brunswick County are the surficial aquifer for domestic use and the Castle Hayne aquifer for municipal and County supplies. The County does however, operate water treatment plants that utilize both surface waters as well as groundwater.

The Castle Hayne aquifer, underlying the eastern half of the coastal plain, is the most productive aquifer in the state and the primary water source for the county's water system. It is primarily limestone and sand. The Castle Hayne aquifer is noted for its thickness (more than 300 feet in places) and the ease of water movement within it, both of which contribute to high well yields. It lies fairly close to the surface toward the south and west, deepening rapidly toward the east. Water in the Castle Hayne aquifer ranges from hard to very hard because of its limestone composition. Iron concentrations tend to be high near recharge areas but decrease as the water moves further through the limestone.

Throughout the low lying and coastal areas of Brunswick County, the Castle Hayne aquifer is subject to salt water intrusion. Because of the potential for salt water intrusion, approximately 2,500 square miles of the Castle Hayne aquifer, including portions underlying Brunswick County, have been designated as a capacity use area by the NC Groundwater Section. A capacity use area is defined as an area where the use of water resources threatens to exceed the replenishment ability to the extent that regulation may be required. Therefore, wells are not permitted to pump more than 2.018 million gallons per day as permitted under the Central Coastal Plain Capacity Use Area (CCPCUA).

The county's water systems will be discussed in detail in the community facilities section of this plan.

9. Fragile Areas

In coastal North Carolina, fragile areas are considered to include coastal wetlands, ocean beaches and shorelines, estuarine waters and shorelines, public trust waters, natural resource

fragile areas, areas sustaining remnant species, unique geological formations, registered natural landmarks, swamps, prime wildlife habitats, areas of excessive slope, areas of excessive erosion, scenic points, archaeological sites, and historical sites. While not identified as fragile areas in the 15A NCAC 7H use standards, maritime forests and outstanding resource waters (ORWs) should also be considered fragile areas. The Brunswick County 15A NCAC 7H Areas of Environmental Concern (AECs) include estuarine waters and estuarine shorelines, public trust areas, coastal wetlands, ocean beaches and shorelines, areas of excessive slope, areas of excessive erosion, and natural resource fragile areas (including significant natural heritage areas and protected lands). It should be noted that the ocean beaches and shorelines are located in incorporated beach communities.

a. Estuarine Waters and Shorelines

The estuarine system consists of deep water subtidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water, which is the situation at the mouth of the Cape Fear River. These sheltered waters support an abundance and diversity of plant and animal life, including marine mammals, shore birds, fish, crabs, clams and other shellfish, and reptiles. A number of marine organisms, including many of the commercially valuable fish species, depend on the estuaries for spawning, nursing, or feeding.

In addition to serving as an important habitat for wildlife, estuaries also serve as a water filtration system by removing sediments, nutrients, and pollutants before they reach the ocean. The filtration process creates cleaner water, which is of benefit to both marine life and people who inhabit the surrounding areas.

Estuarine shorelines are shorelines immediately adjacent to or bordering estuarine waters. The areas are immediately connected to the estuary and are very vulnerable to heavy erosion caused by wind and water. In shoreline areas not contiguous to waters classified as ORW by the Division of Water Quality, all lands 75 feet leeward from the normal water level are considered to be estuarine shorelines. It should be noted that there are no outstanding resource waters located in Brunswick County. However, the high quality waters located in the County are identified in Appendix III. Development along estuarine shorelines can exacerbate water quality problems within estuarine waters, and expedite the threats of shorefront erosion and flooding.

b. Public Trust Areas

The public trust areas are comprised of submerged lands waterward of the mean high water line in tidal, coastal, or navigable waters adjacent to Brunswick County. On the ground, the public trust area extends from the water up to a prominent debris line or high water mark. In general, if an area is regularly wet by the tides, it is safe to assume that it is in the public trust area. The public trust area is also sometimes referred to as tidelands, and can be generally defined as "public beach." In almost every case, private property ends and public trust property begins at the mean high water line.

Public trust areas are significant because the public has rights in these areas, including navigation and recreation. These areas also support valuable commercial and sports fisheries, have aesthetic value, and are important resources for economic development.

This doctrine applies to all shorelines except privately-owned lakes to which the public has no right of access. In determining whether the public has acquired rights in artificially created bodies of water, the following factors shall be considered:

- (1) the use of the body of water by the public;
- (2) the length of time the public has used the area;
- (3) the value of public resources in the body of water;
- (4) whether the public resources in the body of water are mobile to the extent that they can move into natural bodies of water;
- (5) whether the creation of the artificial body of water required permission from the state; and
- (6) the value of the body of water to the public for navigation from one public area to another public area.

The public trust areas must be determined through in-field analysis and definition.

c. Wetlands

Wetlands is a generic term for all the different kinds of wet habitats where the land is wet for some period of time each year but not necessarily permanently wet. Many wetlands occur in areas where surface water collects or where underground water discharges to the surface, making the area wet for extended periods of time. Other wetlands occur along our coasts, such as salt marshes, and are created by the tide. The Federal Clean Water Act defines wetlands as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation

typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Wetlands have both upland and aquatic characteristics, and thus they often have a richer flora and fauna than other environments. In practice, wetlands are hard to define, precisely because they are transition zones. It is important to recognize that an area does not have to be wet all year long to be considered a wetland - as few as two or three consecutive weeks of wetness a year is all it takes for this determination to be made.

Within Brunswick County, there are approximately 282,728 acres of wetlands. These wetlands vary in their characteristics. The location of the wetland areas within the county's jurisdiction is shown on Map 7, and a summary of wetland acres for the County as a whole is provided in Table 26. Tables 27, 28 and 29 provide wetland area summaries for each river subbasin. The map of wetland locations is intended to be used for general location purposes only. On-site analysis must be performed in order to determine the exact location of all wetlands.

Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. The basic premise of the program is that no discharge of dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded.

**Table 26.
Brunswick County Wetlands**

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	5,531.19	0.96%
Cleared Bottomland Hardwood	106.95	0.03%
Cleared Depressional Swamp Forest	152.74	0.03%
Cleared Estuarine Shrub/Scrub	55.20	0.01%
Cleared Hardwood Flat	62.83	0.01%
Cleared Headwater Swamp	13.59	0.00%
Cleared Pine Flat	314.37	0.05%
Cleared Pocosin	117.97	0.02%
Cutover Bottomland Hardwood	409.47	0.07%
Cutover Depressional Swamp Forest	485.88	0.08%
Cutover Estuarine Forest	2.41	0.00%
Cutover Estuarine Scrub/Scrub	40.18	0.01%

Table 26 (Continued)

Wetland Type	Acres	% of Total County Acres
Cutover Hardwood Flat	240.52	0.04%
Cutover Headwater Swamp	48.84	0.01%
Cutover Pine Flat	1,091.62	0.19%
Cutover Pocosin	513.65	0.09%
Cutover Riverine Swamp Forest	1.23	0.00%
Depressional Swamp Forest	5,204.82	0.91%
Drained Bottomland Hardwood	452.33	0.08%
Drained Depressional Swamp Forest	452.80	0.08%
Drained Hardwood Flat	582.41	0.10%
Drained Headwater Swamp	2.51	0.00%
Drained Pine Flat	22,315.10	3.89%
Drained Pocosin	7,654.63	1.33%
Drained Riverine Swamp Forest	695.94	0.12%
Estuarine Forest	78.64	0.01%
Estuarine Shrub/Scrub	729.22	0.13%
Freshwater Marsh	6,472.43	1.13%
Hardwood Flat	2,490.00	0.43%
Headwater Swamp	1,813.90	0.32%
Human Impacted	1,614.20	0.28%
Managed Pineland	101,576.75	17.71%
Pine Flat	26,740.47	4.66%
Pocosin	33,430.97	5.83%
Riverine Swamp Forest	45,960.27	8.01%
Salt/Brackish Marsh	15,272.77	2.66%
TOTAL	282,728.78	49.29%

Source: North Carolina GIA and National Wetlands Inventory.

Table 27.
Brunswick County Wetlands – Subbasin 03-06-17*

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	3,041.83	0.53%
Cleared Bottomland Hardwood	32.48	0.01%
Cleared Depressional Swamp Forest	33.61	0.01%
Cleared Estuarine Shrub/Scrub	12.69	0.00%
Cleared Hardwood Flat	19.46	0.00%
Cleared Headwater Swamp	11.19	0.00%
Cleared Pine Flat	89.67	0.02%
Cleared Pocosin	20.98	0.00%
Cutover Bottomland Hardwood	178.07	0.03%
Cutover Depressional Swamp Forest	147.24	0.03%
Cutover Estuarine Scrub/Scrub	11.00	0.00%
Cutover Hardwood Flat	95.22	0.02%
Cutover Headwater Swamp	25.67	0.00%
Cutover Pine Flat	371.32	0.06%
Cutover Pocosin	150.60	0.03%
Depressional Swamp Forest	2,215.93	0.39%
Drained Bottomland Hardwood	432.08	0.08%
Drained Depressional Swamp Forest	19.87	0.00%
Drained Hardwood Flat	114.44	0.02%
Drained Headwater Swamp	0.77	0.00%
Drained Pine Flat	9,810.87	1.71%
Drained Pocosin	3,670.29	0.64%
Drained Riverine Swamp Forest	89.08	0.02%
Estuarine Forest	18.22	0.00%
Estuarine Shrub/Scrub	319.42	0.06%
Freshwater Marsh	6,039.20	1.05%
Hardwood Flat	1,065.94	0.19%
Headwater Swamp	804.98	0.14%
Human Impacted	1,153.21	0.20%
Managed Pineland	34,114.23	5.95%
Pine Flat	9,737.02	1.70%
Pocosin	13,465.97	2.35%
Riverine Swamp Forest	17,872.41	3.12%
Salt/Brackish Marsh	8,664.73	1.51%
TOTAL	113,849.70	19.87%

Source: North Carolina GIA and National Wetlands Inventory.

Table 28.
Brunswick County Wetlands – Subbasin 03-07-59*

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	1,116.46	0.20%
Cleared Bottomland Hardwood	61.12	0.01%
Cleared Depressional Swamp Forest	57.11	0.01%
Cleared Estuarine Shrub/Scrub	42.51	0.00%
Cleared Hardwood Flat	18.05	0.00%
Cleared Headwater Swamp	2.12	0.00%
Cleared Pine Flat	168.63	0.03%
Cleared Pocosin	78.22	0.01%
Cutover Bottomland Hardwood	140.65	0.03%
Cutover Depressional Swamp Forest	129.56	0.02%
Cutover Estuarine Forest	2.41	0.00%
Cutover Estuarine Scrub/Scrub	29.18	0.01%
Cutover Hardwood Flat	64.79	0.01%
Cutover Headwater Swamp	17.74	0.00%
Cutover Pine Flat	523.25	0.09%
Cutover Pocosin	283.04	0.05%
Cutover Riverine Swamp Forest	1.23	0.00%
Depressional Swamp Forest	1,834.39	0.32%
Drained Bottomland Hardwood	6.72	0.00%
Drained Depressional Swamp Forest	17.62	0.00%
Drained Hardwood Flat	44.24	0.01%
Drained Pine Flat	822.03	0.14%
Drained Pocosin	411.57	0.07%
Drained Riverine Swamp Forest	14.90	0.00%
Estuarine Forest	60.41	0.01%
Estuarine Shrub/Scrub	409.81	0.07%
Freshwater Marsh	291.57	0.05%
Hardwood Flat	529.62	0.09%
Headwater Swamp	600.65	0.11%
Human Impacted	181.68	0.03%
Managed Pineland	26,987.42	4.71%
Pine Flat	8,617.46	1.50%
Pocosin	9,997.04	1.74%
Riverine Swamp Forest	7,455.78	1.30%
Salt/Brackish Marsh	6,608.04	1.15%
TOTAL	67,627.02	11.80%

Source: North Carolina GIA and National Wetlands Inventory.

Table 29.
Brunswick County Wetlands – Subbasin 03-07-57*

Wetland Type	Acres	% of Total County Acres
Bottomland Hardwood	1,372.90	0.24%
Cleared Bottomland Hardwood	13.35	0.00%
Cleared Depressional Swamp Forest	62.02	0.01%
Cleared Hardwood Flat	25.32	0.00%
Cleared Headwater Swamp	0.28	0.00%
Cleared Pine Flat	56.08	0.01%
Cleared Pocosin	18.77	0.00%
Cutover Bottomland Hardwood	90.75	0.02%
Cutover Depressional Swamp Forest	209.08	0.04%
Cutover Hardwood Flat	80.51	0.01%
Cutover Headwater Swamp	5.43	0.00%
Cutover Pine Flat	197.05	0.03%
Cutover Pocosin	80.01	0.01%
Depressional Swamp Forest	1,154.49	0.20%
Drained Bottomland Hardwood	13.52	0.00%
Drained Depressional Swamp Forest	415.31	0.07%
Drained Hardwood Flat	423.72	0.07%
Drained Headwater Swamp	1.74	0.00%
Drained Pine Flat	11,682.20	2.04%
Drained Pocosin	3,572.77	0.62%
Drained Riverine Swamp Forest	591.96	0.10%
Freshwater Marsh	141.65	0.02%
Hardwood Flat	894.44	0.16%
Headwater Swamp	408.26	0.07%
Human Impacted	279.31	0.05%
Managed Pineland	40,475.10	7.06%
Pine Flat	8,385.99	1.46%
Pocosin	9,967.97	1.74%
Riverine Swamp Forest	20,662.86	3.60%
TOTAL	101,282.90	17.70%

Source: North Carolina GIA and National Wetlands Inventory.

*Refer to Map 12 for locations of subbasins.

MAP 7 - WETLANDS AREAS

d. Ocean Beaches and Shorelines

Ocean beaches and shorelines are lands consisting of unconsolidated soil materials that extend from the mean low water line landward to a point where either (1) the growth of vegetation occurs, or (2) a distinct change in slope or elevation alters the configuration of the land form, whichever is farther landward. Brunswick County contains approximately 47 miles of ocean erodible areas and high hazard flood areas, but no unvegetated beach area. There are six inlet hazard areas within Brunswick County. All of these areas are within or adjacent to municipalities, except the Baptist Assembly grounds located east of Caswell Beach.

e. Areas of Excessive Slope

Areas of excessive slope are considered to be areas with slopes in excess of 12%. The general lay of the land within Brunswick County is fairly flat; however, there are dune lines where slopes may exceed 30%. The grade and slope of these areas is constantly shifting, and this factor has very little impact on land use and/or development within the County. Most of the slope lines are located within incorporated areas.

f. Areas of Excessive Erosion

The ocean shoreline in Brunswick County is vulnerable to erosion associated with coastal storm events. However, the erodible areas are located within the incorporated beach communities. The only ocean erodible area under County jurisdiction is the area of the Baptist Assembly grounds. This area has experienced accretion rather than erosion of oceanfront lands. It should be noted that there is a sea wall at this location.

g. Heritage Areas and Protected Lands

Natural resource fragile areas are generally recognized to be of educational, scientific, or cultural value because of the natural features of the particular site. Features in these areas serve to distinguish them from the vast majority of the landscape. These areas include complex natural areas, areas that sustain remnant species, pocosins, wooded swamps, prime wildlife habitats, or registered natural landmarks.

The North Carolina Natural Heritage Program of the Division of Parks and Recreation works to identify and facilitate protection of the most ecologically significant natural areas remaining in the state. Natural areas may be identified because they provide important habitat for rare species or because they contain outstanding examples of the rich natural diversity of this state.

There are numerous significant protected lands and natural heritage areas in Brunswick County. The County is an environmentally rich area. Major areas include the Green Swamp, Town Creek marshes and swamp, Juniper Creek area, Boiling Spring Lakes wetlands complex, Blue Pond area, and Eagle Island. All of the significant natural heritage areas and protected lands are identified in Tables 30 and 31 and delineated on Maps 8 and 9.

Table 30.
Brunswick County Significant Natural Heritage Areas
(Refer to Map 8)

Map Ref.#	Significant Natural Area Site	Site Number	Acres	% of Total
1	Alligator Branch Sandhill and Flatwoods	S.USNCHP*1617	920.69	0.160%
2	Bald Head Island	S.USNCHP*806	11.25	0.002%
3	Battery Island	S.USSERO1*205	113.33	0.020%
4	Battle Royal Bay	S.USNCHP*1080	877.00	0.153%
5	Big Cypress Bay and Ponds	S.USNCHP*84	135.04	0.024%
6	Big Neck Road at Millpond Bay	S.USNCHP*1574	10.57	0.002%
7	Bird Island	S.USNCHP*88	108.25	0.019%
8	Blue Pond	S.USNCHP*96	29.78	0.005%
9	Bluff Island and East Beach	S.USNCHP*999	4,308.01	0.751%
10	Boiling Spring Lakes Limesink Complex	S.USNCHP*105	2,050.09	0.357%
11	Boiling Spring Lakes Wetlands Complex	S.USNCHP*104	25,045.10	4.366%
12	Boone Neck Maritime Forest	S.USNCHP*872	308.34	0.054%
13	Brantley Island	S.USNCHP*854	0.48	0.0001%
14	Brunswick River/Cape Fear River Marshes	S.USNCHP*119	1,583.90	0.276%
15	Bryant Mill (Greenbank) Bluff	S.USNCHP*1045	486.90	0.085%
16	Camp Branch Savanna Remnant	S.USNCHP*141	43.50	0.008%
17	Colkins Neck Remnant	S.USNCHP*1303	7.87	0.001%
18	Cumbee Pond and Sandhills	S.USNCHP*1076	84.08	0.015%
19	Fall Swamp/Middle River Limesink Complex	S.USNCHP*1030	387.86	0.068%
20	Fort Caswell Dunes and Marshes	S.USNCHP*1866	198.13	0.035%
21	Funston Bays	S.USNCHP*1928	1,774.58	0.309%
22	Goose Pond Limesinks	S.USNCHP*1949	65.58	0.011%
23	Green Swamp	S.USNCHP*314	17,847.53	3.111%
24	Henrytown Savanna	S.USNCHP*334	329.98	0.058%
25	Hog Branch Ponds	S.USNCHP*1427	185.41	0.032%
26	Juniper Bay Savanna	S.USNCHP*1903	194.96	0.034%
27	Juniper Creek Floodplain	S.USNCHP*373	11,949.31	2.083%
28	Juniper Creek/Driving Creek Aquatic Habitat	S.USNCHP*2048	78.24	0.014%

Table 30 (Continued)

Map Ref.#	Significant Natural Area Site	Site Number	Acres	% of Total
29	Little Blue Pond/Black Pond	S.USNCHP*801	44.09	0.008%
30	Lockwood Folly River Tidal Wetlands	S.USNCHP*1576	2,755.24	0.480%
31	Long Bays Savanna and Carolina Bays	S.USNCHP*416	1,135.93	0.198%
32	Lower Black River Swamp	S.USNCHP*1857	128.28	0.022%
33	Lower Cape Fear River Aquatic Habitat	S.USNCHP*421	13,512.90	2.356%
34	Lower Cape Fear River Bird Nesting Islands	S.USNCHP*422	321.77	0.056%
35	Middle Island	S.USNCHP*807	16.26	0.003%
36	Motsu Brunswick Forest Natural Area	S.USNCHP*1900	21.98	0.004%
37	Motsu Northwest Natural Area	S.USNCHP*453	1,778.09	0.310%
38	Myrtle Head Savanna	S.USSERO1*161	72.48	0.013%
39	Neils Eddy Landing	S.USNCHP*1619	0.30	0.0001%
40	Orton Pond	S.USSERO1*297	14,281.83	2.490%
41	Orton Powerline Loosestrife Site	S.USNCHP*1290	3.06	0.001%
42	Pleasant Oaks/Goose Landing Plantations	S.USNCHP*569	3,038.06	0.530%
43	Pretty Pond Limesink Complex	S.USNCHP*833	312.38	0.054%
44	Prospect Ridge White Cedar Forest	S.USNCHP*2073	81.29	0.014%
45	Rabontown Limesinks	S.USNCHP*2072	362.49	0.063%
46	Rattlesnake Branch Sandhills	S.USNCHP*1945	276.37	0.048%
47	Regan Ridge and Swale Boggy Openings	S.USNCHP*1573	134.78	0.023%
48	Sandy Branch Sand Ridge and Bay Complex	S.USNCHP*1115	1,109.20	0.193%
49	Scippio Swamp Ridge and Swale Boggy Openings	S.USNCHP*1578	360.95	0.063%
50	Secession Maritime Forest	S.USNCHP*645	104.55	0.018%
51	Shalotte Creek Sandhills	S.USNCHP*1620	483.58	0.084%
52	Spring Creek Ponds	S.USNCHP*680	603.64	0.105%
53	Sunset Beach Wood Stork Ponds	S.USNCHP*696	61.21	0.011%
54	Town Creek Aquatic Habitat	S.USNCHP*1813	287.60	0.050%
55	Town Creek Marshes and Swamp	S.USNCHP*1516	3,184.28	0.555%
56	Turkey Branch Sandhill	S.USNCHP*2074	4.22	0.001%
57	Waccamaw Island Savanna	S.USNCHP*757	117.43	0.020%
58	Waccamaw River Aquatic Habitat	S.USNCHP*845	177.12	0.031%
59	Waccamaw River Beech Island Swamps	S.USNCHP*1864	37.28	0.006%
60	Waccamaw River Cross Swamp Bottomlands	S.USNCHP*1854	103.89	0.018%
61	Waccamaw River Oxbow Site	S.USNCHP*758	288.64	0.050%

Table 30 (Continued)

Map Ref.#	Significant Natural Area Site	Site Number	Acres	% of Total
62	Waccamaw River Reeves and Gore Lake Bottomlands	S.USNCHP*1855	429.68	0.075%
63	Waccamaw River Ridge and Swale Boggy Openings	S.USNCHP*802	74.39	0.013%
64	Wards Lake	S.USNCHP*765	48.26	0.008%
65	White Spring Ponds Complex	S.USNCHP*1456	1,120.16	0.195%
66	Winnabow Savanna and Sandhill	S.USNCHP*1066	539.58	0.094%
67	Zeke's Island Estuarine Sanctuary	S.USNCHP*797	1,633.37	0.285%
	TOTAL		118,182.41	20.602%

Source: North Carolina GIA, North Carolina Parks & Recreation, Holland Consulting Planners, Inc.

Table 31.
Brunswick County Protected Lands
(Refer to Map 9)

Map Ref.#	Protected Site	Acres	% of Total
1	Beaver Dam Creek	142.32	0.146%
2	Adm. NC-SC Boundary (Bird Island)	27.59	0.005%
3	Cul Res Historic Brunswick Town	78.90	0.014%
4	Cul Res NC Battleship Site	2.16	0.0004%
5	Eagle Island	1,522.76	0.265%
6	EHNR Zeke Island Estuarine Sanctuary	1,060.71	0.185%
7	ENR Marine Fisheries Submerged Lands Section	0.04	0.00001%
8	ENR Estuarine Preserve	7.13	0.001%
9	ENR Roan Island	0.11	0.00002%
10	Green Swamp Preserve	13,552.20	2.362%
11	Lockwood Folly Township Park	14.14	0.002%
12	Northwest Township District Park	35.84	0.006%
13	Pleasant Oaks Plantation	2,229.90	0.389%
14	Prks Bald Head Island Natural Area	4,825.81	0.841%
15	Shalotte Township District Park	20.12	0.004%
16	Smithville Township District Park	25.48	0.004%
17	Town Creek	1,528.74	0.266%
18	UNCW Ecological Botanical Gardens	105.80	0.018%
19	Wells Tract	109.92	0.019%

Table 31 (Continued)

Map Ref.#	Protected Site	Acres	% of Total
20	WRC 904 Bridge/Pipeway Access Area	1.93	0.0003%
21	WRC South Pelican Island 39-37 (NHA)	18.32	0.003%
22	WRC Sunset Harbor Access-Lockwood Folly	0.44	0.0001%
23	WRC Town Creek Access Area	0.78	0.0001%
24	WRC Unnamed Island Snows March #1 39-33	52.59	0.009%
	WRC Unnamed Island Sunny Point 39-28	23.08	0.004%
	TOTAL	25,386.82	4.426%

Source: North Carolina GIA, North Carolina Parks & Recreation, Holland Consulting Planners, Inc.

MAP 8 – NATURAL HERITAGE AREAS

MAP 9 – PROTECTED LANDS

h. Areas of Resource Potential

(i) Regionally Significant Public Parks

While Brunswick County has important historic sites and many sensitive natural and environmentally important areas, the County does not contain any regionally significant parks. There are locally significant parks, which are discussed in the Community Facilities section of this plan.

(ii) Marinas and Mooring Fields

Marinas are defined as any publicly- or privately-owned dock, basin, or wet boat storage facility constructed to accommodate more than ten boats and providing any of the following services: permanent or transient docking spaces, dry storage, fueling facilities, haulout facilities, and repair service. Excluded from this definition are boat ramp facilities allowing access only, temporary docking and none of the preceding services. Brunswick County allows the construction of marinas and any associated drystack storage facilities that are in compliance with the County zoning ordinance.

A "freestanding mooring" is any means to attach a ship, boat, vessel, floating structure, or other water craft to a stationary underwater device, mooring buoy, buoyed anchor, or piling (as long as the piling is not associated with an existing or proposed pier, dock, or boathouse). When more than one freestanding mooring is used in the same general vicinity it is commonly referred to as a mooring field. Brunswick County has not regulated the establishment of mooring fields within its planning jurisdiction and mooring fields have not been a problem. However, the County recognizes that the establishment of mooring fields could lead to the degradation of water quality. In addition, the County recognizes that mooring fields could impede the use of and navigation within public trust surface waters.

(iii) Floating Homes

A floating home or structure is any structure, not a boat, supported by means of flotation, designed to be used without a permanent foundation, which is used or intended for human habitation or commerce. A structure will be considered a floating structure when it is inhabited or used for commercial purposes for more than thirty days in any one location. A boat may be deemed a floating structure when its means of propulsion has been removed or rendered inoperative and it

contains at least 200 square feet of living space area. There are currently no floating homes within Brunswick County. Brunswick County prohibits floating home development anywhere in its waterways, public trust waters, and along the shorelines of the County to prevent consumption of the county's limited estuarine surface waters.

(iv) Aquaculture

As defined under N.C. General Statute 106-758, aquaculture is the propagation and rearing of aquatic species in controlled or selected environments, including, but not limited to, ocean ranching. Aquaculture has not been an issue within Brunswick County's planning jurisdiction; however, the County does support Brunswick Community College's aquaculture program.

(v) Channel Maintenance and Interstate Waterways

The Intracoastal Waterway extends through Brunswick County's southern boundary. The waterway, along with the inlets which provide access to the ocean, provides an indispensable route for fishermen, commercial barge traffic, and recreational boat traffic, all instrumental to the county's economic well-being. The waterway and the ocean inlets are maintained by the US Corps of Engineers. Brunswick County supports dredging and general maintenance of the Intracoastal Waterway.

Proper maintenance of channels is very important to Brunswick County because of the substantial economic impact of commercial fisheries. If silt or other deposits fill in the channels, safe and efficient movement of commercial fishing and transport vessels could be impeded. The Intracoastal Waterway is also an important tourism/economic benefit to the County.

(vi) Marine Resources (Water Quality)

The North Carolina Division of Water Quality assigns water quality classifications to all named waters of the State of North Carolina. The classifications are based upon the existing or contemplated best usage of the various streams and segments of streams within a basin, as determined through studies, evaluations, and comments received at public hearings. The state water classification system is broken down as follows:

**Table 32.
NC Division of Water Quality Water Body Classifications**

PRIMARY FRESHWATER AND SALTWATER CLASSIFICATIONS*

<u>Class</u>	<u>Best Uses</u>
C and SC	Aquatic life propagation/protection and secondary recreation
B and SB	Primary recreation and Class C uses
SA	Waters classified for commercial shellfish harvesting
WS (Water Supply Watershed)	There are five WS classes ranging from WS-I through WS-V. WS classifications are assigned to watersheds based on land use characteristics of the area. Each water supply classification has a set of management strategies to protect the surface water supply. WS-I provides the highest level of protection and WS-V provides the least protection. A Critical Area (CA) designation is also listed for watershed areas within a half-mile and draining to the water supply intake or reservoir where an intake is located.

SUPPLEMENTAL CLASSIFICATIONS

<u>Class</u>	<u>Best Uses</u>
Sw (Swamp Waters)	Recognizes waters that will naturally be more acidic (have lower pH values) and have lower levels of dissolved oxygen.
Tr (Trout Waters)	Provides protection to fresh waters for natural trout propagation and survival of stocked trout.
HQW (High Quality Waters)	Waters possessing special qualities including excellent water quality, Native or Special Native Trout Waters, Critical habitat areas, or WS-I and WS-II water supplies.
ORW (Outstanding Resource Waters)	Unique and special surface waters that are unimpacted by pollution and have some outstanding resource values.
NSW (Nutrient Sensitive Waters)	Areas with water quality problems associated with excessive plant growth resulting from nutrient enrichment.

* Primary classifications beginning with an "S" are assigned to salt waters.

Source: NC Department of Environment and Natural Resources.

Water classifications vary widely throughout Brunswick County. Appendix III provides a listing of all water bodies within the County that are classified by the NC Division of Water Quality, including their subbasins and assigned classification. There are high quality waters within Brunswick County but no outstanding resource waters.

(vii) Primary Nursery Areas and Submerged Aquatic Vegetation

The North Carolina Marine Fisheries Commission (MFC) has adopted definitions in rule for anadromous spawning and nursery areas. Anadromous fish spawning areas are those areas where evidence of spawning of anadromous fish has been documented by direct observation of spawning, capture of running ripe females, or capture of eggs or early larvae [NCAC 15A 31.0101 (20)©]. Anadromous fish nursery areas are those areas in the riverine and estuarine systems utilized by post-larval and later juvenile anadromous fish [NCAC 15A 31.0101 (20)(D)].

There are no areas of submerged aquatic vegetation (SAVs) in Brunswick County. SAVs are an important habitat utilized by finfish and invertebrates. Beds of SAV are one of the critical habitat types defined by MFC [NCAC 15A 31.0101 (20)(A)].

Wetlands are of great importance to fisheries production serving as sources of biological productivity, directly and indirectly, nursery areas, and reducing sedimentation/turbidity to improve water quality.

Map 10 delineates the important fisheries areas and water quality monitoring sites in Brunswick County.

MAP 10 - WATER QUALITY

B. Environmental Composite Map

Under the updated CAMA Planning Guidelines, there is a requirement for the preparation of an Environmental Composite Map. This map is intended to work in conjunction with the Land Suitability Map discussed later in this plan (Section III.D) and should be utilized for future land use map impact analysis (see Future Land Use Map, page 212). The Environmental Composite Map (Map 11) breaks down land masses within the County into three categories based on natural features and environmental conditions. The categories utilized are as follows:

Class I – Land that contains only minimal hazards and limitations that can be addressed by commonly accepted land planning and development practices. Class I land will generally support the more intensive types of land uses and development.

Class II – Land that has hazards and limitations for development that can be addressed by restrictions on land uses, special site planning, or the provision of public services such as water and sewer. Land in this class will generally support only the less intensive uses, such as low density residential, without significant investment in services.

Class III – Land that has serious hazards and limitations. Land in this class will generally support very low intensity uses, such as conservation and open space.

The Environmental Composite Model was prepared in a similar fashion to the Land Suitability Map. An overlay analysis was performed, breaking the County into one acre cells utilizing only map layers determined to be environmental factors. The layers used and their assigned classes are outlined in Table 33.

Table 33.
Brunswick County Environmental Composite Map Layers

Layer	Class I	Class II	Class III
Coastal Wetlands			✓
Exceptional or Substantial Non-Coastal Wetlands			✓
Beneficial Non-Coastal Wetlands		✓	
Estuarine Waters			✓
Soils with Slight or Moderate Septic Limitations	✓		
Soils with Severe Septic Limitations			✓
Flood Zones		✓	

Table 33 (Continued)

Layer	Class I	Class II	Class III
Storm Surge Areas		✓	
HQW Watersheds		✓	
Water Supply Watersheds		✓	
Significant Natural Heritage Areas		✓	
Protected Lands			✓

Source: North Carolina GIA and Coastal Area Management Act.

For a given cell, the computed value of the cell will be determined by the highest class theme that contains the cell. For example, if a cell is in a coastal wetland (Class III) and in a storm surge area (Class II) and intersects a soil with a slight or moderate septic limitation (Class I), the cell value will be Class III. In other words, if a cell does not meet the criteria for Class III, but qualifies as Class II, it has Class II for a value. If a cell does not qualify for either Class III or Class II, then it is Class I by default. This order enables the modeler to leave out themes that are not associated with Classes II or III to simplify the model (yielding the same results). The class acreages are summarized in Table 34.

Table 34.
Brunswick County Environmental Composite Class Acreages Summary

	Acres	% of Total
Class I	215,995.38	39.4%
Class II	55,161.65	10.1%
Class III	277,056.50	50.5%
TOTAL	548,213.53	100.0%

Sources: Holland Consulting Planners, Inc., and NC Center for Geographic Analysis.

The resulting Environmental Composite Map is similar to the Land Suitability Map in that Class III areas are consistent with the least suitable category and the Class I areas are related to the most suitable areas. The primary difference is the absence of infrastructure in the Environmental Composite Map that heightens the emphasis on environmental sensitivity and relative land conservation value. The Future Land Use Map reflects the Class I, II, and III criteria.

MAP 11 - ENVIRONMENTAL COMPOSITE

C. Environmental Conditions (Water Quality, Natural Hazards, and Natural Resources)

Brunswick County includes portions of the Cape Fear River Basin and the Lumber River Basin. These plans were approved by the North Carolina Division of Water Quality (DWQ) in August 2000 and December 2003, respectively. The following are the goals of DWQ's basinwide program:

- Identify water quality problems and restore full use to impaired waters;
- Identify and protect high value resource waters;
- Protect unimpaired waters while allowing for reasonable economic growth;
- Develop appropriate management strategies to protect and restore water quality;
- Assure equitable distribution of waste assimilative capacity for dischargers; and
- Improve public awareness and involvement in the management of the state's surface waters.

As existing and future land use is considered in Brunswick County, these goals should be kept in mind.

The following data on water quality is provided by the North Carolina Department of Environment and Natural Resources. This information is provided by subbasins that geographically include some areas located outside of Brunswick County. Brunswick County includes portions of the following subbasins: 03-07-57, 03-07-59, and 03-06-17. Map 12 delineates the subbasins, and the following provides a summary of existing conditions in the three subbasins.

1. Subbasin 03-07-57

Most of the land use in this subbasin is either forest or agriculture. All tributary streams tend to be intermittent, with little or no flow during dry summer months. For this reason, most of the DWQ sampling in this subbasin focused on the Waccamaw River. Many of the Carolina Bays in this subbasin were drained for agricultural land use.

Water chemistry data is collected from Seven Creeks and from two sites on the Waccamaw River (western boundary of Brunswick County). The

Subbasin 03-07-57	
Land and Water Area (sq.mi.)	
Total area:	555
Land Area:	552
Water area:	3
Population	
1990 Est. Population:	37,457
Population Density:	37 persons/sq.mi.
1996 Land Cover (%)	
Forest/Wetland:	74%
Agriculture:	25%
Urban:	<1%
Water:	1%
Municipalities: Carolina Shores, Calabash, Tabor City, and Shallotte	

principal water quality problem is low dissolved oxygen concentrations, especially during summer low flows. Because of predicted summer low flow for this subbasin, all macroinvertebrate sampling of tributaries was planned for winter. Caw Caw Swamp, a channelized stream, was the only tributary stream found to have flowing water during the July 1996 survey. The basinwide plan for the Cape Fear River Basin will be updated no later than 2008. This plan will involve updated water quality studies throughout the County.

Table 35.
1996 Benthic Macroinvertebrate Sampling Locations
in the Lumber River Subbasin 03-07-57

Stream Name	Sample Type	Rating
Waccamaw River	Benthic Macroinvertebrate	Good-Fair
Caw Caw Swamp	Benthic Macroinvertebrate	Not Rated

Sources: NC Division of Water Quality.

The Waccamaw River is a significant resource within this watershed. While the river is not considered to be impaired, it does have a fish consumption advisory due to mercury accumulation in fish tissue. For this reason, the river remains on the 303(d) list as required by the Clean Water Act.

a. Recommendations

The 1994 Lumber River Basinwide Plan identified several stream segments as impaired. These include the Waccamaw River, Muddy Branch, Bear Branch, Gore Creek (Gore Lake), Toms Fork, Monie Swamp, and Caw Caw Swamp. The planned management strategy for these waters was to investigate sources of impairment, to continue existing nonpoint source control programs, and to conduct fish tissue monitoring and investigate sources of mercury in the Waccamaw River. DWQ also recognized the need to more accurately determine natural versus impacted swamp conditions.

In addition, management strategies to maintain adequate levels of oxygen in stream were recommended. These strategies were aimed at new dischargers into the Waccamaw River watershed.

MAP 12 - SUBBASINS

2. Subbasin 03-07-59

This subbasin is entirely located in Brunswick County and is the only subbasin in the entire Lumber River basin where all waters drain to the Atlantic Ocean. Population growth in the subbasin is primarily concentrated in the coastal communities, but also around the towns of Shallotte and Calabash.

There are three National Pollutant Discharge Elimination Systems (NPDES) wastewater discharge permits in this subbasin with a total permitted flow of 0.02 MGD. There is also one individual NPDES stormwater permit in the subbasin. Brunswick County and South Brunswick Water and Sewer Authority are required to develop a stormwater program under Phase II.

Subbasin 03-07-59	
Land and Water Area (sq.mi.)	
Total area:	267
Land Area:	260
Water area:	7
Population Statistics	
2000 Est. Population:	21,177 people
Land Cover (%)	
Forest/Wetland:	75%
Surface Water:	3%
Urban:	4%
Agriculture:	18%
Municipalities: Boiling Spring Lakes, Bolivia, Carolina Shores, Holden Beach, Oak Island, Ocean Isle Beach, Shallotte, Sunset Beach, and Varnamtown	

There were three benthic macroinvertebrate community sites¹ sampled in 2001 as part of basinwide monitoring. One site was not rated, as biocriteria were being developed to assess swamp streams. Another site received a fair bioclassification, and the last benthic site sampled was part of a special study investigation. There was one fish community site sampled and was not rated due to biocriteria still in development. Data were also collected from 13 ambient stations.

Table 36.
Benthic Macroinvertebrate Community Monitoring Sites
for Subbasin 03-07-59 in Brunswick County

Waterbody	Location	1996	2001
Royal Oak Swamp	NC 211	Good-Fair	Not Rated
Shallotte River	Near US 17	Good-Fair	Fair Good-Fair (Resample 2003)
Royal Oak Swamp	NC 211	Not Rated (1998)	Not Rated (1999)

Source: NC Division of Water Quality.

¹Benthic macroinvertebrates are creatures such as mussels, crayfish, snails, leeches and worms. Each species has a varying tolerance to water pollutants and are, therefore, utilized as an indicator of water quality. (See page 93.)

a. Status and Recommendations of Previously Impaired Waters

(i) Impaired Class SA Waters

Portions of Lockwood Folly and Shallotte Rivers, the Intracoastal Waterway, and all of Calabash Creek were partially supporting in the 1999 basin plan because they were classified as prohibited and conditionally approved-closed to shellfish harvesting by DEH-SS. It was recommended that management strategies be developed for shellfish harvesting waters. These strategies included, but were not limited to, reducing nonpoint source (NPS) runoff, resolving septic system impacts, and working more closely with other state and local agencies to address all pollution impacts to SA waters. The differences in acreage estimates between years are not necessarily related to changes in water quality, but to different methods of estimating acreage and changes in use support methodology.

b. Status and Recommendations of Waters Newly Impaired

(portions of the Intracoastal Waterway, Lockwood Folly River, Shallotte River, Mullet Creek, Sams Branch, Spring Creek, Jinnys Branch, Kilbart Slough, Mill Creek, The Mill Pond, The Swash, Shallotte Creek, Saucepan Creek, Goose Creek, Calabash River, Hangman Branch)

(i) Status

Portions of all of these waters are currently impaired. These areas are prohibited, conditionally approved-closed, or conditionally approved-open to shellfish harvesting because of bacteria levels that do not meet approved area criteria. All waters in the subbasin are considered impaired on an evaluated basis because of fish consumption advice.

(ii) Recommendations

DWQ, DEH-SS, and the NC Coastal Nonpoint Source Program are developing the database and expertise necessary to assess shellfish harvesting use support using a frequency of closure based approach. This database will allow DWQ to better assess the extent and duration of closures in Class SA waters. These tools are not available for use support determinations in Class SA waters for the 2003 Lumber River basin assessment. DWQ believed it important to identify frequency of closures in these waters, resulting in an interim methodology to be used based on existing databases and GIS shapefiles. This will likely bring changes in reported

acreages in future assessments using the permanent methods and tools that define areas and closure frequency.

For the 2003 Lumber River basin assessment, DWQ used an interim frequency of closures based method to assign use support ratings to Class SA waters. DWQ worked with DEH-SS to determine the number of days and acreages that identified conditionally approved-open Class SA waters which were closed to shellfish harvesting in the Lumber River basin during the assessment period (September 1, 1996 to August 31, 2001). For the one growing area with conditionally approved-open Class SA waters, DEH-SS and DWQ staff defined subareas (within the larger conditionally approved-open area) that were opened and closed at the same time. The number of days these conditionally approved-open waters were closed was determined using proclamation summary sheets and the original proclamations. The number of days that approved areas in the growing area were closed due to preemptive closures because of named storms was not counted. DEH-SS will continue to monitor bacteriological water quality in these waters. DWQ, DEH, DCM and DMF are currently developing tools to better track water quality changes, make use support decisions, and support research in shellfishing harvesting waters of North Carolina.

The Division of Marine Fisheries (DMF) is in the process of developing Coastal Habitat Protection Plans (CHPP) with DWQ and DCM. These plans will identify existing and potential threats to habitats important to coastal fisheries and recommend actions to restore and protect them. The plans will also provide a framework for adoption of rules to protect habitats vital to coastal fisheries. The plans will help to assure consistent actions among the Coastal Resources Commission (CRC), Environmental Management Commission (EMC), and the Marine Fisheries Commission (MFC).

It should be noted that Brunswick County is currently working on a project in conjunction with the N.C. Coastal Federation to identify growth management practices that are compatible with maintaining water quality in the river. The project was funded through the Environmental Protection Agency, and has been modeled after successful programs implemented in the upper Chesapeake Bay.

c. Atlantic Ocean – Status and 2002 Recommendations

The Atlantic Ocean (25.6 coastline miles) is currently impaired in the fish consumption category because there is a statewide consumption advice for mercury in fish tissue

that is applied to waters east and south of I-85, including the Atlantic Ocean where king mackerel fish tissue was analyzed in 1999.

d. Status and Recommendations for Waters with Noted Impacts

The surface waters discussed in this section are supporting designated uses based on DWQ's use support assessment and are not considered to be impaired unless otherwise noted. However, notable water quality problems and concerns have been documented for some waters based on this assessment. Attention and resources should be focused on these waters to prevent additional degradation or facilitate water quality improvement.

(i) Calabash River

Status and 2003 Recommendations

The Calabash River is currently impaired for shellfish harvesting. However, it is observed from the DWQ ambient monitoring station, I9916000, that the pH values (Site A-13) were lower than 6.8 in 18.4% of the samples. The 10th percentile illustrates the value of the lower 10% of the measurement. The 10th percentile of pH was 6.7. The state's standard for saltwater is a range of 6.8 to 8.5. Possible adjacent swamp waters could be influencing this watershed. It was also observed at this ambient site that the fecal coliform values exceeded the geometric mean of 14/100 ml in more than 10% of the samples for Class SA waters.

Water Quality Initiatives

The Calabash River watershed comprises one of 20 watersheds in the Lumber River basin that has been identified by the NC Wetlands Restoration Program (NCWRP) as an area with the greatest need and opportunity for stream and wetland restoration efforts. This watershed will be given higher priority than nontargeted watersheds for the implementation of NCWRP restoration projects.

South Brunswick Water & Sewer Authority received \$3,000,000 in state Revolving Grant funds for a new collection system.

(ii) Shalotte River

Status and 2003 Recommendations

Site B-2 near US 17 was reduced from a good-fair bioclassification in 1996 to a fair bioclassification during the 2001 assessment. The decrease in bioclassification was possibly due to drought conditions and subsequent effects of brackish intrusion during the low flow period. DWQ resampled this site in September 2003 to assess potential drought impacts. The site assessment in 2003 received a good-fair bioclassification. However, this assessment found the highest number of species out of its historical sampling regime including the freshwater/brackish shrimp, macrobrachium olfersii. This crayfish-like species inhabits the transitional zones between fresh and brackish water and is rarely seen. This is only the second location found in North Carolina. The Shalotte River is currently rated supporting for the aquatic life category.

Water Quality Initiatives

The Shalotte River watershed comprises one of 20 watersheds in the Lumber River basin that has been identified by the NCWRP as an area with the greatest need and opportunity for stream and wetland restoration efforts. This watershed will be given higher priority than nontargeted watersheds for the implementation of NCWRP restoration projects.

(iii) Lockwood Folly River

Status and 2003 Recommendations

Lockwood Folly River from north of Varnum to the mouth is impaired for the shellfish harvesting category. The data from ambient monitoring sites I9440000 and I9450000 showed the fecal coliform values exceeded the geometric mean of 14/100 ml in more than 10% of the samples for Class SA waters. DWQ will continue to monitor these stations.

Water Quality Initiatives

The NC Coastal Land Trust received a \$652,000 grant from the Clean Water Management Trust Fund (CWMTF) to acquire 263 acres along Lockwood Folly River and Sandy Branch.

The Lockwood Folly River watershed comprises one of 20 watersheds in the Lumber River basin that has been identified by the NCWRP as an area with the greatest need and opportunity for stream and wetland restoration efforts. This watershed will be given higher priority than nontargeted watersheds for the implementation of NCWRP restoration projects.

The Army Corps of Engineers has a \$1,440,000 aquatic habitat restoration project on the lower Lockwood Folly River.

Brunswick County will continue to monitor water quality in the Lockwood Folly River pending the results of the Lockwood Folly Water Quality Study.

(iv) Doe Creek

Status and 2003 Recommendations

A private developer was assessed a civil penalty for land clearing activities where earth and fill were deliberately placed into wetlands. These activities caused extreme turbid water in an unnamed tributary to Doe Creek. DWQ has required the developer to implement a restoration plan.

(v) Mill Creek

Status and 2003 Recommendations

A private owner was assessed a civil penalty for excavating 19,000 linear feet of ditches in wetlands. An unnamed tributary of Mill Creek was impacted by this activity. DWQ has required the owner to implement a restoration plan.

(vi) Jinnys Branch and Saucepan Creek

Status and Water Quality Initiatives

Jinnys Branch and Saucepan Creek are currently impaired for the shellfish harvesting category. The Jinnys Branch/Saucepan Creek watershed comprises one of 20 watersheds in the Lumber River basin that has been identified by the NCWRP as an area with the greatest need and opportunity for stream and wetland restoration efforts. This watershed will be given higher priority than nontargeted watersheds for the implementation of NCWRP restoration projects.

(vii) Davis Creek

Water Quality Initiatives

The Town of Oak Island received a \$456,000 grant from the CWMTF to acquire 30 acres along Davis Creek.

(vii) Bird Island

Water Quality Initiatives

The NC Division of Coastal Management received a \$2,750,000 grant from the CWMTF to purchase Bird Island. Bird Island now falls under the jurisdiction of the NC Division of Coastal Management, who established a management plan for the 1,300 acres of coastal reserve located along Bird Island.

(ix) Montgomery Slough

Status

Montgomery Slough is currently supporting for the aquatic life category. However, it is currently impaired for the shellfish harvesting category.

Water Quality Initiative

The Town of Oak Island received a total of \$2,200,155 from the State Revolving Grants program for new collection lines and treatment modifications.

e. Additional Water Quality Issues within Subbasin 03-07-59

This section discusses issues that may threaten water quality in the subbasin that are not specific to particular streams, lakes or reservoirs. The issues discussed may be related to waters near certain land use activities or within proximity to different pollution sources.

(i) Water Quality Threats to Streams in Urbanizing Watersheds

Streams in this subbasin are already impacted from urban stormwater runoff in shellfish harvesting waters and continue to be threatened by development pressure. In order to prevent aquatic habitat degradation and impaired biological communities, protection measures must be put in place immediately. The County is a named community under Phase II of the National Pollutant Discharge Elimination System Program. As a named community, the County has been required to establish a comprehensive stormwater management program. The permitting process, as well as the County's program, is discussed in detail in the Stormwater Management Section of this plan.

(ii) Impacts of Post-Hurricane Desnagging on Instream Habitats

Many streams in the subbasin have noted impacts from the recent hurricanes. The biological community in the streams can recover rapidly if instream habitat is maintained. Desnagging operations should carefully remove debris from stream channels to restore natural flow and leave enough instream habitats so the biological community can recover.

(ii) Golf Courses

The number of golf courses in Brunswick County has grown vastly through the last five years, making many of the small towns centers of golf activity. Utilizing best management practices during and after construction of the courses can greatly reduce nonpoint source pollution to adjacent streams. It is critical to implement and maintain these management practices throughout the life of the golf course. It should be noted that since the basinwide water quality plan was published, the trend toward golf course development in Brunswick County has slowed.

3. Subbasin 03-06-17

Subbasin 03-06-17 is located in the outer Coastal Plain and in estuarine regions of the basin. The subbasin contains the City of Wilmington and the City of Southport. Most tributaries in this subbasin are backwater and slow moving or tidal. The primary land uses are forest and agriculture. However, Wilmington and surrounding suburban areas also contribute to nonpoint source pollution. There are 49 permitted dischargers in subbasin 03-06-17. Ten of these are major dischargers (>1 MGD). The largest of them are International Paper, Wilmington North Side Wastewater Treatment Plant (WWTP), and Wilmington South Side WWTP.

Waters are classified according to their best intended uses. Determining how well a waterbody supports its designated uses is an important method of interpreting water quality data and assessing water quality. Waterbodies are fully supporting (FS), partially supporting (PS), or not supporting (NS). Streams that are classified PS or NS are considered impaired waters. In subbasin 03-06-17, there are 251.5 miles of fully supporting freshwater streams, 3.8 miles of partially supporting freshwater streams, and 65.5 miles are not rated. There are no freshwater streams classified as NS in the subbasin. There are 16,314 acres of fully supporting estuarine waters, 7,211 acres of partially supporting estuarine waters, and 925 acres that are not rated. There are no estuarine waters that are classified as NS.

Benthic macroinvertebrate data indicated improved water quality at sites most affected by nonpoint sources during the low flow year. Excellent conditions (using draft criteria) were recorded from the Cape Fear River above International Paper. The Cape Fear River below the International Paper discharge showed no change in water quality since the last sampling. The following table indicates the biological assessments sites and information for the subbasin.

Subbasin 03-06-17

Land and Water

Total area: 547 mi²
Land area: 498 mi²
Water area: 49 mi²

Population Statistics

1990 Est. pop.: 56,467 people
Pop. density: 113 persons/mi²

Land Cover

Forest/Wetland: 74.7%
Surface Water: 9.3%
Urban: 4.1%
Cultivated Crop: 7.6%
Pasture/Managed Herbaceous: 4.3%

Municipalities: Northwest, Wilmington, Southport, St. James, and portions of Boiling Spring Lakes

Table 37.
Benthic Macroinvertebrate Community Monitoring Sites for Subbasin 03-06-17

Site #	Stream Name	Location	Rating	
			1993	1998
B-1	Cape Fear River	above International Paper	Good-Fair	Excellent
B-2	Cape Fear River	below International Paper	Fair	Fair
B-3	Livingston Creek	US 74	Fair	Good-Fair
B-5	Hood Creek	US 74/76	No sample	Good
B-9	Barnards Creek	US 421	No sample	Good-Fair
B-10	Town Creek	above SR 1413	No sample	Good-Fair
B-11	Lewis Swamp	SR 1410	No sample	Good-Excellent
B-18	Cape Fear River	Snows Marsh	Moderate	Moderate

Sources: NC Division of Water Quality.

Portions of the Cape Fear River (near Neils Eddy Landing), the Cape Fear River Estuary, and other estuarine waters are currently rated as impaired according to recent DWQ monitoring. The Cape Fear River (near Neils Eddy Landing) is classified as partially supporting because of an impaired biological community. International Paper discharge and nonpoint source pollution are possible causes of impairment. The Cape Fear Estuary is classified as partially supporting due to low levels of dissolved oxygen (DO). Wastewater treatment plant discharges and nonpoint source pollution are suspected to be contributors to the impairment. Swamp water drainage may also be a source of low DO waters feeding into the estuary. Possible sources of nonpoint source pollution include marina, canal systems, and septic systems. There are 2,211 acres of impaired estuarine waters (Southport, Buzzard Bay, the Basin, and the Cape Fear River) in the subbasin according to recent DWQ and DEH Shellfish Sanitation Section monitoring. This figure is in addition to the Cape Fear River Estuary mentioned earlier. These waters have been closed to shellfishing.

a. Recommendations

The 303(d) list approach for the Cape Fear River is to re-sample for biological and chemical data to attempt to determine potential problem parameters. International Paper discharge will also be monitored to determine the extent of impacts. The recommendation for all estuarine waters within the subbasin is management of various land use activities to decrease fecal coliform bacteria levels in shellfish growing areas, thereby decreasing the acreage closed to harvesting.

4. Shellfishing

The following table provides updated information regarding shellfishing areas throughout Brunswick County. This information is current and should clarify any discrepancies present in the basinwide plans. At this time, acreages for conditionally opened and closed areas are not available. The plan will be updated to reflect this information when it becomes available. See Appendix IV for specific areas prohibited for shellfishing.

Table 38.
Status of Shellfishing Areas in Brunswick County

Area	Acres	
	Open	Closed
Calabash Creek	602	1,198
Shalotte River	794	556
Lockwood Folly River	718	932
Southport Area	-0-	1,325
Buzzard Bay	2,733	117
The Basin Area	75	-0-

Source: NCDENR Recreation and Shellfish Division.

III. ANALYSIS OF LAND USE AND DEVELOPMENT

A. Introduction

The Division of Coastal Management Land Use Plan Guidelines (15A NCAC 7B.0207) require that existing land uses and water uses be mapped. The land and water use maps should be utilized as working documents and serve as a basis for the development of the future land use map(s). Specifically, this plan should address the following:

- Significant land use compatibility problems;
- Significant water use compatibility problems including those identified in any water supply plan appendix and those identified in the applicable Division of Environmental Management basinwide plan;

- Significant problems that have resulted from unplanned development and that have implications for future land use, water use, or water quality;
- An identification of areas experiencing or likely to experience changes in predominant land uses, including agricultural and forestry land being converted to other uses and previously undeveloped shoreline areas where development is now occurring;
- Significant water quality conditions and the connection between land use and water quality.

B. Land Use in Relation to Water Quality

This section will serve to take a closer look at land use in Brunswick County and how it relates to water quality. This section has been compiled with information provided by the North Carolina Division of Water Quality (DWQ). Under the Basinwide Management Program, the DWQ completes Basinwide Assessment Reports every five years to be utilized as a basis for the Basinwide Management Plans.

Basinwide water quality planning is a non-regulatory, watershed-based approach to restoring and protecting the quality of North Carolina's surface waters. Preparation of a basinwide water quality plan is a five-year process. While these plans are prepared by the DWQ based on data provided through the Basinwide Assessment Reports, their implementation and the protection of water quality entails the coordinated efforts of many agencies, local governments, and stakeholder groups in the state. The first cycle of plans was completed in 1994 for the Lumber River Basin and 1996 for the Cape Fear River Basin. Each assessment report and plan is updated at five-year intervals.

It should be noted that the results of the monitoring efforts are not intended to provide precise conclusions about pollutant budgets for specific watersheds. Since the assessment methodology is geared toward general conclusions, it is important not to manipulate the data to support policy decisions beyond the accuracy of the data.

Two primary methods of water quality testing were performed in Brunswick County. The details of this methodology are described below so that the information on the results of this testing can be better understood. The methods utilized were Benthic Macroinvertebrate Monitoring and the Ambient Monitoring System. DWQ also observes water bodies for the existence of algal blooms, which are an indication of poor water quality.

Benthic macroinvertebrates are organisms, primarily aquatic insect larvae, which live in and on the bottoms of rivers and streams. The use of macroinvertebrate data has proven to be a reliable water quality monitoring tool because most macroinvertebrates are immobile and sensitive to subtle changes in water quality. Benthic communities also respond to, and show the effects of, a wide array of potential pollutant mixtures.

The Ambient Monitoring System (AMS) is a network of stream, lake, and estuarine (saltwater) water quality monitoring stations (about 420 statewide) strategically located for the collection of physical and chemical water quality data (or parameters). Water quality parameters are arranged by freshwater or saltwater water body classification and corresponding water quality standards. Under this arrangement, Class C waters (refer to page 65 for a description of water quality classifications and specific water quality ratings) are assigned minimum monthly parameters, with additional parameters assigned to waters with classifications such as trout waters and water supplies.

Prolific growths of phytoplankton, often due to high concentrations of nutrients, sometimes result in "blooms" in which one or more species of alga may discolor the water or form visible mats on the water's surface. Blooms may be unsightly and deleterious to water quality causing fish kills, anoxia, and taste and odor problems.

Water quality monitoring is conducted and reported at the subbasin level. Brunswick County falls within two major river basins, and within these two basins three separate subbasins. The subbasins that fall within Brunswick County are the Cape Fear River Basin (03-06-17) and the Lumber River Basin (03-07-59 and 03-07-57). The following provides a summary of water quality issues within each of the subbasins, as well as how land use in these areas impact the overall water quality ratings.

1. Cape Fear River Basin (Subbasin 03-06-17)

This subbasin falls primarily along the southern reaches of the Cape Fear River Basin. The area encompassed by the subbasin takes in a small portion of Wilmington, located in New Hanover County, but is predominantly located within the eastern portion of Brunswick County including the towns of Leland, Belville, Navassa, Boiling Spring Lakes, and Southport. Development within this subbasin has been extremely rapid over the last ten years, and this pace is expected to continue. Within this subbasin there are several large water-dependent significant natural heritage areas. These areas have been mapped and are shown on page 66. There are currently 49 NPDES permitted dischargers in the subbasin. None of the largest recorded dischargers are located within Brunswick County.

The following table provides a summary of all biological assessment sampling sites located within Brunswick County. The table provides the 1993 (if available) and 1998 bioclassification of each site. Fish sampling sites within Brunswick County are also provided where applicable. These tables will be provided for each of the subbasins represented in Brunswick County. The intention of these tables is to provide an overview of the predominant land uses surrounding these monitoring sites. A general description of adjacent land use is provided in the table, as well as an indicator of how rapidly development is occurring in these areas. Map 13 provides an overview of land use, as well as the locations of the streams and monitoring sites referenced in the table.

Detailed information regarding all three subbasins is provided in the environmental conditions/water quality section of the plan. This section begins on page 78. Discussions within this section include recommendations for improving water quality within the subbasin. It should be noted that there are currently no impaired water within subbasin 03-06-17.

Table 39.
Biological Assessment Sites and Predominant Adjacent Land Use - Brunswick County

Site #	Stream	Location	1993	1998	Adjacent Land Use	Development Intensity
B-5	Hood Creek	US 74/76	no sample	Good	Rural/Single Family Residential	Moderate
B-9	Barnards Creek	US 421	no sample	Good-Fair	Medium Density Residential	High
B-10	Town Creek	ab SR 1413	no sample	Good-Fair	Medium Density Residential	High
B-11	Lewis Swamp	SR 1410	no sample	Good-Excellent	Medium Density Residential	High
B-18	Cape Fear River	Snows Marsh	Moderate	Moderate	Mixed Use Residential/Non Residential	High

Source: NC Division of Water Quality.

2. Lumber River Basin (Subbasin 03-07-57)

This subbasin covers the western third of Brunswick County. The largest town within this subbasin is Tabor City, which is located in Columbus County. A portion of Carolina Shores is also located within this subbasin. Land use within this subbasin is predominantly forested with higher concentrations of development within Tabor City, as well as the extraterritorial jurisdiction of Carolina Shore along US Highway 17. Development within this subbasin has not been as rapid

as in the eastern and south/central portions of the County, however, the pace of development is beginning to increase. There are currently four permitted NPDES dischargers in the subbasin, however the only municipal discharge is currently Tabor City. It should be noted that there are currently no impaired water within subbasin 03-07-57.

Table 40.
Biological Assessment Sites and Predominant Adjacent Land Use
(Benthic Macroinvertebrate Community Monitoring Sites) - Subbasin 03-07-57

Site #	Stream	Location	1996	2001	Adjacent Land Use	Development Intensity
SB-1*	Caw Caw Swamp	SR 1305	not rated	not rated	Rural/ Agricultural	Moderate

* NC Division of Water Quality does not yet have an accurate system that can be utilized to monitor and classify swamp waters.

3. Lumber River Basin (Subbasin 03-07-59)

This subbasin covers the entire central portion of Brunswick County. The entire subbasin is located within Brunswick County, and all waters within the subbasin flow to the Atlantic Ocean. The largest municipality within the subbasin is Shallotte, as well as the beach communities located to the south. Growth within the southern portion of this subbasin has been significant, and this trend is expected to continue as more high to moderate density subdivisions are platted and developed south of the US Highway 17 corridor. There are currently three NPDES wastewater discharge permits within the subbasin. Please refer to the environmental conditions/water quality discussion of the plan for a detailed discussion of impaired waters and recommendations for improving water quality with in this subbasin.

Table 41.
Biological Assessment Sites and Predominant Adjacent Land Use
(Benthic Macroinvertebrate Community Monitoring Sites) - Subbasin 03-07-59

Site #	Stream	Location	1996	2001	Adjacent Land Use	Development Intensity
B-1	Royal Oak Swamp	NC 211	Good-Fair	Not Rated	Rural/Moderate Density Residential	Moderate
B-2	Shallotte River	Near US 17	Good-Fair	Good-Fair	Urban Development	High

Source: NC Division of Water Quality.

MAP 13

Table 42.
Biological Assessment Sites and Predominant Adjacent Land Use
(Ambient Monitoring Sites) - Brunswick County

Site #	Waterbody	Location	Noted Parameters	Adjacent Land Use	Development Intensity
A-1	Intracoastal Waterway	CM R16 at Beaverdam Creek	None	High Density Residential	High
A-2	Montgomery Slough	SR 1105	Fecal Coliform Bacteria*	High Density Residential	High
A-3	Lockwood Folly River	NC 211	None	Moderate Density Residential	Moderate
A-4	Lockwood Folly River	At Varnam	Fecal Coliform Bacteria*	Moderate Density Residential	Moderate
A-5	Lockwood Folly River	CM R9 - downstream of Varnam	Fecal Coliform Bacteria*	Moderate Density Residential	Moderate
A-6	Lockwood Folly River	West Channel Islands	None	High Density Residential	High
A-7	Intracoastal Waterway	CM R42 West of Lockwood Folly River	Fecal Coliform Bacteria*	High Density Residential	High
A-8	Intracoastal Waterway	NC 130	None	High Density Residential	High
A-9	Shalotte River	Business US 17	None	Urban Development	High
A-10	Shalotte River	At Shell Point	None	Moderate Density Residential	High
A-11	Intracoastal Waterway	NC 904	None	High Density Residential	High
A-12	Intracoastal Waterway	SR 1172	Fecal Coliform Bacteria*	Urban Development	High
A-13	Calabash Creek	NC 179	PH, Fecal Coliform Bacteria*	Urban Development	High

*Fecal Coliform Bacteria levels exceeded criteria for shellfish harvesting waters only.

Source: NC Division of Water Quality.

C. Brunswick County Land Use

The existing land use in Brunswick County was mapped by aerial photographs, windshield surveys, and Geographical Information System (GIS) data provided by Brunswick County. The existing land use is depicted on Map 14, and land use for participating municipalities is shown on Maps 15 through 19.

Tables 43, 44, 45, and 46 provide approximate land use acreage summaries for the entire County and individually for subbasins 03-06-17 (Cape Fear River Basin) and 03-07-57 and 03-07-59 (Lumber River Basin). Brunswick County has a land coverage of 484,449 acres or 756.9 square miles. The majority of the County is located in subbasin 03-07-59 of the Lumber River Basin, which is located entirely within the County. Within the entire County the majority of the land, 80.2%, is utilized as vacant. The second largest land use in Brunswick County is residential/agricultural, which in the County as a whole includes 73,815.05 acres, or 15.4% of the County. However, it should be noted that this includes the Green Swamp area.

Table 43.
Brunswick County Total Acreage, 2005
(Includes the County and all municipalities participating in the plan)

Land Use	Parcels	Acres	% of Total
Commercial	221	752.90	0.16%
Industrial	140	1,682.12	0.35%
Multi-Family Residential*	208	156.95	0.03%
Mobile Home	33	165.60	0.03%
Office & Institutional	190	2,569.94	0.53%
Residential/Agricultural**	3,596	98,201.57	20.27%
Recreation	29	1,368.89	0.28%
Single-Family Residential***	16,174	9,626.78	1.99%
Vacant	51,219	369,288.62	76.23%
Water	46	635.93	0.13%
Total	71,856	484,449.32	100.00%

*There is no assumption of density. This category includes parcels where there are more than one dwelling unit per parcel.

**Low density residential includes areas where residential density is primarily 1.5 acres per dwelling unit or greater.

***Residential includes areas where residential density is primarily less than 1.5 acres per dwelling unit.

Source: Holland Consulting Planners, Inc and Brunswick County GIS.

MAP 14 - BRUNSWICK COUNTY EX. LAND USE

MAP 15 - MUNICIPALITY

MAP 16 - MUNICIPALITY

MAP 17 - MUNICIPALITY

MAP 18 - MUNICIPALITY

MAP 19 - MUNICIPALITY

Table 44.
Brunswick County Acreage – Subbasin 03-06-17

Land Use	Parcels	Acres	% of Total
Commercial	96	445.99	0.22%
Industrial	75	742.35	0.36%
Multi-Family Residential*	38	35.73	0.02%
Mobile Home	8	80.54	0.04%
Office & Institutional	83	1,117.10	0.54%
Residential/Agricultural**	1,406	46,021.51	22.40%
Recreation	21	872.24	0.42%
Single-Family Residential***	5,297	3,280.27	1.60%
Vacant	16,711	152,194.57	74.09%
Water	46	635.93	0.31%
Total	23,781	205,426.22	100.00%

*There is no assumption of density. This category includes parcels where there are more than one dwelling unit per parcel.

**Low density residential includes areas where residential density is primarily 1.5 acres per dwelling unit or greater.

***Residential includes areas where residential density is primarily less than 1.5 acres per dwelling unit.

Source: Holland Consulting Planners, Inc and Brunswick County GIS.

Table 45.
Brunswick County Acreage – Subbasin 03-07-57

Land Use	Parcels	Acres	% of Total
Commercial	15	136.59	0.09%
Industrial	18	87.02	0.06%
Multi-Family Residential*	61	71.26	0.05%
Mobile Home	4	13.13	0.01%
Office & Institutional	20	352.26	0.24%
Residential/Agricultural**	817	36,568.50	24.57%
Recreation	7	335.69	0.23%
Single-Family Residential***	2,995	2,406.07	1.62%
Vacant	5,512	108,860.50	73.14%
Total	9,449	148,831.02	100.0%

*There is no assumption of density. This category includes parcels where there are more than one dwelling unit per parcel.

**Low density residential includes areas where residential density is primarily 1.5 acres per dwelling unit or greater.

***Residential includes areas where residential density is primarily less than 1.5 acres per dwelling unit.

Source: Holland Consulting Planners, Inc and Brunswick County GIS.

**Table 46.
Brunswick County Acreage – Subbasin 03-07-59**

Land Use	Parcels	Acres	% of Total
Commercial	111	170.32	0.13%
Industrial	47	852.76	0.66%
Multi-Family Residential*	109	49.96	0.04%
Mobile Home	21	71.93	0.06%
Office & Institutional	91	3,340.19	2.60%
Residential/Agricultural**	1,381	14,959.51	11.64%
Recreation	5	160.96	0.13%
Single-Family Residential***	7,936	3,939.87	3.06%
Vacant	29,157	105,023.63	81.69%
Total	38,858	128,569.13	100.00%

*There is no assumption of density. This category includes parcels where there are more than one dwelling unit per parcel.

**Low density residential includes areas where residential density is primarily 1.5 acres per dwelling unit or greater.

***Residential includes areas where residential density is primarily less than 1.5 acres per dwelling unit.

Source: Holland Consulting Planners, Inc and Brunswick County GIS.

1. Summary of Land Use Conditions

The following summarizes the existing land use conditions in Brunswick County:

- The County is predominantly vacant.
- While the County is predominantly vacant, it is one of the fastest growing counties in the state.
- Growth is occurring along the corridors of better suited lands which are located along the US 17, NC 87, and NC 133 corridors. The US 17 corridor is developing as a major commercial corridor.
- Commercial and industrial development currently occupy very small percentages of total developed land in Brunswick County.
- All of the participating municipalities in this plan are predominantly residential.
- Agricultural land use continues to be a significant land use in Brunswick County.

2. Land Use Compatibility Issues

There are several land use compatibility problems within Brunswick County. This is primarily due to the abundance of environmentally sensitive areas that exist throughout the County. The following provides a summary of the problems that exist:

- Over the years some platting and development of subdivisions on unsuitable soils and construction in floodplain areas has occurred
- Portions of the County that are highly suitable for development, such as land immediately adjacent to US Highway 17, are bordered by large portions of land unsuitable for development. This may constrain development in these areas, especially along major corridors.
- There is a heavy reliance on private septic tanks for wastewater treatment throughout the County. Soils throughout the County are considered poor for use with these systems, but at this time the county's central sewer system only serves approximately 17% of all residential units in the County.
- As discussed on page 50 of the plan, approximately 14% of Brunswick County's total land area is comprised of soils classified as prime farmland. According to the NC Department of Agriculture, 55% of the county's agricultural production is made up of crop production. With development continuing at a rapid pace throughout the County, residential subdivisions have begun to infringe on land traditionally utilized for farming activities. This issue will be addressed further in the Future Land Use and Policy Statements sections of the plan.
- Strip commercial development is beginning to take place along major corridors, including US Highway 17, NC 211, and NC 87. This development appears to be taking place at key intersections, and may begin to infringe on residential areas if not controlled. This problem has been addressed through the adoption of a highway overlay zone in the County's zoning ordinance.
- The proximity of Sunny Point and Progress Energy to urbanized areas is a significant land use conflict. The county's emergency response personnel should monitor this closely and maintain up to date evacuation routes and procedures.
- There is a threat within Brunswick County that future growth will infringe upon Significant Natural Heritage Areas, or other environmentally sensitive portions of

the County. These areas are widespread in Brunswick County, and have been discussed in the natural systems analysis of the plan. Protection of these areas in a time of such substantial development pressure is imperative.

The most significant constraint to development throughout Brunswick County is the lack of a County-wide central sewer system. Brunswick County is one of the fastest growing counties in the nation, but until sewer service is more extensive growth will remain constrained to portions of the County that either will support private septic tank systems, or that currently are served by the county's existing system. The County sewer system is discussed in more detail in the Community Facilities section of the plan.

There are several portions of the County that are expected to experience substantial land use changes over the next ten to fifteen years. Development is expected to increase along the US Highway 17 corridor. Residential development between the Brunswick County line and Carolina Shores is expected to continue. Land prices are more affordable in this area, compared with the coastal areas of the County. This will allow for the construction of more moderately priced housing developments. As these subdivisions are constructed, infill commercial development will take place to support the growing population in these rural areas. Development along this corridor should be monitored to ensure that proper land use patterns develop and that the increased growth does not result in significant land use conflicts.

The most rapidly developing portion of the County is located south of US Highway 17 between the municipalities of Carolina Shores and Bolivia. There are several large golf course communities and planned residential developments located in this portion of the County. Development of this type is especially rapid between Shallotte and the South Carolina state line where the County has experienced development pressure stemming from the Myrtle Beach/Grand Strand Area. Large development companies have already targeted this region south of Highway 17 for the development of additional large scale mixed use subdivisions. These developers are awaiting the point when the county's infrastructure development catches up with the current rate of growth.

The third areas within the County that have experienced significant growth are those surrounding the towns of Southport, Oak Island, and Boiling Spring Lakes. Residential and commercial development surrounding these towns continues to increase. Existing municipal and County infrastructure serves portions of this area, which makes development much more feasible at this time. This portion of the County has a variety of commercial establishments, as well as medical services, making it a more desirable location for retirees and the elderly population.

3. Historic and Archeological Sites

The North Carolina Department of Cultural Resources, Division of Archives and History, has indicated that there are 5 known sites listed on the National Register of Historic Places within the Brunswick County planning area. The old Brunswick County Courthouse is located within the City of Southport, which is a non-participating jurisdiction. Information on all archaeological locations is restricted and may not be included in any public document or made available to any individual without the permission of the state archaeologist. Any development projects should be implemented under appropriate historic preservation legislation and in coordination with the Division of Archives and History to avoid damage to valuable archaeological resources. Below is a list of those sites and their general location:

<u>Site</u>	<u>Location</u>
Brunswick County Courthouse	Southport, NC
Brunswick Town Historic District	Located off NC 133
Orton Plantation	On the Cape Fear River (juncture of SR 1530 and SR 1529)
St. Philips Church Ruins	South of Orton off SR 1533
T.B. McClintic	Tripps Marina, Shallotte Point

4. Existing Land Use in Participating Municipalities

Table 47 provides a summary of land uses within each of the five municipalities participating in Brunswick County’s planning process: Carolina Shores, Belville, Boiling Spring Lakes, St James, and Northwest. Developed land use within each of the municipalities is predominantly single-family residential. Non-residential land uses within each of these towns is comprised almost entirely of small retail commercial establishments, schools, and office and institutional uses.

The two most rapidly developing areas are Carolina Shores and St. James. St James, although a gated community, is one of the fastest growing planned residential developments in the nation. Carolina Shores is the only municipality that currently has an extraterritorial planning jurisdiction. The ETJ of Carolina Shores extends north of town to encompass properties located north of US Highway 17. Maps 14 through 19 provide a detailed view of land uses within each of the participating municipalities.

Table 47.
Participating Municipalities – Existing Land Use

Land Use ++	St. James		Belville		Boiling Spring Lakes		Carolina Shores						Northwest	
	Town Limits		ETJ		Total		Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total
	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total
COM	0.00	0.0%	11.12	1.9%	37.86	0.3%	36.48	3.1%	15.55	0.8%	52.03	1.7%	37.44	1.0%
IND	0.00	0.0%	12.81	2.2%	0.00	0.0%	0.00	0.0%	22.11	1.2%	22.11	0.7%	0.09	0.0%
MFR*	18.86	0.4%	2.22	0.4%	0.00	0.0%	2.71	0.2%	8.09	0.4%	10.80	0.4%	0.00	0.0%
MH	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.30	0.0%	0.30	0.0%	0.00	0.0%
O&I	10.24	0.2%	41.60	7.3%	87.20	0.6%	22.74	1.9%	25.94	1.4%	48.68	1.6%	3.77	0.1%
RA**	4.09	0.1%	57.52	10.0%	148.69	1.1%	36.89	3.2%	235.45	12.4%	272.34	8.9%	931.81	24.2%
REC	827.83	17.2%	0.00	0.0%	157.11	1.1%	0.003	0.0%	163.65	8.6%	163.65	5.3%	0.00	0.0%
SFR***	334.91	7.0%	87.79	15.3%	591.33	4.2%	419.81	35.9%	162.19	8.5%	582.00	19.0%	131.34	3.4%
Vacant	3,254.83	67.7%	359.32	62.8%	12,551.06	88.3%	492.99	42.2%	1,086.14	57.1%	1,579.13	51.4%	2,654.20	69.0%
Water	53.62	1.1%	0.00	0.0%	639.05	4.5%	0.00	0.0%	0.00	0.0%	0.0	0.0%	0.00	0.0%
TOTAL	4,504.38	93.7%	572.37	100.0%	14,212.30	100.0%	1,011.61	86.5%	1,719.42	90.4%	2,731.04	89.0%	3,749.65	97.5%
ROW	304.42	6.3%	0.00	0.00	0.00	0.00	157.29	13.5%	181.69	9.6%	338.97	11.0%	95.83	2.5%
TOTAL	4,808.80	100.0%	572.37	100.0%	14,212.30	100.0%	1,168.90	10.0%	1,910.12	100.0%	3,070.01	100.0%	3,845.48	100.0%

*There is no assumption of density. This category includes parcels where there are more than one dwelling unit per parcel.

**Low density residential includes areas where residential density is primarily 1.5 acres per dwelling unit or greater.

***Residential includes areas where residential density is primarily less than 1.5 acres per dwelling unit.

Source: Holland Consulting Planners, Inc. and Brunswick County GIS

++Definitions of land use for Table 47:

(COM) Commercial – includes all retail uses except those relating to farm operations or other agricultural areas.

(IND) Industrial – includes all manufacturing, construction, contracting, transportation, utilities wholesaling, mining, and warehousing operations.

(MFR) Multi-Family Residential – includes all tax parcels where there is a presence of three or more dwelling units on a single lot. Under this land use category, there is no assumption of density.

(O&I) Office & Institutional – includes all private, federal, state, County, and local government offices. This land use category also includes churches, cemeteries, hospitals, charitable organizations, and other civic or religious facilities.

(REC) Recreational – includes lands for which the primary purpose is for outdoor recreation or natural area conservation. This may include public or private-owned parks, outdoor sporting clubs, golf courses, marinas, campgrounds, or areas for which the primary purpose is preservation and conservation of undeveloped natural areas.

(RA) Residential Agricultural – this category was developed to address large parcels of land that have both residential and agricultural uses. There are a substantial number of homes in the County located on large parcels that accommodate both farming activities and a primary residence. Development in these areas is considered to be low density and includes areas where the development density is 1.5 acres per dwelling unit or greater.

(SFR) Single-Family Residential – includes all lots that have less than 1.5 acres per dwelling unit, and support single-family residential structures.

Vacant – includes parcels where no development has taken place. These are parcels that are undisturbed and do not have development constraints or conservation easements tied to them.

Water – This category accounts for interior portions of the County that are covered by permanent waterbodies.

(ROW) Right-of-Way – includes all street and roadways that have been included in the land use survey.

D. EXISTING LAND SUITABILITY ANALYSIS

A thorough analysis of all impediments to development, as well as existing community facilities, has been completed in the preceding sections. All of these variables factor into suitability for development for a specific piece of property. In order to assess what effect the various man-made and environmental constraints will have on development throughout Brunswick County, an overlay analysis was performed. This overlay analysis is a GIS-based process geared toward evaluating the suitability of land for development. The procedure is very similar to the practice developed by Ian McHarg, in which geospatial data layers are referenced to each other in an effort to determine what portions of a land mass appear to be the most favorable sites for a specific land use.

The overall process utilized Arcview GIS software with the Spatial Analyst extension along with data layers provided by the North Carolina Center for Geographic Information and Analysis (NCGIA). The analysis takes into consideration a number of factors, including natural systems constraints, compatibility with existing land uses and development patterns, existing land use policies, and the availability of community facilities. The end product of this analysis is a land suitability map that shows underutilized land that is suited or not suited for development (see Map 20). This map can be used as a foundation for the discussion and formation of county-wide land use policy and should be compared to the future land use map (Map 26, page 212).

Land suitability analysis involves the application of criteria to the landscape to assess where land is most and least suitable for development of structures and infrastructure. A computer application is not essential for this analysis, but greatly simplifies the process. There are eight key steps to completing the overlay analysis:

- (1) Define criteria for the analysis
- (2) Define data needed
- (3) Determine what GIS analysis operations should be performed
- (4) Prepare the data
- (5) Create a model
- (6) Run the model
- (7) Analyze results
- (8) Refine model as needed

All of these steps have been completed and, as noted above, the end product is displayed on Map 20. There were no additions or adjustments to the default layer sets and weighting factors provided by the Division of Coastal Management to the County for the existing land suitability analysis map.

MAP 20 -LAND SUITABILITY

Prior to producing the map, data was compiled and each data layer in conjunction with criteria was assigned a weight. The County was then divided into one-acre squares. Each of these one-acre squares of land was given a score based on how that respective piece of property related to each data layer. The score for each data layer was multiplied against that given layer's weight. The scores for each layer were added together to determine a suitability rating for that one-acre square of property. The suitability rating falls into four primary categories: least suitable, low suitability, medium suitability, and high suitability.

The following table summarizes all data layers used, including the criteria and weight assigned to each layer.

Table 48.
Land Suitability Analysis Criteria

Layer Name		Criteria and Rating				Assigned Weight
		Least Suitable	Low Suitability	Medium Suitability	High Suitability	
		0	-2	1	+2	
Coastal Wetlands	Exclusion*	Inside	--	Outside	--	
Exceptional & Substantial Non-Coastal Wetlands	Exclusion*	Inside	--	Outside	--	
Estuarine Waters	Exclusion*	Inside	--	Outside	--	
Protected Lands	Exclusion*	Inside	--	Outside	--	
Storm Surge Areas	Weighted	--	Inside	--	Outside	2
Soils (Septic Limitations)	Weighted	--	Severe	Moderate	Slight	2
Flood Zones	Weighted	--	Inside	--	Outside	2
HQW/ORW Watersheds	Weighted	--	Inside	--	Outside	1
Natural Heritage Areas	Weighted	--	<500'	--	>500'	1
Hazardous Substance Disposal Sites	Weighted	--	<500'	--	>500'	1
NPDES Sites	Weighted	--	<500'	--	>500'	1
Wastewater Treatment Plants	Weighted	--	<500'	--	>500'	1
Discharge Points	Weighted	--	<500'	--	>500'	1
Land Application Sites	Weighted	--	<500'	--	>500'	1
Developed Land	Weighted	--	>1 mi	.5 - 1 mi	<.5 mi	1
Roads	Weighted	--	>1 mi	.5 - 1 mi	<.5 mi	2
Water Pipes	Weighted	--	>.5 mi	.25 - .5 mi	<.25 mi	3
Sewer Pipes	Weighted	--	>.5 mi	.25 - .5 mi	<.25 mi	3

*Data layers that are slated as exclusion have a suitability of 0 or 1, meaning that if a specific one-acre piece of property falls within one of these areas, it is automatically considered least suitable for development.

Source: NCGIA and CAMA.

Overall, land in Brunswick County is predominantly unsuitable for development. Table 49 provides a summary of land suitability acreage based on the results of the overlay analysis. The majority of the land within the County determined to have a high suitability rating is located along the US Highway 17 corridor. A large percentage of the land cover within Brunswick County is comprised of wetlands, a large portion of which is within the Green Swamp. Thus, large portions of the County are automatically considered unsuitable for development regardless of how these areas relate to the rest of the factors in consideration. Existing developed areas have not been excluded.

Table 49.
Brunswick County Acreage

Suitability	Acreage	% of Total
Least Suitable	284,907	54.6%
Low Suitability	131,959	25.3%
Medium Suitability	74,497	14.3%
High Suitability	30,354	5.8%
Total	521,717	100.0%

Source: CAMA and Holland Consulting Planners, Inc.

IV. ANALYSIS OF EXISTING COMMUNITY FACILITIES/SERVICES

Map 21 provides the location of the following Brunswick County community facilities: health care facilities, emergency medical service stations, the Brunswick County government complex, fire departments, public schools, and park locations.

A. Transportation

US Highways 17 and 74/76 and NC Highways 87, 130, 133, 179, 211, and 904 are the major routes in Brunswick County. US Highways 17 and 74/76 enter Brunswick County on the east side at the New Hanover County border. US Highway 17 is four lanes to facilitate volumes of traffic heading southwest towards the North Carolina/South Carolina state line. US Highway 74/76 is also four lanes and runs west to the Columbus County boundary. NC Highways 87 and 211 enter the County from Columbus County and head south towards Southport. NC Highway 133 runs south from US Highway 17/74/76 to Southport. NC Highways 130 and 904 run south from Columbus County on the western side of the County. NC 179 runs west from Shallotte to the North Carolina/South Carolina state line. These highway corridors coincide with the areas of high suitability for development as depicted on the Brunswick County Land Suitability Map.

MAP 21 - COMMUNITY FACILITIES

According to the North Carolina Department of Transportation (NCDOT), there are approximately 3,077 miles of roadway located within Brunswick County. NCDOT (2003) data reports that the highest annual average daily traffic counts (AADT) occur along US Highways 74/76 and 17 and on NC Highway 211 near Southport. The AADT counts have increased as much as 18.8% in some of these areas since 2002.

According to the NCDOT Division 3 2006-2012 Transportation Improvement Program (TIP), there are eight (8) road projects scheduled for development. The TIP also lists nine (9) bridge replacements in the County. These bridge replacements include improvements to the Oak Island Bridge and connector road. These improvements will be discussed in detail in the Future Demands section of this plan. Map 22 depicts the NCDOT 2003 AADT counts along the highways with the highest traffic volumes in Brunswick County, as well as the road projects and bridge replacements identified on the TIP.

B. Health Care

Brunswick Community Hospital, located in the heart of the County, has been providing medical care to residents since 1977 and is accredited by the Joint Commission on Accreditation of Healthcare Organizations. The hospital is staffed with over 96 physicians and specialists. The hospital offers a variety of medical and surgical services from general surgery to cardiology. Following are some of the services provided at the facility. This is not a comprehensive list of services at the hospital.

- | | |
|------------------------------|--------------------------------|
| Birthing | Nuclear Medicine |
| Cardiac Rehab | Obstetrics/Gynecology |
| Diagnostic Imaging | Ophthalmology |
| Endoscopy/Special Procedures | Orthopedics |
| Immunology | Outpatient Diagnostic Services |
| Inpatient Surgery | Outpatient Surgery |
| Intensive Care | Pediatrics |
| Laboratory Services | Physical Therapy |
| Mammography | Plastic/Reconstructive |
| MRI | Radiology |
| Neurosurgery | Respiratory Therapy Services |
| | Speech Therapy |

MAP 22 - DOT MAP

J. Arthur Doshier Memorial Hospital, founded in 1930, provides comprehensive medical care to residents of Southport and the Smithville Township. The hospital is owned by the Smithville Township taxpayers and is managed by an elected seven member Board of Trustees. Doshier Memorial Hospital and the Skilled Nursing Center are both accredited by the Joint Commission on Accreditation of Healthcare Organizations. The laboratory and Cardiopulmonary Service are accredited by the College of American Pathologists. The Diagnostic Imaging Department is accredited by the American College of Radiology in Mammography and the hospital has been certified in Mammography by the Food and Drug Administration. The hospital is licensed for 36 acute care beds and 64 nursing center beds and has a staff of 300. Following are services provided at the facility:

- Acute Nursing Care
- Cardiopulmonary and Respiratory Therapy
- Diagnostic Imaging
- Emergency Services
- Lab Services
- Nutritional Counseling
- Skilled Nursing Center
- Social Services
- Therapy Services (Speech, Physical, and Occupational)
- OR Procedures and Surgeries (General, Gynecology, Ophthalmology, Orthopedic, Otolaryngology, and Urology)
- Cardiac Rehabilitation - Coming 2005

Brunswick County also has emergency medical care facilities, assisted living facilities, and home health care facilities throughout the County. Following is a list of those facilities.

Emergency Care

- Shallotte Medical Center
- Seaside Medical Center
- Holden Beach Medical Center
- Bolivia Medical Center
- Leland Medical Center
- Brunswick Adult Medical Clinic (for the uninsured) – Supply
- New Hope Clinic (for the uninsured) – Southport
- Shallotte Urgent Care
- Coastal Immediate and Primary Care – Southport

Assisted Living

- Autumn Care – Shallotte
- Brunswick Cove – Winnabow
- Ocean Trail Convalescent Center – Southport
- Shallotte Assisted Living – Shallotte

Home Health Care

- Liberty Care and Hospice – Shallotte
- Lower Cape Fear Hospice and Life Care Center – Supply

C. Emergency Medical Services

Emergency Medical Services (EMS) are provided throughout the County from various locations. For emergency calls, the County has a response time goal of reaching 90% of calls in less than 12 minutes. Currently they reach 60% of calls in less than 12 minutes. The average response time is 11 minutes 44 seconds. For non-emergency calls, the county's response time goal is 90% reached in less than 20 minutes. Currently the County reaches 80% in less than 20 minutes. The average response time for non-emergency calls is 14 minutes 57 seconds. Following is a list of stations and addresses for each EMS Station and Rescue Squad.

**Table 50.
Brunswick County EMS Stations and Rescue Squads**

Department Name	Location
Bolivia	3325 Old Ocean HWY, SE – Bolivia
Base 1/Medic 11 - Holden Beach	1044 Sabbath Home Road – Holden Beach
Base 2/Medic 12 - Leland	8605 Trade Street, NE – Leland
Base 3/Medic 13 - South Brunswick	7061 Old Georgetown Road, SW – South Brunswick
Base 4/Medic 14 - Southport/St. James	4280 Committee Drive, SE – Southport
Base 5/Medic 15 - Boiling Spring Lake	3053 George II Highway – Boiling Spring Lakes
Base 6/Medic 16 - Waccamaw/Calabash	#5 School Road, NW – Calabash
Base 7/Medic 17 - Oak Island	101 Oak Island Drive – Oak Island
Bald Head Island Fire/Rescue	251 Edward Teach Wynd – Bald Head Island
Calabash Volunteer EMS	9031 Beach Drive, SW – Calabash
Coastline Volunteer Rescue Squad	3027 Holden Beach Road – Supply
Leland Volunteer Fire/Rescue	1004 Village Road – Leland
Oak Island EMS	4601 East Drive – Oak Island
Shalotte Rescue Squad	131 Smith Avenue – Shalotte
Southport Rescue Squad	107 East Nash Street – Southport
Towncreek Rescue Squad	PO Box 144 – Winnabow
Waccamaw Volunteer Rescue Squad	4045 Whiteville Road – Ash
Sunny Point Fire/Rescue	597 th US Army Transportation Group Sunny Point MOT – Southport

Source: Brunswick County Emergency Medical Services Department

D. Law Enforcement

Law enforcement is provided to the County by the Brunswick County Sheriff's Department. The department is located in Building J at the Brunswick County Government Complex. There are 91 full-time deputies, 15 part-time/auxiliary deputies, 25 employees at the Detention Center, and seven office employees. The department operates 13 units: Uniform Patrol, Criminal Investigations, Narcotic Investigations, School Resource Officers, D.A.R.E., Crime Prevention, K-9, Swat, Water Search and Rescue, Major Crimes, Investigations, Transportation, and Community Policing. The Brunswick County jail is located at the Government Center in Bolivia and holds 198 beds. The Brunswick County 911 Call Center receives and dispatches emergency personnel for the entire County.

E. Fire Services

Brunswick County residents receive fire protection from 23 fire departments. Some departments have more than one station, but they are considered to be under one department. Each fire department is under contract with the County for automatic mutual aid and mutual aid. Automatic mutual aid sends multiple departments to a fire call. Mutual aid occurs when the fire departments that respond to a call ask for additional assistance by other departments. Table 51 provides a list of those departments (and substation(s), if applicable), their location, and their ISO ratings.

The Insurance Services Office (ISO) of North Carolina has a grading schedule for rural and municipal fire protection. Individual communities are surveyed every nine to ten years, and the grading process used considers the following: water supply 39%, fire department 39%, fire communications 9%, and fire safety control 13%. A rating of 1 is the best possible, with the lowest rating of 10 being assigned to areas with essentially no protection. The ratings have a financial impact on property owners because fire insurance premiums depend on the grade or class assigned by the ISO. The first number (and in some cases, the only number) in the sequence represents the rating if a structure is within 1,000 feet of a fire hydrant. The second number in the sequence represents the rating if a structure is beyond 1,000 feet of a fire hydrant. A 9S sequence is a five-mile rating, which means that the department can carry 1,500 gallons of water on wheels, has 20 personnel, and meets certain minimum equipment requirements.

**Table 51.
Brunswick County Fire Departments**

Department Name - Station No. (stations)	Location	ISO Rating
Bald Head Island - 32 (1 main, 1 substation)	251 Edward Teach Wynd Bald Head Island	6
Boiling Spring Lakes - 4 (1 main, 2 substations)	3059 SE George II Highway Boiling Spring Lakes	4/9S
Bolivia - 7 (1 main)	119 Green Lewis Road SE Bolivia	8/9S
Calabash - 12 (1 main, 1 substation)	892 Persimmon Road SW Calabash	5/9S
Civietown (1 main)	2227 Civietown Road Shalotte	8/9S
Grissetown/Longwood - 31 (1 main)	758 Longwood Road Ocean Isle Beach	5/9S
Leland - 5 (1 main, in process of developing 2 substations)	1004 Village Road Leland	7/9S
Navassa - 19 (1 main)	336 N. Main Street Navassa	9S
Northwest - 33 (1 main)	5029 Blue Banks Loop Road Leland	9S
Oak Island - 1 * (1 main, 1 substation)	4601 E. Oak Island Drive Long Beach	5
Ocean Isle Beach - 14 (1 main)	105 Causeway Drive Ocean Isle Beach	4/9S
Shalotte - 15 (1 main, 1 substation under construction)	113 Wall Street Shalotte	6/9S
Shalotte Point - 17 (1 main)	4126 Pigott Road SW Shalotte	6/9S
St. James - 37 (1 main)	3628 St. James Drive SE Southport	5/9S
Southport - 3 (1 main, 1 substation)	107 E. Nash Street Southport	4/9S
Sunset Harbor/Zion Hill (1 main)	2706 Sunset Harbor Road SE Bolivia	5/9S
Sunset Beach - 11 (1 main under construction)	102 Shoreline Drive W Sunset Beach	5/9S
Supply - 13 (1 main)	47 Southport-Supply Road Supply	9S
Tri-Beach - 8 (1 main, 1 substation in design)	854 Sabbath Home Road Supply	5/9S
Waccamaw - 28 (1 main)	4045 Whiteville Road Ash	9S
Winnabow - 6 (1 main)	161 Governors Road SE Winnabow	9S
Yaupon Beach - 2 * (1 main, 1 substation)	518 Yaupon Drive Oak Island	5/9S
Sunny Point (1 main, 1 substation)	Sunny Point Military Ocean Terminal	Federal (no ISO rating)

*The ISO ratings for Oak Island and Yaupon Beach are based on the facilities combined.

Source: Brunswick County Emergency Management/Fire Marshal Division.

F. Administration

The Brunswick County Administration Office is located at the Brunswick County Government Complex at 45 Courthouse Drive NE, Bolivia. The County operates under a Board of Commissioners-Manager form of government and has 699 budgeted positions. The following table provides a summary of the governmental departments and the number of employees in each.

**Table 52.
Brunswick County Administration**

Department	# of employees	Department	# of employees
Governing Body	2	Detention Center	34
Administration	7	Emergency Management	3
Finance	9	Emergency Medical Services	51
Tax Administration	18	Building Inspections	9
Revenue	11	Emergency Communications	21
GIS	8	Solid Waste	8
County Attorney	2	Engineering/Stormwater	1
Cape Fear Sentencing	1	Planning	10
Board of Elections	4	Cooperative Extension	12
Register of Deeds	18	Soil and Water	3
MIS	7	Veteran Services	2
Service Center/Transportation	11	Library	20
Engineering	3	Parks & Recreation	20
Operation Services	49	Cafeteria	5
Teen Court	1	Health	93
Sheriff	69	Social Services and Chore	103
Sheriff-High School	10	Wireless	2
Sheriff-Criminal Justice Partnership	1	Revaluation	3
Public Utilities General & Sewer	69		

Source: Brunswick County Human Resources

NOTE: Table 52 will be revised prior to adoption of the plan.

G. Water System

Brunswick County provides potable water service to over 20,000 residential, commercial, and industrial customers. The County also provides treated water to 10 cities, towns, and villages, and to the North Brunswick Sanitary District. Brunswick County Public Utilities employees operate two water treatment plants – one 24 mgd surface water treatment plant located near Leland, and one 6 mgd groundwater lime softening plant located near Southport. The County owns and operates a water transmission system that includes seven elevated water storage tanks, a 4-million gallon ground storage tank, and 14 booster pump stations. Brunswick County Public Utilities employees

also operate the Kings Bluff raw water pumping station for the Lower Cape Fear Water and Sewer Authority. Map 23 illustrates the locations of the county’s water lines.

North Carolina General Statute [GS 143-355(L)] requires all units of local government that provide or plan to provide public water supply service to prepare a Local Water Supply Plan and to update that plan at least every five years. A local water supply plan is an assessment of a water system’s current and future water needs and its ability to meet those needs. Brunswick County’s Local Water Supply Plan has been undated and is currently under review by the Division of Water Resources. The following tables provide summaries of the water use information.

**Table 53.
Brunswick County Water System Average Daily Water Use by Month (MGD)**

Month	Average Daily Usage	Month	Average Daily Usage	Month	Average Daily Usage
January	6.975	May	9.841	September	10.061
February	7.129	June	13.367	October	9.463
March	8.018	July	12.979	November	7.615
April	9.661	August	12.475	December	7.322

Source: Brunswick County Water Supply Plan.

**Table 54.
Brunswick County Water System Average Annual Daily Water Use by Type**

Type of Use	Average Use (MGD)
Residential	2.485
Commercial	0
Industrial	3.477
Institutional	0
Sales to Other Systems	3.626
System Process Water	0.096
Subtotal	9.684
Average Annual Daily Water Use	10.091
Unaccounted for Water	0.407

Source: Brunswick County Water Supply Plan

H. Sewer System

Brunswick County utilizes pressure sewer and gravity sewer for wastewater treatment and serves 5,000 customers. The county-wide collection system currently consists of 53 County owned sewage pump stations, approximately 39.5 miles of gravity mains and 105 miles of force mains. There are approximately 41 miles of sewer force mains and 16 miles of wastewater effluent reuse

pipings under construction as part of the West Brunswick Water Reclamation Project. The systems pipe sizes range from 2" to 24" and are made of Polyvinyl Chloride (PVC), Ductile Iron (DIP), and Polyethylene (PE). The following table provides information regarding the county's nine Wastewater Treatment Plants. Map 23 illustrates the location of sewer lines in within the County.

**Table 55.
Brunswick County Wastewater Treatment Plants**

Facility	Description
Northeast Brunswick Regional Water Reclamation Facility	1.650 MGD Extended Aeration/Tertiary/BNR Solids Handling Operation (ATAD) Conjunctive Use Permit - NPDES (Discharge) and Non-Discharge (golf course- re-use)
West Brunswick Regional Water Reclamation Facility (Under Construction)	3.0 MGD Extended Aeration/Tertiary/BNR Solids Handling Operation (ATAD) Non-Discharge Permit (golf courses and dedicated drip irrigation facility)
*Brunswick Government Center Wastewater Treatment Plant	0.024 MGD Facultative Lagoon/Spray Application (Non Discharge)
Town Creek Township Park Wastewater Treatment Plant	0.001 MGD Sand Filter Package System NPDES Discharge
*St James Wastewater Treatment Plant	0.600 MGD Extended Aeration/Tertiary Spray Irrigation - Non Discharge
*Winding River Wastewater Treatment Plant	0.100 MGD (Permitted for 0.500 MGD) Extended Aeration/Tertiary Spray Irrigation - Non Discharge
*Brunswick Community College Wastewater Treatment Plant	0.030 MGD Extended Aeration/Tertiary Spray Irrigation - Non Discharge
Sea Trail Wastewater Treatment Plant	0.200 MGD (Permitted for 0.500 MGD) Extended Aeration/Tertiary Spray Irrigation - Non Discharge
Carolina Shores Wastewater Treatment Plant	0.530 MGD (Permitted for 0.830 MGD-reuse only) Extended Aeration/Tertiary NPDES Discharge

*These plants will gradually be turned into pump stations that will tie into the West Brunswick Regional Water Reclamation Facility. After the new facility is on-line, these WWTPs will be dismantled within six months.

Source: Brunswick County Utilities Department.

MAP 23 – WATER & SEWER LINES

I. Schools

The Brunswick County School System oversees all public schools providing service to Brunswick County citizens. During the 2004-2005 school year, total enrollment in the county's public schools was 11,167. The following table provides a summary of the schools that serve the county's school age children. The school system is currently researching areas for land acquisition to accommodate the construction of the equivalent of two elementary schools and one middle school.

**Table 56.
Brunswick County Public Schools**

School	Enrollment	Staff	Capacity	Recreational Facilities
Belville Elementary Grades PK-5	722	80	624	Gym, 3 play areas, soccer field
Bolivia Elementary Grades PK-5	664	107	781	Gym, outdoor playground equipment, small outdoor basketball area
*Brunswick Learning Center Grades 6-12	96	39	420	Outdoor recreation area (open field)
Jessie Mae Monroe Elementary Grades PK-5	442	79	543	Gym, outdoor playground equipment PK-5
Leland Middle Grades 6-8	631	97	789	Gym, tennis courts, outdoor basketball court
Lincoln Elementary Grades PK-5	664	110	717	Gym, outdoor playground equipment
North Brunswick High Grades 9-12	779	104	717	Gym, track/football field, tennis courts, softball field, baseball field
Shalotte Middle Grades 6-8	926	113	924	Gym, soccer field, football field, softball field, softball field, baseball field, and 2 bocci courts
South Brunswick High Grades 9-12	1,050	126	1,075	Gym, auxiliary gym, track, football field, baseball/softball fields, tennis courts
South Brunswick Middle Grades 6-8	907	102	789	Gym, soccer field, baseball/softball field, fitness walk
Southport Elementary Grades K-5	594	109	725	Playground, gym
Supply Elementary Grades K-5	638	117	632	Multi-purpose room (gymnasium), a field, and 4 playgrounds
Union Elementary Grades K-5	653	108	726	Gym and playground
**Virginia Williamson Elementary Grades K-5	572	99	590	Basic playgrounds
Waccamaw Elementary Grades K-8	546	88	662	Gym, outdoor basketball & sports court, multipurpose field (this school is located adjacent to a County recreation facility)

Table 56 (Continued)

School	Enrollment	Staff	Capacity	Recreational Facilities
West Brunswick High School Grades 9-12	1,283	150	1,270	Gymnasium, football field, practice field, baseball field, softball field, and track

*Brunswick County Academy will eventually replace Brunswick Learning Center. Groundbreaking is scheduled for July 2005, and the Academy is scheduled to open August 2006. The Academy will be located on Old Ocean Highway in Bolivia, adjacent to Brunswick Community College. The facility plans call for a multi-purpose room, and baseball and soccer fields.

**This school plans to expand to include additional 3rd grade classrooms by August 2006.

Source: Information regarding enrollment and recreational facilities for Belville Elementary, Shallotte Middle, South Brunswick High, South Brunswick Middle, Southport Elementary, Supply Elementary, Union Elementary, Virginia Williamson Elementary, and West Brunswick High came directly from each school. The remaining information was provided by the Brunswick County Director of Facilities and Capital Improvements.

The Brunswick County School System is participating in The Brunswick Destiny Partnership. This partnership includes the school system, Brunswick Community College, and UNC-Chapel Hill, with the goals being to improve science education in the county’s high schools and offer a biotechnology associate degree at Brunswick Community College. The partnership expands an existing program called Destiny. Destiny is a program offered by UNC-Chapel Hill that utilizes a bus to provide advanced scientific classes and experiments to high schools. One of the programs offered on the bus teaches crime solving using science.

Of special interest is the South Brunswick High School’s Aquaculture Program. The program began in 1987 by Instructor Byron Bey and consisted of a ditch on school property. The instructor’s dedication, the support of the school system and the community, the enthusiasm of the students, and a NC Fisheries Resource Grant brought the program to its current level of excellence. Today the program has eighteen (18) display aquariums ranging in size from 55 to 200 gallons, six (6) 500-gallon rearing tanks, and four (4) hatching troughs. The program received the Best in Show award from 1991 through 2003 and received the 2000 Governor’s Program of Excellence in Education Award.

The Aquaculture program provides students the opportunity to experience practical application as well as textbook training. While in the third year of the program, students spend three days a week at the high school doing hands-on tasks and two days a week at Brunswick Community College studying college level aquaculture. Students can continue their aquaculture education at Brunswick Community College, UNC-Wilmington, and NC State University. The curriculum at Brunswick Community College prepares individuals for careers in aquaculture and management of aquatic ecosystems with a practical experience in fish, shellfish, and aquatic plant production and management.

Higher education is offered at Brunswick Community College (BCC). The college is located at 50 College Road in Supply, and also offers classes at the Leland Center in the Leland Industrial Park. The college is a public institution supported by tax dollars. Originally established as Brunswick Technical Institute in July 1979, the name was changed later that year to Brunswick Technical College, and to Brunswick Community College in 1988.

The 2005-2006 Brunswick Community College catalog identifies the mission, goals, and vision of the college. Those statements are listed below:

Mission

The mission of Brunswick Community College, a public two-year educational institution, chartered in 1979 and centrally located in Brunswick County, North Carolina, is to provide accessible and affordable programs and services that meet the educational and cultural needs of the community and to provide opportunities for individuals to be successful.

The College will:

- Emphasize multicultural experiences
- Encourage lifelong learning
- Enhance economic development locally
- Ensure academic excellence
- Establish positive learning environments
- Foster an awareness of global, economic and cultural trends

Goals

- Procure and allocate essential fiscal and human resources for the College
- Enhance and validate quality and flexible educational programs, learning environments, and College services
- Encourage productive partnerships and collaboration locally, regionally, and globally
- Expand and enrich educational services to enhance and validate individual successes
- Create and nurture a work environment that ensures maximum development and utilization of the skills and abilities of all employees

Adopted by the Board of Trustees, October 2002

Vision Statement

Brunswick Community College is proud of its past and its ability to remain a close-knit community that is reflective of the larger community of Brunswick County. Our future will be one in which this family environment will be preserved and valued. Challenged by change and innovation, we will move forward to create a future responsive to the diverse needs of our students, our employees, and all those we serve.

The community college operates classes on a semester schedule and offers a variety of programs that lead to degrees, diplomas, or certificates. Following is a list of those programs.

- Air Conditioning, Heating, and Refrigeration Technology
- Aquaculture Technology
- Associate Degree Nursing (pending approval of the NC Board of Nursing)
- Associate in Arts
- Associate in Science
- Basic Law Enforcement Training
- Business Administration
- Business Administration/Electronic Commerce
- +Business Administration/Small Business Entrepreneur
- Computer Programming
- Cosmetology
- Cosmetology Instructor
- Early Childhood Education
- Early Childhood Education/Administration
- +Early Childhood Education/Infant and Toddler
- Early Childhood Education/School-Age
- Early Childhood Education/Special Education
- Early Childhood Education/Teacher Associate
- Electronics Engineering Technology
- Esthetics Instructor
- Esthetics Technology
- General Occupational Technology
- Health Information Technology
- Horticulture Technology
- +Horticulture Technology/Landscape Specialty
- +Horticulture Technology/Nursery Specialty
- Industrial Systems Technology
- Information Systems
- Information Systems/Network Administration and Support
- Internet Technologies
- +Manicuring Instructor
- +Manicuring/Nail Technology
- Nursing Assistant

Office Systems Technology
 +Phlebotomy
 Practical Nursing
 Turfgrass Management and Technology
 Welding Technology

+Ineligible for Title IV Federal Financial Aid Programs.

BCC also offers college transfer programs with associate degrees in arts and science, consortium and collaborative programs in allied health, and developmental education programs.

Distance learning is offered at BCC. Distance learning typically occurs when instruction is provided with the instructor and student in different locations. The college offers several types of distance learning with different requirements for successful completion, including on-line courses, interactive video classes, telecourses, hybrid courses, and web-supplemental courses.

The University of North Carolina at Wilmington (UNCW) is also within commuting distance to County residents. UNCW is a major four-year university, and is part of the University of North Carolina system.

J. Recreation

The Brunswick County Parks and Recreation Department offers a variety of programs and facilities for County residents to enjoy. The department maintains six community buildings and offers classes in Aerobics, Dancing, Pilates, Water Babies, Water Aerobics, and Swim Lessons. Athletic programs are offered during all seasons. Winter Athletic Programs include Youth boxing, Youth Basketball, and Mens over 30 Basketball. Spring Programs include Dixie Boys Baseball, Dixie Majors Baseball, Dixie Belles Girl’s Softball, and Dixie Debs Girl’s Softball. Summer Programs include Hook-A-Kid-On-Golf, Adult Coed Softball, Tennis Lessons, and Summer Day Camps. Fall Programs include Youth Football, Mens Softball, and Women’s Softball. There are 10 parks throughout the County. The following table provides a summary of the facilities.

**Table 57.
 Brunswick County Park Locations and Amenities**

Park	22 acres	Amenities
Brunswick River Park 580 River Road, Leland	22 acres	Continued development Fishing Boat dock 3 picnic shelters 1 playground Restrooms

Table 57 (Continued)

Park		Amenities
Dutchman Creek Park 4750 Fish Factory Road, Southport	30 acres	Continued development Fishing Restrooms
Leland Community Park 1490 Village Road NE, Leland	11 Acres	2 baseball fields - 180 feet & 200 feet Practice area/batting cage Recycle bin 1 concession stand with restrooms 1 storage building 3 picnic shelters 1 playground 1 community building - 2,500 square feet
Lockwood Folly District Park 430 Green Swamp Road, Supply	20 acres	3 baseball/softball fields - 2 @ 200 feet and 1 @ 300 feet 1 football/soccer field 1 concession stand with restrooms 1 office/storage building 1 restrooms building 1 basketball court 2 tennis courts 3 picnic shelters 1 playground
Navassa Park 800 Park Avenue, Navassa	5 acres	1 baseball field - 300 ft. 1 basketball court 1 tennis court 1 picnic shelter 1 concession stand with restrooms 1 playground
Northwest District Park 1937 Andrew Jackson Highway NE, Leland	35 acres	3 baseball/softball fields - 2 @ 300 feet, and 1 @ 250 feet 1 football/soccer field 1 concession stand with restrooms 2 basketball courts 4 tennis courts 4 picnic shelters 1 playground 8 acres of practice area
Shallotte District Park 5550 Main Street, Shallotte	64 acres	4 baseball/softball fields - 2 @ 200 feet and 2 @ 300 feet soccer fields 1 concession stand with restrooms 1 office/storage building 1 basketball court 2 tennis courts 3 picnic shelters 1 playground

Table 57 (Continued)

Park		Amenities
Smithville District Park 8340 River Road SE, Southport	23 acres	2 baseball/softball fields - 300 feet each 1 football/soccer field - 300 feet 1 soccer field - mini 1 concession stand with restrooms 1 storage building 1 basketball court 2 tennis courts 2 picnic shelters 1 playground
Town Creek District Park 6420 Ocean Highway East, Winnabow	35 acres	2 baseball/softball fields - 1 @ 200 feet and 2 @ 300 feet 1 concession stand with restrooms 1 basketball court 2 tennis courts shuffleboard and horseshoes 2 picnic shelters 1 playground 1 community building - 2,000 square feet
Waccamaw Park 5855 Waccamaw School Road NW, Ash	30 acres (20 undeveloped)	2 baseball/softball fields 1 @ 200 feet and 1 @ 300 feet 1 football/soccer field 1 concession stand with restrooms 1 basketball court 2 tennis courts 1 beach-style volleyball court 2 picnic shelters 1 playground 1 community building - 7,500 square feet

Source: Brunswick County Parks and Recreation Department.

The Parks and Recreation Department also offers special programs for seniors. Those programs include seniorcise classes that feature muscle strengthening exercises, stretching, and aerobics; social day and overnight trips; and a golf tournament program open to those 55 and older.

While the County does not own any golf courses, there are 36 courses located within the County. According to the Brunswick County Chamber of Commerce, there was an explosion of golf courses in the last few years. This trend has slowed. Golf can be played year-round because of the pleasant climate. Many of the golf courses were designed by golfing masters including Arnold Palmer and Fred Couples. Also, the County has hosted professional and amateur golf tournaments that include the PGA Tour qualifying, LPGA Futures Tour, Cool Max Amateur, and the Sunbelt Senior PGA Tour.

K. Electric Service

Brunswick Electric Membership Corporation and Progress Energy provide power to Brunswick County residents.

L. Stormwater Management

1. Introduction

Precipitation that occurs as a result of a rainfall or snow melt event that does not permeate into the soil, is not consumed by plants, or is evaporated into the air becomes stormwater. Pollutants such as oil and grease, sediment, bacteria, and other toxic substances are added to this water as it runs across impervious surfaces and thereby polluting our surface waters. In addition, as the volume of stormwater increases, more flooding and erosion may occur.

2. Existing Drainage Problems

As discussed in the Natural Systems section of this plan, there are three basic drainage areas. The Green Swamp, approximately 175,000 acres in the north-central part of the County, is drained on the east side by the Cape Fear River, the west side by the Waccamaw River, and the south side by the Atlantic Ocean. This area has the county's largest area of muck soil and is very poorly drained. The Cape Fear River drainage area has numerous irregularly-shaped ponds and lakes created by the dissolution and removal of underlying limestone. The Waccamaw River drainage area has poorly drained to moderately drained soils. Due to the size of the County, it is difficult to pinpoint specific problem drainage areas. Drainage problems tend to occur in low lying areas with poorly drained soil. In addition, flooding is a potential problem in approximately 67% of the County, according to current flood hazard data.

3. Water Quality

Three subbasins are in Brunswick County: 03-07-57 and 03-07-59 in the Lumber River Basin and 03-06-17 in the Cape Fear River Basin. There are no waters classified as impaired in subbasin 03-07-57. However, all waters are considered impaired for fish consumption. There are four NPDES wastewater discharge facilities. One facility is considered a major discharger and three facilities are considered minor dischargers. Only two of the receiving streams have notable water quality problems. Fecal coliform bacteria, ammonia, and biochemical oxygen were detected in Grissett Swamp and fecal coliform bacteria and ammonia were detected in Bear Branch. There are no waters impaired for aquatic life or recreation in subbasin 03-07-59. However, all waters are impaired for fish consumption and 84% of estimated acres are impaired for Shellfish Harvesting. There are three NPDES wastewater dischargers in this subbasin, all of which are minor dischargers.

Only the Shallotte River (receiving stream) had notable water quality problems. A Good-Fair bioclassification in the 1996 assessment was reduced to a Fair bioclassification during the 2001 assessment. The decrease was probably a result of drought conditions and subsequent affects of brackish intrusion during a low flow period. One percent (1%) of freshwater streams are impaired in subbasin 03-06-17. Twenty-nine percent (29%) of estuarine waters are impaired in the subbasin. There are 49 permitted dischargers in the subbasin, 10 of which are major dischargers. The receiving waterbodies that have notable water quality concerns are the Cape Fear River near Neils Eddy Landing and the Cape Fear River Estuary. The impaired section of the Cape Fear River had an impaired biological community. The International Paper Board discharge and non-point source pollution are the probable causes. The Cape Fear River Estuary was classified impaired because of low levels of dissolved oxygen. The probable causes for impairment are WWTP discharges as well as nonpoint source pollution like marinas, canal systems, and septic systems.

4. EPA Regulations

The Environmental Protection Agency (EPA) has begun implementation of Phase II of the Stormwater Management Plan. These policies apply to municipalities with populations greater than 10,000 and with densities of 1,000 per square mile. For municipalities that meet these parameters, submittal of a stormwater management plan is required. Phase II regulations also apply to entities designated under the 1990 census as a Small MS4 (Small Municipal Separate Storm Sewer System). MS4s are defined as a publicly-owned conveyance or system of conveyances designed or used for collecting and conveying stormwater. MS4's are not combined with sewer and are not part of a publicly-owned treatment facility. Municipally-owned MS4's can include counties, town, airports, federal properties, hospitals, schools, etc. Small community MS4's are regulated if they discharge into impaired or sensitive US waters. Based on the 1990 Census, Brunswick County is required to meet the EPA Phase II Stormwater Management Program regulations.

Effective management of stormwater runoff offers a multitude of possible benefits that include: protection of wetlands and aquatic eco-systems, improved quality of receding water bodies, conservation of water resources, protection of public health through flood control, and improved operation and hydraulic characteristics of streams receiving run-off; all of which can cause higher peak flow rates that increase frequency and duration of bank full and sub-bank full flows. Increased occurrences in downstream flooding can also be reduced by lowering base flood levels, such as with traditional flood control methods that rely on the detention of the peak flows. They are generally not targeted to the reduction of flooding and in many cases have exacerbated the problems associated with changes in hydrology and hydraulics. The EPA recommends an approach that integrates control of stormwater peak flows and the protection of natural channels to sustain physical and chemical properties of aquatic life.

The EPA has developed guidelines for implementing the Phase II Stormwater Management Program. The guidelines outline six (6) steps for development of Best Management Practices for a stormwater management plan. Those six steps are as follows:

- (i) Public Education and Outreach on Stormwater Impacts
- (ii) Public Involvement and Participation
- (iii) Elicit Discharge Detection and Elimination
- (iv) Construction Site and Stormwater Runoff Control
- (v) Post-Construction Stormwater Management and New Development or Redevelopment
- (vi) Pollution Prevention and Good Housekeeping for Municipal Operations

Brunswick County is currently in the application phase of the NPDES program. The County has submitted a permit application to the North Carolina Department of Environment and Natural Resources, and is currently modifying the application based on directives from the state. Once approved, the County will begin implementation of their comprehensive stormwater management program. This program will address each of the six minimum control measures outlined above. The County's stormwater management program will be discussed in detail in the Future Demands section of the plan.

5. Construction Activities

Stormwater runoff from construction activities can have a significant impact on water quality, contributing sediment and other pollutants exposed at construction sites. The NPDES Stormwater Program requires operators of both large and small construction sites to obtain authorization to discharge stormwater under a NPDES construction stormwater permit. In 1990, the Phase I Stormwater Management Program regulations addressed large construction operations that disturbed five (5) or more acres of land. The NPDES program also addresses small construction activities – those that disturb less than five (5) acres of land – which were included in the Phase II final rule. Construction activities that disturb over one (1) acre of land are required to develop and implement a stormwater pollution prevention plan specifically designed for the construction site. The development implementations of the plan follow the basic phases listed below:

- (i) Site Planning and Design Development Phase
- (ii) Assessment Phase
- (iii) Control Selection/Design Phase
- (iv) Certification/Verification/Approval Phase
- (v) Implementation/Construction Phase
- (vi) Final Stabilization/Termination Phase

6. North Carolina Shoreline Buffering

In August of 2000, the State of North Carolina developed a thirty (30) foot buffering rule for all new development in the twenty coastal counties governed by the Coastal Area Management Act (CAMA). This rule applies to all navigable waters, excluding the ocean, which has previously established setback requirements. The development of this buffer does not restrict the construction of water dependent structures, such as docks and boat ramps. The benefits of the buffering include the following:

- (i) Flood Control – by reducing the velocity and providing a collection area for stormwater runoff and precipitation. Buffers encourage water infiltration into the ground, rather than flooding low-lying areas.
- (ii) Groundwater Recharge – buffers are also beneficial to recharging the ground water supply and promoting ground water flow.
- (iii) Soil Erosion Prevention – vegetated buffers stabilize the soil and reduce sedimentation.
- (iv) Conservation of Coastal Riparian Wildlife Habitats – these natural areas provide breeding, nesting, and habitat, and protect wildlife from predication. Vegetated buffers help increase the diversity of wildlife while providing site for foraging and corridors for dispersal.

V. CURRENT PLANS, POLICIES AND REGULATIONS

Brunswick County has an active Planning Board which works with the County Commissioners to oversee the county's land use management program. The County currently utilizes the Brunswick County Zoning Ordinance and Subdivision Regulations, adopted in the fall of 1993, and effective January 1, 1994, as the basis for all land use regulation. Zoning was established in Brunswick County as a result of a public vote that took place in 1991. The vote to establish a County zoning ordinance prevailed with a vote of 2-1. Since the initial adoption of this ordinance, several amendments and rezoning activities have taken place in response to growth trends occurring throughout the County.

The following provides a summary of the county's land use related codes, ordinances, and plans.

A. Brunswick County Zoning Ordinance

As stated above, the Brunswick County Zoning Ordinance became effective on January 1, 1994. It contains the criteria for use of all land throughout Brunswick County along with requirements for land use, setback, different type uses, special requirements, etc. The County has a central permitting office and planning department to oversee the enforcement of the zoning ordinance.

Table 58 and Map 24 provide the location and acreage figures of all zoning districts within Brunswick County. The two largest zoning districts within County are Residential Agricultural and Residential. These two districts account for 92.1% of the county’s land that is not included within a municipality’s corporate limits or extraterritorial jurisdiction. For a detailed explanation regarding what uses and densities are permitted in each of the districts identified below, please refer to the Brunswick County Zoning Ordinance, which can be viewed on the web at <http://www.brunasco.net>.

**Table 58.
Brunswick County - Zoning**

Districts	Acres	% of Total
Commercial	9,151.6	1.9%
Residential	66,910.7	14.1%
Industrial	16,346.5	3.5%
Military/Institutional	11,478.0	2.4%
Residential Agricultural	369,147.7	78.0%
Total	473,034.3	100.0%

Source: Holland Consulting Planners, Inc.

Note: Table 58 will be updated prior to adoption of the plan.

B. Brunswick County Subdivision Regulations

The Brunswick County Subdivision Regulations were originally adopted in 1974. Since that time the regulations were revised in 1980 and 1992, before a complete rewrite was done in 1998. The current subdivision regulations went into effect in January 1999. These regulations ensure that development within Brunswick County will take place in an orderly fashion. The ordinance includes provisions for the coordination of streets within proposed subdivisions with existing or planned streets or with other public facilities; for the dedication or reservation of right-of-way easements for street and utility purposes; and for the distribution of population and traffic which shall avoid congestion and overcrowding, and which shall create conditions beneficial to or promotive of public health, safety, and the general welfare.

C. Airport Height Control Ordinance

This ordinance was originally adopted in the early 1980s. The County adopted a revised ordinance in 1998 in an effort to regulate height control and development immediately surrounding the two general aviation airports located within the county: Brunswick County Airport and the Ocean Isle Beach Airport. This ordinance is intended to ensure public safety through establishing land use controls within and immediately adjacent to the airport properties. The ordinance is implemented through a joint effort of the two airports’ management authority and the county’s building inspections department.

Map 24 - Zoning

D. Manufactured Home Park Ordinance

The county's Manufactured Home Park Ordinance was adopted in 1995, in an effort to control the development of mobile home parks throughout the county. The purpose of this Ordinance is to regulate and guide the establishment of manufactured home parks in order to promote the public health, safety, and general welfare of the citizens of Brunswick County, North Carolina. This Ordinance is designed to accomplish the following specific objectives: (a) to further the orderly layout of manufactured home parks; (b) to secure safety from fire, panic, and other dangers; (c) to provide adequate light and air; and (d) to ensure that facilities for transportation, parking, water, sewage, and recreation are provided for manufactured home park residents.

E. Brunswick County Campground Ordinance

This ordinance was adopted in 1995 in conjunction with the Manufactured Home Park Ordinance. The purpose of this Ordinance is to regulate and guide the establishment of campgrounds in order to promote the public health, safety, and general welfare of the citizens of Brunswick County. The Ordinance is designed to accomplish the following specific objectives: (a) to further the orderly layout of campgrounds; (b) to secure safety from fire, panic, and other dangers; (c) to provide adequate light and air; and (d) to ensure that facilities for transportation, parking, water, sewage, and recreation are provided for campground visitors.

F. Hazard Mitigation Plan

Brunswick County recently adopted an updated Hazard Mitigation Plan, which includes the county as well as several participating municipalities. This plan was developed and adopted in response to new federal and state legislation. This legislation, the Disaster Management Act 2000 (Federal) and NC Senate Bill 300 (State), makes it mandatory that each jurisdiction must adopt a current Hazard Mitigation Plan in accordance with new guidelines in order to receive Public Assistance and HMGP funding in the event of a disaster.

G. NC State Building Code

Brunswick County has adopted the NC State Building Code as the county's regulatory tool for overseeing construction. The county has adopted in their entirety the North Carolina State Building Code, North Carolina Heating Code, North Carolina Electrical Code, and the North Carolina Uniform Residential Building Code.

The county's building codes establishes regulations for the following:

- (1) The location, design, materials, equipment, construction, reconstruction, alteration, repair, maintenance, moving, demolition, removal, use and occupancy of every

- building or structure or any appurtenances connected or attached to such building or structure;
- (2) The installation, erection, alteration, repair, use and maintenance of plumbing systems consisting of house sewers, building drains, waste and vent systems, hot and cold water supply systems, and all fixtures and appurtenances thereof;
 - (3) The installation, erection, alteration, repair, use and maintenance of mechanical systems consisting of heating, ventilating, air conditioning and refrigeration systems, fuel burning equipment, and appurtenances thereof; and
 - (4) The installation, erection, alteration, repair, use and maintenance of electrical systems and appurtenances thereof.

H. National Flood Insurance Program

Brunswick County is a participant in the Regular Phase of the National Flood Insurance Program. Enrollment in the Regular Phase of the National Flood Insurance Program is initiated by a voluntary agreement between the local jurisdiction and the federal government. It is agreed that if a community implements and enforces measures to reduce the risk from flooding in special flood hazard areas, the federal government will make flood insurance available within the community to mitigate future flood losses. As required by the NFIP, the county has adopted a flood damage prevention ordinance. This ordinance assures that the ground floor of all structures located in FEMA-designated 100-year flood zones have a base floor higher than the defined 100-year flood elevation.

I. Current CAMA Land Use Plan

The current CAMA land use plan was certified by the CRC on November 20, 1998. Appendix V provides an analysis of the County's success in implementing the plan. The plan is consistent with the state's standards for AECs. In addition, Appendix V summarizes implementation measures by Brunswick County and the actions taken by the County to protect natural systems.