

## SECTION I: INTRODUCTION

The Fiscal Years 2004/2005 - 2008/2009 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.

The Subchapter 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 (hereinafter referred to as the "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.

In general, Subchapter 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 which the Town of Pine Knoll Shores will take to ensure implementation of this plan.

At the beginning of the preparation of this document, the Town of Pine Knoll Shores 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.

Following adoption of the plan by the Pine Knoll Shores Board of Commissioners, it was submitted to the CRC for certification. Certification of the plan was achieved on \_\_\_\_\_, 2008.

## SECTION II: HISTORY

The following history of Pine Knoll Shores, North Carolina, is a compilation of excerpts from The Story of Pine Knoll Shores by Authors Mary Korff, Ken Hanan and Art Browne of the original work by Ken Haller. It is an excellent summary and has been utilized verbatim as it appears on the Town's website.

### **A. THE BEGINNING**

The story of Pine Knoll Shores as we know it, begins with Alice Hoffman, who bought substantial acreage on Bogue Banks (known then as "Isle of the Pines") in 1918. She made her home here, off and on, until her death in 1953. The property was then willed to her niece, Mrs. Theodore Roosevelt, Jr., and her four children.

It was these Roosevelts who envisioned the development of the Town of Pine Knoll Shores. To carry this out, they engaged a nationally known management consultant firm and later a prominent local engineering firm. Together they came up with a plan which not only set up the physical structure of the Town, but also established a long range plan, allowing each stage of development to gel before the next stage was begun. Throughout this development the Roosevelts stood by to assist and encourage those who came to carry it out, as we shall see.

Early builders began in the easternmost section of the Town, constructing mostly vacation homes. By 1964, lots were selling for \$1,150 to \$1,600. The first three motels, the Atlantis Lodge, the Sea Hawk, and the John Yancey (later the Royal Pavillion), went up on the oceanfront during this period.

The Roosevelts began to notice that this new community had appeal for permanent residents as well. It was time to draw up covenants to regulate its growth.

With the further development of the central area, a homeowners association was established known as Pine Knoll Association, Inc. This became the organization responsible for maintaining streets, parks, and waterways; providing utilities such as water; and enforcing building standards. Later the eastern section would also form an association called PIKSCO. These associations eventually worked together to incorporate the Town.

With these Homeowners' Associations began the tradition of volunteerism so much a part of the development of Pine Knoll Shores and which still exists today. The Town had attracted prominent citizens of the area and retirees from outlying areas who contributed their talents honed in the professions, business, government, and the military. They gave generously of their services. Nor were their services confined to their expertise. The Shoreline, the Town newsletter, was conceived and published by its co-editors, a housewife and a former librarian. Former corporate vice presidents could be seen helping to clear and maintain public areas, repairing potholes and building docks, to name but a few examples.

Another very important influence of the Homeowners' Associations was, and continues to be, their emphasis on residential growth as opposed to commercial development. Farsighted planning by the Roosevelts' representatives had designated park areas, areas to be kept natural, those to be developed commercially, and those to be held to single-family dwellings.

Major emphasis of these associations, and later the incorporated Town, was to be on Pine Knoll Shores as a residential community ... and so it has remained.

## **B. ORGANIZING A TOWN GOVERNMENT**

By the close of the '60s, as the Roosevelts began to bow out, the first Homeowners' Associations assumed responsibility for many Town functions. By the early 1970s they were recommending incorporation.

In January 1972, a public meeting was arranged at which a representative of the North Carolina League of Municipalities discussed the advantages of incorporation. As a result of the meeting, a steering committee of nine volunteers, broadly representative of all sections of the area then subdivided, was formed to study all aspects of the proposal to incorporate.

In June the committee reported its findings, and had also prepared a draft of a proposed charter of incorporation. A second public meeting was held. Most residents were receptive to the plan. Thus, the committee contacted Carteret County's representative in the North Carolina General Assembly, submitted the proposed charter and requested that the proposal be presented for enactment.

The General Assembly responded by ratifying the charter on April 25, 1973. Pine Knoll Shores was now officially The Town of Pine Knoll Shores!

## **C. TOWN HALL**

Upon incorporation, one of the most immediate problems facing the new Town was to find quarters in which to conduct its business. This problem was solved when the owners of the Atlantis Lodge offered a small office space for the Town Clerk and use of a large recreation room for public meetings. Need for a larger and more permanent office space, however, soon became apparent. The solution came when the Roosevelts gave the Town the little house (formerly a part of Mrs. Hoffman's home) that was then the office for the Roosevelts' resident manager. In July 1974, the house was moved to a 25-acre plot on Pine Knoll Boulevard donated by the Roosevelts as a Town Hall site. The Pine Knoll Shores Garden Club, already well organized, provided the landscaping.



**Figure 1: Original Town Hall**

This building served for the next five years until the present structure was completed. Serious consideration of the need for a larger and more adequate Town Hall began as early as 1976. One of the major considerations was the desire for the Town's own fire department and a space to house its equipment when acquired.

Planning, in conjunction with the architect, continued until May 1978, when bids for construction were accepted. Still another year went by before the building was completed, and fire and rescue vehicles acquired. When the move to the new building had been accomplished by May 1979, there was a joyful official opening ceremony celebrating the result of years of planning and effort.



**Figure 2: Current Town Hall**

#### **D. VOLUNTEERS**

Critical to the evolution of this community as it is today has been the contribution of the hundreds of dedicated volunteers who have given so freely of their time and talents. In the years leading up to incorporation, but especially in the years since that time, the spirit of volunteerism has been a hallmark of the Town. Counted among the hundreds of unpaid volunteers are those who have served as firefighters, emergency medical personnel, emergency management staff, members of the boards, commissions, committees, and mayors.

Because of these caring, involved townspeople, a distinctive community has been created which today offers many advantages to its residents. Among these are one of the lowest tax rates of any incorporated towns in this part of the state.

Our residents also have the comfort and security of a first class, well-trained and equipped combined group of paid employees and volunteers serving as fire, EMS and emergency management personnel, ready to respond immediately to nearly every type of disaster.

Less tangible but just as beneficial is the ambience created throughout the Town by the spirit of neighbor helping neighbor. This makes Pine Knoll Shores a community in the truest sense of the word!

### SECTION III: REGIONAL SETTING

The Town of Pine Knoll Shores is centrally located on Bogue Banks in south central Carteret County. Pine Knoll Shores is located between Atlantic Beach to the east and Indian Beach to the west. North Carolina Highway 58 is the main thoroughfare running the length of the Town's corporate limits. This highway connects all of the beach communities along Bogue Banks. Maps 1 and 2 provide an overview of the Town's regional location, as well as a detailed street level map which indicates the location of the Town's street rights-of-way.

Pine Knoll Shores is also centrally located for access by residents of several large urban centers throughout the state's Coastal Plain and Piedmont regions. For this reason, the Town is a desirable tourist destination. The following summarizes the distance in miles to several major urban centers in close proximity to the Town of Pine Knoll Shores: Beaufort (10 miles), Morehead City (6 miles), New Bern (41 miles), Jacksonville (29 miles), Greenville (83 miles), Rocky Mount (128 miles), Raleigh (146 miles), and Wilmington (81 miles).

Map 1 - Regional Location

Map 2 - Street Level

**SECTION IV: PINE KNOLL SHORES**  
**COMMUNITY CONCERNS AND ASPIRATIONS**

**A. KEY ISSUES/DOMINANT GROWTH-RELATED ISSUES**

It is very useful for a community to determine the key concerns and growth-related issues at the beginning of the planning process. In order to solicit input from Pine Knoll Shores citizens, an issues identification meeting was held on November 11, 2004. Approximately 30 Town residents attended this work session. The 1,600+ citizens of Pine Knoll Shores were notified of this meeting via normal open meeting procedures. At this meeting, an open floor discussion was held regarding issues that Town residents feel will have a significant impact on the future of Pine Knoll Shores. The list provided below is a ranking of the issues identified at this meeting. During the course of this meeting, all issues identified were listed. Subsequent to the discussion portion of the meeting, all attendees were asked to vote on what they felt were the most significant concerns or issues listed. There are several issues whose rank is tied, due to receiving the same number of votes.

RANK	ISSUE	SCORE
1	Maintain strict residential zoning restrictions	13
2	Develop a recreational facility (indoor - senior)/Address issue of providing youth recreational facilities (multi-use)	12
3	Phase in underground utilities	11*
3	Solve problems involved with water system (purchase and/or improvements)	11*
3	Develop long term plan for beach renourishment 20-30 years	11*
3	Maintain the canal	11*
4	Preserve the maritime forest	10*
4	Identify strategy for use and preservation of Roosevelt natural area	10*
5	Address stormwater management issues	9*
5	Maintain housing standards	9*
6	Address traffic issues along Highway 58	8*
6	Determine a proper use for Roosevelt tract (10 acre) to be gifted to the Town	8*
7	Recognize need for ongoing beach renourishment	7
8	Encourage redevelopment	6*
8	Develop additional access into the canal (ingress/egress) to Intracoastal Waterway	6*
8	Identify central storage area for recreational vehicles (boats, Rvs)	6*
9	Install a central sewer system	5*
9	Take status quo approach to traffic issue	5*
10	Oppose third right-of-way access proposed for the middle of Bogue Banks	4
11	Identify ways to make the Town more senior friendly	3
12	Develop improved Town signage at entrances	2*
12	Address the issue of demographic shift (housing occupancy)	2*
12	Develop recreational programs (Town-sponsored)	2*
13	Develop a storm (hurricane) shelter	1*
13	Recycle stormwater	1*
13	Provide adequate parking at beach access sites to comply with section 933 standards	1*
14	Identify potential sites for sewer system infrastructure	0*
15	Address sewer need for commercial operations along Highway 58	0*
16	Develop Town-wide bicycle paths	0*

\*Indicates a tie score.

Additionally, a land use plan survey was mailed to 1,975 (617 in-Town; 1,358 absentee) property owners. A total of 959 (333 in-Town; 626 absentee) completed questionnaires were received. See Appendix II for a comparison of these results as well as the tabulation of additional questions from the property owners survey.

## ***B. PINE KNOLL SHORES COMMUNITY VISION***

*To the fullest extent possible, Pine Knoll Shores will strive to maintain a community dedicated to preserving its diverse forestlands, Roosevelt Natural Area, wetlands, marine life, and native wildlife while at the same time offering its citizens a quiet, respectable, predominantly single-family community. Residential areas will be strictly preserved and protected. Population growth should continue at a moderate growth rate. Commercial development will be limited and not allowed to infringe upon non-commercial land uses. Pine Knoll Shores will continue to be a community in which the best possible services are provided to its citizens at the most reasonable cost.*

## SECTION V: ANALYSIS OF EXISTING AND EMERGING CONDITIONS

### A. POPULATION, HOUSING, AND ECONOMY

#### 1. Pine Knoll Shores Permanent Population

##### a. *Pine Knoll Shores Permanent Population*

The permanent population within Pine Knoll Shores has increased substantially since the Town's incorporation. Overall the Town has experienced a growth rate of 131.6% since the 1980 Census was released. The 1980 Census was the first census in which Pine Knoll Shores was reported since the Town was incorporated in 1973. A 1970 figure for total population was backdated for Census purposes; however, this figure was based on estimates.

Subsequent to experiencing a huge in-migration of 714 persons between 1980 and 1990 for a growth rate of 110.5%, the Town saw a more modest increase of 164 individuals for a growth rate of 12.1% between the years 1990 and 2000. Since 1980, Pine Knoll Shores has experienced the second highest growth rate of any Town in Carteret County. Emerald Isle has experienced the most rapid growth by far, with a 303.2% growth rate from 1980 to 2000. A detailed breakdown of population growth throughout Carteret County is provided in Table 1.

Table 1. Pine Knoll Shores and Carteret County Population Growth by County and Municipality

Municipality	1980	1990	2000	'80 to '90	'90 to '00	Overall '80 to '00
Atlantic Beach	941	1,938	1,781	106.0%	-8.1%	89.3%
Beaufort	3,826	3,808	3,771	-0.5%	-1.0%	-1.4%
Cape Carteret	944	1,008	1,214	6.8%	20.4%	28.6%
Cedar Point*	0	628	929	628.0%	47.9%	47.9%
Emerald Isle	865	2,434	3,488	181.4%	43.3%	303.2%
Indian Beach	154	153	95	-0.6%	-37.9%	-38.3%
Morehead City	4,359	6,046	7,691	38.7%	27.2%	76.4%
Newport	1,883	2,516	3,349	33.6%	33.1%	77.9%
<b>Pine Knoll Shores</b>	<b>646</b>	<b>1,360</b>	<b>1,524</b>	<b>110.5%</b>	<b>12.1%</b>	<b>131.6%</b>
Total Municipalities	13,618	19,891	23,842	46.1%	19.9%	74.9%
Total Unincorporated Areas	27,574	32,662	35,537	18.5%	8.8%	28.9%
Total County	41,192	52,553	59,379	27.6%	13.0%	44.1%

\* Cedar Point was incorporated in 1988, therefore census data is not available prior to 1990.  
Source: US Census Bureau.

Peak seasonal population can be defined as the total number of overnight visitors in the Town of Pine Knoll Shores on the busiest day of the year, which typically occurs on holiday weekends such as the Fourth of July and Labor Day. The estimate provided below is based upon a study conducted by Paul D. Tschetter in 1988 in conjunction with East Carolina University.

This study was aimed at addressing seasonal population in the Albemarle-Pamlico region. A summary of estimated persons per unit for different types of lodging units and residences were provided in the study. Table 2 is a breakdown of how these estimates were calculated. The private housing units figure was taken from the US Census and accounts for all of the vacant housing units within Pine Knoll Shores. These units are comprised of both single-family and multi-family units.

Table 2. Pine Knoll Shores Seasonal Population, 2004

Housing Type	Number of Units	Persons Per Unit	Seasonal Population
Motel/Hotel	569	4.00	2,276
Campsites	0	3.50	0
Marina Boat Slips	0	3.25	0
Public Beach Access Visitors	118	3.00	354
NC Aquarium Visitors	1	4,000.00*	4,000
Private Housing Units	900	5.00	4,500
<b>Total</b>	<b>1,469</b>		<b>11,130</b>
Permanent Population	1,524		
Peak Seasonal Population	11,130		
<b>Total Peak Population</b>	<b>12,654</b>		

\*NC Aquarium Visitors figure is current as of July, 2008.  
Source: 2000 US Census and Holland Consulting Planners, Inc.

*b. Population Profile*

Table 3 summarizes the racial composition for Pine Knoll Shores and Carteret County from 1980 to 2000. An overwhelming majority of the population in Pine Knoll Shores is Caucasian. Caucasians comprise 99.1% of the Town’s population based on the 2000 US Census. Only 13 of the Town’s 1,524 person permanent population is made up of minorities, which makes up less than one percent (0.9%) of the total population. This racial composition has been very consistent since the Town’s incorporation. The contrast of male residents to female residents is split fairly even making 47.6% and 52.4% of the population, respectively.

Table 3. Pine Knoll Shores and Carteret County Racial Composition, 1970-2000

	Pine Knoll Shores		Carteret County	
	Total	Percentage	Total	Percentage
<b>1980 Population*</b>	<b>658</b>	<b>100.0%</b>	<b>41,902</b>	<b>100.0%</b>
Caucasian	655	99.5%	36,955	89.9%
African American	0	0.0%	3,857	9.4%
Other	3	0.5%	280	0.7%
<b>1990 Population**</b>	<b>1,367</b>	<b>100.0%</b>	<b>52,556</b>	<b>100.0%</b>
White	1,360	99.5%	47,445	90.3%
Black	0	0.0%	4,385	8.3%
Asian or Pacific Islander	5	0.4%	293	0.6%
American Indian, Eskimo, Aleut	2	0.1%	269	0.5%
Other	0	0.0%	164	0.3%
<b>2000 Population***</b>	<b>1,524</b>	<b>100.0%</b>	<b>59,383</b>	<b>100.0%</b>
White	1,511	99.1%	53,443	90.0%
Black or African American	1	0.1%	4,191	7.1%
Asian or Pacific Islander	3	0.2%	282	0.5%
American Indian and Alaska Native	2	0.1%	341	0.6%
Some Other Race	1	0.1%	392	0.7%
Two or More Races	6	0.4%	734	1.2%
Hispanic or Latino (of any race)****	16	N/A	929	N/A
Male	725	47.6%	29,041	48.9%
Female	799	52.4%	30,342	51.1%

\*Racial breakdown available for the 1980 Census.

\*\*Racial breakdown available for the 1990 Census.

\*\*\*Racial breakdown available for the 2000 Census.

\*\*\*\*In the 2000 Census, the Hispanic race was not considered an ethnic group. However, this is the number of individuals who reported being of Hispanic origin.

Source: 2000 US Census.

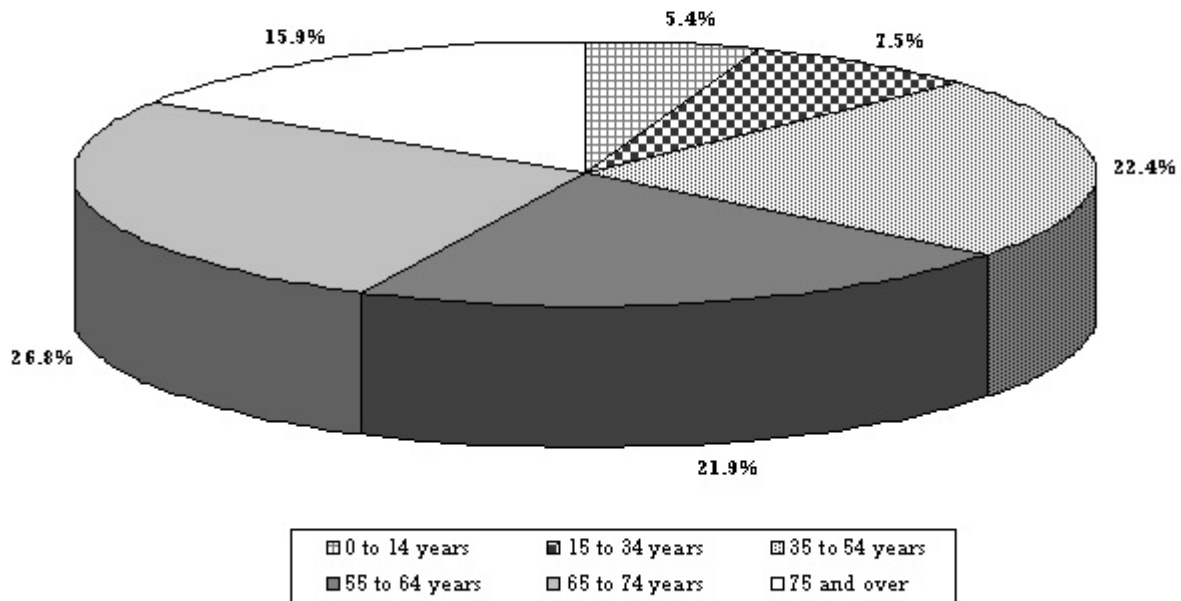
The population within Pine Knoll Shores is comprised primarily of an older population base. According to the 2000 Census, only 5.4% of the population is under the age of fifteen, compared to 16.7% for Carteret County overall. When comparing the 1990 and 2000 Census figures, it appears that the population of the Town is aging. The retired population between the two census reports increased by 11.5%, with an increase of 225 individuals over the age of 65. This shift can be attributed to the aging of the existing population, as well as in-migration of retired age individuals. The working age population within the Town compares quite favorably to the county in that 51.8% of the population is considered working age, compared to 66.0% for the county overall. Table 4 on the following page provides an overall summary of age composition for both the 1990 and 2000 Census years. Graph 1 depicts the Town's age composition for 2000.

Table 4. Pine Knoll Shores and Carteret County Age Composition, 1990 and 2000

	Pine Knoll Shores				Carteret County
	1990 Total	1990 % of Total	2000 Total	2000 % of Total	2000 % of Total
0 to 14 years	123	9.0%	83	5.4%	16.7%
15 to 34 years	197	14.4%	115	7.5%	21.9%
35 to 54 years	326	23.8%	342	22.4%	31.5%
55 to 64 years	295	21.6%	333	21.9%	12.7%
65 to 74 years	330	24.1%	408	26.8%	10.1%
75 and over	96	7.0%	243	15.9%	7.1%
<b>Total population</b>	<b>1,367</b>	<b>100.0%</b>	<b>1,524</b>	<b>100.0%</b>	<b>100.0%</b>
Median Age	N/A		61.8		42.3
School Age Population (5-18)	128	9.4%	104	6.8%	17.7%
Working Age Population (16-64)	800	58.5%	790	51.8%	66.0%
Elderly Population (65+)	426	31.2%	651	42.7%	17.2%

Source: 2000 US Census.

Graph 1. Pine Knoll Shores Age Composition, 2000



The educational attainment for Pine Knoll Shores residents is quite high. An overwhelming majority (96.9%) have a high school education, while approximately 48.1% reported having a bachelor's degree or higher. Additionally, 18.9% of the permanent population have received their graduate or professional degrees compared to 6.7% for Carteret County overall. Table 5 provides a comprehensive breakdown of educational attainment for permanent residents over 25 years of age for Pine Knoll Shores as well as Carteret County.

Table 5. Pine Knoll Shores and Carteret County Educational Attainment, 2000, Based on Persons 25 Years and Over

	Pine Knoll Shores		Carteret County
	Total	% of Total	% of Total
Less than 9 <sup>th</sup> grade	11	0.8%	5.1%
Ninth to twelfth grade, no diploma	30	2.2%	12.8%
High school graduate	235	17.2%	29.6%
Some college, no degree	335	24.6%	25.7%
Associate degree	96	7.0%	6.9%
Bachelor's degree	398	29.2%	13.1%
Graduate/Professional degree	258	18.9%	6.7%
Total population 25 years and over	1,363	100.0%	100.0%
Percent High School Graduate or higher	96.9%		
Percent Bachelor's degree or higher	48.1%		

Source: 2000 US Census.

*c. Population Summary*

- ▶ Pine Knoll Shores is the second fastest growing municipality in Carteret County following the Town of Emerald Isle.
- ▶ The Pine Knoll Shores permanent population increased by 131.6% since 1980.
- ▶ It is estimated that the Town's peak seasonal population is approximately 12,654 persons.
- ▶ According to the 2000 US Census, 96.9% of Pine Knoll Shores residents have a high school degree, while 48.1% reported having a bachelor's degree or higher.
- ▶ The minority population in Pine Knoll Shores is less than one percent (0.9%).
- ▶ Between the years of 1990 and 2000, the retired age population (65+) increased by 11.5%.

## 2. Housing

### a. *Housing Occupancy and Tenure*

Housing occupancy within the Town of Pine Knoll Shores is comprised predominantly of vacant structures. According to the 2000 US Census, 1,286 structures or 62.5% of the Town's total housing units were determined to be vacant. This large number of vacant housing units is made almost entirely (98.4%) of residences intended for seasonal, recreational, or occasional use. Of the 771 housing units that are occupied, 90.8% are owner-occupied. The number of occupied dwelling units has decreased since the 1990 Census, dropping by 4.1%. Table 6 provides an overview of housing occupancy and tenure for Pine Knoll Shores, as well as Carteret County overall.

Table 6. Pine Knoll Shores and Carteret County Housing Occupancy and Tenure, 1990 and 2000

	Pine Knoll Shores				Carteret County
	1990		2000		2000
	Total	% of Total	Total	% of Total	% of Total
Total Housing Units	1,542	100.0%	2,057	100.0%	100.0%
Vacant:	900	58.4%	1,286	62.5%	38.4%
For rent*	14	1.6%	6	0.5%	5.4%
For sale only*	8	0.9%	12	0.9%	2.9%
Rented or sold, not occupied*	6	0.7%	0	0.0%	2.2%
For seasonal, recreational or occasional use*	868	96.4%	1,266	98.4%	86.0%
For migrant workers*	0	0.0%	0	0.0%	0.1%
Other vacant*	4	0.4%	2	0.2%	3.4%
Occupied:	642	41.6%	771	37.5%	61.6%
Owner-occupied**	530	82.6%	700	90.8%	76.6%
Renter-occupied**	112	17.4%	71	9.2%	23.4%

\*Indicates breakdown of vacant household types.

\*\*Indicates breakdown of occupied household types.

Source: US Census Bureau.

### b. *Structure Age*

For all housing structures within Pine Knoll Shores, the median year for construction is 1989. This establishes the fact that an overwhelming majority of the residential structures within Pine Knoll Shores are of fairly new construction. Additionally, 83.6% of the housing units within Pine Knoll Shores have been constructed since 1980. Development has tapered off substantially since the rapid growth between 1980 to 1994 during which 1,391 structures or 67.6% of the Town's overall housing stock was constructed. The tables below detail the overall residential construction activity dating back to pre-1930. Table 7 and Graph 2 provide a breakdown taken from the 2000 US Census, while Table 8 details the residential building

permit activity that has occurred since 2000. Since the 2000 US Census report was released, there have been a total of 59 single-family units constructed resulting in a 2.9% increase in the Town's overall housing stock.

Table 7. Pine Knoll Shores Housing Structure, 2000

Year	Number of Structures	% of Total
1999 to March, 2000	65	3.2%
1995 to 1998	263	12.8%
1990 to 1994*	614	29.8%
1980 to 1989	777	37.8%
1970 to 1979	232	11.3%
1960 to 1969	75	3.6%
1950 to 1959	29	1.4%
1940 to 1949	2	0.1%
1939 or earlier	0	0.0%
<b>Total Structures</b>	<b>2,057</b>	<b>100.0%</b>
Median Year Structure Built	1989	

\*The Census reports this data in 10-year intervals until 1990. From 1990 to 1999, data are reported in 5-year intervals, and a 1-year interval for 1999 to 2000.

Source: US Census Bureau.

Graph 2. Pine Knoll Shores Year Structure Built (Residential)

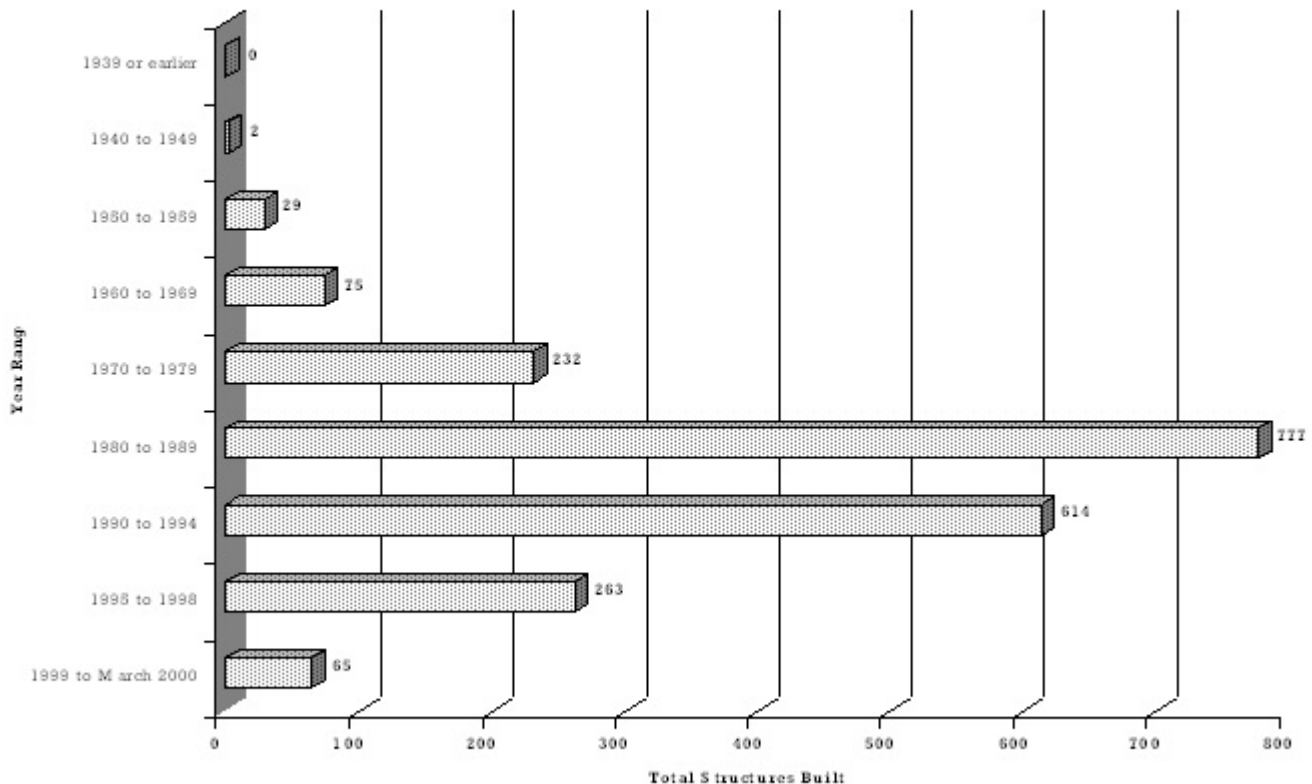


Table 8. Pine Knoll Shores Residential Building Permit Activity, 2004

Year	# of Permits	Construction Value
1997	24	\$2,709,700
1998	23	\$2,038,800
1999	18	\$3,734,920
2000	13	\$2,753,270
2001	39 (includes 24 condo units)	\$5,154,209
2002	16	\$3,719,619
2003	18 (includes 12 condo units)	\$3,164,589
2004	30 (includes 6 condo units)	\$7,840,439
<b>Total</b>	<b>181</b>	<b>\$31,115,546</b>

Source: Town of Pine Knoll Shores.

*c. Housing Conditions*

The housing stock within Pine Knoll Shores is comprised of larger, well-constructed homes (see Table 9, below). The average rooms per unit for housing units is 5.9 compared to 5.2 for Carteret County, and 70.8% of all homes have three or more bedrooms. Additionally, it should be noted that there were no reported instances of houses lacking complete or adequate kitchen and/or plumbing facilities.

Table 9. Pine Knoll Shores, Carteret County and North Carolina Housing Conditions

	Pine Knoll Shores	Carteret County	North Carolina
Average Rooms Per Unit	5.9	5.2	5.5
Percent with no bedroom	3.2%	0.5%	1.1%
Percent with 3+ bedrooms	70.8%	62.6%	60.8%
Percent lacking complete kitchen facilities	0.0%	0.4%	1.1%
Percent lacking complete plumbing	0.0%	0.5%	1.1%
Percent occupied with telephones	100.0%	59.6%	86.2%

Source: US Census Bureau.

*d. Single- and Multi-Family Units*

Approximately 63.0% of the overall residential structures within Pine Knoll Shores are single-family residences. Single-family residences are defined as stand-alone housing units with a single-family or individual living in the overall structure. Pine Knoll Shores was initially developed to accommodate single-family dwelling units while preserving the unique maritime forest landscape throughout what is now the corporate limits of the Town. Through strict zoning and various other land use controls the Town has achieved this goal.

Thirty-eight percent (37.8%) of the housing units within the Town are considered to be multi-family units. Multi-family units are structures that are occupied by three or more dwellings. There are several large multi-family complexes within the Town, a majority of which are utilized for seasonal or recreational purposes. It should be noted that there are no mobile homes within Pine Knoll Shores' jurisdiction. This occurrence contrasts with other communities along Bogue Banks who accommodate large mobile home subdivisions. The Town will address this fact in the context of policy statements developed later in the document.

Table 10. Pine Knoll Shores and Carteret County Units in Structure and Mobile Home Count, 2000

Units in Structure	Pine Knoll Shores		Carteret County
	Total	% of Total	% of Total
1-unit, detached	981	47.7%	55.7%
1-unit, attached	314	15.3%	4.5%
2 units	2	0.1%	3.7%
3 or 4 units	23	1.1%	2.9%
5 to 9 units	193	9.4%	2.5%
10 to 19 units	173	8.4%	1.1%
20 units or more	369	18.0%	3.9%
Mobile home	0	0.0%	25.7%
Boat, RV, van, etc.	0	0.0%	0.0%
<b>Total</b>	<b>2,055</b>	<b>100.0%</b>	<b>100.0%</b>

Source: US Census Bureau.

e. *Housing Summary*

- ▶ The total number of dwelling units that are permanently occupied by either renters or owner-occupants decreased by 4.1% between 1990 and 2000. This also means the vacant housing stock increased by 4.1%.
- ▶ The median year for year structure built within Pine Knoll Shores is 1989.
- ▶ Approximately 67.6% of the Town's housing stock was constructed between 1980 to 1994.
- ▶ According to Pine Knoll Shores building permit activity reports, 59 single-family residential structures were constructed between 2000 and 2003.
- ▶ Residential structures within Pine Knoll Shores on average have 5.9 rooms per unit.
- ▶ According to the 2000 US Census, 63.0% of the Town's housing stock is comprised of single-family homes.

### 3. Employment and Economy

#### a. *Introduction (General Economic Indicators)*

The Town of Pine Knoll Shores does not rely on commercial activity to drive the Town's economy. A majority of the Town's annual budget is comprised of proceeds from Ad Valorem Tax levies and Sales and Use Tax allocation. Table 11 is a summary of economic indicators for Pine Knoll Shores with a comparison to Carteret County and North Carolina overall. The per capita income for the Town is \$34,618, which is quite a bit higher than Carteret County and the state average. The mean income for the Town's residents according to the 2000 US Census was \$60,860. It should be noted that this figure is more than likely skewed due to the presence of several households or individuals with much higher than average annual incomes.

Table 11. Pine Knoll Shores, Carteret County and North Carolina Summary of Economic Indicators

	Year	Pine Knoll Shores	Carteret County	North Carolina
Per Capita Income	1999	\$34,618	\$21,260	\$20,307
Mean Income	1999	\$60,860	\$49,509	\$50,814
Unemployment Rate	2000	1.0%	2.9%	3.4%
% of population in labor	2000	36.8%	60.0%	65.7%
Poverty Rate	2000	3.6%	10.7%	15.2%

Source: NC Department of Commerce and US Census Bureau

#### b. *Household Income*

The annual household income for Pine Knoll Shores residents is very high for a municipality in Carteret County. Approximately fifty-four percent (53.8%) of all households reported making \$50,000 or greater. Additionally, the median income for Pine Knoll Shores is \$53,800. Table 12 summarizes the household incomes for the Town as of 2000. The figures are based on 760 families recorded in the context of the 2000 US Census.

Table 12. Pine Knoll Shores and Carteret County Household Income, 2000

	Pine Knoll Shores		Carteret County
	Total	% of Total	% of Total
Less than \$10,000	25	3.3%	9.4%
\$10,000 to \$14,999	19	2.5%	7.7%
\$15,000 to \$24,999	65	8.6%	14.6%
\$25,000 to \$34,999	101	13.3%	13.5%
\$35,000 to \$49,999	141	18.6%	18.1%
\$50,000 to \$74,999	179	23.6%	19.8%
\$75,000 to \$99,999	105	13.8%	8.8%
\$100,000 to \$149,999	74	9.7%	5.4%

Table 12 (continued)

	Pine Knoll Shores		Carteret County
	Total	% of Total	% of Total
\$150,000 to \$199,999	26	3.4%	1.2%
\$200,000 or more	25	3.3%	1.5%
Total Families	760	100.0%	100.0%
Median Income	\$53,800		\$42,307

Source: 2000 US Census.

*c. Employment/Earnings By Industry*

Tables 13 and 14 below provide an overview of industry categories in which the working age population of Pine Knoll Shores are employed. These figures account for all individuals over the age of 16 recorded in the 2000 US Census. The average weekly wage figures provided in Table 14 are for Carteret County overall and were compiled by the NC Department of Commerce. The largest employer of Pine Knoll Shores' residents is Education, Health, and Social Services making up 23.2% of all jobs. This is followed by Retail Trade (15.4%) and Finance, Insurance, Real Estate, and Rental and Leasing (12.6%). The highest paying jobs within Carteret County based on average weekly wage are as follows: Professional, Scientific, Management, Administrative, and Waste Management Services (\$708); Education, Health, and Social Services (\$631); and Public Administration (\$616).

Table 13. Pine Knoll Shores Employment By Industry, 2000

Industry	# Employed	% Employed
Agriculture, Forestry, Fishing, and Mining	2	0.4%
Construction	34	6.8%
Manufacturing	14	2.8%
Wholesale Trade	4	0.8%
Retail Trade	77	15.4%
Transportation, Warehousing, and Utilities	14	2.8%
Information	0	0.0%
Finance, Insurance, Real Estate, and Rental and Leasing	63	12.6%
Professional, Scientific, Management, Administrative, and Waste Management Services	50	10.0%
Education, Health, and Social Services	116	23.2%
Arts, Entertainment, Recreation, Accommodation, and Food Services	53	10.6%
Other Services (except Public Administration)	24	4.8%
Public Administration	48	9.6%
Total Persons Employed 16 Years and Over	499	100.0%

Source: US Census Bureau.

Table 14. Carteret County and North Carolina Wages by Industry, 2000

Industry	Average Weekly Earnings	
	Carteret County	North Carolina
Agriculture, Forestry, Fishing, and Mining	\$381	\$496
Construction	\$431	\$693
Manufacturing	\$412	\$801
Wholesale Trade	\$454	\$960
Retail Trade	\$265	\$439
Transportation, Warehousing, and Utilities	\$552	\$732
Information	\$352	\$928
Finance, Insurance, Real Estate, and Rental and Leasing	\$437	\$844
Professional, Scientific, Management, Administrative, and Waste Management Services	\$708	\$1,095
Education, Health, and Social Services	\$631	\$655
Arts, Entertainment, Recreation, Accommodation, and Food Services	\$395	\$558
Other Services (except Public Administration)	\$344	\$453
Public Administration	\$616	\$692

Source: NC Department of Commerce.

*d. Employment Commuting Patterns*

There are very few commercial operations within Pine Knoll Shores, and extremely limited office space. Thus, citizens must commute to neighboring municipalities for employment. According to the 2000 US Census, the average commuting time for Pine Knoll Shores residents is 27.7 minutes. Table 15 breaks the overall commuting time for all working age residents within Town.

Table 15. Pine Knoll Shores Travel Times to Work

Travel Time	Total	% of Total
Travel Time:		
Less than five minutes	21	4.5%
5 to 9 minutes	42	9.1%
10 to 14 minutes	98	21.2%
15 to 19 minutes	66	14.3%
20 to 24 minutes	78	16.9%
25 to 29 minutes	24	5.2%
30 to 34 minutes	48	10.4%
35 to 39 minutes	12	2.6%
40 to 44 minutes	11	2.4%
45 to 59 minutes	25	5.4%

Table 15 (continued)

Travel Time	Total	% of Total
60 to 89 minutes	12	2.6%
90 minutes or more	25	5.4%
Total (did not work at home)	462	100.0%
Worked at home	37	
Total workers 16 years and over	499	
Mean Travel Time:	27.7	

Source: 2000 US Census.

*e. Industries*

As noted above, there is very little commercial activity within Pine Knoll Shores. The Town does; however, have several large hotels that have a significant impact on the Town's revenue stream. These hotels are all located along Highway 58, and are scattered throughout the Town's jurisdiction. The provision of Town services to these facilities will be an important issue to discuss in the context of the policy development phase of the plan.

*f. Employment and Economy Summary*

- ▶ The per capita income for Pine Knoll Shores residents is \$34,618, 2000 U.S. Census.
- ▶ The 2000 US Census reported that 53.8% of the Town's households had an annual income of \$50,000 or greater.
- ▶ The largest employer of Pine Knoll Shores' residents falls under the category of Education, Health, and Social Services.
- ▶ The highest paying jobs in Carteret County are businesses related to Professional, Scientific, Management, Administrative, and Waste Management Services.
- ▶ The average commuting time for Pine Knoll Shores residents is 27.7 minutes.

**4. Population Projections**

Population is a difficult thing to predict in an area such as Pine Knoll Shores. The primary reason is that there are many factors involved in making this determination. In many jurisdictions, population growth is a trend that can be tracked back many years. Typically this trend can be expected to continue into the future. In a beach community such as Pine Knoll Shores, population is not as easy to predict. In most cases upon incorporation, the population within a Town increases very rapidly. Pine Knoll Shores population increased by 110.5%

between 1980 and 1990. This growth tapered off very quickly however, which is evidenced by the modest growth rate from 1990 to 2000 of 12.1%.

The following provides population projections for both the permanent population and peak seasonal population for Pine Knoll Shores through the year 2025. These projections are based on historical growth rates, as well as an estimated population of 1,601 citizens for the year 2005 provided by the North Carolina Office of State Planning. It is projected that permanent population growth will continue to slow, as more homes within Town are utilized for seasonal, recreational, or occasional use. The estimates for peak seasonal population growth are based on trends experienced throughout Bogue Banks. It is also projected that the number of summer visitors to the community will continue to increase over the next five to ten years.

Table 16. Pine Knoll Shores Permanent and Peak Seasonal Population Forecast, 2000-2025

	2000	2005	2010	2015	2020	2025
Permanent Population	1,524**	1,601**	1,657	1,696	1,724	1,741
Peak Seasonal Population*	11,130	11,898	12,707	13,330	13,970	14,598
Total	12,654	13,499	14,364	15,026	15,694	16,339

Sources:

\*Holland Consulting Planners, Inc. (November 2004 and 2005), additional visitors to the expanded North Carolina Aquarium have also been included in these figures.

\*\*NC Office of State Planning.

## **B. NATURAL SYSTEMS ANALYSIS**

### **1. Mapping and Analysis of Natural Features**

#### *a. Topography/Geology*

Carteret County is underlain by an eastward thickening wedge of sedimentary deposits of Pleistocene-age, ranging from 2,000 feet thick in the northwest portions of the county to almost 7,000 feet thick beneath the easternmost sections of the offshore strand. Because of the depth of the surficial sand/siliceous deposits, little is known of the composition of underlying deposits. Well logs indicate that shell fragments and calcareous material are consolidated into limestone at a depth of less than 120 feet west of Morehead City.

Pine Knoll Shores is centrally located along the shores of Bogue Banks, which is encompassed by water and is predominantly a low-lying area. The Town is bordered on the north by Bogue Sound and the south by the Atlantic Ocean, this portion of the Atlantic Ocean is also referred to as Onslow Bay. Topography along this stretch of the island varies from sea level or zero along the shoreline to 36 feet further inland. Higher elevations within Pine Knoll Shores are generally located towards the center of the island or fall within the Roosevelt Natural Area. Pine Knoll Shores is a very unique setting, in that a great deal of the maritime forest within the Town's jurisdiction has been preserved. Throughout Bogue Banks, a substantial amount of clear cutting has occurred to allow for increased residential construction.

Over the years, the Town of Pine Knoll Shores and its citizens have made it a top priority to preserve the maritime forest environment that exists along this portion of the island.

The majority of the Town's land is comprised of slopes within the 0 to 8% range; however, along dune lines the slopes may be as great as 30%. The shoreline along Pine Knoll Shores is constantly shifting. The Town has a proactive beach renourishment effort that is ongoing, and will be specifically addressed during the policy development phase of this plan.

*b. Climate*

Pine Knoll Shores is hot and humid in the summer, but is frequently cooled by sea breezes. Winter is cool with occasional, brief cold spells. Rain occurs throughout the year and is fairly heavy at times. In winter, the average temperature is 47° F, and the average daily minimum temperature is 38° F. The lowest temperature on record, which occurred on January 13, 1962, is 4° F. In summer, the average temperature is 78° F and the average daily maximum temperature is 85° F. The highest recorded temperature, which occurred on July 26, 1952, is 107° F.

The total average annual precipitation is roughly 52.5 inches. Of this, 30 inches, or 57%, usually falls in April through September. The heaviest one day rainfall during the period of record was 8.5 inches at Morehead City on June 11, 1966. Thunderstorms occur on about 45 days each year, and most occur in summer. The average seasonal snowfall is one inch. The deepest snowfall accumulation on record is 36 inches.

The average relative humidity in mid-afternoon is about 65%. Humidity is higher at night, and the average at dawn is about 80%. The sun shines 60% of the time in summer and 50% in winter. The prevailing wind is from the southwest. Average wind speed is 12 miles per hour in winter and spring.

*c. Flood Zones and Storm Surge*

Coastal flooding associated with tropical storm systems and nor'easters is a significant issue for the Town of Pine Knoll Shores. Coastal flooding is the inundation of land areas along the oceanic coast by sea waters over and above normal tidal action. Such flooding can originate from the ocean front, back bays, sounds, etc. Coastal flooding affects the general public and maritime interests along much of the U.S. coastline extending from the shoreline beaches to inland tidal waterways and the tidal portions of river mouths. Factors that contribute to the severity of coastal flooding include: tidal cycles, persistence and behavior of the storm that is generating the flooding, topography, shoreline orientation, and bathymetry of the area.

The most significant concern for Pine Knoll Shores with regards to coastal flooding is the storm surge that is generated by tropical storm events, including tropical storm systems and hurricanes. A storm surge is a dome or bulge of water that is caused by wind and pressure forces. It is a rise above the normal water level along a shore that is caused by strong onshore winds and/or reduced atmospheric pressure. The surge height is the difference of the observed water level minus the predicted tide.

A storm surge is caused by powerful coastal storms that move toward or adjacent to the coastline. It may be worsened by higher than normal astronomical tide levels. Two factors key in the development of a storm surge:

**Low barometric pressure** reduces the weight of the air on the ocean surface causing a slight rising (1 to 2 feet) of the surface of the water. This rising creates a dome and a new balance of forces.

**Wind** sweeps around the dome of water and induces currents that spiral toward the center of the storm. The force of the winds induces high waves that travel away from the storm. Wind is the dominant force at landfall, often bringing violent wave action far inland. The battering of these waves causes damage beyond mere flooding.

There are two different sets of data that will be used in the context of this plan to determine what portions of Pine Knoll Shores fall within a flood hazard area: Federal Emergency Management Agency (FEMA) designated flood zones; and National Oceanic and Atmospheric Administration (NOAA) Storm Surge Inundation Model.

The Flood Insurance Rate Maps (FIRMs) for Carteret County were recently updated in response to inaccuracies in the data exposed during Hurricane Floyd in 1999. On September 15, 2000, the first anniversary of the Hurricane Floyd disaster, FEMA and the State of North Carolina announced an historic agreement to develop a model program to maintain accurate flood hazard information for the State. Working with FEMA, North Carolina would become the first Cooperating Technical State and assume the primary ownership and responsibility of the FIRMs for all North Carolina communities as part of the National Flood Insurance Program. Carteret County received updated flood maps for the county in November 2002. Table 17 provides a summary of the acreage within Pine Knoll Shores that falls within various flood zones outlined on the new FIRMs. Additionally, Map 3 provides the locations of these flood zones. In addition to updating the maps, FEMA has also updated the flood zone designations as well as the criteria associated with them. The new designations that fall within the Town's jurisdiction are as follows:

**Zone AE:** Zone AE is the flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined in the Flood Insurance Study by detailed or limited detailed methods. In most instances, whole-foot Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Map 3 - Flood Hazard Areas

**Zone X:** Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2% annual chance floodplain.

**Zone VE:** Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

**Shaded X:** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than one foot or with drainage areas less than one square mile; and areas protected by levies.

Table 17. Pine Knoll Shores Flood Zones in Acres

Flood Zone	Acres	% of Total Town Acreage
AE	451.3	30.74%
X	180.4	12.29%
VE	194.2	13.23%
Shaded X	642.4	43.75%
Total Town Acres*	1,468.3	100.00%

\*Includes water and right-of-ways.  
Source: Federal Emergency Management Agency.

NOAA National Weather Service forecasters model storm surge using the SLOSH (Sea, Lake and Overland Surges from Hurricanes) model. The SLOSH model is a "diagnostic" model in which the hurricane's track, size, and intensity must be specified before the model is run. When these parameters are put into the model, a model wind field is produced, which in turn gives the surface stresses. The stresses act as the driving forces to move the water. Friction, the surface wind stress, and the pressure gradient cause the water to pile up along the coast. Generally, shallow areas will experience greater storm surges than areas with a shelf that drops off rapidly. NOAA has run the SLOSH model for coastal areas of the United States assuming average parameters in order to determine the general locations of storm surge impact associated with fast and slow moving hurricanes. Table 18 below provides a summary of the impact that varying storm events will have on the Town of Pine Knoll Shores. Maps 4A and 4B show the locations of the storm surge inundation.

Map 4A - Storm Surge

Map 4B - Storm Surge

Table 18. Pine Knoll Shores Storm Surge Inundation Acreage (Fast & Slow Moving Hurricanes)

Hurricane Strength	Fast Moving		Slow Moving	
	Acreage*	% of Total Acreage	Acreage*	% of Total Acreage
Category 1 - 2	1,046	71.3%	165	11.2%
Category 3	1,260	85.8%	244	16.6%
Category 4 - 5	1,361	92.7%	1,053	71.7%

\*It should be noted that all acreage falling within a Category 1 - 2 storm surge area will also fall within the storm surge boundary of a Category 3 storm. The same applies to a Category 5 storm.

Source: National Oceanic and Atmospheric Administration.

The data in these models is broken down by storm magnitude. The following provides a summary of hurricane strength according to the Saffir-Simpson Scale:

**Category 1:** Winds of 74 to 96 miles per hour. Damage primarily to shrubbery, trees, foliage, and unanchored mobile homes. No appreciable wind damage to other structures. Some damage to poorly constructed signs. Storm surge possibly 3 to 5 feet above normal. Low-lying roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings.

**Category 2:** Winds of 97 to 111 miles per hour. Considerable damage to shrubbery and tree foliage; some trees blown down. Major damage to exposed mobile homes. Extensive damage to poorly constructed signs. Some damage to roof materials of buildings; some window and door damage. No major wind damage to buildings. Storm surge possibly 6 to 8 feet above normal. Coastal roads and low-lying escape routes inland cut by rising water 2 to 4 hours before arrival of hurricane center. Considerable damage to piers. Marinas flooded. Small craft in unprotected anchorages torn from moorings. Evacuation of some shoreline residences and low-lying island areas required.

**Category 3:** Winds of 112 to 131 miles per hour. Foliage torn from trees; large trees blown down. Practically all poorly constructed signs blown down. Some damage to roofing materials of buildings; some window and door damage. Some structural damage to small buildings. Mobile homes destroyed. Storm surge possibly 9 to 12 feet above normal. Serious flooding at coast and many smaller structures near coast destroyed; larger structures near coast damage by battering waves and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives.

**Category 4:** Winds of 132 to 155 miles per hour. Shrubs and trees blown down; all signs down. Extensive damage to roofing materials, windows, and doors. Complete failure of roofs on many small residences. Complete destruction of mobile homes. Storm surge possibly 13 to 18 feet above normal. Major damage to lower floors of structures near shore due to flooding and battering by waves

and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Major erosion of beaches.

**Category 5:** Winds greater than 155 miles per hour. Shrubs and trees blown down; considerable damage to roofs of buildings; all signs down. Very severe and extensive damage to windows and doors. Complete failure of roofs on many residences and industrial buildings. Extensive shattering of glass in windows and doors. Some complete building failures. Small buildings overturned or blown away. Complete destruction of mobile homes. Storm surge possibly greater than 18 feet above normal. Major damage to lower floors of all structures less than 15 feet above sea level. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives.

*d. Man-Made Hazards*

There are no significant man-made hazards within the corporate limits of Pine Knoll Shores. 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 1<sup>st</sup> of each year to the North Carolina Emergency Response Commission, the County or Local Emergency Planning Committee, and the local fire department with jurisdiction over the reporting facility.

*e. Soils*

A detailed soil survey was issued for all of Carteret County in September of 1978. That report, Soil Survey of Carteret County, North Carolina, identifies nine soil series located within Pine Knoll Shores' planning jurisdiction. The soil series are presented on Map 5, and their characteristics are summarized in Table 19.

Of the nine soil series located within Pine Knoll Shores, four are hydric soils. Hydric soils are defined as soils formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions within the upper part. In order to be considered hydric, a soil does not need to be saturated at the time of examination. Similarly, soils that formed under these conditions that have been drained are still considered hydric soils. The presence of hydric soils is significant due to the fact that these soils are typically poorly suited for development. Additionally, these soils may meet the definition of 404 wetland areas if found in combination with certain 404 vegetation and require permitting by the U.S. Army Corps of Engineers' Wilmington office prior to any disturbance.

Map 5 - Soil Classifications

Table 19. Pine Knoll Shores Soil Conditions

Map Symbol	Soil Name	% of Town Acreage	Septic Tank Conditions	Flooding Frequency
Bn*	Beaches-Newhan complex	3.3%	Severe: poor filter, slope	None
CH*	Carteret sand, frequently flooded	1.8%	Severe: flooding, ponding, poor filter	Frequent
CL*	Carteret, sand, low, frequently flooded	0.1%	Severe: flooding, ponding, poor filter	Frequent
Co	Corolla fine sand	2.9%	Severe: wetness, poor filter	Rare
Du*	Duckston fine sand	5.2%	Severe: flooding, wetness, poor filter	Frequent
Fr	Fripp fine sand	10.8%	Severe: poor filter, slope	None
Nc	Newhan-Corolla complex	68.2%	Severe: poor filter, slope	None
Ne	Newhan-Urban land complex	1.0%	Severe: poor filter	None
Nh	Newhan fine sand	0.7%	Severe: poor filter, slope	None
w	water	6.0%	n/a	n/a

\*Indicates soil series that are made up of hydric soils.  
 Source: Soil Survey of Carteret County, North Carolina.

*f. Water Supply*

Groundwater is plentiful throughout Carteret County as well as Pine Knoll Shores. It is near the surface in most places, particularly during the winter and early spring. Thousands of feet of sedimentary deposits underlie the area. The upper part of these deposits contains aquifers that supply water for domestic use. The surficial aquifer ranges from near the surface to a maximum depth of about 75 feet. The water is generally hard but is low in iron. It should be noted that the Town of Pine Knoll Shores receives its municipal water supply from a series of four wells located throughout the Town’s corporate limits. The Town purchased this well system from Carolina Water Service on September 27, 2005.

*g. 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 Pine Knoll Shores 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).

## **i. Estuarine Waters and Shorelines**

The estuarine system consists of deepwater 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, although this is not the case in Pine Knoll Shores. The northern portion of Pine Knoll Shores is immediately adjacent to the Bogue Sound. This body of water is considered to be an estuarine environment. 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. The western portion of Bogue Sound (14,256.5 acres) and the Theodore Roosevelt State Natural area totaling 11,236.4 acres are classified as Outstanding Resource Waters or High Quality Waters. Development along estuarine shorelines can exacerbate water quality problems within estuarine waters, and expedite the threats of shorefront erosion and flooding.

## **ii. Public Trust Areas**

The public trust area is comprised of submerged lands waterward of the mean high water line in tidal, coastal, or navigable waters adjacent to Pine Knoll Shores. 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 probably 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.

These areas are significant because the public has rights in these areas, including navigation and recreation. The public trust areas also support valuable commercial and sports fisheries, have aesthetic value, and are important resources for economic development. All of the land within Pine Knoll Shores that falls immediately

adjacent to waters of both the Bogue Sound and Atlantic Ocean are considered public trust areas, and follow this general rule. Additionally, the canal network that traverses through the eastern portion of Town is also considered a public trust water.

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.

### **iii. Coastal Wetlands**

Wetland 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 Pine Knoll Shores, there are approximately 213 acres of wetlands. These wetlands vary in their characteristics. The location of the wetland areas within the Town's jurisdiction are shown on Map 6, and a summary of wetland acres are provided in Table 20. The map of wetland location 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. It should be noted that a majority of the wetland acres within Pine Knoll Shores are located within the Roosevelt Natural Area.

Map 6 - 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 fills 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. A majority of the wetlands within Pine Knoll Shores fall under the jurisdiction of Section 404 of the Clean Water Act.

Table 20. Pine Knoll Shores Coastal Wetlands

Wetland Type	Acres	% of Total Town Acres
Cleared Depressional Swamp Forest	0.12	0.05%
Cleared Pine Flat	0.57	0.27%
Cutover Depressional Swamp Forest	0.02	0.01%
Cutover Estuarine Shrub/Scrub	0.17	0.08%
Cutover Maritime Forest	0.39	0.18%
Cutover Pine Flat	1.82	0.86%
Depressional Swamp Forest	0.92	0.43%
Estuarine Shrub/Scrub	35.51	16.69%
Freshwater Marsh	5.24	2.46%
Maritime Forest	28.18	13.24%
Pine Flat	72.21	33.93%
Salt/Brackish Marsh	67.64	31.79%
Total	212.79	100.00%

Source: North Carolina GIA and National Wetlands Inventory.

#### iv. 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. The entire southern length of Pine Knoll Shores is considered an ocean beach and shoreline. Pine Knoll Shores contains approximately five miles of ocean erodible areas and high hazard flood areas, but no unvegetated beach area (a dynamic area that is subject to rapid unpredictable landform change from wind and wave action). Unvegetated beach areas are only designated following detailed studies by the Coastal Resources Commission. There are no inlet hazard areas within or adjacent to the corporate limits of Pine Knoll Shores.

**v. 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 Pine Knoll Shores 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 Town of Pine Knoll Shores.

**vi. Areas of Excessive Erosion**

The ocean shoreline along Bogue Banks is extremely vulnerable to erosion associated with coastal storm events, primarily because the natural flow of sediment that would replenish this shoreline has been diverted offshore by the dredging and channel maintenance activities at the Morehead City Port. The Town of Pine Knoll Shores has proactively addressed this issue over the past few years through a Town-funded beach renourishment effort. In addition to this, Pine Knoll Shores is constantly working to establish a long-term comprehensive beach renourishment program with the assistance of the US Army Corps of Engineers Section 933 program. In order to comply with the criteria for this program, the Town must provide a public beach access at precise one-half mile intervals. This issue will be addressed in further detail throughout this document.

Using current and historical aerial photography and sophisticated computer software, the Division of Coastal Management evaluates erosion rates about every five years. The most recent study conducted in 1998 indicates that the erosion rate along the ocean shoreline within Pine Knoll Shores is approximately two feet per year.

**vii. Natural Resource Fragile Areas (including Significant Natural 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. Within the Town of Pine Knoll Shores the only recorded natural resource fragile area is the Roosevelt Natural Area. The Roosevelt Natural Area is a 265-acre nature preserve adjacent to the NC Aquarium, and showcases the Barrier Island ecosystem including maritime forest and marsh habitats.

The marsh habitat is a rich area for shellfish and abundant birdlife. A discussion regarding marking walking trails within the Roosevelt Natural Area will be included in the policy statement portion of the plan. The NC Department of Environmental and Natural Resources has identified two protected lands within the planning jurisdiction of Pine Knoll Shores: the Salter Path Dunes Natural Area and the North Carolina Aquarium. The Salter Path Dunes Natural Area follows the same boundary as the Roosevelt Natural Area. Map 7 provides the locations of these sites.

*h. Areas of Resource Potential*

**i. Regionally Significant Parks**

There are no regionally significant parks located within the corporate limits of Pine Knoll Shores.

**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.

Within the Town of Pine Knoll Shores, there are no commercially operated marinas. There are, however, a substantial number of docking facilities throughout the Town that are privately-owned. Additionally, there are several private marinas that are maintained by Homeowners' Associations. Pine Knoll Shores is unique in that there is a network of canals running throughout the central portion of the Town's corporate limits. There are private docking facilities located throughout these canals that are maintained by individual property owners.

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. Pine Knoll Shores has not regulated the establishment of mooring fields within its planning jurisdiction and mooring fields have not been a problem. However, the Town recognizes that the establishment of mooring fields could lead to the degradation of water quality.

MAP 7 - SNHA/PROTECTED LANDS

### **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 Pine Knoll Shores. Pine Knoll Shores does not support the location of floating homes within the Town's jurisdiction.

### **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 the planning jurisdiction of Pine Knoll Shores.

### **v. Channel Maintenance and Interstate Waterways**

There are navigable channels throughout Bogue Sound adjacent to Pine Knoll Shores. These channels are marked and periodically dredged. At lower tides, navigation into and out of shoreline within Pine Knoll Shores must go through these marked channels. The waters of the Bogue Sound are generally very shallow even at high tides; therefore, these marked navigation channels are essential for recreational boaters and commercial fisherman. The Town's Homeowners Associations maintain the network of channels that run throughout the central portion of the Pine Knoll Shores corporate limits. These channels are public trust waters used for access to private docking facilities. In order to ensure ingress and egress from these channels, periodic maintenance of the navigation channel is required. Water quality within these channels has also been identified as a concern by Pine Knoll Shores residents. This issue will be discussed further later in the plan and will be addressed within the context of policy statements.

### **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 21. NC Division of Water Quality Water Body Classifications

<b>PRIMARY FRESHWATER AND SALTWATER CLASSIFICATIONS*</b>	
<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	<i>Water Supply watershed.</i> 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.
<b>SUPPLEMENTAL CLASSIFICATIONS</b>	
<u>CLASS</u>	<u>BEST USES</u>
Sw	<i>Swamp Waters:</i> Recognizes waters that will naturally be more acidic (have lower pH values) and have lower levels of dissolved oxygen.
Tr	<i>Trout Waters:</i> Provides protection to freshwaters for natural trout propagation and survival of stocked trout.
HQW	<i>High Quality Waters:</i> 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	<i>Outstanding Resource Waters:</i> Unique and special surface waters that are unimpacted by pollution and have some outstanding resource values.
NSW	<i>Nutrient Sensitive Waters:</i> Areas with water quality problems associated with excessive plant growth resulting from nutrient enrichment.

\* Primary classifications beginning with an “S” are assigned to saltwaters.  
 Source: NC Department of Environment and Natural Resources.

There are only two segments or water bodies that have been rated and lie adjacent to the jurisdiction of Pine Knoll Shores. Table 22 provides a listing of all water bodies within the Town that have been classified by the NC Division of Water Quality. Also included are their stream index numbers and assigned classification.

Table 22. Pine Knoll Shores Alphabetical Listing of Water Bodies

<u>Name of Stream</u>	<u>Description</u>	<u>Stream Index Number</u>	<u>Class</u>
Bogue Sound (including Intracoastal Waterway to Beaufort Inlet)	From a line across Bogue Sound from the southwest side of the mouth of Gales Creek to Rock Point to Beaufort	20-36-(8.5)	SA; HQW
Atlantic Ocean	The waters of the Atlantic Ocean contiguous to that portion of the White Oak River Basin that extend from the northern boundary of White Oak River Basin (southwest side of Drum Inlet) to the southern boundary of White Oak River Basin (northern boundary of Cape Fear River Basin) at the southwest side of the mouth of Goose Bay in the Intracoastal Waterway.	99-(4)	SB

Table 22 (continued)

Name of Stream	Description	Stream Index Number	Class
Roosevelt Natural Area Swamp	All of the fresh waters within the property boundaries of the natural area including swamp forest, shrub swamp and ponds	20-36-9.5-(1)	C; Sw; ORW
Roosevelt Natural Area Swamp	All of the saline waters within the boundaries of the natural area including brackish marsh and salt marsh	20-36-9.5-(2)	SA; Sw; ORW

Source: NC Division of Water Quality.

### **vii. Primary Nursery Areas and Submerged Aquatic Vegetation**

Bogue Sound and adjacent streams are extremely important to fisheries production and support significant commercial and recreational fisheries. The above listed areas are documented spawning and nursery areas. These areas also function as nursery areas for species such as spot, croaker, weakfish, flounder, striped bass, white perch, yellow perch, blue crabs and other commercially and recreationally important species (refer to Map 8).

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 3I.0101 (20) (C)]. Anadromous fish nursery areas are those areas in the riverine and estuarine systems utilized by post-larval and later juvenile anadromous fish [NCAC 15A 3I.0101 (20) (D)].

There are no anadromous fish spawning areas or primary nursery areas immediately adjacent to the corporate limits of Pine Knoll Shores. There are however, nursery areas located along the northern bank of Bogue Sound and also within tributaries feeding into Bogue Sound. These areas are identified on Map 8.

Submerged aquatic vegetation (SAV) is an important habitat utilized by finfish and invertebrates. Beds of SAV are one of the critical habitat types defined by MFC [NCAC 15A 3I.0101 (20) (A)]. There are no instances of SAVs within or adjacent to Pine Knoll Shores' jurisdiction.

MAP 8 - WATER QUALITY

## 2. Environmental Composite Map

Under the updated CAMA Planning Guidelines, there is a requirement for the preparation of an Environmental Composite Map. The preparation of this map involves an overlay analysis of geographic data layers involving natural features and environmental conditions. The layers are classified into three categories based on their environmental sensitivity. The intent of this analysis is to break the jurisdiction into three separate land classifications in an effort to identify what portions of land are most and least suitable for future development with respect to environmental conditions and sensitive areas. A land suitability analysis will also be performed in the context of this plan that will incorporate community facilities into an analysis similar to the environmental composite map. The following table details the Geographic Information System (GIS) data that was utilized in the preparation of the environmental composite map.

Table 23. Pine Knoll Shores 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	✓		
Public Trust Areas/Estuarine Shorelines			✓
Flood Zones		✓	
Storm Surge Areas		✓	
HQW/ORW Watersheds		✓	
Water Supply Watersheds		✓	
Significant Natural Heritage Areas		✓	
Protected Lands			✓

NC Division of Coastal Management has provided the Town with a model that breaks the Town's jurisdiction into one-acre pieces of land. Breaking the Town's planning jurisdiction into these one-acre divisions distorts the outcome of this analysis, mainly because a majority of the lots within the Town are smaller than one-acre in total area. In order to produce an environmental composite map that more accurately depicts the true nature and location of environmentally sensitive areas within Pine Knoll Shores, a different approach was taken.

Table 23 above lists all of the GIS data that was utilized in the preparation of the environmental composite map. Additionally, this table lists whether each data layer was classified as Class I, II, or III. This classification corresponds to the development potential of a defined area with respect to environmentally sensitive areas located throughout the Pine Knoll Shores planning jurisdiction. The following provides a definition of the three classes:

**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. Overall land that falls within this category should be considered developable with regards to environmental factors.

**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. Land in this class either falls within the boundary of a natural hazard area, or is within or immediately adjacent to environmentally sensitive areas.

**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. Land falling within this class should be considered conservation areas, due to the presence of either public trust areas or extremely environmentally sensitive areas.

Map 9 displays the outcome of the environmental composite overlay analysis. This map was compiled by merging all of the GIS data listed under each of the classes above. All data listed under Class III was merged to form the boundaries shown on the environmental composite map. This process was repeated for Classes I and II. The following table provides a summary of the land area within Pine Knoll Shores that falls within each of the defined classes.

Table 24. Pine Knoll Shores Land Use Acreage by Class (as determined through Environmental Composite Analysis)

	Acres	%of Total
Class I	16.3	1.3%
Class II	804.5	63.7%
Class III	442.0	35.0%
TOTAL*	1,262.8	100.0%

\*This figure does not include water or right-of-ways.

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

## Map 9 - Environmental Composite

### 3. Environmental Conditions

#### a. *White Oak River Basin*

The White Oak River Basinwide Water Quality Plan was adopted by the Division of Water Quality (DWQ) in 1997 and updated in November 2001. 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 uses are considered within Pine Knoll Shores, these goals should be kept in mind. Within the White Oak River Basin, Pine Knoll Shores is located entirely within subbasin 03-05-03. The White Oak River Basin and subbasin boundaries are shown on Map 10. It should be noted that there are currently two designated outstanding resource waters located within or immediately adjacent to the Pine Knoll Shores planning jurisdiction.

The White Oak River Basin lies entirely within the southern coastal plain. The basin includes four separate river systems: the New River and its tributaries in the southwestern section; the White Oak River and its tributaries; the Newport River and its tributaries; and the North River in the eastern section. The basin also includes Bogue and Core Sounds. Pine Knoll Shores' jurisdiction is bordered to the north by Bogue Sound. The White Oak River Basin encompasses all or portions of four counties and sixteen municipalities. Table 25 provides population information for these areas within the White Oak River Basin. This information was provided by the NC Division of Water Quality from the update to the White Oak River Basinwide Water Quality Plan which is not yet available for distribution.

Table 25. White Oak River Basin Population Distribution

Area in the White Oak River Basin	1990 Population	2000 Population	% Change
Carteret County	52,407	59,383	13.3%
Atlantic Beach	1,938	1,781	-8.1%
Beaufort	3,808	3,771	-1.0%
Bogue	351	590	68.1%
Cape Carteret	1,013	1,214	19.8%
Cedar Point	628	929	47.9%
Emerald Isle	2,434	3,488	43.3%
Indian Beach	153	95	-37.9%

Table 25 (continued)

Area in the White Oak River Basin	1990 Population	2000 Population	% Change
Morehead City	6,046	7,691	27.2%
Newport	2,516	3,349	33.1%
Peletier	304	487	60.2%
Pine Knoll Shores	1,360	1,524	12.1%
Craven County	81,812	91,523	11.9%
Jones County	9,361	10,419	11.3%
Maysville	892	1,002	12.3%
Onslow County	149,838	150,355	0.3%
Jacksonville	30,398	66,715	119.5%
North Topsail Beach*	947	843	-11.0%
Richlands	996	928	-6.8%
Swansboro	1,165	1,459	25.2%

Source: NC Department of Water Quality DRAFT White Oak River Basinwide Water Quality Plan (not available for distribution).

The following table provides a summary of registered animal operations within White Oak River subbasin 03-05-03. It should be noted that the only registered animal operations within this subbasin consist of swine production. Additionally, none of these facilities are located in close proximity to Pine Knoll Shores or Bogue Banks. These facilities are centrally located within the mainland portion of Carteret County.

Table 26. Pine Knoll Shores Registered Animal Operations

Subbasin	Swine*		
	No. of Facilities	No. of Animals	Total Steady State Live Weight**
03-05-03	2	951	542,655

\*There are no other registered animal operations located within subbasin 03-05-03.

\*\*Steady State Live Weight (SSLW) is the result, in pounds, after a conversion factor has been applied to the number (head count) of swine, cattle, or poultry on a farm. The conversion factors, which come from the Natural Resource Conservation Service (NRCS) guidelines, vary depending on the type of animals on the farm and the type of operation (for example, there are five types of hog farms). Since the amount of waste produced varies by the size of the animal, SSLW is the best way to compare the sizes of the farms.

Source: NC Division of Water Quality DRAFT White Oak River Basinwide Water Quality Plan (not available for distribution).

Map 10 - River Basins

b. *Subbasin 03-05-03 (Hydrologic Unit 03020106)*

Most federal government agencies, including the US Geological Survey (USGS) and the US Natural Resources Conservation Service (NRCS), use a system of defining watersheds that is different from that used by the Division of Water Quality (DWQ) and many other state agencies in North Carolina. Under the federal system, the White Oak River Basin is made up of two hydrologic areas referred to as hydrologic units. One of these units includes the entire White Oak River Basin, except the New River watershed area, which is assigned to the other unit. Each hydrologic unit is defined by an 8-digit number. DWQ has a two-tiered system in which the state is subdivided into 17 river basins with each basin further subdivided into subbasins. Table 27 compares the two systems. The White Oak River Basin is subdivided by DWQ into five subbasins.

Table 27. Hydrologic Subdivisions in the White Oak River Basin

Watershed Name and Major Tributaries	USGS 8-digit Hydrologic Units	DWQ Subbasin 6-digit Codes
New River	03030001	03-05-02
Bogue-Core Sounds	03020106	03-05-01
White Oak River		03-05-01
Newport River		03-05-03
North River		03-05-04
Jarrett Bay and Nelson Bay		03-05-04
Core Sound and Back Sound		03-05-05

Sources: NC Division of Water Quality White Oak Basinwide Water Quality Management Plan, and US Geological Survey.

Water quality within subbasin 03-05-03 is generally good. The Division of Marine Fisheries has classified waters in this subbasin to have Fair to Good commercial fisheries value. Oyster production is considered fair and clam production is good. Some problems do exist within the subbasin, which can mainly be attributed to increased development along Bogue Banks, as well as the northern shore of the Bogue Sound. Subbasin 03-05-03 lies in the center of Carteret County, extending from the U.S. Forest Service’s Croatan National Forest to the Town of Beaufort and the Beaufort Inlet. Most of this subbasin is comprised of the estuarine waters of Bogue and Core sounds. The only source of surface freshwater throughout the subbasin is the Newport River.

Most of the development within the subbasin is occurring within Morehead City, Atlantic Beach, Beaufort, Newport, and Bogue Banks. There are eight individual National Pollutant Discharge Elimination System (NPDES) wastewater discharge permits in this subbasin with a total permitted flow of 4.75 MGD. The Town of Morehead City WWTP has the largest of these permits with a total permitted flow of 2.5 MGD and discharges into Calico Creek. The following table summarizes the characteristics of subbasin 03-05-03.

Table 28. Characteristics of Subbasin 03-05-03

**Land and Water Area (sq. miles):**

Total Area	228
Land Area	168
Water Area	60

**Land Cover (%):**

Forest/Wetland	59%
Surface Water	26%
Urban	4%
Cultivated Crop	6.5%
Pasture/Managed Herbaceous	4%

**Monitored Stream Statistics:**

**Aquatic Life**

Total Streams	15.1 mi/5,788.1 ac
Total Supported	5,847.9 mi
Total Impaired	140.2 ac
Total Not Rated	15.1 mi

**Recreation:**

Total Streams	11.2 mi/17,912.9 ac
Total Supported	11.2 mi/17,764.7 ac
Total Impaired	8.0 ac
Total Not Rated	140.2 mi

**Shellfish Harvesting:**

Total Streams	5.2 mi/23,867.4 ac
Total Supported	19,357.1 mi
Total Impaired	5.2 mi/14,510.3 ac

Source: NC Division of Water Quality DRAFT White Oak River Basinwide Water Quality Plan.

Pine Knoll Shores lies within the Division of Environmental Health’s Growing Area E-2. Of the six rated areas within the E-2 growing area, only one is approved for Shellfish Harvesting. Four of the areas are prohibited for Shellfish Harvesting and one area is Conditionally Approved - Closed. The stressors in those areas not opened for shellfish harvesting are fecal coliform bacteria. The following table provides information regarding these areas.

Table 29. Use Support Assessment Summary Growing Area E-2

AU Number	Classification	Aquatic Life Rating	Recreation Rating	Shellfish Harvesting Rating	Stressors
20-36-(8.5)b1	SA HQW	No data	No data	Supporting	
Approved area immediately adjacent to Salter Path prohibited area					
20-36-(8.5)b2	SA HQW	No data	Supporting	Impaired	Fecal coliform bacteria
DEH prohibited area adjacent to Salter Path on sound side of outer banks					
20-36-(8.5)c1	SA HQW	Supporting	Supporting	Impaired	Fecal coliform bacteria
DEH Conditionally Approved Closed area near Jumping Run Creek					
20-36-(8.5)c2	SA HQW	No data	No data	Impaired	Fecal coliform bacteria
DEH Conditionally Approved Closed area near Jumping Run Creek					

Table 29 (continued)

AU Number	Classification	Aquatic Life Rating	Recreation Rating	Shellfish Harvesting Rating	Stressors
20-36-(8.5)d	SA HQW	No data	No data	Impaired	Fecal coliform bacteria
DEH closed area in unnamed bay approximately 2500 meters east of line across Bogue Sound from the southwest side of mouth of Gales Creek to Rock Point					
20-36-(8.5)e	SA HQW	No data	No data	Impaired	Fecal coliform bacteria
DEH closed area in unnamed bay approximately 3500 meters east of line across Bogue Sound from the southwest side of mouth of Gales Creek to Rock Point					

Source: NC Division of Water Quality DRAFT White Oak River Basin Water Quality Management Plan (not available for distribution).

*c. Water Treatment Facilities*

Communities along Bogue Banks have been concerned with wastewater treatment and a long term strategy for dealing with wastewater for many years . According to the Carteret County Department of Environmental Health (DEH), it is anticipated that Pine Knoll Shores will continue to rely on private septic tank systems and package treatment plants. Reliance on these systems has slowed growth and redevelopment of large multi-family and hotel complexes due to the significant expense associated with package treatment facilities. At this time, the Town of Pine Knoll Shores has made a decision to not support the installation of a central sewer system. This decision was made based on the premise that not providing central sewer will ultimately help control growth. There are currently 12 package plants located within the jurisdiction of Pine Knoll Shores. These systems vary in age and require weekly maintenance. All facilities have operators who are responsible for weekly maintenance and upkeep of the systems. Additionally, the county health department inspects the systems annually to ensure that there are no problems or deficiencies that need to be addressed. As these facilities age, the health department requires that upgrades and/or replacement systems be put in place.

There are a large number of private septic tank systems located throughout Pine Knoll Shores. Although the soil survey reports that soils within Pine Knoll Shores are poorly suited for septic tank systems, the existing systems appear to be in good working order. According to the Carteret County DEH, there are no significant problems with private septic tank systems within Pine Knoll Shores.

Carteret County is currently working on a comprehensive database that will locate and document problems experienced with septic systems throughout the county, including Pine Knoll Shores. Once completed, this system will allow for the county to identify specific areas where there is a concentration of septic tank problems, and can address these problems before they have a significant effect on water quality. At this time, however, there do not seem to be any problems of note with respect to wastewater treatment facilities in Pine Knoll Shores. Carteret County DEH reports that surface runoff, and the contaminants associated with it, have had a much greater impact on water quality in Bogue Sound than septic tank systems or package treatment plants. One of the biggest problems affecting water quality is the runoff of waste associated with pets and wildlife along Bogue Banks and the northern shore of Bogue Sound. Additionally, there are no public health hazards currently within the jurisdiction of Pine Knoll Shores.

d. *Natural Hazards*

Pine Knoll Shores is very vulnerable to the effects of natural hazards in the form of hurricanes, coastal flooding, and nor'easters. One of the most significant impacts of these events is the flooding and beach erosion that occurs. The Town has a proactive approach to dealing with the issue of beach erosion; however, there is no straight forward approach to ensuring the safety of personal property when a hurricane and/or flooding event occurs. The locations of both flood zones and storm surge inundation areas have been discussed in detail earlier in the plan (refer to page 24). These two areas aim to define boundaries around portions of land that will potentially flood in storm events of varying magnitude.

In order to further define how significant an impact a major storm event may have on the Town of Pine Knoll Shores, the following table provides the acreage within the AE and VE flood zones by land use type. A detailed discussion regarding flood hazard areas within Pine Knoll Shores, including definitions of flood zone designations, is provided on page 25 and 27 of the plan. These two flood zones are considered to be high hazard areas, where there is a one percent annual chance of a flooding event. The primary distinction between these two zones is that properties within the VE zone are also vulnerable to coastal wave action. All properties within these two zones are required to carry federal flood insurance. Additionally, development within these areas must comply with the Town's Flood Damage Prevention Ordinance, which has provisions for construction and finished floor elevation to increase the safety of a structure if a flooding event occurs. Table 30 provides the Town's acreage that falls within the AE and VE flood zones by land use. According to this table, 142.2 acres or 11.0% of Pine Knoll Shores' 454.8 residential land use acres fall within a flood hazard area. This includes both single- and multi-family housing units.

Table 30. Pine Knoll Shores Land Use Acreage within Flood Hazard Areas

Land Use	Acreage by Land Use	% of Total Town Acreage
Association Owned Property	9.6	0.7%
Canal	12.8	1.0%
Commercial/Hotel	11.6	0.9%
Common Area	65.2	5.0%
Multi-Family Residential	9.9	0.8%
Marina	2.6	0.2%
Municipally Owned	40.1	3.1%
Office & Professional	0.1	0.0%
Institutional	34.0	2.6%
Public Beach Access	3.1	0.2%
Recreational	243.4	18.7%
Single-Family Residential	132.3	10.2%
Utility	5.3	0.4%
Vacant	40.4	3.1%
<b>Total</b>	<b>610.2</b>	<b>47.0%</b>

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

e. *Natural Resources*

Pine Knoll Shores is home to many natural resources including significant natural heritage areas, wetlands, public trust areas, and state defined protected lands. These areas have been discussed in detail earlier in the plan. This discussion begins on page 33 of the plan and includes maps showing the locations of all natural resources and areas of environmental concern within the Pine Knoll Shores jurisdiction.

**C. ANALYSIS OF LAND USE AND DEVELOPMENT**

1. Existing Land Use

In order to address future development within Pine Knoll Shores, it is necessary to establish a snapshot of what is currently developed within the Town’s planning jurisdiction. This is achieved by conducting a detailed land use survey, which allows for a review of existing land use patterns. This review will assist in identifying land use patterns, conflicts, and trends that exist within the Town’s planning jurisdiction. The process and data associated with it will provide a solid foundation for decisions about future land use and policy development.

A detailed land use survey of Pine Knoll Shores was conducted for the Town’s entire planning jurisdiction. This survey was completed through the use of aerial photography and on-site windshield surveys. The existing land use map was then submitted to the Land Use Planning Committee for review to address any errors. Land use within Pine Knoll Shores has been divided into the following land use categories: association owned property, canal, commercial/hotel, common area, multi-family, marina, municipally owned, office & professional, institutional, public beach access, recreational, single-family residential, utility, and vacant. Map 11 provides the locations of varying land uses within Pine Knoll Shores, and Table 31 summarizes the land use acreage resulting from the existing land use survey. According to the land use survey, approximately 35% of the acreage within Pine Knoll Shores is residential. Single-family housing takes up the most acreage followed by recreational. A majority of this acreage is located within the Roosevelt Natural Area.

Table 31. Pine Knoll Shores Existing Land Use Survey

Land Use	Acreage by Land Use	% of Total Town Acreage
Association Owned Property	16.6	1.3%
Canal	12.3	0.9%
Commercial/Hotel	24.1	1.9%
Common Area	117.9	9.1%
Multi-Family	21.8	1.7%
Marina	2.8	0.2%
Municipally Owned	56.2	4.3%
Office & Professional	2.1	0.2%
Institutional	51.3	3.9%
Public Beach Access	3.8	0.3%

Table 31 (continued)

Land Use	Acreage by Land Use	% of Total Town Acreage
Recreational	403.9	31.1%
Single-Family Residential	433.0	33.3%
Utility	13.9	1.1%
Vacant	139.9	10.8%
Total*	1,299.5	100.0%

\*This figure does not include right-of-ways.

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

## 2. Land Use Conflicts

Land use conflicts often exist within a Town's planning jurisdiction resulting from a variety of circumstances. Issues leading to land use conflicts can result from a lack of proper land use controls, demand for increased development, and development of land not suited for a particular land use. The rate of development within Pine Knoll Shores has been very rapid dating back to the early 1980s. Because of this demand, several problems have arisen with respect to land use. These issues can be summarized as follows:

### a. *Encroachment of Residential and Urban Type Uses into Forested Areas*

Pine Knoll Shores has done an excellent job over the years of preserving the maritime forest and maintaining the natural landscape that exists throughout the Town's jurisdiction. Over time, however, portions of the forest have given way to development. The Town's proactive approach to protecting wooded areas will assist with the effort of preserving natural areas. It is recognized that portions of the forest will continue to be cleared in order to accommodate future development. This issue will be addressed in the policy development portion of the plan.

### b. *Residential Development within Flood Hazard Areas*

The vulnerability of Pine Knoll Shores to coastal flooding and cyclonic tropical storms has been discussed several times within the context of this plan. The Town recognizes that development within flood hazard areas is going to occur due to the Town being located almost entirely within the floodplain. The Town's strategy to address this issue will be to continue enforcement of land use controls that increase the safety of residential and non-residential structures that are built within defined flood zones. Additionally, the Town has recently adopted a FEMA-approved hazard mitigation plan that details the Town's vulnerability to all natural hazards. This document also outlines specific goals, objectives, and implementing actions that will be carried out to increase the safety of Town citizens and property in the event of a natural disaster.

Map 11 - Existing Land Use

c. *High Density Development in Areas with Soils Having Severe Septic Tank Limitations*

There is currently no central sewer system serving the municipalities along Bogue Banks. Sewage treatment within Pine Knoll Shores is primarily handled either through individual septic tank systems or package treatment plants. Use of these facilities is a concern for the Town, and has been identified as a key issue within this planning process. This issue has been an impediment to new construction and redevelopment within the Town’s jurisdiction. This issue will be discussed further in the Community Facilities/Services portion of the plan.

3. Development Trends

The Town of Pine Knoll Shores has developed very rapidly over the last 30 years. From the Town’s origin, Pine Knoll Shores has been developed as a primarily residential area to accommodate both permanent and seasonal residents. The Town has implemented strict land use controls in an effort to maintain this residential character.

According to the existing land use survey, approximately 304, or 14%, of the Town’s total parcel count remains vacant. All but ten of the 304 parcels have already been platted for single-family residential development. The vacant property within Pine Knoll Shores is scattered throughout the Town’s jurisdiction; however, a majority of the vacant parcels fall within the central portion of Town, south of Oakleaf Drive, which consists of single-family homes. It is anticipated that a majority of the vacant land within Pine Knoll Shores will be developed as single-family residential homes. There are several larger vacant parcels that are located along Pine Knoll Boulevard that could potentially support a future development. Two of these properties are currently municipally-owned parcels. There has been discussion of converting one of these properties into a boat/recreational vehicle storage area that would be operated by the Town.

In order to provide a forecast of how vacant land will be developed throughout the Town’s jurisdiction, an overlay analysis was performed based on the existing land use survey and the Town’s zoning map. Based on this analysis, the zoning district of each undeveloped parcel has been identified. Table 32 provides a summary of how all vacant parcels will be developed, if this development follows existing zoning patterns.

Table 32. Pine Knoll Shores Zoning Classification of Undeveloped Properties

Zoning District	Parcels	% of Total Vacant Parcels	Acreage by Land Use	% of Total Vacant Acreage
MF1, MF2	56	18.4%	29.3	20.9%
OP	1	0.3%	9.3	6.7%
R1, R2, R3, R4	245	80.6%	100.9	72.1%
REC2, REC3	2	0.7%	0.4	0.3%
Total	304	100.0%	139.9	100.0%

Source: Holland Consulting Planners, Inc.

Each of the zoning classifications listed in the table above include several different zoning districts. The following summarizes which zoning districts have been included in the table, as well as the intended use of each zoning district as defined in the Town's zoning ordinance:

- ▶ Multi-Family District (MF1, MF2) - the principal use of land is for multi-family dwellings.
- ▶ Office & Professional (OP) - the principal use of land is for office and professional service facilities to serve the needs of the community.
- ▶ Residential Districts (R1, R2, R3, R4) - the principal use of land is for dwellings.
- ▶ Recreation Districts (REC2, REC3) - the principal use of land is for recreation, both public and private.

According to this information, 295 acres, or 96% of the Town's undeveloped land is zoned for either single- or multi-family development. A majority of this land, 86% of the vacant parcels, is zoned to be developed as single-family homes. It is difficult to judge how rapidly this development will take place. The Pine Knoll Shores planning and inspections office has issued an average of 17 single-family residential building permits per year between the years of 1997 and 2004. There were also building permits issued for the construction of 42 multi-family units. It is anticipated that development of this undeveloped property will occur across the Town's jurisdiction. It is not expected that rapid development will occur in specific portions of the Town's jurisdiction.

#### 4. Historical, Cultural, and Scenic Areas

There are several Protected Lands and state-defined Natural Heritage areas that fall within the planning jurisdiction of Pine Knoll Shores. These areas have been thoroughly discussed in the Natural Systems Analysis portion of this plan (refer to page 23). All fragile areas are discussed and maps detailing the locations of these areas are provided.

#### 5. Land Use in Relation to Environmental Composite Map

The environmental composite map (Map 9) was discussed beginning on page 45 of the plan. This map is intended to delineate the Town's jurisdiction in accordance with environmentally sensitive areas. For a detailed discussion of how this map was compiled, and what the various classes mean, refer to Section B(2). The following table provides a summary of how the undeveloped parcels in Pine Knoll Shores relate to the classes established on the environmental composite map. If a parcel was located in more than one class as defined in the environmental composite analysis, the most environmentally sensitive concern was assigned to that parcel.

Table 33. Pine Knoll Shores Undeveloped Land in Relation to Environmental Composite Analysis (Class I-III)

Environmental Composite Map (Class I - III)	Acreage by Land Use	% of Total Vacant Acreage
Class I	2.7	1.9%
Class II	116.9	83.6%
Class III	20.3	14.5%
Total	139.9	100.0%

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

## 6. Land Use Demand Forecast

In order to gauge the rate of growth within the Town of Pine Knoll Shores, it is necessary to establish an estimate of how rapidly development is expected to occur within the Town’s planning jurisdiction. Many times land use demand is established based on the growth rate of a Town’s population. Pine Knoll Shores, as well as other barrier island communities, faces a different situation than a typical inland municipality.

One issue is that there is no space to grow. The Town has no means through which to expand. The Town cannot establish an Extraterritorial Jurisdiction, and within North Carolina it is not legal to annex portions of a neighboring municipal jurisdiction. Another issue is that Pine Knoll Shores has grown so rapidly, there are not many remaining vacant parcels. Within Pine Knoll Shores, only approximately 140 of the Town’s 1,299.5 total acres remain undeveloped.

The Town does not have a problem supporting the permanent or seasonal population in terms of housing. There is more than adequate housing to support these two populations. As the housing stock increases, so will the peak seasonal population until total build-out occurs. Due to the unique nature of development within Pine Knoll Shores, residential development estimates have been established based on building permit activity over the last five years. The following table provides a summary of these estimates.

Table 34. Pine Knoll Shores Residential Land Use Demand Estimates

	2005**	2010	2015	2020
Built-Upon Residential Acreage (Single- and Multi-Family)*	441	478	516	554
Residential Unit Increase	1,913	1,988	2,063	2,138

\*Residential acreage increase is based on the average lot size of all remaining undeveloped land within the Pine Knoll Shores jurisdiction. The average lot size is one-half (0.5) acre.

\*\*Figure based on the existing land use survey.

Sources: Holland Consulting Planners, Inc., and Pine Knoll Shores Planning Department.

## **D. ANALYSIS OF EXISTING COMMUNITY FACILITIES/SERVICES**

### **1. Transportation**

A majority of the roads within the planning jurisdiction of Pine Knoll Shores are local access streets, with the exception of NC Highway 58 which runs the entire length of the Town's corporate limits. NC Highway 58 is the primary road running along Bogue Banks, and connects the island to Cape Carteret to the west and Morehead City to the east. All of the roads within Pine Knoll Shores are maintained by the Town, with the exception of private drives which are located within several of the single-family and multi-family developments and NC Highway 58.

According to the North Carolina Department of Transportation (NCDOT), there are approximately 20.9 miles of public right-of-way within Pine Knoll Shores' jurisdiction. As stated, a majority of these streets are local access streets serving the residential portions of Town. NCDOT collects traffic count data on an annual basis at key intersections throughout the state. A traffic count for the intersection of Pine Knoll Boulevard and NC Highway 58 was reported in the 2005 NCDOT Traffic Survey. Based on this information, the average daily traffic count (AADT) for this intersection was 10,000 automobiles in 2005. The 2005 data is the most recent traffic count data currently available for the Town of Pine Knoll Shores.

There are currently no major road projects underway within the jurisdiction of Pine Knoll Shores. There has been discussion in recent years regarding the installation of a third bridge access to Bogue Banks located somewhere towards the middle of the island. Construction of this bridge is strongly opposed by the residents of Pine Knoll Shores. This issue was identified and discussed at the Town-wide issues identification meeting held in November 2004. This issue will be addressed further in the policy statement section of the plan.

The Level of Service (LOS) for NC Highway 58 is an A or B in the off-season. During the height of the summer, around the fourth of July, the LOS for this road can be as low as a D. The road cannot be significantly widened due to the availability of land and environmental concerns that exist in the area. Overall, the LOS is acceptable for that area. Appendix III shows the levels of congestion associated with the various levels of service. LOS D is considered the "practical capacity" of a facility, or that at which the public begins to express dissatisfaction.

### **2. Health Care**

Citizens of Pine Knoll Shores have access to a wide variety of local physicians, as well as regional care facilities. The nearest comprehensive health care provider is Carteret County General Hospital. The hospital has 117 beds with an average of 87 inpatients each day and performs over 410 surgeries each month. The hospital anticipates the need for 18 additional beds in the near future. In addition, over 4,000 outpatient tests or treatments are provided each month. Services provided by the hospital include:

- ▶ Cancer care center
- ▶ Radiology imaging center

- ▶ Outpatient clinics for neurology and blood transfusions
- ▶ Nuclear medicine
- ▶ CT Scanning
- ▶ Mobile lithotripsy
- ▶ Laser surgery
- ▶ Laparoscopic surgery
- ▶ Maternity facilities
- ▶ Urgent and emergency care
- ▶ Extended care facilities
- ▶ Home health
- ▶ Hospice

The following list provides the name, function, and location of a variety of health care providers that are in close proximity to Pine Knoll Shores and serve the citizens of Bogue Banks:

Mental Health Care

Brynn Marr Behavioral Healthcare System Jacksonville, NC

Urgent and Medical Care

The Heart Center of Eastern NC	Morehead City, NC
Eastern Carteret Medical Center	Sea Level, NC
Beaufort Care	Beaufort, NC
ECIM Urgent Medical Care	Cape Carteret, NC
Emerald Isle Primary Care	Emerald Isle, NC
Med Center One	Atlantic Beach, NC
Beach Care Urgent Medical Care Center	Morehead City, NC
Carteret Urgent Care Center	Morehead City, NC
Carteret Surgery Center	Morehead City, NC

Physical Therapist

Beaufort Physical Therapy	Beaufort, NC
Carteret Physical Therapy	Morehead City, NC
Cape Carteret Physical Therapy	Cape Carteret, NC

In addition to this list of varying health care providers, there are several dentist offices located on Bogue Banks, as well as in Morehead City and Beaufort.

For services not provided at Carteret County General Hospital, citizens of Pine Knoll Shores also have regional access to both Craven County Regional Medical Center, located in New Bern, and University Health Systems of Eastern North Carolina located in Pitt County. The Pitt County facility is located approximately 110 miles from Pine Knoll Shores, and provides service to 29 counties throughout eastern North Carolina. University Health Systems includes Pitt County Memorial Hospital in Greenville, NC, community hospitals, physician practices, home health, and other independently operated health services. University Health Systems is affiliated with the Brody School of Medicine at East Carolina University.

### 3. Law Enforcement

The Town of Pine Knoll Shores Police Department provides law enforcement services for all of the Town's corporate limits. The staff consists of nine officers, including the Police Chief. Two officers are on duty at all times. The full-time staff is supported by three part-time officers. Nine patrol cars are maintained. Based on National Standards, a community would normally provide two staff police personnel per 1,000 persons in population. The Town has a 2000 population of 1,524, and therefore exceeds the two per 1,000 population ratio.

Peak seasonal population was established for the Town earlier in the plan. The estimated peak population based on these estimates is 12,654. If the Town's three part-time officers are factored into the overall police staffing count, Pine Knoll Shores still exceeds the recommended ratio for police personnel even during summer months when the Town's population substantially increases. Future needs regarding police and fire/EMS protection will be discussed later in the plan.

### 4. Fire/Rescue Services

The Town of Pine Knoll Shores operates a full-time fire department. The department has a staff of three paid EMT/firefighters, a fire inspector, and a Fire Chief. This staff is supported by a number of volunteers. Department fleet includes one 75-foot ladder truck, two 1,500 GPM pumpers, one 1,000 GPM pumper, two Rescue Basic EMS Transport Units, two service vehicles, and one command unit. The Town of Pine Shores currently maintains a mutual aid agreement with all other municipal and volunteer fire departments within Carteret County. The Pine Knoll Shores Fire Department assists the other departments along Bogue Banks, including the Salter Path Fire Department, the Atlantic Beach Fire Department, and the Emerald Isle Fire Department, much more frequently than those located on the mainland. The mutual aid agreement that the Town maintains with Salter Path and Atlantic Beach is considered an automatic mutual aid agreement. This means that when a response call is requested in either jurisdiction, the Pine Knoll Shores Fire Department is also contacted regarding the incident. According to the Town's Emergency Services Director, response time for the Pine Knoll Shores Fire Department averaged 3.5 minutes over the last year.

In addition to the Town's Fire/EMS staff, there is a paramedic stationed within the Town seven days a week. The paramedic operates out of the Fire/EMS facility, but all equipment and compensation for the paramedic is paid by Carteret County. It should be noted that this paramedic does not just serve Pine Knoll Shores, but may be dispatched to incidents throughout the county.

There are currently four 911 command centers located throughout Carteret County. These call centers are located in Emerald Isle, Atlantic Beach, Morehead City, and Beaufort. Emergency calls occurring within Pine Knoll Shores are dispatched through the central command center located in Beaufort.

The Insurance Services Office (ISO) makes an independent evaluation of many departments every ten years or when major changes have occurred. Many insurance companies use the ISO rating as one factor in setting the amount of premium that is paid on a particular property. Departments are rated from a Class 1 (the best) to Class 10 (unprotected). The Insurance Services Office (ISO) rating for the Town of Pine Knoll Shores is 6.

#### 5. Administration

The Town of Pine Knoll Shores is governed by a Council-Manager form of government. The Town's personnel are broken down into five defined departments including: Administration, Police, Fire/EMS and Emergency Management, Planning/Inspections, and Public Service. The Town currently employs 20 full-time employees. Pine Knoll Shores has five acting Town Commissioners, and maintains an active Planning Board, Board of Adjustment, Community Appearance Commission, and Recreational Advisory Committee.

#### 6. Water System

The Town of Pine Knoll Shores owns and operates 94,288 linear feet of water line, two elevated storage tanks, and four wells within the Town. The Town purchased the system from Carolina Water Service on September 27, 2005. The locations of all water lines, storage tanks, and wells within Pine Knoll Shores are shown on Map 12. The Town's water system is permitted for a maximum capacity of 1.2 million gallons per day (mgd). Through operation of the Town's existing four well sites, the Town's system is capable of producing approximately 982,000 gallons of treated potable water per day. Consumption of the Town's water resources varies substantially from winter months to peak summer months. During peak summer months, the Town utilizes approximately 680,000 gallons per day (.68 mgd) comprising approximately 58% of the Town's total permitted water system capacity. This demand drops to as low as 244,000 gallons per day (.24 mgd) during winter months.

The water supplied to Pine Knoll Shores is gathered from wells, which are tapped into the Castle Hayne Aquifer running beneath portions of Carteret County. The Castle Hayne aquifer, underlying the eastern half of the North Carolina coastal plain, is the most productive aquifer in the state and the primary water source for the Town. 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.

#### 7. Sewer System

The Town of Pine Knoll Shores relies on a combination of private septic tank systems and package treatment plants for wastewater treatment. A majority of single-family homes utilize private septic tank systems. While these systems are suitable for moderate density residential development, these systems are not suitable for high density developments.

Map 12 - Water Lines

Within Pine Knoll Shores, privately-owned central collection, treatment, and disposal systems are being utilized by high density and multi-family developments. These systems consist of mechanical package plants for wastewater treatment with land disposal of the effluent accomplished through nitrification line, rotary distributors, or low pressure disposal fields. These privately-operated package treatment plants are permitted and regulated by Carteret County Department of Environmental Health (DEH). Table 35 provides a listing of all package treatment plants within Pine Knoll Shores, including their capacity and condition. The information regarding the condition of the plants was provided by Carteret County DEH.

Table 35. Pine Knoll Shores Package Treatment and Disposal Systems

Complex	Capacity (GPD)	Operator	Type	Condition
Ameri-Suites	13,800	Don O'Mara	Subsurface-LPP	New System
Coral Bay West	10,000	Kevin Mullineux	Subsurface-Siphon-Conversion Lines	Older System
Pine Knoll Townes II	11,040	Don O'Mara	Subsurface-LPP	Older System
Ocean Terrace	12,000	Don O'Mara	Subsurface-Conversion Lines	Older System
Genesis	30,500	Ernie Guthrie	Rotor Fields	Older System
Oceans	6,000	Don O'Mara	Subsurface-Conversion Lines	In Good Working Order
Whaler Inn	20,000	Dan Fortin	Subsurface-LPP	Fairly New System
Beach Walk Villas	17,340	Don O'Mara	Subsurface-Conversion Lines	Older System
Bogue Shore Club	12,000	Chuck Barnes	Subsurface-LPP	Older System
McGinnis Point	30,600	Don O'Mara	Subsurface-LPP	Drain Field Recently Replaced
Beacons Reach	135,000	Don O'Mara	Re-Use/Spray Irrigation	In Good Working Order

Source: Carteret County Department of Environmental Health.

As noted, the systems above are responsible for treating high density multi-family developments. Private septic tanks are relied upon for the treatment of waste from individual housing units. According to the Carteret County DEH, there are no recurring septic tanks problems. One concern of the County Health Department is that as redevelopment occurs higher density development will take place and will potentially create problems with respect to water treatment due to the lack of land available for utilization as a drain field. In order to address this issue, many developers are moving toward new septic tank technologies. The new systems are supposed to extend the life of a drain field, can be used in poor soil conditions, take less space than standard septic systems, and are supposed to be better for the environment. The establishment of a central sewer system within Pine Knoll Shores is not viewed as a feasible option at this point. Sewage treatment will be discussed further in the future demands and policy statement sections of the plan.

## 8. Solid Waste

The Town of Pine Knoll Shores contracts out its solid waste collection services to Waste Industries. Town residents pay for this service through their annual tax bill. Curb side trash collection runs once per week for household waste and bi-weekly for recyclables. Yard debris is removed once per month. All trash and debris collected by Waste Industries is taken to the Tri-County Landfill located near Tuscarora in Craven County. This facility serves Carteret, Pamlico, and Craven Counties, and was opened in 1994. The Tri-County Landfill currently has one cell that is at capacity, one that is being utilized, and a third is being constructed. According to 2003 estimates, the landfill has the capacity to operate for approximately 30 more years.

## 9. Schools

The school age population of Pine Knoll Shores is served by the Carteret County School System. All schools serving the area are located on the mainland of Carteret County. Bus service provides transportation to and from these schools on a daily basis. Table 36 provides a summary of the schools serving Pine Knoll Shores, along with some general statistics about those facilities. All schools have recreational facilities in place to serve students. The Coastal Carolina Boys and Girls Club was recently constructed near Morehead City Primary School. This facility offers an after school program throughout the school year, as well as summer activities and programs.

Table 36. Pine Knoll Shores Educational Facilities

School	Enrollment	Staff	Recreational Facilities
Morehead City Primary (PreK - 3)	681	120	Playground, Indoor Gym
Morehead City Elementary (4 - 5)	302	45	Full Size Gym, Multi-purpose Room, Playground, General Open Athletic Field
Morehead City Middle (6 - 8)	582	66	Indoor Gym, Soccer Field, Softball Field
West Carteret High School (9 - 12)	1,198	134	Gym, Athletic Fields, Track

Source: Carteret County Schools.

In addition to the Carteret County School System, there are several private schools that are available to the school aged population of Pine Knoll Shores. The following table provides a listing of these schools and their respective student body population.

Table 37. Pine Knoll Shores Area Private Schools

School	Grades	Student Population
Beaufort Christian Academy	PreK - 12	108
Tiller School*	K - 6	104
Cape Lookout Marine Science School*	9 - 12	116
Carteret Academy	5 - 12	67
St. Egbert Elementary School	K - 9	134

\*These are designated charter schools.

Source: Holland Consulting Planners, Inc.

Higher education is offered for Pine Knoll Shores citizens through Carteret Community College, located in Morehead City. The school offers more than 100 courses, and students can pursue programs leading to a certificate, diploma, or associate degree. East Carolina University is a major four-year university, and is part of the University of North Carolina system. The university is located in Greenville, North Carolina, roughly 100 miles from Pine Knoll Shores.

#### 10. Recreation

Since development of the Town's 1996 CAMA Land Use Plan, Pine Knoll Shores has worked very diligently to establish a number of public beach access points. At the time the 1996 plan was adopted, the Town did not have any public accesses. At this time, the Town has established five public beach access points with plans for additional access points in accordance with Army Corps of Engineer requirements. The locations of the public, private, and state-owned access points are shown on Map 13. Aside from the natural recreational resources that are so prominent in Pine Knoll Shores, there are also several other outdoor activities available to Town citizens and visitors. There is a semi-private golf course and tennis facility located within the eastern portion of Town, which is open to the public. The Town is interested in establishing some additional recreation opportunities, and identified this as a key issue at the Town's public input meeting. The Board of Commissioners has created the Recreation Advisory Committee to study future needs. The need for a central recreation facility will be discussed further in the future demands and policy statement sections of the plan.

#### 11. Electric Service

Electric service within Pine Knoll Shores is provided by the Carteret-Craven Electric Cooperative. This organization is one of 27 electric cooperatives throughout North Carolina. There are currently 2,613 customers within Pine Knoll Shores being served by Carteret-Craven Electric Cooperative.

#### 12. Telephone/Cable Service

Telephone service within Pine Knoll Shores is provided by EMBARQ Corporation, and cable television service is provided by Time Warner Cable.

#### 13. Wireless Providers

Cellular telephone service is available through all major carriers in Pine Knoll Shores. The most common service providers serving the area are as follows: Alltel, AT&T, Sprint PCS, US Cellular, and Verizon. There are cellular antenna located within the Town's planning jurisdiction; on top of a water tower and on top of the Clamdigger Inn.

Map 13 - Beach Access Points

14. High Speed Internet

High speed internet service providers serving Pine Knoll Shores residents include the following: Starfish Internet, CoastalNet, Time Warner Cable (Roadrunner), and Embarq.

15. Stormwater Management

a. *Introduction*

Stormwater is pure rainwater plus anything the rain carries along with it. In urban areas, rain that falls on the roof of a house, or collects on paved areas like driveways, roads, and footpaths is carried away through a system of pipes that is separate from the sewerage system. Unlike sewage, stormwater is not treated. In some cases it's filtered through traps, usually located at the end of the pipe system, but it still flows directly from streets and gutters into the canal, Bogue Sound, and ocean. Straight from the street to waterways inhabited by fish and other aquatic animals and plants in these estuarine environments. There are three main types of stormwater pollution: litter, such as cigarette butts, cans, paper or plastic bags; chemical pollution, such as detergents, oil or fertilizers; and 'natural' pollution, such as leaves, garden clippings, or animal droppings. According to the Carteret County Health Department, the most significant problem with respect to pollutants in stormwater runoff is pet and animal waste.

b. *Existing Drainage Problems*

Overall stormwater drainage is not a significant problem within Pine Knoll Shores. There is, however, a low-lying area situated between portions of Cedar Road and the eastern extent of the Town's corporate limits. This area is centrally located between Cypress Drive to the north and Salter Path Road to the south. This area experiences heavy ponding of water, and in some cases floods during heavy rain events. The boundaries of this stormwater drainage problem area is shown on Map 14. The Town will continue to address drainage and stormwater runoff through updated ordinances and regulations.

c. *Water Quality Problems*

Stormwater runoff is a significant problem with respect to water quality. Water quality within and adjacent to the corporate limits of Pine Knoll Shores has been discussed in detail in the Natural Systems Analysis (Page 41) and Environmental Conditions (Page 48) sections of the plan. Pine Knoll Shores is currently in the process of planning to update its stormwater management policies. These policies will address collection, treatment, and disposal. Addressing these problems through development of enhanced stormwater management policies will help to reduce the impact the Town's runoff is having on the waters of Bogue Sound.

Map 14 - Stormwater Concerns

*d. Environmental Protection Agency (EPA) Regulations*

The EPA has begun implementation of Phase II of the National Pollutant Discharge Elimination System (NPDES). 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 apply to all entities that meet these criteria based on both the 1990 and 2000 census. This will apply only if the entity is operating a Small MS4 (Small Municipal Separate Storm Sewer System). MS4's 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. At this time, the Town of Pine Knoll Shores is not required to meet the new EPA Phase II Stormwater Management Program regulations.

Pine Knoll Shores is moving ahead with proactive efforts in anticipation of Phase II and/or Division of Coastal Management regulations.

*e. 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:

- (1) Site Planning and Design Development Phase
- (2) Assessment Phase
- (3) Control Selection/Design Phase
- (4) Certification/Verification/Approval Phase
- (5) Implementation/Construction Phase
- (6) Final Stabilization/Termination Phase

*f. North Carolina Shoreline Buffering*

In August 2000, the State of North Carolina developed a 30 foot buffering rule for all new development in the 20 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:

- (1) 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.
- (2) Groundwater Recharge – buffers are also beneficial to recharging the ground water supply and promoting groundwater flow.
- (3) Soil Erosion Prevention – vegetated buffers stabilize the soil and reduce sedimentation.
- (4) Conservation of Coastal Riparian Wildlife Habitats – these natural areas provide breeding, nesting, and habitat, and protect wildlife from predation. Vegetated buffers help increase the diversity of wildlife while providing site for foraging and corridors for dispersal.

## **E. 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 affect the various man-made and environmental constraints will have on development throughout Pine Knoll Shores, an overlay analysis was performed. This overlay analysis is a Geographic Information System (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 15). This map can be used as a foundation for the discussion and formation of Town-wide land use policy and should be compared to the future land use map.

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 15. There were no additions or adjustments to the default layer sets and weighting factors provided by the Division of Coastal Management to the Town for the existing land suitability analysis map. Prior to producing the map, data was compiled and each data layer in conjunction with criteria was assigned a weight. The Town 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 38. Pine Knoll Shores Land Suitability Analysis Criteria Table

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.

Map 15 - LSA

Overall, land in Pine Knoll Shores is moderately suitable for development. Table 39 provides a summary of land suitability acreage based on the results of the overlay analysis.

Table 39. Pine Knoll Shores Acreage

<u>Suitability</u>	<u>Acreage</u>	<u>% of Total</u>
Least Suitable	413	28.1%
Low Suitability	215	14.6%
Medium Suitability	720	49.0%
High Suitability	120	8.2%
Total	1,468	100.0%

Source: Holland Consulting Planners (April, 2003); North Carolina Center for Geographic Information and Analysis.

## **F. CURRENT PLANS, POLICIES, AND REGULATIONS**

### **1. Town of Pine Knoll Shores Code of Ordinances**

Land development within Pine Knoll Shores is regulated by a Code of Ordinances. The Code of Ordinances was last updated and adopted by the Board of Commissioners on May 13, 2008. The ordinance is a comprehensive approach to controlling land development within the corporate limits of Pine Knoll Shores. The following provides a summary of the Town's ordinances that pertain to development or environmentally sensitive areas.

#### *a. Zoning*

On the Town's official zoning map, 13 zoning districts are established for the corporate limits. Pine Knoll Shores does not have any extraterritorial jurisdiction. Specific requirements are set forth regarding permitted uses in each district as well as the minimum lot sizes, yard setbacks, and building heights. Map 16 and Table 40 provide the location and acreage figures of all zoning districts within Pine Knoll Shores' planning jurisdiction. The two largest zoning districts within the Town's planning jurisdiction are R-2 and REC3. These two districts account for 45% of Pine Knoll Shores' total jurisdiction. Fifty-eight percent (57.7%) of Pine Knoll Shores is zoned residential use, 8.8% is zoned for non-residential uses, and 33.5% is zoned for recreational uses. For a detailed description of each of the zoning districts provided in this table, refer to the Town's current Code of Ordinances.

Table 40. Pine Knoll Shores - Zoning

<u>Districts</u>	<u>Acres</u>	<u>% of Total</u>
<b>Residential</b>	<b>742.9</b>	<b>57.7%</b>
R-1	126.1	9.8%
R-2	280.8	21.8%
R-3	38.1	3.0%
R-4	35.7	2.8%
MF1	53.6	4.2%
MF2	208.6	16.2%

Table 40 (continued)

<b>Non-Residential</b>	<b>113.6</b>	<b>8.8%</b>
C	7.8	0.6%
INSTT	51.3	4.0%
MS	45.2	3.5%
OP	9.3	0.7%
<b>Recreation</b>	<b>431.5</b>	<b>33.5%</b>
REC1	24.9	8.0%
REC2	103.2	1.9%
REC3	303.4	23.6%
<b>TOTAL</b>	<b>1,288.0*</b>	<b>100.0%</b>

\*This figure does not include water or right-of-ways.

Source: Holland Consulting Planners, Inc., and Town of Pine Knoll Shores.

*b. Subdivision Regulations*

The subdivision regulations for the Town of Pine Knoll Shores are intended to contain all criteria pertaining to the subdivision of individual tracts of land into smaller lots. This ordinance is intended to establish sound and orderly development principles in an effort to prevent overcrowding and integrate future developments into the Town's existing road and utility infrastructure network. The subdivision regulations also contain provisions requiring the establishment of right-of-way easements required for public utilities installation.

*c. Stormwater Management Ordinance*

An ordinance is currently under consideration which will require all proposed construction within the Town of Pine Knoll Shores to submit a stormwater management plan for review and approval by the Town's building inspector. The ordinance is intended to ensure that individual property owners are responsible for managing stormwater. Properly addressing the issue of stormwater will help minimize the impact that construction will have on adjacent properties, as well as water quality within Bogue Sound and the Atlantic Ocean.

*d. Flood Damage Prevention Ordinance*

The Town of Pine Knoll Shores is a standard member of the National Flood Insurance Program (NFIP). The NFIP has recently completed updated floodplain maps for Carteret County. The new maps were adopted on July 16, 2003. The floodplain maps have been discussed in the Natural Systems Analysis section of the plan (page 23).

Map 16 - Zoning

In accordance with regulations under the NFIP, Pine Knoll Shores adopted a Flood Damage Prevention Ordinance. The purpose of this ordinance is as follows:

- (1) Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increase in erosion, flood heights or velocities;
- (2) Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- (3) Control the alteration of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of flood waters;
- (4) Control filling, grading, dredging, and all other development which may increase erosion or flood damage; and,
- (5) Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

*e. Public Waters and Boats Ordinance*

This Town ordinance governs the construction of piers and docking facilities within the Town's planning jurisdiction. The ordinance specifies the allowable location and volume of private docking facilities for both single-family developments, as well as multi-family developments. This ordinance also sets forth rules and regulations pertaining to use of the Town's canal network. This portion of the ordinance addresses issues such as anchoring, speed, discharging and dumping, etc.

*f. Beaches and Dunes Ordinance*

This Town ordinance addresses the issue of vehicular access to the ocean beach running along Pine Knoll Shores. The ordinance specifies who is eligible for these permits, and outlines the process required to obtain a permit. This ordinance also provides provisions relating to general beach use regulations, parking restrictions, and restrictions against bulldozing on the beach.

2. NC State Building Code

The Town of Pine Knoll Shores utilizes the North Carolina State Building Code to oversee the erection of all structures within its planning jurisdiction. The Town employs a full-time building inspector and an administrative assistant to oversee the inspections process.

The minimum use standards, provisions, and requirements for safe and stable design, methods of construction, and usage of materials in buildings and structures erected, enlarged, altered, repaired, moved, converted to other uses, or demolished, and the equipment, maintenance, use, and occupancy of all buildings and structures in the Town, are regulated in accordance with the terms of the North Carolina State Building Code.

It should be noted that when the State of North Carolina recently adopted the International Building Code, a provision related to wind driven debris was eliminated. Because of this, the Town's Insurance Services Office (ISO) rating would potentially drop from a 6 to an 8. This would affect insurance rates throughout the Town's jurisdiction. The Town is currently working in conjunction with other jurisdictions to establish a means of locally adopting the wind driven debris regulations.

### 3. Hazard Mitigation Plan

The Town of Pine Knoll Shores adopted a Hazard Mitigation Plan (HMP) on September 14, 2004. The HMP was completed in response to new federal legislation established under the Disaster Mitigation Act of 2000. The federal law states that all governmental entities, including counties and municipalities must have an adopted hazard mitigation plan in order to receive public assistance money following a natural disaster. The Pine Knoll Shores hazard mitigation plan details the Town's vulnerability to various natural hazards. The HMP also establishes goals, policies, and implementing actions that the Town will carry out to address the issue of hazard mitigation, and make Pine Knoll Shores more prepared to deal with the effects of natural disasters. The HMP in its entirety is available for public review at the Pine Knoll Shores Town Hall and is incorporated herein by reference. The plan's mitigation strategies and polices are provided in Appendix IV.

### 4. Review of the Pine Knoll Shores 1996 CAMA Land Use Plan

In 1996, Pine Knoll Shores completed its current CAMA land use plan update. The Coastal Resources Commission certified this document on July 25, 1997. The current plan addresses a variety of issues, with a focus on transportation, community development, economic development, and hazard mitigation. This document has served as the Town's primary land use management guide since its adoption by the Pine Knoll Shores Board of Commissioners on June 10, 1997.

The 1996 Town of Pine Knoll Shores CAMA Land Use Plan included 79 specific policy statements, and a detailed summary of the Town's storm hazard mitigation procedures, post-disaster recovery operations, and evacuation plans. Of the 79 policy statements, 64 have been accomplished, and are listed below. There are 15 policy statements from the 1996 plan which have not been carried out. These are also listed below, and those actions that have not been completed will be revised and addressed in the policy action section of this plan. This list (pages 81 to 89) is a verbatim reproduction of the text from the 1996 Town of Pine Knoll Shores Land Use Plan; there are duplications in the text. Some of these statements are inconsistent with current circumstances and requirements. However, they were not changed in order to accurately reflect the contents of the 1996 plan.

## **ACCOMPLISHED**

1. Enforce all current regulations of the N.C. State Building Code and support Carteret County Health Department in all matters relating to septic tank installation/replacement in areas with soils restrictions.
2. Coordinate all development activity with appropriate county and state regulatory personnel.
3. Pine Knoll Shores will insist that the U.S. Army Corps of Engineers provide stringent regulation/enforcement of the 404 wetlands permit process in Pine Knoll Shores, and will cooperate with them in the regulation/enforcement process. This will include wetlands identified as being of the highest functional significance on maps supplied by the Division of Coastal Management. Development must be consistent with Chapter 21, Section 7.10 c.(a) of the Town Code.
4. Pine Knoll Shores will maintain low-density residential development (4 dwelling units/acre or less in single-family residential areas, and 8 dwelling units or less per acre in multi-family residential areas) in order to decrease soil contamination and groundwater pollution from septic tanks.
5. Pine Knoll Shores will coordinate any development within the special flood hazard area with the North Carolina Division of Coastal Management, FEMA, and the U.S. Corps of Engineers.
6. Pine Knoll Shores will continue to enforce its existing zoning and flood damage prevention ordinances and follow the storm hazard mitigation plan. (See Storm Hazard Mitigation, Post-Disaster Recovery, and Evacuation Plans).
7. The Town will continue to support and implement the community rating system which allows for reduced flood insurance rates.
8. It is the policy of Pine Knoll Shores to conserve its surficial groundwater resources by supporting CAMA and N.C. Division of Water Quality stormwater runoff regulations, and by coordinating local development activities involving chemical storage or underground storage tank installation/abandonment with Carteret County Emergency Management personnel and the Groundwater Section of the N.C. Division of Water Quality.
9. Pine Knoll Shores is concerned with the overall quality of the surface waters within the White Oak River watershed. The Town will support regional and multi-jurisdictional efforts to improve and protect water quality.

10. Pine Knoll Shores will support planning by the Carolina Water Service and the Town itself for an adequate long- range water supply. Public and private water conservation efforts will be encouraged.
11. Pine Knoll Shores supports public acquisition/ownership of the water system serving the Town.
12. Pine Knoll Shores recognizes the value of water quality maintenance to the protection of fragile areas and to the provision of clean water for recreational purposes. The Town will support existing state regulations relating to stormwater runoff resulting from development (Stormwater Disposal Policy 15 NCAC 2H.001-.1003).
13. To improve stormwater drainage, Pine Knoll Shores will pursue the development of a Town-wide stormwater control ordinance. Drainage from developed land areas shall have rate of flow and volume characteristics as near to predevelopment conditions as reasonable.
14. Pine Knoll Shores encourages the use of monitored pilot projects using advanced technology to treat stormwater runoff.
15. Pine Knoll Shores will coordinate the regulation of underground storage tanks with the North Carolina Division of Water Quality. Pine Knoll Shores will support 15A North Carolina Administrative Code (NCAC) 2N, Sections .0100 -.0800 which includes the criteria and standards applicable to underground storage tanks.
16. With the exception of bulk fuel storage tanks used for retail sales, and individual heating fuel storage tanks, Pine Knoll Shores opposes the bulk storage of manmade hazardous materials within its jurisdiction.
17. Pine Knoll Shores is opposed to the establishment of toxic waste dump sites or incinerators within Carteret County.
18. Coordinate all housing code enforcement/redevelopment projects with the N.C. Division of Archives and History, to ensure that any significant architectural details or buildings are identified and preserved.
19. Coordinate all Town public works projects with the N.C. Division of Archives and History, to ensure the identification and preservation of significant archaeological sites.
20. No industrial development of any type shall be located within Pine Knoll Shores' planning jurisdiction. This policy is supported by the Town's zoning ordinance.
21. Pine Knoll Shores will support the construction of package treatment plants which do not discharge waste in any areas classified as coastal wetlands or freshwater wetlands (404) and are approved and permitted by the State Division of Water Quality and by the

Carteret County Health Department/Division of Health Services. If any package plants are approved, Pine Knoll Shores supports requirement of a specific contingency plan specifying how ongoing private operation and maintenance of the plant will be provided.

22. Pine Knoll Shores opposes the construction of both upland and open water marinas within its planning jurisdiction. Modifications to an existing marina (including the development of additional boat slips) are allowed, provided the external boundaries of the marina are not affected.
23. The construction of all docks and piers shall minimize or eliminate adverse effects on coastal wetlands and subaquatic vegetation.
24. Existing marinas, docks and piers may be reconstructed to their prior size so long as all other applicable policies of this plan are satisfied and met when reconstruction occurs.
25. Pine Knoll Shores opposes the construction of dry stack storage facilities for boats associated with or independent of marinas. This policy will be supported through the Town's zoning ordinance.
26. Pine Knoll Shores is concerned with the potential for the development of mooring fields. The Town opposes the development of mooring fields and will investigate the development of an ordinance to regulate the establishment of mooring fields.
27. Pine Knoll Shores will support only uses within the ocean hazard areas which are allowed by 15A NCAC 7H and are consistent with the Town's zoning and dune and vegetation protection ordinances.
28. Pine Knoll Shores supports beach nourishment and relocation as the preferred erosion control measures for ocean hazard areas.
29. The Town objects to the construction of permanent shoreline stabilization structures in ocean hazard areas and any changes in state standards which would allow such structures.
30. Except for ocean hazard areas, Pine Knoll Shores does not oppose bulkhead construction within its jurisdiction as long as construction fulfills the use standards set forth in 15A NCAC 7H. The Town is opposed to bulkhead construction in ocean hazard areas.
31. Pine Knoll Shores will continue to receive and review reports on sea level rise and revise as necessary all local building and land use related ordinances to establish setback standards, long-term land use plans, density controls, buffer vegetation

protection requirements, and building designs which will facilitate the movement of structures.

32. Pine Knoll Shores will allow the construction of bulkheads which satisfy 15A NCAC 7H in all non-ocean hazard areas to protect structures and property from rising sea level.
33. All of Pine Knoll Shores' maritime forests which are classified as conservation are located in the Roosevelt Natural Area and the Town-owned property located south of Roosevelt Boulevard. There are no other significant areas of maritime forests located within the Town. Except for the North Carolina Aquarium, no development will be allowed.
34. Pine Knoll Shores supports addressing the following issues in the development of the White Oak Basinwide Management Plan:

Long-term Growth Management

- Wastewater management (non-discharge, regionalization, ocean outfall).
- Urban stormwater runoff/water quality.
- Role of local land use planning.

Shellfish Water Closures

- Increases in number of acres closed.
- Examine link between growth and closures.
- Opportunities for restoration and prevention.

Animal Operation Waste Management

- Between 1990-1994, swine population in the White Oak Basin more than doubled.

Nutrients/Toxic Dinoflagellate

- Reduction in nitrogen and phosphorous levels.

35. The Pine Knoll Shores Planning Department will undertake a review of all local land use regulation ordinances to determine if revisions should be undertaken to respond to specific water quality management problems.
36. All lands classified as conservation and natural recreation areas are considered valuable passive recreation areas. Except as otherwise provided for in these policy statements, these areas shall be protected in their natural state, and development should not be allowed.
37. Pine Knoll Shores supports the state's shoreline access policies as set forth in Chapter 15A, Subchapter 7M of the North Carolina Administrative Code. The Town will conform to CAMA and other state and federal environmental regulations affecting the development of shoreline access areas. The Town will prepare a shoreline access plan

and seek funding as necessary for the construction of additional shoreline access facilities.

38. Aquaculture is considered the cultivation of aquatic plants and animals under controlled conditions. Pine Knoll Shores objects to any discharge of water from aquaculture activities that will degrade in any way the receiving waters. The Town objects to withdrawing water from aquifers or surface sources if such withdrawal will endanger water quality or water supply from the aquifers or surface sources.
39. Residential and commercial development which meets 15A NCAC 7H use standards, Pine Knoll Shores zoning requirements, and the policies contained in this plan will be allowed in estuarine shoreline, estuarine water, and public trust areas. Industrial development will be prohibited within Pine Knoll Shores.
40. Pine Knoll Shores opposes the construction of any privately owned signs in the coastal wetlands, estuarine waters, and public trust areas. Publicly owned instructional signage will be permitted.
41. Pine Knoll Shores will vigorously enforce Chapter 21-3.5 of the Town's zoning ordinance which establishes stringent requirements for lot clearing. These requirements address both the construction of buildings and the clearance of vegetation. Plants of "special concern" are designated and afforded special protection. The Planning Board will review local ordinances to determine if amendments should be made to improve the regulation of lot clearing and the protection of maritime forest areas.
42. With the exception of the construction of signs, marinas, and floating structures, Pine Knoll Shores supports the use standards for estuarine waters and public trust areas as specified in 15A NCAC 7H.0208.
43. Pine Knoll Shores reserves the right to review and comment on policies and requirements of the North Carolina Division of Marine Fisheries which govern commercial and recreational fisheries and activities, including trawling and netting activities.
44. The Town of Pine Knoll Shores supports the designation of its beach area as a sea turtle sanctuary by the State of North Carolina.
45. Pine Knoll Shores allows permitted commercial fishing and emergency off-road vehicles in the beach area. Other vehicles are prohibited by local ordinances.
46. Pine Knoll Shores will support preparation of a long-range study to assess the cost, quantity and quality of the Town's water supply. The Town will consider acquiring the Carolina Water Service Company system.

47. In the absence of a waste treatment plant and collection system, Pine Knoll Shores will support the issuance of permits for the construction of septic tanks for residential, commercial, and public/semi-public land uses.
48. Pine Knoll Shores encourages work toward denitrification and phosphorous reduction of all discharges to our estuaries.
49. Pine Knoll Shores encourages the use of monitored pilot projects using advanced technology for wastewater treatment.
50. Pine Knoll Shores supports Carteret County's participation in a regional multi-county approach to solid waste management. This includes disposal of solid waste in the Tri-County Landfill.
51. Pine Knoll Shores will cooperate with any efforts to educate people and businesses on waste reduction and recycling. The Town vigorously supports recycling and supports setting up practical collection methods and education efforts to achieve a high degree of county-wide recycling.
52. Pine Knoll Shores supports the siting of recyclable collection centers within developed commercial and developed institutional land classifications.
53. There are no electric generating or other power generating plants located in or proposed for location within Pine Knoll Shores' planning jurisdiction. The Town will not support the location of permanent energy generating facilities within its jurisdiction.
54. Pine Knoll Shores supports Carteret County's policy of reviewing proposals for development of non-nuclear electric generating plants within Carteret County on a case-by-case basis, judging the need for the facility by the county against all identified possible adverse impacts. Pine Knoll Shores objects to all nuclear power plant construction. The Town reserves the right to comment on the impacts of any energy facility proposed for location within Carteret County.
55. The Town of Pine Knoll Shores is generally in opposition to offshore drilling for either oil or natural gas based on the possibility of harmful environmental impacts which can result from these efforts. However, in light of current or future advances in the technology employed in these drilling activities which offer significantly greater protection for the environment, reasonable and sufficiently technologically advanced proposals should not be rejected "out of hand".
56. Pine Knoll Shores opposes industrial development of any type. This policy is supported by the Town's zoning ordinance.
57. Pine Knoll Shores considers its existing community facilities to be adequate to serve the Town's needs during the planning period. This policy statement does not apply to water

and sewer facilities. The Town will investigate the possibility of expanding the Municipal Building meeting room.

58. Pine Knoll Shores is receptive to state and federal programs, particularly those which provide improvements to the Town. The Town will continue to support fully such programs, especially the following: North Carolina Department of Transportation road and bridge improvement as defined by the Transportation policies, the CAMA planning process and permitting programs, the U.S. Army Corps of Engineers regulatory and permitting efforts, dredging and channel maintenance by the U.S. Army Corps of Engineers, and federal and state projects which provide efficient and safe boat access for commercial and sport fishing. There is no demand for housing rehabilitation programs nor housing for low to moderate income families and individuals. However, the Town does support the construction of housing and care facilities for the elderly.
59. Pine Knoll Shores considers the interstate waterway to be a valuable economic asset. The Town will provide assistance in maintaining the waterway by helping to obtain or providing dredge spoil sites and, when possible, providing easements across Town-owned property for work.
60. Pine Knoll Shores will continue to support the activities of the North Carolina Division of Travel and Tourism; specifically, the monitoring of tourism-related industry, and efforts to promote tourism-related commercial activity.
61. Pine Knoll Shores supports the state's shoreline access policies as set forth in Chapter 15A, Subchapter 7M of the North Carolina Administrative Code. The Town will conform to CAMA and other state and federal environmental regulations affecting the development of shoreline access areas. The Town will prepare a shoreline access plan and seek funding as necessary for the construction of additional shoreline access facilities.
62. The Town of Pine Knoll Shores does not support construction of a third bridge ending in the Pine Knoll Shores Town limits.
63. Pine Knoll Shores reserves the right to comment on other specific transportation improvements.
64. Through enforcement of local ordinances including zoning, subdivision and the dune and vegetation ordinance, the Town of Pine Knoll Shores will strive to accomplish the following growth objectives:
  - (a) Maintain commercial zoning in areas existing in 1992.
  - (b) Maintain single-family residential developments at 4 units per acre or less, multi-family residential development at 8 dwelling units per acre or less, and motels/hotels at 22 living units per acre or less.
  - (c) Prohibit marina development.

- (d) Support development of a Town-wide stormwater control ordinance.
- (e) Strive to protect the dunes and maritime forest areas.
- (f) Ensure an adequate water supply.

***NOT ACCOMPLISHED***

1. Support and cooperate with the efforts of Carteret County to develop a central sewer system to serve the developed areas of the county, including the municipalities.
2. Pine Knoll Shores supports the development of a sewage collection system. The Town would support treatment of waste in a centralized Bogue Banks and/or Carteret County sewage treatment system.
3. Pine Knoll Shores is opposed to any widening of U.S. 58 to provide four lanes. The Town prefers widening to three lanes.
4. The Town of Pine Knoll Shores will support the development of a Town-wide sewer collection system.
5. Pine Knoll Shores will support a regional multi-jurisdictional study of the limestone aquifer underlying Carteret County. Such a study would aid in determining the optimum locations for wells and the long-term viability of the Town's water supply. The issue of salt water intrusion should be addressed by the study.
6. Pine Knoll Shores will encourage and support water conservation efforts. Motels and rental units will be encouraged to post notices encouraging water conservation by occupants.
7. In Pine Knoll Shores, no storm drains or drainage ditches shall be constructed which discharge directly into estuarine waters, public trust waters, or estuarine shorelines. Some form of water retention area or settling basin must be provided. Discharge into coastal wetlands is considered acceptable if associated construction and development does not damage coastal wetland areas.
8. Nutrient-sensitive corridors should be established around all our sounds, bays, and feeder streams. Special attention should be given to reducing nutrient and sediment enriched runoff in these areas. The Town will pursue possible methods of controlling the excess fertilization of lawns. The Town will also pursue a public awareness program.
9. The Town of Pine Knoll Shores supports regular testing of the water in the canals located within the Town. The North Carolina Marine Fisheries Division of Shellfish Sanitation has conducted tests for fecal coliform. The Town supports continuation of this testing on a regular basis. In addition, the Town supports regular testing (at least once per

year) for toxic pollutant levels. The Town will seek funding sources for establishment of a testing program.

10. Pine Knoll Shores opposes the location of floating structures and vessels for permanent occupancy in all public trust areas and estuarine waters. The Town will investigate the development of an ordinance designed to enforce this policy.
11. Pine Knoll Shores supports development and adoption of a local ordinance by Carteret County to regulate swine production.
12. The only significant redevelopment issue facing Pine Knoll Shores through 2000 will be reconstruction following a hurricane or other natural disaster. The Town will allow the reconstruction of any structures demolished by natural disaster which will comply with all applicable local and state regulations and the policies contained in this plan. The Town will not spend any local funds in order to acquire unbuildable lots but will accept donations of such unbuildable lots. Pine Knoll Shores will work with any owners who may have to move any threatened structures to safer locations. The Town will support reconstruction only at densities specified by current zoning regulations.
13. Pine Knoll Shores will support efforts of the U.S. Army Corps of Engineers and state officials to provide proper channel maintenance. Usable spoil material for beach nourishment will be accepted from any dredging operation for spoil taken outside of Pine Knoll Shores regardless of the location of the service. The Town will work to provide/locate spoil sites for dredge spoil taken from within Pine Knoll Shores' jurisdiction.
14. Pine Knoll Shores will continue to support the activities of the Carteret County Tourism Development Bureau.
15. Pine Knoll Shores supports the concept of mass transportation as a demonstrated need develops.