Comprehensive Land Use Planning in Coastal North Carolina

GUIDANCE FOR LOCAL GOVERNMENTS

NC Division of Coastal Management

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Contributions

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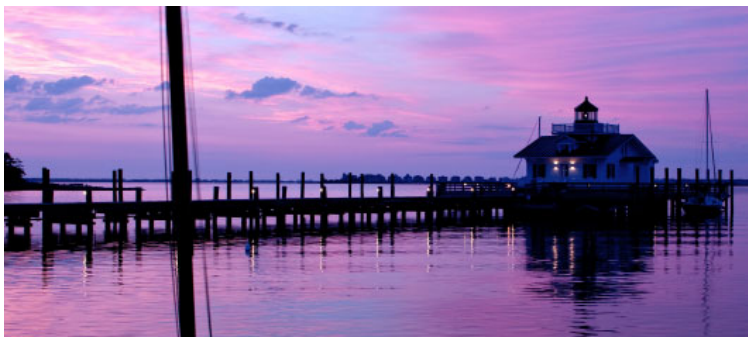

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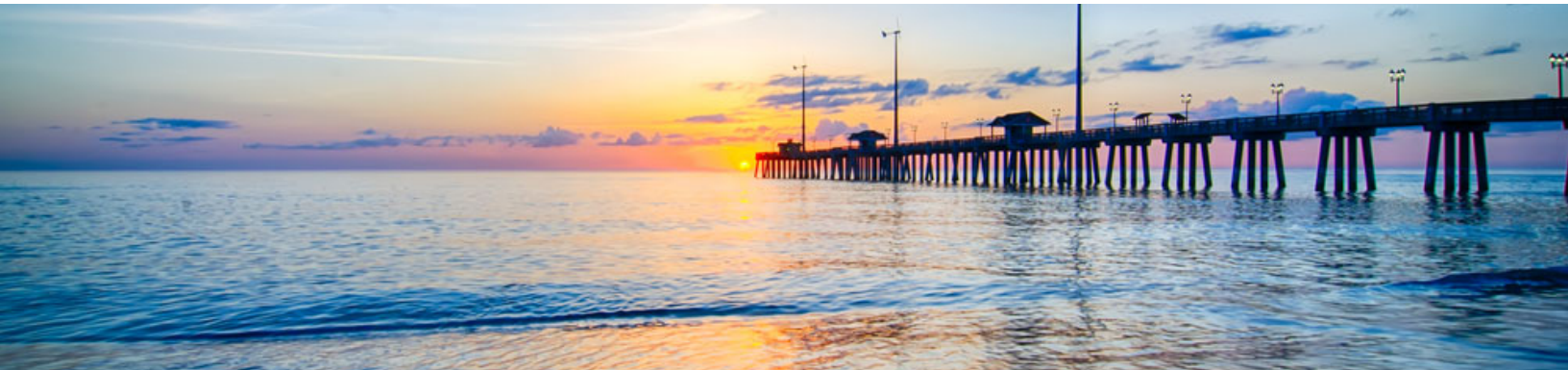


List of Acronyms

AEC	Areas of Environmental Concern
ADA	Americans with Disabilities Act, U.S.
AICUZ	Air Installation Compatible Use Zones
APA	American Planning Association
BCEGS	Building code Efficiency Grading System
BID	Business Improvement District
BLS	Bureau of Labor Statistics, U.S. Department of Labor
CAMA	Coastal Area Management Act, NC
CDC	Center for Disease Control
CHPP	Coastal Habitat Protection Plan, NC
CIP	Capital Improvement Program
CMP	Coastal Management Program
COE	U.S. Army Corps of Engineers
COG	Council of Governments
COOP	Continuity of Operations Plans
CRC	Coastal Resources Commission
CRS	Community Ratings System
CZMA	Coastal Zone Management Act, U.S.
DCM	Division of Coastal Management, DEQ
DEQ	Department of Environmental Quality (formerly DENR)
DMF	Division of Marine Fisheries, DEQ
DWR	Division of Water Resources, DEQ
ECJLUS	Eastern Carolina Joint Land use Study
EMC	Environmental Management Commission, NC
EMS	Emergency Management Services
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency, U.S.
ETJ	Extra-territorial Jurisdiction
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency (FEMA)
GIS	Geographic Information System
HMP	Harbor Management Plan
HPC	Historic Preservation Commission
HUA	Hydrologic Unit Area

LEAD	Labor and Economic Analysis Division, NC Department of Commerce
LEED	Leadership in Energy and Environmental Design certification standards
LID	Low Impact Development
LSA	Land Suitability Analysis
LINC	Log Into NC
LPO	Local Permit Officer
MCALF	Marine Corps Auxiliary Land Field Bogue
MCAS	Marine Corps Air Station Cherry Point
MCOLF	Marine Corps Outlying Landing Field Atlantic
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
MTIP	Metropolitan Transportation Improvement Program
NC-CREWS	NC Coastal Regional Evaluation of Wetland Significance
NCDOT	North Carolina Department of Transportation
NFIP	National Flood Insurance Program
NHC	National Hurricane Center, NOAA
NHP	Natural Heritage Program
NMFS	National Marine Fisheries Service, NOAA
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resource Conservation Service, USDA
OCM	Office of Coastal Management, NOAA
OCS	Outer Continental Shelf
OSBM	Office of State Budget Management, NC
OSDS	Onsite Sewage Disposal System
PNA	Primary Nursery Areas
RFP	Request for proposals
RFQ	Request for qualifications
RPO	Rural Planning Organization
SWOT	Strengths, weaknesses, opportunities, and threats
STIP	State Transportation Improvement Program
TIP	Transportation Improvement Program
UDO	Unified Development Ordinance
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Service

Section 1

Comprehensive Planning in Coastal North Carolina

INCLUDES:

Section 1.1
Developing a Comprehensive Plan

Section 1.2
Investing in a Comprehensive Plan

Section 1.3
Engaging the Public

Section 1.1

Developing a Comprehensive Plan

TOPICS INCLUDE:

- What is a comprehensive plan?
- The comprehensive planning process
- Working with a planning consultant
- How to use this manual

INTRODUCTION

Weather, ecology, and ocean and waterfront views combine to make coastal North Carolina an extraordinary place to live and to visit. Many people spend their year dreaming of a week-long vacation on the coast or their entire working lives saving to retire here. Others grow up on the North Carolina coast and have no interest in leaving. The desirability of living and visiting this part of the state puts great pressure on the coast to support an ever-growing population without damaging the unique environment that draws people here. The key to protecting these values while also encouraging economic prosperity and supporting population growth is planning for new development rather than letting individual development proposals shape the coast's future.

The goal of planning is to maximize the health, safety, and economic well-being of all people living in our communities. This involves thinking about how we can move around our community, how we can attract and retain thriving businesses, where we want to live, and opportunities for recreation. Planning helps create communities of lasting value (American Planning Association).

Nationwide, the gold standard for long range planning is a robust comprehensive plan that considers growth 20 to 30 years into the future. The comprehensive plan is then used to direct updates to development regulations such as zoning codes and subdivision codes, drive public investments through a capital improvement plan (CIP), and shape local programs ranging from affordable housing to green infrastructure. Land use planning, which addresses the location and character of development in a community, is a major part of a comprehensive plan. A comprehensive plan, in addition to land use, addresses a broad range of community planning topics that may or may not directly relate to land use.

North Carolina recognized the importance of land use planning to help balance the needs of economic development and protecting coastal resources when it adopted the Coastal Area Management Act (CAMA) in 1974. Since CAMA's passage, all 20 coastal counties have adopted a plan consistent with CAMA requirements under land use planning rules developed by the North Carolina Coastal Resources Commission (CRC). Cities and municipalities are not required to develop plans but many of those that

enforce a zoning ordinance, subdivision regulations and the State Building Code have chosen to adopt plans consistent with CRC requirements.

The CRC's initial land use planning rules came into effect in 1975 and were amended through the 1990's and early 2000's. The most recent amendment became effective in 2016. The CRC's 2016 land use planning rules provide for increased flexibility in plan content and format. This flexibility makes it easier for communities to leverage minimum CRC land use planning requirements to create a plan that follows the national model of a truly comprehensive plan, spanning issues ranging from protecting coastal resources to economic development to community resilience.

Citizens participating in a planning exercise

In the past, coastal communities that had adopted a CAMA land use plan, often referred to as the CAMA plan, were required to update it on a regular basis. The CRC's 2016 land use planning rules clarified that updates are not on a specific timetable. The question local governments must now answer is no longer how much time has elapsed since the most recent CAMA plan was adopted, but rather have local conditions changed enough to necessitate a new plan? Are the population, real estate development, and economic projections in the current plan out of date? Has the community's vision for its future shifted as development patterns have changed? If so, it is time to update the existing comprehensive plan or write a new plan. This manual provides guidance to help communities determine when it is appropriate to update a CAMA plan (see Section 1.2). Some communities choose to incorporate CRC requirements into a broader comprehensive plan. This manual is designed to provide guidance for development of both a land use plan that complies with the minimum CRC requirements and a broader comprehensive plan that includes these requirements.

Comprehensive planning was recently mandated in North Carolina under G.S.160D-501 as a condition for communities to adopt and maintain zoning. Prior to this legislation, only land use planning for the 20-coastal counties was required. Under 160D-501, a land-use plan meets the requirement to adopt a comprehensive plan. Communities must adopt a comprehensive plan or land-use plan by July 1, 2022 to maintain zoning. The content of the plan is determined by the community. Existing CAMA land use plans qualify as a "comprehensive plan" under 160D.

Other states where comprehensive planning is mandated provide a guide for local governments to use in meeting their content requirements. California, for example, provides guidelines for creation of a comprehensive, element-based General Plan. The *State of California 2017 General Plan Guidelines* is intended to be a living document where resources and links are added periodically, similar to the format of this manual. The 2017 update to their previous 2003 guide includes climate change and its implications as well as new topics such as health

and equity. Coastal zone requirements are also addressed in the guide with references to Local Coastal Programs. For coastal communities in California, a Local Coastal Program Land Use Plan is also required and can be integrated into the General Plan. *The 2013 Local Coastal Program Update Guide* provides information on updating land use plan components. As another example, *Maine's Comprehensive Planning: A Manual for Maine Communities (2005)* integrates the State's coastal management policy areas into its comprehensive planning guide.

For this coastal North Carolina manual, guidance is provided on how to meet CRC land use planning requirements and how to prepare an optional comprehensive plan that integrates those requirements.

WHAT IS A COMPREHENSIVE PLAN?

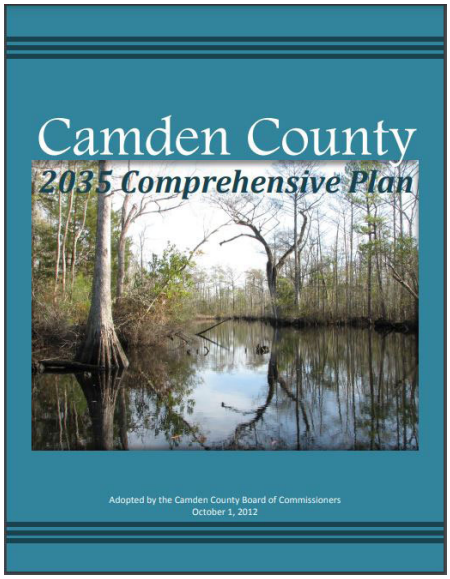
A comprehensive plan is a document that assesses a community's status quo, establishes its vision for the future, and outlines a policy framework that will bring this vision to life over the next twenty to thirty years. As explained by the American Planning Association, "a comprehensive plan is the adopted official statement of a legislative body of a local government that sets forth goals, policies, and guidelines intended to direct the present and future physical, social, and economic development that occurs within its planning jurisdiction" (2018). Traditionally, a comprehensive plan focuses on land use but modern plans frequently include discussions of topics such economic development, public health, and sustainability that relate to, but are larger than, land use alone.

In North Carolina, as defined in G.S. 160D, "(a) comprehensive plan sets forth goals, policies and programs intended to guide the present and future physical, social, and economic development of the jurisdiction. A land use plan uses text and maps to designate the future use or reuse of land. A comprehensive plan or land-use plan is intended to guide coordinated, efficient, and orderly development within the planning and development regulation jurisdiction based on an analysis of present and future needs." In the statute, comprehensive plan content is determined by the local government.

The comprehensive plan is one of many plans a local government may adopt, but in a constellation of local plans, the comprehensive plan is the sun around which other plans, such as a hazard mitigation plan or an affordable housing needs assessment orbit. The comprehensive planning process is an opportunity to review what has been implemented from these plans and which goals remain important today. Progress toward the goals and objectives in existing plans should be integrated into the development of a new comprehensive plan.

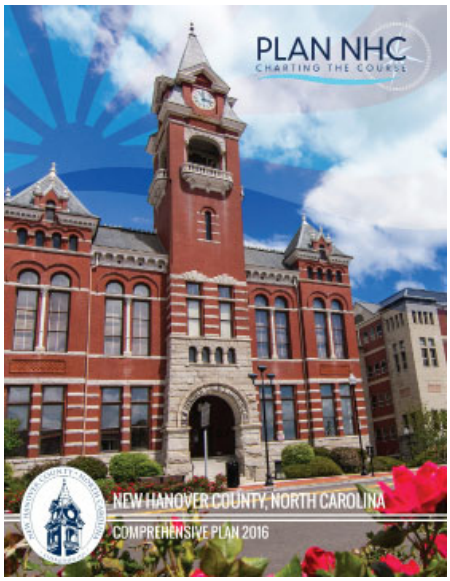
Many comprehensive plans have a common structure that includes data on existing conditions, a projection of trends, a vision for the future of the community, and a series of elements or chapters focused on individual topics. Virtually every comprehensive plan begins with an assessment of existing conditions in the community, such as population demographics, housing stock, infrastructure, and the health of the local environment and economy. Planners combine this snapshot of the present with recent trends in population growth and development patterns to project growth several decades into the future (see Section 2.2). The existing conditions analysis is typically the basis for a community visioning process, in which residents, business owners, and other stakeholders define how they would prefer to see their community grow in the future (see Section 2.3).

The typical comprehensive plan responds to the community's vision in a series of topical sections, which are often referred to as elements, that reflect important topics or issues. Each element then focuses on describing the goals, objectives, and policies related to a major topic that must be addressed for the vision to become a reality, such as land use, natural resources, economic development, or transportation (see Sections 3.1 through 3.6). Additionally, a comprehensive plan generally includes a future land use map that incorporates the issues raised across the whole plan. While the underlying structure is common across comprehensive plans, each plan reflects the community's individual context and its goals for the future and is therefore unique. For example, the *Camden County 2035 Comprehensive Plan* (2012) has elements organized around: preserving and enhancing community character; building the local economy; expanding tourism and recreation; fostering mobility, accessibility, and safety; conserving environmental resources, and serving current and future residents. It should be noted that Camden County has a separate CAMA land use plan that was CRC certified in 2005, *Camden County North Carolina Advanced Core CAMA Land Use Plan*. Camden County's comprehensive plan builds on the CAMA plan, focuses on addressing recent (at that time) trends and conditions, and provides more strategic goals, policies and actions for the future, but does not replace the CRC certified CAMA land use plan.



Camden County 2035 Comprehensive Plan is an example of an element based comprehensive plan

In addition to the typical comprehensive plan, there are two other approaches to organizing a plan. One focuses on creating a CAMA land use plan (or CAMA plan) to satisfy the requirements outlined in the CRC planning rules. These requirements are described in Section 2 of this manual. The other structure outlined in this manual was identified by the American Planning Association (APA) in its report *Sustaining Places: Best Practices for Comprehensive Plans* (Godschalk and Rouse 2015). The APA recommends structuring the plan around six major themes rather than topical elements: livable built environment, harmony with nature, resilient economy, interwoven equity, healthy community, and responsible regionalism. New Hanover County's *Plan NHC* (2016) is an example of a comprehensive plan structured around this framework. Section 2 discusses the different approaches to organizing a plan in more detail.



New Hanover County's Plan NHC is an example of a comprehensive plan that follows the American Planning Associations sustaining places framework

A comprehensive plan has little power to shape land use decisions on its own. At the local level, it must be implemented through changes to the local zoning code and subdivision regulations or through a unified development ordinance (UDO). Implementation of a comprehensive plan may also require additional plans that are more focused and detailed, such as a downtown economic development plan or pedestrian and bicycle plan. For many communities, starting a new program, such as a farmers market or business improvement district, is also a step in implementing a comprehensive plan. The plan may also make it clear that public investments in infrastructure or capital facilities, such as a new library, fire station, or school are needed. In this case, the Capital Improvement Plan (CIP)

and funding mechanisms, such as a bond or grant proposal, are critical parts of implementing the comprehensive plan. The diverse group of plans, policies, programs, and construction projects that implement a comprehensive plan do not emerge organically from an adopted plan. To address this issue, the plan should include a road map for implementation, assigning specific aspects of implementation to specific departments and staff members (see Section 1.2 and 2.4).

The development of a CAMA land use plan or comprehensive plan has consequences beyond providing a framework for local decision-making. In North Carolina, CAMA land use plans are considered to be "comprehensive plans" for the purposes of NC G.S. Chapter 160 D. which governs the use of zoning ordinances. All changes to zoning regulations are required be consistent with a comprehensive plan. The CAMA land use plan is also used by the North Carolina Department of Environmental Quality (DEQ's), Division of Coastal Management (DCM) to make CAMA permit decisions and federal consistency decisions while the NC Department of Commerce only certifies industrial sites when they are located consistent with CAMA plan policies (see Section 2.5).

THE COMPREHENSIVE PLANNING PROCESS

Developing a comprehensive plan begins with collecting data on existing conditions, using national, state and local data sources such as the US Census, NC Department of Environmental Quality, and local development permit records (see Section 2.2 for a discussion of data sources needed to develop a CAMA plan). Planners then analyze existing conditions and forecast future conditions, such as population growth and housing availability. Planners usually begin a public engagement process at this point to work with residents, business owners and other stakeholders to identify the vision, aspirations, and concerns that will shape the comprehensive plan's goals and future land use map. From this broad vision, planners draft individual plan elements, which include goals, objectives, and implementing policies related to the elements topic. Public participation may continue through this portion of the planning process, in the form of a citizen advisory committee or ongoing public workshops.

Modern comprehensive planning draws from two lines of thought: rational planning and participatory planning. While the hope is that a well-researched and thoughtfully constructed comprehensive plan will rationalize development decisions, planners also recognize that the public must be involved in creating the comprehensive plan for both democratic and practical reasons. Planning decisions shape quality of life for all residents and can alter land values. It follows that residents and property owners should have a role in shaping planning policies. Additionally, if the public is not involved in drafting the comprehensive plan, zoning changes that implement the plan may be faced with steep public opposition. For these reasons, planners are encouraged to

think of comprehensive planning as a process, rather than a simple document. Section 1.3 of this manual provides extended discussion of ways to engage the public across the phases of creating a comprehensive plan.

For communities creating a comprehensive plan to meet the CRC's land use planning requirements, the Division of Coastal Management (DCM) District Planners are a resource for local planners throughout the planning process. Once the draft is complete, a DCM planner begins the state review for compliance with CRC requirements described in detail in Section 2.2, 2.3, and 2.4, and summarized in the Matrix for Land Use Plan Elements contained in Appendix B.

Once the DCM District Planner determines that the plan has addressed all the requirements, the final step is formal adoption by local elected officials at a public hearing. It then moves to the DCM for final certification. At this point, the plan becomes the policy that DCM staff uses when reviewing applications for CAMA major, minor, and general coastal development permits. This is an important reason to keep the plan up to date – a CAMA development permit application that is inconsistent with local policies, including the future land use map, may be denied. Section 2.5 discusses the plan approval process and the implications of having a certified plan.

After the local government adopts the plan, the next step is to update the zoning code or unified development ordinance (UDO) and zoning map to match the plan's goals, objectives, policies, and future land use map. While a CRC certified plan is considered regulatory policy for CAMA development permits, it is not regulatory policy at the local level. Only the zoning code and subdivision regulations or UDO create the legal framework for what type and form of development is permitted in a community. For example, the plan may include goals related to mixed-use development or conservation subdivisions, but these goals can't be implemented until the zoning code is updated to allow commercial and residential development in the same land use zone or the subdivision code is updated to allow clustered homes on one portion of a rural site. Conversely, if a community determines it needs to modify a zoning ordinance in the future, these changes are required to be consistent with the state certified plan.

It is also important to recognize that many of the new programs and capital projects recommended in the plan will only move forward if the resources, such as funding, staff, and equipment, are allocated through the annual budget and CIP. Accordingly, it is important for local officials to incorporate the plan into local budgeting and financial planning processes.

The comprehensive plan is also likely to identify additional plans that are needed before implementation can move forward. For example, creating a safe environment for pedestrians across a town or in specific neighborhoods may be a comprehensive plan goal but it is impossible to fully assess the challenges to pedestrian safety and develop strategies to address these challenges in a plan that covers topics ranging from economic development to habitat preservation. In this example, the comprehensive plan's implementation schedule would include drafting a pedestrian plan and integrating the recommendations of this plan, such as marked crosswalks, crossing signals, and sidewalk construction, into the CIP.

WORKING WITH A PLANNING CONSULTANT TO DRAFT THE PLAN

There are two options for writing the plan: hiring a planning consultant or writing the plan with "in-house" planners. There are a number of reasons a community may consider hiring a planning consultant to lead the planning process. Existing staff may be responsible for both long-range and current planning and may not have enough time available to lead a major planning process. Staff expertise may not span the full breadth of issues the community hopes to include in the plan. Additionally, a consultant may have specific skills, such as scenario planning, or access to software that the local planners do not have. Finally, members of the public can see consultants as more credible experts than staff planners (even in situations where staff planners are in fact experts as well) as they provide an outside perspective.

However, there are several major reasons to use in-house planners to create the plan. First, this virtually guarantees that the plan will be unique to the community rather than a modified version of a plan the consultant has produced for other local governments. Planners are also more likely to understand the intent of different policies and recommended actions if they were directly involved in their development. Additionally, local planners will also be responsible for implementation and may feel more invested in implementing a plan that they personally drafted (Kelly 2013).

If the community decides to work with a consulting firm the first, and arguably most important step, is creating a scope of services that will be included in the request for proposals. Important considerations include the specific areas of expertise the consulting firm should bring to the planning process, the division of labor between the consulting firm and the local planning department, the extent of public engagement the consulting firm will manage, the time table for completion of the plan, and the total budget for the planning process (Kelly 2013). Communities that are new to the process of hiring a planning consultant should refer to the American Planning Association's guidebook *Working with Planning Consultants* for an extended discussion of the options for selecting a consulting firm, including hiring a sole source provider, selecting from a list of pre-qualified firms, issuing a Request for Qualifications (RFQ) or Request for Proposals (RFP) or an RFQ followed by an RFP.

Public planning meeting

To learn more about working with a planning consultant: *Working with Planning Consultants.* Eric Damian Kelly. 2013. Published by the American Planning Association.

HOW TO USE THIS MANUAL

Regardless of how the plan is organized, the development of a comprehensive plan represents a significant investment by a community in terms of both time and money. It also provides an important opportunity to do much more than simply satisfy the CRC's minimum planning requirements. It is an opportunity to

consider all the aspects of physical and economic growth that synergistically create the future community residents want to see. It also provides a means of ensuring that economic development does not occur at the expense of the natural environment or the quality of life that attracted residents to live in coastal NC in the first place.

This manual is organized to provide guidance on developing a land use plan that meets the requirements of the Coastal Resources Commission as well as guidance on developing a comprehensive plan that addresses a broader range of local planning issues.

Section 1.2 makes the case for developing a comprehensive plan to get the most out of the planning process. A primary focus of this section is leveraging a community's investment in the planning process to lay the groundwork for a broadly supported plan that fully captures a community's hopes and dreams for its future. The APA's Sustaining Places Framework for comprehensive planning is also highlighted as a best practice. Additionally, Section 1.2 discusses ways to invest in staff capacity while writing the plan. This section also elaborates on ways to organize the plan with the goal of providing a framework for future decision-making and discusses how to begin thinking about implementation during the planning process. Every plan, no matter how well crafted, eventually becomes out of date. To address this issue, Section 1.2 includes discussion of the indicators that it is time to update a community's plan. Public input early in the decision-making process can help determine the type of plan that will best accomplish the community's desired vision for the future. Section 1.3 concludes with strategies for engaging the public throughout the planning process.

The CRC's land use planning requirements are described in Section 2 of the manual and are summarized in the matrix contained in Appendix B, which must be included in all plans submitted for CRC certification. These plans are referred to in the manual as CAMA land use plans or CAMA plans. Section 2.1 provides a detailed overview of the CAMA and describes the relationship between its permitting program and land use planning requirements. Section 2.2 focuses on describing the existing and emerging conditions as well as the dominant growth-related conditions that influence land use, development, water quality, and other environmental concerns in the planning area. This information is important because it provides justification for the plan's policies and recommended actions. Section 2.3 focuses on developing a vision statement and identifying the community concerns and aspirations. Section 2.4 discusses requirements related to plan policies, the future land use map, and an action plan and implementation schedule. Finally, Section 2.5 describes the CRC certification process and the implications that plan adoption have for local governments and federal and state agencies.

Section 3 of the manual is designed to help communities that want to go further and make the most of the investment in plan development by incorporating the CRC's requirements into a comprehensive plan. For simplicity, we refer to plans structured around topical elements or organized around the APA's sustaining places framework as comprehensive plans. Section 3 is organized around a set of possible elements that incorporate the CRC's minimum requirements: Land Use and Community Form (Section 3.1), Coastal Environment (Section 3.2), Natural Resources and Environmental Sustainability (Section 3.3), Infrastructure and Community Facilities (Section 3.4), Transportation and Connectivity (Section 3.5) and Disaster Resilience and Recovery (Section 3.6). Each section identifies the applicable CRC management goals and also explores other topics that are of concern to many coastal communities in NC. Each element also provides a set of

practices recommended by the APA and other professionals that can be incorporated into a comprehensive plan or CAMA land use plan to address the CRC's management goals or other topics of concern. Where possible, examples of the practices from coastal NC or elsewhere in the state are provided. Each element also includes additional resources for readers who want to learn more about a specific topic or practice included in the manual.

Residents and planners discuss the draft New Hanover County future land use map from the Plan NHC (2016)

Section 1.2

Investing in a Comprehensive Plan

TOPICS INCLUDE:

- Investing in the planning process
- Investing in the plan to create a useful framework for decision making
- Encouraging change by focusing planning on implementation

INTRODUCTION

Creating a plan requires a significant investment of community resources whether the focus is on developing a CAMA land use plan or a comprehensive plan. If a community is strategic about this investment, they can do more than just satisfy a state requirement. They can leverage the process to create opportunities for authentic public participation, grow staff capacity, and shape future development. This section focuses on additional strategies to maximize a community's investment in comprehensive land use planning and concludes with advice for determining when it is time to update or revise a plan.

"A city is not an accident but the result of coherent visions and aims."

— Léon Krier

INVESTING IN THE PLANNING PROCESS

It is difficult to plan without knowing how much funding, staff, and other resources are available to support the effort. Similarly, it helps to have a solid understanding of what the land use plan will try to accomplish before you begin. While it may sound strange, planning to plan is an important strategy that helps you get the most out of your community's investment in the planning process. A scoping process, sometimes referred to as the planning to plan phase of the project should occur well before initiating the planning process. While many communities jump into a planning process or just issue an RFP to hire a consultant, it is wise to set clear, realistic expectations that all parties understand to make the most of the community's investment in the planning process. Questions to consider in the planning to plan phase include:

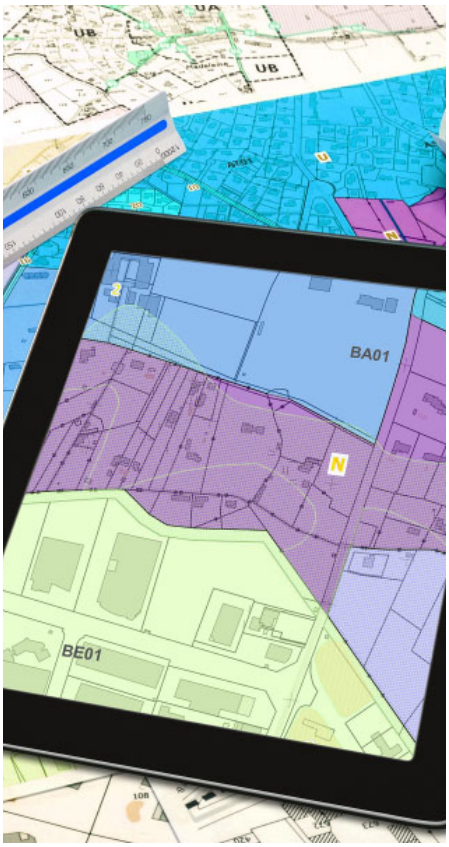
- What does the community want to accomplish beyond complying with CAMA's minimum requirements?
- If the goal is a traditional comprehensive plan, how ambitious do you plan to be and what is the time horizon (e.g., 10 years, 20 years, etc.)?
- Is the community growing rapidly or slowly?
- What are the issues that appear to be most important to the public and decision makers?

- What does the future look like in terms of the resources available to support plan implementation?
- Is the current plan useful to decision makers?
- How much time is available for the planning process?
- How much community engagement is planned (because this will lengthen the process)?

See Section 1.3 for guidance on investing in authentic public engagement.

Invest in a broadly supported vision for the future

Developing a vision statement is a critically important stage of the planning process and this is an area where a consultant or other third-party facilitator can be helpful, even if most of the planning process will be managed by the community's staff planners. The vision statement provides the foundation of the plan. It reflects principle community concerns and aspirations. The plan's goals, objectives, policies, and recommended actions should all focus on enacting this vision. It also prioritizes and sets direction for future community decision making. However, developing a vision statement can be a challenging process for even an experienced planner given competing interests, ongoing community conflicts, or competition for resources. It can also require specialized participation processes such as a series of public meetings or workshops and might even use specialized processes such as a charrette to develop a vision statement that has broad support among a diverse range of stakeholders. Therefore, it is sometimes useful to contract with a third-party facilitator who can work to bring the community together to support a unifying vision statement. These third parties abound and may be found in councils of government, universities, or consulting firms.



Invest in analysis needed to support plan development

Planning is a data driven enterprise. It is hard to know where you are going without knowing where you have been. For some communities, hiring an expert to complete the analysis of existing and emerging conditions or to project future trends is the best place to invest in a stronger plan. While Section 2.2 specifies the required descriptions, maps, and analysis needed for a CAMA land use plan, developing an effective plan often requires a more significant investment in data collection and analysis to address some topics. The exact nature of the analysis will depend on the community concerns and aspirations and the community context as reflected in the answers to such questions as:

- Is it a large or small community in terms of physical/geographic size?
- Is it densely populated or sparsely populated?
- Are there special populations that need to be considered, such as the military?
- How is the community population and housing distributed?
- Is it developing rapidly or slowly?
- Is the economy strong or weak?

- Are there concentrations of at-risk populations such as the elderly, low income, or handicapped that require special transportation, social services, or evacuation during major storms.

The answers to these and other questions may suggest that additional forms of analysis that exceed the minimum requirements for CAMA land use plans are needed to understand existing and emerging conditions. Depending on the community context and the community concerns and aspirations, additional specialized analytical tools may be necessary to understand land use needs, development limitations, and the consequences of different policy choices. Common tools include:

- Land suitability analysis;
- Buildout analysis; and,
- Land use modeling and scenario planning.

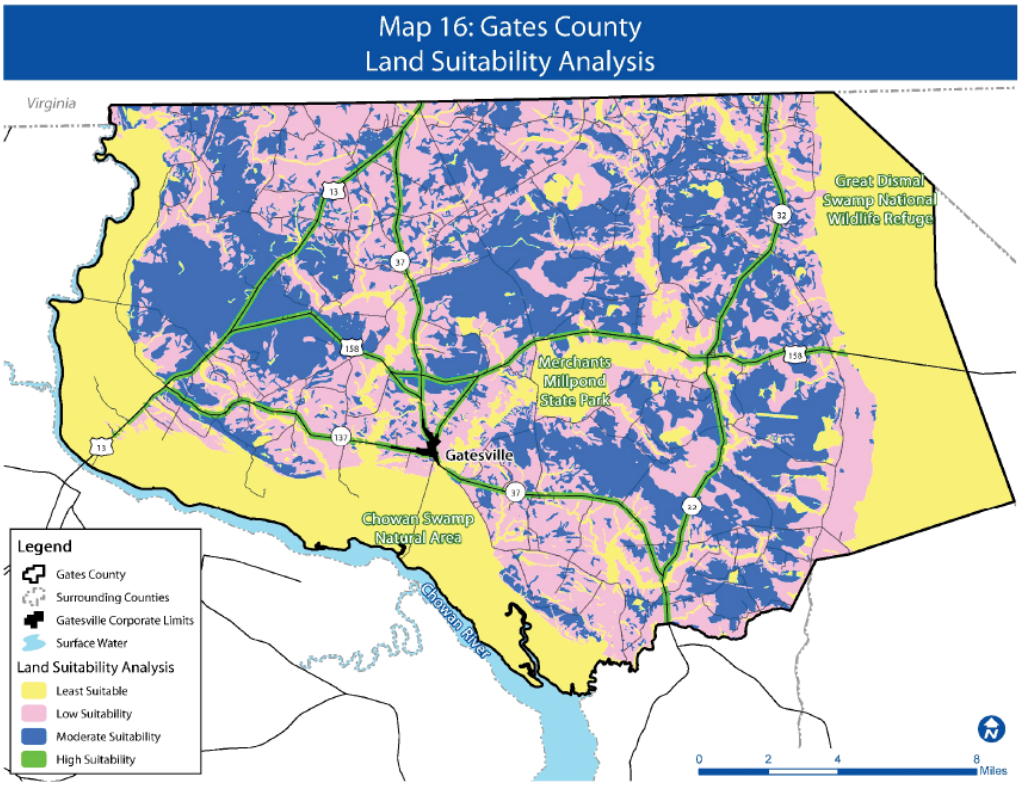
These tools are technically intensive. Even if planning staff is developing the plan, it is sometimes worth the investment in technical specialists located in councils of government, universities, or consulting firms to provide specialized analysis.

Land suitability analysis

A land suitability analysis (LSA) is a systematic process for identifying land areas that are most appropriate for future land uses such as housing, commercial development, etc. and is typically undertaken using GIS software. While a LSA is not a required element of the CAMA land use plan, the information generated is very useful to the planning process. The LSA is a very useful tool for making decisions about future land use, particularly in counties and large municipalities. The process of developing the LSA and the choices that have to be made can also help planners identify potential issues, such as incompatible uses, infrastructure needs and opportunities for open space preservation, that should be addressed in different land use plan elements.

The process involves several steps. First, planners determine the attributes that make land suitable and unsuitable for development. For example, planners may decide highway proximity makes land suitable for development, while wetlands are not suitable for development. Once attributes are selected, factor ratings are assigned to each attribute and these ratings determine the suitability of a piece of land for development based on the proximity to the attribute. Finally, maps are generated for different attributes. The composite map, or LSA map, identifies the relative suitability of land for development.

For example, the *Gates County, NC: Comprehensive Plan* (2017, pp. 3-44 – 3-49) used a land suitability analysis to identity lands with high, moderate, and low suitability as well as lands that are least suitable to development. Conversely, the *Town of Windsor: Comprehensive Land Use Plan* (2018, pp. 3-50 – 3-58) used a Land Use Conflict Identification Strategy (LUCIS) Model to identify locations where a particular land use type can provide the greatest benefit to a jurisdiction by identifying lands best suited for relatively intensive human activity, conservation purposes, or productive agricultural lands. Maps then identify the suitability of town lands for each of these three general land use categories. Methodologies for both analyses are documented in the respective plans.



Gates County Land Suitability Analysis from the Gates County Comprehensive Plan (2017)

Buildout analysis

A buildout analysis estimates the amount of development that can occur if all developable land is consumed or converted to residential and other uses based on current or proposed land use regulations. GIS software is typically used to complete the analysis. A buildout analysis provides an estimate of what may occur according to current or proposed policy and what population this level of development would support. This scenario can be compared to current population projections to determine future land use needs. The information can also help planners determine if too much or too little land is allocated for specific housing or densities. The buildout analysis can also clarify how much future retail, commercial, or industrial space is available pursuant to current zoning and then decide if this is sufficient for future economic development needs. A buildout analysis can be useful in helping plan for future infrastructure (e.g., water, sewer, stormwater, schools, etc.) and transportation needs. This information can be used in public participation efforts to determine if the buildout is consistent with the vision developed for the community or whether important zoning changes are needed. In addition, buildout analyses can be used to explore the implications of proposed zoning changes by looking at changes in buildout levels resulting from modifications to current zoning policies.

The general process for completing a buildout analysis is:

1. Identify all developed land.
2. Identify vacant land subject to conservation easements and land owned by government that is unlikely to be developed.
3. Identify land that has environmental or other constraints limiting its development (e.g., wetlands, AECs, etc.).
4. Calculate the amount of new development that can occur under current regulations for the developable area based on the zoning code and subdivision regulations.

5. Based on the projected number of single and multi-family homes, calculate the population size the community will support at buildout.

The Town of Oak Island included a buildout analysis in the *Town of Oak Island: Comprehensive Land Use Plan* (2017, p.4-8). The plan explains that "buildout analyses are done to estimate the potential impacts of development and projections for infrastructure. The buildout analysis for Oak Island includes all vacant/unimproved land as classified by zoning district in order to determine the maximize amount of development that could occur based on existing regulations."

Table 4-6. Island Portion of Corporate Limits

Zoning District	Parcels	Acres	Potential Square Footage/ Number of Housing Units
CB: Community	93	21.05	160,496 square feet
CR: Commercial	141	34.86	265,703 square feet
OS: Open Space	13	896.26	N/A
R-20: Low Density	38	56.46	38 units
R-6A: Higher Density	1,816	389.10	2,098 units
R-6B: Higher Density	354	77.59	354 units
R-6MH: Higher Density	158	29.75	293 units
R-7: Medium Density	685	223.67	950 units
R-9: Medium Density	69	21.24	69 units
Total	3,367	1,749.96	

Town of Oak Island buildout analysis for vacant land on its island portion from the Town of Oak Island Comprehensive Land Use Plan (2017).

The Town of Oak Island's buildout analysis for vacant land on the island portion of its corporate limits indicates the potential for 426,199 square feet of non-residential development and 3,802 residential units based on current zoning.

Scenario planning

One major impediment to planning for future development is that the exact circumstances that will shape the future are unknowable in the present. Scenario planning has long been used by the military and corporations to deal with uncertainty when planning for the future. Through land use modeling, planners have developed robust methods for incorporating scenarios into planning. The end result of this analysis is several scenarios for future development projected from one to several decades into the future that range from the "business as usual" to major shifts in development patterns, such as concentrated development or development around public transit lines. Each scenario is accompanied by quantitative indicators that can be compared, such as daily vehicle miles traveled and number of acres of land developed. Scenario planning

has a number of benefits; it makes it easier for the public to understand the implications of different development decisions; it shows how well different land use choices relate to the community's vision; and it allows planners and the public to simultaneously consider economic, environmental, and social impacts of different possible futures. This approach to dealing with uncertainties is also relevant when a community is considering how to adapt and reduce vulnerability to climate change impacts like sea level rise (See Section 3.6). Planners typically use GIS-based software designed specifically for scenario planning. At the local level, this type of analysis is almost always completed by a planning consultant using specialized software.

As part of its creation of *Plan NHC* (2016), New Hanover County used scenario planning to determine where growth could be accommodated and the positives and negatives of accommodating growth in different ways. The County considered four distinct Alternative Futures scenarios: 1) Market-based lower density scenario (called 'Business as Usual'), 2) Market-based, higher density scenario (Mixed Use Development), 3) Compact development, lower density scenario (Redevelopment and Infill), and 4) Compact Development, higher density scenario (High Growth Nodes). The scenarios showed that there are many ways to accommodate future growth. The County's future land use map was modeled on these scenarios and reflects a mix of the growth strategies. The County's scenario planning methodology can be found in *Plan NHC* (2016) Chapter 4 Appendix Alternative Futures Scenarios.

For more information visit the *APA Scenario Planning webpage* and *https://connectourfuture.org/tools/land-use-modeling/*

Invest in future planning capacity

There is no better way to learn how to plan than planning. Thus, the planning process not only provides the opportunity to invest in technical resources to support future decision-making, it allows a community to invest in the training of its own staff. Some larger counties and cities in coastal NC are now developing their CAMA land use plans or comprehensive plans using their own planning staff with targeted support from consultants. This provides a critical professional development opportunity for their staff and allows a local government's staff to become fully invested in not just the plan, but its implementation. Some communities are unsure whether they can develop a plan internally. In these situations, the choice is an important one that should be decided as part of the scoping process. However, it should never be framed as an all or nothing choice. It is possible for a community's staff to develop and write much of the plan with the assistance of contractors who perform critical pieces of analytical work, such as completing a build out analysis, LSA, developing specialized GIS coverages, or managing part of the public process such as hosting participatory workshops or administering surveys.

Using the planning process as an opportunity to invest in the capacity of planning staff improves a community's capability to amend and update a

certified plan. Since the CRC's planning rules do not require regular updates, some communities may choose to extend the life of current and future plans through the use of more frequent amendments to keep their plans current. Investing in planning capacity may save the community money and time over the long run by utilizing in-house staff for amendments and minor updates prolonging the plans useful life.

INVESTING IN THE PLAN TO CREATE A USEFUL FRAMEWORK FOR DECISION-MAKING

When it comes time to write and organize a full update of the CAMA plan, local governments have flexibility in terms of both the content and organization of the plan. Local governments can prepare a CAMA Plan that meets the CRC's planning rules or prepare a comprehensive plan that meets the CRC's rules while addressing additional community wide issues. A comprehensive plan as recommended in this guide can be organized on traditional elements that also address coastal issues, or on the APA's Sustaining Places framework which is organized around the concept of sustainability. Each option can be utilized to meet the CRC's planning rules as well as respond to other local issues.

Developing a CAMA Land Use Plan

If the goal is to produce a CAMA land use plan that complies with minimum requirements, the plan may be structured as outlined in Section 2 and according to the organizational matrix in Appendix B. A basic outline consists of the following:

- Community concerns and aspirations
- Existing and emerging conditions
- Future land use
- Tools for managing development

Developing a comprehensive plan

Over the last 20 years, counties and cities throughout NC have developed comprehensive plans organized around a series of elements that reflect important topics or strategic issues confronting a community. This manual suggests six broad topics that could serve as chapters in a comprehensive plan designed to satisfy CRC's planning requirements:

- Land Use and Community Form Element
- Coastal Environment Element
- Natural Resources and Environmental Sustainability Element
- Infrastructure and Community Facilities Element
- Transportation and Connectivity Element
- Disaster Resilience and Recovery Element

Each element in Section 3 provides a range of topics, which will be more or less important to each community. All of the CRC's required analyses and its management goals and policies can be addressed within this general framework along with other issues that are commonly included in a comprehensive plan. While Section 3 provides a useful starting point, communities are free to develop elements and configure topics as needed, such as elements dedicated to open space, parks and recreation, or economic development. In fact, many of the topics noted in the various elements in Section 3 could warrant their own element if it is central to achieving the plan's vision or a high community priority. The choice of elements and their framing should

also reflect the values that inform the vision statement, the community concerns and aspirations, and the analysis of existing and emerging conditions. When using this option, it is important to use the organizational matrix contained in Appendix B to identify where each of the CRC's rule requirements are addressed.

The element-based plan is by far the most common approach to comprehensive planning across the nation. Looking beyond the coast, North Carolina has several comprehensive plans that could serve as a model for coastal communities. For example, *The 2030 Plan for the City of Raleigh* and the *Winston-Salem/Forsyth County Legacy 2030 Comprehensive Plan* provide traditional elements while incorporating small area plans.

Sustaining Places framework

A third option for organizing the plan is to rely on the *Sustaining Places* framework that focuses on developing the next generation of comprehensive plans and is organized around the concept of sustainability. The *Sustaining Places* framework is recommended by the American Planning Association (APA) in recently published guidance materials and includes a wide range of generally accepted best practices and strategies to incorporate into a plan (Godschalk and Anderson 2012; Godschalk and Rouse 2015). This new framework recommends organizing the development of a comprehensive plan around a series of principles that encourage sustainable development:

- ***Livable Built Environment:*** Ensures that all elements of the built environment, including land use, transportation, housing, energy, and infrastructure work together to provide sustainable green places for living, working, and recreation with a high quality of life;
- ***Harmony with Nature:*** Ensures that the contributions of natural resources to human well-being are especially recognized and valued and that maintaining their health is a primary objective;
- ***Resilient Economy:*** Ensures that the community is prepared to deal with both positive and negative changes in its economic health and to initiate sustainable urban development and redevelopment strategies that foster green business growth and build reliance on local assets;
- ***Interwoven Equity:*** Ensures fairness and equity in providing for the housing, services, health, safety, and livelihood needs of all citizens and groups;
- ***Healthy Community:*** Ensures that public health needs are recognized and addressed through provisions for healthy foods, physical activity, access to recreation, health care, environmental justice, and safe neighborhoods; and,
- ***Responsible Regionalism:*** Ensures that all local proposals account for, connect with, and support the plans of adjacent jurisdictions and the surrounding region.

The above principles include a wide range of recommended practices, many of which have been used by planners for decades. They are incorporated throughout this manual along with other practices used widely across coastal

For more information about the APA's sustaining places framework see:

- Godschalk, David R. and William R. Anderson. 2012. *Sustaining Places: The Role of the Comprehensive Plan*. Chicago, IL: American Planning Association, Planning Advisory Service.
- Godschalk, David R. and David C. Rouse. 2015. *Sustaining Places: Best Practices for Comprehensive Plans*. Chicago, IL: American Planning Association, Planning Advisory Service. January.

NC and beyond. New Hanover County used the sustaining places framework to organize the development of their comprehensive plan, *Plan NHC* which also addresses the CRC's planning requirements.

General advice regardless of the plan's structure

Regardless of how the plan is structured, there are several strategies that can help a community develop a land use plan that provides a useful framework for local decision making.

Design the plan to be a useful framework for decision-making

The plan should be useful to local decision makers. At a minimum, this requires ensuring the language of goals, objectives, policies, and actions is specific, clear, and concise. The plan needs to be consistent across its different components so policies and actions are not working at cross-purposes. It is also important that implementation responsibility is clearly assigned. Since the plan will be used to make CAMA permit decisions, federal consistency determinations, and Department of Commerce certifications, the policies should be easy to find and apply. The plan should also be incorporated into local budgeting processes and the capital improvement program (CIP).

Provide a coordination mechanism between plans

The plan can coordinate local decision making in different ways. A community may have other plans and policy documents such as a hazard mitigation plan, parks and recreation plan, open space plan, or transportation improvement plan. It is important that those planning documents are updated after the planning process to ensure that their goals, objectives, policies, and recommended actions are consistent with the new plan. This coordination should be addressed in the land use or comprehensive plan's discussion of implementation.

Communities do not exist in a vacuum. It is wise to coordinate the plan's policies with adjoining local, regional, state, or federal plans. Adjacent communities could have plans for development that may have impacts beyond their borders. There may be regional planning organizations (e.g., MPOs, RPOs, and COGs) that have plans identifying regional needs that should be considered when making future land use decisions. There are also several military installations throughout NC's coastal zone. The plan may have to consider development needs that occur as a result of decisions made on those installations (e.g., increase in military population may increase local housing needs). These external coordination efforts need to occur during the development of the plan and then continue into the implementation phase. This helps ensure coordinated decision making as policies and priorities change, new opportunities emerge, and communities work together to confront new challenges.

Present information in a clear and compelling manner

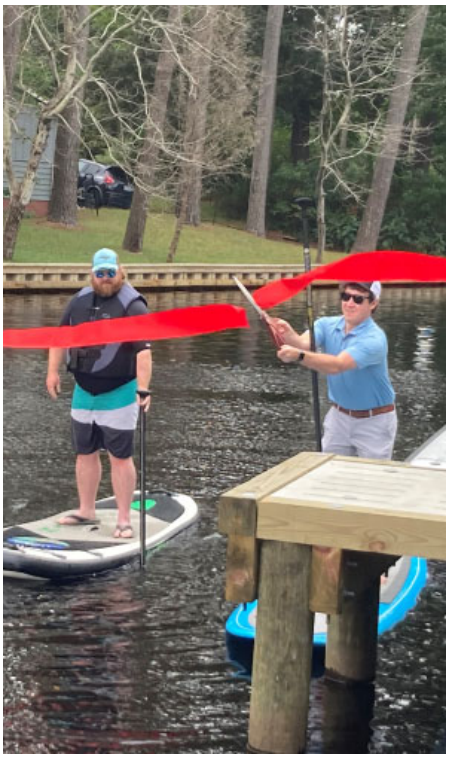
The plan is likely to outlast many local decision makers. Thus, the plan must educate and justify the plan's actions to maintain the support of local decision makers and staff who were not involved in the plan's development. In addition to narrative, the plan should include clear and compelling features such as maps, figures, tables, infographics, and summaries. This will make the information, ideas, and recommendations more interesting, engaging, and understandable to decision makers and the public (Godschalk and Rouse 2015). The plan should also clearly define the actions required during plan implementation using actions, timeframes, responsibilities, funding sources, and provisions for monitoring and updating the plan.

Keep the plan current

Perhaps the best strategy to ensure that a community gets the most out of its investment in the planning process is to keep the plan current during the implementation process. Policies and priorities inevitably change due to changing politics, economics, changing values of citizens, or unexpected threats and opportunities. For example, changes in funding availability or priorities by federal or state agencies could change priorities associated with implementation of a plan.

ENCOURAGING CHANGE BY FOCUSING PLANNING ON IMPLEMENTATION

The plan should be framed in terms of action if it is to provide an effective framework for future decision-making. The focus during plan development should always remain on identifying strategies to implement policies and recommended actions in a manner that achieves the plan's goals and objectives. This requires working directly with the agencies responsible for implementing policies and actions to build support and develop strategies designed to overcome potential barriers to implementation. The potential window for action is short following plan adoption. If the focus drifts from plan implementation, another set of local priorities may take hold and capture the attention of local decision makers.



New improvements on Pettigrew Creek in Cape Carteret implement plan policies to develop public water access.

Investing in planning can enhance plan implementation

One strategy to bridge the gap between planning and implementation is for the planning advisory or steering committee to remain involved and support plan implementation. They can ensure that the policies and recommended actions are adopted in the manner envisioned during the plan's development. They can take the lead in coordinating the actions of implementation agencies and maintain communication between the parties responsible for plan implementation. They can advocate for the resources and support needed to implement policies and recommended actions. They can also grow public support for its goals and objectives. They can also help monitor the plan's implementation over time.

Design the plan to overcome implementation obstacles

Competing values, priorities, and interests can be obstacles to plan implementation. This underscores the need to get buy-in from affected stakeholder groups during the planning and implementation processes to ensure sustained support. Successful implementation also requires coordinating with other governing boards or decision makers during plan development to obtain their buy-in. For example, if the decision makers involved in updating

and approving the community's hazard mitigation plan do not support the changes recommended in a plan, they are unlikely to implement those policy changes. Similarly, the wastewater or water supply systems may have their own governing boards that control investment decisions. Planners need to work with these officials to ensure they support the recommended policy changes and infrastructure improvements recommended in the plan so that development occurs in the desired manner.

Funding creates another practical constraint. Some communities enjoy steady revenue growth punctuated by relatively weak fiscal downturns due to recessions. Others face a constant economic challenge. In either case, it is important to leverage resources whenever possible by coordinating with funders that have similar priorities. The plan should be connected to the capital improvement planning (CIP) and local budgeting processes. The processes used to prioritize investments in facilities and infrastructure should be aligned with the priorities and policies contained in a plan. It is important that plan actions are aligned with budget categories and timeframes so that resources are allocated to support plan implementation.

It is wise to develop knowledge of available funding sources during plan development and to recommend actions that can be funded by known sources. There are limits to what a community can afford in terms of implementation. Many communities will need external funding support and resources to implement some aspects of their plan. Planning staff should work with federal, state, and regional partners during the plan's development to identify opportunities for leveraging resources. Projects can also be leveraged with funding or grants obtained by nongovernmental organizations (e.g., a foundation, nonprofit organization, or university) to implement actions recommended in the plan. If the community needs a bond referendum to support capital investment, such as water, sewers, and facilities, the planning process can be used to help build the requisite public support needed for its passage.

Performance measurement encourages plan implementation

What is measured is often what gets done. In general implementation schedules include action items and identify when each item will be completed. In addition to action items and completion times, a community can also develop a wide range of performance measures used to gauge progress towards the plan's goals and objectives, which may include:

- ***Outcome or effectiveness measures:*** a measure that quantifies the extent to which goals are attained, needs are met, and desired effects are achieved.
- ***Workload or output measures:*** a basic measure of the work performed or service provided.

- ***Unit cost or efficiency measures:*** a more refined version of an output measure that calculates the monetary expense per unit of output.
- ***Productivity measures:*** a measure that combines dimensions of efficiency and effectiveness in a single indicator.
- ***Service quality measures:*** a value-based assessment of management's responsiveness to client needs or expectations.
- ***Citizen satisfaction measures:*** the extent to which citizens feel that their needs have been met by a program (Henry 2004; Imperial 2004; Behn 2003; Ammons 1999)

For example, the City of Norfolk Virginia's *plaNorfolk2030* uses a comprehensive set of performance metrics in conjunction with the goals for their plan's implementation.

Monitoring the implementation of the plan is important for a variety of reasons. It can help determine whether it is time to develop a new plan or may suggest that an element or plan component needs updating. For example, when a local government prepares the required implementation report it will eventually realize that the plan's policies and actions have either all been implemented or that the priorities or local context has changed such that it no longer is guiding local actions. Performance measurement information on local conditions may suggest that there are important new topics or issues that require consideration and possible amendments to a plan.

WHEN IS IT TIME TO DEVELOP A NEW PLAN?

Determining when the useful life of a plan is over is a complicated task. The structure of the plan will factor into this decision. True comprehensive plans often cover a much broader range of issues and are designed to have a longer useful life than a plan designed to comply with the CRC's planning requirements. The level of investment required to develop an entirely new plan in contrast to a substantive update to some outdated portion of an existing plan may also help decide how to proceed. In a rapidly growing community with little developable land, a shorter timeframe between new plans may be appropriate; while in a rural community with a lot of developable land that is experiencing modest or slow growth, a longer timeframe might be more appropriate.

In short, the decision depends, in part, on the community context. It is clearly time for a substantive update or a new plan when the current document no longer provides a useful framework for local decision-making. Indicators that a plan's useful life may be waning include:

- The vision for the community is clearly inconsistent with its current goals.
- The governing body is making frequent updates to the plan so that zoning changes are consistent with the future land use map.
- Implementation reports contain outdated actions that have been completed or are no longer applicable.
- Performance measures demonstrate that progress towards plan's goals and objectives is not being made. Performance measures indicate that the actions identified in the plan are no longer performing well.
- The capital improvement plan and annual budget process are no longer connected to the plan's recommendations.
- Decisions to expand infrastructure and community facilities are no longer guided by the contents of the plan.

- Community priorities have shifted based on significant changes in the community such as the loss or gain of major employers, new highway access, or major flooding events.

The plan's fundamental purpose is to provide a framework for making important community decisions. Once it ceases to be useful, it is time to develop a new plan or make significant updates to the current plan.

Section 1.3

Engaging the Public

TOPICS INCLUDE:

- Why involve the public in planning?
- Developing a public participation strategy
- Invest in authentic public engagement
- How to involve the public

INTRODUCTION

Public participation during plan development is critical to ensure that the community's vision for the future is accurately reflected in the plan. Information gathered through various public engagement strategies provides the basis for the vision and for preferred local policies and actions. A plan with broad public support has a greater likelihood of being implemented. The CRC's planning rules do not address public participation and engagement during plan development, only a public hearing requirement prior to local adoption of a plan. Apart from the public hearing, local planners have the complete freedom to structure public participation in the planning process in a manner that fits their community's needs. For new comprehensive plans or land use plans that are intended to meet the requirements for applying and maintaining zoning under Chapter 160D however, the planning process for the plan shall include opportunities for citizen engagement in plan preparation and adoption.

"There is immense power when a group of people with similar interests gets together to work toward the same goals."

— Idowu Koyenikan

WHY INVOLVE THE PUBLIC IN PLANNING?

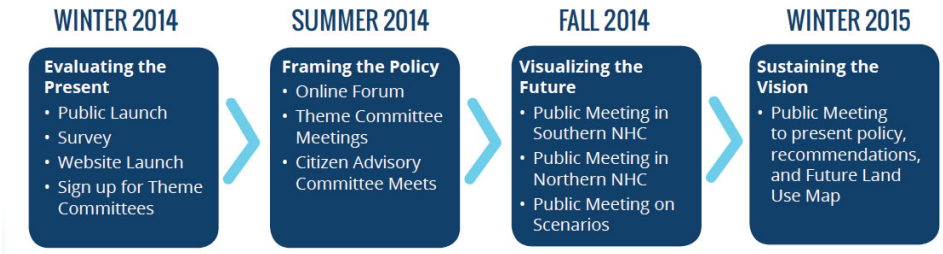
Engaging the public in the comprehensive planning process provides an opportunity to identify residents', property owners', and business owners' vision for their future. Broad-based authentic public participation can lead to a vision that fully captures the future a community sees for itself. It can also provide practical support as planners assess existing conditions because residents often have local knowledge that can supplement state and national data sources such as the US Census and state water quality data. When members of the public participate in plan making to the extent that they feel ownership of the comprehensive plan, the planning process creates buy-in that can be critical when implementation begins. In contrast, planners take a risk if they create a comprehensive plan without public participation because residents, property owners, and business owners who do not understand or support the plan's recommendations may later oppose its adoption and implementation.

DEVELOPING A PUBLIC PARTICIPATION STRATEGY

Prior to officially kicking off a comprehensive planning process, planners and elected officials engage in a phase of work sometimes referred to as "planning to plan." This pre-planning stage is the time to design a public participation strategy for both the initial visioning and the comprehensive planning process. Planners, elected officials, and Planning Board members must consider what level of information sharing or partnership they are seeking from the participatory process, as well as the staff resources available to organize public engagement events. Some communities elect to front-load public participation and focus engagement around identifying community strengths and weaknesses and crafting the broad vision that will then shape the comprehensive plan and future land use map. Other communities choose to build public participation into the full planning process, not only asking for early input but also seeking critiques of the plan and future land use map as they develop. The participatory process behind New Hanover County's *Plan NHC* (2016), shown in the graphic below, is an impressive example of incorporating varied forms of public participation across the phases of plan drafting. For communities seeking more guidance on developing a public participation strategy, the guide *Comprehensive Planning and Citizen Participation*, published by the University of Wisconsin Extension, is an excellent resource that includes an extensive discussion of how and when to engage the public, as well as a worksheet to help local governments define their public participation strategy.

For additional information on public engagement: Comprehensive Planning and Citizen Participation Steven H. Grabow, Mark Hilliker, and Joseph Moskal. 2006. Published by the University of Wisconsin Extension.

Participation Tools for Better Community Planning Dave Davis et al. 2013. Published by the California Local Government Commission.



New Hanover County's comprehensive planning process from Plan NHC (2016)

INVEST IN AUTHENTIC PUBLIC ENGAGEMENT

Investing in public engagement is one way to maximize the plan's impact because participants will feel ownership of the resulting plan and are more likely to support implementation. A variety of practices help achieve authentic participation:

- Engage stakeholders at all stages of the planning process;
- Seek diverse participation;
- Promote leadership development, particularly in disadvantaged communities;
- Provide understandable information for all participants;

- Use a variety of communication channels to inform and involve the community; and,
- Continue to engage the public after the plan is adopted (Godschalk and Rouse 2015).

An authentic participation process requires the exchange of information between the public and decision makers. The first step in an information exchange is ensuring that the information provided by planners is understandable for all participants as well as the general public. This requires producing information in multiple formats and possibly different languages. It may also require providing information to constituents with different knowledge levels. There are also a multitude of communication channels available ranging from social media, traditional media, and internet-based platforms, all of which can be used to reach different constituencies. (Godschalk and Rouse 2015).

Information exchange also requires forums where the public has the opportunity to communicate their opinions and needs to planners. Stakeholders should be involved throughout the process from identifying the community concerns and aspirations and crafting the vision statement to the development of the plan's goals, objectives, policies, and recommended actions. They should also be involved, to the extent practicable, when implementing the plan and evaluating the extent to which these efforts are effective. The engagement of stakeholders ensures that the resulting plan and its vision for future land use stays true to the community's core values. It also ensures that the community and its elected officials are fully invested in the plan's implementation (Godschalk and Rouse 2015).

Finally, authentic participation requires diverse participation in the process from participants across age ranges, ethnic groups, racial groups, and income ranges in addition to the stakeholders associated with important issues within the community. It is also especially important to reach out specifically to those who often do not have a voice or feel excluded from the process. The participation process also creates an opportunity for cultivating new community leaders, including those in diverse communities (Godschalk and Rouse 2015).

Tools and guidance to help with stakeholder engagement:

Planning with Diverse Communities (2019). APS PAS Report 593.

Introduction to Stakeholder Participation. 2015. NOAA Office for Coastal Management, provides guidance on stakeholder identification and outlines the various methods and roadblocks of stakeholder participation.]

All-American Conversation Toolkit. 2017. National Civic League.

The *Community Tool Box* developed by the Center for Community Health and Development at the University of Kansas offers a comprehensive look at how to foster successful community engagement and planning.

The *Climate Ready Communities: A Practical Guide to Building Climate Resilience* (2019) developed by the Geos Institute explores community engagement in relation to resilience planning.

HOW TO INVOLVE THE PUBLIC

There are a wide range of techniques for public engagement in community planning and these choices impact the planning process in different ways. Ideally, the goal of engaging the public, such as informing residents about a draft plan, is matched to the appropriate engagement technique, such as an open house. The public participation strategy should be designed before the planning process begins in order to create the intended relationship between local government, stakeholders, and residents. For example, a community survey is a great tool for consulting residents and business owners, but a survey alone won't lead to collaborative decision making. This section provides

a brief overview of common methods of engaging the public in creating comprehensive plans.

Forming an advisory or steering committee to oversee the planning process is considered to be a best practice in comprehensive planning. Advisory committees have several major advantages as a public participation strategy. First, they provide a forum for education and working through differences of opinion that could stall implementation if not addressed during the planning process. Bringing local experts and knowledgeable stakeholders together for monthly meetings also expands the technical capacity of local government staff and gives planning consultants a source for local knowledge. An advisory committee typically meets on a monthly basis for the duration of the planning process and is supported by a staff planner. Some communities also form sub-committees or technical committees that focus on specific elements of the comprehensive plan. Members of these committees are typically either experts in the topic area or have a strong personal interest in the topic. New Hanover County took this approach when drafting the *Plan NHC* (2016) by forming a Citizen Advisory Committee and six theme committees. The committees focused on the major themes of the plan, such as livable built environment and resilient economy.

Dot survey partial image from the Town of Swansboro

Surveys are another common public engagement strategy. While surveys do not feature an opportunity for deliberation or education, they are an excellent way to gauge preferences and identify problems in an early stage of the planning process. Surveys can also gauge the level of public support for policy proposals that planners are considering further into the planning process. Most communities choose to make their survey available online and on paper to ensure that individuals without internet access can participate. In coastal North Carolina some communities reach out not only to residents and business owners, but also to summer visitors and non-resident property owners. One of the larger challenges of surveying is ensuring that the responses capture a representative cross-section of the community. Ideally, the survey is distributed to every household via a mailing from the local government, such as with the water bill.

Some residents are unwilling to commit to monthly advisory committee meetings over the course of a year or 18 months but would like to be more engaged in the planning process than simply filling out a survey. Community workshops are one way to engage these individuals and provide a greater opportunity for deliberation and education than a survey. Early in the planning process is the right time for workshops in which residents are asked for input that will lead to the vision statement which in turn shapes the comprehensive plan. For example, at a *Town of Wallace Land Use Plan: 2011-2030* workshop, attendees participated in four activities designed to gather input early in the planning process. The activities included a SWOT analysis identifying strengths,

weaknesses, opportunities, and threats; a discussion of desired improvements to infrastructure, community services, and land use planning; a visual preference survey; and a map of favorite and least favorite places in the town.

Community workshops may not provide enough information on specific topics to move forward with the planning process. Planners often use key stakeholder interviews and topical focus groups to expand the level of detail gathered through the participatory process. The Town of Burgaw began the *Burgaw 2030* public engagement process with an issue identification session at a Planning Board meeting followed by a visual preference survey at a subsequent Planning Board meeting and a community-wide survey. To gather more detailed information on topics covered in the comprehensive plan, town planners also held a series of focus groups covering eight of the plan's policy areas as well as stakeholder and expert interviews. The focus group topics included agriculture and forestry, parks and recreation, environment, economic development, youth development, transportation, public health and safety, and housing.

A charrette is a way to engage the public while also making a significant amount of progress on developing the plan in a short period of time. A charrette is an intensive workshop where the planning team, citizens, and public officials work together over a multi-day period in an interactive fashion to find a solution that has support from all parties. For example, the NC Department of Transportation held a three-day design charrette in the Mecklenburg County town of Matthews to design "complete-street" improvements to a 6.5-mile stretch of East John Street-Old Monroe Road in 2017. Over the three-day period, the public was invited to eleven different presentations and meetings ranging from an opening workshop to identify "hot spots" on the corridor to smaller meetings on topics like access management and community concerns. Charrettes are resource intensive endeavors best suited to a community working with a planning consultant to develop its comprehensive plan. Despite this limitation, charrettes can be a useful approach to addressing complex or controversial problems where traditional forms of public involvement are insufficient to develop solutions that have broad support among affected stakeholders. The Town of Leland held a weeklong charrette in 2015 while developing the *Leland 2020 Master Plan*.

Public engagement in unusual settings can broaden the range of participants in the process. For example, Wilmington planners met with both college and high school students during the *Create Wilmington* planning process in 2016 to discuss their opinions on aspects of the physical environment that should be improved. Wilmington planners also organized a Planning on Tap night with seven simultaneous meetings at local bars to discuss each of the plan's major themes. The goal of these meetings was to "engage people where they are already gathering" as a complement to a range of more traditional public

engagement techniques designed to reach both stakeholders and community leaders, as well as a cross-section of residents who are less engaged in planning decisions.

Project websites are an increasingly common way to provide access to the planning process for individuals who cannot or will not attend in-person events. While many communities choose to host the project website as a page within the local government's website, a stand-alone website for the project may generate more traffic. New Hanover County created a project website for *Plan NHC* which included traditional information such as meeting minutes, streaming video of meetings, and drafts of the plan; but also featured a community photo contest and children's art related to the project. Non-traditional aspects of the website like the photo contest are an opportunity to draw residents to the site who might then stay to learn and about the planning process. Additionally, a community's existing social media presence, such as its Facebook page and Twitter account, can attract residents to the project website or feature announcements and updates on the planning process.

Student engagement activity on Morehead City's land use plan held at West Carteret High School

Public engagement can also be useful in later phases of the planning process. Community workshops further into the planning process are an opportunity to get feedback on specific proposals and policies that may be included in the plan and the future land use map. Workshops can also be used near the end of the planning process to help prioritize strategies and recommended actions. This information is often very useful in developing a timeline for implementation efforts as well. Toward the end of the planning process, an open house is an appropriate choice, rather than a community workshop. At an open house professional staff and advisory committee members share the plan with the public and answer questions. The goal of an open house is typically to inform the public and build support for the plan. The Town of Sunset Beach held an open house toward the end of the analysis phase of drafting its 2010 comprehensive plan and invited residents to "assess trends, find out about their community, and to express support or recommend adjustments" (p. 194) while meeting the planning team in an informal setting.

GETTING MORE OUT OF YOUR PLAN

An extensive public participation process can be time and resource intensive, but this investment can generate many returns. Public participation early in the planning process can lead to a vision statement that fully captures the community's hopes and dreams for its future. Early participation can also provide local knowledge that planners working in a large geographic area will have trouble gathering on their own. Public engagement that continues into plan creation can ensure that planners have identified policies that are true to the vision statement while also building political support for these policies. Political support is critical when adopting land use regulations that implement

the comprehensive plan and future land use map, such as updates to the zoning code and subdivision regulations. Finally, public engagement can have an even larger impact on moving implementation forward if it spans both planning and implementation. Citizen advisory committees related to comprehensive planning efforts are often framed as a 12 or 18-month commitment for members. If this opportunity is instead framed as an ongoing commitment to a committee that will continue meeting after the plan is adopted, planners can capitalize on the political support generated during the planning process to encourage a sustained focus on implementation.

Public engagement meeting, Sunset Beach, NC

Section 2

Developing a CAMA Land Use Plan

INCLUDES:

Section 2.1
North Carolina's Coastal Area Management Act (CAMA)

Section 2.2
Analyzing Existing and Emerging Conditions

Section 2.3
Creating a Vision for the Future

Section 2.4
Managing Future Development

Section 2.5
Plan Certification

Section 2.1

North Carolina's Coastal Area Management Act (CAMA)

TOPICS INCLUDE:

- The history of CAMA
- CAMA's permitting program
- CAMA's land use planning program
- A summary of CAMA's planning requirements

INTRODUCTION

Coastal North Carolina boasts over 320 miles of ocean shoreline and more than 10,000 miles of estuarine shoreline. It is home to 10 percent of the state's population and more than a half million people visit the coast's attractions and state and national parks each summer. In the 1970's it became clear that the coast's fragile natural resources could be "loved to death" if development was not carefully managed. The North Carolina Coastal Area Management Act (CAMA), passed in 1974, responded to this threat by creating a partnership between local and state government to manage land development with the goal of preserving the coast's unique natural resources. The land use plans discussed in this manual are one aspect of this partnership. Since its inception, implementation of the CAMA has been responsible for:

- A development permitting program that minimizes impacts to Areas of Environmental Concern (AECs)
- Protecting life and property through the use of set-backs and other oceanfront development policies
- Awarding of more than $47 million to establish 451 public access sites along NC's coast;
- Research and the development of mapping tools that help state and local officials make better land use decisions
- Developing county and municipal land use plans, covering 118 local governments

"In the implementation of the coastal area management plan, the public's opportunity to enjoy the physical, esthetic, cultural, and recreational qualities of the natural shorelines of the State shall be preserved to the greatest extent feasible; water resources shall be managed in order to preserve and enhance water quality and to provide optimum utilization of water resources; land resources shall be managed in order to guide growth and development and to minimize damage to the natural environment; and private property rights shall be preserved in accord with the Constitution of this State and of the United States." — *from the Coastal Area Management Act §113A-102 (a).*

In addition, local implementation of CAMA land use plans has led to the expansion of public access facilities and boat ramps, improved the management of stormwater, identified the need for sufficient capacity in water supply and wastewater treatment systems, protected groundwater supplies, preserved open space, and expanded recreational facilities. Local governments also issued countless building permits, subdivision approval, and zoning decisions in accordance with policies contained in CAMA land use plans. Collectively, these efforts demonstrate that development need not occur at the expense of environmental protection.

This section provides a brief history of CAMA, its purposes, and notes some of the ways it has changed over time. It also briefly describes CAMA's permitting program and an overview of the planning requirements.

CAMA Counties

Beaufort
Bertie
Brunswick
Camden
Carteret
Chowan
Craven
Currituck
Dare
Gates
Hertford
Hyde
New Hanover
Onslow
Pamlico
Pasquotank
Pender
Perquimans
Tyrrell
Washington

A BRIEF HISTORY OF CAMA

By the late 1960s, there was increasing concern about the quickening pace of development along NC's coast, which was comprised of many small, rural communities and barrier islands. The initial legislative response to manage the impacts on coastal resources was passage of NC's Dredge and Fill statute in 1969 and the Coastal Wetlands Act in 1971, both of which worked to slow the alteration and destruction of salt marshes for development purposes.

At about the same time, interest in protecting the environment led to passage of a wide range of new environmental laws at the federal level including the Coastal Zone Management Act (CZMA) in 1972. This new federal program was designed to address many of the problems that states such as NC were experiencing due to increasing development in sensitive coastal areas. Administered by the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce, it is a voluntary program with two incentives for participation: (1) funding for state program development and implementation; and (2) the authority to review a wide range of federal activities, development projects, and license and permit activities to ensure they are consistent with a state's approved coastal management program (CMP). The CZMA's goal is to *"preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations"* (16 U.S.C. § 1452 (1).

Many of the same political forces and dynamics that drove passage of federal coastal management legislation led to the development of North Carolina's Coastal Area Management Act (CAMA) in 1974. While the final version of the Act passed with bipartisan support, it was subject to one of the most intense debates of any environmental bill in the state's history (Owens 1985; DeGrove 1984). One of the important arguments that contributed to the passage of CAMA was the intent to participate in the federal coastal zone management program, particularly to gain federal consistency authority (DeGrove 1984) while other arguments largely focused on growing concerns about the impacts of poorly planned development. However, the passage of CAMA was not the result of a great outpouring of public concern or the result of a grass roots movement as it was in other coastal states. Rather, it was mostly the product of a political process involving state and local decision makers. The legislature created a 25-member Comprehensive Estuarine Plan Blue Ribbon Committee in 1971 to review different proposals for a coastal management bill (DeGrove 1984). Early proposals focused primarily on the state level and left the local governments entirely out of the process. Local governments pushed back and opposed this approach. Subsequent versions of the bill then focused on finding ways to give local governments a stronger role in the process. Accordingly, much of the political conflict surrounding the act focused on finding the right balance of state-local control in terms of land use planning and composition of its administrative body, the Coastal Resources Commission (CRC) (DeGrove 1984). Compromises in the legislative process resulted in the basis for a strong program that has survived for more than 40 years due to an emphasis on a state and local partnership.

NORTH CAROLINA'S COASTAL AREA MANAGEMENT ACT (CAMA)

The CAMA strikes a balance that protects, preserves, and provides for the orderly development and management of the state's coastal areas (DeGrove 1984, Owens 1991). In 1978 NOAA approved North Carolina's coastal management program (CMP) and the NC Supreme Court affirmed CAMA's constitutionality. The jurisdiction of CAMA covers the 20 coastal counties, as well as the cities and towns within the coastal counties.

With a jurisdiction covering the 20 coastal counties, state and local governments share implementation power under CAMA, which also uses a citizen commission, the Coastal Resources Commission (CRC), to set policy decisions rather than professional staff. The CRC consists of 13 members appointed by the Governor, Speaker of the House, and the Senate President Pro Tempore. Eleven of the 13 members must have experience in a particular area of expertise (land development, coastal engineering, marine science, local government, coastal agriculture or forestry, sports fishing, commercial fishing, coastal-related business, or wildlife). Two members may be "at-large". The Division of Coastal Management (DCM) provides the staff support to the CRC, implements its rules, and issues development permits. Also established under the CAMA is the Coastal Resources Advisory Council (CRAC), a 20-member group that provides the CRC with local government perspectives and advice.

In addition to its permitting program, the CRC and DCM staff oversee grant programs for public beach and coastal waterfront access, local planning and management projects, and marine sewage pumpout stations. The program also oversees a natural area management program (NC Coastal Reserve Program) focusing on public outreach and education, as well as research on topics affecting coastal areas.

CAMA's permitting program

CAMA's permitting program adopted its initial development standards in 1977 and DCM began issuing development permits in 1978. While the standards continue to evolve, a CAMA permit is required for all development that is in or affects an Area of Environmental Concern (AEC) established by the CRC. The CAMA land use plan plays a central role in this permitting process, as DCM staff will not issue a permit for a development proposal that is inconsistent with the plan's policies or future land use map.

AECs are areas of importance that are protected from uncontrolled development that can cause irreversible damage to public health, safety, or welfare or adversely affect the environment. There are four categories of AECs:

For more information on the federal Coastal Zone Management Program see:

The NOAA National Coastal Zone Management Program *website*.

Coastal Zone Management (PAS Report Number 581). Elizabeth Felter and Marya Morris, AICP. 2016. Published by the American Planning Association.

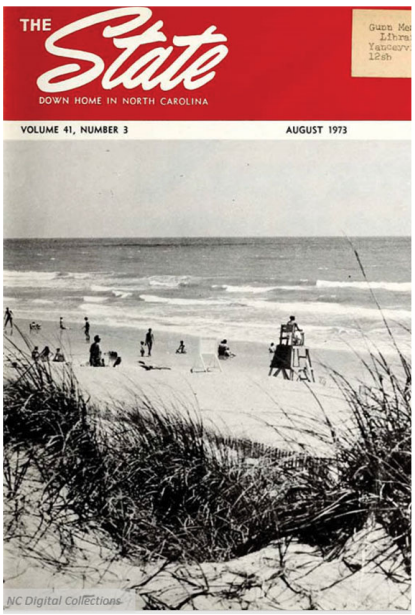


Image Source: NC Digital Collections

- Estuarine and Ocean System
- Ocean Hazard System
- Public Water Supplies
- Natural and Cultural Resource Areas

The Estuarine and Ocean System AEC has four components: Public Trust Areas, Estuarine Waters, Coastal Shorelines, and Coastal Wetlands. The Ocean Hazard System AEC includes: Ocean Erodible AEC, the Inlet Hazard AEC, and, the Unvegetated Beach Area AEC. Public Water Supply AECs include: Small Surface Water Supply Watershed AEC and Public Water Supply Well Field AEC. There are four types of natural and cultural resource AECs: Coastal Complex Natural Areas, Coastal Areas that Sustain Remnant Species, Unique Coastal Geologic Formations, and Significant Coastal Archaeological Resources (see Section 2.2 for definitions of the AECs). The CRC has development rules for each AEC category and specific types of projects (e.g., beach nourishment, boat ramps, bulkheads and estuarine shoreline stabilization, docks, marinas, etc.).

For more information on DCM's permitting see their *website.*

DCM issues three types of CAMA permits: Major, General and Minor. Major Permits require the review of nine state agencies and four federal agencies. Major Permits are required when a project involves development in an AEC and any of the following conditions apply:

- Another federal or state permit, license, or authorization such as dredging and filling, wetlands fill, storm water management, sedimentation control, wastewater discharge, or mining is required
- Excavation or drilling for natural resources on land or under water
- Construction of one or more buildings that cover more than 60,000 square feet on a single parcel of land
- Alteration of more than 20 acres of land or water
- When a request exceeds the development allowed under a General or a Minor Permit

As general guidance, a Major Permit is required if there is any dredging or filling of water or wetlands. General Permits are used for routine projects that usually pose little to no threat to the environment. Minor Permits are required for projects such as single-family homes that are not subject to General or Major Permits. DCM staff issue Major Permits and General Permits. A Local Permit Officer (LPO), who is typically a local government employee (e.g., building inspector, zoning administrator, or planner) trained by DCM administers Minor Permits in their locality. DCM staff issue Minor Permits for local governments that do not have an LPO. In addition to complying with CRC development standards, CAMA Permits are required to be consistent with the local, state certified land use plan and local development regulations.

On-site review being conducted by a DCM Field Representative

CAMA's land use planning program

The Division of Coastal Management's land use planning program is an integral part of the state's coastal management strategy. A land use plan is required for all 20 coastal counties and is to be developed in accordance with CRC planning requirements (*15A NCAC 07B*). Municipalities are not required to develop a land use plan, however, they can prepare a plan provided that the county delegates this authority or the CRC grants the authority based upon a written request demonstrating that the municipality enforces a zoning ordinance, subdivision regulations, and state building code within its jurisdiction.

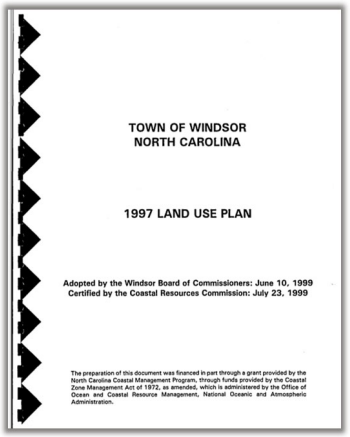
Prior to CAMA's passage in 1974, local governments in the coastal area were not very active in terms of having land use or environmental control programs (DeGrove 1984). The CRC began promulgating the initial planning guidelines in 1974, which were further revised in 1978 to add a focus on policy. By January 1985, all 20 coastal counties had updated their plans along with 55 municipalities (Owens 1985, 323). Today, all 20 counties have certified plans and more than 40 cities and towns have certified plans, many of which have updated their plans four or more times. Others have chosen to create joint plans with their county and/or neighboring jurisdictions. Cities or towns not preparing their own plan are covered by their county's plan.

As with its development standards, the CRC planning requirements have evolved over time, with the most recent changes occurring in 2016. Over the last 40 years, local capacity and expertise in terms of land use planning and environmental protection have improved considerably and the quality of land use plans has improved with each update. The 2016 changes provide greater flexibility to encourage local governments to incorporate the CRC land use plan requirements within a broader comprehensive plan.

One of the important changes in the 2016 CRC's land use planning requirement was clarification that updating CAMA land use plans is voluntary. This change recognized that some communities choose to make small updates to their CAMA plans on a more frequent basis to extend the life of their plans while others prefer longer cycles since they incorporate the CRC's planning requirements into a comprehensive plan that takes longer to prepare.

In 2017, the North Carolina General Assembly amended the CAMA to allow the CRC to delegate authority for plan certification to the DCM director, further streamlining the plan certification and amendment process which resulted in increased efficiency.

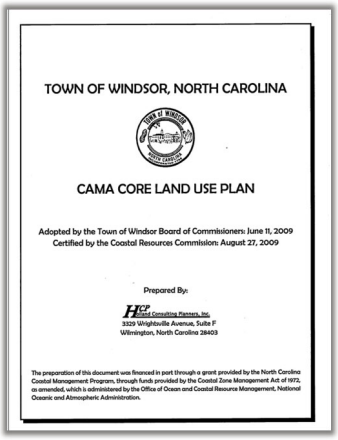
The most recent Town of Windsor plans were prepared between 1997 and 2018.


TOWN OF WINDSOR
NORTH CAROLINA

1997 LAND USE PLAN

Adopted by the Windsor Board of Commissioners: June 10, 1999
Certified by the Coastal Resources Commission: July 23, 1999

The preparation of this document was financed in part through a grant provided by the North Carolina Coastal Management Program, through funds provided by the Coastal Zone Management Act of 1972, as amended, which is administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration.


TOWN OF WINDSOR, NORTH CAROLINA

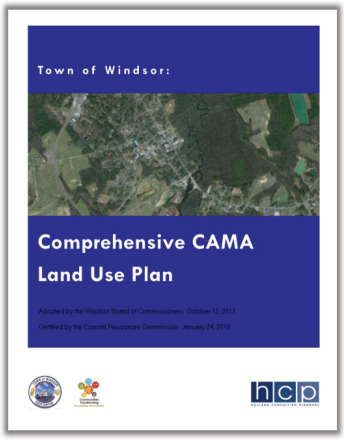
CAMA CORE LAND USE PLAN

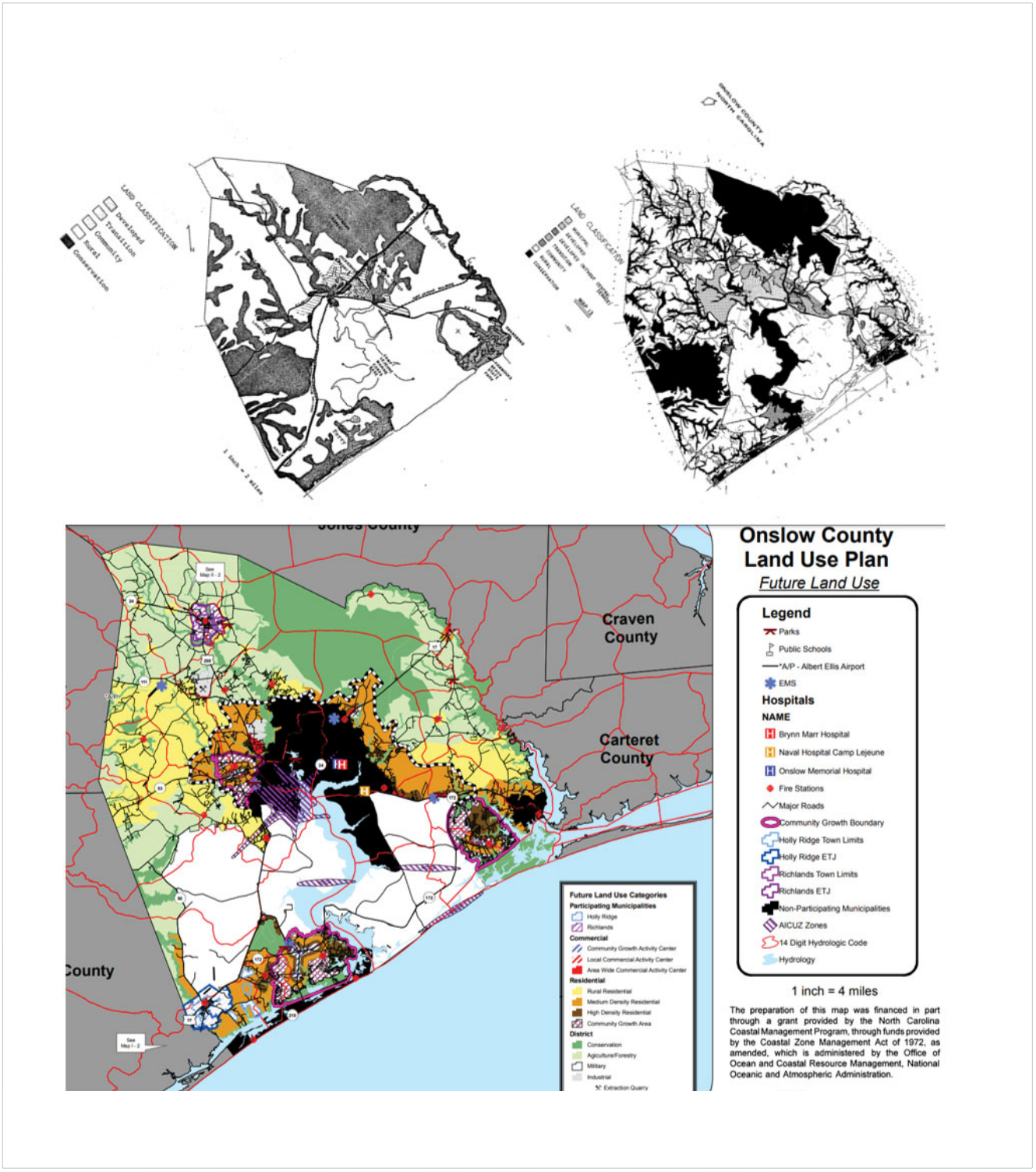
Adopted by the Town of Windsor Board of Commissioners: June 11, 2009
Certified by the Coastal Resources Commission: August 27, 2009

Prepared By:

3329 Wrightsville Avenue, Suite F
Wilmington, North Carolina 28403

The preparation of this document was financed in part through a grant provided by the North Carolina Coastal Management Program, through funds provided by the Coastal Zone Management Act of 1972, as amended, which is administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration.





Comparison of the Onslow County future land use maps from the 1976, 1981 and 2009 CAMA land use plans.

A SUMMARY OF THE CRC'S PLANNING REQUIREMENTS

Local governments have a great deal of flexibility in terms of how they develop and organize their land use plan or comprehensive plan but the requirements do specify certain information, analyses, maps, and topics that must be included. Every plan must include a completed Matrix for Land Use Plan Elements (contained in Appendix B) that identifies where each of the required plan components are addressed in the planning document. This matrix is extremely important during the initial stages of plan review by DCM staff and serves as a quick reference for noting CRC required items in the plan.

Section 2.2 describes the requirements for analyzing the existing and emerging conditions and data and trends associated with:

- Population, housing, and economy
- Natural systems
- Existing land use and development
- Community facilities (includes public and private water supply and waste water systems, transportation systems, and storm water systems)

Some of these topics require maps in addition to a description and an analysis of trends. This information is used to identify planning issues and support the development of policies and recommended actions included in the land use plan.

Section 2.3 describes the CRC's planning requirements related to community concerns, aspirations, and planning needs. The description of key issues must address the CRC's five required management topics – public access, land use compatibility, infrastructure carrying capacity, natural hazard areas, and water quality – and may also include local areas or topics of concern. The plan must also include a community vision that describes the general physical appearance and form that represents the plan for the future.

Section 2.4 focuses on the requirements that a plan includes policies, a future land use map, and implementation actions designed to achieve the CRC's five management goals for public access, land use compatibility, infrastructure carrying capacity, natural hazard areas, and water quality.

Section 2.5 describes the approval and certification process for a plan or plan amendment. It also describes the implications of a state certified plan in terms of local, state, and federal actions. A flow chart summarizing the certification process and templates that a local government can use as part of the approval process are contained in Appendix C.

Section 2.2

Analyzing Existing and Emerging Conditions

TOPICS INCLUDE:

- Analysis of population, housing, and economy
- Natural systems analysis
- Analyzing existing land use and development
- Analyzing community facilities and infrastructure

INTRODUCTION

Planning is a data driven enterprise. One of the first steps in the planning process is to collect data related to existing and emerging conditions in order to identify trends that suggest potential problems facing the community, as well as opportunities for growth or improved quality of life. This information helps planners identify the community aspirations and concerns or the land use and development topics most important to the future of the planning area. It also helps planners and the public develop a vision statement grounded in a shared understanding of existing and emerging conditions. The analysis of existing and emerging conditions also provides information to develop policies related to the five required management topics: public access, land use compatibility, water quality, infrastructure carrying capacity, and natural hazard areas. Data on the community's current conditions as well as long-term trends also supports making informed decisions about the topics addressed in the plan. Finally, this information is used to provide a justification for the plan's policies and recommended actions.

"… everything has a past - a person, an object, a word, everything. If you don't know the past, you can't understand the present and plan properly for the future"

— Chaim Potok

This chapter describes the Coastal Resources Commission's (CRC's) planning rule requirements in terms of the information, analysis, and maps that must be included in a plan in order for it to qualify for CRC certification. It identifies sources to collect these data and other internet-based resources to comply with the requirements. Subsequent sections of this document identify areas where planners can collect additional data related to planning topics beyond those required by the CRC's rules.

ANALYSIS OF POPULATION, HOUSING, AND ECONOMY

Preparing a CAMA plan requires understanding the existing conditions and trends related to a community's population, housing, and local economy. Planners need to consult a wide range of data sources to complete this analysis. The data needed to satisfy each requirement are available on a number

of websites that are hyperlinked throughout the manual. Understanding a community's changing population demographics, housing, and economic situation is important because all three serve as important drivers for future land use needs.

While planners may want to examine a wide range of information related to the community's population, housing, and economy, the CRC's planning rules specifically require the following descriptions and analysis in the plan:

- Permanent population growth trends using data from the two most decennial Censuses;
- Current permanent and seasonal population estimates;
- Key population characteristics including age and income;
- Thirty-year projections of permanent and seasonal population in five-year increments;
- Estimate of current housing stock, including permanent and seasonal units, tenure, and types of units (single-family, multi-family, and manufactured); and
- Description of employment by major sectors and community economic activity.

While not a specific CRC planning requirement, it is recommended that the community describes these data, trends, and projections using clear and compelling maps, tables, graphics, and summaries to present this information in a manner that is understandable to the public and decision makers (Godschalk and Rouse 2015).

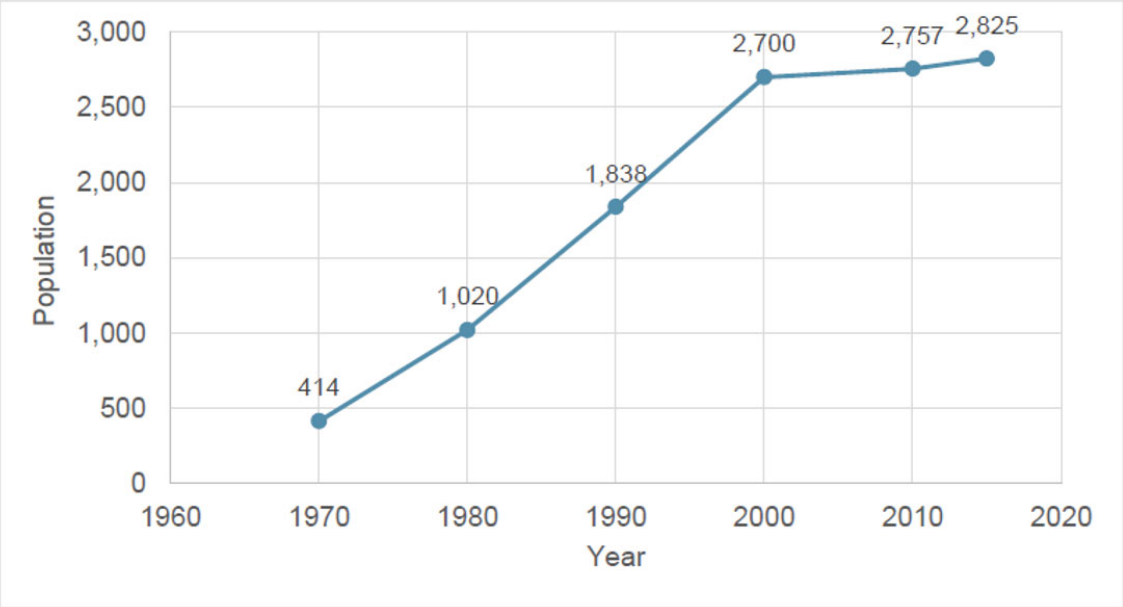
Permanent population growth trends

Understanding trends in the permanent population's growth (or decline) provides local context and identifies potential issues that should be considered during the planning process. For example, the rate of population growth influences housing and infrastructure needs. CRC planning rules require each plan to describe population growth trends from the two most recent decennial censuses. Population data is readily available from the *U.S. Census* and the *NC Office of State Budget and Management*. *Log Into North Carolina* is an integrated data portal that also includes population data.

U.S. Census Data

The *U.S. Census website* has data needed to analyze population, housing, and the local economy. It can also be used to make estimates for municipalities and extraterritorial jurisdiction (ETJ) areas. Popular facts can be viewed by state, county, city, town or zip code using *American Fact Finder*. The *American Community Survey* and *annual planning database* may also be helpful in the development of a plan.

Figure 2: Nags Head Permanent Population, 1970-2015



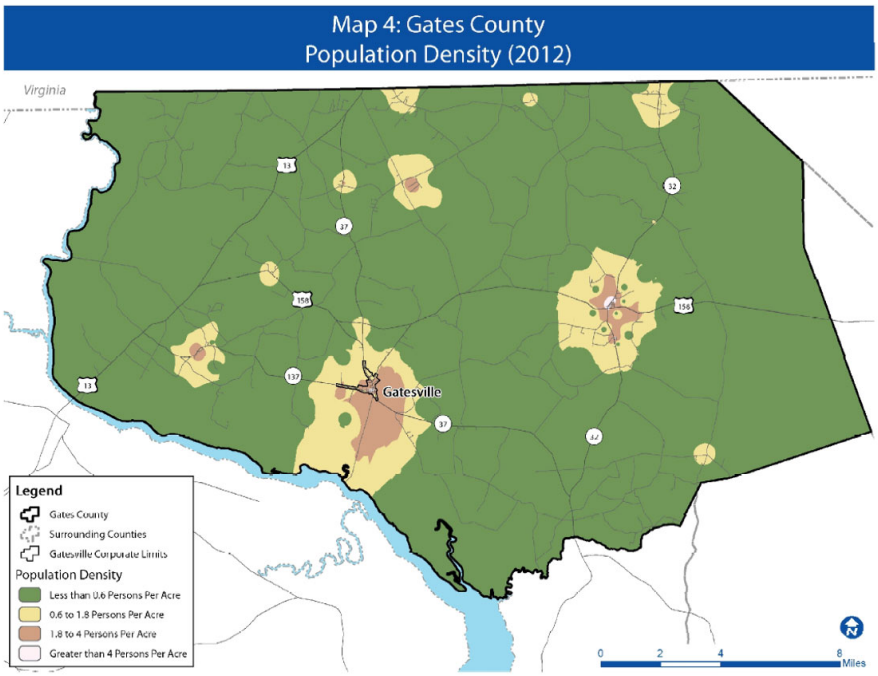
Source: US Census Data

Town of Nags Head Permanent Population 1970 - 2015
from the Town of Nags Head Comprehensive & CAMA Land Use Plan (2022)

While not required by CRC's planning rules, it is often useful to extend population data to cover longer periods to better understand trends. It is also useful to illustrate trends graphically and to compare trends to other jurisdictions. For example, the *Gates County Comprehensive Plan* (2016, pp. 2-1 – 2-5) extends the time period of census data back to 1980, includes population data for surrounding jurisdictions and the state, and uses tables and color maps to convey population information.

Questions to consider when analyzing population growth data include:

- Is the community experiencing growth or decline in population?
- What factors appear to influence population changes?
- How does the growth rate compare to other communities and regions within the state?
- Has the permanent population changed over time due to annexation?
- Is population change distributed uniformly throughout the planning area? What are the growth areas in the planning area?
- Is population growing or declining faster in incorporated or unincorporated areas?



Gates County Population Density in 2012
from the Gates County Comprehensive Plan (2017)

Permanent and seasonal population estimates

The CRC's planning rules require each plan to include estimates of the current permanent and seasonal populations. Current county and municipal permanent population data is available from the *North Carolina Office of State Budget and Management* (OSBM). These data may need to be adjusted to account for extra-territorial planning (ETJ) jurisdictions. *Census data* should be used to make these adjustments and estimate population in smaller communities.

While permanent residents generally reside within in the planning area, seasonal residents include those who reside in the planning area for a period of time during the community's "season", which is usually less than six months. They are primarily comprised of people who own or rent second homes. Seasonal housing units are defined by the U.S. Census Bureau as: "vacant units used or intended for use only in certain seasons or for weekends or other occasional use throughout the year. Seasonal units include those used for summer or winter sports or recreation, such as beach cottages and hunting cabins. Seasonal units also may include quarters for migrant workers. Interval ownership units, sometimes called shared-ownership or time-sharing condominiums, also are included here."

Estimates of seasonal population include tourists who visit for relatively short periods or just for the day (e.g., beachgoer, shopper, etc.), stay with friends

An extra-territorial planning (ETJ) jurisdiction is an area adjacent to a municipality where it can apply its territorial authority. Establishing an ETJ is an important planning tool for managing land use because it allows a jurisdiction to extend its zoning authority to areas adjacent to its territorial boundary. See the UNC School of Government's *website on ETJs* for more information.

and family, and occupy hotels/motels. Understanding the dynamics and size of the seasonal population is important as these visitors place additional burdens on the local infrastructure and community services.

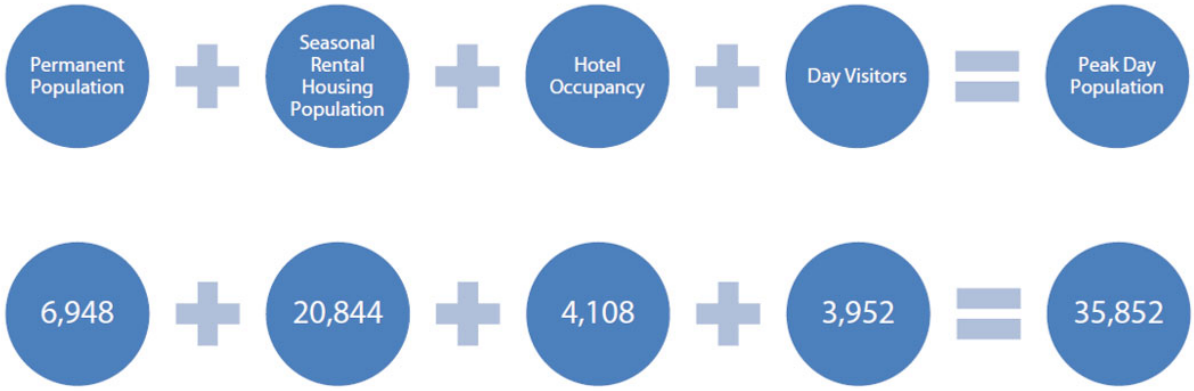
Estimating Seasonal Population

Estimating seasonal population levels is inherently less precise because data gathered during the decennial census only counts and measures characteristics of the permanent population. Seasonal population is transitory and varies on a day-to-day basis. It will also vary to some extent on a year-to-year basis due to economic fluctuations, weather, and other factors that affect travel behavior and second home use. Thus, planners need to not only estimate seasonal population, but also examine the impacts that different assumptions have on these estimates.

There are direct and indirect methods for preparing seasonal population estimates. The direct approach uses census data for the permanent population (e.g., number of persons per permanent dwelling unit) to estimate the potential seasonal housing population by making data driven assumptions about occupancy levels (i.e., number of people per unit) and rates (i.e., percentage of use during different time periods) for seasonal housing units. It may also be necessary to use different calculations for different geographic areas within the community. Likewise, once the number of hotel/motel rooms is determined, similar estimates of the transient population can be derived using reasonable estimates of occupancy levels and rates. The number of available parking spaces can be used to make estimates of the potential beach visitors or day-trippers as well as assumptions about the average vehicle occupancy rate. The occupancy rates and levels are important assumptions that a planner makes as they impact seasonal population estimates. Information is often available to make reasonable assumptions by administering surveys or looking for survey data collected from other sources such as visitor or tourist bureaus, real-estate professionals, and hotel operators. These estimates can also be improved using GIS data noting the locations of seasonal housing units and hotel/motel rooms to make different assumptions about the occupancy levels and rates across the planning area based on the location of these units.

Planners should avoid the tendency to overestimate seasonal population because the estimates are used to make future population projections, which in turn may lead decision makers to make faulty decisions related to the allocation of future land uses and lead to unnecessary investments in infrastructure or other community services. Rarely are there 100 percent occupancy rates during the peak season (60 – 70 percent may still be too high) and the average occupancy level should not assume that huge families or groups of visitors occupy every available room or rental unit (some studies of seasonal population find occupancy levels averaging between 3 and 4 people per occupied unit). The *2011 Regional Land Use Plan* for New Bern, River Bend, and Trent Woods provides a good example of reasonably estimating seasonal population by determining average hotel occupancy rates, and the number of individuals per room. It then goes a step further by analyzing the economic impact by noting the average going rate for renting a room (p. 8). Despite these challenges, the advantage of the direct method is that it is defensible if assumptions that underlie the estimates are reasonable. A sensitivity analysis varies assumptions to explore the resulting estimates based on those choices. It allows planners to ask "what if" some assumption is different. For example, planners can develop high and low estimates of seasonal populations by using different occupancy rates to better understand how changes in this assumption produces a different estimate. Information from the indirect method combined with data provided from a sensitivity analysis can also help refine the assumptions used in the seasonal population estimate.

The indirect approach uses other factors that are symptomatic of changes in the population to estimate changes in population size such as variations in the use of electricity, water, or wastewater. For example, if the planning area is served by a public water system, the changes between the off-season and peak-season water usage rates are likely to reflect the change in population. Once changes in water use are adjusted to account for differences in individual seasonal water use (i.e., irrigation use in the summer), an estimate of increased population can be obtained by using a per person water usage rate and dividing it by the volume of additional water used. If you only have monthly or weekly water usage information, simple algebraic formulas can create weekday and weekend estimates for the seasonal peak population. While this approach may not provide a substitute for the direct approach, it often provides information that helps determine the accuracy of a direct estimate. For example, Hyde County's *CAMA Core Land Use Plan* (2008) used hunting permits and ferry trips to Ocracoke to inform its peak seasonal population estimates (pp. 17 – 18).



Sources:

- *Permanent Population: Total 2016 population as reported by the US Census Bureau = 6,948.*
- *Seasonal Rental Housing Population: Estimated number of seasonal rental units 3,474 (91.2% of total 2016 vacant housing units [3,809] as reported by the US Census Bureau) X 6 persons per unit = 20,844.*
- *Hotel Occupancy: Total number of available rooms in Kill Devil Hills (1,027) X an average of 4 persons per room = 4,108.*
- *Day Visitors: Total number of public access parking spaces (494) X an average of 4 persons per car X a daily usage of 2 cars per space per day = 3,952.*

Town of Kill Devil Hills Estimated Peak Day Population with source methodology from the Town of Kill Devil Hills CAMA Land Use Plan Update (2020)

While not required by CRC planning rules, it is often useful to calculate a peak population by combining permanent, seasonal, and daily tourist estimates to present an approximation of the population located in the planning jurisdiction on a typical day during the height of tourist season. Planners may also explore whether the seasonal population trend is increasing or decreasing. This information helps determine service demands and evaluate whether community facilities, infrastructure, transportation systems, and public services are adequate to serve the community's needs during peak periods.

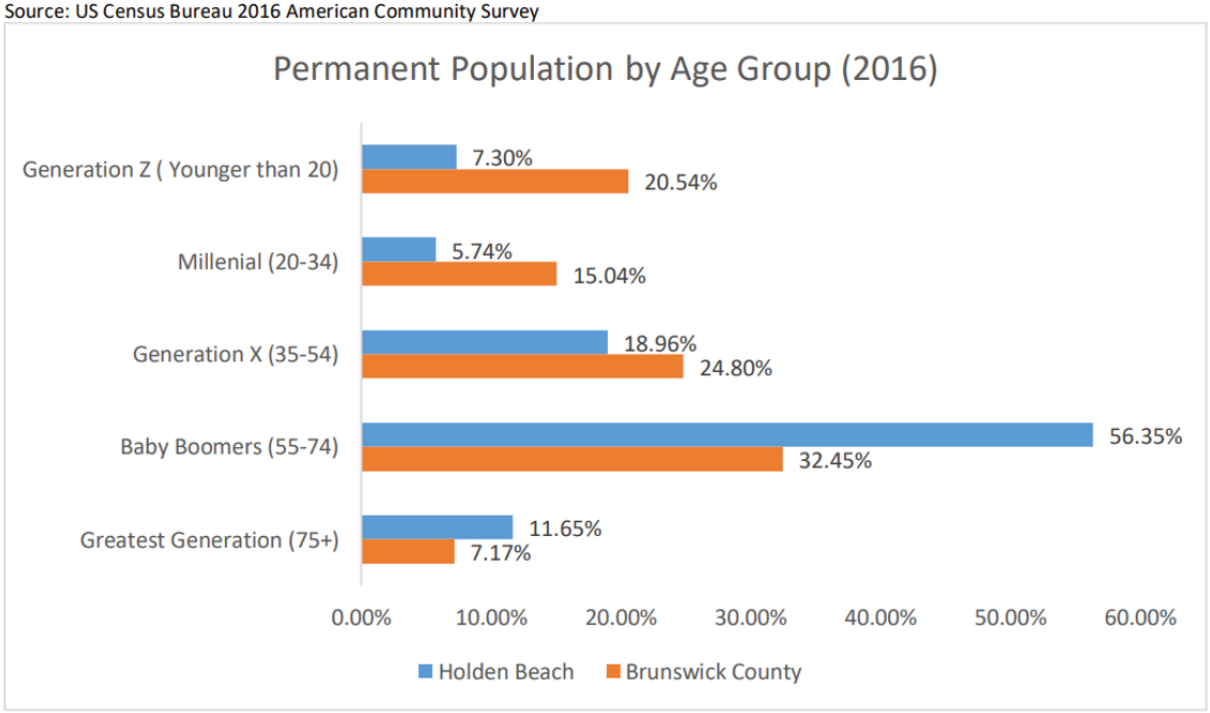
Questions for planners to consider when estimating the seasonal population include:

- How does the permanent population compare to the seasonal population?
- Has the ratio of the permanent population to seasonal population changed over time?

Key population characteristics

It is hard to develop a plan without understanding the community context. This requires firm knowledge of those who reside in the community on a permanent basis. The CRC's planning rules require every plan to include information that examines key population demographics such as age, racial or ethnic composition, education level, income, and household characteristics such as family size. These data are readily available from the *U.S. Census* or *Log Into NC* (LINC). For example, New Hanover County's *Plan NHC* (2016) provides a chart that illustrates the generational breakdowns of different ethnicities in the county (Figure 2.15).

Figure 2.1: Permanent Population by Age Group
Source: US Census Bureau 2016 American Community Survey



Town of Holden Beach and Brunswick County Permanent Population by Age Group in 2016 from the Town of Holden Beach, NC 2019 Land Use Plan (2021)

While not required by CRC rules, it is often useful for planners to compare these data to that of prior years to identify important trends. It may also be useful to compare these data to other jurisdictions that may serve as a benchmark and to examine other special populations beyond tourists and visitors. For example, a large military population, prison population, migratory farm workers, immigrant, or university/community college population should be considered during the plan's development.

Questions to consider when analyzing the demographic data include:

- How do key population characteristics compare to other communities and regions within the state?
- Is the community more or less educated than adjacent communities?
- Is the minority population more or less than surrounding communities?
- Are incomes higher or lower than comparable communities?
- Is the community getting older or younger?
- Are incomes rising faster or slower than other areas in the state?

Thirty-year projections of permanent and seasonal population

The population projection is a critical piece of data that drives many important local decisions during the development of a plan as it helps determine future land use and housing needs. It also helps planners make informed decisions about infrastructure expansion and future transportation needs. These decisions should rely on a reasonable estimate of the growth in permanent and seasonable populations. CRC's rules require local governments to include 30-year projections for the permanent and seasonal populations in 5-year increments. Generally, longer timeframes will be less accurate than shorter time horizons so the 5-year increments are important.

The *NC OSBM* provide forecasts for permanent population growth over a 20-year period at the state and county level. Planners have to extrapolate these results to produce the 30-year estimate. The simplest way to do this is by assuming that the same growth rate for year 20 to 30 is the same as between years 10 and 20. Projections for seasonal population can be based on the existing ratio of permanent to seasonal population extended over a 30 year period.

Table 2.4: 2045 Population Projections
Source: NCOSBM & Cape Fear Council of Governments

2045 Population Projections				
Population Estimates	Pender County	Brunswick County	New Hanover County	Duplin County
2045 Projection	93,846	216,691	318,058	59,867
2040 Projection	87,941	201,058	300,947	59,867
2035 Projection	82,566	186,128	278,612	59,866
2030 Projection	76,410	170,230	264,016	59,866
2025 Projection	70,254	154,332	249,424	59,866
2020 Projection	64,102	138,430	234,826	59,866
2015 Population	57,941	115,926	213,091	59,453
2010 Population	52,205	107,431	202,667	58,505
2000 Population	41,079	73,143	160,307	49,063
Population Growth/Projections				
Growth 2015-2045 (%)	61.97%	86.92%	49.26%	0.70%
Growth 2015-2020 (%)	10.63%	19.41%	10.20%	0.69%

*2045 Unincorporated County Population Projection: 83,578.

Comparison of 2045 Permanent Population Projections for Pender, Brunswick, New Hanover and Duplin counties. The 2045 unincorporated Pender County population projection of 85,578 assumes 12% of population growth will occur in municipalities and 88% in the unincorporated County, consistent with the current ratio. from the Pender 2.0: Comprehensive Land Use Plan (2018)

Municipalities often base their projections on county-level and state-level data to make their forecasts. For example, municipal planners can look at the growth rates at the state or county level and then assume that their growth may occur at the same rate. Municipalities should pay close attention to their local context

Log into North Carolina (LINC)

Log Into North Carolina (LINC) is an interactive data repository that contains historic information for over 900 data items related to diverse topics such as population, labor force, education, transportation, revenue, agriculture, vital statistics, energy and utilities and other topics of interest to local planners and decision makers. Most data are available at the state and county level. Some data are also available for municipalities. The website also contains links to U.S. Census data available for tracts and townships.

when making projections. For example, some barrier beach communities are nearly built-out with limited developable land and height limits that restrict increased densities on developed land. In this case, there is likely to be little growth in the permanent population unless it comes at the expense of the size of the seasonal population since there can be no significant increase in the housing stock. In short, the land available for increased construction of permanent or seasonal housing influences potential growth in the respective populations. Municipalities should also ensure that their projections factor in their ETJ.

Population is also unlikely to grow at a uniform rate across a county. A municipality may have to make upward or downward adjustments to the county growth rates to reflect their local context. For example, the Town of Leland's *2020 Master Plan* (2016, p. 60) provides a detailed explanation of two models used to project future population. One uses Brunswick County's growth rate. The second relies on a comparison of Leland and the county's growth rates in the recent past. Determining these rates involves comparing municipal and county population data with building permit data or census tract data to identify the necessary adjustments.

Annexation, the extension of municipal limits to nearby property, presents another complication when it comes to making accurate projections over relatively long periods. Annexations not only expand the geographic area of the planning jurisdiction but can also increase the community's population and associated demands for service delivery. Accordingly, population projections should take into account any planned annexation areas. Census tract data for the annexed areas in combination with the estimated growth rates can generate this estimate.

A community's economic development prospects and assumptions about the effectiveness of these activities can also influence population growth rates. For example, if several large employers have agreed to relocate to a community, the impacts of these relocations should be included in the population projections. Conversely, if a major employer has closed its doors, population estimates may need to account for poor economic conditions as well.

Planners should avoid unreasonable estimates of population growth or decline when developing their projections. It is important to conduct a sensitivity analysis when doing the projections and model different scenarios to examine the impacts that changes in assumptions have on these forecasts. For example, planners can use different assumptions to model fast or slow growth scenarios and explore the implications that growth assumptions have in terms of demands on infrastructure (e.g., water and sewer), housing needs, or future land use. It is also important to coordinate the community's population projections with

NC OSBM - State Demographics Branch

The North Carolina Office of State Budget and Management (OSBM) provides budgetary, management, and information services. The *State Demographics branch of OSBM* provides current population estimates as well as state and county projections for a 20-year period that are further broken down by age, race (white/other) and sex. The basis for these projections is 2000 and 2010 Census data.

those produced by other entities to minimize the risk of planning at cross-purposes due to inconsistent or inaccurate data (Godschalk and Rouse 2015). For example, a municipality may want to ensure that its population growth forecasts are reasonable when compared to the county or perhaps those generated by a water and sewer authority. It should also ensure that its projections are consistent with those generated by the school district and examine estimates of the future military population at nearby installations.

While not required by CRC planning rules, communities could go further with their population analysis to improve their understanding of how different demographic characteristics are also changing over time (e.g. the age, racial composition, and income of the population). It is also important to consider how these changes may affect future land use needs or demands for future services.

Questions to consider when generating a population projection include:

- What factors may cause population in the planning area to grow faster or slower than surrounding areas?
- Does the community have enough developable land to support the projected population growth?
- What physical constraints or geographic factors will limit population growth?
- What policies will limit or constrain population growth?
- What are the implications of population growth or decline on land uses, community facilities, and other infrastructure?

More information on population projections:

A Practitioner's Guide to State and Local Population Projections by Stanley K Smith, Jeff Tayman, and David A. Swanson. 2013.

Demographic Analysis, Chapter 3 in *Fundamentals of Plan Making: Methods and Techniques* by Edward J. Jepson, Jr. and Jerry Weitz. 2016.

Population and Economy, Chapter 5 in *Urban Land Use Planning* by Philip R. Berke and David R Godschalk. 2006.

Population Analysis, Chapter 4 in *The Practice of Local Government Planning* edited by Charles Hoch, Linda Dalton and Frank So. 2000.

Estimate of current housing stock

Housing is the economic engine that drives much of the economy in coastal NC. The availability and variety of housing needs should be evaluated against the demographics of a community. Housing sufficient to accommodate the needs generated by changing population demographics is important, so development of a plan requires understanding the current distribution of housing stock in order to determine what the future housing and related land use needs will be to accommodate projected population growth (see Section 3.1 for additional discussion).

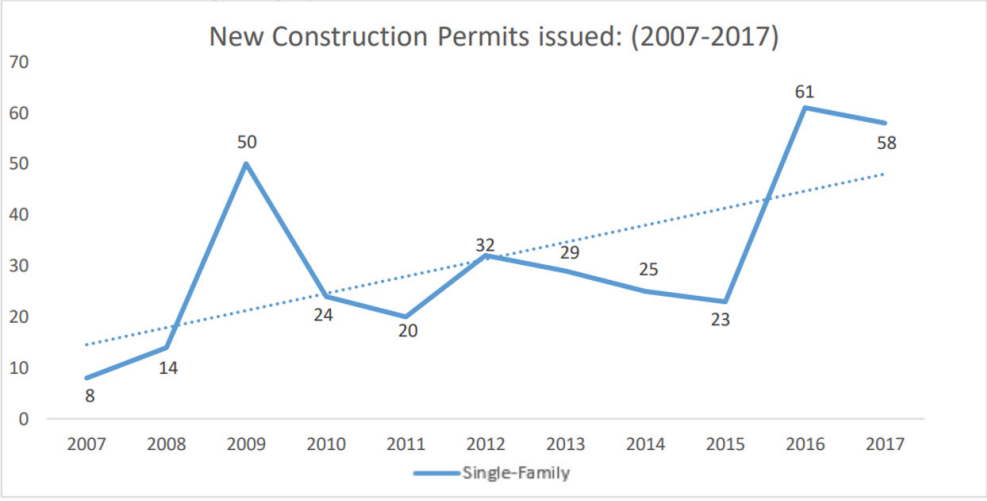
Table 2.6 2010-2019 Units in Housing Structures

Year	2010	%	2015	%	2019	%
Units in Housing Structures	47,459		48,694		50,962	
Single Family Detached	26,519	55.88%	28,397	58.32%	30,164	59.0%
Duplexes	2,081	4.38%	1,805	3.71%	2,040	4.0%
2 Units	1,561	3.29%	1,292	2.65%	930	2.0%
3 or 4 Units	1,576	3.32%	1,540	3.16%	1,437	3.0%
5 to 9 Units	1,273	2.68%	1,616	3.32%	1,629	3.0%
20 or more Units	1,013	2.13%	3,133	6.43%	3,479	7.0%
Manufactured Homes	10,341	21.79%	9,645	19.81%	8,947	18.0%
Other	12	0.03%	32	0.07%	80	.02%
Source: US Census; decennial census, ACS						

Carteret County Units in Housing Structures, 2010 to 2019
from the 2021 CAMA Land Use Plan Update Carteret County NC (2022)

CRC planning rules require analysis of the current housing stock, including permanent and seasonal units, tenure (owner or renter occupied), and breakdown of the types of units (single-family, multifamily, and manufactured homes). Housing data is available from the *U.S. Census* or *Log Into NC* (LINC). Housing units are classified as permanent (year-round), seasonal or vacant. A housing unit is permanent when it is permanently occupied by a person or group of persons living in it at the time of the census interview/survey; or if the occupants are only temporarily absent, as for example, on vacation. Seasonal units are those intended for occupancy only during certain seasons of the year and are classified as "seasonal vacant units" by the US Census because they are occupied by individuals with a usual residence elsewhere (e.g. families on vacation, migrant farm laborers). The seasonal vacant category does not include permanent housing that is vacant at the census interview/survey. Mobile homes and trailers are considered units if intended for occupancy. Housing units are also classified as renter or owner occupied. A unit is owner occupied if the owner or co-owner lives in the unit. A cooperative or condominium unit is "owner occupied" only if the owner or co-owner lives in it. All other occupied units are classified as "renter occupied."

Figure 2.3: New Construction Permits – Holden Beach
Source: Holden Beach Planning/Building Inspections



Town of Holden Beach Single-Family New Construction Permits issued 2007 to 2017
from the Town of Holden Beach, NC 2019 Land Use Plan (2021)

Estimates for current housing stock are typically prepared using census data that is adjusted for construction or demolition since the last census. This data can be adjusted using data on building permits from the local building department. However, these records will not identify the housing as permanent or seasonal so planners will have to make educated assumptions about these percentages. Local building inspectors can provide guidance in this regard.

While not required by CRC planning rules, it is useful to examine the future housing needs of specific subgroups of the population (e.g., military, farm workers, etc.) and different ages and incomes. It is also important to examine the distribution of housing types and how they have changed over time to better understand future housing needs. For example, the *Gates County Comprehensive Plan* (2016, pp. 2-6 – 2-8) examines the age, value, and affordability of its housing stock.

Questions to consider when examining these housing data include:

- Are there important changes in the housing stock?
- Are there shortages or surpluses of different types of housing?
- Is the available housing likely to be sufficient to meet the projections for growth in permanent or seasonal populations?
- Does the housing stock meet the community's future socioeconomic needs (i.e., is there a range of housing types to meet the needs of various ages or incomes?)
- Is housing being developed to serve employment centers and is it accessible to existing current or planned transportation systems?

Description of employment by major sectors and community economic activity

The economic base of a community infl uences a wide variety of planning issues such as population growth and housing needs that in turn infl uence land use, making it an important aspect of the community for planners to understand. (see Section 3.1 for additional discussion). The CRC's rules require a description of employment by major sectors and the community's economic (business) activity. Economic data is available from several sources such as the NC Department of Commerce *Labor and Economic Analysis Division* (LEAD), *Area Profiles*, U.S. Department of Labor's *Bureau of Labor Statistics*, and the *U.S. Census*. For its section on the economy, the *Gates County Comprehensive Plan* (2016, pp. 2-9 to 2-12) addresses employment by industry, leading employers, and farm commodity rankings for the county.

Data sources on employment and economic activity

The NC Department of Commerce's *Labor and Economic Analysis Division* (LEAD) provides links to a wide range of labor market information. LEAD collects data, conducts research, reports, and disseminates information related to the economy and work force related issues. It also provides a *data driven demand delivery system* that provides access to many of these data.

Area Profiles is a data depository maintained by the North Carolina Department of Commerce, which is the lead agency for economic, community and workforce development. The website provides access to 63 data sets containing information about population, housing, and economic development. It also includes access to labor and economic GIS map layers.

The U.S. Department of Labor's *Bureau of Labor Statistics* provides another source of economic data such as employment and unemployment statistics, employment projections, wages, and prices.

Table 9. Gates County Employment by Industry, 2000 to 2013						
Industry	**2000**	**% of Total**	**2010**	**% of Total**	**2013**	**% of Total**
Agriculture, forestry, fishing and hunting, mining	263	6.1%	193	3.8%	163	3.5%
Construction	377	8.7%	611	12.1%	442	9.5%
Manufacturing	952	22.0%	842	16.7%	783	16.7%
Wholesale trade	115	2.7%	129	2.6%	131	2.8%
Retail trade	460	10.6%	636	12.6%	714	15.3%
Transportation and warehousing, and utilities	271	6.3%	286	5.7%	197	4.2%
Information	55	1.3%	32	0.6%	13	0.3%
Finance, insurance, real estate, and rental and leasing	186	4.3%	164	3.2%	212	4.5%
Professional, scientific, management, administrative, and waste management services	216	5.0%	223	4.4%	32	0.7%
Educational, health, and social services	857	19.8%	1,221	24.2%	1,159	24.8%
Arts, entertainment, recreation, accommodation and food services	211	4.9%	211	4.2%	262	5.6%
Other services (except public administration)	193	4.5%	153	3.0%	231	4.9%
Public administration	174	4.0%	347	6.9%	336	7.2%
Employed Person 16+	4,330	100.0%	5,048	100.0%	4,675	100.0%

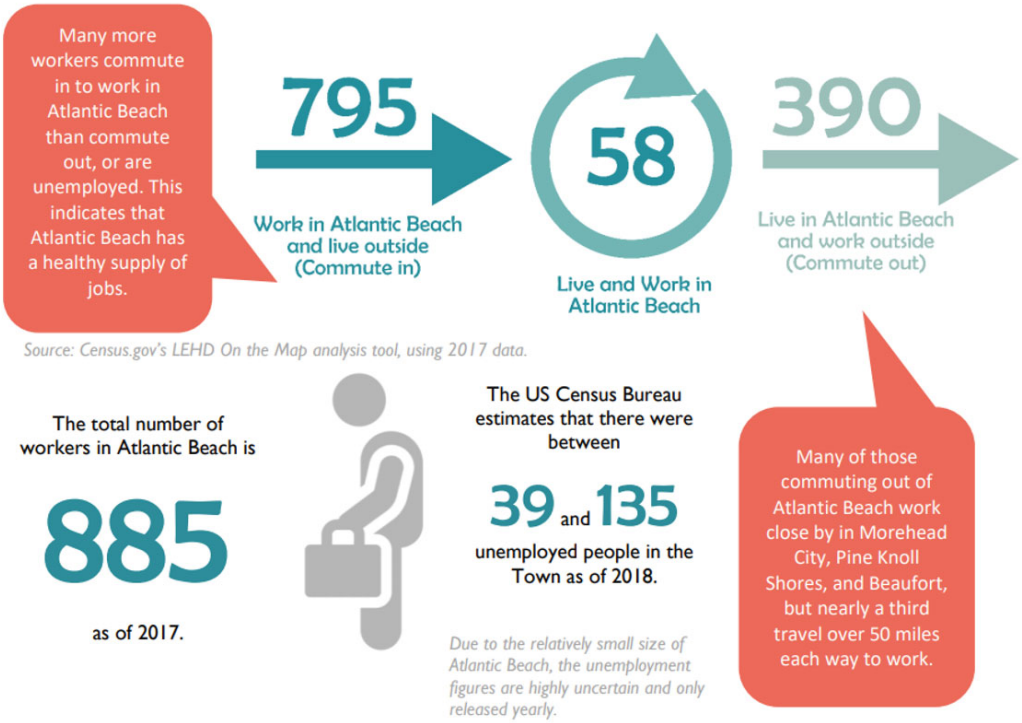
Source: US Census Bureau.

Gates County Employment by Industry, 2000 to 2013 in number of employees from the Gates County Comprehensive Plan (2017)

While not required by the CRC's planning rules, it is useful to distinguish between the "place of work" and "place of residence" statistics, especially if the area has a high commute rate. The place of work is the location where an employed person performs his or her job, and where a usually employed person performs the primary job used to determine his/her other economic characteristics such as occupation, industry, and status in employment. Place of work data is often more useful to planners, and the statistics at the county level are readily available at *Log Into NC* (LINC). Similar statistics are typically unavailable for smaller jurisdictions and census tracts. Municipal planners will have to make assumptions to adjust county-level data to smaller jurisdictional areas.

Planners may use retail sales, property tax records, business licenses, zoning information, the distribution of industrial and business uses, and information provided by chambers of commerce or economic development organizations to help inform community economic activity assumptions. This data can also provide information related to business losses, expansions, and the effectiveness of efforts to recruit and attract new business and industry.

While not required by the CRC's planning rules, it is often useful to examine data from prior years to identify trends. It may also prove useful to compare these data with other benchmark communities to help interpret these data. Another useful exercise is to examine commute to work trends to understand the relationship between housing, the economy, and the transportation system. As an example, the *Create Wilmington Comprehensive Plan* (2016, p. 1-41) shows historical unemployment data for the city, county, and state along with graphical representation of trends in various employment sectors.



Town of Atlantic Beach employment and commute to work data shown in an illustrated format from the Atlantic Beach CAMA Land Use Plan Update (2021)

Questions to consider when examining these economic data include:

- Who are the major employers?
- Are there any factors that could change the structure of the local economy?
- Are there any economic changes that could lead to changes in land use?
- What is the unemployment rate?
- What sectors have problems finding workers?
- What are the commute to work trends?

NATURAL SYSTEMS ANALYSIS

A community's natural features provide a range of important benefits. They contribute to a community's sense of place and improve the quality of life by providing a wide range of recreational opportunities such as swimming, fishing, boating, hiking, and bird watching. Natural resources have aesthetic value and their presence often increases adjacent property values. Some natural systems not only provide important environmental and recreational benefits, but they also provide a means of flood protection and minimize damage from severe storm events (e.g., wetlands). Natural features and environmental conditions also place limitations on some types of land use. Therefore, the natural systems analysis helps identify land most suitable for future development. Each CAMA plan is required to include a description of the natural features and discussion on environmental conditions. These requirements and data sources and how to address them are described in more detail below, while planning topics related to the natural features and environmental conditions are discussed in greater detail in Section 3.

Natural features

Every CAMA plan must include a detailed description of the following natural features:

- Areas of Environmental Concern (AECs) as set forth in Subchapter 15A NCAC 07H (discussed further below);
- Soil characteristics, including limitations for septic tanks, erodibility, and other factors related to development;
- Environmental Management Commission (EMC) water quality classifications and related use support designations;
- Division of Marine Fisheries (DMF) shellfish growing areas and water quality conditions;
- Flood and other natural hazard areas;
- Storm surge areas;
- Non-coastal wetlands, including forested wetlands, shrub-scrub wetlands, and freshwater marshes;
- Water supply areas or wellhead protection areas;
- Primary nursery areas;
- Environmentally fragile areas including wetlands, natural heritage areas, areas with endangered species, prime wildlife habitats, and maritime forests; and
- Additional natural features or conditions identified by the local government.

Environmental conditions

Every CAMA plan must include an assessment of environmental conditions within the community related to water quality, natural hazard areas, and natural resource areas. The assessment includes descriptions for the following conditions and features:

- Status and changes in surface water quality including: impaired streams from the most recent Division of Water Resources (DWR) Basin Planning Branch Reports; Clean Water Act 303 (d) listed waters; and other comparable data;
- Current situation and trends on permanent and temporary closures of shellfishing waters as determined by the Report of the Sanitary Survey by the Shellfish Sanitation and Recreational Water Quality Section of the DMF;

- Areas experiencing chronic wastewater treatment system malfunctions;
- Areas with water quality or public health problems related to nonpoint source pollution;
- Areas subject to recurrent flooding, storm surges, and high winds;
- Areas experiencing significant shoreline erosion as evidenced by the presence of threatened structures or public facilities;
- Environmentally fragile areas or areas where resource functions are impacted because of development; and
- Natural resource areas that are being impacted or lost as a result of incompatible development including, but are not limited to the following: coastal wetlands, protected open space, and agricultural land.

Environmentally fragile areas are defined as wetlands, natural heritage areas, areas containing endangered species, prime wildlife habitats, or maritime forests *15A NCAC 07B .0702*.

While not required by the CRC's planning rules, it is useful to develop a GIS library of natural features and environmental conditions, which can then be used to determine the suitability of land for development and make decisions about future land use. It may also be useful to include maps of natural constraints and environmental conditions in the plan to supplement descriptions. For example, information about groundwater resources may influence decisions about the infrastructure needs (see Section 3.4) while information about a community's flood, storm surge, and hazard areas should influence land use (see Section 3.1) and hazard mitigation policies (see Section 3.6).

Collecting data on natural systems and environmental conditions

Information related to a community's natural systems and environmental conditions are available from many sources. The following sections identify the important sources of data for this analysis. Many of these natural systems and environmental conditions are discussed further in Section 2.4 and Section 3 in the context of developing policies and recommended actions.

There are many ways to organize the presentation of this information. The Town of Manteo's *Core CAMA Land Use Plan Update* (2007, pp. 21-50) provides a lengthy description and illustration of each facet of these requirements and provides maps to allow readers to visualize and understand where these resources are located. The *Tyrrell County-Town of Columbia CAMA Core Land Use Plan* (2009, p. 26 – 54) provides another example of how required information and analysis can be complemented with tables and illustrations.

Areas of Environmental Concern (AECs)

Areas of Environmental Concern (AECs) are areas of natural importance that may be easily destroyed by erosion or flooding or areas that may have environmental, social, economic or aesthetic qualities that make them valuable to our state and in need of protection from uncontrolled development. AECs are designated by the CRC and are the foundation of the CAMA permitting program (see Section

2.1). The CRC has development rules that apply to each type of AEC, as well as rules that apply to specific types of projects (e.g., beach nourishment, boat ramps, bulkheads and estuarine shoreline stabilization, docks, marinas, etc.) within AECs.

AECs are separated into four broad groupings:

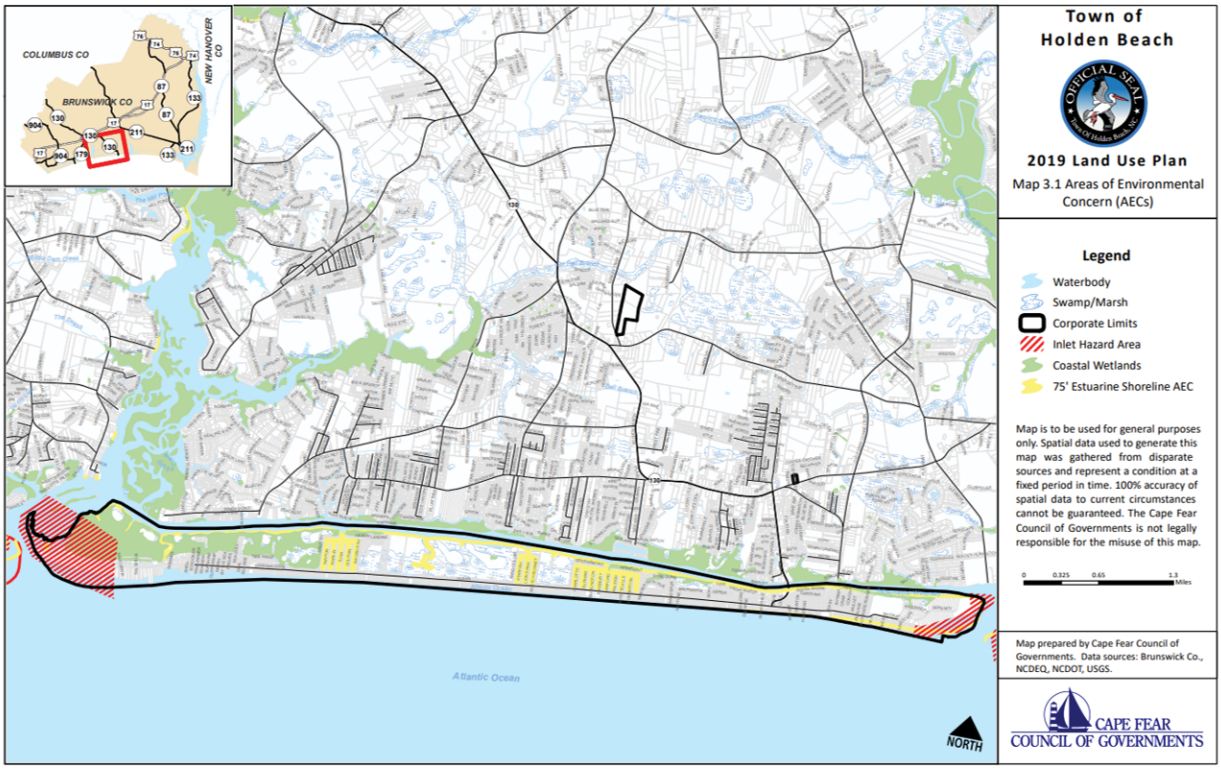
- Estuarine and Ocean System
- Ocean Hazard System
- Public Water Supplies
- Natural and Cultural Resource Areas

Estuarine and Ocean System AECs include Public Trust Areas, Estuarine Waters, Coastal Shorelines, and Coastal Wetland areas. Public Trust Areas are the waters, submerged lands, and shorelines that every North Carolinian has the right to use for activities such as boating, swimming, or fishing. These areas overlap with estuarine waters and extend to the limits of navigability within CAMA counties. The following lands and waters are public trust areas:

- Waters and the lands underneath the Atlantic Ocean from the mean high water mark seaward to the state's official boundary 3 miles offshore;
- All navigable waters and their submerged lands extending landward to the normal high water mark. This does not include privately owned lakes where the public does not enjoy access rights;
- Waters in artificially created water bodies with significant public fishing resources and accessible to the public from other waters; and
- Waters in artificially created water bodies where the public has acquired rights by prescription, custom, usage, dedication, or any other means.

Estuarine Waters are the state's oceans, sounds, and tidal rivers and their tributaries, which stretch across coastal NC and link to other parts of the estuarine system – public trust areas, coastal wetlands, and coastal shorelines. For regulatory purposes, the inland boundary for estuarine waters is the line used to separate the jurisdiction between the Division of Marine Fisheries and the Wildlife Resources Commission. This line is indicated on *maps provided by the NC Division of Marine Fisheries*.

Coastal Shorelines include all lands within 75 feet of the normal high water or normal water level of estuarine waters. It also includes lands within 30 feet of the normal high water or normal water level of public trust waters located inland of the dividing line between coastal and inland fishing waters. Along Outstanding Resource Waters, the jurisdiction extends to lands within 575 feet of the normal high water or normal water level. The fishing waters map provided by the NC Division of Marine Fisheries provides a general location for the Public Trust and Estuarine Water AECs.



Town of Holden Beach's plan provides a generalized map of the 75 foot Estuarine Shoreline, Coastal Wetland, and Inlet Hazard AECs. Note that other AECs within the Town not indicated on this map include Public Trust Area and Estuarine Waters, 30' Public Trust Shoreline and Ocean Erodible. from the Town of Holden Beach 2019 Land Use Plan (2021)

Coastal Wetlands are marsh areas that include one or more of the 10 specific marsh plant species and that are regularly or occasionally flooded by lunar or wind tides (not including hurricane or tropical storm tides). Due to the dynamic nature of the estuarine and ocean system, maps of these AECs are not available. For permitting, AEC determinations are made on a site-specific basis and are valid for a limited time.

The Ocean Hazard System AECs include the Ocean Erodible AEC, Inlet Hazard AEC, and Unvegetated Beach AEC. The Ocean Erodible AEC covers NC's beaches and any other oceanfront lands that are subject to long-term erosion and significant shoreline changes. The seaward boundary of this AEC is the mean low water line. The landward boundary of the AEC is measured from a site specific first line of stable and natural vegetation and is determined by multiplying a designated long-term annual erosion rate times 90. Long term annual erosion rates are developed by DCM and provided on maps on its *website* and *mapping portal*. The CRC updates the long-term erosion rates about every 5 years. Recent aerial photographs can be used to estimate the general location of the first line of stable and natural vegetation from which the landward limit of the Ocean Erodible AEC can be measured. Due to the dynamic nature of the system, this would be a general location only. For permitting, determination of the first line of stable and natural vegetation is made on a site-specific basis and is valid for a limited time.

The Inlet Hazard AEC is comprised of the land adjacent to ocean inlets. Inlet shorelines are especially vulnerable to erosion and flooding and can shift dramatically and suddenly, which can create risks to public health, safety, and welfare. The CRC has approved maps for each inlet along the coast based on a scientific

assessment of the expected inlet migration. At a minimum, the landward jurisdiction is the same as the ocean erodible AEC but can range in width from about 250 feet for a fairly stable inlet to about 4,000 feet for the most dynamic inlets. Inlet hazard areas can be found on DCM's mapping portal.

Unvegetated Beach AECs can be designated by the CRC for areas where no stable and natural vegetation is present. DCM uses aerial photography and other techniques to establish a measurement line to be used in place of the vegetation line for measuring setbacks. This line is usually established by the CRC after storms and is repealed once the vegetation has reestablished itself to the point it can be used for setback determinations.

The CRC has designated two Public Water Supply AECs to protect certain coastal public water supplies from the negative effects of development. The Small Surface Water Supply Watershed AEC protects coastal drainage basins that contain a public water supply classified as A-II by the NC Environmental Management Commission (EMC). To date, two such watersheds have been designated as AECs: Fresh Pond at the Town of Nags Head and the Town of Kill Devil Hills border; and Toomer's Creek near the City of Wilmington. Public Water Supply Wellfields AECs are areas of rapidly draining sands extending from the earth's surface to a shallow groundwater table that supplies public drinking water. Currently one wellfield is designated as an AEC, on Hatteras Island at Buxton.

Natural and Cultural Resource AECs are specific sites designated to receive protection because they contain significant environmental or cultural resources. The areas are of importance to the state due to their role in maintaining the coastal ecosystem, are important for scientific research and education, have historical significance, or provide aesthetic value.

There are five types of Natural and Cultural AECs. Coastal complex natural areas are lands that support native plants and animal communities, providing habitats essentially unchanged by human activity. Coastal areas that sustain remnant species provide habitat for native plant or animal species that the N.C. Wildlife Resources Commission or the federal government has determined to be rare, threatened or endangered. Unique coastal geologic formations are areas containing especially notable examples of geologic formations or processes found in the coastal area. Such formations are important educational, scientific and scenic resources. Significant coastal archaeological resources and significant coastal historical architectural resources contain objects, features, buildings or sites that provide unmatched and irreplaceable scientific, educational and aesthetic resources that commemorate the coastal region's heritage.

Any person can nominate a Natural and Cultural Resource AEC for designation by the CRC. If the CRC determines that the area is worthy of increased protection through AEC designation, the commission will adopt standards for development tailored to fit the management and resource protection needs for those areas. Management plans for Permuda Island in Onslow County and Jockey's Ridge in the Town of Nags Head, the only two natural and cultural AECs to date, are available from the Division of Coastal Management.

When addressing AECs in the plan, it is important to indicate how they relate to the community's waterways, shorelines and land area. Every AEC is not included in each community. The community's assessment of environmental conditions should identify any AECs (e.g. coastal wetlands) that are being impacted or lost as a result of incompatible development, and shorelines that are experiencing significant erosion as evidenced

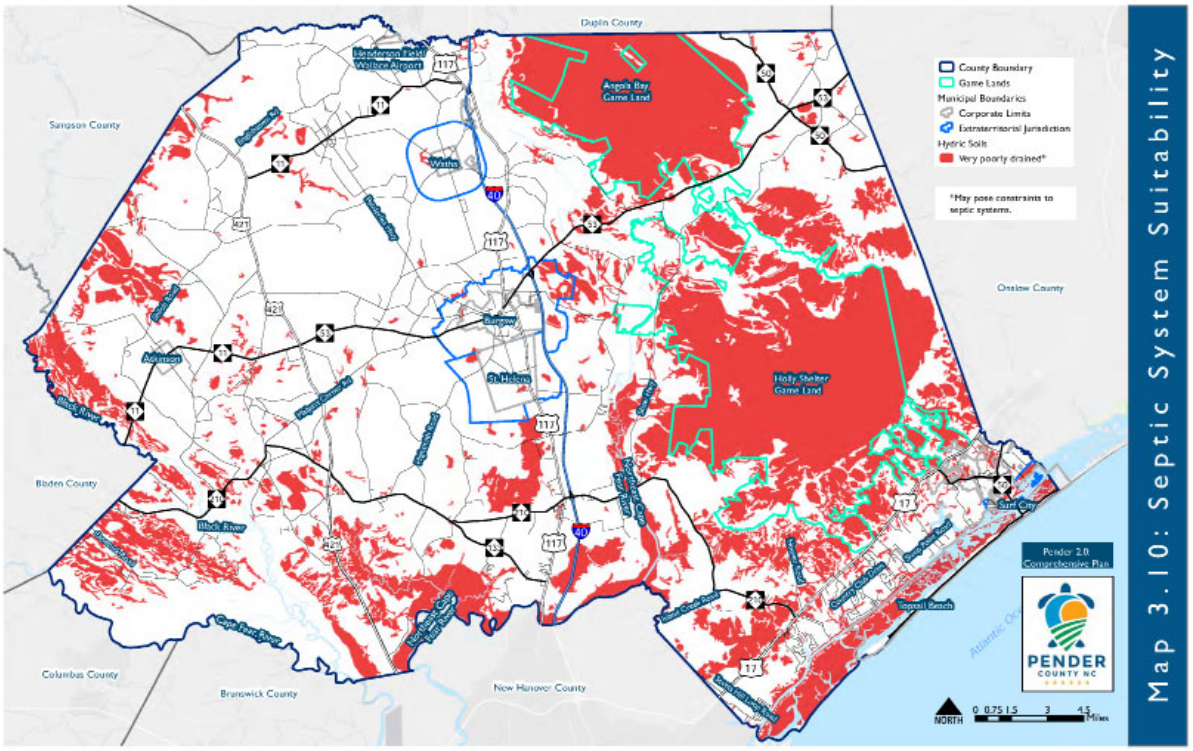
by the presence of threatened structures or public facilities. For example, the *Chowan County & Town of Edenton Joint Land Use Plan* (2018) identifies AEC locations countywide (p. 3-33) and indicates that there are no areas experiencing significant shoreline erosion (p. 3-51).

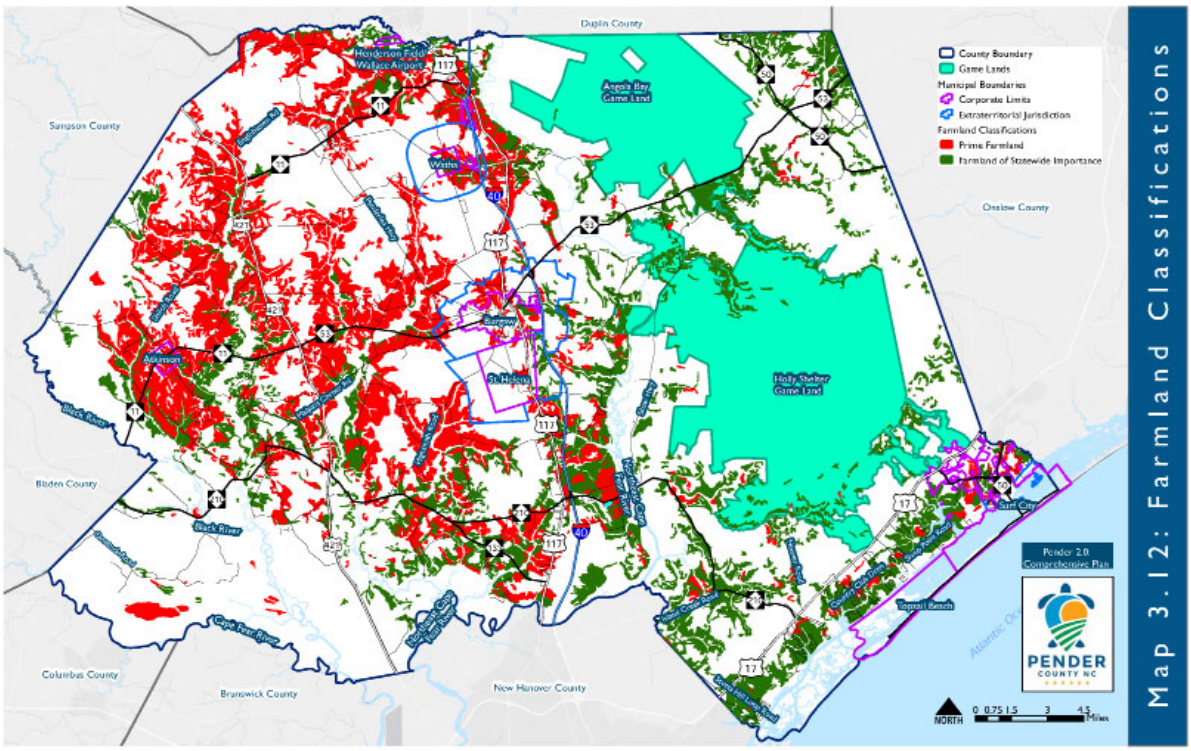
Soil characteristics

Many soils have characteristics that create constraints on land development. For example, the soil type can limit the use of onsite sewage disposal systems (OSDSs) or be prone to erosion making it unfit for some development. It may be important to preserve prime agricultural soils for farming. The City of Havelock's *2030 Comprehensive Plan* (2009, pp. 3-45 – 3-48) discusses and maps soil types by prime farmland and limitations for septic systems. The plan also discusses slope and wind erosion's effects on soils. For information on your community's soil characteristics see the USDA, Natural Resource Conservation Service's (NRCSs) website that has *links to published soil surveys* for all NC counties.

USDA NRCS Web Soil Survey provides soil data, information, and maps to help guide planning decisions.

Prime Farmland is defined as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management". (USDA NRCS)





Septic System Suitability and Farmland Classifications maps based on soils information for Pender County from the Pender 2.0: Comprehensive Land Use Plan (2018)

Water quality classifications and conditions

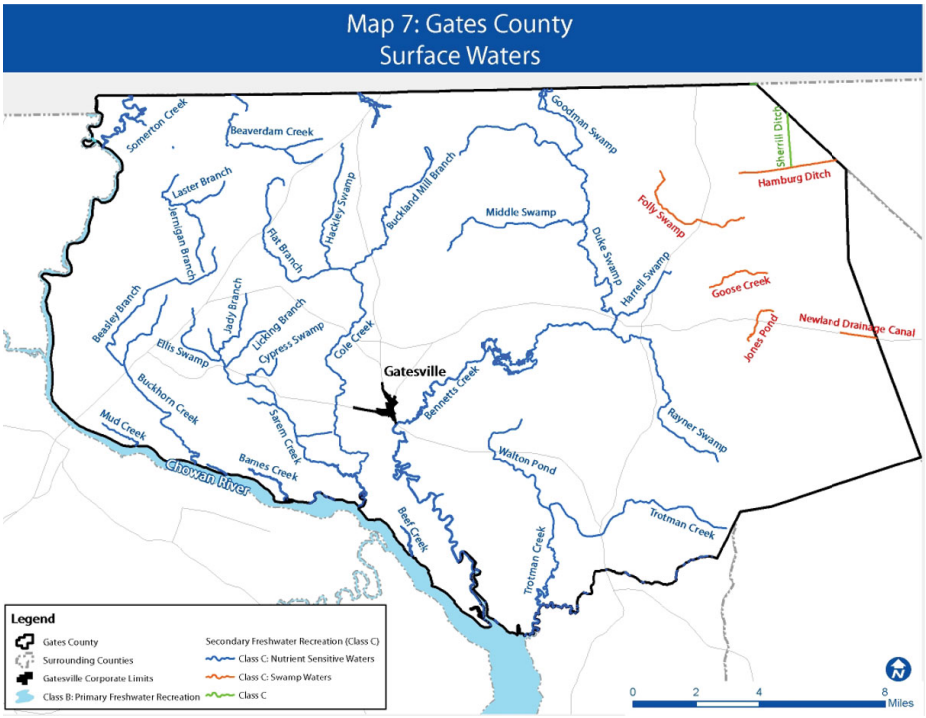
Good water quality is essential to the health of the state's coastal waters. Poor water quality can result in public health issues requiring beach closures and swimming advisories, degraded wildlife habits that reduce fisheries resources and require shellfishing areas to be closed, and reduced waterfront property values where bacterial contamination, algal blooms and fish kills negatively impact use and enjoyment of the waters. To address water quality issues, it is important for a community to assess the current conditions and consider the likely sources of any impairment during the planning process. See Section 3.3 for more information on water quality and the point and nonpoint sources of water pollution.

The primary resources for water quality information are the basinwide water quality plans prepared by the NC Division of Water Resources *Basin Planning Branch*. The Basin Planning Branch develops and maintains comprehensive, detailed, online basinwide plans for NC's 17 river basins. Coastal NC is located within portions of the Roanoke, Chowan, Pasquotank, Tar-Pamlico, Neuse, White Oak, Cape Fear, and Lumber basins. The basin plans organize water quality data and information by subbasin. Maps of basins and subbasins are provided in the basinwide plan. The community will need to determine the applicable basin or basins that overlap their jurisdiction. Water quality information can then be obtained from the subbasin chapters in the applicable basinwide plan or plans.

DWR assigns water quality classifications to watercourse segments within the basins using a stream name/stream index for all surface waters. *Primary surface water classifications* define the best uses to be protected within these waters (e.g., SB: Primary Recreation, Salt Water; SA: Market Shellfishing, Saltwater) A *map* for each watercourse segment can be found on DWR's website.

Listing of basins with Links to the 8 .pdf educational brochures N.C. Environmental Education River Basin Program *Roanoke*, *Chowan*, *Pasquotank*, *Tar-Pamlico*, *Neuse*, *White Oak*, *Cape Fear*, and *Lumber basins*.

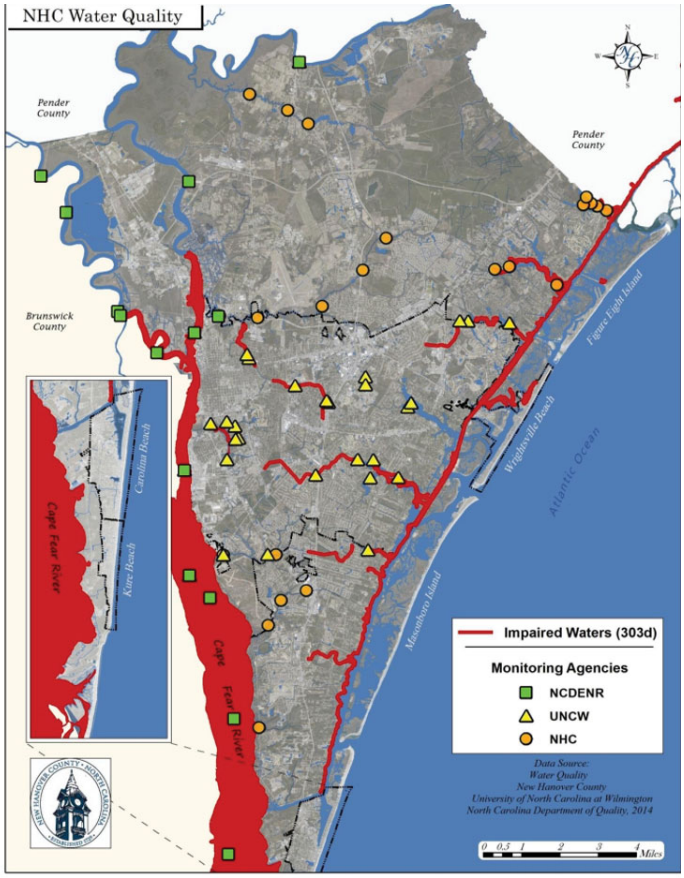
Digital maps of the basins and their further subdivisions into subbasins, watersheds, and subwatersheds can be viewed at *https://deq.nc.gov/about/divisions/water-resources/water-planning/basin-planning/basin-planning-branch-maps.*



Gates County Surface Water Classifications from the Gates County Comprehensive Plan (2017)

The CRC's planning rules require an assessment of the status and changes in surface water quality. This information can be found in the basinwide plans and on the DWR Planning Branch webpage. Water bodies that do not meet the water quality criteria for their surface water classifications will be reported as part of the US Environmental Protection Agency's (EPA's) 305(b) report and 303(d) list. The 303(d) is a list of waterbodies that do not meet water quality criteria and are considered "impaired". *Integrated Reports* providing an assessment of impaired water quality can be found on the DWR's *Water Quality Data Assessment website*. The website also contains information on water quality assessment based on *NC's water quality standards*. Other comparable data, including local data, can also be used in the assessment of surface water quality.

See *DWR's 303(d) Listing Methodology* – for information on how NC compiles its 303(d) lists.



New Hanover County Impaired Waters on the 303(d) list 2014 from Plan NHC (2016)

The CRC planning rules require an assessment of areas experiencing chronic wastewater treatment system malfunctions. These can be areas served by individual septic systems as well as those served by private or public sewage treatment systems (including package treatment systems). Data can be collected from local environmental health departments, the NC Division of Water Resources Water Quality Permitting Section and treatment system operators.

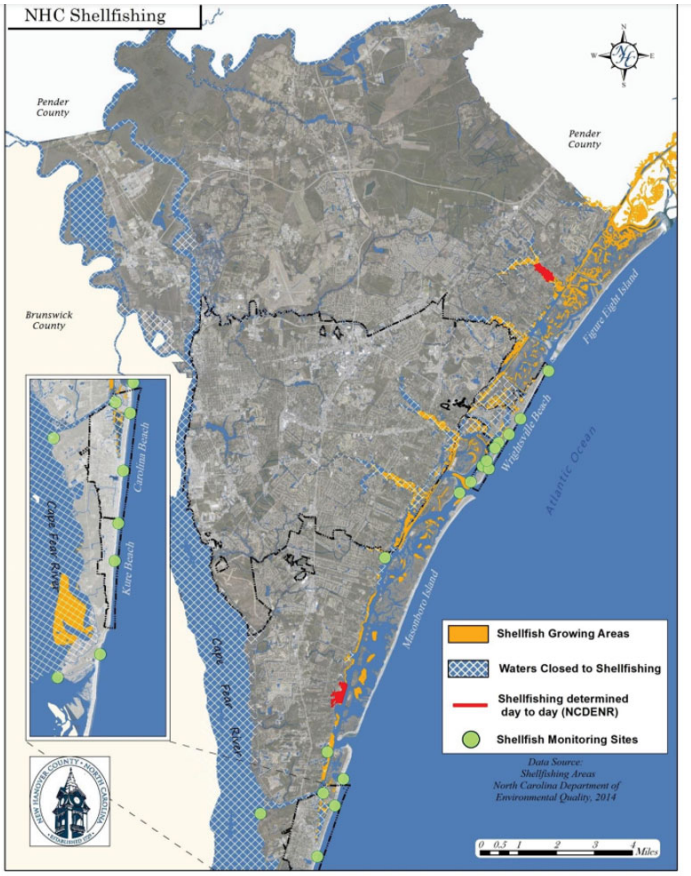
The plan is also required to provide an assessment of areas with water quality or public health problems related to nonpoint source pollution. Nonpoint source pollution is generated by rainfall or snowmelt moving over the ground, picking up pollutants and depositing them into the waterbody. Problems with water quality related to nonpoint source pollution are identified in the basinwide plans. For swimming waters, recreational water quality data is available from the NC Division of Marine Fisheries *Recreational Water Quality Program*. The program tests 204 recreational swimming areas including ocean beaches, sounds, bays, and estuarine rivers for *enterococcus* bacteria produced by warm-blooded animals, which is used as an indicator of potential health problems due to recreational contact. Local data can also be used to assess water quality or public health problems related to nonpoint source pollution.

Some of the data sources mentioned above are available from DEQ's *Online GIS website*. NC OneMap also contains access to *map coverages addressing different water quality issues*.

Shellfish growing areas and closures

Shellfish, such as oysters, mussels and clams, are found throughout the waters of coastal NC. The DEQ's Division of Marine Fisheries provides *shellfish growing area maps* for each county. Growing areas extend from estuaries to inland waters beyond the 20-coastal counties. Growing areas with descriptions are provided for each map.

Shellfish are filter feeders, which means they strain food particles and matter (including nutrients, suspended sediments and chemical contaminants) out of water by circulating them through their system. Shellfish are sensitive to water quality – excessive nutrients can limit their development and sediments can make them more susceptible to disease. Examining the health of shellfish growing areas adjacent to a community is important because a pattern of permanent and temporary closures of growing areas for shellfish harvesting is an indicator of significant water quality problems from point or nonpoint sources of pollution. A Report of Sanitary Survey is available for each growing area on *NC Digital Collections* or by contacting the DMF Shellfish Sanitation Office. The sanitary survey includes a comprehensive shoreline survey conducted by Shellfish Sanitation staff that determines potential sources of pollution entering shellfish growing waters.



New Hanover County Shellfish Growing Areas 2014
from Plan NHC (2016)

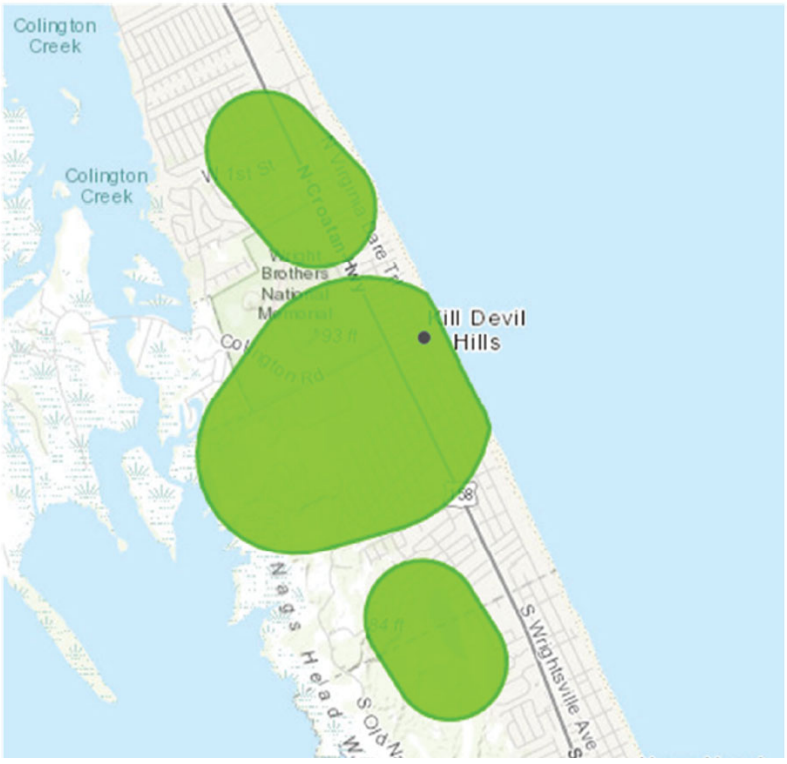
Classification of coastal waters as either open or closed for shellfish harvesting is done in accordance with the sanitary survey. Recommendations are then made to the Division of Marine Fisheries (DMF) for which areas should be closed to shellfish harvesting. Shellfish growing areas can either be permanently or temporarily closed to shellfish harvesting. The DEQ's Division of Marine Fisheries website lists all of the *proclamations about the opening and closures of shellfish harvesting areas*. The CRC's planning rules require an assessment of the current situation and trends on permanent and temporary closures of shellfishing waters as determined by the Report of Sanitary Survey. Depending on the reason for closure, permanent and temporary closures can be an indicator of areas where important water quality problems should be addressed in a plan.

For more information about the *Sanitary Survey.*

Interactive Shellfish Sanitation Temporary Closures WebMap – allows viewers to see in real time to see which waters are open to harvest.

Water supply and wellhead protection areas

Given the relatively flat topography in N C's coastal plain, most of the public and private water supply is provided by either ground or surface waters (see Section 3.4). Accordingly, it is important for a plan to take steps to protect these waters from contamination (see Section 3.3). The DEQ's *Water Supply Watershed Protection Program* requires all local governments having land use planning jurisdiction within a water supply watershed to adopt and implement water supply watershed protection ordinances, maps, and management plans. Their website also provides links to various materials including *maps of water supply watersheds*.



Wellhead protection areas in the Town of Kill Devil Hills from the Town of Kill Devil Hills CAMA Land Use Plan Update (2020)

Wellhead protection, protection of all or part of the area surrounding a well from which the well's groundwater is drawn, can help reduce the susceptibility of wells to contaminants (see Section 3.3). In North Carolina, development of local Wellhead Protection Programs is not mandatory, but is viewed as a valuable supplement to existing state groundwater protection programs. The DEQ's *Wellhead Protection website* has resources useful for planners, including a list of approved wellhead protection plans and maps of wellhead protection areas.

Wetlands

Wetlands are areas where water covers the soil for at least part of the year. In North Carolina there are a range of wetlands including marshes, swamps, bottomland hardwoods, and pocosins. These wetlands provide a variety of important ecological, economic and social benefits vital to coastal North Carolina. These benefits include habitat for commercial and recreational important fish, wildlife, and plants; flood protection; improvements to water quality; shoreline erosion protection; and opportunities for recreational activities. Section 3.3 further describes the range of functions that wetlands provide and the steps a community can take to protect these important resources.

For development permitting purposes, wetlands are categorized as coastal / "saltwater" wetlands or non-coastal / "freshwater" wetlands. Coastal wetlands fall under the jurisdiction of the Coastal Resources Commission (CRC) and freshwater wetlands are under the jurisdiction of the US Army Corps of Engineers (USACE). Coastal Wetlands are addressed under Areas of Environmental Concern (AEC) earlier in this Chapter.

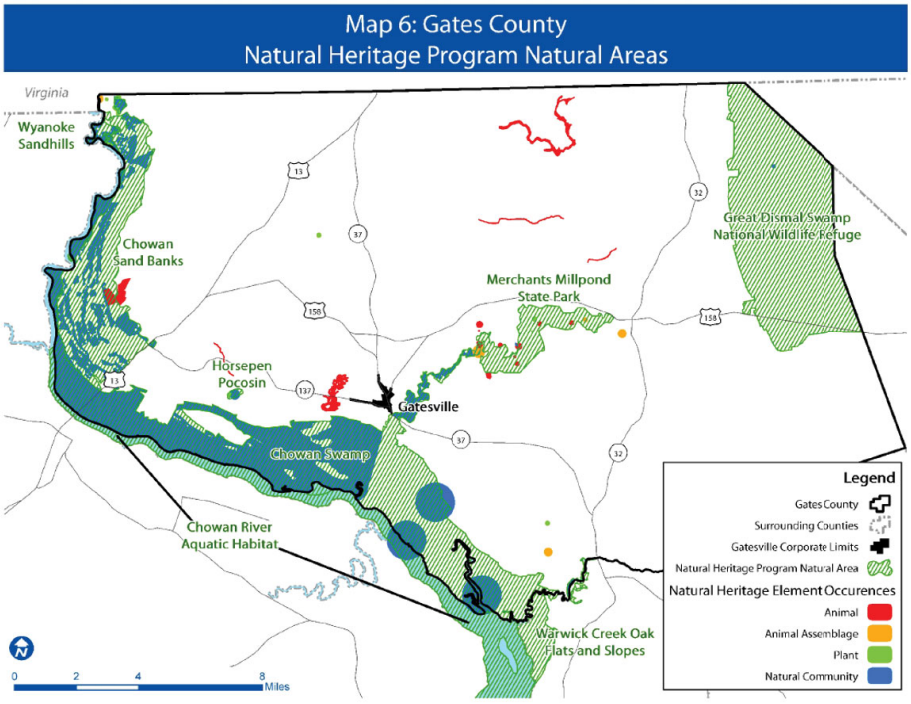
There are a number of sources of data, information, and maps of wetland areas and their complex interrelated hydrologic systems. Nationwide data can be found at the US Fish and Wildlife Service's *National Wetlands Inventory* and *data download page*. An analysis of the change in wetlands from 1996 to 2016 can be found at NOAA's Coastal Change Analysis Program (C-CAP) *Land Cover Atlas*. North Carolina specific wetland data related to the North Carolina Coastal Region Evaluation of Wetland Significance (NC-CREWS) can be found on DCM's *Wetlands and GIS Data web page*. The model uses GIS software to assess the level of water quality, wildlife habitat, and hydrologic functions of individual wetlands. The data in NC-CREWS, while mostly field verified, has not been updated since 1999. The NC Division of Water Resources NC Wetlands site includes *Research and Data* on wetlands throughout the State and an *interactive map* of public wetlands. It should be noted that while wetland data mapping is an important tool for determining general locations, for permitting purposes the jurisdictional limits of coastal and non-coastal wetlands are determined on a site specific basis.

Wetlands in the Town of Southern Shores
from the Town of Southern Shores CAMA LUP Update (2012)

Environmentally fragile areas

Environmentally fragile areas include wetland areas, natural heritage areas, areas containing endangered species, prime wildlife habitats and maritime forest. A variety of state and federal programs have identified environmentally fragile areas in need of protection. Planners should work to protect these habitat areas during the plan's development. The importance of protecting these areas is discussed further in Section 3.3.

The *North Carolina's Natural Heritage Program* (NHP) provides a natural area inventory for each county. Identified natural areas are land or water areas that are important for the conservation of the natural biodiversity of North Carolina. The NHP website also contains a *rare species inventory* and a searchable list of rare plants and animals. The North Carolina *Natural Heritage Data Explorer* provides interactive access to natural heritage resource maps and data. Subscription accounts allow users to view reports of the rare species, natural areas and managed areas found in a specified project area. Federal, state, local government and nonprofit organizations are exempt from subscription fees.



Gates County Natural Heritage Program Natural Areas from the Gates County Comprehensive Plan (2017)

Several federal agencies provide information related to endangered and threatened species of plants and animals under the 1973 Endangered Species Act (ESA). The main federal agencies that implement the ESA are the *U.S. Fish and Wildlife Service* (FWS) and NOAA's *National Marine Fisheries Service* (NMFS). The FWS has responsibility for terrestrial and freshwater organisms, while NMFS has responsibility for marine species such as whales, sea turtles, and marine fi sh. There are 61 federally threatened and endangered species known to occur in NC. Information about each species is located on the FWS *Raleigh Ecological Services Field Office website*. The FWS Geospatial Services website provides an interactive mapping feature for locating areas of federally threatened and endangered species resources called the *Information, Planning and Conservation* System, which provides a range of information on sensitive habitat areas that may also be useful for planning purposes. The USACE also *maintains a website* with downloadable GIS data that can help planners address federal endangered species concerns.

Threatened means a species is likely to become endangered within the foreseeable future. **Endangered** means a species is in danger of extinction throughout all or a significant portion of its range.

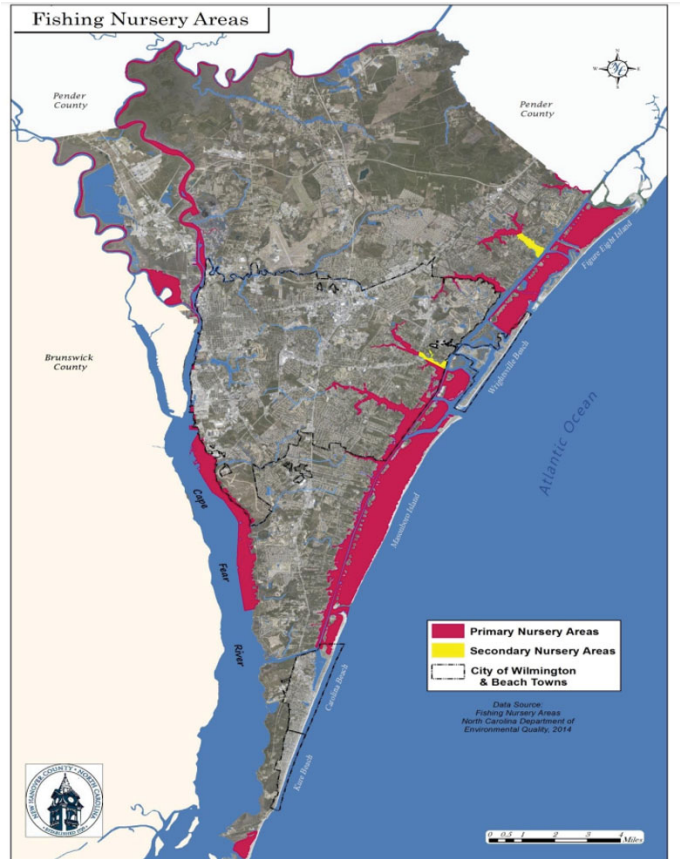
Information, including maps and datasets, on animals, plants, and communities nationwide may be found on *NatureServe Explorer*.

The CRC's planning rules require an assessment of environmentally fragile areas or areas where resource functions are impacted or lost as a result of development. Also required is an assessment of natural resource areas that are being impacted or lost as a result of incompatible development. Natural resource areas may include, but are not limited to the following: coastal wetlands, protected open space, and agricultural land. The *North Carolina Conservation Planning*

Tool provided by the NC Natural Heritages Program can assist with the local assessment of impacts to environmentally fragile areas and natural resource areas. The tool identifies and prioritizes, on a statewide scale, essential high quality natural resources. Assessment maps are provided for "biodiversity/wildlife habitat", "open space and conservation lands", "agricultural lands" and "forestry lands".

Primary nursery areas

Nursery areas are locations where young finfish and crustaceans spend the major part of their early growing season due to the availability of food, cover, bottom type, salinity, temperature or other factors. A primary nursery area (PNA) is the part of an estuarine system where initial post-larval development takes place. Since fish are most vulnerable during the early life cycle, PNAs are the focus of regulatory protection intended to maintain the habitats in their natural state. The NC Division of Marine Fisheries Commission designates coastal water Primary Nursery Areas. A *map* of coastal water PNA locations are available on DMF's website, while a list is defined in rule *15A NCAC 03R .0103*. The NC Wildlife Resources Commission designates Inland Water Primary Nursery Areas, which are also located within the 20 coastal counties. A list of inland PNA locations are defined in rule 15A NCAC 10C .0503. Land use planners can assist in efforts to protect nursery areas, and work to minimize impacts to these habitat areas from land development (see Section 3.3).



New Hanover County Primary and Secondary Nursery Areas from Plan NHC (2016)

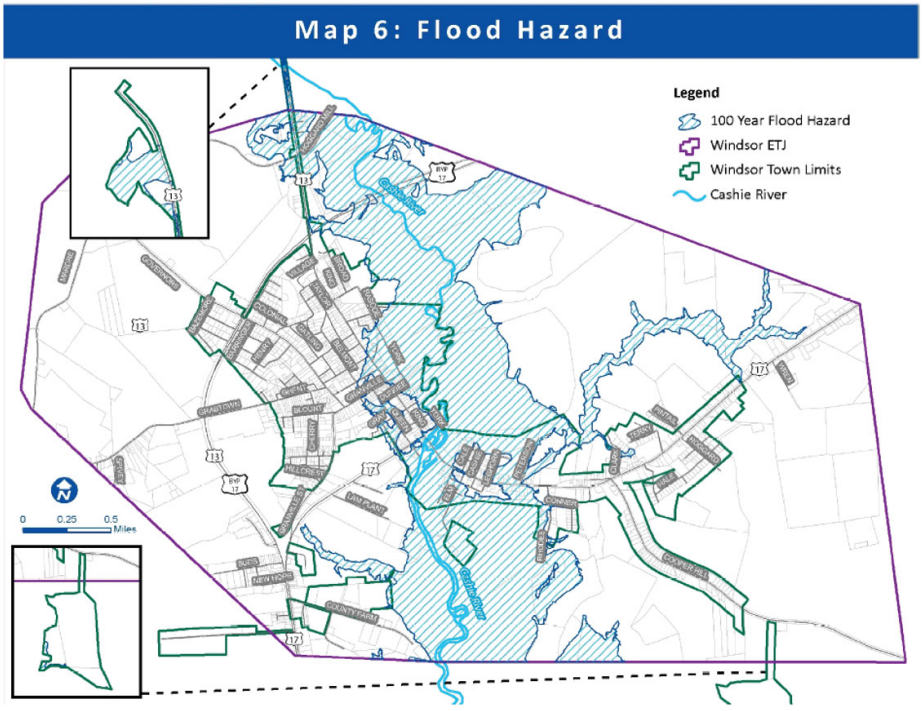
While only a description and discussion for PNAs are required under the CRC's planning rules, there are other fishery related areas that can be discussed in the plan including permanent secondary nursery areas, special secondary nursery areas, anadromous fish spawning areas, and submerged aquatic vegetation (SAV).

The locations of permanent and special secondary nursery areas can be found on DMF's PNA map and in rule *15A NCAC 03R .0104* and *15A NCAC 03R .105* respectively. *Anadromous fish spawning area maps* can also be found on DMF's webpage. SAV GIS data is available for download on *NC OneMap*.

Additional resources include, DMF's Coastal Habitat webpage that contains *maps of Coastal Habitat Types* that are important to protect and enhance to improve our fish and shellfish resources. The *NC Coastal Habitat Protection Plan* (CHPP) a guidance document for the protection, enhancement, and restoration of fish habitat may provide other information that can be helpful when developing a plan.

Flood and natural hazard areas

Flood prone areas are located throughout the coastal plain of North Carolina. Flooding becomes a hazard when it negatively impacts developed areas. It is important for a community to understand its flood risks and to minimize the negative impacts of flooding in the interest of public health, safety and welfare. The official public source for flood hazard information is the FEMA Flood Map Service Center (MSC) and the information produced in support of the National Flood Insurance Program (NFIP) that is available *on their website*. North Carolina's Flood Risk Information System (FRIS) also provides data and maps available for download. These data will help a community understand its flooding risks. The CRC's planning rules require an assessment of areas subject to recurrent flooding.



Town of Windsor FEMA flood hazard area from the Town of Windsor: Comprehensive CAMA Land Use Plan (2018)

Secondary nursery areas are those areas in the estuarine system where later juvenile development takes place. Populations are composed of developing sub-adults of similar size that have migrated from an upstream primary nursery area to the secondary nursery area located in the middle portion of the estuarine system.

Anadromous fish spawning areas are areas where anadromous fish spawn. Anadromous fish spend most of their adult life at sea but migrate up rivers to spawn.

Submerged aquatic vegetation are grasses found in shallow water that provide an important habitat for a variety of organisms.

Other natural hazard areas include those areas susceptible to coastal erosion and sink holes and areas that can be impacted by dam failures or wildfires. Not all natural hazards are area specific. Hurricanes, nor'easters, thunderstorms, tornadoes, excessive heat, drought, severe winter weather and earthquakes, for example, can impact areas throughout NC. The degree to which these impact the local community is addressed in the local or regional hazard mitigation plan. Specific to other natural hazards, the CRC's planning rules require an assessment of areas experiencing significant shoreline erosion as evidenced by the presence of threatened structures and or public facilities and an assessment of areas subject to high winds.

The State of North Carolina Hazard Mitigation Plan (2018) prepared by North Carolina's Department of Public Safety's Office of Emergency Management, identifies hazards that could potentially affect the State and identifies actions to reduce loss of life and property from a disaster across the state. As an Enhanced Hazard Mitigation Plan, it addresses not only natural hazards but technological, manmade and human caused hazards and serves as the sole hazard identification and risk assessment source for all hazards. While not a required by the CRC's planning rules, the local community may decide to identify a broader range of hazards in its plan.

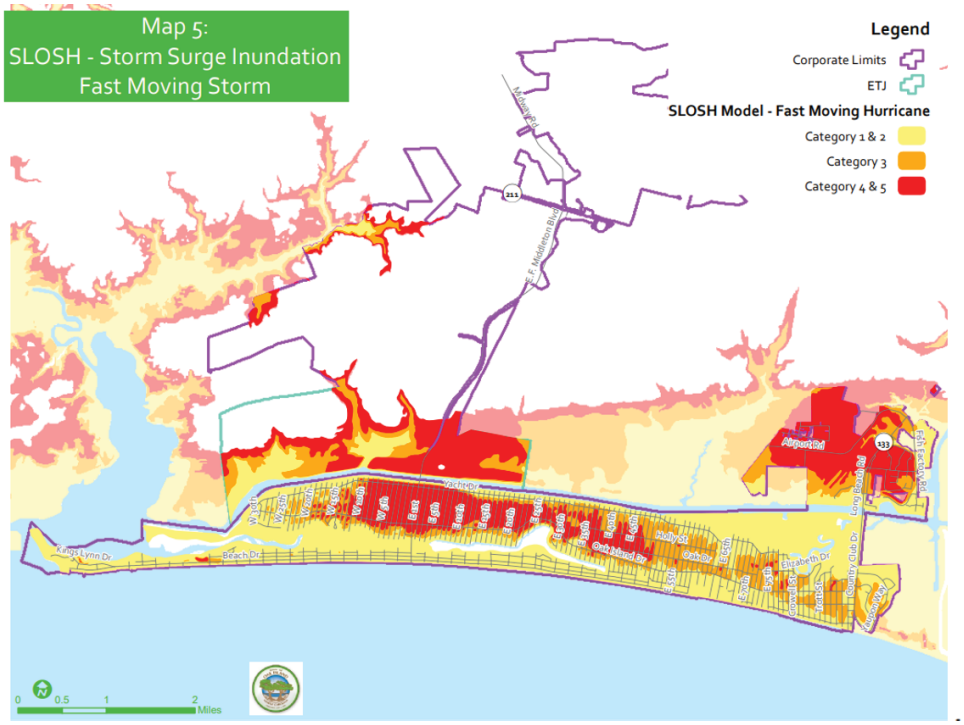
Flooding and natural hazard areas and their impact on land use is discussed in every element in Section 3 while flood zones and other natural hazard areas are defined in more detail in Section 3.6.

NOAA's *Digital Coast* contains links to a wide range of data, tools, and training that can help communities address coastal issues addressed in this manual.

DCM's Coastal Adaptation and Resiliency website provides additional data and mapping tools for natural hazards such as sea level rise to support adaptation and resilience planning efforts.

Storm surge areas

Storm surge is a rise in water level generated by a storm, over and above astronomical tides. Along the coast, storm surge is often the greatest threat to life and property from a hurricane (NOAA). It is important for planners to understand the potential geographic extent of storm surge areas when making future land use decisions to help prevent loss of life, property, and public infrastructure resulting from storm events. The National Hurricane Center (NHC) *provides a range of mapping tools and data* to estimate the potential geographic coverage of storm surge areas for different storm events. One informative tool on this site is *The National Storm Surge Hazard Map* that uses the SLOSH model to calculate potential storm surge associated with Category 1 through 5 hurricanes. Section 3.6 discusses the causes of storm surge and their importance to land use planning. The CRC's planning rules require an assessment of areas subject to storm surges.



Town of Oak Island SLOSH model of storm surge inundation from a fast moving storm from the Town of Oak Island: Comprehensive Land Use Plan (2017)

EXISTING LAND USE AND DEVELOPMENT

It is hard to develop a plan for future land use without understanding the existing land use and development pattern. The existing land use pattern is an important part of the community context that drives the identification of community aspirations and concerns and the vision for the future. Understanding existing land use also helps to develop goals, objectives, policies, and recommended actions. Section 3.1 discusses the importance of land development in more detail.

Existing land use

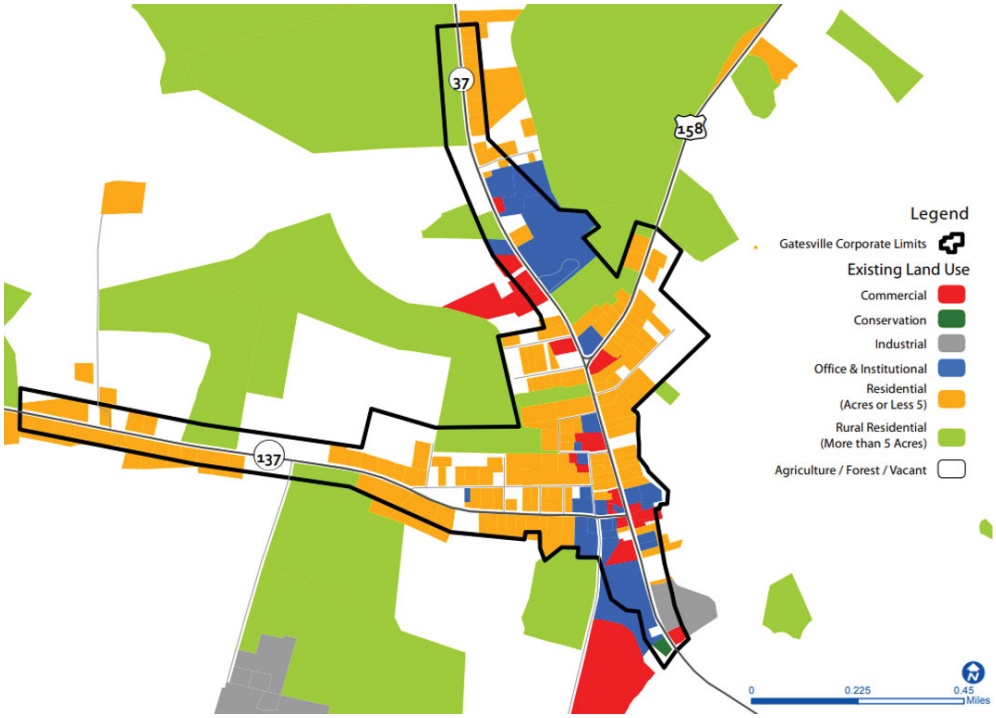
The CRC's planning rules require each plan to include an existing land use map and descriptions of existing land use. The existing land use patterns may include various categories such as residential, commercial, industrial, institutional, public, dedicated open space, agriculture, forestry, and vacant. The description must include estimates of the land area allocated to each land use category and the characteristics of each land use category. The *City of Boiling Spring Lakes 2016 Land Use Plan* (p. 4-2) describes the percentage of land use classified as commercial, office and institutional, recreation, single-family residential, and vacant. A combination of sources and methods is required to generate an existing land use map. Sources include county tax maps and records, aerial photography, interpretation of land cover from satellite images, and the

Aerial Photography
NC OneMap Orthoimagery

Land Cover Data
National Land Cover Database
NOAA's C-CAP (Coastal Change Analysis Program)

Multi-Resolution Land Characteristics (MRLC) Consortium *https://www.mrlc.gov/*

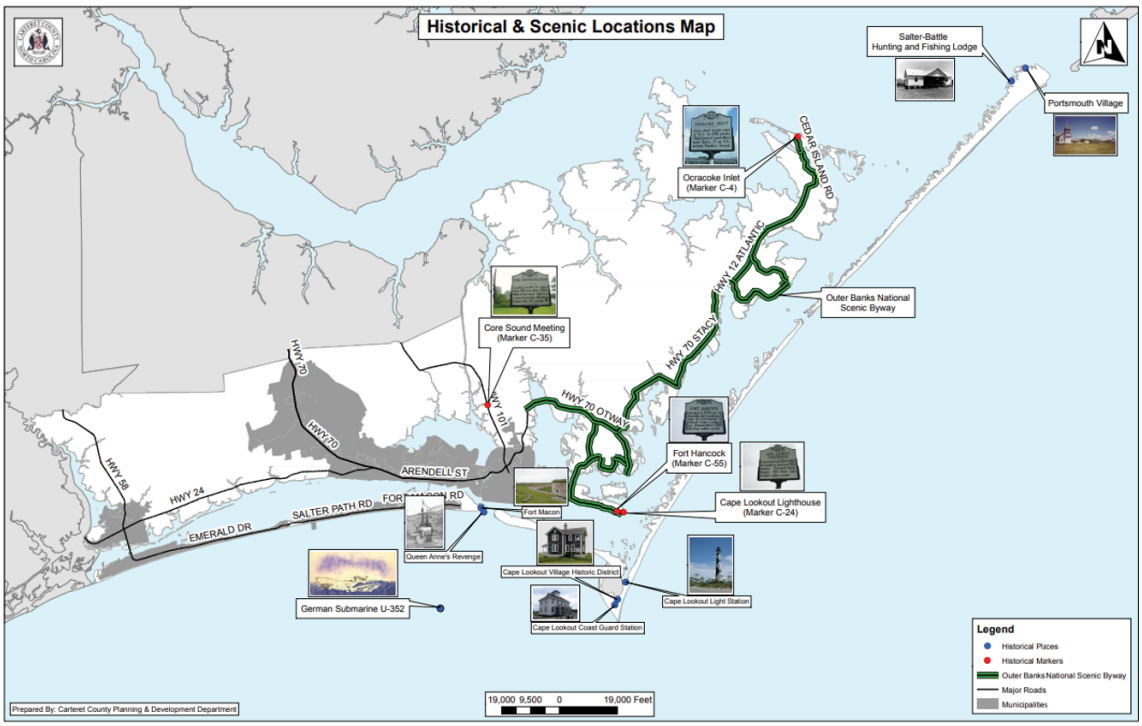
traditional field inspection or "windshield survey." Where GIS is available, using tax maps and records with limited "spot" field inspections where needed is an efficient method with acceptable accuracy for collecting existing land use information. The *Chowan County Town of Edenton Joint Land Use Plan* (2018) documents the methodology used to create its existing land use maps in Appendix 8 (Page 4-12 and Pages 4-99 through 4-102). Geospatial information was collected using a range of data sources to create draft existing land use maps. Draft maps were then presented at a community workshop where changes were made based on participant comments. When creating the existing land use map, be sure to include municipal boundaries and Extra-Territorial Jurisdiction (ETJ) and factor them into the estimates of area allocated to each category.



Town of Gatesville Existing Land Use Map from the Gates County Comprehensive Plan (2017)

Historic, cultural and scenic areas

Historic, cultural and scenic areas contribute to a community's uniqueness and sense of place. The CRC's planning rules require a description of the community's historic, cultural and scenic areas designated by a state or federal agency or by local government and a corresponding map of these areas. As an example, The *Town of Manteo Core CAMA Land Use Plan Update* (2007) identifies cultural, historic, and scenic areas in a narrative (p. 57), a map (Figure 17 on p. 63), and lists locally important structures not yet included in the state or federal listings (Appendix C, pp. 159 – 162). Section 3.1 discusses the importance of protecting and preserving historic, cultural, and scenic areas.



Carteret County Historical and Scenic Locations
from the 2021 CAMA Land Use Plan Update Carteret County NC (2022)

Information on federally designated historic places is provided by the *National Register of Historic Places* and is available via a *webmap*. More detailed information on the National Register of Historic Places and eligible properties and study areas, as well as the process for proposing new sites, can be found by consulting the *North Carolina State Historic Preservation Office* and by visiting their *website search tool*. For architectural resources, *NC Listings in the National Register of Historic Places* are provided by county. *NC Historic Sites* also identifies locations of historic and cultural significance. Locally designated historic structures and/or historic districts are also to be included in the plan.

The NC Office of State Archeology *maintains a listing* of active sites as well as *underwater sites* worthy of protection. The Office of State Archaeology is *currently creating* a GIS database of North Carolina's archaeological sites and systematically surveyed area, however, at this time, web-based access is not available. North Carolina Underwater Archaeology Branch is in the process of converting major reports to a digital format for online access. A listing of major underwater archaeological reports are available *on their website*.

North Carolina has several *National Scenic Byways*, including one on the Outer Banks. The NCDOT has also *designated* a number of state roads as scenic byways.

ANALYZING INFRASTRUCTURE AND COMMUNITY FACILITIES

A community's infrastructure and community facilities are important contributors to economic growth and quality of life. Infrastructure can be used to guide growth to areas suited for development, and away from areas with environmental constraints. Limited or inadequate infrastructure can place constraints and limitations on land development, particularly when it cannot accommodate a growing population. Section 3.4 discusses the importance of each type of community facility and the practices to ensure that a community provides adequate infrastructure and community facilities sufficient for planned growth. The CRC's planning rules require each land use plan to evaluate existing and planned capacities as well as the locations and adequacy of the following infrastructure:

- Public and private water supply systems;
- Public and private wastewater systems;
- Multimodal transportation systems; and
- Stormwater systems.

Public and private water supply systems

Public Water Supply Water Sources GIS Data – *NC OneMap*

A water supply system consists of a water source, water treatment and storage facilities, and the pipelines and equipment that transmit water from the source and facilities and distribute treated water to houses, businesses and other users. The water supply system service area is the geographical area served by the system. Each CAMA plan must include a description of all of the existing public and private water supply systems and a map of all existing and planned public and private water supply service areas. At minimum, this discussion is to include the existing condition and capacity of the system, documented overflows or bypasses, and other problems that may degrade water quality or constitute a potential threat to public health as documented by DEQ's Division of Water Resources. The CAMA plan must also indicate the future water supply needs for the community based on the plan's population projections. For example, the *Pasquotank County and Elizabeth City's Joint Advanced Core Land Use Plan* (2012, pp. 94-100) provides a thorough treatment of its three local water supply systems. The most extensive of these systems is the Elizabeth City Municipal Water System, and this plan describes the background and historical development of this system and identifies current and future assets, opportunities, liabilities and challenges currently facing the system. The plan also describes future water supply needs for unincorporated areas and the incorporated areas of Elizabeth City and South Mills. This analysis establishes the current state of water systems within Pasquotank County and the future needs, which then sets the stage for the plan's objectives and recommendations for the future.

Table 5.5 Current and Future Water System Needs – Carteret County Planning Area

Total Population, Water Supply, Water Demand, and Demand as Percent of Supply for Five Planning Area Water Systems					
Year	2019	2020	2030	2040	2050
Total population served (permanent & seasonal)	55,803	57,486	60,360	63,396	66,618
Total water supply (MGD)	10.1	10.1	11.5	11.5	11.5
Total demand (MGD)	3.0	3.4	3.6	3.8	4.1
Demand as Percent of Supply	30%	34%	32%	33%	35%
Source: System Water Supply Plans, 2019-2020 Water systems: Bogue Banks, Harkers Is., Merrimon, North River/Mill Cr., and West Carteret					

Carteret County Future Water System Supply Needs for its planning area based on population projections from the 2021 CAMA Land Use Plan Update Carteret County NC (2022)

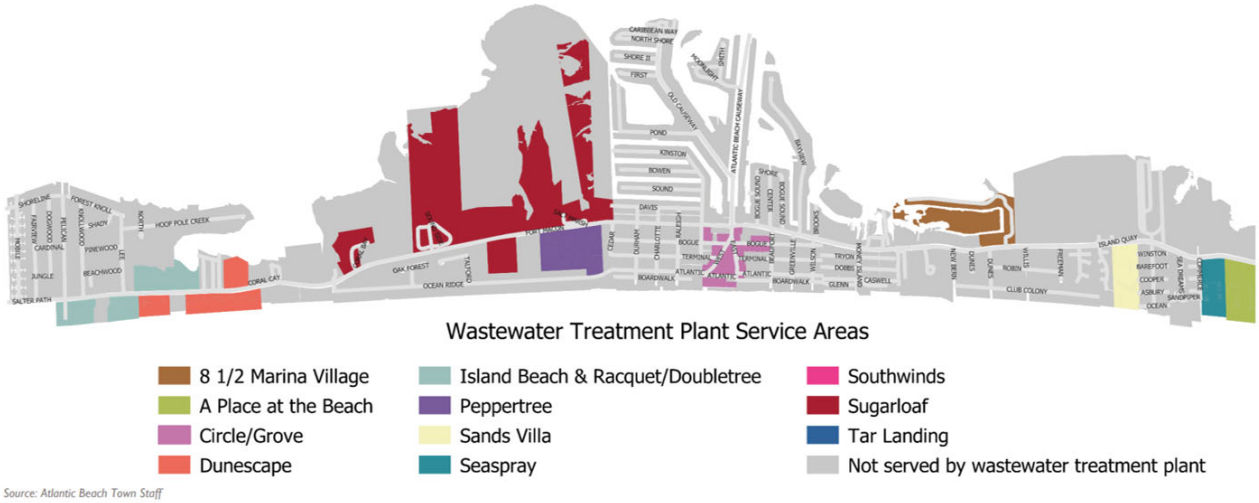
While not required by CRC planning rules, it is recommended that the community also factor in other anticipated needs (e.g., economic development, agriculture, etc.) into the projection for future water supply needs so that the future system provides adequate capacity.

The information needed to complete the descriptions and map requirements may be obtained from a variety of sources. Much of the information should be available from the operator of the public or private water systems or a *Local Water Supply Plan*. All units of local government that provide or plan to provide public water service and all community water systems that regularly serve 1,000 or more service connections or more than 3,000 people are required to prepare an annual Local Water Supply Plan for submittal to the *NC Division of Water Resources Water Supply Planning Branch*. These plans provide valuable information for the analysis of your local water systems, including populations, current usage, water supply and demand projections, and overall future water supply needs.

Public and private wastewater systems

A wastewater system consists of a wastewater treatment facility and the pipes and equipment that collect waste from houses, businesses and other users for treatment. The wastewater system service area is the geographical area served by the system. The CAMA plan must include a detailed description of all existing public and private wastewater treatment systems and a map of all existing and planned public and private wastewater service areas. The description is to include a discussion of existing conditions and existing capacity of the systems. It is also required to discuss documented overflows or bypasses, and other problems (e.g., DEQ violations, system failures, etc.) that may degrade water quality or constitute a threat to public health as documented by DEQ's Division of Water Resources (DWR). The CAMA plan is also required to indicate future wastewater needs based on population projections. For example, the *Currituck County 2006 Land Use Plan* (pp. 5-4 - 5-5) discusses the county's nine large surface sewage treatment plants and many on-site wastewater treatment systems that serve individual developments in the county. The county operated only one of the large surface wastewater plants when the plan was written. A composite map of water and sewer service areas is provided on Map 5.1 (p. 245).

Section 2.5.7: Wastewater Treatment Plant Service Areas



Town of Atlantic Beach wastewater treatment plant service areas are shown for privately-owned sewage treatment plants only since no public wastewater treatment is provided. from the Atlantic Beach CAMA Land Use Plan Update (2021)

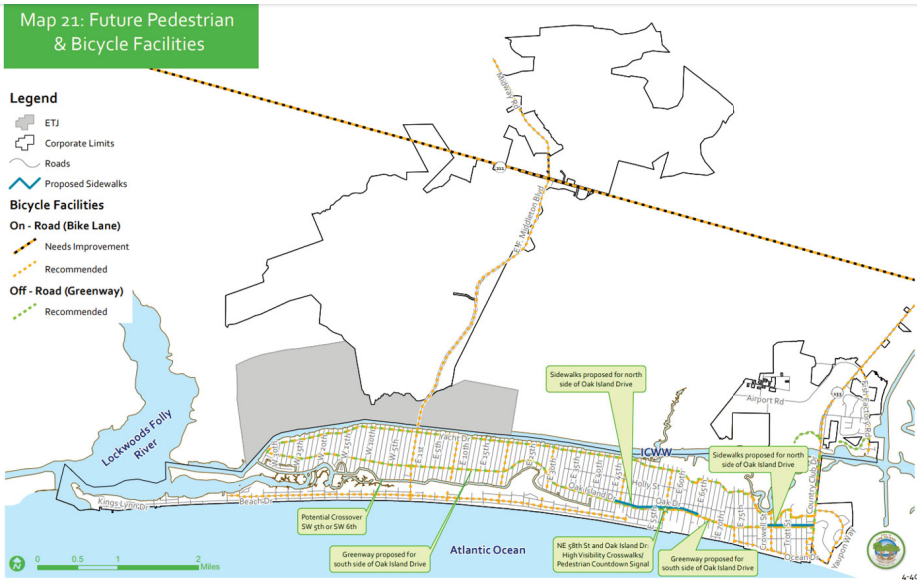
Information needed to complete the descriptions and map requirements should be available from the operator of the public or private wastewater systems. The NC Division of Water Resources *provides a map of collection systems*, but does not provide the service area. A *map of non-discharge wastewater treatment systems* is also available.

Multimodal transportation systems

A multimodal transportation system consists of a broad range of transportation options, including roadway, sidewalk, bike lane, transit, railway, port and airport facilities. The importance of a multimodal transportation system and its relationship to land use and economic development is discussed in more detail in Section 3.5. The CRC's planning rules require a plan to include a detailed description and map of the community's existing and planned multimodal transportation systems and port and airport facilities. The description must include:

- Any highway segments deemed by the NC Department of Transportation (NC DOT) as having unacceptable services as documented by the most recent NCDOT Transportation and/or Thoroughfare Plan;
- Highway facilities on the current Thoroughfare Plan or current Transportation Improvement Plan; and
- The impact of existing transportation facilities on land use patterns.

For example, the *Gates County, NC: Comprehensive Plan* (2016) reviews multimodal transportation (pp. 3-43 and pp. 4-6 - 4-15), drawing heavily from the *Gates County Comprehensive Transportation Plan* by addressing roadways and bicycle and multi-use path facilities. Maps from the comprehensive transportation plan are included in the plan to address mapping requirements.



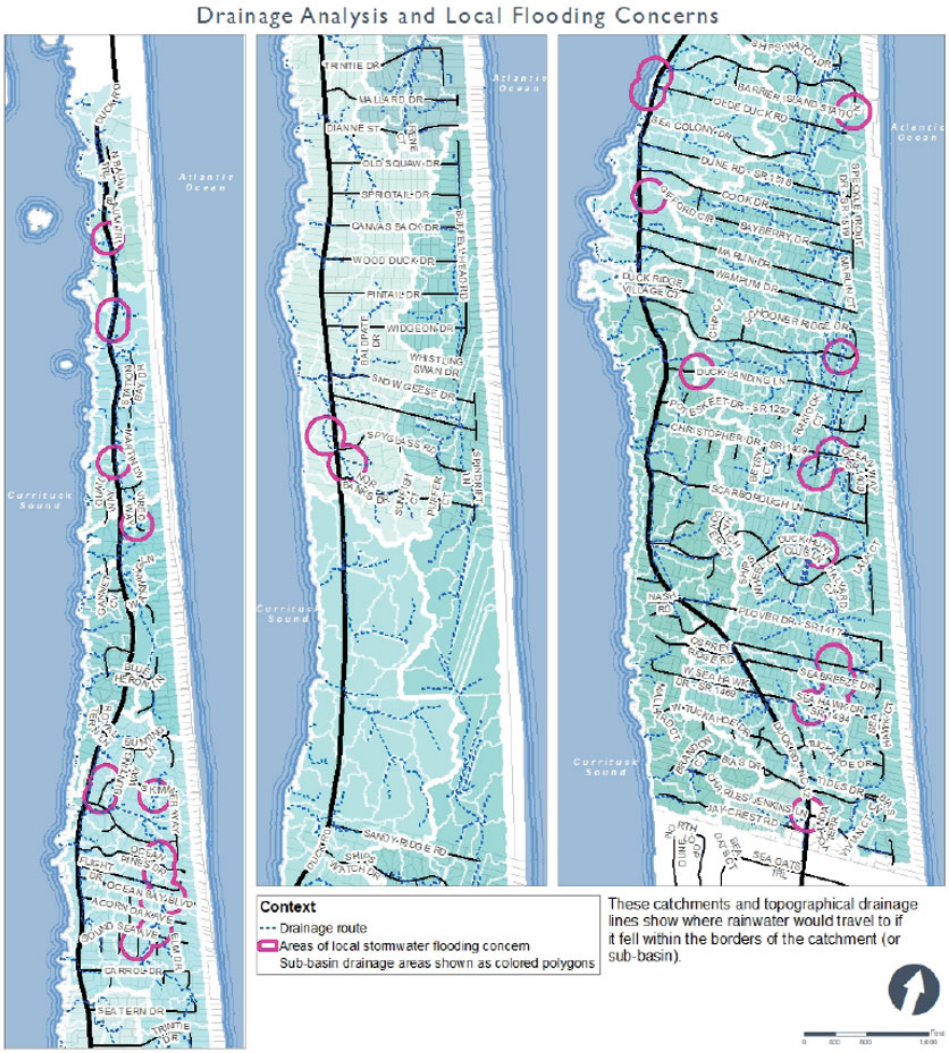
Town of Oak Island Future Pedestrian and Bicycle Facilities from the Town of Oak Island: Comprehensive Land Use Plan (2017)

The NC Department of Transportation organizes the state's transportation planning activities under Metropolitan and Rural Planning Organizations (MPO/RPO). The majority of coastal NC is covered under RPOs, with MPOs in New Bern, Jacksonville, and Wilmington. Organization boundaries are shown on a map *provided by the NCDOT*. These planning organizations assist with the creation of comprehensive transportation plans, which are the primary source material for narrative and maps to address the transportation topic. The community's transportation plan can be obtained from the respective MPO/RPO or downloaded from Connect NCDOT, which *has links* to long term, long range transportation plans for municipalities, counties, and metropolitan areas. Transportation improvements projects are indicated in NCDOT's *most recent State Transportation Improvement Program* and are listed by NCDOT Division (coastal NC counties are within Divisions 1, 2, and 3). Additional information can be found from a number of different sources such as *Log Into North Carolina* (LINC) and *NC OneMap*. The NCDOT's *Maps and Local Governments web pages* also contains links to useful transportation related information including map coverages.

For more information about regional transportation planning activities see the *North Carolina Association of Metropolitan Planning Organizations* (NCAMPO) or *RuralTransportation.org*

Stormwater systems

A stormwater system consists of the infrastructure that conveys rainfall during a storm event. Municipal systems may be combined with a wastewater treatment system or use a separate storm sewer system. Each CAMA plan is required to describe the existing public stormwater management system. It is also required to identify existing drainage problems and water quality problems related to point source discharges of stormwater runoff. Section 3.3 describes the importance of stormwater and its impacts on local water quality.



Locally identified areas of flooding concern in the Town of Duck from the Town of Duck Comprehensive and CAMA Land Use Plan (2021)

Information about a community's stormwater system is provided primarily by the local government. For municipalities in urbanized areas that manage separate storm sewer systems, information can be derived from National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Separate Storm Sewer System (MS4) permits. The NPDES is a federal permitting program that regulates point sources that discharge pollutants to waters of the United States. Phase II MS4 permits are required for communities to discharge untreated stormwater from their municipal separate storm sewer systems. In North Carolina this program is managed by DEQ's Division of Energy, Mineral and Land Resources (DEMLR). Phase II permits are indicated on DEMLR's *NPDES MS4 Permitting Site* and can be viewed *on a map*. Other resources include DEMLR's *Stormwater Maps and GIS Resources webpage*. If there is a local program or utility responsible for managing stormwater outside of an MS4 permit, they are also likely to have much of this information. When combined with the sources of water quality information noted earlier in this section, planners can also identify water quality problems associated with the community's stormwater system.

Stormwater management, particularly in suburban and rural areas, can be organized under watershed management districts. The Camden County *Advanced Core CAMA Land Use Plan* (2005, pp. 101 – 103), examined stormwater drainage in their rural county. At that time, the county was conducting a drainage study for various creek watershed areas with the goal of establishing a stormwater management program through watershed districts that could generate funds for ongoing maintenance of drainage ditches and tributaries. In 2014, Camden instituted a Stormwater Utility Ordinance with four assigned watershed districts to maintain and manage watersheds in the county. The county conducts clearing and maintenance activities on major streams and ditches to keep downstream and forested areas clear of debris while property owners and the NCDOT maintain the ditches and canals located on their property and within road rights-of-way to manage stormwater.

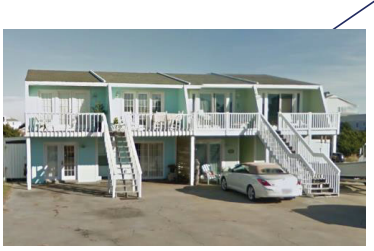
GETTING MORE OUT OF YOUR PLAN

Effective planning requires a fact base consisting of a wide range of data on the existing and emerging conditions affecting a community. Clearly, there is an important technical component to the planning process. Decision making should be fact-based using the best available data and projections of future conditions to understand the different topics addressed by the plan. These data should also be used to support the plan's policies and recommendations which can be accomplished in different ways. Many communities have a chapter that contains the data and required analysis in an element that documents the existing and emerging conditions. The information can also be incorporated into different elements as both required and optional topics are covered. Regardless of the approach taken, it is important to use this information to support the policies, strategies, and recommendations across the different sections of the plan.

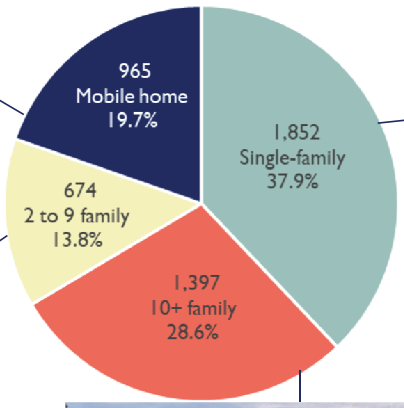
However, communicating the results of the analyses to the public, advisory committees, and local decision makers in ways they can understand and use is equally important. This requires using features such as maps, tables, graphics, and text summaries that effectively convey the meaning, intent, and complexity of issues in ways that are understandable to the audience for the plan. Key principles and ideas should be communicated in a readable and attractive manner to inform, engage, and motivate the public, local officials, and decision makers to support its ideas and recommendations. This may also involve using new data visualization tools and presenting the plan in formats that go beyond paper (e.g., web-based formats) that provide greater opportunity for interactive content (Godschalk and Rouse 2015).

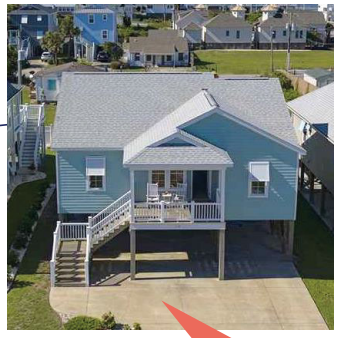
2.2.2: HOUSING

The Town's housing stock—4,888 units in total—forms the core of its developed areas. The high number of properties used as vacation rentals or seasonal homes makes analysis of housing in Atlantic Beach different from many other communities.



Housing Units by Type of Structure





Most of the housing in Atlantic Beach is located in either single-family neighborhoods or large multi-family developments.

Only 1 out of 5 housing units in Atlantic Beach is occupied by a year-round resident.

Atlantic Beach has very little vacant housing – only about 4% of the units in town, or about 200 units, are vacant.
Of these, most are available for rental. Less than 50 homes on average are up for sale.

The dramatic increase in home values and low vacancy rates indicate a very strong housing market.

Median value of owner-occupied housing in 2018:

$357,800

Median value of owner-occupied housing in 2000:

$160,200

Source: American Community Survey, 2018 Five-Year Estimates; Census

Visualization of housing data using chart, graphics, text summaries and community photos from the Atlantic Beach CAMA Land Use Plan Update (2021)

Section 2.3

Creating a Vision for the Future

TOPICS INCLUDE:

- Community concerns and aspirations
- The vision statement

INTRODUCTION

The initial phase of the planning process, often referred to as the "visioning" phase, should lead to both the identification of community concerns and aspirations and the vision statement. The community concerns and aspirations reflect the planning needs and desires of the community that support the land use and development policies included in the plan. Their selection typically grows out of the analysis of the existing and emerging conditions described in the previous section. Public engagement processes can also be used to identify the community concerns and aspirations. The community vision describes the general physical appearance and form that represents the plan for the future. Both are critical components of a plan. The community concerns and aspirations influence the topics addressed in the plan and how it is organized. The vision statement reflects the overall goals the plan seeks to achieve. Consequently, they both influence the development of the plan's policies and recommended actions in significant ways.

"When it comes to understanding community, people, housing, and employment are as simple as it gets"

— Unknown

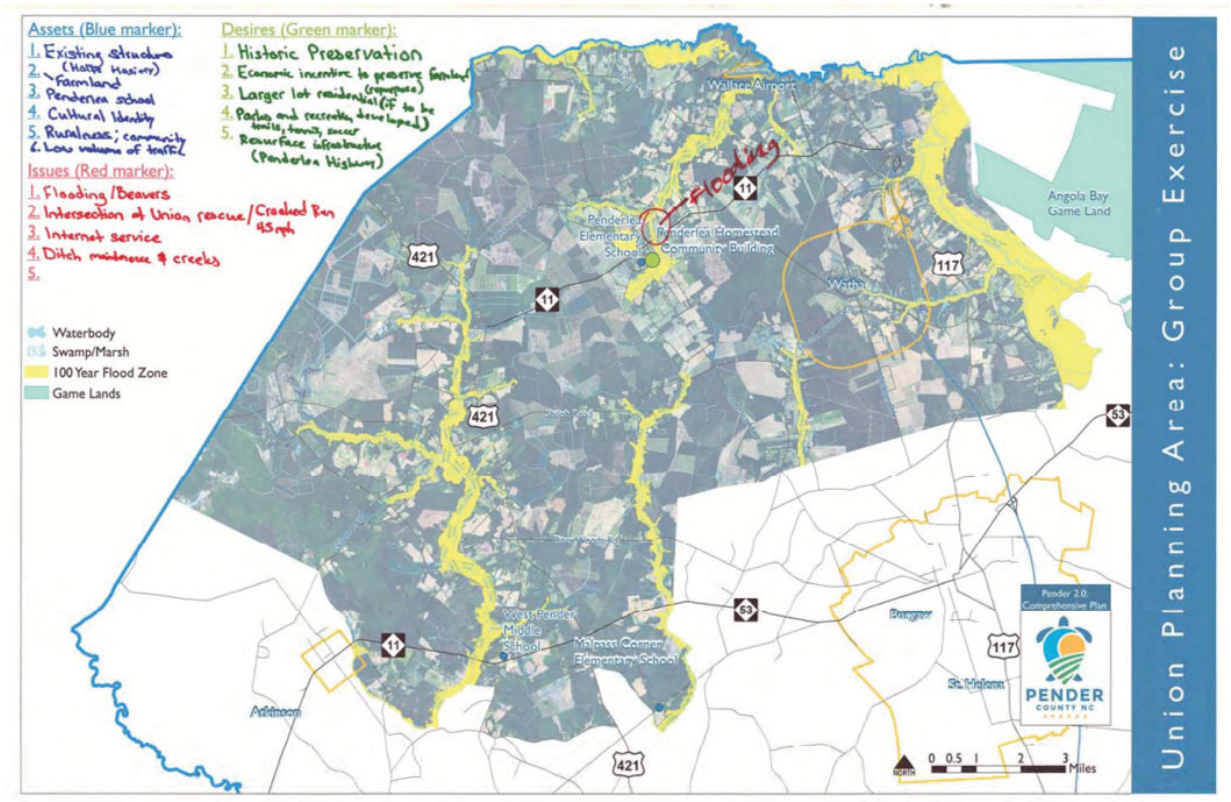
COMMUNITY CONCERNS AND ASPIRATIONS

The community concerns and aspirations must reflect the community's significant existing and emerging conditions and key planning issues. They are issues that are most important to residents, business owners, and non-resident property owners. This information should reflect the analysis of the existing and emerging conditions (see Section 2.2). While the CRC planning rules do not require public participation in the planning process, it is difficult to imagine how a planner would assess the community's concerns and aspirations without using a survey, workshop, or other public engagement strategy. Public participation can also provide practical support because residents often have local knowledge that can inform the identification of community concerns and aspirations (see Section 1.3).

The discussion of community concerns and aspirations should include enough detail to clarify the planning needs and desires of the community to support the land use and development policies included in the plan. At a minimum, it must include a discussion of the following:

- ***Significant existing and emerging conditions:*** The plan shall describe the dominant growth-related conditions that influence land use, development, water quality, and other environmental concerns in the planning area.
- ***Key issues:*** The plan shall describe the land use and development topics most important to the future of the planning area. The description shall include public access, land use compatibility, infrastructure carrying capacity, natural hazard areas, and water quality and may include other areas of local concern

Accordingly, the list of community concerns and aspirations supports the development of a vision statement, and it becomes the basis for organizing the discussion of the plan's goals, objectives, policies, and recommended actions.



Community concerns and aspirations in the Union Planning Area of Pender County were identified using a public engagement group exercise map. Note that the 100-year floodplain and aerial imagery have been provided on the map for reference. from the Pender 2.0: Comprehensive Land Use Plan (2018)

MANTEO 2007 CAMA LAND USE PLAN

Community Concerns and Aspirations

Maintaining a small town sense of community; carefully developing an economy that is place-appropriate for Manteo; and maintaining the unique natural edges of forest, wetland, and water around the town are goals that Manteo residents have pursued since the first CAMA plan in 1981 and continue to pursue today.

The planning process for Manteo's 2007 *CAMA Land Use Plan* Update reinforces long-held community values and goals and identifies new challenges and strategies for the Town to pursue. The key issues today revolve around growth. Manteo's infrastructure, the wastewater treatment plant in particular, has limited capacity remaining. At the same time, Manteo residents are more focused than ever on resource protection, from preserving wetlands to improving water quality. With these issues in mind, community members participated in planning workshops to update goals for planning in Manteo. These goals became the foundation for the 2007 CAMA Land Use Plan Update:

1. Maintain small town character, hometown sense of community, and history
2. Protect upland wetlands and other environmentally fragile areas on the island
3. Require new development to be in character with the town
4. Maintain a natural edge of wetlands, forest, and water around town
5. Improve water quality in Shallowbag Bay to allow shellfishing
6. Provide adequate public parks and open spaces
7. Provide affordable housing
8. Limit growth so it doesn't exceed the wastewater plant's current capacity
9. Make safe places to walk to see neighbors, shop, and go to school
10. Slow down growth

THE VISION STATEMENT

Vision statements balance aspirational goals for the community with specific ways to achieve them. The vision statement is a central element of any CAMA plan. Each plan must include a community vision that describes the general physical appearance and form that represents the local government's plan for the future, including objectives to be achieved by the plan and identify changes that may be needed to achieve the planning vision. Broad-based public participation can lead to a vision that fully captures the future a community sees for itself (See Section 1.3). It is very difficult for professional planners to discern a community's vision for its future without some form of public participation .

As stated earlier, vision statements often include aspirational goals. There are many examples from coastal communities across NC. For example, in their 2016 vision statement, the residents, business and property owners of the Town of Ocean Isle Beach state that they intend to maintain and enhance their community "as the finest family-oriented beach community in the United States." Chowan County's 2018 vision statement describes striving "to preserve the rural character, natural beauty and scenic qualities of this remarkable place by guiding growth and development so that our natural and historic resources are protected for future generations." Some vision statements are very specific about how land use decisions support the community's vision for its future. For example, in their 2017 plan, the Town of Oak Island residents envision living in a community in which "multi-modal transportation options including efficient sidewalks, bikeways, and roadway system will provide for an accessible community."

The vision statement has two main planning purposes. It provides a foundation for setting priorities, defining goals, and developing land use policies to achieve them. For example, it allowed the Town of Kitty Hawk to build consensus among various stakeholders on a unified approach to its land use and development issues. Through its vision statement in the *Kitty Hawk North Carolina CAMA Core Land Use Plan Update 2003-2004* (2005) the Town of Kitty Hawk describes what it wants to be and how it wants to look in the future.

KITTY HAWK VISION STATEMENT

Kitty Hawk is a cottage community:

- rich in history and tradition
- tranquil and environmentally attuned
- portraying a unique mixture of resort beach and traditional Outer Banks village
- characterized by low to medium density, single family residential development with commercial establishments serving its residents and seasonal visitors

Advice for writing a vision statement from the Town of Kitty Hawk

The Kitty Hawk vision statement:

- is developed using information about driving forces, priority issues, and citizen values and aspirations concerning what Kitty Hawk should look like in the future;
- is written in positive terms and in the present tense;
- includes a description of how the Town will look in the future;
- is not time-bound and extends beyond the horizon of the land use plan;
- is not lengthy, but provides for goals and policies developed as a part of the land use plan;
- is tailored to Kitty Hawk; and,
- is endorsed by the Kitty Hawk Town Council.

Ingredients of a Vision Statement

- Positive, present-tense language
- Qualities that provide the reader with a feeling for the region's uniqueness
- Inclusiveness of the region's diverse population
- A depiction of the highest standards of excellence and achievement
- A focus on people and quality of life
- A stated time period

Source: National Civic League Press, quoted in Town of Kitty Hawk CAMA Core Land Use Plan Update, 2004

- wherein development remains on a human scale and is in harmony with nature
- possessing undisturbed natural areas such as Kitty Hawk Woods, a vast maritime forest
- whose special atmosphere comes from a combination of natural beauty and small-scale development
- whose major tourist attractions include the Atlantic Ocean and the waters of the Currituck Sound, Kitty Hawk Bay, and Albemarle Sound
- set apart by the fact that is has clearly expressed a preference for being a family oriented beach community
- which neither encourages or permits high rise apartments, condominiums, time shares, urban density, intense waterfront development, carnivals, amusement parks, or racetracks
- intent upon remaining a low density family oriented community, a year-round community, a retirement community, a traditional coastal village community, and a resort-tourist community in harmony with the natural environment

Locally identified community concerns, aspirations and key issues contribute to the creation of the vision statement. For example, The Town of Manteo adopted the following vision statement in their 2007 plan in response to the concerns and issues identified:

> "The Town of Manteo is a small town with a permanent population whose identity is intimately tied to its natural landscape. Future development and economic growth will preserve the character of the town and the surrounding landscape of Roanoke Island while supporting the livelihood and quality of life of residents of Roanoke Island. The planning process used to accomplish this vision will be transparent and should encourage participation."

While not required by the CRC's planning rules, some communities move beyond a written vision to convey their preferred future in the form of maps and images. For example, the Town of Oak Island began creating its 2017 Comprehensive Land Use Plan through a visioning process that contributed to the town's vision statement and also resulted in a map of land use concerns and defined preferences for the "look and feel" to the town, including buildings not taller than four stories, tree preservation, increased landscaping in commercial areas and open space preservation. The character residents envision for the Town of Oak Island was identified in a visual preference survey in which participants at a public workshop assessed images of buildings, streets, open spaces, landscaping, and parking and identified which they prefer.

Public Input Map
from the Town of Oak Island: Comprehensive Land Use Plan (2017)

Preferred future appearance of the Town of Oak Island based on a visual preference survey from the *Town of Oak Island: Comprehensive Land Use Plan* (2017)

Buildings

Streets – Pedestrian/Bicyclist Zone

Landscape Material

Open Spaces

Streets – Thru-Zone

Parking

GETTING MORE OUT OF YOUR PLAN

If community vision is the destination, the plan is the road map for how the community will get there. The list of community concerns and aspirations and key issues are the major topics that need to be addressed along the way. While the vision statement defines the future, the community hopes to achieve, the community concerns and aspirations and key issues reflect the topics the plan has to address to bring the vision to life. Some topics are required in all CAMA plans. These topics are described in greater detail in Section 2.4 and include land use compatibility, public access, water quality, infrastructure carrying capacity, and natural hazard areas. However, the list of community concerns and aspirations and key issues often encompasses a much wider range of topics, many of which are addressed in the variety of elements that comprise Section 3. The selection of the community concerns and aspirations and key issues should be informed by the analysis of existing and emerging conditions. It should also reflect the community context and priorities that emerge from public engagement. The outcomes of the visioning process may also produce a list of topics that a local government should consider for inclusion in the plan. For example, a vision that mentions economic prosperity suggests that the plan should include economic development policies as discussed in Section 3.1.

The community's vision statement should also drive the future land use map. If a community's vision includes remaining a family-oriented beach community, the future land use map should show how this conceptual idea plays out across the community both in the form of mapped residential areas but also through the character of commercial areas and the location of public amenities such as schools and parks. Development of the future land use map is discussed in more detail in the Section 2.4 of this manual.

To chart a realistic course, some analysis of the community's status quo is necessary before visioning begins. Some or all of this background information should be collected before the visioning process begins so the vision can be informed by a realistic picture of the community's status quo. This is important for two reasons. First it is hard to develop a plan for the future unless you understand where you have been. Second, analyzing data on topics like population growth and housing construction rates will show trends. Through the visioning process, the community can then decide how these trends impact its future and make decisions based on this knowledge. For example, a community that values its rural character but foresees population growth could choose to incorporate goals, objectives, and policies in its comprehensive plan to permanently preserve farmland or other types of open space.

For more information on community visioning:

Using Visioning in Comprehensive Planning Process. Anna Haines. 2001. Published by the University of Wisconsin Extension.

Planning for the Future: A Handbook on Community Visioning. The Center for Rural Pennsylvania. 2006. Published by the Center for Rural Pennsylvania.

Word cloud image representing survey responses to the question: What are the things about Atlantic Beach that you love and would not want to change? Words most often used in the responses show up larger in the cloud image. from the Atlantic Beach CAMA Land Use Plan Update (2021)

Section 2.4

Managing Future Development

TOPICS INCLUDE:

- Goals, objectives, policies, and actions
- Writing the plan for use in CAMA permit decisions and for federal consistency reviews
- Addressing the CRC's management topics with goals, objectives, policies and actions
- The future land use map
- Tools for managing development
- Implementing the plan

INTRODUCTION

Once planners understand the community's existing and emerging conditions and its vision for the future, the next question is how to get there. This section covers the basics of what must be included in a CAMA plan. It begins by discussing how to write goals, objectives, policies, and implementation actions that bring the vision statement to life. Next, it provides an overview of the five topics that the CRC planning rules require every plan address: Public Access, Land Use Compatibility, Infrastructure Carrying Capacity, Natural Hazard Areas, and Water Quality. It also provides an overview of the planning objectives that must be addressed in every plan by the community's policy statements and future land use map. It concludes with a discussion of the tools for managing future development which include the community's development management program and an action plan and implementation schedule.

If community vision is the destination, the plan is the road map for how the community will get there. — *from the guide*

GOALS, OBJECTIVES, POLICIES AND ACTIONS

Creating goals and objectives is the critical bridge between a community's vision and the policies and actions that work towards building the future community members seek. The CRC's goals and planning objectives for the five topics require local policies and associated implementation actions. Though not required in the CRC's rules, local governments can develop additional goals and objectives to address these topics and others of community interest. Goals are general statements that reflect the desired outcomes that planners and decision makers hope to achieve. However, planners should be careful to not state goals so broadly that it is impossible to measure progress towards the goal. Rather, an effective plan sets goals that support its vision. Objectives support the goals. A goal may be accompanied by multiple objectives designed to achieve different aspects of the same goal, but an objective should not stand alone without a goal that it supports. Objectives are more specific and include measurable targets met through actions (e.g., implementation of policies and actions).

The plan should include policies that specify the principles used to guide the public and private actions needed to achieve the plan's goals and objectives. Policies represent a general rule or set the course of action a community takes to achieve its goals and objectives. They guide decision-making and set the parameters for the actions that implement the plan. Plans can also recommend specific actions needed to satisfy the goals, objectives and policies (e.g., establish a new program, undertake a specific project, etc.). The main difference between policy and action statements is that policy statements can be used over and over again to guide decisions while action statements can be considered a task list, used once and completed. When put together, the goals, objectives, policies, and actions provide a framework for making future decisions. When developing a plan, it is often useful to define the terms used in these action statements. For example, The Hertford County *CAMA Land Use Plan Update* (2011, p. 101) contains a listing of all of the policy/implementation terms used in its plan. Similarly, Currituck County's *2006 Land Use Plan* (p. 9-2) defines the meaning of all key words used in its policy statements.

TIPS FOR WRITING GOALS, OBJECTIVES AND POLICIES

- Goals, objectives and policies, should focus on achieving the community's vision.
- Be concise and be sure that each statement is just one goal or objective.
- Be specific and realistic in terms of what you hope to achieve.
- While goal statements are often broad, they should still be specific enough to exclude some actions. Similarly, while goals are not measurable, they should still describe the desired outcome.
- When possible, write objectives in quantitative terms so that progress is measurable.
- Avoid writing too many goals and too few objectives and policies. There are typically several objectives and policies under each goal.
- Pay attention to the words used. Shall means required. May or should provide discretion.

Writing policies for use in CAMA permitting

Policies and the future land use map are used as part of DCM's permitting process. It is important to be clear on the issues that the community wants CAMA permitting to regulate through the certified plan. It is also important to consider the wording of policies to ensure that their intent is clear when applied in the context of CAMA permitting. Consider a policy worded as follows: *It is the policy of the Town that residential and commercial structures shall not exceed 35 feet in height.* The policy is definitive in its wording and can be used as the basis for denying a permit for any application involving structures greater than 35 feet in height. Unlike local permit procedures, there is no variance provision regarding CAMA plan policies. Either the CAMA permit request must be modified or the state certified plan must be amended to allow permit approval (see Section 2.5).

As the following examples demonstrate, a community can include policies that exceed the CRC's use standards and permitting requirements found in *Subchapter 7H*, State Guidelines for Areas of Environmental Concern. It is important that these policies be clearly interpretable as enforceable, and are identified as exceeding the CRC's rules.

Pamlico County has policies that exceed the CRC's use standards and permitting requirements for marina development. The CRC's rules do not require wastewater pump-out, restrooms, parking and hydrants to be provided as part of a marina development, but policies 1.1.2.1 and 1.1.2.2 from the *Pamlico County Joint CAMA Land Use Plan 2005* (p. 57) state:

> The county will require open water and upland marinas to meet the following development guidelines:
>
> - Provide wastewater pump-out facilities and restrooms approved by the appropriate state or local agency.
> - Provide at least ½ off-street space for each slip or storage space. (Marinas serving solely property owners of an adjoining subdivision are not required to provide off-street parking.)
> - Provide at least one dry fire hydrant.
>
> Multi-dock facilities that accommodate 10 or less slips or more than 4 slips are required to provide either permanent restrooms or pump-out facilities, unless they serve exclusively an adjoining residential subdivision.

Pamlico County also enforces a 75-foot shoreline conservation zone in their plan policies that exceeds the CRC's permitting rules. As stated in Policies 2.3.3 through 2.3.3.1. (p. 59):

> The county establishes a local, permanent conservation zone within 75 feet of the normal mean high water level or normal water level for all shorelines bordering public trust waters, estuarine waters, and any waters designated as primary nursery areas.
>
> All development and construction activities will be prohibited in this area except for the following uses: marinas, docks and piers, boat ramps and similar structures providing public access; and structures to prevent erosion as described in the Public Access policies section.

In 2013, the Town of Nags Head amended the *Town of Nags Head 2010 Land Use Plan* governing the use of sandbags on the oceanfront seaward of a static vegetation line, making it more stringent than the CRC's rules. As stated in Policy/Planning Objective 1. B. (p. 96):

> Allowing for the repair, replacement or installation of septic systems and/or sandbags seaward of the static vegetation line as delineated by the Division of Coastal Management on maps effective August 18, 2011 or the first line of stable natural vegetation, whichever may apply, is contrary to the public health, safety and welfare. The Town opposes the permitting, construction or placement of such septic systems and/or sandbags and finds that such permitting would be inconsistent with the Town's planning for the Ocean Hazard Area of Environmental Concern.

In the *2006 Wilmington-New Hanover County Joint Land Use Plan*, Policy 3.20 policy exceeds the CRC's rules regarding dredging activities:

> Prohibit new dredging activities in Primary Nursery Areas (PNA), Outstanding Resource Waters (ORW), and Shellfishing Waters (SA). Limited exceptions may be allowed for the urban waterfront and Wilmington's Ports, consistent with the goals and objectives of the Cape Fear River Corridor Plan and the Wilmington Vision 2020 Plan and for inlet management projects as permitted by the US Army Corps of Engineers, and in accordance with the provisions in the implementation strategies in this plan.

In the *2006 Wilmington-New Hanover County Joint Land Use Plan*, the manner in which Marinas and Community Boating Facilities are defined in the plan, along with the way in which waterfront communities and waterfront lots are defined, exceeds the CRC's permitting rules related to marinas. Policy 3.18 (a) states:

> Marinas as defined in this plan shall not be allowed in Primary Nursery Areas (PNA), Outstanding Resource Waters (ORW), or open Shellfishing Waters (SA). Limited exceptions may be allowed in the Urban Water Front District, to the extent that they are consistent with the goals and objectives of the Cape Fear River Corridor Plan and the Wilmington Vision 2020 Plan, and in designated areas zoned Waterfront Urban Mixed Use Districts. Community Boating Facilities of any size that may be permitted by the NC Division of Coastal Management may be allowed for waterfront communities.

The policies noted above which exceed requirements in Subchapter 7H are helpful examples for consideration, but do not cover the full range of possibilities for exceeding policies. Exceeding policies may also include policies that set height restrictions, identify a maximum pier length, limit allowable impacts to wetland areas, or other local priorities.

Policies are a consistent set of land use and development principles and decision guidelines or courses of action that are planned to attain the local government's goals and objectives. Those policies that exceed the CRC's use standards and permitting requirements found in Subchapter 7H may act as a regulatory requirement since CAMA permits may not be issued if a proposed project is inconsistent with the local certified land use plan. At the local level, it is generally accepted that the policies and the future land use map are decision-making guides and that they do not have the force of law. However, in considering the roles and status of the plan, planners should keep in mind that the policies and the map are frequently used in a "regulatory" manner in the issuance of state and federal permits.

Writing policies for use in Federal Consistency reviews

Enforceable policies, including the future land use map, are used for federal consistency reviews. Federal consistency reviews are conducted throughout the

For more information about the federal consistency process see NOAA's *CZMA Federal Consistency Review* (2016) (resource folder) and *DCM's federal consistency website*

20 coastal counties on proposed federal agency actions, such as federal activities and development projects, federal licenses and permits, and on projects receiving federal assistance/funding (see Section 2.5). Policies, including the future land use map, for use in federal consistency reviews must meet NOAA's definition of "enforceable policy". An enforceable policy is a state policy that is legally binding under state law (e.g., through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions), and by which a state exerts control over private and public coastal uses and resources, and which has been approved by NOAA and incorporated into the state's federally approved Coastal Management Program (CMP). The use of policies for this purpose reiterates the importance of developing clearly worded policy statements in the plan.

ADDRESSING THE CRC'S MANAGEMENT TOPICS WITH GOALS, OBJECTIVES, POLICIES AND ACTIONS

Coastal communities have a great deal of flexibility when developing goals, objectives, policies, and actions to include in a CAMA plan. At minimum, each plan must contain policies that address CRC's five management topics: public beach and waterfront access, land use compatibility, infrastructure carrying capacity, natural hazard areas, and water quality. These topics are core components of NC's federally approved coastal resource management program. Each of these management topics and their goals and objectives are described below.

While not a CRC planning rule requirement, many plans include local goals and objectives related to the management topics. Many also include goals, objectives, policies, and actions for local areas of concern that stem from the community concerns and aspirations or vision statement. Each community should select additional topics that are appropriate based on their local context, assessment of existing and emerging conditions, and the vision for the community. After setting goals and objectives, planners and local officials should explore alternative ways to achieve community goals. In some cases, it is useful to continue engaging the public in this process to ensure that the policies and programs selected truly match the community's vision for its future. Section 3 provides a starting point for exploring these alternatives.

Management topic one: Public access

North Carolinians and visitors to the state have traditionally had "the right to navigate, swim, hunt, fish and enjoy all recreational activities in the watercourses of the State and the right to freely use and enjoy the State's ocean and estuarine beaches and public access to the beaches" (N.C. Gen. Stat. § 1-45.1). Therefore, an important goal of NC's coastal resource management program is to enhance public access to beaches and public trust waters. Each plan is required to have policies that address the public access management goal:

Maximize public access to the beaches and the public trust waters of the coastal region.

The planning objectives for public access require that each "plan shall include policies that address access needs and opportunities, with strategies to develop public access for all segments of the community, including persons with disabilities. Oceanfront communities shall establish access policies for beach areas targeted for nourishment".

There are many examples of community policies that address this management topic. For example, Bertie County's *CAMA Land Use Plan Update* (2016, p. 71) states that it "will explore sources of revenue to acquire and/or develop access sites and facilities, including matching grant funding from State agencies. A long-

range financial plan that identifies sources of revenue to acquire or improve areas included on the inventory of potential public access sites will be developed." The Town of Cedar Point's *2012 Comprehensive Plan* (p. 40) states that it will "(d)evelop a Public Access and Park Plan that focuses on providing the Town an inventory of potential sites, targeting properties that have a low tax value and are not suitable for other uses, and prioritizing them for future development." The Town of Kitty Hawk's *CAMA Core Land Use Plan* (2005, p. IX-17) notes that "Kitty Hawk will seek opportunities, including memorandums of understanding, easements, and deeded property for beach access(s)."

The Coastal Environment Element (Section 3.2) includes an expanded discussion and describes a range of practices designed to achieve this management goal.

Management topic two: Land use compatibility

Development should be guided in a way that ensures it does not occur at the expense of the environment or create risks related to the public's health, safety or welfare. Accordingly, each plan is required to have policies that address the land use compatibility management goal:

> *Ensure that development and use of resources or preservation of land balance protection of natural resources and fragile areas with economic development, and avoids risks to public health, safety, and welfare.*

The planning objectives for land use compatibility require each community to develop policies that: "(1) characterize future land use and development patterns; and, (2) establish mitigation criteria and concepts to minimize conflicts". Each community has the flexibility to establish a set of policies within these general requirements.

Notable examples of communities with CAMA plan policies that advance the land use compatibility management goal include Onslow, Gates, and Craven Counties. Onslow County's *Comprehensive Plan* (2009, p. 178) states that "(o)ffice and institutional development shall be encouraged to locate as a transitional land use between residential areas and commercial and industrial activities of higher intensity, where appropriate…" *Gates County, NC: Comprehensive Plan* (2016, p. 6-11) states that it "shall discourage action(s) which would irreparably harm the long-term viability of valuable natural heritage areas. If action must be taken to achieve public health, safety, and welfare objectives, project designs shall seek to incorporate features which preserve and protect natural features as an integral part of the project design." Craven County's CAMA Core Land Use Plan (2009, p. 142) "supports the recruitment and siting of environmentally compatible light industrial establishments within its borders in areas that are already similarly developed or in public or private industrial parks to minimize the sacrifice of prime agricultural lands for such development."

The Land Use and Community Form Element (Section 3.1) and Natural Resources and Environmental Sustainability Element (Section 3.3) describe a range of practices that a community could use to achieve the land use compatibility management goal.

Management topic three: Infrastructure carrying capacity

Population growth and economic development place demands on public infrastructure (e.g., water and sewer systems, transportation systems, and stormwater systems) and create demands for new or expanded

public services. As a result, each plan is required to have policies that address the infrastructure carrying capacity management goal:

> *Ensure that public infrastructure systems are sized, located, and managed so that the quality and productivity of AEC's and other fragile areas are protected or restored.*

The planning objectives for infrastructure carrying capacity require each community to establish policies that: (1) establish service criteria; and, (2) ensure improvements in these facilities minimize impacts to AEC's and other fragile areas. Each community has the flexibility to establish a set of policies within these general requirements.

CAMA plans feature a wide range of polices that meet the infrastructure carrying capacity management goal. Dare County's *Land Use Plan Update* (2009, p. 167) asserts that the "current minimum lot size standards, … shall not be reduced regardless of the availability of central wastewater treatment or the availability of a combination of central wastewater treatment and a central water supply." The City of Havelock's *2030 Comprehensive Plan* (2009, p. 6-14) states that it "will continue to reduce the number of residents relying on private septic systems in close proximity to existing or programmed sewer service, with priority given to those areas designated by the Craven County Health Department as "problem areas" with failing septic tanks". In their joint *Regional Land Use Plan* (2010, p. 83), New Bern, River Bend and Trent Woods support policies that encourage utility extensions that focus water and sewer service within existing developed areas and targeted growth areas. They also support providing service where densities make the provision of services cost efficient, where land is most suitable for development, and is located away from environmentally sensitive areas.

The Infrastructure and Community Facilities Element (Section 3.4), Transportation and Connectivity Element (Section 3.5), and the Natural Resources and Environmental Sustainability Element (Section 3.3, on managing stormwater) describe additional practices that achieve the infrastructure carrying capacity management goal.

Management topic four: Natural hazard areas

By definition, coastal communities are exposed to varying natural hazards including hurricanes, nor'easters, and other severe weather that causes flooding, storm surge, wind damage, and shoreline erosion putting life and property at risk. Communities can minimize risks to public health, safety, and welfare by ensuring that natural coastal features that provide some measure of protection are conserved and maintained. Each plan is required to have policies that address the natural hazard areas management goal:

> *Conserve and maintain barrier dunes, beaches, flood plains, and other coastal features for their natural storm protection functions and their natural resources giving recognition to public health, safety, and welfare issues.*

The planning objectives for natural hazard areas require local policies that: (1) establish mitigation and adaptation concepts and criteria for development and redevelopment, including public facilities; (2) minimize threats to life, property and natural resources resulting from erosion, high winds, storm surge, flooding, or other natural hazards.

There are many examples of community policies that address the natural hazard areas management goal. For example, the City of Boiling Spring Lakes *2016 Land Use Plan* (p. 8-12) states it "shall encourage the purchasing by conservation groups of parcels located in hazard areas or those rendered unbuildable, for the purpose of conservation of open space." The Town of Southern Shores *CAMA Land Use Plan Update* (2011, p. 59) states that it "shall support protection and maintenance of the dune system." The Town of Emerald Isle's *Comprehensive Plan* (2017, p. 5-12) states that it "will avoid taking any action or approving any action that materially damages the frontal dune system or that hampers its recovery from storm damage."

The Disaster Resilience and Recovery Element (Section 3.6) describes a range of additional practices that also achieve CAMA's natural hazard areas management goal.

Management topic five: Water quality

Water quality is important for a variety of reasons related to the quality of life in coastal areas. It is vital to the health and ecological integrity of many natural resources and essential for drinking water and recreational opportunities. Each plan is required to have policies that address water quality management goals:

> *Maintain, protect and where possible enhance water quality in all coastal wetlands, rivers, streams, and estuaries.*

The planning objectives for water quality require each community to develop policies that: (1) establish strategies and practices to prevent or control nonpoint source pollution; and, (2) establish strategies and practices to maintain or improve water quality.

There are many examples of community policies that address the water quality topic. Hyde County's *CAMA Core Land Use Plan* (2008, p. 208) states that it "will not encourage the construction of storm drains, drainage ditches, or mosquito ditches in the Village of Ocracoke which discharge directly into estuarine waters." Tyrrell County and the Town of Columbia *CAMA Core Land Use Plan* (2009, p. 117) will "oppose the installation of package treatment plants and septic tanks or discharge of waste in any areas classified as coastal wetlands, freshwater wetlands (404), or natural heritage areas. This policy does not apply to constructed wetlands." The City of Havelock's *2030 Comprehensive Plan* (2009, p. 7-30) commits to improving water quality by implementing recommendations set forth in the Neuse River Basinwide Plan. Recommendations noted as policy include the intent to develop and refine nitrogen reduction strategies for point and nonpoint source polluters/pollution and evaluate the potential for implementation of appropriate best management practices (BMPs) to reduce nutrient and sediment loading in the watershed, and provide educational workshops on local water quality issues.

The Natural Resources and Environmental Sustainability Element (Section 3.3) describes additional practices designed to achieve the water quality management goal.

THE FUTURE LAND USE MAP

Once the plan's goals, objectives, and policy statements are established, it is time to prepare the future land use map – one of the plan's important required components. The future land use map consists of a drawing of the community's geographic area, including its Extra-territorial Jurisdiction (ETJ), that depicts designations

with accompanying descriptions of the land uses and development permitted in each designation. The map along with the corresponding designations are considered to be policy from the standpoint of CAMA permitting, federal consistency reviews, and Department of Commerce Certifications (see Section 2.5). The future land use map is important for many reasons. It provides a visual representation and guide to making future decisions. It also ensures consistency across the plan's wide range of goals, objectives, and policies. The future land use map helps ensure that there is a balanced land use mix that provides sufficient lands for residential and nonresidential uses. It enhances the connections between local activity centers and regional destinations and can ensure that growth areas are served by transit options. It helps ensure that there is the physical capacity for future development in terms of land and needed infrastructure (e.g., water and sewer) (Godschalk and Rouse 2015). It also helps ensure that future growth minimizes impacts to the environment, natural resources, and does not otherwise endanger the public health, safety, and welfare by considering natural hazards. In short, the future land use map depicts what the community wants to happen based on the plan's policies and actions and provides a visual representation of the vision that the community has for its future .

The future land use map illustrates what the community will look like when the plan is implemented and the policy statements are enforced. Inversely the policies should be consistent with the future land use map to ensure investment decisions in water or sewer infrastructure, priorities for economic development, housing policies, historic preservation policies, and priorities for land acquisition or future parks and open space reflect the desired future development pattern. A community's capital improvement program (CIP) should also reflect the policies embodied in a future land use map.

Public involvement in the development of a future land use map and in defining its designations plays a critical role in achieving the community's vision. For example, there was an extensive public engagement process associated with the development of New Hanover County's *Plan NHC* (2016), including its future land use map. Similarly, the City of Havelock also involved the public in the development of its future land use map in its *2030 Comprehensive Plan* (2009).

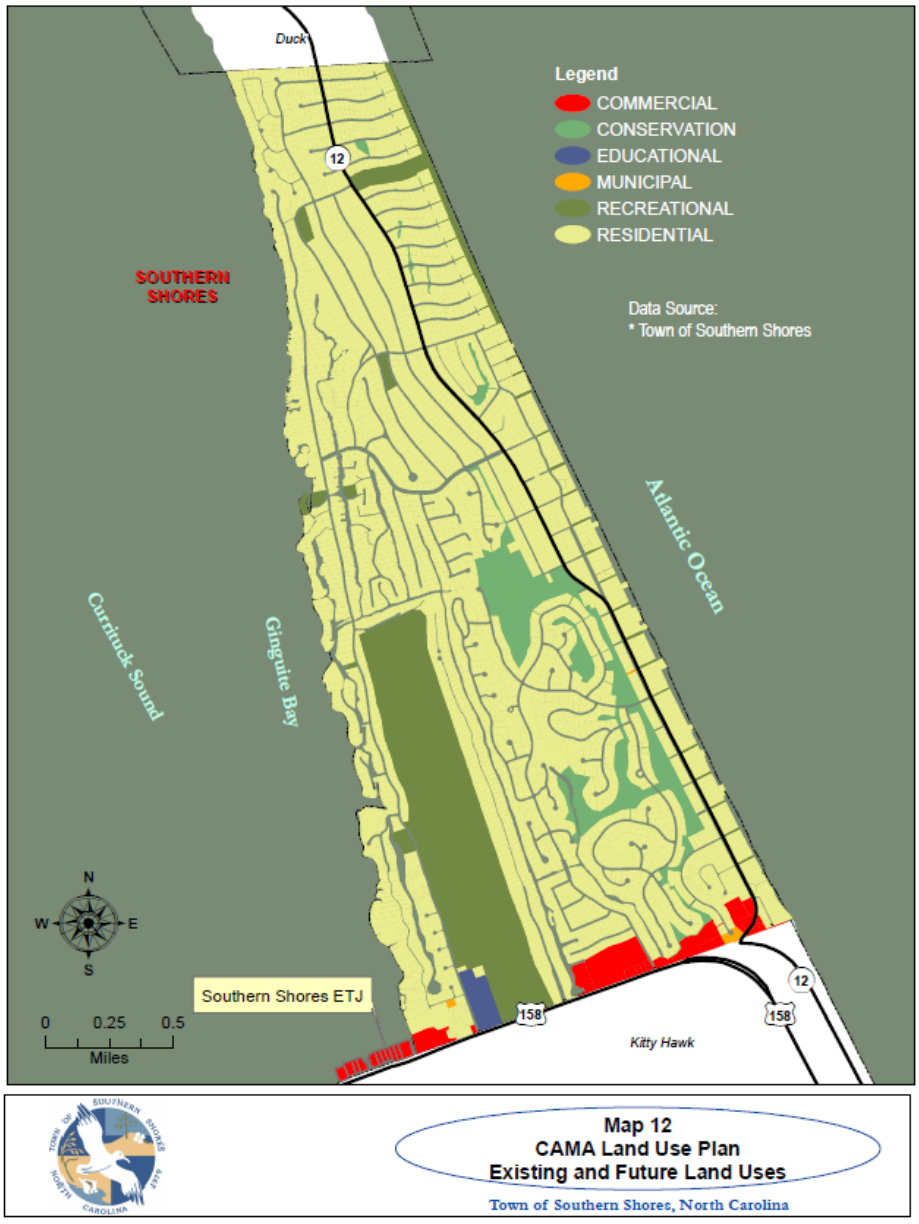
Preparing the future land use map

The CRC planning rules require a future land use map that depicts policies for growth and development and the desired future patterns of land use and development with consideration given to natural system constraints and infrastructure. The plan must also include descriptions of the land uses and development associated with future land use map designations. A community is to consider its vision, the data collected in Section 2.2, and the plan's goals, objectives, and policies as the basis for developing the future land use map. It is important to ensure that the future land use map will serve community needs in terms of growth, economic development, natural resource protection, and steers development where infrastructure and transportation is existing or planned. It is also important to avoid steering development into sensitive environmental areas or locations subject to hazards.

Creating the future land use map is often described as a process of layering a series of maps to identify where new development should happen. This process typically begins with a base map that shows where land is available for development and redevelopment. The maps created during the analysis of existing conditions are useful as layers in the base map. The base map should also include land that can't be developed – such as water and state parks – and delineate land where development is difficult or discouraged – such as in

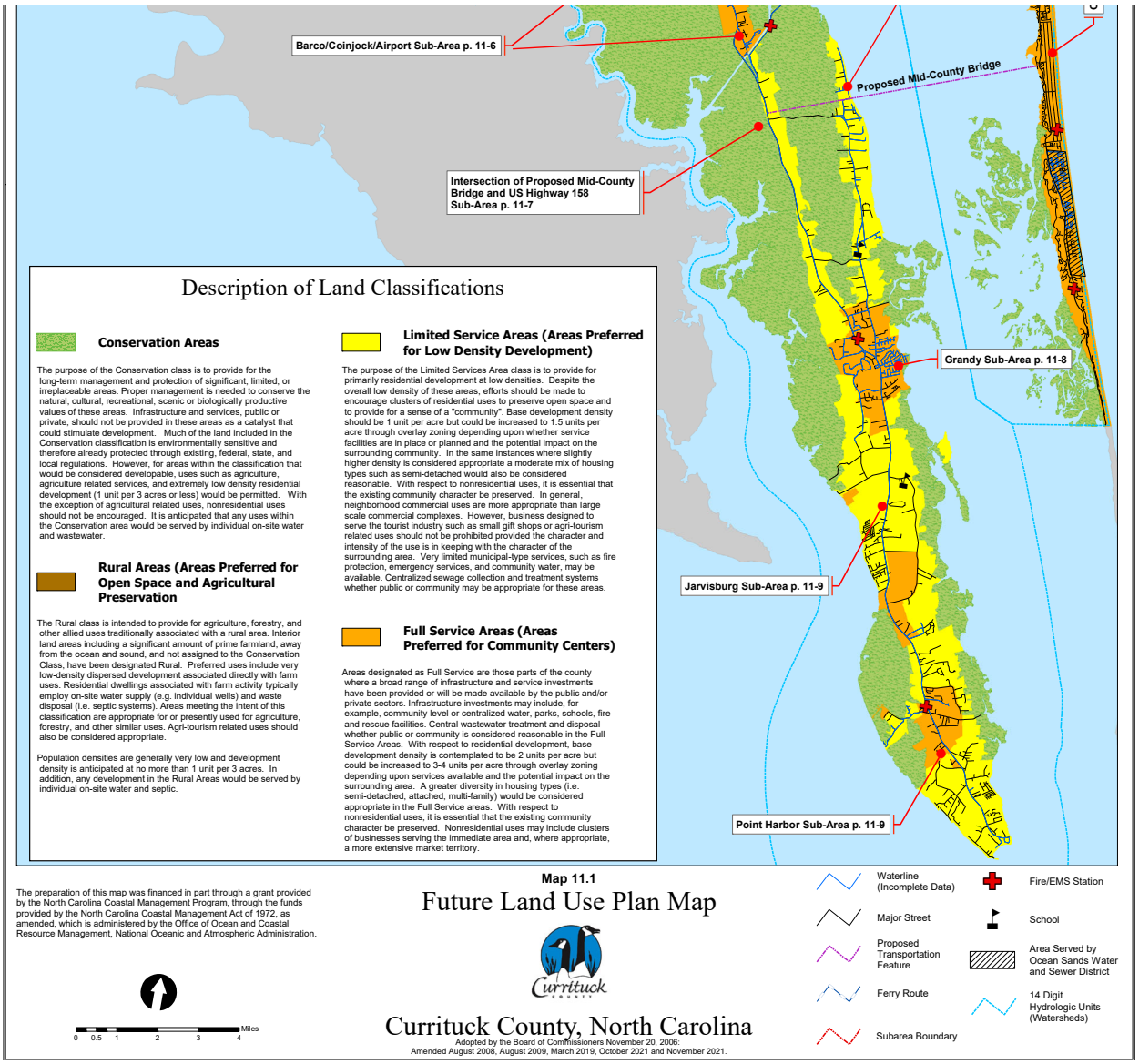
wetlands or flood plains. If the plan aspires to protect farm or forest land, or natural resource areas, those most suitable for conservation can be identified on a base map by parcel size or soil quality. Existing residential, commercial, industrial, and institutional development should also be considered, as well as infrastructure such as roads and sewer lines. Once the base map is complete, it is clear what areas will be available for new development and what areas will be targeted for redevelopment, infill development, or greenfield development.

Future land use maps can be detailed, conceptual, or a combination of both. Detailed maps show intended uses by parcel while conceptual maps show general character for future development. The future land use map from the *Town of Southern Shores CAMA Land Use Plan Update* (2012) is an example of a detailed future land use map. The "Residential" designation on the future land use map is associated with four residential zoning districts found in the local zoning code and associated zoning map.



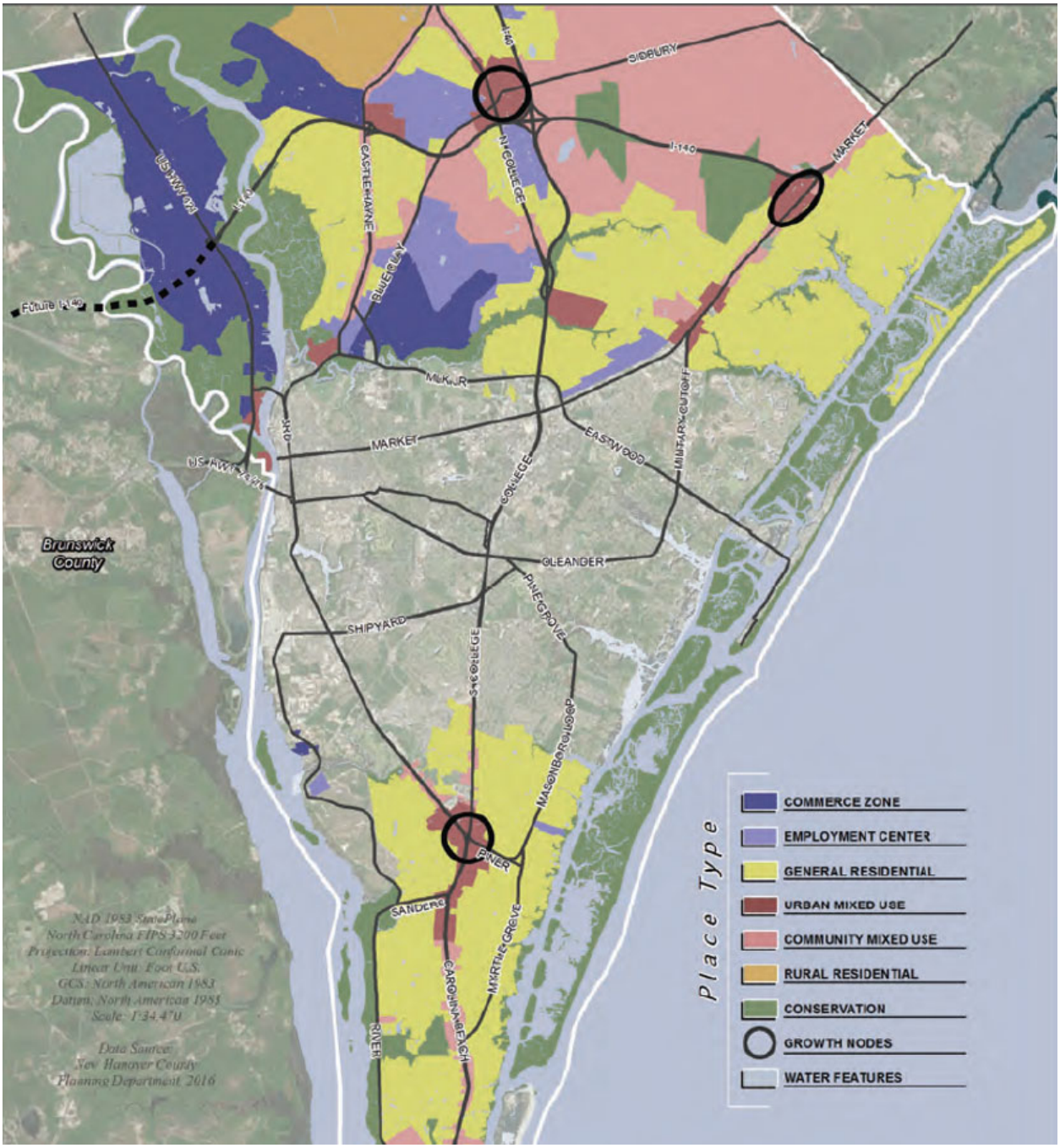
Town of Southern Shores Future Land Use Map organized on traditional land uses from the Town of Southern Shores CAMA Land Use Plan Update (2012)

The future land use map from the *Currituck County 2006 Land Use Plan* (2006) is an example of a conceptual future land use map. Land classifications are based on desired character rather than use. Desired character is further defined by sub-area through narratives provided in the plan.



Partial image of the Currituck County Future Land Use Map showing land classifications based on desired character from the Currituck County 2006 Land Use Plan (2006)

Communities may also utilize Growth Nodes, which can be illustrated on the Future Land Use Map within a plan. As indicated in the New Hanover County comprehensive plan, *Plan NHC* (2016), "growth nodes are intended to be focus areas of development, encouraging high-density developments that promote pedestrian activity and alternative transportation options. The growth nodes pertaining to the Future Land Use Maps are individual focus areas within the unincorporated county that have seen and/or are seeing exponential growth. The intent is to cluster growth in these areas so that public transportation connections can be accomplished."



Partial image of the New Hanover County Future Land Use Map which uses growth nodes to indicate focus areas of development from Plan NHC (2016)

Future land use map designation descriptions address the uses and character of development to be allowed within the corresponding designations shown on the map. Non-residential uses can be defined by intensity measures such as floor area ratio (FAR), square feet of development per acre, and bulk and height of structures, and by their potential to generate traffic or nuisances such as noise, dust, or odor. Residential use is most often defined by density in units per acre, though intensity measures can also be identified. It is anticipated that higher density and intensity residential and non-residential uses will be located where adequate infrastructure is available or will be available to support their needs and where they will not negatively impact sensitive environmental areas or locations subject to hazards. Areas identified as environmentally sensitive or subject to hazards should be located in designations where development is not allowed, or where development has low density and intensity characteristics that will minimize potential impacts to these areas.

Several future land use map options should be reviewed to determine how plan goals and objectives can be met through the future land use map and its designation descriptions. For example, the plan may have the objective of creating areas with concentrated commercial development, often referred to as commercial nodes, and planners might test several locations for new commercial nodes as they develop the map. The plan may also have the goal of increasing the community's stock of rental apartments. In this case, areas allowing multi-family buildings would be identified on the map and an approximate number of affordable housing units this option would produce would be calculated. If there is a specific objective, such as "increase the stock of multi-family housing units by 25%," planners would assess whether the future land use map would meet the objective or if more areas allowing multi-family housing should be included. These types of decisions will have an impact on quality of life and property values for surrounding residents, so it is important to include the public in the creation of the future land use map and its designation descriptions.

Some communities evaluate different land use scenarios when preparing the future land use map. Scenario planning is a technique whereby different outcomes for the future are developed by comparing different policy frameworks and development patterns. This allows planners and decision makers to compare "business as usual" with new strategies (Godschalk and Rouse 2015). Build out analyses, land suitability analyses, and other land use modeling tools may be useful in comparing the outcomes of different scenarios. These planning tools are discussed in more detail in Section 1.

Creating a future land use map for use in CAMA permitting

The future land use map and its associated designation descriptions are considered policies and are used as part of DCM's permitting process. As with policy statements, it is important to be clear on the issues that the community wants CAMA permitting to regulate through the future land use map and its designation descriptions. Only definitive wording can be used as the basis to deny a CAMA permit, so ensure that the intent of the wording is clear as it applies to CAMA permitting decisions. Since there are no variance provisions in CAMA's permitting process for land use plan consistency, it is important that the map is created and designation descriptions written with this regulatory process in mind. When development applications are inconsistent with the map or the designation descriptions, a permit is denied. Either the CAMA permit request must be modified or the state certified plan must be modified through a map and/or text amendment to allow permit approval (see Section 2.5).

Creating a future land use map for use in Federal Consistency reviews

The future land use map and its associated designation descriptions must meet NOAA's definition of "enforceable policy" in order to be used in federal consistency reviews. As indicated earlier in this chapter, an enforceable policy is a state policy that is legally binding under state law (e.g., through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions), and by which a state exerts control over private and public coastal uses and resources, and which has been approved by NOAA and incorporated into the state's federally approved Coastal Management Program (CMP). The use of the future land use map for this purpose reiterates the importance of developing clearly worded future land use map designation descriptions in the plan (see Section 2.5).

TOOLS FOR MANAGING DEVELOPMENT

Making the community's vision for the future a reality will require actions over time that align with plan goals, objectives and policies. Plan implementation will occur across a variety of local ordinances, codes, plans and programs and through a wide range of local departments, appointed or elected officials and other authorities. The local governing body will use the plan when considering rezonings and other local government decisions regarding future land use and development, however most actions needed to implement the plan will be conducted through existing local government programs and regulatory frameworks. When creating the plan, identifying actions and a schedule for their completion can allow for targeted, proactive decision-making by the local governing body and across existing programs and frameworks. Decisions made with the plan in mind can ensure successful implementation.

Guide for land use decision making

The CRC's planning rules require each plan to describe the role of plan policies, including the future land use map, in local decisions regarding land use and development. The description should include how the plan is used by local planning staff and locally appointed and elected officials when considering rezoning applications and adoption or amendment of other local ordinances and plans. For communities participating in the CAMA Local Permit Officer program, the role of the plan in making CAMA Minor Permit decisions should also be recognized.

Development management program

The community's development management program includes the local ordinances, codes, plans and programs that guide development and the

Each community has codes and ordinances that may be used to implement the plan's policies. Accordingly, the development management program can include a wide range of components including:

- Zoning ordinance
- Flood plain ordinance
- Subdivision ordinance
- Capital improvement program
- Stormwater management ordinance
- Vegetation preservation ordinance
- Conservation design ordinance
- Open space preservation ordinance
- Dune protection ordinance
- Lighting ordinance
- Harbor management ordinance
- Airport zoning
- Housing code
- Building inspection program
- CAMA permit program
- Historic preservation program
- Farmland/forest preservation program
- Onsite sewage treatment policy
- Acquisition program

individuals and groups that administer them. The CRC's planning rules require each plan to describe the community's development management program, including local ordinances, codes, and other plans and policies. The joint Pasquotank County/Elizabeth City *2004 Advanced Core Land Use Plan* (2012, p. 175-176), as an example, describes the regulatory ordinances and related plans and the parties responsible for administering them for the county and city. Though not required in the CRC's planning rules, the plan should also address how components of the development management program will be modified based on the plan's policies and recommended actions.

Action plan and implementation schedule

The CRC's planning rules require an action plan and implementation schedule. While the action plan can take many forms, it must include:

- Description of actions that will be taken by the local government to implement policies that meet the CRC's management topic goals and objectives, specifying fiscal year(s) in which each action is anticipated to start and finish; and
- Identification of specific steps the local government plans to take to implement the policies, including adoption and amendment of local ordinances, other plans, and special projects.

There are many ways a community can structure the action plan and implementation schedule. In general, it is useful to provide as much specificity as possible and answer questions such as:

- Is it an existing, modified, or new action?
- Which actions are the highest priority or most important to the community?
- Who is responsible for implementing each policy or recommended action?
- What is the deadline for implementing the policy?
- Where will the resources or funding come from to carry out the action?
- How will implementation progress be monitored?
- How will the implementation of the goal, objectives, policies, and actions be measured? What are some performance measures, indicators, or targets?

Primary actions for plan implementation often include the adoption and/or amendment of local ordinances. For example, if the zoning ordinance and associated zoning map are out of sync with the plan and future land use map, the plan implementation step is to amend the zoning ordinance and zoning map to be consistent with the plan and its future land use map. If the zoning ordinance, zoning map and other development regulations are not updated, proposed developments may not match the community's vision and may be inconsistent with the plan. Consistency between the plan and local ordinances and regulations is particularly important for Areas of Environmental Concern (AECs). As required under the CAMA, any adopted local ordinance applicable to an AEC, such as a zoning code and associated zoning map, shall be consistent with the certified plan and any existing local ordinances and regulations within an AEC shall be reviewed and modified as necessary to make them consistent.

A plan can include many implementation actions beyond regulations. Plans often recommend actions such as public education and outreach efforts, adopting or modifying existing plans, creating incentives for property owners or businesses to behave in a specified way, acquiring property, or working with conservation groups to preserve property. For example, the *2009 Dare County Land Use Plan Update* (2011, p 253-257)

includes implementation actions to identify and pursue grant opportunities for public access sites, promote best management practices, and encourage marina operators to participate in the Clean Marina certification program.

A community will not be able to implement all of the policies and recommended actions at once. Some actions may involve subsequent specialized planning efforts (e.g., developing a parks and recreation master plan). Other actions may require time to budget funds or secure grants (e.g., construct a new boat ramp). For these reasons, the community may want to organize actions into short-range, mid-range and long-range action items. Short-range actions are implemented within a year of the plan's adoption. They are high priorities for which little additional study is needed and can be implemented with existing staff and financial resources. They might include updating related policy documents and making changes to existing ordinances to implement the plan's policies. Recommendations to "study" the needs, resources, or identify priorities for some topic may also be included in the short-range actions. Mid-range actions take longer and likely occur two to three years after the plan's adoption. These actions include high priority actions that require additional study or more detailed planning as well as those for which sufficient resources need to be allocated to support implementation efforts. They also include those actions where some coordination with or approval of another governmental entity is required. Long-range actions take considerably longer, perhaps four to seven years or more. These often involve efforts needed to carry out or implement the mid-range actions once they are initiated. They also involve much more sizable long-term commitments and investments needed to expand water, sewer, and transportation infrastructure or to build other public facilities. It is also important that the action plan and implementation schedule are connected to the community's capital improvement program (CIP) and annual budgeting process to ensure that the plan's priorities are consistent with a community's long-term spending priorities (Godschalk & Rouse 2015). Input from the public and decision makers can also help identify short-, mid-, and long-range action priorities.

While not required in the CRC's planning rules, communities are encouraged to develop action items and an implementation schedule that address all policies in the plan, not just those that meet the CRC's management topic goals and objectives. Communities are also encouraged to include measurable outcomes to gauge implementation progress as discussed in Section 1. The resources needed to implement every policy and action should also be identified during the plan's development. Many implementation actions will be constrained by availability of resources (e.g., funding, staff time or expertise, equipment, technology, etc.). Others will require some preparatory work or simply require much more time to complete. It is often useful to include funding sources or availability in the implementation schedule. Some policies may need approval from another governing board or agency (e.g., utility authority), so it is a good idea to identify which authorities are responsible for implementing each policy or action. Local planners should also consult with program administrators whose responsibilities are affected by recommended policies and actions during the plan's development since their support will be needed to implement the plan.

Task	Action	Priority/ Schedule	Action Tool	Responsible Entity	Budgetary Impact	Capital Item
1.14	Adopt flexible building code provisions and other incentives to encourage development of second floor residences in mixed use areas	1	Development Regulations, Building Code	Planning Director, City Attorney	Low	No
1.15	Adopt Planned Development standards that: • Enable the development of compatible multi-family dwellings in medium and lower density residential areas; • Promote open space retention, recreational opportunities for community residents and visitors; • Permit neighborhood service and retail uses in residential areas subject to appropriate compatibility standards and size and spacing limitations; • Permit mixed use commercial uses in residential areas subject to appropriate compatibility standards and size and spacing limitations.	1	Development Regulations	Planning Director	Low	No
1.16	Monitor development requests and approvals throughout the planning area to ensure that the Future Land Use map provides adequate land for residential and non-residential demands.	1	Annual Report	Planning Director	Low	No
1.17	Participate in business owners' roundtable discussions to identify the needs of local businesses.	1	Outreach	Planning Director, City Manager	Low	No
1.18	Adopt a water and sewer extension plan.	1	Water / Sewer Plans	City Engineer	Low	No
1.19	Establish regular contact with Military facility representatives to discuss and resolve military short- and long-term land use needs, both on- and off-base.	1	Outreach	Planning Director	Low	No
1.20	Maintain an on-going capital improvements plan and program as a component of the annual budget process to assure the provision of high quality services to property owners in the planning area, to identify and prioritize potential improvement projects, to include staff review and comment.	1	CIP	City Manger, Finance Director, City Engineer, Planning Director	Low	No
1.21	Modify the annual CIP update processes to include review and comment by other service providers and request respective CIPs to coordinate funding strategies, improvement plans and schedules and help achieve cost savings.	1	CIP, Outreach	City Manger, Finance Director	Low	No

Excerpt from the City of Jacksonville's Implementation Strategies Matrix from the City of Jacksonville CAMA Land Use Plan (2011)

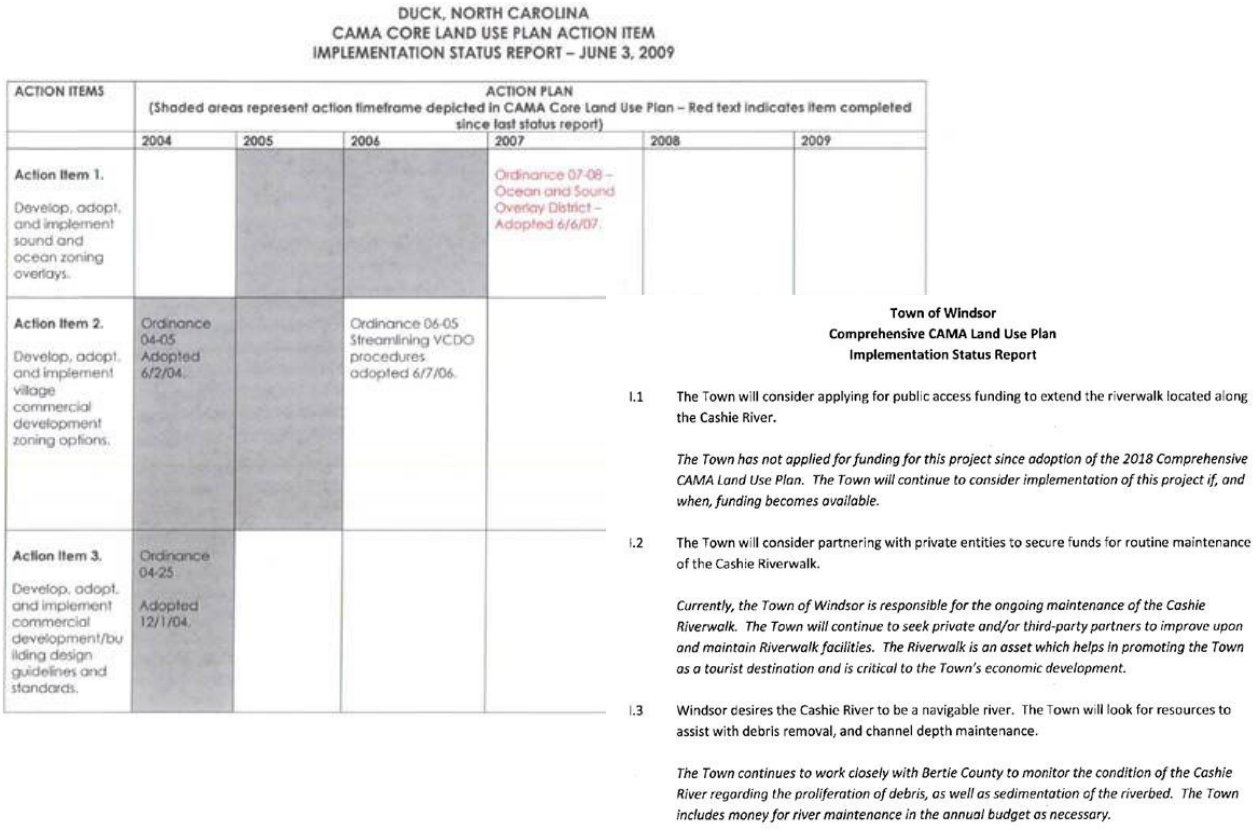
Monitoring implementation of a plan

If the plan is to be useful over time, it is important to develop a system for monitoring whether it is effective in achieving its goals and objectives. It is also important to know whether the community has implemented its policies and actions. To facilitate implementation monitoring, the CRC requires implementation status reports every two years from the initial date of plan certification.

The report is based on implementation actions that meet the CRC's management topic goals and objectives. It must also identify:

- All local, state, federal, and joint actions that were undertaken successfully to implement its certified plan
- Any actions that have been delayed and the reasons for the delays
- Any unforeseen land use issues that have arisen since certification of the plan; and
- Consistency of existing land use and development ordinances with current land use plan policies

Implementation status reporting must be up to date in order for the community to be eligible for *DCM administered planning and management grants*. The status reports submitted to DCM are *available online* and use a variety of formats.



DUCK, NORTH CAROLINA
CAMA CORE LAND USE PLAN ACTION ITEM
IMPLEMENTATION STATUS REPORT – JUNE 3, 2009

ACTION ITEMS	ACTION PLAN (Shaded areas represent action timeframe depicted in CAMA Core Land Use Plan – Red text indicates item completed since last status report)					
	2004	2005	2006	2007	2008	2009
Action Item 1. Develop, adopt, and implement sound and ocean zoning overlays.				Ordinance 07-08 – Ocean and Sound Overlay District – Adopted 6/6/07.		
Action Item 2. Develop, adopt, and implement village commercial development zoning options.	Ordinance 04-05 Adopted 6/2/04.		Ordinance 06-05 Streamlining VCDO procedures adopted 6/7/06.			
Action Item 3. Develop, adopt, and implement commercial development/building design guidelines and standards.	Ordinance 04-25 Adopted 12/1/04.					

Town of Windsor
Comprehensive CAMA Land Use Plan
Implementation Status Report

I.1 The Town will consider applying for public access funding to extend the riverwalk located along the Cashie River.

The Town has not applied for funding for this project since adoption of the 2018 Comprehensive CAMA Land Use Plan. The Town will continue to consider implementation of this project if, and when, funding becomes available.

I.2 The Town will consider partnering with private entities to secure funds for routine maintenance of the Cashie Riverwalk.

Currently, the Town of Windsor is responsible for the ongoing maintenance of the Cashie Riverwalk. The Town will continue to seek private and/or third-party partners to improve upon and maintain Riverwalk facilities. The Riverwalk is an asset which helps in promoting the Town as a tourist destination and is critical to the Town's economic development.

I.3 Windsor desires the Cashie River to be a navigable river. The Town will look for resources to assist with debris removal, and channel depth maintenance.

The Town continues to work closely with Bertie County to monitor the condition of the Cashie River regarding the proliferation of debris, as well as sedimentation of the riverbed. The Town includes money for river maintenance in the annual budget as necessary.

Implementation status reports can be provided in a tabular or written format as shown in these excerpts from the Town of Duck 2009 report and the Town of Windsor 2020 report

GETTING MORE OUT OF YOUR PLAN

To get the most out of a plan, it is important for it to establish a framework for decision-making designed to achieve the community's vision. A plan is more likely to be implemented when it is useful to local decision makers. In other words, the plan provides useful information organized in a manner that is easy to understand and contains goals, objectives, policies and actions that are of sufficient clarity and specificity to guide decision-making.

It is important to remember that plans are not self-executing and do not result in revisions to zoning maps, districts, or ordinances without some additional work once the plan is locally adopted. Similarly, a future land use map does not replace the local government's current zoning map, which is typically much more specific and precise. The plan's adoption does not automatically change the community's capital improvement program (CIP) or necessarily supersede other standing policy documents (e.g., open space plan, economic development plan, Hazard Mitigation Plans, etc.). Apart from local ordinances and regulations affecting AECs, there is no requirement that a local government implement the actions or make changes to the programs recommended in the plan. While the planning process may end with the plan's adoption, the real work of turning its words into action is just beginning. Even if the plan has broad support from the public and decision makers, it may still be necessary to continue building support to fund and implement many of the plan's policies and recommended actions.

For the plan to be effective, it is also important to avoid viewing it as a static document or some box to check off. The document should be used on a regular basis for making decisions. This requires that it includes not only clear policy statements but that it also contains useful reference information that helps make decisions or provides the context for understanding what it is designed to achieve. The plan also has to be coordinated with other local policy and planning documents to provide a consistent framework for making decisions. Following approval of the plan the community may have to update its capital improvement plan, hazard mitigation plan, water supply plan, open space plan, or parks and recreation plan; changes to zoning ordinances or zoning maps may be required. Over time new priorities or requirements imposed by other agencies may emerge that necessitate modifications to planning documents. When this occurs, it is often useful to modify the plan as well to remain consistent with other local policy documents.

Table 4.3.2 Policy and Action Matrix			
Natural Resources & Resiliency			
Policy #		Policy	Timeframe
	Action #	Action	
	NR-20f	Investigate innovative programs and seek funds for mitigation measures such as relocation of threatened structures and more stringent building codes for high hazard areas that support the growth management policies of the town.	Short
NR-21		Prevent the use of sandbags, seawalls, bulkheads and other hard structures as an approach to erosion protection for private property along the oceanfront shoreline. This does not include public protection projects such as a terminal groin which are an integral component of a community wide erosion abatement strategy.	
	NR-21a	Clarify and strengthen regulations that address appropriate erosion protection approaches.	Long
NR-22		Prevent commercialization of the ocean beaches.	
	NR-22a	Clarify and strengthen regulations on non-commercialization of the ocean beaches to include the activities that are prohibited.	Intermediate
NR-23		Seek cooperation on shoreline management activities from local, state and federal agencies.	
	NR-23a	Advocate for the establishment of a statewide beach management strategy and policy along with a dedicated funding (state or federal) program designed specifically for beach restoration and nourishment projects.	Short
	NR-23b	Advocate for legal and administrative enforcement assistance from state and other local agencies to remove structures and debris from the ocean beaches. This includes advocating for expanded state and federal programs to remove structures on the beach.	Short

Future land use map and policy and implementation excerpts from the Town of Nags Head Comprehensive and CAMA Land Use Plan (2022)

Section 2.5

Plan Certification

TOPICS INCLUDE:

- Getting the plan certified
- Amending the certified plan
- Implications of plan certification

INTRODUCTION

Once a community has a final draft of a CAMA land use plan or comprehensive plan, the next step is to get the plan certified. The process involves a state review followed by local adoption of a final draft plan that is then submitted for certification. Once certified, the plan is used in local land use decisions and in state decisions regarding CAMA permits. After the certified plan is federally approved, it's enforceable policies are used in federal consistency determinations. Locally adopted amendments to a plan are also submitted for certification.

"No land-use plan shall become finally effective until it has been approved by the (Coastal Resources) Commission…"

— from the Coastal Area Management Act § 113A 110 (f)

GETTING THE PLAN CERTIFIED

The certification process begins when the community submits print and electronic copies of a final draft plan to their DCM District Planner. The plan must include a completed Matrix for Land Use Plan Elements indicating where CRC plan requirements have been addressed in the plan (See Appendix B). The DCM planner reviews the final draft plan to ensure it is complete with each requirement contained in the organizational matrix clearly addressed. The community may have to modify the final draft plan to meet the completeness requirements. Once determined complete, the final draft plan is sent to other federal and state agencies and adjacent local jurisdictions for a 30-calendar day review and comment period. The DCM planner provides a review of the plan along with written comments from other agencies to the community within 45-calendar days after the end of the 30-calendar day state agency review period. Depending on the nature of the comments, the community may have to modify the final draft plan.

Once state review comments have been satisfied, the resulting final draft plan is ready for local action (See flow chart in Appendix C). If the plan was developed by an advisory committee, the committee may vote on a recommendation to the local governing body concerning the final draft plan. Many communities have the local planning board render a recommendation on the final draft plan before sending it to the local governing body. For new plans that are intended to meet the requirements for maintaining zoning under Chapter 160D, the plan is required to be adopted with the advice and consultation of the planning board.

The CRC's rules require a noticed public hearing prior to formal adoption of the final draft plan by the local government. It is important that the community follows the noticing requirements specified by the CRC. These requirements vary from other routine procedures for public notice, particularly the opportunity for the public to provide written comments to the DCM District Planner. The community must notify their DCM planner in writing at least five business days prior to publication of the notice. The community must then publish the public hearing notification on the proposed final draft plan at least one time, not less than 10 days nor more than 25 days before the date scheduled for the hearing on local adoption. In computing such period, the day of publication is not to be included but the day of the hearing shall be included. A model notice is provided in Appendix C. The notice timing is within the timeframe allowed for maintaining zoning under Chapter 160D, per an amendment to the CAMA adopted by the General Assembly in July of 2022.

After the public hearing, the local governing board most often makes the decision to approve the final draft plan. Typically, this is done in the form of a resolution. A model resolution is provided in Appendix C. Occasionally, the local governing body decides to table a decision on the final draft plan perhaps to address concerns brought up at the meeting or to obtain further clarification on an item addressed in the plan. As long as the approved motion to table includes reconsideration at a specified date, time, and location no additional published notices are required. Once the final draft plan is locally adopted, the community then submits the locally adopted final draft plan and required support materials to the DCM planner for final review and certification (required materials are summarized in Appendix C). DCM accepts written comments or objections on the locally adopted final draft plan for 30 calendar days after local adoption. Any comments received are forwarded to the community and considered in a Final Agency Decision on certification.

The authority to certify locally adopted plans is delegated by the Coastal Resources Commission (CRC) to the Director of the Division of Coastal Management (DCM). DCM will provide a Final Agency Decision on certification of the locally adopted final draft plan by certified mail to local government officials. The CRC (i.e., DCM Director) shall certify plans and amendments which:

- Are consistent with the current federally approved North Carolina Coastal Management Program;
- Are consistent with the rules of the CRC;
- Do not violate state or federal law; and
- Contain policies that address each management topic

If not certified, the Division of Coastal Management (DCM) has 45 calendar days after receipt of the locally adopted plan and required support materials to inform the local government on how the plan does not meet the procedures and conditions for certification. If the Director or local government determines that a submission requires additional scrutiny, it shall be forwarded to the CRC for a review and a decision on the merits.

Once the local government receives a Final Agency Decision certifying the plan, they must submit a final print and an electronic copy of the certified plan to DCM within 90 calendar days of certification. Appendix C lists the submittal requirements for the certified plan. The entire approval process is also summarized in a flow chart in Appendix C.

Amending the certified plan

A community may need to amend its certified plan for a variety of reasons such as revising outdated policies, incorporating new policies, and reconciling inconsistencies with local zoning ordinances. The content of an amendment can also range from a large scale update adding a new or updated section to the plan, to amending the future land use map, or it could involve a simple text amendment that changes the wording of one or more policies. The local government shall determine the scope, timing, and frequency of plan amendments (15A NCAC 07B .0803 (d)). For joint plans originally adopted by each participating jurisdiction each government retains its sole and independent authority to make amendments to the plan as it effects their jurisdiction (15A NCAC 07B .0802 (d)). The process for certification of a plan amendment is the same as for a plan certification, minus the requirements for state and federal agency review (see Appendix C). For more guidance on when to amend or update a plan see Section 1.2.

IMPLICATIONS OF PLAN CERTIFICATION

There is sometimes a mistaken belief that a state certified plan is nonbinding or just serves as a guide. While the community may use the certified plan as a guide for local decision-making, state certification of the plan means that it will also be used in making CAMA development permit decisions and federal consistency determinations. The certified plan is considered a regulatory document to the extent that it can be used as the basis to deny a CAMA permit. The community should therefore carefully consider the wording of policies and future land use map designation descriptions (See Section 2.4). It is extremely important to keep the policies and future land use map updated and to amend the plan as needed.

Areas of Environmental Concern

The Areas of Environmental Concern (AECs) are designated to protect land of environmental, social, economic, and aesthetic value from uncontrolled development. The AECs for estuarine and ocean systems, ocean hazard systems, public water supplies, and natural resource conservation areas are described in more detail in Section 2.2. Once a community's plan is certified by the CRC, no local ordinance or other local regulation shall be adopted which, within an AEC, is inconsistent with the certified plan. Any existing local ordinances and regulations affecting AECs shall be reviewed in light of the certified plan and modified to make them consistent (NC GS 113A-111).

CAMA permit process

Once the plan is certified, its policies, including the future land use map, are used in conjunction with the CRC's rules to review and approve CAMA Major, General and Minor permits in accordance with G.S. 113A-111. However, unlike local ordinances, there is no variance process for the certified plan. When a CAMA permit request is found inconsistent with the policy or policies of a certified plan, either modification to the CAMA permit request or state certification of a locally adopted amendment to the plan will be required to allow permit approval.

When it comes to administering the land use plan in the review of CAMA permits, local governments have three options: DCM administration, joint administration, or local administration (15A NCAC 07B.0803 (c)). Most local governments have chosen DCM administration, in which DCM reviews the CAMA permits for consistency with the plan policies, including the future land use map and implementation actions. The joint

administration option allows the local government to identify policies, including the future land use map and implementation actions that will be used by DCM for CAMA permit consistency reviews. The local administration option allows the local government to review CAMA permits for consistency with the plan. For communities participating in the CAMA Local Permit Officer (LPO) program, the designated LPO administers the plan in the review of CAMA Minor Permits as indicated in 15A NCAC 07I.

For more information see the *CAMA permitting website*

Zoning decisions

A certified CAMA land use plan or comprehensive plan is considered to be a "comprehensive plan" as defined in NC GS 160D-102, which governs the use of zoning ordinances. All changes to zoning regulations are required to be consistent with a comprehensive plan. While local adoption of a zoning map amendment effectively results in local adoption of a future land use map amendment, state certification of the amendment is still required. The key to the simultaneous approval process for plan amendments requiring state certification is to ensure that the public has the opportunity to inspect the potential amendment with a not less than 10 days nor more than 25 day notice.

The process outlined in Appendix C assists local governments in preparing a simultaneous amendment that can qualify for state certification. Appendix C also includes examples of the notice of public hearing and resolution language for amendments to certified plans. For example, Morehead City amended their plan's future land use map to coincide with a rezoning request. The complete amendment process, from the date of local adoption to certification took 41 days.

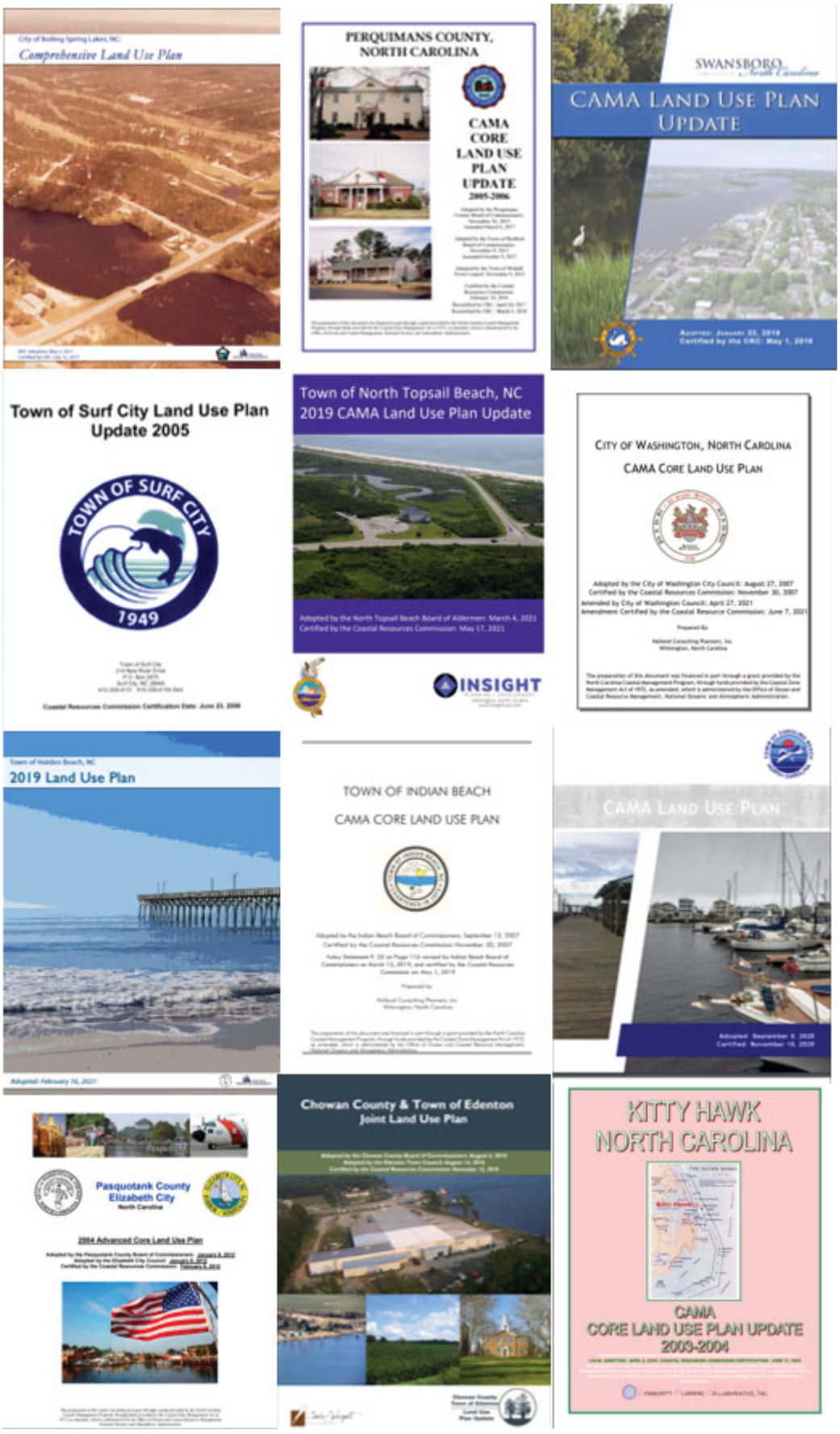
Federal consistency determinations

Once the plan is certified, its "enforceable policies" can be submitted by DCM to NOAA's Office for Coastal Management (OCM) for inclusion in the state's coastal program (See Section 2.4 for definition of "enforceable policies"). Once approved by OCM, these enforceable policies are used in federal consistency determinations. Federal consistency applies to activities that may reasonably affect any coastal resource or coastal use (even if the activity occurs outside of the coastal zone). These include federal activities, and activities that require a federal license or permit, receive federal money, or plan for the exploration, development or production of any area leased under the Outer Continental Shelf Lands Act. These activities must comply with key elements of the state's coastal program, including the OCM approved enforceable policies of state certified plans.

For more information about the federal consistency process see NOAA's *CZMA Federal Consistency Review* (2016) (resource folder) and *DCM's federal consistency website*

NC Department of Commerce Certified Sites Program

The NC Department of Commerce is the state's lead agency when it comes to economic, community, and workforce development. Their many responsibilities include providing local governments with grants and planning services designed to spur infrastructure and economic development, administering the state's economic incentive programs, working to recruit companies to NC and marketing NC as a business location. One of the ways they recruit business investment is through the *certified sites program* initiated in 2001. The purpose of this program is to provide a statewide inventory of industrial sites that have gone through a prescreening program to ensure development can be expedited when a developer expresses interest in the location. Sites are reviewed for potential environmental impacts and no site in an AEC can be certified. During the site certification process, DCM reviews the location to make sure an industrial site certification is consistent with the policies, including the future land use map, contained in the certified plan.



Just a few of the local government plans that have been certified by the Coastal Resources Commission

Section 3

Elements for a Comprehensive Plan in Coastal North Carolina

INCLUDES:

Section 3.1
Land Use and Community Form Element

Section 3.2
Coastal Environment Element

Section 3.3
Natural Resources and Environmental Sustainability Element

Section 3.4
Infrastructure and Community Facilities Element

Section 3.5
Transportation and Connectivity Element

Section 3.6
Disaster Resilience and Recovery Element

Section 3.1

Land Use and Community Form Element

TOPICS INCLUDE:

- Development patterns
- Housing
- Economic development
- Historic preservation and cultural heritage
- Working landscapes: Agricultural and forestry land

INTRODUCTION

Decisions regarding land use are central to achieving a community's vision for its future and therefore, the Land Use and Community Form Element is the core of a comprehensive plan. This element provides a framework for goals, objectives, policies and implementation actions that support the community's vision for the future. It guides decisions about public and private land development proposals and meeting the community's infrastructure and transportation needs. It also may minimize exposure to natural hazards by identifying land that is the most suitable for development. The Land Use and Community Form Element provides a mechanism for addressing issues such as the preservation of agricultural land, protection of historic and cultural resources, and revitalization of deteriorated neighborhoods.

CRC'S LAND USE COMPATIBILITY GOAL:
Ensure that development and use of resources or preservation of land balance protection of natural resources and fragile areas with economic development, and avoids risks to public health, safety, and welfare.

Analyzing existing and emerging conditions helps communities understand land use and development trends and their relationship to a wide range of topics related to community form. At a minimum, each community is required by CRC planning rules to develop policies and implementation actions to comply with the CRC's planning objectives for the land use compatibility management goal. The Land Use and Community Form Element may also address a wide range of topics of greater or lesser importance in different communities.

The required and suggested analyses (see Section 2.2) and the community vision (see Section 2.3) help identify which topics to include in this element. Additional analysis that goes beyond the CRC planning rules discussed in Section 2.2 may be required in some cases. This chapter includes references linked in the right hand margin that explain recommended practices in detail and discuss additional analysis that may be required to cover a topic in more depth. Some topics may be significant enough to warrant a stand-alone element. For example, a community with strong demand for both seasonal vacation rentals and service

workers might choose to develop a stand-alone element focused on housing while a community with a strong agricultural sector in combination with increasing demand for residential development might elect to include a Working Landscapes Element in its comprehensive plan.

The following discussion presents practices that are appropriate for comprehensive plans in many coastal North Carolina communities, but every local community is free to choose which practices fit their Vision Statement and community aspirations and concerns. This chapter also identifies policies and programs that have been put into practice along the coast and in the rest of the state. The policies and programs identified here are by no means the only alternatives for addressing the land use issues indicated in this chapter and communities are encouraged to consider additional policies if those highlighted here are not a strong fit with local conditions.

DEVELOPMENT PATTERNS

A development pattern is the arrangement and character of uses within a community's geographical area. The pattern consists of wide-ranging types of residential and non-residential uses along with areas where no development will occur. Establishing a development pattern is a critical part of the planning process since it helps balance development needs with other values such as preserving natural resource and recreational areas. An understanding of the existing land use patterns and development trends is needed to ascertain if continuing these patterns will meet the community's vision for its future. In many cases, simply building out the existing zoning code and subdivision regulations will not fulfill the vision. A future development pattern can build on the existing pattern to identify areas available for development. A number of future development pattern options, or scenarios, can then be considered to determine a future pattern most suited to the community's vision. The selected future development pattern will then serve as the basis for the community's future land use map.

Existing development patterns and desired patterns for the future vary greatly throughout coastal North Carolina. In barrier beach communities the development pattern may focus on balancing the protection of environmental areas with the need to provide residential and commercial areas to support tourism. For counties, the development pattern may focus on balancing the desire for non-residential development to serve economic needs with the availability of county support services and infrastructure. In rural communities, the development pattern may focus on ensuring isolated residential areas have access to non-residential areas with support services such as grocery stores and health care providers. Regardless of location, the common interest in all development patterns is the protection, preservation, orderly development and management of the state's economically, esthetically and ecologically rich coastal area.

Recommended practices

Mix commercial, residential, entertainment and institutional land uses

Traditional future land use plans and zoning codes were structured to separate the areas where people live, work, and shop. Planners and residents have recently begun to understand the environmental and economic impacts of separated land uses and to embrace the mixed land uses that you would find in a historic downtown or typical Main Street. Mixed land use is characterized by residential and nonresidential land uses located in close proximity so that everyday destinations can be reached by

walking or biking and therefore reducing the number of automobile trips. These areas are more vibrant because people live, work, and play in these areas creating activity at all times of day. Mixed uses of land can also encourage fiscal sustainability when the long-term cost of providing services is balanced by taxes and user fees generated by the mix of land uses.

There are a variety of ways to encourage mixed land uses through land use policies and development regulations. In its 2006 Land Use Plan, the Town of Kure Beach encourages limited mixed-use development with policies that allow residential uses downtown secondary to commercial uses. The City of Wilmington implemented the goal of mixed-use areas through its Urban Mixed Use District zoning district, which applies to the city's historic core but can also be applied to other areas with a conditional approval. The city is currently experiencing a rapid increase in the number of development proposals that either mix land uses vertically, with condos above shops, or horizontally, with housing within walking distance of commercial areas.

Support a sense of place with new development

In coastal North Carolina many communities aim to maintain their unique sense of place by protecting natural areas and encouraging new development that is compatible with historic architectural traditions. The comprehensive plan is the appropriate vehicle to set the broad goal that new development supports the local sense of place and define specific community areas that are held to a higher design standard. For example the *City of Raleigh's 2030 Comprehensive Plan* includes an element devoted to urban design. Design standards or guidelines are a common way to implement the goal of fostering a unique sense of place through new development.

Design standards are specific criteria and requirements related to the form and appearance of development within a community. They can specify building placement, materials, appearance (e.g., colors, styles, signage, etc.), and other important design elements that help ensure that development is compatible with the community context and reinforces the sense of place. Planners should be aware of a few limitations on design standards in North Carolina. State law does not allow mandatory design standards to go beyond height and bulk for residential single- and two-family buildings, except in historic districts. Additionally, local governments may not limit the number of bedrooms within a single family house. Multifamily and commercial design standards may cover the full range of building elements typically included in design guidelines.

The Town of Morehead City set the goal of amending its Unified Development Ordinance to include commercial design guidelines in its 2007 Land Use Plan and adopted commercial design guidelines in 2008. The guidelines cover site

Commercial Mixed-Use Development Code Handbook. 2001. Published by the Oregon Transportation and Growth Management (TGM) Program. 2001. Published by the Oregon Transportation and Growth Management (TGM) Program.

Downtown Manteo, NC

design, architecture, utilities, and equipment at commercial and multifamily residential development projects, as well as industrial projects fronting on a thoroughfare with the stated goal of "preserving what attracts people to this place and to making sure that the City continues to keep its identity and does not look like "every place" in America" (page 1). Other coastal communities, such as The Town of Edenton, City of Wilmington and City of Washington, focus on design guidelines for historic areas to maintain their sense of place. While not located on the coast, the city of Asheville uses design standards more broadly to preserve and support a sense of place. The city has mandatory design guidelines for its downtown and historic areas and also has a mandatory design review coupled with voluntary compliance for development projects in the River District abutting the French Broad and Swannanoa Rivers. The purpose of their design review is to encourage the design of new construction and rehabilitation projects in a manner that promotes visual harmony, enhances the historical integrity of the River District, and recognizes the environmental constraints of developing along the river – is also relevant to coastal development.

Commercial Design Guidelines, Morehead City, adopted in 2008".An Introduction to Design Guidelines. The Planning Commissioners Journal, 2001.

For additional information on infill development:

Investing in Infill Development. U.S. Environmental Protection Agency Office of Sustainable Communities. 2014. Published by the U.S. Environmental Protection Agency.

The Infill Development Code Handbook. 1999. Published by the Oregon Transportation and Growth Management (TGM) Program.

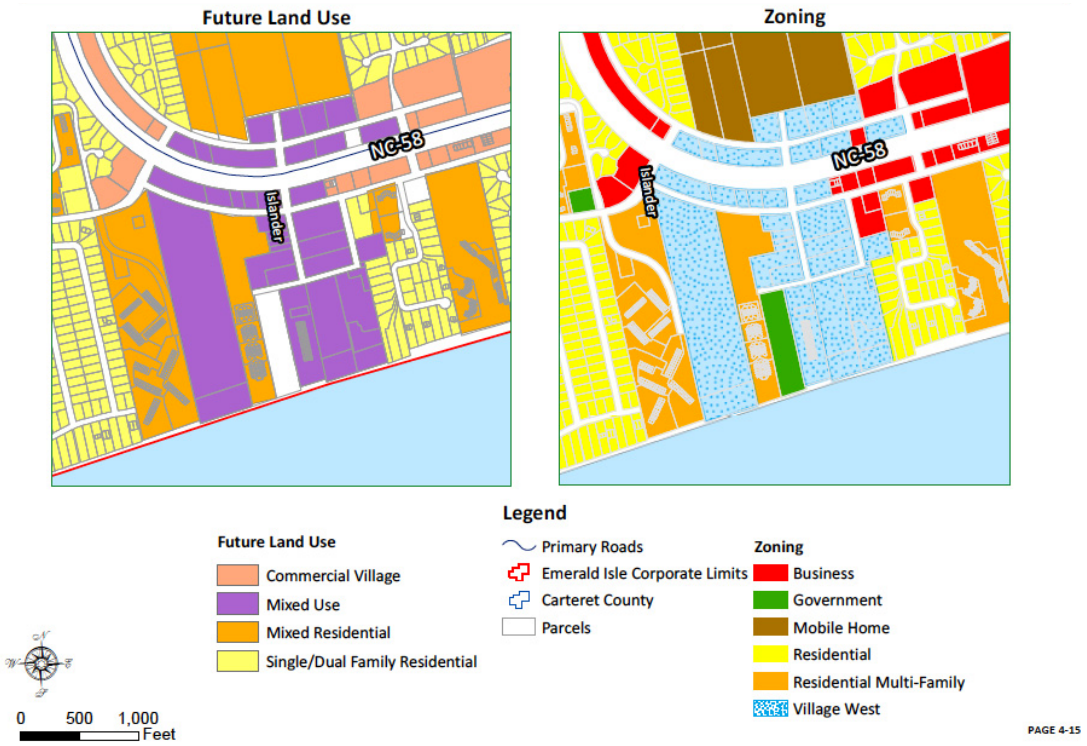
Encourage infill development

Virtually every community has potential development sites surrounded by existing development and infrastructure. Developing or redeveloping these sites will infill the community's urbanized area and reduce the overall impact of new development on the coastal environment. Since infill sites are served by existing infrastructure and services, development costs are lower in comparison to undeveloped "greenfield" sites. Additionally, infill development can increase a community's property tax base since infill development often improves sites that were an eyesore, raising the value of surrounding properties.

Coastal North Carolina communities incorporate infill development into their plans by implementing policies in a variety of ways. Atlantic Beach established the Circle Development District to "re-establish and preserve the area as the primary civic, retail, office, institutional, cultural and entertainment center for the community" and as the "premier destination for residents and visitors of Atlantic Beach" (Town of Atlantic Beach, Ordinance Number 01.2-09-01). This development district is structured to allow and encourage infill development at a higher density provided it is designed to fit within the historic fabric of the community. In its 2017 Land Use Plan, Emerald Isle noted that "redevelopment is most likely to occur in the mixed use areas of Village East, Village West, and Marina Village, and appropriate zoning districts have been established to promote redevelopment in these areas." (4-12). To encourage infill development, the Future Land Use map designates these areas as mixed-use.

Village West, Emerald Isle, NC

MAPS OF THE EMERALD ISLE VILLAGE WEST FOCUS AREAS SHOWING FUTURE MIXED USE, INFILL DEVELOPMENT (2017 LAND USE PLAN, P. 4-15).



Pursue development patterns that respect the natural environment

Traditional development practices, including clearing, grading and draining a site before construction, may be damaging to the natural environment. The conventional approach to development modifies stormwater runoff patterns and alters habitat in ways that can be expensive to mitigate. Many new residents are attracted to the North Carolina coast because of the natural environment, so development patterns that protect natural resources will ultimately contribute to the tax base by protecting the desired natural character of the area.

However, development does not need to come at the expense of the natural environment. There are numerous practices planners can use to promote development designed with nature in mind. As an alternative to traditional drainage practices, on-site stormwater management techniques such as low impact development (LID) can be utilized to reduce infrastructure costs and off-site flooding and erosion. LID techniques mimic the natural infiltration processes, managing stormwater naturally, rather than treating it as waste product to be disposed of. Examples of LID include rain gardens, green roofs, and use of pervious surfaces. Communities can encourage LID through goals, objectives and policies in the comprehensive plan, that are implemented through updated subdivision and land development regulations (see Section 3.3).

The Future Land Use Map and comprehensive plan goals can also identify land that should be restored, as well as natural habitats and other sensitive land that the community would like to protect from development (see Section 3.3). The Future Land Use Map and the comprehensive plan can include

policies that discourage or limit development in flood zones and other hazard areas (see Section 3.6).

While the community may identify natural areas to be protected from development, it is often impossible for a local government to simply purchase all such areas. In addition to acquisitions, areas can also be protected from development through regulations or easements. Regulations can require, for example, large lots with limited building area or allow for conservation subdivisions where houses are constructed on small, clustered lots and remaining areas are dedicated open space. In coastal North Carolina, Brunswick, Carteret, Currituck, Craven, New Hanover, and Onslow Counties all allow conservation subdivision designs. Although not a coastal county, Henderson County has a Conservation Subdivision Program that exchanges a 20% increase in density for permanent protection of 25% of the site. Easements are legal agreements with a willing landowner to protect their land from development, usually in exchange for lower tax valuation. Easements can be crafted to the owner's needs and the property's resources. A strategic approach to this type of planning will utilize acquisition, regulation and easement tools as opportunities arise to protect areas from development.

Incorporating green building techniques into local construction projects is another way to implement the broad goal of pursuing development patterns that protect the natural environment. Green building techniques include designing, constructing or operating buildings to conserve energy, reduce waste, prevent pollution, , and provide a high quality of life to building occupants. New public facilities are an opportunity for green building and many local governments now build new libraries, fire stations and schools to meet the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification standards. The comprehensive planning process may indicate that a community will need new public buildings, creating an opportunity to meet the goal of development patterns that incorporate green building techniques. For a larger environmental impact, some communities elect to update their building and energy codes to incorporate green building practices and mandate energy conservation in private development. A third, low-cost alternative is to create or join a program that recognizes public and private development projects that go beyond minimum regulatory requirements to minimize their impacts on the environment such as the *Lower Cape Fear Stewardship Development Council* (SDC). Each year, the SDC provides awards to public and private development projects that protect, conserve, improve, and provide awareness of natural resources in the Lower Cape Fear region.

FOR ADDITIONAL INFORMATION ON CONSERVATION SUBDIVISION:

The Conservation Subdivision Handbook. Steve Allen et al. 2011. Published by NC State University.

Conservation Subdivision Design Handbook. Conservation Subdivision Design Task Force. 2006. Published by Southwestern Illinois Resource Conservation & Development, Inc.

Growing Greener: Conservation by Design. The Natural Lands Trust and Pennsylvania Department of Conservation and Natural Resources. 2009. Published by Natural Lands Trust.

For more information and resources related to green building and LEED certification see the websites of the *U.S. Green Building Council* and the *NC Chapter*

HOUSING

Housing is an important topic in every community. Housing is strongly connected to other components of the plan, particularly land use and public services. Planning for housing should begin with an analysis of existing housing supply, including age, condition, location, and cost of structures, followed by analysis of existing and future demand based on population data. Population characteristics such as household size, age and income can assist with determining a community's current and future housing needs.

For additional information on addressing housing in a comprehensive plan:

A Guide to Preparing the Housing Element of a Local Comprehensive Plan. Brian W. Ohm, J. D. et al, 2003. Published by University of Wisconsin Extension.

Housing issues vary greatly throughout coastal NC. In barrier beachfront communities, the predominance of costly seasonal housing units that support the tourism industry often reduces the availability of affordable housing for tourism service workers in traditionally low-wage jobs. The high cost of housing in these areas also makes it difficult for individuals who provide the services that every community needs, such as fire fighters, paramedics, and teachers, to afford housing in the community where they work. In rural areas, despite lower housing costs, there can still be a shortage of housing affordable to its least affluent residents. Rural areas also typically have fewer rental units available to individuals who can't enter the homeownership market. The comprehensive planning process provides an opportunity for the community to identify current and future gaps in housing and establishes goals, objectives, and policies to address housing needs.

Recommended practices

Plan for a range of housing types

Housing Element from City of Raleigh 2030 Comprehensive Plan

The comprehensive plan should support a range of housing types to serve the needs of those who live and work in the community. A range of housing types is characterized by residential units of different sizes, configurations, tenures, and price points located in buildings of different sizes, configurations, ages, and ownership structures. A range of housing types is important because it serves different affordability needs while allowing households of different sizes and income levels to live in close proximity to one another and to their places of employment.

Craven County's *2009 CAMA Core Land Use Plan* examines housing from a variety of perspectives, including the condition and tenure of housing as well as its affordability. Of particular concern was the prevalence of substandard housing in the county and its relationship to the needs of low-moderate income individuals. It also discusses how high concentrations of deteriorated

housing combined with the lack of adequate infrastructure (i.e., roadway and stormwater) exacerbates health and safety problems associated with substandard housing and a lack of affordable housing. Policies in their plan support these issues by recommending the pursuit of Community Block Development Grants and other "state and federal funds for rehabilitation or redevelopment of substandard housing" (p. 140). Currituck County focused on the housing needs of two groups: senior citizens and moderate income families and individuals. The policies in Currituck's *2006 Land Use Plan* address the needs of these groups by supporting a range of senior housing options, including active adult retirement communities, assisted living facilities, nursing homes, granny flats, and accessory apartments within a single family home. A second policy aimed to enlarge the range of affordable options for those with moderate incomes beyond manufactured homes to stick-built homes and accessory dwelling units.

Balance jobs and housing options

A community's housing needs are also important because housing availability influences economic development. Promoting a healthy balance between jobs and housing options will support economic development. When a healthy balance is achieved, workers can live near their places of employment, which reduces commuting distances, improves productivity, and enhances quality of life. When coordinated with public transportation systems, this can improve access to employment for disadvantaged populations. In some areas of the coast, individuals commute to work within a region that spans more than one community. In these places, it is important to coordinate the community's housing plan with any regional housing and economic development plans developed for the larger multijurisdictional area.

If the existing housing conditions analysis and population projections show a current or likely imbalance between jobs and housing, planners should consider different policy options to address this imbalance, such as increasing (or identifying) the area where multi-family buildings or accessory dwelling units are permitted. The selected policy or policies should be identified in a comprehensive plan, located on the future land use map, and implemented through an update to the community's zoning code. Increasing the land available for multi-family housing is one option but residents are often concerned that "apartment buildings" will alter community character. Permitting accessory dwelling units is an alternative that increases the supply of small, and therefore comparatively affordable, housing units without the construction of multifamily buildings. Accessory dwelling units are located on the property of a single family home, either in an attic or over a garage or as a small freestanding building in the back or side yard. Approximately 10 counties and 50 municipalities across the state allow accessory dwelling

Newer housing development in Elizabeth City, NC

units, including the Town of Duck, Town of Edenton, City of Elizabeth City, Town of Kitty Hawk, Town of Manteo, Town of Shallotte, Town of Southern Shores, Town of Southport, Chowan County, and Pender County.

Maintain and provide affordable housing

A common problem in many coastal communities, both large and small, is the challenge of providing affordable housing given the strong demand for seasonal housing. Making housing affordable to low income residents often requires a subsidy both for homeownership and rental units but access to federal funds for affordable housing is limited in small communities. If a local government can't fund affordable housing directly, partnering with a non-profit or for-profit organization opens new pathways to meeting the goal of maintaining and providing affordable housing.

For additional information on affordable housing:

Providing Well-Place Affordable Housing in Rural Communities. Smart Growth America. 2017. Published by Smart Growth America.

Jobs-Housing Balance (PAS Report Number 516). Jerry Weitz. 2003. Published by the American Planning Association.

One policy alternative to implement the goal of providing affordable housing is to use inclusionary zoning to encourage for-profit developers to create affordable housing. The Town of Manteo in Dare County created its *Inclusionary and Affordable Housing Ordinance* in response to rising housing and property costs. The ordinance explains that "Without intervention, the trend toward increasing housing prices will result in an inadequate supply of affordable housing for town residents and local employees, which will have a negative impact upon the ability of local employers to maintain an adequate local work force and will otherwise be detrimental to the public health, safety, and welfare of the town and its residents." In response, the town requires that all developments or subdivisions over five units sell 20% of the housing units or lots as affordable in return for a waiver of all development fees (except fees related to water).

Potential threats associated with natural hazards and disasters should also be considered when addressing affordable housing needs. Major disasters, such as hurricanes, can and have caused significant damage to affordable housing stocks in the state which can further exacerbate the lack of affordable housing. During short and long-term recovery, relief assistance may be available to recover or rebuild temporary or permanent affordable housing, ideally in a way that's more resilient to future disasters (see Section 3.6).

ECONOMIC DEVELOPMENT

Communities in coastal North Carolina face a myriad of economic challenges. Some have healthy and vibrant economies marked by the occasional financial recession. Others have faced fiscal difficulties for decades or more. In either situation, economic development is an important topic to address in a comprehensive plan. Economic development includes the policies that governments use to promote employment and sustainable economic

growth. It also includes the policies and programs that improve the business climate such as finance, marketing, neighborhood development, business retention and expansion, technology transfer, real estate development, and others. Finally, it includes the provision of utilities, transportation, and other infrastructure needed to attract and retain business and industry (Nunez 2017; EDC 2000).

If economic development is an important topic, then a shotgun approach is unlikely to work as no single strategy, policy, or program is likely to address the complex set of issues impeding economic development (Nunez 2017). Planners are encouraged to take a comprehensive approach to the topic by either elevating the issue to become its own element or to take an integrated approach that weaves a comprehensive set of strategies, policies, and programs into the applicable plan elements. It is also important for communities to prepare for positive and negative changes in economic health by developing policies and programs that promote a healthy economy (Godschalk & Rouse 2015).

In some communities, economic development is such a critical issue that a targeted economic development plan is created by a local government, nonprofit organization, or a regional partnership. Economic development plans can be regional or multi-jurisdictional in nature or be more narrowly focused. For example, the Town of Navassa partnered with the NC Department of Commerce Main Street and Rural Planning Center to complete an economic development plan for the land around the two new exits from I-140 into the town. When an existing economic development plan exists, it important to use the comprehensive plan to advance the goals and policies of existing economic development plans.

Recommended practices

Plan for a long-term supply of commercial and industrial land

Having a healthy economy requires not just jobs, but the right mix of jobs. This often means having the physical capacity for economic development, and suitable land with access to the necessary infrastructure and transportation systems. While a large employer in an office building can be easily incorporated into the existing fabric of a community, industrial or light industrial employers require sites that are buffered from residential development. Additionally, industrial development often requires comparatively large parcels. For these reasons, it is critical to consider the supply of land for the economic future envisioned in a community's comprehensive plan and locate spaces for different economic sectors on the future land use map.

State of NC economic development resources:

Department of Commerce

Rural Development Division

NC Main Street Program

NC Rural Ready Sites

New gantry cranes at the Port of Wilmington along Cape Fear River are part of monumental infrastructure improvements to increase capacity at the container terminal

A visionary example of implementing the goal of providing land for economic growth and catalyzing new development with strategic public investment comes from the City of Conover, North Carolina. In 2005 the town purchased an abandoned and contaminated factory site, keeping one historic factory building and preparing the rest of the site for commercial or industrial development. What is notable about the Conover Station redevelopment is the mixture of public and private uses on the site, including a public library branch and a community room in the renovated factory building, a public park on a portion of the site, a transit hub, and sites for future light industrial development by the private sector. This town of 8,000 residents has attracted $6.8 million in grant funding to bring this vision to reality.

Plan in coordination with the military

According to a 2015 report conducted by the NC Department of Commerce, the defense industry accounts for 10 percent of the state's economic activity, which ranks it as North Carolina's second largest economic sector behind agriculture. The state is actively working to support and enhance existing military installations and missions and to increase the economic impact of the military and defense industry in NC. State support of the military is outlined in the NC Military Affairs Commission's *Strategic Plan for Supporting and Enhancing North Carolina Military Missions and Installations* (2016).

Coastal NC is home to a number of major military installations as well as military ranges and dedicated air space, waterways and offshore waters that support military training. The most notable major military installations include: Marine Corps Base Camp Lejeune in Jacksonville; Marine Corps Air Stations New River in Jacksonville; Marine Corps Air Station Cherry Point in Havelock; US Coast Guard Base Elizabeth City in Elizabeth City, and; Military Ocean Terminal Sunny Point in Brunswick and New Hanover counties. The proximity of installations, ranges, and training areas to the community requires consideration of military activities and their compatibility with the community's vision for future development.

The military has been working with coastal NC communities to develop regional joint land use studies that address compatibility issues. The *Eastern Carolina Joint Land Use Study* (ECJLUS) (2002), completed as part of the Air Installation Compatible Use Zones (AICUZ) program, promotes community growth that is compatible with future military installation flight operations at Marine Corps Air Station (MCAS) Cherry Point, Marine Corps Auxiliary Land Field (MCALF) Bogue, and Marine Corps Outlying Landing Field (MCOLF) Atlantic. The study attempts to resolve conflicts between the base's mission objectives and community growth concerns. The *Cherry Point Regional Joint Land Use Study* (2016) and the *Seymour Johnson AFB & Dare County Range Joint*

For additional information on Economic development planning:

A Guide to Preparing the Economic Development Element of a Comprehensive Plan The Wisconsin Economic Development Institute, Inc. 2003. Published by the Wisconsin Economic Development Institute, Inc.

Economic Development Element from City of Raleigh 2030 Comprehensive Plan

How Small Towns and Cities can use Local Assets to Rebuild Their Economies: Lessons from Successful Places. U.S. Environmental Protection Agency Office of Sustainable Communities. 2015. Published by the US Environmental Protection Agency.

Fiscal Impact Analysis: Methodologies for Planners (PAS Report Number 561). L. Carson Bise II. 2010. Published by the American Planning Association.

An Economic Development Toolbox: Strategies and Methods (PAS Report Number 541). Terry Moore, Stuart Meck, and James Ebenhoh. 2006. 'Published by the American Planning Association.

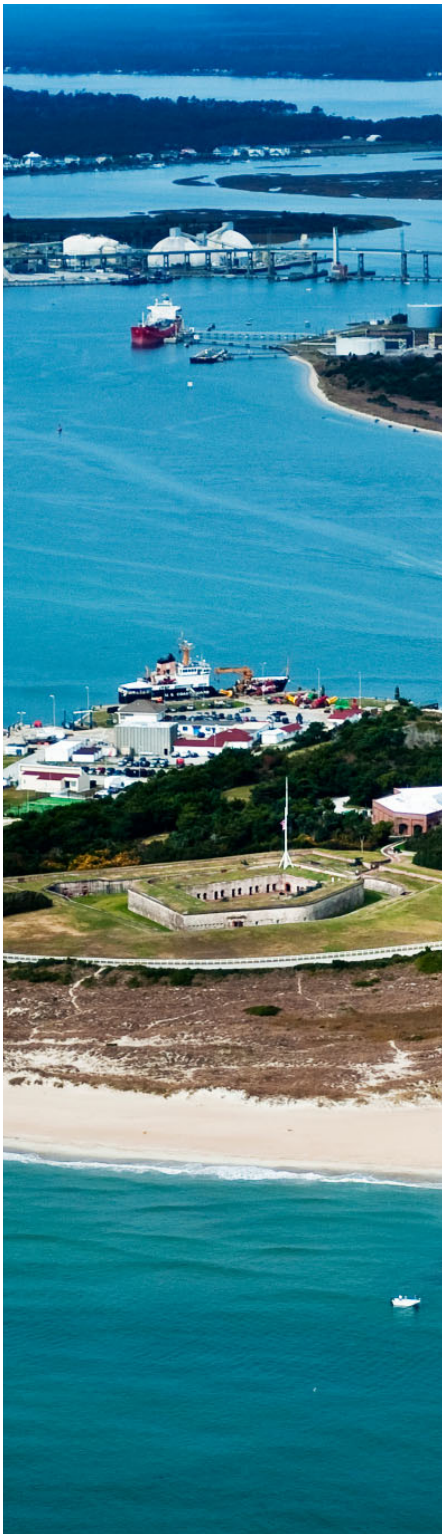
Land Use Study (2017) provide other examples of coordinated planning. These studies identify strategies to address a range of compatibility factors such as housing, land use, infrastructure and public safety, while also addressing economic development. Communities are encouraged to collaborate and partner with the military to address local concerns.

Use strategic public investment to catalyze economic development

Simply designating sites for commercial or industrial development on the future land use map and in the zoning code is not always enough to make economic development a reality. Some communities choose to make strategic public investments to move their vision for economic development forward. Examples of public investments that aim to catalyze economic development range from parking decks in downtown Wilmington managed by the city to the redevelopment of a contaminated factory site in Conover as described above.

One approach to leveraging public investment to spur private investment is project development financing (more commonly known as tax increment financing or TIF). Through project development financing, local governments borrow money to fund capital costs that enable, facilitate, or benefit private development in a designated project development district. Public debt is secured and repaid using property tax revenue generated by new private investment in the district surrounding the public project. TIF is used in many places around the country to finance a wide range of projects including infrastructure, land acquisition, parks, schools, and libraries (Meyer 2012). TIF districts can be as small as a few acres to many square miles. In North Carolina, project development finance districts must meet specific requirements. The capital projects must have capital expenditures by private entities and one or more units of local government that increase net employment opportunities for residents within the development district or a two-mile radius, whichever is larger, and must increase the local government's tax base. Project development districts must also meet at least one of the following criteria: blighted, deteriorated, deteriorating, undeveloped, or inappropriately developed; appropriate for rehabilitation or conservation activities; or appropriate for the economic development in a community.

TIF financing has not been used frequently in North Carolina. One example is the Wodfin Downtown Corridor Financing District in which the Town of Wodfin and a private developer with the support of Buncombe County redeveloped an unsuccessful golf course on the site of a former landfill. In the process, Buncombe County developed a Project Development Financing Policy, which targets blight and areas of the county that are economically depressed. Although the recession stalled redevelopment in 2008, it did



U.S. Coast Guard Station, Fort Macon

not collapse and there are now a variety of new commercial and multifamily buildings located in the Downtown Corridor (Levengood 2011).

Conduit bonds are another tool used to facilitate economic development. These bonds are a type of investment sold by local government where the revenue from the bond is directed at a private entity that uses the money to finance a development project that benefits a community in some way. The advantage of this approach is that it can increase the breadth and quality of services provided to residents without the local government having the responsibility for constructing a government-funded project. Projects can range in size from relatively small, single-use projects to large-scale expansions of schools, hospitals, airports, and retail expansion (Meyer 2012). There are several types of conduit financing including industrial development revenue bonds, private activity bonds, and housing revenue bonds. These securities are typically limited to projects that benefit the public at large (e.g., airports, docks, sewage or water facilities) or specific segments of the population (e.g., low income homebuyers).

For more information, see the *UNC School of government website* including FAQ, Publications, Statutes, Court Challenges to TIFs, and NC TIF Projects

For more discussion of the range of local economic development activities see *The Role of Local. Government in Economic Development: Survey Findings from North Carolina* (Morgan 2009).

Promote community-based economic development and revitalization

Comprehensive plans can also promote community-based economic development and revitalization that promotes, supports, and invests in businesses that serve local needs. It is also important to encourage economic development that is compatible with the vision, character, and cultural values of the community. Efforts to encourage the investment in and revitalization of downtowns, commercial areas, neighborhoods, and other community resources reinforces the community character and sense of place, in addition to creating jobs and other economic opportunities.

One technique to implement the goal of community-based economic development is the creation of a Municipal Service District, known as a Business Improvement District or BID's in other states.

The BID is funded by an *ad valorem* tax on property within the district. The additional tax on this property is then used to fund improvements within the district. There are several steps associated with forming a district and they can serve a variety of purposes, including downtown and urban area revitalization projects. The City of New Bern formed a BID in 1978 at the request of downtown property owners. Over the past four decades, the taxes collected within the New Bern BID have improved the streetscape along 12 blocks, built two small parks, improved two alleys, created design guidelines, and provided staff for both litter collection and a safety patrol (Thomas 2013).

Arts of the Albemarle in the former Chesson's Department Store in downtown Elizabeth City, NC

Counties can also create special taxing districts but this tax revenue can't be used for downtown revitalization.

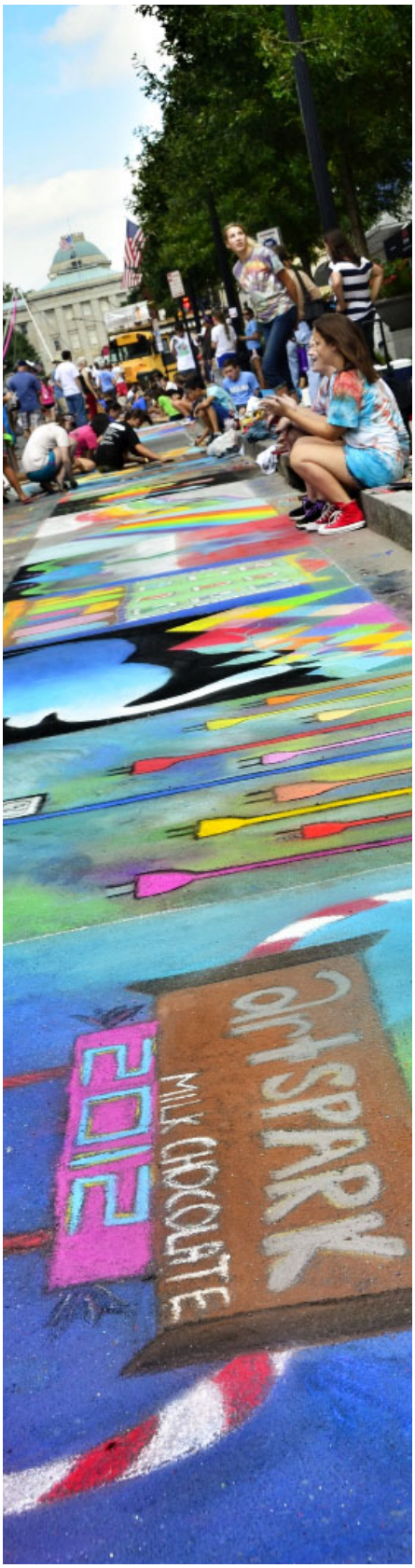
Local governments may also establish a formal economic development program or assign these functions to the planning department. Larger communities may also encourage the creation of economic development organizations with the express purpose of marketing what the community has to offer, recruiting new business, and promoting economic development. For example, the *Economic Development Council (EDC) in Carteret County* is a nonprofit, membership driven organization that has been working to create jobs, opportunities and investment since 1971. It maintains a detailed website and provides a range of potential services for current and prospective employers. These entities, whether housed in a government agency or a nonprofit, perform a variety of functions oriented around business recruitment, business retention and expansion, and entrepreneurship and business creation (Morgan 2009). They can also provide other incentives and services such zoning and permit assistance, infrastructure improvements, one-stop-permitting, coordination with state incentive programs, and assistance with securing the land or buildings needed.

Promote green businesses and jobs

Communities may also consider promoting green businesses and jobs that have less environmental impact on the local and global environment. Green businesses provide environmentally friendly products and services through sustainable business models and practices. Green jobs are found in many sectors including agriculture, manufacturing, research and development, administrative, and other service industries. Increasingly, companies are moving towards production systems where the waste of one industry's production process is used as a raw material for another product. Not only do green businesses provide employment opportunities and generate tax revenue, they often minimize impacts on the environment or quality of life in a community.

HISTORIC PRESERVATION AND CULTURAL HERITAGE

Many coastal communities in North Carolina have a rich history and cultural heritage. Preserving a community's historic character helps preserve its sense of place and can contribute to its economic revitalization. Historic resources are buildings, sites, landmarks, or districts with exceptional value or quality for illustrating and interpreting the cultural heritage of the community. These include archeological sites and historic structures dating back to the precolonial period. They also include important spaces like battlefields,



ArtSpark's street painting festival on Fayetteville Street, Raleigh, NC

submerged artifacts like sunken ships and places that signify the heritage of Native Americans. This topic is often discussed in a Land Use and Community Form Element, however in some communities, historic preservation and cultural heritage are of such importance that the topic becomes a stand-alone element in a comprehensive plan. For example, the City of Raleigh's historic resources are significant enough to the city's character that its *2030 Comprehensive Plan for the City of Raleigh* includes a Historic Preservation Element. This element identifies historic resources and districts and lays out a series of policies and actions to address many facets of historic preservation ranging from zoning to the building code to funding and incentives.

Roanoke River Lighthouse, Edenton, NC

Recommended practices

Use design standards to reinforce historic character with new development

Communities fortunate enough to have a cluster of historic buildings can pursue historic district designation at the federal and local level. The first step in this process it to document the individual historic structures and define the boundaries of the district based on architectural cohesion. Local governments can establish a historic preservation commission (HPC) to designate additional local landmarks or historic districts for protection. After designating a historic district, the historic preservation commission then works with property owners to ensure that new development and renovations meet design guidelines based on historic architectural patterns. In coastal North Carolina, the Town of Beaufort, Town of Edenton, and City of New Bern have all developed design standards for new buildings and renovations in their historic districts. The Town of Swansboro has designated a historic district and established a Historic Preservation Commission but has not adopted design guidelines.

Conserve historic resources and archeological sites and encourage the adaptive reuse of historic structures

It is important for communities to protect, preserve, and where possible find ways to reuse historic buildings, sites, landmarks, or districts to illustrate the community's cultural heritage. Historic resources can be an important part of a community's sense of place and contribute to the local economy through tourism and by increasing property values. In some cases, the reuse of historic structures in innovative ways can reduce the need for new structures while minimizing environmental problems created by new development. Protecting and preserving historical resources also means incorporating them into risk or vulnerability assessments that may be conducted for hazard mitigation, disaster recovery, or resilience planning (See section 3.6).

On the North Carolina coast, some historic and archeological sites have such cultural significance that they become tourist destinations. Fort Fisher in Kure Beach, for example, is the site of an earthen fortification used during the Civil War to ensure supply ships, known as "blockade runners", could deliver goods bound for inland armies to the Port of Wilmington. Today, while only remnants of the earthen fort remain, the site includes a visitors' center, tour trail and exhibits that include artifacts from a blockade-runner that sank off the coast. The Town of Edenton, in Chowan County, has a historic downtown with excellent examples of 18th century colonial architecture. The Town's historic character and small coastal community charm are highlighted in its *Visit Edenton* tourism marketing. Visitor can stop by the downtown welcome center and join trolley or boat guided tours to learn about the Town's history.

However, most historic structures important to local character cannot be operated as museums. Encouraging adaptive reuse of historic structures allows communities to maintain their sense of place, for visitors and residents, while building the tax base through income generating uses. The rebirth of the St. Andrew Church as the Brooklyn Arts Center in the City of Wilmington is an example of city-supported adaptive reuse involving private, public and non-profit partners. The structure was condemned and nearly demolished in the 1990s but today it is the anchor of an emerging arts and entertainment district and is driving the revitalization of the surrounding neighborhood. Today, the area is known as the Brooklyn Arts District, which is home to concert venues, art studios, restaurants, neighborhood pubs, bottle shops, and contemporary luxury housing. The district lies at north end of downtown Wilmington between the Cape Fear River and Smith Creek. Several luxury condominiums have since been outfitted in renovated industrial buildings. This includes the Modern Baking Company, the Weldon Building, and Brooklyn House building on North 4th Street. It was, in part, the adaptive reuse of the St. Andrews Presbyterian Church that has transformed the area into Brooklyn Arts District.

For additional information on historic preservation and cultural resource planning:

2030 Comprehensive Plan for the City of Raleigh, Historic Preservation Element (PDF)

A Guide to Smart Growth and Cultural Resource Planning Richard A. Bernstein et al. 2003. Published by the Wisconsin Historical Society.

Preserving our Places: Historic Preservation Planning Manual. Chester County Planning Commission. 1998. Published by the Chester County Planning Commission.

WORKING LANDSCAPES: AGRICULTURE AND FORESTRY LAND

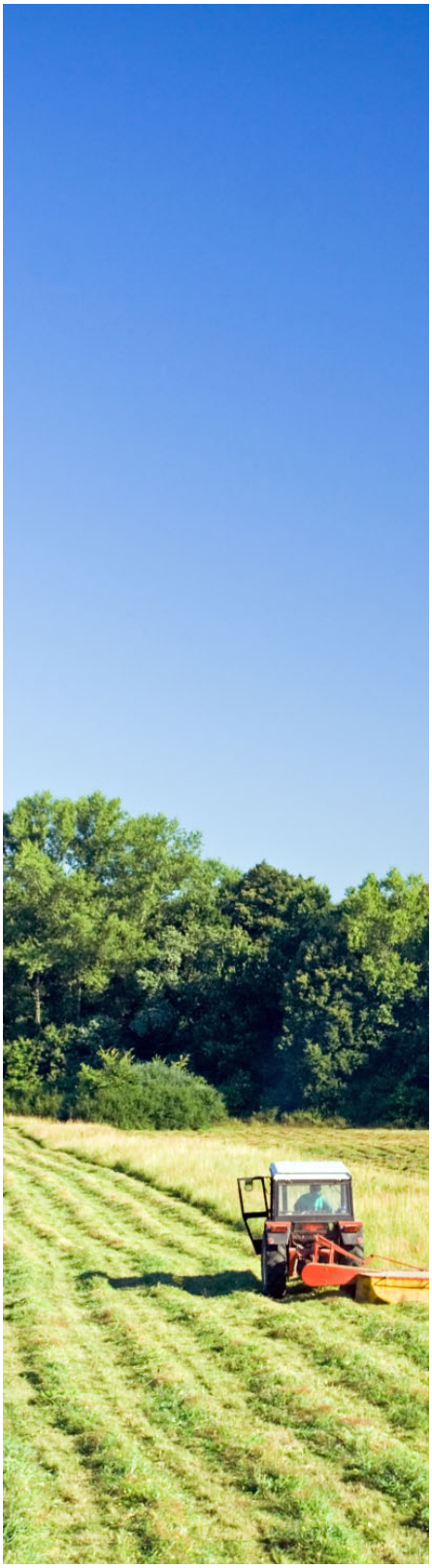
For rural areas of coastal NC, a majority of land area is devoted to agriculture and forestry. These "working lands" are primary contributors to the local economy, providing local products to residents and to the broader agriculture, fiber and forestry industries. Working lands are the scenic landscapes that bolster tourism, provide open space, and contribute to a rural community's sense of place.

As the population of NC increases, working lands are increasingly being lost to development. Statewide, North Carolina lost 35,500 acres of agricultural land and 120,400 acres of forest land to development between 2005 and 2012 according to the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) *2012 Natural Resource Inventory Summary Report* (August 2015). There are many reasons communities may be interested in preserving working land. The Planning Vision in Beaufort County's *Joint CAMA Land Use Plan 2006 Update* captures the value of working land well with the statement "Agriculture remains a major part of the county's economy, and the open spaces and vistas gained from working farms and managed woodlands contribute heavily to the county's quality of life."

When residential development is sited near agricultural areas conflicts can occur. Farm operations often generate nuisances such as odors, noise, and dust that conflict with residential uses. Local governments should h ave policies and zoning requirements in place to manage potential conflicts.

The conversion of working lands to residential and commercial uses can also present unique opportunities since these lands can provide very large undeveloped tracts with the potential to be developed into vibrant communities. A downside is that the conversion of working land to other uses can require costly infrastructure expansion, especially if uses are located in the middle of an agricultural area where limited infrastructure is provided. A balance is needed to accommodate desired development while protecting valuable working lands.

Incorporating farm and forest protection into a comprehensive plan recognizes the importance of working lands as a natural resource. It also provides a mechanism to plan for the conversion of land and minimize the conflicts that occur as development encroaches upon these areas. Depending on the topic's importance to the community, working lands could be addressed in this element or as a standalone element.



Tractor working on green grass field

Recommended practices

Minimize conflicts between working land and residential uses

Conflicts between working lands and residential land uses occur, for example, when suburban housing is constructed next to working farms where work begins at dawn or animal waste is part of the business. North Carolina has a right to farm statute (G.S. 106-700 to 106-702) that protects agricultural and forestry land from nuisance lawsuits, but the local zoning code can implement the goal of reducing conflicts between farmers and homeowners. However, in NC there are significant differences between city and county land use regulatory authority relative to agricultural activities.

While cities have broad authority to regulate a wide range of agricultural activities (but not in their ETJs), county authority is more limited. For example, land used for a bona fide farm purpose (including growing and harvesting trees) is exempt from county zoning requirements. This exemption ends if farmland is subdivided for other uses. Where possible, the creation of buffers on properties adjacent to farms through zoning, subdivisions or other policies can manage land use conflicts resulting from agricultural operations.

Preserve farms and working forests in clusters

Farms function best economically when they are clustered, rather than isolated between residential subdivisions. Additionally, clusters of working forests can create corridors (e.g. physically connected patches of forest) that provide habitat to a wide range of animal and bird species. The comprehensive plan is a place to identify farm clusters that should be preserved based on economic productivity and soil quality. If farmland preservation is not a stand-alone chapter in the plan, a second option is to create a farmland protection plan to complement the plan's goals. The North Carolina Department of Agriculture and Consumer Services provides support for stand-alone Farmland Protection Plans. Three counties in coastal North Carolina – Onslow, Craven, and Pamlico - have taken advantage of this program and completed a Farmland County Protection Plan. The *Gates County, NC: Comprehensive Plan* (2016, 6-13 – 6-15) supports the creation of a Farmland Protection Plan for their community.

Counties and cities can encourage clustering by establishing Voluntary Agricultural Districts (VAD) and Enhanced Voluntary Agricultural Districts (EVAD) that provide a range of benefits to land owners in return for protecting farm and forest land from future development. For example, water and sewer assessments may be suspended or waived if the farmland or forest is not connected to the utility. Brunswick County's Voluntary Agricultural Districts take the form of conservation easements that "prohibit non-farm use or development" for a period of 10 years. The land owner voluntarily places this easement on his or her property and can extend the time frame if they wish. The property owner also reserves the right to terminate the easement by submitting a written request to county staff and the Agriculture Advisory Board. The Advisory Board can also terminate a VAD should a land owner use their property for a non-farm or forestry use. In the twenty coastal counties 15 counties have a VAD program, while three counties have EVADs including Craven, Gates, and Pamlico.

One of the strongest tools for farm preservation is a permanent easement that restricts future use of the property to farming or forestry in perpetuity. Governments, nonprofits, foundations and private individuals can purchase

For additional information on planning to protect working landscapes:

Planning for an Agricultural Future: A Guide for North Carolina Farmers and Local Government. 2007. Published by the American Farmland Trust.

For additional information see the *NC Department of Agriculture and Consumer Services Voluntary Agricultural Districts, Enhanced VADs and Farmland Protection Plans page.*

Planning for Agriculture: A Guide for Communities. Douglas Jackson-Smith et al, 2002. Published by the Wisconsin Dept. of Agriculture.

Policies and programs to protect farmland. Farmland Information Center website.

an agricultural, development, or conservation easement to restrict future use of a farm to farming or forestry or simply to remove development rights from the land. There are many federal and state programs as well as nonprofit organizations such as Conservation Trust for North Carolina that work with local land trusts to purchase agricultural conservation easements to protect agricultural land from development. In some cases, landowners will also agree to donate their land or place a conservation easement on their land. In coastal North Carolina, farms ranging from 25 acres in Carteret to 250 acres in Hyde County have been preserved with easements funded through the NC Agricultural Development and Farmland Preservation Trust Fund (ADFP). Statewide, the ADFP program is responsible for purchasing easements covering over 10,000 acres of farmland.

Use the property tax code to benefit farmers and forest owners

Like many states, North Carolina uses a tax program to help preserve agricultural land. NC's present-use value (PUV) property tax exclusion program for farms, working forests, and wildlife conservation land allows property owners to pay taxes based on their current use of the property (e.g. farming or forestry) rather than the market value of the property as a site for a housing or commercial development. The goal of this program is to avoid situations where rural property owners are forced to sell their land to a developer because their farm or forest income is too low to cover the property taxes. Local governments should encourage eligible landowners to utilize these incentives to preserve working lands.

Use the zoning code to support viable farms and prevent forest fragmentation

A common approach to the goal of preserving rural character across the United States is low density zoning of two to five-acre residential lots. The unintended consequence of this lot size has been to encourage non-farm uses in formerly agricultural areas because a two-acre lot is too small for most farms but is a desirable lot size for many homebuyers. Large-lot zoning may reduce the financial incentive for developing agricultural land but if the intention is to protect farmland, then minimum lot size should be based on the minimum parcel size required for an economically viable farm given local conditions.

Cluster subdivision development in combination with a conservation easement can provide a development alternative to protect agriculture and forestry working lands as well as forested wildlife habitats. Timber harvesting and wildlife habitat can coexist in a well-managed forestry operation but the impacts on wildlife are significantly greater when their habitats are fragmented into two or five-acre parcels. Cluster subdivisions, sometimes referred to as "conservation subdivisions", concentrate lots on a portion of a development site away from areas to be protected. Lots smaller than otherwise allowed are permitted in exchange for land conservation. Cluster subdivisions can be tailored to protect working lands and contiguous wildlife habitats.

For more information related to local authority to zone and regulate agricultural and forestry land use *see resources from the UNC School of Government*

For more information about zoning forested lands see the *NC Cooperative Extension's website*

North Carolina's Forestry Present-Use Valuation (PUV) Property Tax Program. Rick Hamilton et al. 2011. Published by the NC Cooperative Extension.

For more information on the NC Present-Use Value Program see the *Present-Use Value Program Guide,* 2019. *Published by the NC Department of Revenue.*

For additional information on farmland conservation:

NC Dept. of Agriculture and Consumer Services/ Farmland Preservation page

Conservation Trust for North Carolina, Protecting Farmland

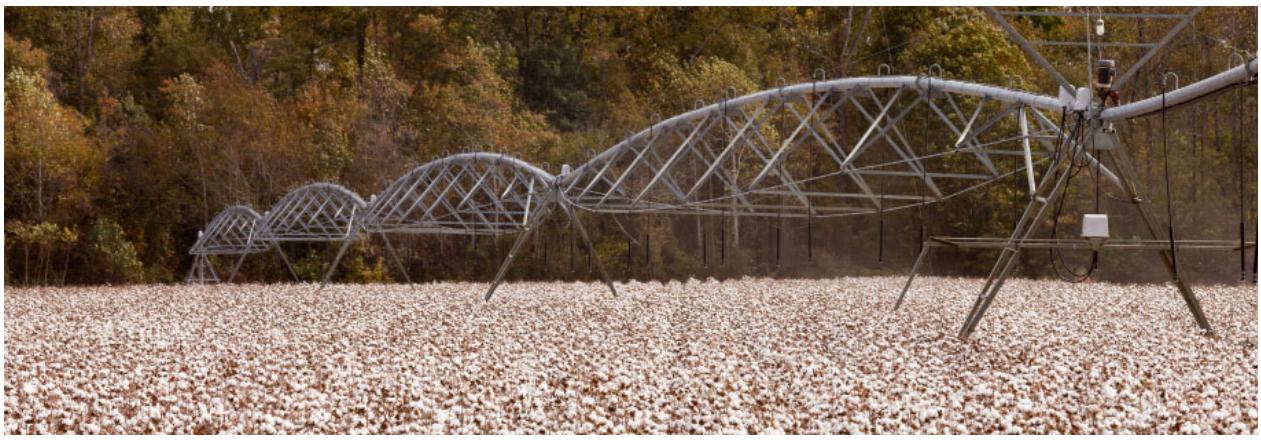
GETTING MORE OUT OF YOUR PLAN

Developing the Land Use and Community Form Element involves much more than a description of current and future land uses. It involves making critical decisions related to the housing, economic health, and related infrastructure and transportation needed to achieve the community vision and ensuring that the land use policies support and reinforce those goals. Land use also affects the community form and character in important ways by helping preserve open space, agricultural and forested areas, and significant historic structures and cultural resources. Land use choices also influence the environmental health, mitigate user conflicts, and help improve the lives of at-risk populations. Thus, all the elements discussed in subsequent sections have a strong connection to the designation of land uses described in this element. It is important to ensure that the practices described in this section are not only consistent, but reinforce the strategies and practices described in the subsequent elements.

This element also involves making critical decisions to protect public safety. It is important to consider a future development pattern that recognizes areas vulnerable to natural hazards and changing environmental conditions. For example, flooding disasters often bring about discussion on land use and community form since the existing development pattern (e.g., development in flood hazard areas) can both determine the severity of damage experienced and effect how the community recovers or rebuilds. Accounting for and mitigating against potential natural hazards risk is important for growing a community with a resilient economy, housing stock, and cultural and natural resources (see Section 3.6).

It is also important to recognize that developing policies to address some of these topics may require additional analysis that moves beyond the minimum CRC rule requirements (e.g., buildout analysis, land suitability analysis, scenario planning, fiscal analysis). Section 1 describes how a community can invest in their analyses to go further in addressing some of these topics. Other topics such as economic development may require focused planning efforts (e.g., creation of an economic development plan) as part of the implementation process.

It is important to ensure that the land use practices identified here coordinate with the policies advocated by adjoining jurisdictional areas. For cities and towns, this requires some coordination to ensure that the local and county comprehensive plans are consistent. It is also likely to require coordination with larger regional plans for transportation (e.g., NCDOT and MPOs) and regional economic development organizations. In addition, many NC communities will also require some coordination with military installations to ensure comprehensive plan policies are consistent with plans for those facilities (e.g., expansions, closures, etc.).



Automatic pivot irrigation mechanism between rows of cotton on rural NC farmland

Section 3.2

Coastal Environment Element

TOPICS INCLUDE:

- Public trust waters and submerged lands
- Public access
- Waterfront revitalization
- Shoreline erosion and stabilization

INTRODUCTION

The unique geographic features of North Carolina's coast are one reason that people choose to live and visit our state. The state's beaches support a tourism industry, which is important to many coastal communities. The region's beaches, bays, sounds, rivers, creeks, marshes, and shorelines provide incredible natural beauty and a myriad of recreational opportunities. The state's shoreline is dotted with small towns and large cities that support water dependent commercial uses such as working waterfronts, ports, marinas and recreational facilities such as docks, piers, boat ramps and boat launching facilities. Industrial uses and military installations are also located along the state's shoreline. NC's coastal management program is designed to create a decision-making framework that balances these competing uses and facilities in a manner that enhances our economy while protecting the environment and quality of life for future generations. CAMA plans are a critical piece of this framework.

CRC'S PUBLIC ACCESS GOAL:
Maximize public access to the beaches and the public trust waters of the coastal region.

While the Land Use and Community Form element (see Section 3.1) described a range of practices that address common land use concerns, this chapter focuses specifically on the topics that emerge from the land-water interface and the need for communities to manage user conflicts in shoreline areas and adjacent public trust waters. For example, a growing population creates greater demands for housing, community facilities, and infrastructure and can place additional pressure on existing recreational boating and public access facilities. New commercial or residential development on the waterfront can crowd out water-dependent uses like commercial fishing facilities, working waterfronts, and port facilities.

The state works to conserve and protect its waters for the benefit of all its citizenry and to preserve recreational and scenic areas, wetlands, estuaries, and beaches, through "public trust rights". The public trust in NC includes the reach of navigable waters and the full depth and breadth of ocean beaches, including dry sand beach areas, as well as submerged lands below Mean High Water out to *3 nautical miles offshore*. The state recognizes pre-existing uses of public trust waters under *submerged lands claims* in *NCGS 113-205*.

In coastal NC, public trust areas are primarily managed through the Division of Coastal Management, with the Division of Marine Fisheries (DMF) and the Wildlife Resources Commission (WRC) having jurisdiction over fishing activities in coastal and inland waters respectively.

The federal government also exercises jurisdiction over the state's waters, with the authority to regulate commerce, navigation, power generation, and national defense. The state's coastal waters contain exclusion areas due to *military danger zones and restricted areas*. The U.S. Army Corps of Engineers (COE) maintains setbacks from all federal navigation channels and small boat harbors and harbors of refuge. There are also federal projects with designated harbor or pierhead lines. Planners should consult the *COE website* for information about the projects that may be located in the community's jurisdiction. Additionally, federal government jurisdiction extends into the offshore waters of the Atlantic Ocean. The federal government asserts authority over offshore activities such as resource management, shipping, and national security. Local governments can address offshore activities through the state's federal consistency program (See Section 2.4).

The jurisdictional limits and regulatory authority local governments have over public trust waters vary, so it is important for a community to understand this when preparing a plan to address uses and activities over public trust waters. Concerning jurisdictional limits, in Bertie County, for example, the county's boundary extends across the entire Roanoke River rather than to the river centerline, which is more typical. Specific to regulatory authority, certain cities and towns, as specified in state statute, have the authority to adopt ordinances to regulate and control activities. For example, some are authorized to regulate swimming, personal watercraft operation, surfing, and littering in the Atlantic Ocean and other waterways adjacent to their city, within their boundaries or within their extraterritorial jurisdiction (ETJ); however, they are not allowed to prohibit swimming or surfing or to make these activities unlawful. Understanding the scope of local government regulatory authority over public trust waters will allow the community to determine which goals, objectives, and policies for their local waterways and shorelines can be met locally and which will require partnerships with other local, state and/or federal agencies to achieve.

While the range of topics for a Coastal Environment Element will vary based upon community context and development pressure, this chapter focuses on four topics that will likely be of concern to many NC coastal communities: public trust waters and submerged lands, public access, waterfront revitalization, and shoreline erosion and stabilization. The policies developed for the Coastal Environment Element provide an important tool for regulating development and uses of a community's shoreline through CAMA development permits (see Section 2.2). This element may include local policies for Areas of Environmental Concern (AEC) that exceed the CRC's permitting rules. This element can also include policies for federal and federally licensed activities on or near the water. Each community should select topics consistent with their community concerns and aspirations and vision statement in addition to addressing the CRC's management goal for public access. Many of the policies developed for this element will also support management goals for land use compatibility and natural hazards, and to a lesser extent infrastructure carrying capacity and water quality. The following sections describe each general topic and provide strategies that can be included in a plan.

PUBLIC TRUST WATERS AND SUBMERGED LANDS

Public trust rights extend well beyond public access to the state's beaches. These rights include, the "right to navigate, swim, hunt, fish and enjoy all recreational activities in the watercourses of the State" (N.C. Gen. Stat. § 1-45.1). The public trust doctrine is a common law principle whose origin predates the U.S. Constitution. The doctrine ensures that certain waters and the submerged lands they cover, are held in trust by the State for the benefit of the public. As the trustee, the state is obligated to ensure that these resources are protected and maintained for the public's use. This is one of the principle reasons that the CRC designates the following as Public Trust Waters AEC:

- Waters and the lands underneath the Atlantic Ocean from mean high-water seaward to the state's official boundary three miles offshore
- All navigable waters and their submerged lands extending landward to the normal high-water or normal water level. This does not include privately owned lakes where the public does not enjoy access rights
- Waters in artificially created water bodies with significant public fishing resources and accessible to the public from other waters
- Waters in artificially created water bodies where the public has acquired rights by prescription, custom, usage, dedication, or any other means

The docks along the waterfront in Southport, NC. The string of boat docks line the Cape Fear river opening.

Public Trust Waters are coastal waters that are open for public use and include activities such as fishing, boating, watersports and swimming. Providing and expanding access to public trust waters is important in cultivating an ownership or desire by the public to protect and enhance these waters and resources for future generations to enjoy. Local governments and their plans play an important role in helping provide, protect and expand public access to NC's public trust waters and beaches. According to the National Marine Manufacturers Association (NMMA), in 2010 NC had more than 400,000 registered recreational boats, most of which are used in public trust waters. Docks, marinas, boat launching facilities, and moorings provide boat owners with the access needed to exercise their public trust rights. However, the design, location, and density of these facilities can create environmental concerns (e.g., water quality, shading, damaged habitat, etc.) and the permanent occupation of public trust waters and submerged lands can cause conflicts with those who no longer have access to those waters. Boat facilities can also create conflicts with adjoining land uses given the level of activity, noise, boat traffic, and other issues associated with their operation. The uses of recreational and commercial vessels can also create conflicts due to their noise or operations. As an example, to address personal watercraft conflicts the Town of Nags Head's *2010 Land Use Plan* (2010, p. 96) limits the number

of personal watercraft units that can be rented at a commercial site and will not permit or allow land based commercial rental of personal watercraft to be used in the Atlantic Ocean. Another problem can be abandoned vessels that litter waterways and obstruct navigation.

In addition to recreational uses, the plan may need to include strategies to manage other potential uses of public trust waters including aquaculture operations such as shellfish lease areas. While these water dependent uses are appropriate for public trust waters, they may present potential conflicts with adjacent land or water uses.

Additionally, there has been increased interest in establishing energy production facilities within the state's coastal waters. Wind turbines are being considered for offshore and sound waters. There is also interest in exploring offshore natural gas and oil resources for potential use. Energy production facilities and their related support facilities (e.g., transmission lines, pipelines, etc.) would occupy submerged lands and public trust water, with support facilities potentially connecting to land-based distribution systems.

DMF Shellfish Lease and Aquaculture Permitting Program

DMF Shellfish Leasing Application – webmap that allow for the viewing of all shellfish leases within NC, as well as proposed leases.

Sail boats in marina in New Bern, NC

Recommended practices

Identify areas appropriate for different uses of public trust areas

As on land, there are competing uses for public trust waters. Uses also compete with the need to protect resources (e.g. primary and secondary nursery areas or other fish habitat, submerged aquatic vegetation, shellfish growing areas, or underwater archeological sites) and navigation channels and with the need to avoid areas used for military purposes. Commercial fishermen rely on the fish and shellfish in these waters for their income. Recreational users depend on the waters to enjoy a wide range of activities, such as swimming, boating, wildlife observation, and hunting. The community may find it necessary to identify areas appropriate for certain commercial and recreational uses, particularly where structural improvements will be needed.

It is likely that NC will see growth in its aquaculture industry within public trust waters, particularly for shellfish. Areas leased for commercial shellfishing are increasingly utilizing fixed structures and equipment that essentially limit water access in these areas. Concerning aquaculture, Dare County's *Land Use Plan Update* (2009, p. 194) indicates that local efforts to develop aquaculture as a source of fisheries production are supported provided the proposed fishery or fish species does not negatively impact fisheries. While commercial shellfishing can be good for a local economy and reinforce the community's culture and sense of place, the permanent occupation of public trust waters has the potential to create conflicts with other users and may face objections from adjacent landowners.

A community may also have economic growth strategies centered around a waterfront with improvements that serve the commercial fishing industry or recreational transient boaters, such as mooring fields, commercial docking facilities and marinas. Identifying areas for these uses would benefit a community looking to protect a working waterfront or to enhance their urban waterfront. It may also be beneficial to identify areas for recreational use to ensure future protection and enhancement. For example, there may be an area where the public has traditionally enjoyed swimming, but there is no formal, land based public access to the swimming area. Recognizing this use in the plan would assist in prioritizing its protection.

Proposals for offshore or even inshore energy exploration and development (e.g., wind, oil, natural gas) may generate land use conflicts and environmental concerns. Even if the facilities are located a great distance from the coast, additional upland support facilities such as transmission lines or pipe lines will be needed. The installation and continued maintenance of these facilities can also have upland impacts. A few communities have incorporated energy exploration in their CAMA land use plans. It is important that any policies meet the standard for "enforceable policies" as defined by NOAA Office for Coastal Management if they are to be used in federal consistency reviews (see Section 2.5). For example, the Town of Shallotte's *CAMA Core Land Use Plan* (2007, p. 93) policy for inshore and offshore exploration and development is to "not allow offshore exploration and inshore development of refineries or large gas or petroleum storage facilities in Shallotte. Town policy shall be to permit the exploration of gas or oil on inland properties as long as all zoning, State and Federal regulations are followed". In contrast, the Town of Beaufort's *Core Land Use Plan* (2017, p. 121) states "Beaufort has some concerns over offshore drilling. In the event that oil or gas is discovered, Beaufort will not oppose drilling operations and onshore support facilities for which an Environmental Impact Statement has been prepared with a finding of no significant impact on the environment…Offshore drilling and the development of onshore support facilities may have severe costs for the town and county as well as advantages. The costs should be borne by the company(ies) which profits from offshore drilling and onshore support facilities." While policies opposing offshore activities may clearly state the local government position, such statements will more than likely not be approved as enforceable for the purposes of federal consistency by the OCM.

Boats moored in Beaufort, NC

Encourage recreational and commercial boating

One strategy that expands access to the state's public trust waters is to make them more accessible to commercial and recreational boaters by expanding marinas (public or private), mooring fields, residential docks, and various types of boat launching facilities. This is accomplished with policies that

support new or expanded marina operations. Marinas require access to navigable waters of sufficient depth. They can have impacts on water quality, wetlands, or submerged aquatic habitat so their location needs to be carefully considered in light of existing conditions. They can also negatively affect adjoining land uses due to the nature of their operation (e.g., noise, traffic, etc.). As a result, in many communities the number of potential locations for new or expanded marina operations may be quite limited.

Building a boat dock to access navigable waters is an important riparian and littoral right. While constructing one dock often has limited environmental impact, the proliferation of a large number of private docks along a river, channel, or harbor can lead to a number of environmental impacts such as shading of submerged habitat, destruction of habitat, and impacts due to the operation of the vessels. It can also create user conflicts if docks are constructed that block views or negatively impact access to navigable waters. Their construction could also complicate public access along shoreline areas spanned by docks. Consequently, plans may include policies related to the siting and design of docks. The plan may also establish a pier head line to limit waterward extension in order to protect views and minimize impacts to navigation. Policies may also prevent conflicts between residential and commercial uses of residential docks. For example, the *Town of Wrightsville Beach's 2018 CAMA Land Use Plan Update* (p. 5-12 & 5-13) includes policies designed to protect navigation channels from obstruction, enforce its pier head line that limits the waterward extension of docks and piers, and limits commercial fishing and private vessels for hire to existing commercial marina facilities.

While less common in North Carolina, mooring fields provide another option that expands recreational and commercial boating opportunities for some river and harbor areas. Moorings not only expand recreational boating opportunities, they also provide refuge for transient boaters during coastal storms. Siting a mooring field requires careful consideration of water depth and the swing radius for boats. There also needs to be a suitable location nearby where the boats can access land. As with docks and marinas, environmental impacts need to be considered when siting a mooring field. The Town of Carolina Beach's *Water Use and Harbor Management Plan* (2008) designates areas appropriate for a public mooring field and contains technical design standards for mooring fields. After approving the plan, the Town applied to DCM for the requisite permits and installed a mooring field. The field's 10 moorings are rated for yachts up to 55-feet and are specifically designed to accommodate boats larger than 26-feet. The field is designed to attract transient boaters who traverse the Intracoastal Waterway (ICW) or move yachts seasonally along the coast. By attracting these boaters, the

For additional information on marinas:

DEQ created a *Clean Marina Program* in 2010 to highlight marinas that use best practices to limit their impacts on the marine environment.

Marinas are defined in CRC rules as any publicly or privately owned dock, basin or wet boat storage facility constructed to accommodate more than 10 boats and provides any of the following services: permanent or transient docking spaces; dry storage; fueling facilities; haul out facilities; and repair services.

project also promotes local tourism while providing safe harbor for transient boaters.

Smart Growth for Coastal and Waterfront Communities - https://coastalsmartgrowth.noaa.gov/smartgrowth_fullreport.pdf

Develop a harbor management plan

In some communities, the harbor is a prominent geographic feature and many issues such as public access, recreational boating, commercial fishing, economic development, flooding, and water quality are all linked directly or indirectly to the harbor area. Sometimes this collection of issues is too complex to address within the confines of a plan. Addressing these issues may require working with a complex set of specialized stakeholders to develop policies that have broad community support. It may also require specialized data gathering (e.g., collecting data on water depths). In these situations, it may be appropriate for a community to develop a specialized harbor management plan. The plan can then support the harbor management plan's policies.

The development of harbor management plans in states such as Rhode Island, Massachusetts, and Maine is quite common. However, the Town of Carolina Beach was the first planning jurisdiction in North Carolina to develop a *Water Use and Harbor Management Plan* (2008). The plan contains a number of policies and recommended actions. The town also established a harbor commission to oversee the implementation of part of the plan and includes provisions for designating a harbor master.

Establish policies and programs to remove abandoned vessels

Abandoned vessels are unsightly and create a myriad of hazards. Environmental issues arise due to leaking fluids or other materials. A sunken vessel can impede navigation and become a safety hazard. They also pose a hazard during storm events when they break free from their moorings and damage other vessels or shoreline property. The removal of abandoned vessels is a complex and costly issue for local governments and there is no one state agency or organization responsible for the removal of the abandoned vessels. Additionally, if the owner of the vessel cannot be determined, the cost of removing the vessels can fall to the local government.

In 2015, NC counties were given the authority to pass an ordinance to remove abandoned vessels. An "abandoned vessel" is one that meets any of the following:

> (1) A vessel that is moored, anchored, or otherwise located for more than 30 consecutive days in any 180 consecutive-day period without permission of the dock owner.
> (2) A vessel that is in danger of sinking, has sunk, is resting on the bottom, or is located such that it is a hazard to navigation or is an immediate danger to other vessels.

Abandoned vessels being prepped for removal

Shipwrecks, vessels, cargoes, tackle, and other underwater archeological remains that have been in place for more than 10 years shall not be considered abandoned vessels and their removal requires the approval of the Department of Natural and Cultural Resources (NC GS 153A-132).

Currituck, Dare, New Hanover, Brunswick, and Hyde counties have passed ordinances to address this issue. Brunswick County's ordinance makes it unlawful for any person to anchor, dock, moor, or store any vessel in waters of the county for more than 10 days in a 30-day period in any calendar year, except at a private dock or marina. The ordinance also makes it unlawful to abandon a vessel and makes the owner responsible for the costs of towing, relocating, and storing the vessel and the restoration of the area surrounding the vessel.

See the Eastern Carolina COG's resource on abandoned vessels. *http://www.eccog.org/economic-development/abandoned-and-derelict-vessels/*

CRC's Public Access Management Goal:

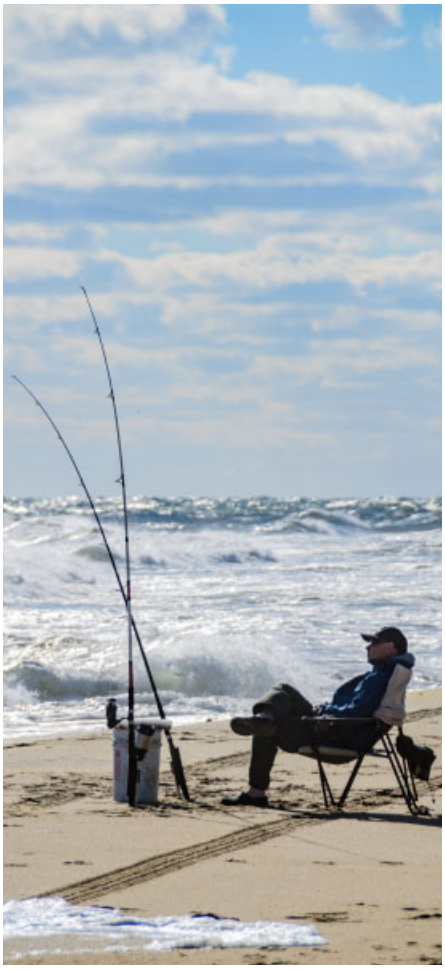
Maximize public access to the beaches and the public trust waters of the coastal region.

PUBLIC ACCESS

North Carolinians have the right to freely use and enjoy the State's ocean beaches and estuarine waters and to traverse along the tidal shoreline (*N.C. Gen. Stat. § 1-45.1*). Accordingly, every plan is required to address the CRC's Public Access Management goal (see Section 2.4).

Public access to the dry sand beaches is of particular importance, the concept of public access extends much further than simply beach going. It includes other uses of public trust waters including the right to navigate, swim, hunt, fish and enjoy recreational activities in the state's watercourses. Accordingly, it is important for the public to be able to access rivers, sounds, bays, and other estuarine shoreline areas for these purposes. This requires boat ramps and launching facilities, piers, or other facilities that provide access to water bodies.

A local government can maximize public access to beaches and public trust waters using a number of different strategies. For example, public access facilities can be made accessible to people with disabilities, and provide special equipment (e.g., beach wheel chairs) to enable people with disabilities to access beach areas. Facilities can provide signage to accommodate non-English speakers. Local governments can also protect much sought after waterfront views since they are a commodity that makes shoreline property more valuable and contributes to a community's sense of place.



Fisherman enjoys a beautiful day along the Outer Banks of North Carolina

Recommended practices

Develop a local waterfront access plan

A local waterfront access plan can provide a coordinated framework to address the community's waterfront access needs. Access plans include an inventory of existing sites, identify opportunities to obtain new locations or enhance

existing ones, and recommend strategies and funding options. The access plan should include an inventory of community-owned sites on or near the water, including street ends since many street ends are platted to the mean high-water line. While street ends can provide access to oceanfront beaches, those that run to inland waters (e.g., bays, sounds, rivers) are often publicly owned too. A few minor improvements can increase accessibility to public trust waters for viewing, fishing, or other forms of passive recreation in these areas. Some locations may provide relatively low-cost opportunities to build facilities such as piers or small launches for canoes, kayaks, or paddleboards.

The *Town of Carolina Beach 2007 Land Use Plan* (2007, p. 68) sets the goal of maximizing public access to the town's beaches and the public trust waters followed by the objective of establishing a shoreline access plan to address access along the Myrtle Grove Sound. In 2008, the town implemented this objective with the *Carolina Beach Water Use and Harbor Management Plan*, which includes a *detailed inventory* of all of the potential access sites along the harbor, and possible future land uses to be considered in planning and local government decision-making. Once a local waterfront access plan is adopted, the community can then use it as justification when applying for grants from DCM or other federal and state sources. Improvements indicated in the local waterfront access plan can also be included in the local government's capital improvement plan or annual budget process.

Identify opportunities for funding and partnerships to expand public access

As NC's coastal communities continue to grow, many areas will need to expand public access facilities of all types. While this naturally includes accessibility to oceanfront beaches, it also includes access to harbor and waterfront areas as well. Local governments have a number of tools at their disposal to increase public access.

Communities can select from a number of grant opportunities to acquire land and expand access. DCM's Public Beach and Coastal Waterfront Access Grant Program provides low cost construction grants to local governments in the 20 coastal counties. Since 1981, DCM has provided over $47 million to acquire or improve more than 450 public water front access sites. Other programs include the Parks and Recreation Trust Fund, The Clean Water Management Trust Fund, The Land and Water Conservation Fund, *Water Resources Development Grant Program, Boating Infrastructure Grant Program (BigP), and the Coastal Recreational Fishing License Program Grant (CRFL)*.

While an expensive option, the acquisition of property is often one of the only options for expanding public access and building new facilities in urbanized shoreline areas. Conversely, communities that still have open space and

Houses and docks near Morehead City, NC

undeveloped lands should expand their access to accommodate future growth while the land is relatively inexpensive. Flood prone areas and FEMA buyout properties can also serve as locations to provide additional public access (See Section 3.6).

For more information on funding for public access improvements see *DCM's Public Access Grant Program, Clean Water Management Trust Fund, Parks and Recreation Trust Fund (PARTF), Water Resources Development Grant Program, WRC, and Boating Infrastructure Grant Program (BigP), Coastal Recreational Fishing License Program Grant (CRFL)*.

As the population grows, the demand for places to launch boats also increases. This includes not only boat ramps and parking facilities but also places to launch canoes, kayaks, and paddle boards. Many of these facilities are expensive given that by necessity they are located along shoreline areas where property may be very expensive. If the local waterfront access plan identifies a publicly owned waterfront site as a possible location for a public access boating facility, the NC Wildlife Resources Commission (NCWRC) is a potential partner for improvement and management of the site. The Brick Landing Boating Access in the Town of Shallotte is an example of such a partnership. The NCWRC purchased the site from Brunswick County in 2013 and constructed two boat ramps, a floating dock, and a paved parking lot with 23 boat trailer spaces and five single-vehicle spaces. The design and construction cost approximately $250,000 but the project was fully funded by the NCWRC. Local governments can explore many other sources of grant funds to assist with these projects as well.

Getting ready to launch a kayak at Cape Carteret Pettigrew Creek Access

Develop policies that manage existing uses of dry sand beach areas

Beachfront communities have a wide range of public access facilities and use of existing access sites vary widely. Planners should examine the adequacy of existing sites and the management of beachfront areas to determine whether existing policies are sufficient. The examination should address the adequacy of the facilities used to promote public access (e.g., on street and off-street parking, signage, dune walkovers, viewing platforms, etc.) and the services provided to beachgoers (e.g., life guards, location of life guard stands, trash collection, restrooms, showers, changing areas, etc.). The plan should then identify and prioritize areas for improvements that either increase public access or enhance the existing experience. The needs will vary greatly based on community context. Uses of beach areas in addition to beach going include different activities in different communities, such as driving, camping, bonfires, and erecting temporary structures like tents. Some beach areas near urban centers experience greater demand than other rural communities and therefore require different policies and facilities.

After assessing the current management of dry sand beach areas, the plan can then recommend policies and ordinances to manage activities along the beach strand. The Town of Nags Head's *2010 Land Use Plan* (2010, p. 92) states that it "will not allow or permit commercialization of the town's ocean beaches"; and "will make a financial commitment including additional personnel and equipment if needed to keep the beaches clean of debris and

litter" In recent years, tent structures being abandoned or left on the beach overnight has become an increasing problem. In 2014, the Town of Nags Head adopted an ordinance requiring beachgoers to remove tent structures between 8 PM and 7 AM.

The DCM *provides a map of access sites on its website* that may be useful for planning purposes.

Provide and maintain access along commercial waterfronts

Maintaining or expanding access along commercial waterfronts provides an important economic development tool while allowing the public to enjoy recreational opportunities and the aesthetic values of these areas. The plan should include policies that protect access along commercial and working waterfronts to the maximum extent practicable such that new development accommodates this use. For example, a downtown waterfront boardwalk can become a central design feature that is incorporated into waterfront and downtown development projects as described below.

The City of *Wilmington's Riverwalk* is a particularly notable example of what can be accomplished when a community works over a long period of time to promote access along a commercial waterfront. The shoreline of the Cape Fear River was not always pedestrian friendly. The Riverwalk project began back in 1980 and was a key part of the city's efforts to revitalize its downtown waterfront area. Today, after spending more than $33 million, the Riverwalk now extends 1.75 miles from Nun Street to the Isabel Holmes Bridge on the North end of downtown. It is the city's top tourist attraction and redevelopment projects take advantage of their connection and access to the Riverwalk.

Promote accessibility to diverse populations

Diverse populations are identified by factors such as disabilities, race, ethnicity, age, and socio-economic status. Determining beach and waterfront access needs for these populations should involve a collaborative effort with representative individuals from these groups. The alternative perspectives provided by these individuals can assist the community in meeting beach and water access needs in ways that may differ from traditional approaches. As an example, signage at access locations may need to be modified to address language barriers for non-English speaking populations or increase visibility for the elderly.

Relative to ocean beach and inland water access, people with disabilities are the most commonly identified group. Ensuring public facilities comply with the requirements of the 1990 Americans with Disabilities Act (ADA) not only allows people with various disabilities to enjoy uses of public trust areas, but in many cases it makes them more accessible to an aging population. ADA accessibility begins in the parking lot where handicapped parking

Aerial view of Front Street, Taylor Creek and Carrot Island in the coastal town of Beaufort, NC

spaces must be readily accessible to access sites. Other ADA requirements include wheelchair accessible bathrooms, showers and changing facilities, ramps instead of stairs, viewing platforms, benches, handrails and other accommodations. It is important to consider the level of accessibility needed and to make recommendations for improvements during plan development.

Providing accessible facilities in a beach environment is often challenging given the unique terrain and shifting nature of beaches and dunes. The level of beach accessibility varies greatly not only across communities but across access sites within a given planning jurisdiction. In addition to physical site improvements, there are lower cost options for improving access for individuals in wheelchairs that can be recommended in a plan. Wheelchairs are extremely difficult to use in the sand and were not designed to be exposed to saltwater. A beach wheelchair program is one solution to the problem and some NC beaches have expanded access through beach wheelchair programs. Local governments can provide all terrain wheelchairs, aquatic wheelchairs, surf chairs (another beach wheelchair design), off-road wheelchairs, beach rings, soil stabilizer, plastic coated mesh, and modular walk and deck panels to facilitate access across beach areas. For example, the Town of Atlantic Beach began a beach wheelchair program in 2000. The program began with two wheelchairs for public use and added a third because both chairs are typically in use every day between Memorial Day and Labor Day. The chairs can be accessed in the summer months on the beach at one of the town's bathhouses and at the fire department in the off-season. Another option is a beach access mat, a temporary mat that is rolled onto the sand allowing access for wheelchairs, walkers, and strollers that would otherwise sink into the sand.

Beach accessibility mat

Use the zoning code to maintain the waterfront viewshed

Waterfront views are a valuable and highly sought-after commodity. These viewsheds shape a community's sense of place and are worth protecting with plan policies (EPA & NOAA 2009). Height limits are a common tool to protect viewsheds and maintain a community's sense of place. These can be indicated in the plan and detailed in the local zoning ordinance or Unified Development Ordinance. For example, to protect their viewsheds the 2007 Town of Carolina Beach CAMA Land Use Plan has policies to maintain their 50' building height limit and prohibits "development activity that completely obstructs the view of public trust waters from public viewsheds" (p. 71 & 74). The plan and zoning code could also use a "wedding cake" approach and gradually increase heights as the distance from the water increases to maximize the viewshed (EPA & NOAA 2009).

Sometimes the concern is not the direct view of the water but the ability to have an unobstructed view along a beach or shorefront area. Establishing

building setback lines that establish the seaward extent that people can build decks and other accessory structures helps ensure that new construction does not encroach on views down the length of a beach. Similarly, the plan can establish a pier line that establishes the waterward limits for building docks to minimize obstructions to viewsheds. Pamlico County's *Joint Land Use Plan* (2012, 57) includes a policy designed to maintain pristine views: "The county will seek to maintain the pristine views along much of its shoreline and preserve free public use of its waters by encouraging upland marinas where sites are suitable and joint development of docks and piers to serve residential properties where practical."

WATERFRONT REVITALIZATION

Historically, urban centers such as the Town of Morehead City and the City of Wilmington developed because shipping was a main source of transportation. Wilmington remained the largest city in NC until 1910 due largely to its mix of industry, geographic location, working waterfront, port facilities, and railroad connections. Morehead City was reportedly the second largest commercial fishing center on the East Coast in the same time period, second only to Gloucester, MA. The coastal region of NC also had many smaller urban centers with commercial waterfronts located along coastal rivers and harbors that were bustling centers of commerce in their day.

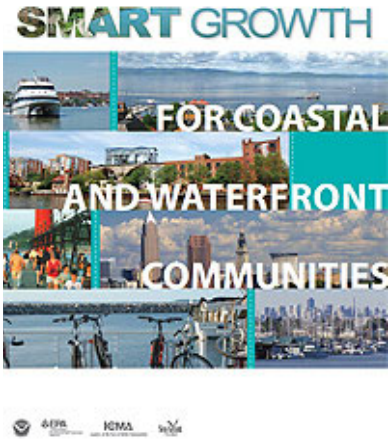
Waterfronts have a particular geographic feature that influences land use planning – a fixed boundary along the water's edge. Land at the water's edge is often the most valuable. As a result, traditional water dependent uses such as fishing, shipping, and marinas can be displaced by non-water dependent uses such as retail, hotels, restaurants, and condominiums. These non-water dependent uses often achieve greater returns on investment and provide higher property taxes due to their compact nature, which allows for dense development along a narrow strip of valuable land. Consequently, waterfront areas are prime targets for economic development projects. Careful planning is needed to ensure that projects preserve opportunities for traditional water dependent uses and reflect the community's waterfront heritage. Waterfront projects also pose unique design challenges because they are prone to hazards related to flooding and storm surge. Waterfront development should also reflect the need for public access along the shoreline and where possible promote walkable communities as noted earlier (see Section 3.1).

An old abandoned grain facility in Washington, NC rests on the waterfront, reflecting the town`s past as a seaport

Many of the land use practices recommended in Section 3.1 prove quite useful in addressing the challenges associated with managing land use along waterfront areas. Mixed use development that includes water dependent uses and promotes walkable communities are an excellent way to maximize economic use of limited shoreline areas. To accomplish this, it is useful to provide a wide range of housing options adjacent to urban waterfront areas. Moreover, the land should be developed in a manner consistent with the community's waterfront heritage and sense of place (EPA & NOAA 2009).

Urban waterfronts are also prime targets for redevelopment. Wilmington and Morehead City provide good examples of waterfront redevelopment as both were vibrant urban centers in the 1900s, but faced economic challenges by the 1970s and 1980s. In 1994, the South Water Street Development Team was formed in Wilmington to lobby for changes that would support Wilmington's downtown waterfront redevelopment. Revitalization efforts included extension of the Wilmington Riverwalk and the redevelopment of numerous waterfront buildings, some of which were built partially over the water. Many of these building had become unsafe and abandoned. Abandoned buildings and vacant land near waterfront areas are not uncommon. These areas provide opportunities for economic development because the land is often served by existing infrastructure (e.g., roads, utilities, water, and sewer). In other instances, the sites include *brownfields* whose reuse is complicated by real or perceived contamination. In these cases, the community may have to remove potential environmental hazards and put the land back to productive use. Many of the economic development strategies listed in Section 3.1 are also appropriate for waterfront revitalization projects. The following additional recommended practice may prove useful for many communities.

EPA, NOAA, the International City-County Management Association (ICMA), and Rhode Island Sea Grant published an excellent manual *Smart Growth for Coastal and Waterfront Communities* (2009). The manual describes how ten common smart growth practices can be modified for use in coastal and waterfront settings.



Recommended practice

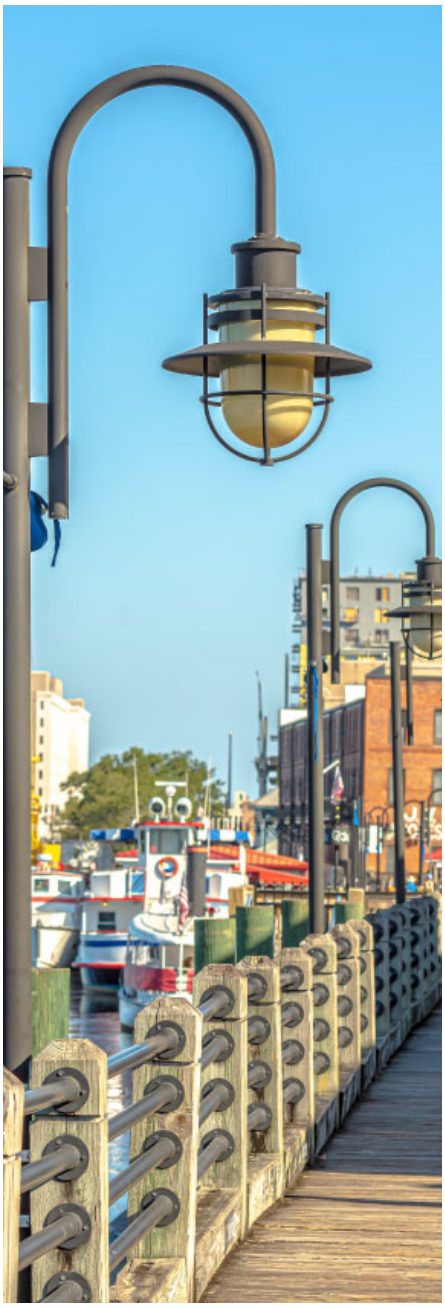
Develop a waterfront plan

When the waterfront is a main economic engine or is central to the community's identity, it is often necessary to supplement the land use strategies noted in section 3.1 with a focused planning effort targeted at the specific needs of a waterfront area. These efforts go by different names such as a waterfront master plan or a waterfront revitalization plan depending on their focus and emphasis (EPA & NOAA 2009).

There are some notable examples of waterfront revitalization in NC. In the City of Wilmington's most recent plan titled *Wilmington Vision 2020: A Waterfront Downtown* the city encourages downtown revitalization by emphasizing its waterfront area and uses its Riverwalk to link projects located along the waterfront. The city also developed detailed plans for particular projects along the waterfront such as the *North Waterfront Park Development Master Plan* (2016).

Other cities on the NC coast are at the early stages of long-term revitalization efforts. For example, the City of Washington released a Waterfront Visualization and Reinvestment Strategy (November 2009) which builds upon its history and waterfront character and identifies a unified strategy for transforming the community's waterfront area. The city has completed several projects along the waterfront and provides a pedestrian walkway, marina, gazebo overlooking the river, a playground, and even provides tourists with free Wi-Fi to encourage use of its urban waterfront area.

More recently, the Town of Shallotte committed to enhancing its central business district (CBD) with a transformative project known as the *Riverfront Town Center Project*, which is located on 20 acres of prime redevelopment land in the center of town along the river. Transforming waterfront areas in the City of Washington or Town of Shallotte is no easy task. It will take a sustained effort for decades. Their plans are likely to change over time, much the same way that planners in the 1980s never envisioned what Wilmington's riverfront would look like today. However, the development of a plan in conjunction with a specialized waterfront revitalization plan is an important first step to realizing the economic potential for many waterfront communities.



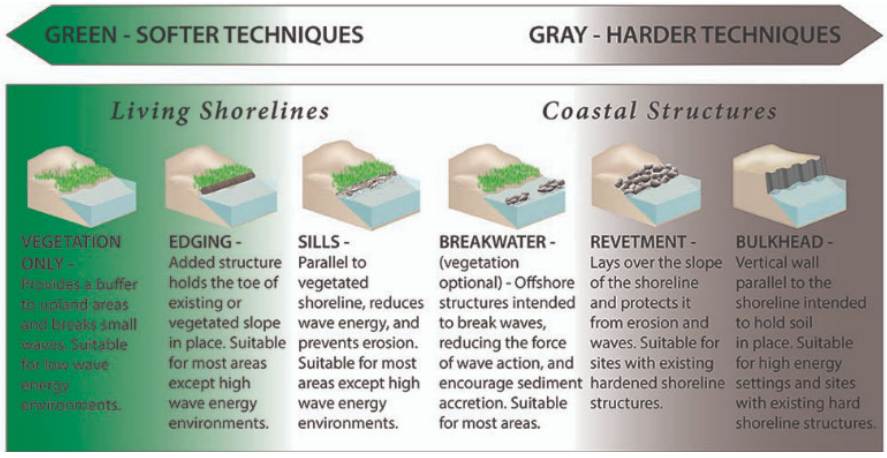
Riverwalk along the waterfront of the Cape Fear River, Wilmington, NC

SHORELINE EROSION AND STABILIZATION

North Carolina is fortunate to have over 320 miles of ocean shoreline and more than 10,000 miles of estuarine shoreline. Most of the state's shoreline remains undeveloped and consists of beaches and coastal wetlands that largely remain in their natural state. However, the shoreline is a dynamic, ever changing environment. It changes naturally due to accretion and erosion as a result of wind, waves, flooding, rain, and runoff. It changes due to the removal of vegetation from natural or manmade forces. It also changes due to sea level rise and storm events like hurricanes, tropical storms and nor'easters. The CRC's development setbacks help minimize risk from shoreline erosion by keeping development a distance from shore. While all development along the shoreline is at some risk from erosion, development that occurred prior to these setbacks faces greater risk of being damaged or destroyed. When erosion threatens, property owners look for solutions to protect their property while local government decision makers want to protect their investments in infrastructure and maintain beach and waterfront areas that attract tourists.

Oceanfront beach and inlet shorelines can change quite rapidly due to natural erosive forces and storms. In coastal NC, protection from beach erosion is handled through "soft" options including nourishment of barrier beaches, beach bulldozing, and plantings of dune grass to help stabilize dune areas. Sandbags are allowed only as a temporary protection measure. Hardened approaches to ocean shoreline stabilization are typically not permitted, although a few authorized terminal groin projects exist.

The shorelines of estuarine and inland waters change too, albeit much less dramatically. Common "soft" options to address shoreline erosion in these areas include planting vegetation along the shoreline and establishing living shorelines. Common "hardened" structures include bulkheads and stone riprap or revetments. Soft approaches to address shoreline erosion are preferred as they maintain existing connections between upland, intertidal, and aquatic areas while providing shoreline erosion control. Bulkheads are less desirable because they may reflect wave energy, leading to the loss of coastal wetlands and shallow-water habitat. They can also increase erosion along the front and sides of the bulkhead wall. Stone riprap and revetments can dissipate some wave energy, but can increase erosion along the front and sides of a revetment. Approximately eight percent of NC's estuarine shoreline is now "hardened" with structures such as bulkheads, riprap revetments, groins, sills, boat ramps, and jetty's according to the DCM's *Estuarine Shoreline Mapping Project 2012 Statistical Reports* (2015). In rural communities, that are sparsely populated and are not experiencing waterfront development, this topic may be less significant. However, for communities with fast growing populations and coastal communities that are largely developed, a much higher percentage of their shoreline has already been "hardened". According to the report approximately 61 percent of the estuarine shoreline in Wrightsville Beach and over 37 percent of Morehead City's estuarine shoreline is "hardened" in some way. Working to preserve the remaining shoreline areas in their natural state is particularly important in areas where a lot of the estuarine shoreline has been "hardened".



Examples of "Soft" and "Hard" Shoreline Stabilization Techniques for the Shorelines of Estuarine and Inland Waters (image source: Florida Sea Grant)

Living shoreline

Recommended practices

Establish strong setbacks for new development

The constantly changing nature of ocean and estuarine shorelines poses challenges for coastal planners. Shoreline erosion is a concern for property owners who are worried about the loss of their property, and in extreme cases the loss of their home. To address these challenges, the CRC's Ocean Erodible and Inlet Hazard AECs require development to be setback a distance from the ocean shoreline based on the annual erosion rate for that section of shoreline (see Section 2.2). The Coastal Shoreline AEC also has a 30-foot buffer where only water-dependent structures are allowed. At a minimum, planners should incorporate these setbacks when making decisions about future land use. While the CRC's setbacks are a useful starting point, the plan can also go further and establish greater setbacks when necessary. For an estuarine example, Pamlico County's *Joint CAMA Land Use Plan* established a permanent conservation zone within 75 feet waterbodies to manage development of the shoreline (p. 59). The policy statement is implemented through their subdivision ordinance.

Steer public investment in community facilities and infrastructure away from erosion prone areas

Development in erosion prone areas can be limited by restricting public investment in community facilities and infrastructure (e.g., roads, utilities, sewers, and public water systems) that allows development to occur in the first place. Not only does this help limit construction in erosion prone areas, it can save the community from having to rebuild this infrastructure after major storm events. For more information, see Section 3.6.

Protect oceanfront dune areas

It is important for oceanfront communities to take steps to protect sand dunes. Aside from their natural beauty and the habitat they provide, dunes provide important protection during major storm events and guard against the loss of life or property. Dunes absorb wave action and minimize the impacts of high waves and storm surges. They prevent or delay flooding from occurring inland and causing damage to structures. They are sand storage features that supply sand to eroding beaches during storms and provide buffers against windblown sand and salt spray.

Dunes grow naturally over time as wind blows sand across a beach area. Beach grass is a plant adapted to these conditions that traps sand as it is blown across the beach and contributes to the dune building process. While beach grass is a hardy plant and tolerant to extreme weather conditions, its stalk snaps easily when trampled or driven upon. The passage of one vehicle or a few people can kill the plants. Without vegetation, the dune is exposed to wind erosion. The low points in dune systems, particularly those without vegetation, are often the first areas breached during storm events. Protecting dune systems is important, because they are only as strong as their weakest link.

Plans should include policies and actions designed to protect dune systems which include prohibiting activities in dune areas. For example, Kure Beach has an ordinance that prohibits trespassing in dune areas. Communities that allow motor vehicles on beaches typically prohibit their operation in dune areas. Many plans, such as Wrightsville Beach's contain policies that restrict pedestrian access in dune areas to designated paths or dune walkover structures (2018, p. 5-10). The plan can encourage the use of existing community

or public dune walk over structures to minimize the number of paths and private structures. Due to geography or pedestrian traffic, the construction of elevated dune walkover structures may be necessary provided they conform to the CRC's standards and specifications.

A community can encourage property owners to create or stabilize dunes to protect their properties by planting dune grass or installing sand fencing. Dune grass is easy to plant, relatively low in cost, and spreads rapidly. It is common for nonprofit organizations such as the NC Coastal Federation or NC Coastal Land Trust to work with coastal communities interested in organizing volunteer planting events.

While it is important to include these policies in a plan, their effectiveness often requires communicating the importance of dune protection to property owners and visitors. The Town of Kitty Hawk has a *webpage* dedicated to dune protection and improvement. It describes the importance of dunes, recommends actions that property owners and visitors can take to protect dune areas, and provides links to additional resources.

Beach bulldozing, moving beach sand from areas seaward of the first line of natural, stable vegetation to repair storm damage to existing dunes or to create a protective berm for imminently threatened structures, is another method of oceanfront erosion management. This strategy is particularly used after major storm events. Beach bulldozing can be authorized through several CRC permitting processes depending on the site and the circumstances. The *DEQ's Beach Bulldozing website* provides more information on these requirements. Several towns in coastal NC manage beach bulldozing at the community scale, while others prohibit bulldozing by individual property owners.

Use beach nourishment to protect and restore oceanfront beaches

Nourishment projects expand the beach profile and rebuild dunes to protect property and provide storm protection. Nourishment projects require planning, permits, and funding. Generally speaking, nourishment and disposal projects may be allowed when:

- Erosion threatens to degrade public beaches and damage public and private properties;
- Beach restoration, renourishment, or sand disposal projects are determined to be socially and economically feasible and cause no significant environmental impacts;
- The project is consistent with state policies for shoreline erosion response and state use standards for Ocean Hazard and Public Trust Waters AECs;

Signs remind beach goers to stay off the dunes

- It is consistent with the relevant rules and guidelines of all federal and state review agencies.

It is important not only for a plan to have policies regarding beach nourishment but also to identify mechanisms for funding the projects. The plan should also provide documentation to support funding requests and permit applications when this is an important issue affecting your community.

DCM's website contains more information on the requirements associated with creating or stabilizing dune areas.

While expensive, beach nourishment projects provide very effective protection to the property and infrastructure along beachfront areas. For example, in the summer of 2017 a $38.5 million project nourished seven miles of beach from Duck to Kill Devil Hills in Dare County. Just as the project was winding down Hurricanes Irma, Jose, and Maria passed offshore. Significant nor'easters also occurred in January and March. The project served its purpose and minimized the loss of property. In 2018, American Shore and Beach Preservation Association recognized this nourishment project on its annual list of best restored beaches.

Sand fencing on North Topsail Beach, NC

Other communities have chosen to collaborate and develop long-term nourishment plans. The communities of Atlantic Beach, Pine Knoll Shores, Indian Beach/Salter Path, and Emerald Isle developed a 50-year regional nourishment plan for Bogue Banks. The plan allows the communities to consolidate their resources in terms of funding and project logistics. Having the plan in place allowed the communities to quickly respond to and undertake post-Hurricane Florence nourishment projects.

Relocate structures or retreat from erosion prone beach areas

Coastal property owners obviously want to protect their homes from erosion. The *CRC has rules in place* that allow property owners to temporarily protect structures when they become imminently threatened, which occurs when the erosion scarp reaches within 20 feet of a structure or site conditions increase the chance of imminent damage to the structure. The CRC may allow the installation of sandbags in order to protect certain structures while the property owner seeks a more permanent solution (e.g., beach nourishment, relocation of the structure landward).

Sometimes nature's erosive forces win. Homes become damaged beyond repair and create a danger to public health, safety, and welfare. Accordingly, the plan may contain policies that require the removal of damaged homes. For example, the Town of Holden Beach's *2009 CAMA Land Use Plan* (2009, p. 94) states "Homes damaged as a result of erosion or coastal storms may be considered a public nuisance and may be subject to removal at property owner expense."

If a community has property or public infrastructure that is imminently threatened, this topic should be addressed in the plan to seek a permanent solution. Typical solutions include beach nourishment, moving the structures, or acquisition. Nourishment is not always a viable option and in some cases, only a handful of property owners are affected. The property may also be located along shoreline areas where nourishment is inappropriate. When there is enough land to move the structure out of harm's way, the plan may encourage the relocation of structures in compliance with CRC rules and local ordinances. For example, the Town of Holden Beach's *2009 CAMA Land Use Plan* (2009, p. 91) states that "(s)tructures may be moved off property subject to erosion and relocated elsewhere so long as that movement meets the requirements of town ordinances and building codes." When neither of these options is viable, the property can be acquired by the town, cleared, and used for recreational purposes.

More information about Beach Nourishment projects can be found on *DCM's website.*

Promote living shorelines

Local governments should consider incorporating policies into their plan that encourage "soft" approaches to stabilizing shorelines along estuarine and inland waterways. "Soft" approaches are recommended because they provide a means of stabilizing shorelines and protecting life and property by mimicking natural systems. Planting or replanting native vegetation typically found along that stretch of shoreline can strengthen its structural integrity once the roots take hold. Providing a diversity of native plant materials and maintaining healthy mature trees can also provide shoreline protection while providing natural habitat. This plant material and their roots help keep the land from breaking apart. It also helps to have gentle slopes that absorb the natural energy from waves.

Living shorelines use native materials such as plants and oyster shells, as alternatives to traditional bulkheads and revetments for shoreline stabilization and erosion control. Unlike a bulkhead living shorelines maintain existing connections between upland, intertidal, and aquatic areas while providing shoreline erosion control. This soft approach to shoreline stabilization in some areas accomplishes the goal of a "hardened" structure while providing additional ecological benefits.

Many property owners seek out "hard" approaches to shoreline stabilization because that is what they are familiar with or they simply want to replace or repair a failing or damaged structure. This familiarity with hardened structures has made them the defacto solution for homeowners, contractors, and local governments. Local governments interested in promoting "soft" approaches may need to educate property owners about newer options such as living shorelines. An excellent example is the 1,250 ft. living shoreline installed at

Temporary sandbags at an erosion prone shoreline

Carteret Community College. The shoreline was a collaboration between the college and the NC Coastal Federation to address shoreline erosion caused by Hurricane Florence.

GETTING MORE OUT OF YOUR PLAN

The Coastal Environment Element provides a mechanism to not only satisfy the CRC's public access planning requirements, but also address the unique set of issues resulting from the community's coastal geography and shoreline characteristics, all while reinforcing the sense of place reflected in the community's vision and future land use map. To do this, the element should consist of much more than an inventory of existing facilities, recommendations for access improvements, and general policies that support public access and uses of public trust waters such as recreational boating activities. This element is an opportunity for local governments to fulfill their responsibility to manage access and minimize adverse impacts to beach and waterfront areas and affected private property owners. The element should support local government's management of user conflicts from boaters and other uses of NC's public trust waters. Public access should also be an overarching planning objective that transcends land use policies as they relate to shoreline areas and promote not only physical but also visual access. Public access can also be an important component of many waterfront development projects and can be used to attract tourists to commercial waterfront areas.

Perhaps the most important reason to include a Coastal Environment Element is that it provides an opportunity to reinforce the community's sense of place shaped by the community's history, unique geographic features, and local culture. The sense of place leads to a strong sense of identity that is shared not only by its residents but those who visit the area and is important for economic development, tourism residents, new businesses and industries.

NC's coastal region is dotted with many communities with very distinctive senses of place. The towns of Beaufort, Morehead City, and Swansboro and the cities of Wilmington, Washington, and New Bern are all marked by their distinctive commercial waterfronts. Barrier beach communities such as Nags Head, Surf City, Bogue Banks, Wrightsville Beach, Oak Island, and Sunset Beach all have their own unique sense of place that attracts a different mix of property owners, seasonal residents, and tourists. Down East communities such as Harkers Island, Smyrna, Sea Level, Atlantic, and Cedar Island have distinctive communities that reflect their emphasis on fishing, shrimping, and crabbing.

Topics in the Coastal Environment Element should inform and be informed by the plan's other elements. While practices recommended in the Land Use and Community Form Element (see Section 3.1) are useful along shorelines

Carteret Community College living shoreline

For more information on living shorelines see NOAA's Digital Coast on *Natural Infrastructure, NOAA Fisheries website* on this topic, or the *Living Shorelines Academy.*

and urban waterfronts, coastal geography often presents unique planning challenges for land use decision making. Established or traditional water dependent uses can be crowded out by non-water dependent activities that generate higher property tax values. Protecting water dependent uses is critically important to preserving the maritime heritage and sense of place in many coastal communities.

The shifting nature of oceanfront and estuarine shorelines presents other challenges. The areas are subject to storm surge, sea level rise, and flooding (see Section 3.6), which requires different construction and design standards. The vulnerability to hazards should influence decisions regarding the siting, design, and location of community facilities and infrastructure (see Section 3.4). At the same time, the estuarine shoreline contains coastal wetlands and other sensitive habitat areas that are sensitive to disturbances and water quality impacts due to development in shoreline areas (see Section 3.3). Shoreline areas and coastal geography can also create unique transportation challenges (see Section 3.5). The element based plan structure gives planners the opportunity to consider the impact of the shoreline on each of these topics.

Marsh along Oak Island, NC

Section 3.3

Natural Resources and Environmental Sustainability Element

TOPICS INCLUDE:

- Water quality
- Groundwater
- Wetlands and sensitive habitat areas
- Open space
- Low impact development
- Air quality

INTRODUCTION

The balance between a community's land use and economic development interests, and the impact of development on natural resources are an important topic for inclusion in the plan. Clean water, healthy soil, clear air, open spaces, abundant wildlife and a pleasing natural environment are important components of a community's quality of life. They are also major contributors to a community's identity and sense of place and are an important reason why some citizens choose to live or businesses locate in a community. Additionally, natural systems provide important "green infrastructure" and "environmental services," such as holding floodwaters and filtering air, that often go unrecognized until a community loses wetlands or treasured open space to poorly planned development.

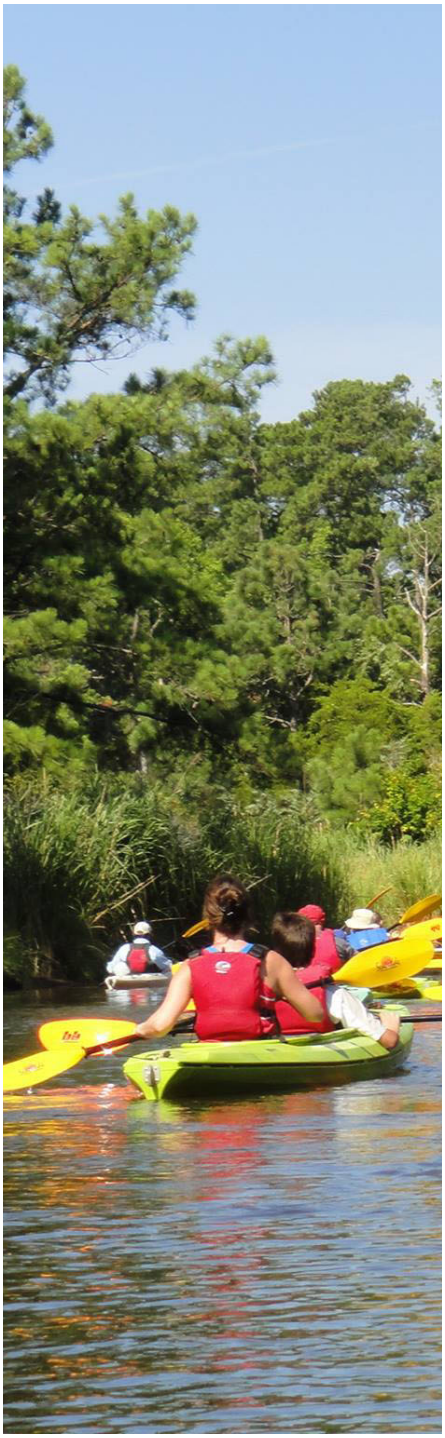
CRC'S WATER QUALITY GOAL:
Maintain, protect and where possible enhance water quality in all coastal wetlands, rivers, streams, and estuaries.

The Land Use and Community Form Element (Section 3.1) discussed the important role that agricultural and forested lands have in a community. The Coastal Environment Element (Section 3.2) discussed the importance of protecting public trust areas as well as preserving public access to and along these areas. This chapter focuses on additional topics related to natural resources and environmental sustainability including the natural resource topics commonly addressed in a plan and suggested practices that will protect these resources.

WATER QUALITY

Water quality is important to a community's quality of life for a variety of reasons. Surface waters may be a source of drinking water, and can be used in some industrial processes, and to irrigate crops. Surface waters also attract tourists and provide important recreational opportunities, such as sailing, kayaking and fishing. Water quality also influences the health of ecological systems and is necessary to support fishery nursery areas along NC's coast. Unhealthy water quality can lead to beach closures, swimming advisories, and create

potential public health issues. It can also result in shellfish closures, declines in fisheries, and degrade wildlife habitat. Poor water quality can adversely affect adjacent property values when bacterial contamination, algae blooms, or fish kills interfere with uses of these waters.



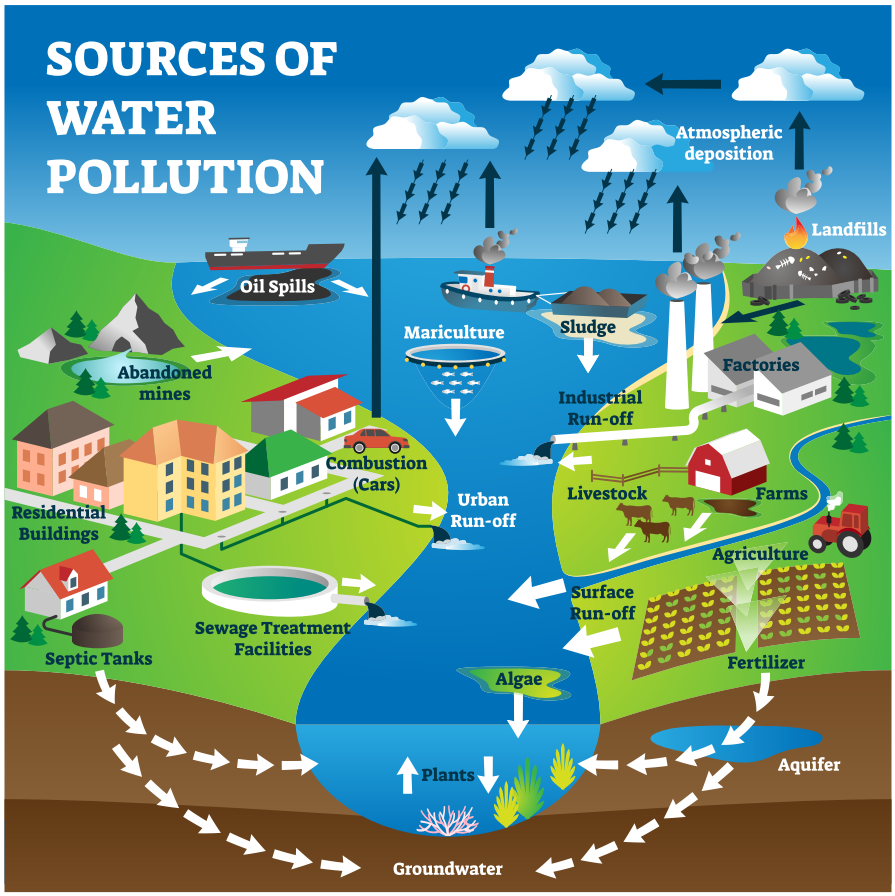
Sources of surface water pollution

Local governments address water quality problems using many practices related to the particular source of the problem – point or nonpoint sources of pollution. Point source water pollution originates from an identifiable "point," such as a sewer outfall pipe, that releases polluted water into a stream or river. The main point source discharges in coastal North Carolina are associated with wastewater treatment facilities and less frequently stormwater systems. Addressing water quality problems associated with point source discharges typically involves decisions related to investments in the underlying infrastructure used to treat wastewater or stormwater. Point source discharges remain a significant source of water pollution in many communities.

The other significant source of water pollution is nonpoint source (NPS) pollution which is generated by rainfall moving over and through the ground. As the water moves, it picks up sediment, nutrients, metals, toxins, oil, pesticide, and other pollutants, ultimately depositing the pollutants into lakes, rivers, wetlands, coastal waters, or groundwater. In many communities, NPS pollution is a major cause of surface water and groundwater problems. Nonpoint sources are difficult to address because they emanate from many different types of land uses including:

- Agricultural operations
- Forestry activities
- Runoff from homes, businesses, industries, parking areas, and roadways
- Individual septic systems
- Marinas and recreational boating activities

A community should not only address waters already impacted from nonpoint sources but should also determine the likely sources of impairment, such as runoff from parking lots at new commercial developments. The goals, objectives, and polices should be aligned to address existing sources of surface water contamination while also preventing new problems before they begin. Addressing NPS pollution problems can require the use of a wide range of practices, many of which are specific to a particular source. The resources linked in the margin provide more information on how to address specific non-point sources of pollution.



Recommended practices

Make investments in waste treatment facilities to address point source pollution

The main strategy used to address water quality problems associated with point source discharges is to make investments that upgrade the capacity and treatment efficiency associated with the existing wastewater treatment facilities. While expensive, these investments can yield major improvements in the quality of water discharged on a daily basis. These investments often have the added benefit of facilitating economic development.

Use land use regulation to limit nonpoint runoff from new development

Local development ordinances can support efforts to manage nonpoint source runoff associated with new land development activities. For example, subdivision regulations or a tree preservation ordinance can mandate the preservation of existing trees that are not located within the footprint of a proposed building. The land development code can require erosion control during construction such as hay bales or silt screens on the perimeter of the property. The zoning code can establish setbacks from wetlands, water bodies,

For more information on the collection of management measures or practices used to address different sources of nonpoint pollution see the *EPA Nonpoint Source Pollution: Technical Guidance Collection.* NC Stormwater Best Management Practices Manual *https://deq.nc.gov/sw-bmp-manual*

For more information on water quality planning:

Planners and Water (PAS Report Number 588). William Cesanek, Vicki Elmer,. and Jennifer Graeff. 2017. Published by the American Planning Association.

Community Solutions for Stormwater Management. U.S. Environmental Protection Agency Office of Water. 2016. Published by the U.S. Environmental Protection Agency.

Using Smart Growth Techniques as Stormwater Best Management Practices. Lisa Nisenson et al. Published by the U.S. Environmental Protection Agency.

and sensitive habitat areas that can greatly minimize the water quality impacts associated with new development. Finally, a local government can incorporate low impact development techniques into its development regulations, a strategy that is discussed in detail at the end of this chapter.

Plans often include a wide range of land use policies to address nonpoint runoff. For example, the Bertie County *CAMA Land Use Plan Update* (2016, p. 126) sets the broad goal of reducing non-point source discharges in order to protect and restore water quality. To implement this goal, "Bertie County encourages low density development through cluster development and low impact development techniques that reduce impervious surfaces and increase open spaces. The County implements a 75' shoreline buffer for Planned Unit Developments. Policies encourage site planning to maintain site hydrology to the maximum extent possible and encourage farmers and timber operators to employ accepted Best Management Practices. Marinas are encouraged to establish pump-out stations and to participate in the "Clean Marina" program. Proper erosion control and stormwater permits are required prior to issuance of building permits or approval of final plans for subdivisions." Pamlico County outlines several water quality policies in their *Joint CAMA Land Use Plan* (2012, p. 50). The policies include enforcement of conservation zones within 75 feet of water body boundaries and encouraging cluster development to reduce the amount of impervious surfaces.

Develop a stormwater management program

Regulatory controls are often limited by their ability to address nonpoint runoff from existing land uses such as roadways, parking lots, agricultural lands and marinas. Poorly sited projects or roads built many decades ago are the source of significant nonpoint source runoff. Addressing these problems takes a sustained effort over a period of years with projects that may require capital investment to reduce the impacts of stormwater runoff from roadways and to improve the functioning of the existing system. Some urbanized areas have stormwater management programs that fall under EPA's MS4 permitting rules. These programs are required to implement practices to control stormwater runoff and unregulated sources of stormwater discharge. Smaller municipalities and rural areas not subject to these permitting requirements can still manage stormwater. Municipalities often have a structural stormwater drainage system that requires maintenance and upkeep as do rural areas with drainage canals and ditches.

Development of the plan is an opportunity to recommend stormwater management improvements. The plan can identify strategies to manage the "quality" of stormwater entering the local waterways. This would be in addition to identifying strategies to manage the "quantity" of stormwater that

For more information on how to develop a local stormwater management program see:

- Center for Watershed Protection's *Managing Stormwater in Your Community A Guide for Building an Effective Post-Construction Program* (2008).
- The EPA's *website for stormwater discharges from municipal sources.*
- The DEQ's *Stormwater Program website* also has useful links to additional resources.

Croatan Sound, Outer Banks, NC

can be quickly moved off the landscape, which tends to be a primary concern of property owners experiencing drainage issues. For example, the City of Wilmington has a comprehensive *Stormwater Management Program* that includes opportunities for the public to report problems, a public education component, maintenance activities, and major capital projects that are part of the city's regular budget process. If a community lacks a stormwater management program, the plan provides an opportunity to identify priorities to improve water quality, reduce flooding and increase community resilience (See Section 3.6).

Educate the public about proper behavior and disposal to minimize nonpoint source problems

Another common practice is to develop public education programs that inform landowners about the myriad of ways that homeowners and business can change their behavior to reduce the harmful impacts associated with NPS runoff. For example, a community can encourage landowners to inspect and pump their on-site septic systems on a periodic basis. The City of Wilmington's *Stormwater Management Plan* (2016, p. 21) outlines the city's objectives for public education and outreach about stormwater management techniques and practices. City staff has implemented its stormwater management program using a variety of innovative programs. For example, the *Canines for Clean Water program* asks pet owners to sign a pledge to clean up after their pets. Their Storm Drain Marking Program places markers on storm drains to remind anyone considering dumping in a storm drain that it drains to a waterway. The *Enviroscape Program* also helps students to visually see the impacts of stormwater runoff through a scaled down functional watershed model. This program is taught to every 8th grade class in New Hanover County as part of the science curriculum.

Stormwater education

Identify and protect a green infrastructure network

A plan can also consider the provision and protection of green infrastructure across a town or county and at the site scale. In the past, planners dealing with stormwater focused on gray infrastructure that moved water away from roads and buildings as quickly as possible, via pipes, culverts, and ditches. In contrast, green infrastructure emphasizes absorbing water on-site through preserved natural vegetation and engineered solutions such as rain gardens, green roofs, and permeable pavement. A green infrastructure network is a strategically planned and managed network of green open spaces including parks, greenways, and protected lands that provide vegetation that captures, stores, and infiltrates runoff. It can provide a range of critical functions and ecosystem services such as wildlife habitat, stormwater management, flood protection, and recreational opportunities (Godschalk and Rouse 2015). The

The EPA's *Nonpoint Source Pollution web page* contains a number of resources that can be used as the starting point for an educational program.

For more information related to on-site sewage disposal systems see the website for *the On-Site Water Protection Branch.*

Future Land Use Map is an ideal place to identify a green infrastructure network and the plan should then include goals, objectives, and policies that protect this network of open spaces from development.

Several CAMA counties include green infrastructure in their plan goals, objectives, and policies. The Beaufort County *Joint CAMA Land Use Plan 2006 Update* (2006, p. III-23) includes the policy that "the county and municipalities, through their design review processes, will encourage the use of green infrastructure that use or duplicate natural processes to infiltrate, evapotranspirate, or reuse stormwater on the site where it is generated." The Craven County *2009 Core Land Use Plan* includes the goal of adopting a green infrastructure plan in its Smart Growth Policies for Implementation. New Hanover County's *Plan NHC* (2016) provides an example of incorporating green infrastructure across a goal, policy and implementation guideline. The plan states the broad goal of promoting environmentally responsible growth with an associated objective to "Adopt and implement a green infrastructure plan that identifies a network of natural lands and open spaces and provides ecosystem conservation as well as alternative transportation modes through trails and greenways (Plan NHC 2016, p. 11)." The plan also includes the following implementation guidelines:

- Encourage best management practices that enhance development and minimize adverse environmental impacts of the built environment.
- Use incentives to create flexible guidelines as well as outreach and education to encourage the use of native vegetation in landscaping and discourage invasive species.
- Identify and promote access opportunities to existing open space and incentivize these spaces for active and passive recreation.
- Prioritize connections of open space, parks and greenways as identified in the Parks Master Plan to enhance recreation, conservation, and transportation infrastructure.

Develop watershed protection plans to focus on areas with significant water quality problems

In many cases, there are specific geographic areas within a community that have a particular set of water quality issues that require a long-term sustained effort to resolve. Developing a watershed plan to address localized water quality problems can be effective because implementation provides a systematic way for a local government to address water quality problems, protect water supplies, improve stormwater management, and address flooding problems

For more information on green infrastructure:

Green Infrastructure: A Landscape Approach (PAS Report Number 571). David C. Rouse and Ignacio F. Bunster-Ossa. 2013. Published by the American Planning Association.

Planning the Urban Forest: Ecology. Economy and Community Development (PAS Report Number 555). James C. Schwab (ed.). 2009. Published by the American Planning Association.

Evaluating and Conserving Green Infrastructure Across the Landscape: A Practitioner's Guide. Kevin Firehock and Charles Kline. 2013. Published by the North Carolina Forest Service and the Green Infrastructure Center.

Regulatory Strategies to Incorporate Green Infrastructure for North Carolina. Written and published by the Urban & Community Forestry Program of the North Carolina Forest Service and the Nicholas Institute for Environmental Policy Solutions at Duke University.

(Godschalk and Rouse 2015). The advantage of the watershed approach is the focused attention on specific sources of impairment and the corresponding development of a multifaceted strategy to set priorities, identify needed actions and investments, and assign implementation responsibility. It can also mobilize community support for investments in the necessary water quality improvements. The development of a watershed management plan also provides additional opportunities for public education.

Communities across coastal North Carolina have developed watershed plans. In 2017, the Town of Beaufort completed a *Watersheds Restoration Plan* that spans three watersheds: Davis Bay, Taylors Creek, and Town Creek. The plan's goal is to proactively reduce stormwater runoff and improve the water quality in the watersheds. The City of Wilmington developed the *Bradley and Hewletts Creeks Watershed Restoration Plan* in response to water contamination levels that resulted in shellfish closures and swimming advisories. The plan contains a series of objectives and action items focused on restoring water quality in these creeks. The *Pasquotank County/Elizabeth City 2004 Advanced Core Land Use Plan* (2012) draws from the *Pasquotank River Local Watershed Plan*, which inventories existing watershed conditions in a 454.5 square-mile area covering all of Elizabeth City and portions of Pasquotank County. The plan identifies sources of water quality issues for the Pasquotank River, including high and low intensity development, agriculture, logging and the fact that 42% of the watershed's streams do not have a vegetated buffer. It also identifies a range of land use planning strategies such as promoting land use practices that reduce non-point source pollution and revegetating stream and river buffers. The *DEQ's website* contains links to these and other watershed restoration plans that have been developed using the EPA's Section 319 NPS funding.

For more information on watershed planning:

Watershed Restoration Planning Guidebook: A Comprehensive Guide to Developing a Coastal Watershed Management Plan. North Carolina Coastal Federation. Updated January 2018. Published by the North Carolina Coastal Federation.

A Quick Guide to Developing Watershed Plans to Restore and Protect Our Waters. 2013. Published by the U.S. Environmental Protection Agency.

A ***watershed*** or drainage basin is the area of land that drains rainwater to a river, lake, estuary, or ocean.

GROUNDWATER

Groundwater is a valuable natural resource in many communities because it provides drinking water, and is used for industry, business, and agricultural activities. Even when a community relies on surface water for its drinking water needs, it may still maintain wells as a backup water source during periods of intensive use or during drought conditions. When population density is high and land use is intensive, groundwater supplies become particularly vulnerable to contamination and overuse. Virtually any human activity, accidental or intentional, can release chemicals and other contaminants that eventually find their way into groundwater. Overuse of groundwater systems can lead to other issues, including saltwater intrusion. Saltwater intrusion is the movement of saline water into freshwater aquifers, which can contaminate drinking water supplies.

Saltwater Intrusion:

To some degree, saltwater intrusion occurs naturally in coastal aquifers due to natural hydraulic connection. Saline water is denser due to its mineral content and has higher water pressure so it can push inland beneath the freshwater. Excessive groundwater pumping lowers the level of fresh groundwater, which lowers its water pressure and allows saline water to move farther inland.

For more information and maps about NC's aquifers, see *DEQ's website.*

Surface water and groundwater are interconnected. Polluted groundwater can degrade surface waters, and vice versa. As contaminates enter the groundwater system they will eventually discharge into rivers, lakes, streams and estuaries. One of the most significant sources of surface water pollution is often contaminated ground water.

Protecting groundwater is important since once it is contaminated, it is extremely difficult and expensive to clean. Groundwater contamination occurs from a variety of sources, including some materials that are naturally present in soils (e.g., metals, radionuclides, decaying organic matter, etc.). One of the main human sources is onsite sewage disposal systems (OSDSs), otherwise known as septic systems. Septic systems and package treatment systems can be a source of nutrients, bacteria, and viruses. However, they also contain other contaminants that can find their way into the waste stream (e.g., chemicals, pharmaceuticals, oils, detergents, and even the chemicals used to clean systems). Another common source of groundwater contamination includes improper storage, disposal, or spills of hazardous waste, petroleum products, fertilizers, and animal waste. Impoundments used for storage in industry, energy production, agriculture, and landfills can also provide sources of contaminations. Leaks from sewer lines, underground storage tanks, drainage wells, injection wells/floor drains, and poorly constructed or abandoned wells, and mining activities can also provide a source of groundwater contamination.

Praying mantis on yellow pitcher plant

Recommended practices

Establish wellhead protection areas

Wellhead protection areas consist of the surface and subsurface land areas where land uses and management are regulated to prevent the contamination of a well or well-field supplying drinking water. Wellhead protection areas exist in many communities along the coast. The first step in defining these areas is to prepare a wellhead protection plan. The plan should be followed by a wellhead protection ordinance. For example, Dare County adopted its *Wellhead Protection Plan* in 2014, delineating seven wellhead protection areas. Education is a major component of implementing this plan, with a focus on educating property owners and residents on actions that may contaminate groundwater and how the wellhead protection area functions to protect water quality.

Wells are holes drilled into an aquifer to provide access to water. Wellheads are the top of the well where it meets the surface. Well-fields are areas that contain one or more wells.

For guidance in developing a wellhead protection program see the *DEQ's website* for links to available resources.

Existing wellhead protection areas and potential sources of contamination can be viewed on the *NC SWAP.*

Be proactive to minimize the risk of contamination from failing septic systems

The best way to maintain high quality drinking water is to minimize the risk of contaminants from failing septic systems. Septic systems fail below ground and can contaminate groundwater for quite some time before it becomes evident above ground that the system is no longer functioning properly. One approach to addressing septic systems is to use the future land use map to downzone or decrease the density of residential development that relies on septic systems to dispose of wastewater. This can prevent excessive nutrient loadings to groundwater that produce water quality problems in surface waters. It also ensures that residential areas that rely on private wells for their water supply to do not exceed the nitrogen standard for safe drinking water. Alternatively, a plan can prioritize the extension of sewer systems to replace older or poorly functioning septic systems or support efforts to find, repair, and replace leaking underground storage tanks.

Local governments can also take an active role in preventing septic systems from impacting water quality by encouraging homeowners to periodically inspect, maintain, and pump their septic systems or create a mandatory public inspection program. For example, in 2000 the Town of Nags Head created the *Septic Health Initiative* that includes a public education component combined with septic inspections and pumping to improve local water quality.

Understanding other risks to septic systems, like rising groundwater levels caused by sea level rise, are important for adapting to changing conditions and maintaining viable systems. The Town of Nags Head's 2017 plan, FOCUS Nags Head, includes an action under their Natural Resource and Resiliency sub-element to "Minimize the impacts of future sea level rise" (NR-16) through a number of actions including maintaining and expanding their Septic Health Initiative program (NR-16-e).

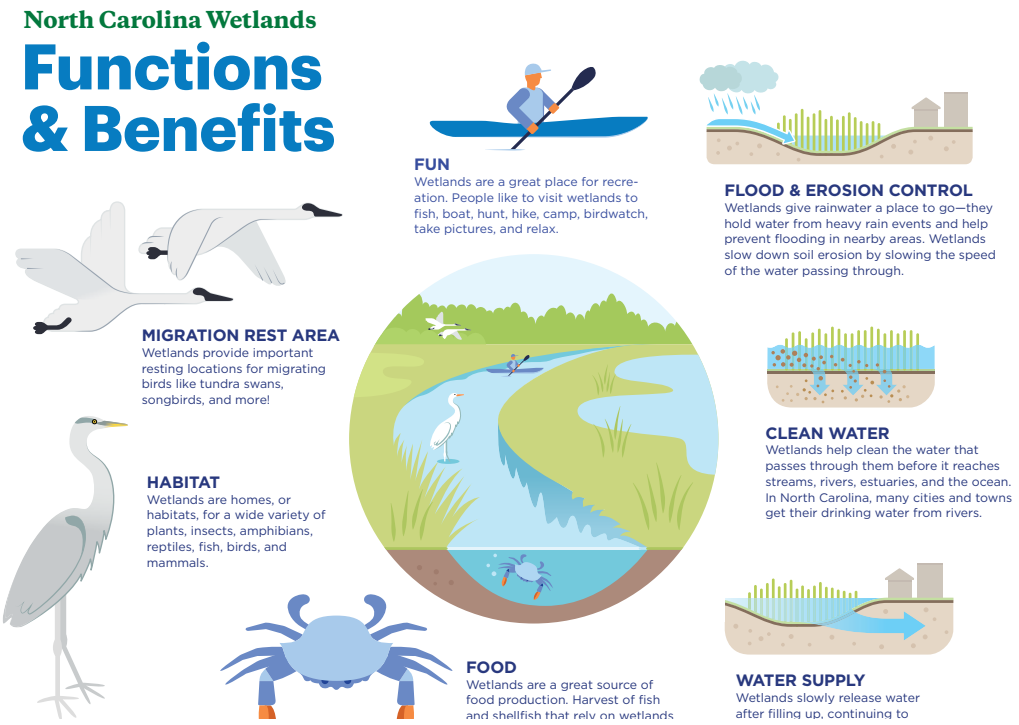
WETLANDS AND SENSITIVE HABITAT AREAS

Wetlands include land areas that are wet at least part of the year because soils are saturated or covered with a shallow layer of water. Wetlands include a variety of natural systems, such as ponds, bogs, fens, marshes, wet meadows, swamps, bottomland hardwoods, pocosins and wet flats. All wetlands share certain properties, including characteristic wetland vegetation, hydric soils and hydrologic features. CRC rules define coastal wetlands as marsh areas that include one or more of the 10 specific marsh plant species that are regularly or occasionally flooded by lunar or wind tides (not including hurricane or tropical storm tides) (see Section 2.2). In general, coastal wetlands under the permitting jurisdiction of the NC Division of Coastal Management are considered "saltwater" wetlands and the remainder are "freshwater" wetlands under the permitting jurisdiction of the U.S. Army Corps of Engineers.

There are many reasons why a community should use a plan to protect wetland areas and minimize impacts to these areas from land development. In their natural state, wetlands provide a variety of ecological functions that are vitally important to environmental and economic health. High functioning wetlands are also impossible or costly to replace. Some of the functions and benefits of wetland areas include:

- Protecting surface water quality by retarding the erosive forces of moving water
- Improving water quality by intercepting and filtering out waterborne sediments, excess nutrients, heavy metals and other pollutants
- Providing sources of food, shelter, essential breeding, spawning, nesting and wintering habitats for fish and wildlife, including migratory birds
- Creating habitat for endangered or threated species
- Playing an important role in the life cycle of many important commercial and recreational fish species
- Providing open space, recreation and educational opportunities
- Serving an important role in groundwater recharge
- Providing a natural mechanism to control flood damage by providing areas to store and retain water, thus minimizing the potential loss of life and property
- Creating aesthetic value that can increase adjacent property values

High marsh/low marsh transition



In North Carolina, development in wetlands requires a permit from either the U.S. Army Corps of Engineers (COE) for freshwater wetlands or the NC Division of Coastal Management for saltwater wetlands. While state and federal environmental regulations have slowed the rate of wetland loss along with conservation efforts by governmental and nongovernmental organizations, local governments still have an important role, particularly when it comes to preventing the loss and alteration of smaller areas outside the jurisdiction of federal and state programs (e.g., isolated wetlands).

It is also important for a plan to protect other sensitive habitat areas within the local jurisdiction. North Carolina has designated over 2,500 land and water areas that are important for the conservation of the natural biodiversity of North Carolina. The *NC Natural Heritage Program* (NHP) identifies natural areas based on biological surveys, as authorized in the Nature Preserves Act. These areas often contain the best populations of rare species, their habitat, and exemplary natural communities. Overall, the NHP's goal is to protect the full spectrum of organisms and ecological processes that comprise North Carolina's Natural Heritage. There are 67 federally threatened and endangered species known to occur in NC according to the 1973 Endangered Species Act.

Finally, NC is home to over 2.5 million acres of estuarine waters as well as inland waters, which are sensitive to impacts from development on surrounding land. Many commercially and recreationally important aquatic species spend critical parts of their life cycle in nursery areas along our estuaries, rivers, and coastal waters. Plans can help protect, preserve, and enhance North Carolina's fishery resources by ensuring that adjacent land uses minimize their impact on the habitats that serve as critical nursery and shell fishing areas.

Recommended practices

Limit development in or adjacent to wetlands, fishery nurseries and other sensitive habitat areas with land use regulation

Wetlands and sensitive habitat areas place constraints on land development, making it important for planners to consider their location when developing plan policies and the future land use map. Local governments should take steps to minimize the impacts on these areas from adjacent land development. A community should work to restore, connect, and protect natural habitats and sensitive lands. This is particularly important when natural habitat areas such as wetlands, riparian corridors, and woodlands are inhabited by rare or endangered species. These areas provide important environmental benefits and restoring degraded habitat can reestablish natural diversity and associated ecosystem services (Godschalk and Rouse 2015).

Using the future land use map and zoning ordinances to limit the scope of allowable development activities in or adjacent to sensitive habitat areas is one of the most effective tools to protect these areas. For example, many communities have land zoned as Conservation to minimize impacts. Other land management and zoning tools like cluster development and "netting out" wetlands from lot area and density calculations, regulating the disturbance of wetlands, and protecting areas surrounding the wetland with buff er areas can be included in local zoning, subdivision, and land development ordinances. For example, Currituck County's *Unified Development Ordinance* (2022) utilizes many of these techniques including the use of conservation subdivisions.

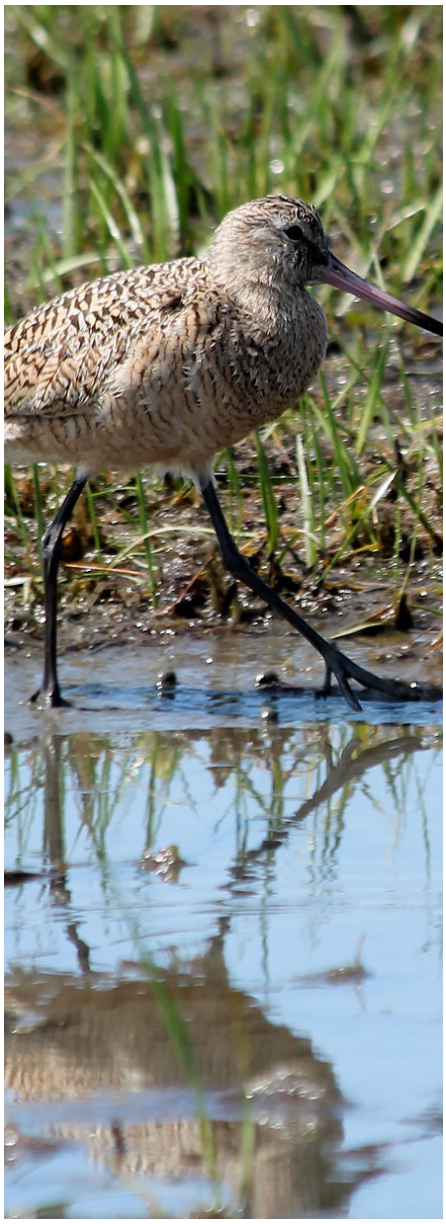
Many of the development regulations discussed throughout Section 3 have been used to protect sensitive areas. Dare County's *2009 Land Use Plan* (2009, p. 31) features a strong example of preserving sensitive lands through land use regulation. The Buxton Woods maritime forest, located on Hatteras Island, is partially state owned and partially private land. Dare County has adopted "special environmental zoning regulations" for Buxton Woods that include "one-acre minimum lot sizes, wetland buffers, and land clearing restrictions in an effort to limit development impacts on the vegetative canopy of the Buxton Woods maritime forest."

Acquire or preserve wetlands and sensitive habitats

Non-regulatory practices can be effective in preserving and protecting wetland areas. Local governments can purchase wetlands and other sensitive habitat areas to protect the land from development, preserve open space, and create passive recreation opportunities. Local governments can enter into partnerships with landowners or a third party, such as a land trust, to acquire conservation easements to preserve wetlands and other sensitive habitat areas (land conservation is also discussed in Section 3.1). Local governments

For additional information on protecting sensitive habitat:

Wetland BMP Manual: Techniques for Avoidance and Minimization. Rhode Island Department of Environmental Management. 2010. Published by the Rhode Island Department of Environmental Management.



Marbled godwit at the Rachel Carson Reserve

can also establish programs that focus on restoring wetlands and other habitat areas, which can sometimes be done in conjunction with projects to improve stormwater management. Other practices included in this element (e.g., stormwater management, protecting fish and shellfish habitat, promoting low impact development, preserving open space) can minimize impacts on wetlands and habitat areas.

The plan's goals can be the starting point for a land preservation program. For example, the Oak Island *Comprehensive Land Use Plan* (2017, p. 5-35) set the goal of preserving estuaries to support water quality. It states, "the Town will apply for grant funds from the Division of Coastal Management and the Clean Water Management Trust Fund to identify key estuarine properties that if preserved, either through conservation easements or outright purchase, will contribute to the protection and betterment of water quality in adjacent estuarine waters." The NC coast also boasts examples of extremely successful grassroots eff orts t o protect sensitive land. For example, in 1977 the Town of Beaufort residents and environmental groups worked together to block the development of the islands and saltwater wetlands now known as the Rachel Carson Estuarine Research Reserve (located in Carteret County). The Nature Conservancy purchased 474 acres of the reserve in 1977 and the State of North Carolina purchased the remainder of the reserve in 1985 and 1989. Today, the reserve is over 2,000 acres of islands, salt marshes and the surrounding water.

Protect or register Natural Heritage Areas

The *NC Natural Heritage Program* (NHP) can also support the preservation of wetlands and sensitive habitats on private property. If land is privately owned but qualifies for the NHP, the plan could encourage landowners to create a *registered heritage area*. A registered heritage area is established when a landowner enters into a non-binding registry agreement with the Secretary of DEQ to voluntarily protect a natural area identified by the NHP. Significant Natural Heritage Areas that are publicly or privately owned can also be dedicated under the Nature Preserves Act to establish a lasting conservation commitment. These dedication agreements are similar to conservation agreements in that they identify specific activities, such as foot trails, that can occur on the property while specifying others, such as commercial development, that are prohibited. Dedications approved by the Governor and the Council of State are then held in trust for the public.

For additional information on planning to protect natural resources:

Green Growth Toolbox: Wildlife and Natural Resource Stewardship in Planning, A Guide for Planners, Communities, and Developers. 2013. Published by the North Carolina Wildlife Resources Commission.

Planning for Natural Resources: A Guide to Including Natural Resources in Local Comprehensive Planning. Brian W. Ohm et al. 2002. Published by the University of Wisconsin Extension.

Habitat Protection Planning: Where the Wild Things Are (PAS Report Number 470/471). 1997. C.J. Duerksen et al. Published by the American Planning Association.

OPEN SPACE

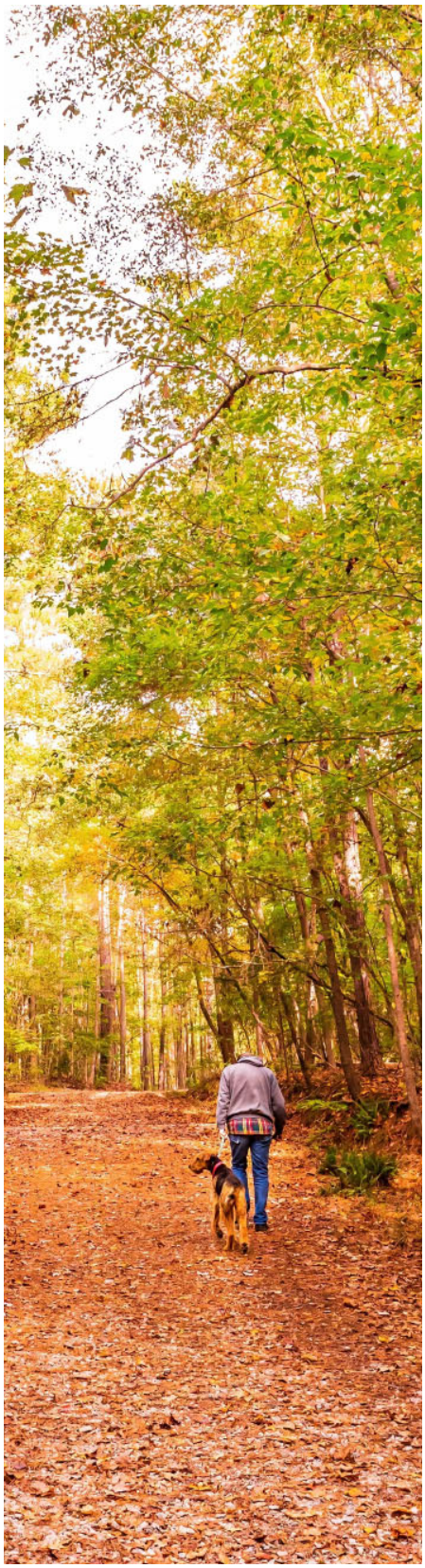
Open space is a topic that cuts across many elements in a plan. Open space is generally defined as land t hat is free from residential, commercial, and industrial development. It includes: developable land without structures that remain in its natural state; agricultural and forested lands that are part of the community's landscape; natural areas with limited development potential (e.g.,

wetlands, undeveloped beach areas); and, parks or other publicly owned lands that provide opportunities for passive recreation. Passive recreation generally includes non-motorized outdoor recreation that has minimal impact on the land, water, or other resources to provide opportunities to be close to nature and interact with the natural environment. Activities within public open space typically include low impact recreation such as hiking, bicycling, horseback riding, dog walking, boating, fishing, photography, or bird watching. Few improvements beyond trails, bathrooms, and picnic shelters are necessary to support these activities. The topic of parks and other recreational activities (i.e., active recreation opportunities) is addressed in the Infrastructure and Community Facilities Element (Section 3.4) while recreational facilities related to beaches and waterways is addressed in the Coastal Environment Element (Section 3.2).

Protecting and preserving open space is an important topic in rapidly developing communities because once these areas are lost, they are difficult, expensive, or impossible to replace. Open space provides a number of important community values or functions including:

- Conserving the rural character of a community.
- Providing scenic corridors along roadways.
- Creating buffers between communities and preventing urban sprawl.
- Protecting agricultural and forested lands from development.
- Providing opportunities for passive recreational activities.
- Protecting and preserving important historic and cultural resources.
- Preserving natural resources, including significant habitats, native species, and ecological processes.
- Providing a buffer between developed areas and water resources to minimize their impact on water resources and sensitive habitat areas.
- Minimizing impacts of flooding when it is located in low-lying areas.

In short, preserving open space is a critical concern for the public and decision makers due to its place-making, aesthetic, cultural, and resource protection functions. It helps determine a community's overall prospects for growth and development. Open space influences economic prosperity and health of residents, which enhances the quality of life in neighborhoods. As a result, protecting and preserving open space will influence many land use, growth management, infrastructure, and economic development decisions so it is important to address this topic in the plan.



Hiker enjoys trails in state forest

Recommended practices

Identify priority areas for preservation and conservation of open space

Some communities are fortunate to have the resources to purchase open space or easements but no community has the resources to protect every parcel valued by residents. Therefore, some degree of prioritization is required to match the open space priorities of community residents with available resources and willing landowners. The underlying goal of open space preservation will drive this prioritization process. For example, if the goal is to preserve working farms, soil quality may shape the prioritization process. In some communities, the plan simply states the broad goals of open space preservation and the objective of creating a stand-alone open space plan that will work through the prioritization process. The advantage of developing an open space plan is that it identifies the current resources, informs development applicants about community policies, and ensures that individual land conservation is directed towards achieving the overall goals and objectives of the open space plan. It should also include short and long-term priorities for acquisition with funding sources for these purchases. Durham County's *Open Space Program* is an excellent example. Formally created in 2003, the program guides the County's acquisition of open space parcels. The program relies on a series of plans that focus on watershed and farmland protection.

The community's floodplain should be considered when prioritizing areas for open space preservation. Communities participating in FEMA's Community Rating System may be eligible to receive points under activity 420 (Open Space Preservation), leading to reduced flood insurance premiums (see Section 3.6).

Preserve undisturbed natural areas and conserve working landscapes that provide open space

Many practices discussed in this manual note the importance of providing accessible parks, recreation facilities, greenways, and open space near all neighborhoods (Godschalk and Rouse 2015). Some practices focus on *preserving* the landscape in its original undisturbed state. Others focus on *conserving* a natural resource in its current state, such as an agricultural working landscape, to protect the values open space provides to a community. A plan may require policies and recommendations focused on both objectives for different areas within the planning jurisdiction.

If the community visioning process and future land use map identify open spaces that the community would like to keep open, a local government can acquire different interests in land to protect open space. Land can be purchased so that the owner conveys all land and water rights to the government. Local governments can acquire lands through full or partial donations of property or through

For additional information on open space planning:

Prioritization of Conservation Resources. 2017. Written and published by the Pennsylvania Land Trust Association.

intergovernmental agreements. Local governments or nongovernmental organizations can work with landowners to secure conservation easements, lease or management agreements, deed restrictions, and restrictive covenants to restrict future uses of the land; sometimes in exchange for cash, tax benefits, or other forms of compensation. Local governments can use their zoning authority to limit uses and development on open space lands (e.g., establishing a conservation area).

Nongovernmental organizations such as the *NC Coastal Land Trust* can help facilitate the process of preserving open space. For example, the Coastal Land Trust acquired 1,000 acres in Bertie County near the confluence of Salmon Creek and Albemarle Sound where archeologists continue to uncover artifacts that may provide clues to the 400-year mystery of the Lost Colony on Roanoke Island. The site features 3.5 miles of frontage along Salmon Creek, floodplain forests of cypress gum swamp, and bottomland hardwood forest along a marsh recognized as being ecologically important by the NHP. The property had been permitted for a 2,800-unit development with a 212-slip marina. Ownership will transfer to the NC Division of Parks and Recreation for management as the Salmon Creek State Nature Area.

LOW IMPACT DEVELOPMENT (LID)

The EPA *defines low impact development* (LID) as an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. "LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product" (EPA). LID supports the concept of sustainability by conserving and utilizing the site's natural features in ways that reduce water quality impacts associated with development projects.

LID is an approach to site development or redevelopment that provides a number of important functions and values to a community. Since LID emphasizes using natural vegetation and working with the natural features of a landscape, it can add value and beauty to public and private areas in a community. Rain gardens often include flowers designed to attract birds, butterflies, and bees. Landscape designs also calm street traffic, which makes the areas more accessible to recreational opportunities like walking and bicycling. Many LID practices use traditional landscaping techniques that utilize mulch, plants, and grass and irrigate these areas with collected rainwater. These practices conserve water and increase property values.

Rain garden

LID can also have important benefits in terms of protecting a community's natural environment. Reductions in impervious surfaces can reduce the heat island effect while practices used to treat and manage stormwater (e.g., bioswales,

rain gardens, and street trees) save money by avoiding the need for costly gray infrastructure. LID's emphasis on infiltration can improve groundwater recharge. The minimization of runoff can also reduce water quality impacts and protect sensitive habitat areas. Finally, improved management of stormwater within flood prone areas can reduce the negative impacts of flooding events.

Recommended practices

Promote the use of LID without the need for variances

Local governments can promote low impact development by ensuring that its land development ordinances emphasize principles such as: conserving natural areas wherever possible to minimize impervious surfaces to allow for infiltration; minimizing the development impacts on hydrology by keeping the water onsite; using integrated, decentralized approaches that infiltrate, store, evaporate, or retain runoff close to where it is generated; and incorporating pollution prevention, maintenance, and public education into project design. Common practices incorporated into project design for LID projects include: bioretention facilities, rain gardens, green roofs, rain barrels, and permeable pavement.

Improved site designs that emphasize conservation and utilizing natural landscape features are a hallmark of development projects that employ the low impact development approach. Often, the innovative features in a LID project also require that the developer apply for variances or that local governments change zoning ordinances to allow for more creative site designs. Many developers will avoid the time-consuming process of requesting variances and therefore, it is recommended that if the plan identifies LID as an appropriate strategy, the first step in implementation is to update the community's development regulations to allow LID.

Several communities on the NC coast have taken steps toward incorporating LID principles into the permitting and development process. The Brunswick County development code was updated in 2002 to include the Stormwater Quality, Management and Discharge Control section with the stated goal of encouraging sustainable and low impact development. It goes on to explain that "prudent site planning should include special consideration for preserving natural drainage ways, maximizing infiltration, slowing stormwater runoff from individual sites in route to streams and rivers by use of effective runoff management, structural and non-structural best management practices, drainage structures, and stormwater facilities" Brunswick County also adopted a LID resolution and approved the *Brunswick County LID Guidance Manual* in 2008. The manual discusses a variety of LID techniques in detail, as well as permitting and monitoring projects that use these techniques.

For more information on low impact development in NC:

Low Impact Development for the NC Coast. Written and published by the North Carolina Coastal Federation.

Low Impact Development: A Guidebook for North Carolina. Christy Perrin, Lee-Anne Milburn, and Laura Szpir ed. 2009. Published by North Carolina Cooperative Extension.

Examples of other LID manuals include *Implementing Low Impact Development in Pender County, NC* (2011) and the Town of Columbia's LID: *Simple Solutions to Reduce Stormwater Impacts* (2012).

Demonstrate the value of LID by incorporating its principles into community facilities

Communities can promote and encourage LID by incorporating its principles into public projects. Considering natural features for development can reduce construction costs, minimize risks posed by natural hazards, and mitigate its impact on the environment (Godschalk and Rouse 2015). Many smart growth strategies, such as using compact building design, increasing density to prevent sprawl, mixing land uses to reduce transportation needs, providing walkable neighborhoods, and preserving more undisturbed areas, can also be used in conjunction with LID to lessen the environmental impacts on a community's natural resources. Projects at existing public facilities are an opportunity to showcase green building and LID techniques in communities. Rain gardens at schools are a case in point. The *North Carolina Coastal Federation* has worked with approximately 20 elementary and middle schools across the coast to install and maintain rain gardens. These sites reduce stormwater runoff and serve as outdoor classrooms to help educate students on the water cycle, plants, soil and stormwater.

AIR QUALITY

Air quality is affected by many sources of pollution. In coastal North Carolina, air quality can be impacted by vehicles, fires from controlled or uncontrolled burns, industrial operations (e.g., paper plants), energy facilities, and livestock operations. Mobile sources, such as cars, buses, and trucks, generate four important types of air pollutants: hydrocarbons, or volatile organic compounds (VOCs); nitrogen oxides (NOx); carbon monoxide (CO); and particulate matter (PM). VOCs react with NOx in the presence of sunlight and elevated temperatures to form ground-level ozone, a major component of smog in urbanized areas. Nitrogen oxide also exacerbates asthma, bronchial symptoms (even in healthy individuals), lung inflammation, and reduces lung function. Emissions of some airborne pollutants are known to damage the health of ecosystems, often in subtle and long-term ways. In rural areas, agriculture can be a significant local source of ammonia emissions due to intensive livestock operations.

Air quality should be an important consideration in long range planning because it is rare for individual siting decisions to produce significant reductions in air quality. When a singular proposal raises the specter of producing unacceptable increases in air pollution, local officials often reject the proposal. More often, declines in air quality are the product of many smaller decisions, the cumulative impact of which are significant increases in pollutant loadings. In this respect, air quality declines are similar to declines in water quality associated with non-point source pollution loadings. As a result, it often takes many small actions and decisions to reduce local air pollution.

Planning can maintain and improve air quality by minimizing the production and exposure to pollutants that adversely affect human health and the environment. For example, the future land use map can determine the locations of facilities that emit pollutants by locating industrial zones. Also, the plan can contain policies and transportation strategies that reduce the use of mobile sources of pollutants (i.e. cars, buses, and trucks).

Information on air quality in NC, including monitoring sites and permits, can be found on the Division of Air Quality's *webpage*.

Recommended practices

Minimize exposure to dangerous pollutants through project siting

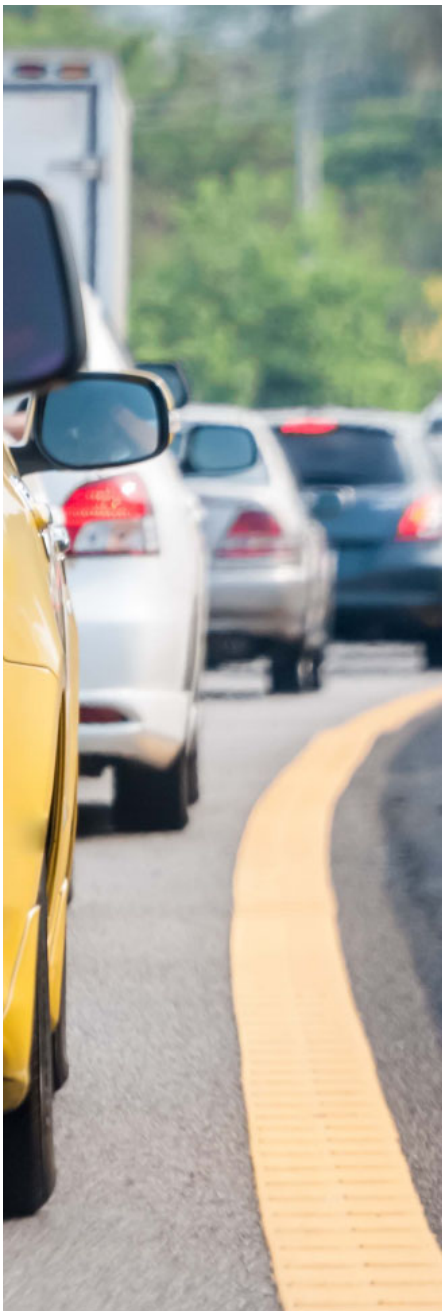
The best way to avoid declines and to work towards improved local air quality is to develop plan policies that guide project siting. Facilities with significant air quality emissions should be located in areas that minimize exposure to dangerous pollutants, particularly for at-risk populations. For example, the Perquimans County, Town of Hertford, and Town of Winfall joint *Core Land Use Plan Update 2005-2006* (2017, p. IX-17) states that they "shall require industries to use the best available technology to avoid pollution of air or water during both construction and operation of new industrial facilities."

The plan can begin the process of evaluating sites for industrial development through maps included in the plan. For example, a map showing where vulnerable populations are concentrated, such as children and elderly residents, can help guide efforts to protect the groups of residents who are the most vulnerable to health impacts from air pollution. The plan can also prioritize infrastructure investment and energy efficiency decisions to reduce exposure to pollutants.

Make transportation-related decisions that minimize impacts to air quality

Auto emissions are often a major contributor to local air quality problems. To address this issue, plans can recommend practices that minimize the impact of new development on air quality by reducing the need to travel by car to a workplace, school, shopping, or leisure facility. Land use patterns often dictate automobile use and traffic patterns. To minimize air quality impacts the plan should ensure that new housing is located close to areas where residents can meet their daily needs (see the mixed land uses discussion in Section 3.1). Alternatively, the plan can set goals for developing alternative modes of transportation (e.g., buses, rideshare programs, and park and ride lots), providing walkable neighborhoods, and providing safe routes for using bicycles.

A plan can set goals to reduce transportation impact on air quality. For example, the Community Concerns and Aspirations in the Boiling Spring Lakes *2016 Land Use Plan* (2016, p. 1-6) states that providing "sidewalks along major roads" and "more walking paths, multi-use trails (greenways), bike routes, and pedestrian-scaled lighting" are a priority. The Leland *2020 Master Plan* (2018, p. v-ii) sets the broad goal of creating strong communities as a foundation for economic development and within the narrative of this goal the plan argues that "Economic and civic life will thrive where a critical population can comfortably walk to a variety of destinations. Infrastructure investment enjoys the highest returns where policy encourages compact neighborhoods."



Traffic impacts air quality

For more information about your local air quality see the DEQ's air quality monitoring program's website and its emission summary tool. The emission summary tool provides emission data by county.

The design of roadways can also impact air pollution. The acceleration and deceleration of vehicles can increase emissions. Road humps and speed bumps that are used to limit traffic speed and improve safety have an adverse impact on air quality. Conversely, the use of traffic circles to replace a traffic light can work to decrease emissions by reducing the time vehicles are idling and keeping cars moving. Other efforts to improve traffic flow such as traffic signal coordination can have an added benefit of reducing emissions from automobiles as well. (Godschalk and Rouse 2015).

GETTING MORE OUT OF YOUR PLAN

Developing in harmony with nature is a theme that should cut across many elements in the plan (Godschalk and Rouse 2015). In additional to its natural benefits nature also provides a variety of health, aesthetic and economic benefits to communities. Surface water and groundwater provide sources of drinking water in every community. Water systems are also critically important to economic development. Similarly, while wetlands and sensitive habitat areas provide environmental benefits, they also provide flood protection and lessen the risks to life and property. Open spaces provide aesthetic value, shape the community's identity, and help increase adjacent property value. Consequently, it is important that the policies and recommended actions in other elements recognize these linkages and work towards a common purpose.

Protecting natural resources, minimizing the environmental impacts of development, and restoring degraded habitat areas are often very important to achieving the community vision. Many practices exist to protect natural resources and minimize environmental impacts. Identifying and mapping wetlands, habitat, open space, and sensitive habitat areas along with adverse environmental conditions (e.g., impaired or threatened waters, shellfish closure areas) is often a useful first step. However, protecting natural resources and minimizing environmental impacts often requires a multifaceted approach that includes regulatory and non-regulatory strategies. The future land use map combined with the plan's policies and local ordinances can help guide development activities to locations suitable for development. These policies and local decision-making processes can also help ensure that the impacts of new development are minimized. While this regulatory approach is often useful for minimizing the impacts associated with new development, it is limited in its ability to address current environmental problems or degraded natural habitat. There are also limits to regulation given the rights of property owners.

To move beyond regulation, a plan can also recommend actions and new local programs to improve water quality (e.g., sewage treatment plant upgrades, improvements to stormwater systems, public education and outreach materials), restore or enhance wetlands and sensitive habitat areas (e.g., identify sites for restoration projects), improve floodplain functions, and preserve open space (e.g., identify sites for acquisition). A community then needs to secure grant-funding, work with other governmental and nongovernmental partners, and allocate local funding to complete these projects, often through the capital improvement plan or annual budget. Natural resource concerns should also influence other decisions related to community facilities and infrastructure, transportation systems, and threats due to natural hazards.

Developing a multifaceted regulatory and non-regulatory strategy will require coordination in the policies and programs across the different elements of the plan. It also includes coordinating a community's priorities with other existing open space, greenway, habitat restoration, watershed, or wellhead protection plans to leverage resources and ensure that there is a consistent direction in terms of policies, recommendations, and spending priorities.

It is also important to coordinate with other jurisdictions to get more out of this element of your plan. This includes ensuring consistency across other community plans as well as coordinating with adjacent communities, the county, military bases, regional planning agencies, and state programs. The *Brunswick County Low Impact Development Guidance Manual* discussed above is an example of coordination between local governments to leverage resources. Brunswick County, New Hanover County, and the City of Wilmington worked together to develop the manual and each locality adopted a version of it.

Bald Head Woods buffers Bald Head Islands from storms and provides a place for passive recreation

Section 3.4

Infrastructure and Community Facilities Element

TOPICS INCLUDE:

- Water supply and wastewater systems
- Parks and recreation facilities
- Community facilities and public services
- Community health

INTRODUCTION

Having adequate infrastructure and public services to meet the needs of the population and businesses is essential. Infrastructure improvements, such as water and sewer systems, provide support for a full range of land uses and can allow for increased residential densities and higher intensities of non-residential development. An absence of infrastructure can result in limited development, which is most desirable for environmentally sensitive areas. For these reasons, being strategic in the provision of infrastructure can help the community shape the land use pattern by directing populations and businesses to areas where infrastructure is or can be provided. Community facilities support the public services on which the population and businesses depend. They include, but are not limited to, police stations, fire departments, and schools. This chapter focuses on the infrastructure and community facilities needed to support land development activities. The size and scope of these facilities can vary by community, so the context and geography of the community should inform the topics to be considered in the plan. Information generated from the analysis of existing and emerging conditions (see Section 2.2) and the identification of the vision and community concerns and aspirations (see Section 2.3) can assist with the selection of planning topics.

CRC'S INFRASTRUCTURE CARRYING CAPACITY GOAL:
Ensure that public infrastructure systems are sized, located, and managed so the quality and productivity of Areas of Environmental Concern (AECs) and other fragile areas are protected or restored.

WATER SUPPLY AND WASTEWATER SYSTEMS

Providing safe drinking water and wastewater collection and treatment are two of the oldest public services provided by local governments. The importance of these public services cannot be overstated. The systems are critical to preventing public health problems and minimizing adverse impacts on the environment and natural resources. It is therefore necessary to understand any problems with these facilities such as overflows, bypasses, or other problems that degrade water quality or constitute a threat to public health. It is also important that these systems are designed to accommodate

population growth, seasonal populations, and economic development. The land development policies and future land use map should reflect the current and planned capacity of public and private water supply and wastewater treatment systems that are available to accommodate population growth and economic development. Since regional authorities or private operators may administer water supply and wastewater systems, planners will have to work closely with these authorities during development of the plan to ensure their expansion plans are consistent with those recommended in the plan.

Since infrastructure is closely tied to population and economic growth, the development of policies for this section of the plan should not only address the CRC's infrastructure carrying capacity goal, but also support policies developed for the Land Use and Community Form (Section 3.1), Natural Resources and Environmental Sustainability (Section 3.3), and Disaster Resilience and Recovery (Section 3.6) elements.

In fast growing areas, communities may want to focus on water conservation to prolong the life of their water supply and wastewater collection and treatment systems. Maintaining sustainable water supply and wastewater treatment systems also requires financial strategies to ensure their operation, maintenance, and future expansions.

Deficiencies in wastewater treatment systems can lead to environmental problems. For example, failing septic systems or package treatment systems might be significant sources of contamination to groundwater or surface water quality. Connection to a wastewater treatment system can provide significant improvements to coastal water quality in areas experiencing contamination.

Water recycling on sewage treatment station

For more information on planning for water supply and wastewater see: *Planning Issues for On-site and Decentralized Wastewater Treatment.* (PAS Report Number 542). Wayne M. Feiden and Eric S. Winkler. 2006. Published by the American Planning Association.

Growing Toward More Efficient Water Use: Linking Development. Infrastructure. and Drinking Water Policies. Paula Van Lare et al. Published by the U.S. Environmental Protection Agency.

Planners and Water (PAS Report Number 588). William Cesanek, Vicki Elmer, and Jennifer Graeff. 2017. Published by the American Planning Association.

Recommended practices

Provide capacity to accommodate growth (or decline) in service demand

A growing population will occupy more land and increase demand for services related to water supply and wastewater treatment in new areas. The plan should carefully consider the community context when making policy decisions about these systems. While private wells and septic systems (or package treatment systems) may be appropriate in rural areas, as the urban boundary expands or land use in rural areas intensifies, public systems may need to replace private systems to avoid impacts on natural systems and to accommodate future growth. Considering the community context underscores the importance of making sound population projections and reasonable estimates of seasonal populations in order to ensure the systems have sufficient capacity to meet projected demand.

The Town of North Topsail Beach *CAMA Core Land Use Plan* (2009, p. 18) includes a policy statement to regulate development such that it matches sewer capacity and eventually eliminates septic systems within the municipal boundary. Beaufort County's *Joint CAMA Land Use Plan 2006 Update* (2009, p. II-45) makes a more specific recommendation: wastewater treatment capacity will need to be expanded to accommodate approximately 17,000 additional people; likewise, the water supply capacity must be expanded to accommodate 6,300 additional people.

Brunswick County recognized an increase in population as noted in their land use plan and acted vigilantly to improve their water quality systems. In 2009, Brunswick County began the process of upgrading the Northwest Water Treatment Plant in Leland in response to the increased growth. This plant is one of two water treatment facilities in the county. This upgrade led to an increase in capacity from 24 to 36 million gallons per day (MGD). The plant has been recognized by the state for maintaining a high level of water treatment, surpassing federal and state drinking water standards, while also supporting the county's rapid population growth.

In areas of prolonged population decline or decreased service demands (e.g., loss of major water users), accommodating reduced demand may require decommissioning or realigning infrastructure to better balance the needs of the overall system. Regardless of the community's situation, it is important to understand the changing population and to link infrastructure policies and planned improvements to the policies reflected in the plan.

In some cases, public water supply or waste treatment systems incur repeated overflows, bypasses, or other problems that degrade water quality or constitute threats to public health. These often occur as a result of poor operation and maintenance. They also occur because an aging facility needs significant maintenance, repair, or even replacement. It can also occur because a facility is running at peak capacity and needs to have its capacity expanded. In these situations, the plan should include policies and actions designed to address these issues.

Site new facilities in locations that minimize impacts to the environment and avoid natural hazards

It is often necessary to build new public or private water supply or waste treatment facilities to serve a growing population or to simply replacing aging or outdated infrastructure. When siting new facilities (public or private) it is important to locate and extend facilities away from sensitive natural resources (see Section 3.3). It is also important to site them away from areas that are vulnerable to shoreline erosion, flooding, sea level rise, and storm surge (see

For more information on water supply and wastewater system planning:

See DEQ's websites on:

- *Water supply planning*
- *Rules governing public water systems*
- *NPDES wastewater permitting*
- *Non-discharge wastewater and reclaimed water permitting*
- *System-wide collection system permitting*

Section 3.6), and to find adjacent land uses that are compatible to minimize conflicts due to operational issues associated with these facilities (e.g., noise, odor, nighttime lighting).

Use investment in infrastructure to support economic growth

Infrastructure policies can be used as a mechanism for leveraging public and private investment in economic development and revitalization projects that support the community as a whole. Supporting economic revitalization may require upgrading infrastructure (e.g., water systems, waste treatment systems, roads, utilities) in older substandard areas with newer components that accommodate increased demands from these new land uses (Godschalk and Rouse 2015). For example, Goal IV of New Hanover County's *Plan NHC* (2016, pg. 5-6) directs the County to "use public infrastructure improvements to leverage private investments," with the desired outcome of coordinating public and private infrastructure investments to provide the most benefit to the community in the most efficient manner. This includes implementation strategies and guidelines designed to encourage collaboration between private investors and other public sector entities, such as the North Carolina Department of Transportation, local water and sewer authorities, and local metropolitan planning organizations (MPOs). It also includes the desire for long-term plans beyond the scope of their plan, which can allow a community to sell itself to potential private investors.

Emphasize financially sustainable infrastructure systems

A plan's policies should guide the local government to make wise investments in infrastructure and community features that are both effective and efficient uses of taxpayer dollars. For example, the first goal in the governance section of *Burgaw 2030: Town of Burgaw Comprehensive Land Use Plan's* (2013, p. 76) is "to ensure cost-effective provision and development of public facilities and services." Upgrading and expanding water supply and wastewater treatment systems is expensive and local governments should avoid unnecessary expenditures. At the same time, facility planning has to be forward-looking, plan for upgrades, and ensure the operation and maintenance needed to safely operate the facilities and prolong their useful life.

Asset management and financial planning play a key role in the administration of infrastructure systems. It is critically important that the financial needs associated with meeting the infrastructure carrying capacity goal are incorporated into the planning jurisdiction's capital improvement program (CIP) and annual budget process. For example, the New Bern, River Bend, and Trent Woods *Regional Land Use Plan* (2011, p. 82-83) includes specific policies and action items related to infrastructure planning, financing and service. The plan also directs the localities to conduct long-range infrastructure planning through a CIP, and explicitly states that "the demands created by new growth and development for infrastructure, facilities, and services should be the responsibility of those creating the additional demand." Investments in infrastructure are expensive and the results long-lasting, so it is important to consider the current and future populations and businesses to be served and the environmental impacts that may need to be addressed throughout the life of a project.

Encourage water conservation and plan for a lasting water supply

Coastal communities get their drinking water from groundwater or rivers because the relatively flat topography limits the creation of surface reservoirs. These waters have limitations in terms of the population size they can support. Water conservation is an effective strategy that prolongs the life of existing surface and groundwater systems.

See *Best Practices to Consider When Evaluating Water Conservation and Efficiency as an Alternative for Water Supply Expansion* (EPA 2016) for more information on best practices for using conservation as an alternative to facility expansion.

There are many different ways to promote water conservation ranging from requirements for low flow plumbing fixtures in new construction, to encouraging creative reuse of gray water for irrigation purposes, to working with homeowners and encouraging them to retrofit their homes with water saving plumbing fixtures. For example, in their *2009 Comprehensive Plan* (2009, p. 6-15), the City of Havelock adopted a policy statement to consider the use of gray water for landscape irrigation within the city (gray water is water from baths, sinks, kitchens uses and washing machines).

Gray water reuse

PARKS AND RECREATION FACILITIES

Park and recreational facilities enhance a community's quality of life and reinforce its sense of place by providing locations where residents interact on a frequent basis. Quality parks are also a vital selling point for a locality, raising property values and contributing to overall economic growth. For a plan to realize these benefits, it should take a comprehensive approach that examines current facilities and compares them to future needs based on population projections, changing demographics, the location of existing facilities, and the range of services they provide such as sports leagues, yoga classes, and swimming lessons. It should also consider active recreational facilities (e.g., play lots, playgrounds, and ball fields) with significant equipment investments and passive recreation areas (e.g., parks) with fewer improvements (e.g., walking path, benches, trash bins), both of which can vary considerably in size. The plan should also address the need for neighborhood parks as well as larger regional facilities. It should also include specialized recreational areas like golf courses, swimming pools, or a sports stadium. The plan should also focus on policies that promote the use of bike or multi-use paths to provide citizens with opportunities for physical activity and active commuting options. The provision of services for individuals with disabilities and limited mobility and ensuring the accessibility of all park and recreational facilities to all segments of the population is critically important as well.

In some communities, parks and recreational facilities are so important that this topic becomes its own element in a plan or a community develops a separate master plan for its parks and recreational facilities. For example, the *Pender County Comprehensive Land Use Plan* (2010) devotes a section to Parks,

Recreation, Open Space and Waterway Access (II-39). The county also developed the *2010 Pender County Comprehensive Parks and Recreation Master Plan* to support proactive funding and construction of parks and recreation facilities for the expected population increase. The *City of Wilmington 2022 Parks, Recreation and Open Space Master Plan* assesses the provision of community parks, recreation and open space services, aims to stimulate an open public discussion of future needs and establishes a plan of action to address identified needs. This plan supported successful parks bond measures that will fund the construction of multiple parks included in the master plan. Recreation is an important topic in many rural communities as well. The Town of Windsor's *CAMA Core Land Use Plan (*2018, p. 4-7 to 4-10) places a great deal of emphasis on its park and recreational facilities throughout the plan and recommends a wide range of facility improvements.

Example: City of Raleigh's *2030 Comprehensive Plan for the City of Raleigh* includes an element devoted exclusively to Parks, Recreation, and Open Space

Recommended practices

Provide park and recreation facilities near all neighborhoods

The number and size of parks and recreational facilities depends on the community context, the community vision, local geography, existing and future land use, population density, rate of population growth, demographic characteristics, and economic conditions. To ensure that the park and recreational facilities accommodate future populations, the plan should consider the adequacy of existing facilities in terms of future projections for population growth (or decline) and changing population demographics. For example, a community with a younger population is more likely to see demand grow for playgrounds and ball fields while an aging population may have greater need for community centers with fitness classes.

Shevans Park in the Promise Land neighborhood in Morehead City

No two communities are the same. Therefore, what is "sufficient" in terms of park acreage, facilities, and services will vary based upon the community context. For example, some low-density suburban communities may have small play areas as part of the facilities provided by homeowners' associations while in a high-density urban area similar opportunities may be limited and only supplied by government agencies.

While it is important to have sufficient park and recreational facilities, their locations are of equal importance. The location of recreational opportunities makes them readily accessible (or inaccessible) to the community's many neighborhoods, including those with historically disadvantaged populations. To ensure that all residents have access to safe active and passive recreational facilities some communities establish a geographic benchmark, such as a park within one mile of every resident to highlight underserved neighborhoods and eliminate gaps in underserved populations. This can help promote an active healthy lifestyle for all segments of the population. For example, New Hanover County's *Plan NHC* (2016, Existing Conditions p. 49) includes a map of proximity

to physical activity opportunities, such as parks and bike paths, showing areas within one-quarter, one-half, and one mile of an opportunity for physical opportunity. The map clearly shows that some portions of the county have a great deal of access while others have no access.

Strategically invest in parks to simultaneously support economic development and quality of life

North Carolina's coast is fortunate to have an influx of tourists who boost local economies in the summer. Parks can support the tourist economy while improving quality of life for residents. Many coastal towns have events such as outdoor movies and concerts on a weekly basis or larger annual festivals. These events attract tourists, improve their stay, and thereby encourage them to return the following summer. However, it is difficult to hold an outdoor concert or show a movie without a park or gathering space of some sort. If the planning process reveals a need for a new park, planners should consider whether it is possible to maximize this investment by incorporating features that will allow the park to function as both an amenity for residents and a part of the tourist economy.

The Kure Beach Ocean Front Park and Pavilion is an example of such a park. It includes an open-air pavilion at which the town holds plays, holiday musicals, weekly bands, and other themed events. Next to the pavilion sits a playground with a wooden pirate ship jungle gym. Within the park and pavilion are public restrooms, additional restrooms for events, benches, swings, rain gardens and a storm water infiltration system. Due to the park's waterfront location, the largest cost was land acquisition, which was made possible with grants from the NC Park and Recreation Trust Fund, the NC Division of Water Resources, the New Hanover County Park Board, the NC Division of Coastal Management, NC Natural Heritage Trust Fund, and additional grants from the US Department of Housing and Urban Development to support its design and construction.

Inland communities and rural communities also invest in downtown parks and other efforts to promote ecotourism. The Town of Plymouth has a waterfront park where they hold festivals such as the Black Bear Festival. The City of Washington constructed a gazebo that extends into the water for viewing along its waterfront that connects with an extensive walkway along the shoreline. They also installed a playground and picnic tables as part of this waterfront revitalization effort. The Town of Windsor's *CAMA Core Land Use Plan* (2018, p. 4-7 to 4-10) includes a proposed greenway to connect nearby recreational sites to the downtown area. Recreational amenities are on properties previously acquired after Hurricane Floyd, which allows the sites to serve public health and flood hazard mitigation goals in addition to supporting economic growth.

For more information on parks planning:

Parks and Economic Development (PAS Report Number 502). John Crompton. 200i. Published by the American Planning Association.

From Recreation to Re-creation: New Directions in Parks and Open Space System Planning (PAS Report Number 551). Megan Lewis (ed.). 2008. Published by the American Planning Association.

COMMUNITY FACILITIES AND PUBLIC SERVICES

Depending on its size and community context, local governments provide a range of community facilities and public services that are vital to public health, safety, and welfare. It is important for planners to consider these facilities and services when developing the plan's policies and recommended actions. For example, if the population projections for permanent or seasonal populations show growth, it may be time to consider expanding public services, such as police or fire departments, or community facilities, such as schools and libraries. If the plan indicates that new community facilities will be needed, the process of developing the future land use map is the ideal time to identify possible sites. If projections show population decline, the plan may have to consider how to best consolidate existing facilities to reduce costs while continuing to provide the services its residents have come to expect.

The City of Raleigh's *2030 Comprehensive Plan for the City of Raleigh* includes an element devoted to community services and facilities.

The planning jurisdiction's governing arrangement will consist of a wide range of departments that deliver a mix of services to its residents. Some communities also rely on other agencies to provide its services. For example, a community may require volunteer fire and private emergency ambulance services to aid both municipal and county governments. It is common for many plans to include a discussion of how the planning jurisdiction is organized administratively with a description of the roles, responsibilities, facilities, and resources maintained by different departments as well as the allocation of decision-making functions in a community. The development of this section of the plan also provides an opportunity to involve staff from across the local government in the planning process to ensure that the plan reflects their needs and priorities. This can help foster support for the plan's implementation among various community decision makers.

For example, the *Burgaw 2030: Town of Burgaw Comprehensive Land Use Plan* (2013, p. 39-40) discusses at length its current administrative structure, including its elected officials and town management staff along with all services offered by the town government. It also includes information about where it offers services, and describes each of Burgaw's currently owned properties. The *Onslow County Comprehensive Plan* (2009, p. 94-95) describes its local government administration, how it operates under a Board of Commissioners-Manager form of government, its total number of employees, and the amount of employees in each department.

Police Officers, Wilmington, NC

Police departments

The planning jurisdiction's current population demographics, seasonal population fluctuations, and population growth (or decline) creates unique public safety challenges that should be considered during the plan's development. Criminal activity will vary across geographies so it is useful to understand crime

data and trends, and to examine how they differ across different neighborhoods. The plan can use crime statistics to identify neighborhoods that require new policing strategies (e.g., community policing) in order to improve safety.

It is important to understand the size of the police force, facilities, equipment, 911 systems, and the breakdown of full- and part-time officers and how it varies by season. The *Burgaw 2030: Town of Burgaw Comprehensive Land Use Plan* (2013, p. 38) examines current staffing levels and expectations of future demand for staffing and for services based on recent trends that see increases in narcotic and financial crimes. The plan may also need to examine the adequacy of facilities to serve a growing population. For example, the 2009 *Dare County Land Use Plan* (2009, p. 115) describes many of their criminal justice related facilities as well as how the County Sheriff's department interacts with local police forces, the National Park Service, and the state highway patrol. Siting decisions for police headquarters, sub-stations, jails and training facilities (e.g. shooting range) should also be considered when developing the plan to ensure adequate response times and to meet public safety needs.

Fire station

Fire departments and EMS

Fire Departments and Emergency Management Services (EMS) are vital community services that literally mean the difference between life and death in emergencies. In some communities, volunteers are involved in the delivery of these services, which creates additional challenges due to the intensive training required of these professionals. The influx of seasonal tourist populations can strain these services during the summer months while increased traffic can slow response times. Conversely, in rural communities it is often difficult to attract volunteers and provide services that maintain low response times to all parts of the community. The plan should describe the facilities, staffing, and equipment that exists to provide these services. It should also consider existing response times and identify where future facilities should be located to improve service.

The NC Department of Insurance, Office of the State Fire Marshal (OSFM) regularly inspects communities as part of the NC Response Rating System (NCRRS). Each area receives a rating that becomes the final Public Protection Classification (PPC), which gauges the community's ability to respond to fires. The PPC rating is important because it is used to set the fire insurance premiums. Lowering the community's PPC rating saves taxpayers' money while providing improved response capability, which can save lives.

Response times are critically important for EMS calls, particularly those requiring cardiac care. The National Fire Protection Association (NFPA) 1170 standard establishes a turnout time of one minute, and four minutes or less for the arrival of a unit with first responder or higher-level capability at an emergency medical incident. This standard should be met 90 percent of the time.

The location of new facilities and operation of both Fire Departments and EMS services should be an important component in any plan. Future land use must also consider the provision of these services and make recommendations for new staff, equipment, and facilities when needed. These needs should then be incorporated into the CIP and annual budget process. For example, Brunswick County's *Core CAMA Land Use Plan* (2007) lists the current response times for Emergency Medical Services calls. For emergency calls, the County has a response time goal of reaching 90% of calls in less than 12 minutes. The County currently reaches only 60% of calls in under 12 minutes (Section 5, Page 111). In the future demands section, the LUP outlines improvements to fire and EMS services that will be needed to accommodate the growing population (2007, 6-11).

Emergency operations center

Many local governments, particularly counties, larger municipalities, and beach communities also have an emergency operations plan that includes facilities to maintain operations during storm events or other emergencies. For some barrier island communities, this requires building, leasing, or otherwise making arrangements to use facilities located on the mainland to maintain operations during storm events when the community has to be evacuated. While these facilities are often a critical component of the operations plan, it may be useful to include a description of these facilities in the plan and include additional recommendations to incorporate into the CIP and budget process. For example, after including the completion of an emergency operations center on the mainland as a recommended action in their *2009 CAMA Land Use Plan*, (p. xxxii), the Town of Holden Beach completed construction of its mainland Emergency Operations Center in the following years.

Beach litter sign

Solid waste collection and recycling

Solid waste is the trash or garbage that consists of everyday items we use and throw away. It includes product packaging, organic material (uneaten food and yard waste), furniture, clothing, bottles, newspapers, appliances, paint, batteries, and nearly any product that is broken or no longer needed. Many communities provide solid waste collection and recycling services or contract directly with a private vendor for these services. Other communities provide regional locations to dispose of their solid waste or recycling materials or operate their own landfill. Local governments also make provisions for collecting and disposing of household hazardous waste, yard waste, electronic goods, and other materials to limit impacts to the environment and lower the risk of contaminating surface and ground water due to improper disposal. The plan should consider the physical location for solid waste collection and disposal and its capacity in light of population projections. It should also examine the impact that the seasonal population has in terms of this service delivery.

Finding a site for a new solid waste collection or disposal facility or expanding an existing facility can be a challenge. Reducing waste generation through mandatory or voluntary recycling programs is one way to address this problem. Recycling prolongs the life of existing landfills while promoting the proper disposal of materials in an environmentally friendly manner. When applicable, the plan should describe these activities and facilities and recommend policies that help reduce the flow of material to landfills. For example, *Onslow County's 2009 CAMA Core Land Use Plan* discusses the *Onslow County Ten-Year Solid Waste Plan* (Approved 2007, Revised 2011). *Solid Waste Plans for communities in Onslow* and its goals of meeting solid waste needs and protecting public health and the environment. The county's goals include the elimination of improper disposal of waste and the expansion of waste reduction opportunities that are convenient for residents. This broad goal is expanded into specific long-range planning goals:

Encourage recycling with conveniently placed recycle bins

- To provide everyone in the community with waste disposal, waste collection services, and waste reduction opportunities.
- To increase the efficiency and cost-effectiveness of the solid waste program.
- To meet the established local waste reduction goals.
- To educate the general public on source reduction, recycling, reusing, and environmental issues.
- To protect public health and the environment.

Schools

The education of a community's young citizens plays a vital role in the long-term economic health and quality of life for many residents. The quality of local schools is often a determining factor when purchasing property. Similarly, the quality of the local educational system (e.g., K-12, community colleges, etc.) helps recruit new employers and businesses when they require an educated work force. For county government, the development of a plan provides critical information on population projections and changing demographics that should be used to estimate future demand for existing and new schools (K-12). Similarly, existing land use patterns and demographics play a critical role in the equitable allocation of students to schools depending upon local priorities and policies. Understanding and planning for growth (or decline) in the demand for this service is important to ensure that there is sufficient staffing and space to avoid over-crowded schools and classrooms. It also ensures the community plans for changes in demand for other education related services such as pre-school and after school programs.

For example, the *2009 Dare County Land Use Plan* (2009, p. 112-113) includes a discussion of the administration of its schools as well as their capacities,

enrollments, and projected enrollments for the next 10 years. It also discusses privately operated facilities in the area, including pre-kindergarten, elementary and secondary private schools. Currituck County's *2006 Land Use Plan* includes policies for schools, particularly regarding the need for advanced planning for locations of new schools. These locations are to follow growth patterns near existing developments instead of promoting sprawl in more rural locations. New Hanover County's *Plan NHC* (2016) also addresses school siting with the policy that schools must be located in areas where they provide the maximum benefit to adjoining neighborhoods and on sites that allow for future expansion and shared use of the facilities.

For more information on school siting see:
The Smart School Siting Tool User Guide. U.S. Environmental Protection Agency. 2015. Published by the U.S. Environmental Protection Agency.

Telecommunications systems

Depending on the community context, it may be necessary to address the community's telecommunications infrastructure. This infrastructure may need improvement to address public safety issues such as gaps in cell phone or emergency radio coverage that complicate emergency response. The level of cell service (3G, 4G, 5G LTE, etc.) is also increasingly important as residents stream data and video directly to their phones and mobile devices. Fiber-optic coverage or broadband high-speed internet access may need improvement to promote economic development and enhance the quality of life for the public who increasingly want fast access to the internet for business or recreational purposes. Some communities even provide public Wi-Fi hotspots to better connect their citizens. For example, the City of Washington provides free Wi-Fi along its waterfront. Each of these aspects of telecommunications could be discussed in a plan. For example, New Hanover County's *Plan NHC* (2016, p. 43) has an excellent analysis of cell phone coverage and upload and download speeds as an indicator of internet signal strength. The *Carteret County Land Use Plan* supports the extension of fiber-optic cabling throughout the county to provide high-speed Internet access for the entire county. While Emerald Isle's Land Use Plan supports enhancing their information technology infrastructure to promote additional remote work opportunities (2017, p. 5-15).

For more information on telecommunications see:

Planning and Broadband: Infrastructure. Policy. and Sustainability (PAS Report Number 569). Kathleen McMahon, AICP, Ronald Thomas, FAICP, and Charles Kaylor. 2012. Published by the American Planning Association.

Electricity

Electricity is vital to any form of economic development and ensuring that electrical infrastructure is available to meet the future needs of a community and will support its ability to attract new development. Many communities get their electric power through investor-owned utility companies such as Duke Energy Progress or Dominion Energy. However, some communities and rural areas in eastern NC get their electricity from either *membership in electric cooperatives* or membership in the *North Carolina Eastern Municipal Power Agency* (NCEMPA), a municipally owned utility in eastern NC. Membership in one of the cooperatives or municipally owned systems creates unique planning and governance challenges. In these communities with municipally owned facilities, local governments have a greater role in the delivery of this utility to

their residents in comparison to communities served by Dominion Energy or Duke Energy Progress. Where the electricity originates also can affect the utility rates paid by citizens. Generally, the NCEMPA rates are the highest while the rates charged by investor-owned utilities are more affordable.

The plan can include both an assessment of current electrical facilities and set goals for expanding or improving the system or diversifying power sources. The plan may also recommend other improvements to improve the utility system's infrastructure. For example, it may recommend moving electric lines underground for aesthetic reasons or to reduce the risk of damage during storm events.

Increased interest in energy efficiency and alternative sources of energy has resulted in the development of solar and wind energy facilities across NC. The scale of these facilities can vary from a few panels or a single turbine on a residential property to a solar or wind farm with a field of panels or turbines covering many acres. The siting of large-scale facilities should consider the local setting and environmental impacts. The *NCDEQ/DEMLR State Energy Program* can provide technical assistance to local governments interested in developing strategic energy plans to promote energy sustainability, efficiency and conservation.

For more information on solar facility siting see:

the NC Wildlife Resource Commission *Preferred Solar Facilities Siting, Design, & Management* and their *Green Growth Toolbox.*

Recommended practices

Provide capacity to accommodate growth (or decline) in service demand

Development of the plan offers an opportunity to analyze whether current community facilities and services are adequate to service existing and future populations and land uses. The plan can identify facilities, equipment, or staffing allocations that need to be changed as a result of increases (or decreases) in service demand expected to occur as a result of changing demographics and land use activities (Godschalk and Rouse 2015). The plan should identify community facilities that are now substandard or in need of improvements to service a growing population or address the needs created by a growing seasonal population. The population projections, estimates of future land use, and the areas targeted for growth with the land use policies and future land use map should be used to identify where new (or expanded) facilities are needed. This information can then be incorporated into the CIP and annual budgeting processes. *Pender County's 2010 Comprehensive Plan* (Page II-7) devotes an entire section to the issue of Infrastructure and Community Services. This section of the Pender County Plan details how the projected increase in population relates to water and sewer policies, transportation policies, schools, libraries, emergency services, solid waste management, and stormwater management. By recognizing the increased demand on services and facilities the plan lays the

groundwork for addressing future needs in the county's capital improvement plan and budget; as well as coordination with service providers such as Pender County Utilities, the county's water and sewer authority, and the Pender County School Board.

Provide facilities that serve all neighborhoods and segments of the population

Existing and planned facilities and public services should serve all neighborhoods and segments of the population on an equitable basis whether that involves public safety, schools, solid waste collection, or access to regional recycling facilities. For example, the planning process may discover that response times for fire and EMS services differ dramatically across the community. The plan can then include recommendations for new facilities designed to reduce response times, improve services, and then lower fire insurance rates in those neighborhoods. Public facilities (buildings or property) should also be located so that all members of the public have safe and convenient access. The *2017 Ocean Isle Beach Land Use Plan* (2017, p. EX-12) includes a policy statement taking responsibility for ensuring that evacuation shelters are "well-publicized, accessible, and meet national standards for public safety and supplies."

Promote public safety in the built environment

Promoting public safety can also be achieved through environmental design (Godschalk and Rouse 2015). Crime prevention through environmental design (CPTED) is a multidisciplinary approach that uses a series of strategies to deter criminal behavior by altering the physical design of the urbanized built environment for the express purpose of deterring criminal behavior. Strategies to reduce crime through environmental design include:

- **Natural surveillance** to maximize the visibility of the space and its users;
- **Natural access control** to limit the opportunity for crime by selectively placing entrances, exits, fencing, and lighting to limit access or control flow to better delimit public and private spaces; and,
- **Natural territorial reinforcement** to promote social control by delineating private space to create a sense of ownership so that strangers or intruders stand out and are easily identified.

The *Burgaw 2030: Town of Burgaw Comprehensive Land Use Plan* (2013, p. 84) includes the goal of ensuring safe and secure communities are implemented through several policies, including the policy to "encourage development projects to incorporate concepts and principles of Crime Prevention Through Environmental Design (CPTED) or similar concepts." Similarly, Goal XVI of New Hanover County's *Plan NHC* (2016, p. 5-16) calls for the county government to "increase public safety by reducing crime through the built environment." New

Bollard lights and delineated walkways are used to maximize visibility and control pedestrian flow

For more information about Crime Prevention through Environmental Design (CPTED), see *CONNECT Our Future*, the *National Crime Prevention Council* and the *NC Department of Public Safety*.

Hanover County seeks to accomplish this through "encouraging best practices and design strategies" and to construct a built environment that increases "human interaction between neighbors." The Town of Windsor's *Comprehensive CAMA Land Use Plan* (2018, p. 6-21) also includes CPTED as an implementation strategy. Durham County, NC provides a CPTED manual, *Durham Guide to Creating a Safer Community*, that addresses design techniques and strategies to help deter criminal activity.

Limit the land area needed for solid waste through waste reduction

Reducing solid waste and recycling can extend the life of a landfill and reduce disposal costs. Providing specialized services such as the collection of household hazardous waste (e.g., paint, motor oil, pesticides) can prevent improper disposal of chemicals, which can contaminate ground water or impair water quality. New Hanover County's *Plan NHC* (2016) includes a strategic goal of increasing recycling and reducing solid waste. This goal is further broken down into four implementation strategies that define stakeholders and benefits for achieving the goal including:

- Work with the private sector to improve the recycling program, including construction debris and consumer product packaging material.
- Work with the private sector to identify innovative strategies to recycle or divert waste landfills such as composting and anaerobic digestion.
- Divert construction waste by encouraging adaptive reuse of existing buildings.
- Encourage consumers to take responsibility for personal recycling, reuse, and waste reduction (2016, Framing the Policy p. 16)

Promote the development of renewable energy

Renewable energy such as solar and wind should be included in the plan's assessment and analysis of a communities existing energy infrastructure. If the development of renewable energy is an existing or desired goal in the community, the assessment will provide a baseline on which the goals progress can be charted. Additionally, this analysis can reinforce goals, policies, and implementing actions that support the development of renewable resources.

The plan should include policies that promote renewable energy. One way to promote renewable energy is by having an ordinance in place that provides a framework for development and streamlines the permitting process. Communities in coastal North Carolina with solar energy ordinances include: Brunswick County, Camden County, and the Town of Kure Beach. Communities with wind energy ordinances include: Camden County, Carteret County, Craven County, Hyde County, Tyrrell County, Town of Kill Devil Hills, Town of Nags Head, and the Town of Southern Shores.

For information on improving your recycling program see the EPA's *Municipal Government Toolkit*. For marketing materials and information on marketing recycling in your community in see *RECYCLE MORE NC*.

Grant funding for *local government waste reduction efforts* is available from the N.C. Division of Environmental Assistance and Customer Service (DEACS).

Brooklyn Arts Center, Wilmington, NC. The building was previously an abandoned church that has been renovated into a concert venue and arts center.

Model Ordinances for North Carolina: *Template Solar Energy Development Ordinance for North Carolina*. 2016. NC Sustainable Energy Association and NC Clean Energy Technology Center

Model Wind Ordinance for Wind Energy Facilities in North Carolina. 2008. North Carolina Wind Working Group]

For more information on integrating renewable energy into the plan see:

Planning for Wind Energy (PAS Report Number 566). Suzanne Rynne et al. 2011. Published by the American Planning Association,

Planning for Solar Energy (PAS Report Number 575). David Morley, AICP (ed.). 2014. Published by the American Planning Association.]

COMMUNITY HEALTH

A plan plays an important role in promoting community health, or the maintenance, protection, and improvement in the health status of population groups or communities within a shared geographic area. When viewed from this perspective, a healthy lifestyle is not only a set of individual choices, but is promoted by a community structure that encourages individuals to make healthy choices, such as walking or riding a bike instead of driving a car. Planners play an important role in shaping the health of their communities by planning for a physical environment that encourages activity and includes sidewalks, multiuse paths, pedestrian friendly neighborhoods, parks, and recreational facilities.

Supporting community health also includes ensuring that all segments of society have access to healthy food and medical care. Planners should consider whether fresh produce and fresh food is available within close proximity to all segments of the community and address this issue in the plan if a "food desert" - an area where it is difficult to buy affordable fresh food exists. Planners also promote community health by ensuring that all segments of the population have access to primary care providers and specialists such as pediatricians, dentists, or ophthalmologists, which may be in short supply in rural or impoverished communities. The location and accessibility of hospitals, clinics, medical service providers, and pharmacies are other considerations addressed through planning to broaden access to the services used to prevent and treat diseases.

Several practices noted in prior chapters promote healthy, active lifestyles such as mixed land use patterns that are walkable and bikeable, parks and recreational facilities, public access, and other forms of greenspace and open space (Godschalk and Rouse 2015). In addition to these strategies, communities can promote community health as a theme that cuts through all of the elements of its plan. For example, public health and safety is one of the major themes that runs through the *Burgaw 2030: Town of Burgaw Comprehensive Land Use Plan* (2013, p. 83). The town "envisions a healthy community where all residents lead active lives, have access to nutritious foods, and live in safety. It recognizes its role in supporting the health of its citizens through the provision of sanitation, water and sewer, public safety, fire protection, and planning services." The town's plan includes goals, policies, and actions related to infrastructure that will allow the town to realize this vision. The Town of Windsor's *Comprehensive CAMA Land Use Plan* (2018, p. 6-21) provides another excellent example of integrating health and wellness throughout the plan.

For more information on community health planning:

Guidebook on Local Planning for Healthy Communities. Jerry Weitz. 2013. Published by the North Carolina Department of Commerce Division of Community Assistance.

A Planners Guide to Community and Regional Food Planning: Transforming Food Environments. Facilitating Healthy Eating (PAS Report Number 554). Samina Raja, Branden Born, and Jessica Kozlowski Russell. 2008. Published by the American Planning Association.

Planning Active Communities (PAS Report Number 543/544). Marya Morris (ed.). 2006. Published by the American Planning Association.

Integrating Planning and Public Health: Tools and Strategies to Create Healthy Places (PAS Report Number 539/540). Marya Morris (ed.). 2006. Published by the American Planning Association.

Vacant lot transformed into a community garden

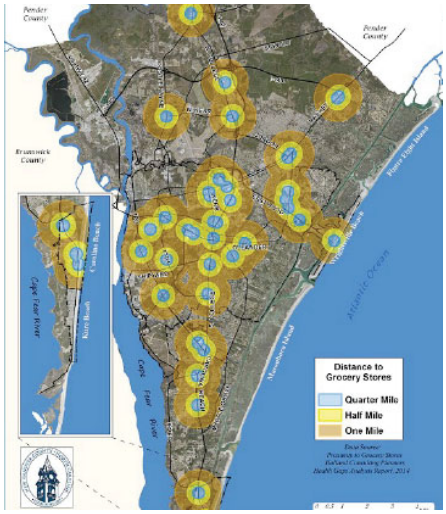
Recommended practices

Provide access to health care facilities for all segments of the population

ECU Medical Center

Health care facilities are of little value to community members if they lack convenient and safe transportation options to reach them. The transportation needs of the elderly, minorities, or low-income populations are often quite different from a typical resident. The plan should recommend actions that improve accessibility and include policies that ensure new health care facilities are located along easily accessible transportation corridors. They should also be located in a manner that ensures they are accessible to at-risk populations such as children, elderly, persons with disabilities, and non-English speakers (e.g., minorities and low income populations) (Godschalk and Rouse 2015). The plan can also recommend providing new transportation services for at-risk populations. In more rural communities, access is an issue for every resident because there are limited medical facilities. To address this problem, Hyde County's *CAMA Core Land Use Plan* (2008, p. 219) includes a policy supporting "the construction of a hospital or primary care facility in or near the county" in order to fulfill local healthcare needs. The Town of Windsor's *Comprehensive CAMA Land Use Plan* (2018, p. 3-1 – 3-5 & 6-19 – 6-21) provides an inventory of local health services, addresses access to care, and then includes policies and implementation actions specific to general health and wellness.

Plan for access to healthy, locally grown foods in all neighborhoods



Proximity to grocery stores map from New Hanover County's first Comprehensive Plan, Plan NHC.

The lack of fresh and healthy food contributes to obesity and has a number of negative health consequences. In some urban areas, particularly those with low-income populations or safety problems, a phenomenon referred to as a "food desert" can emerge where neighborhood residents face difficulty purchasing healthy foods (Godschalk and Rouse 2015). This problem can be particularly problematic when residents lack transportation options to distant supermarkets. Planners can work to avoid "food deserts" by ensuring the land development policies support the location of a supermarkets or other source of healthy foods such as a seasonal farmers market. In some cases, implementing the goal of creating a farmer's market will require updates to the zoning code to allow for open air food sales or commercial sales within residential zones. For example, *Burgaw 2030: Town of Burgaw Comprehensive Land Use Plan* (2013, p. 85) sets the policy to "explore and support initiatives to provide increased access to nutritious foods, such as the development of farmers markets or buyer clubs, and community gardens." New Hanover County's *Plan NHC* (2016, p. 52) considers these issues in its existing conditions analysis through comparative data on the number of fast food restaurants in the county as well as access to fresh food. A countywide map highlighting areas within a one-mile radius of a grocery store accompanies this analysis. The Town of Windsor's *Comprehensive CAMA Land Use Plan* (2018, p. 4-13, 6-19) also provides a map of full-service

grocery store access and then includes policies and implementation actions focused on providing access to fresh food stores.

GETTING MORE OUT OF YOUR PLAN

Well planned and maintained infrastructure and community facilities make a community safer, smarter, healthier, and improve the overall quality of life for residents. They are also a major selling point that attracts new residents, businesses, and industries. While residents take the seamless provision of public services for granted, they will voice their concerns and complaints to local leaders the moment these services are disrupted. The development of this element in a plan is important because proper planning improves service delivery, ensures that all segments of the population are served appropriately, and ensures that the facilities and services are delivered in a cost-effective manner.

This discussion underscores the importance of understanding a community's demographics and population trends in order to understand the changing demand for services such as public water supply and waste treatment systems. It is important that plans for the expansion of public water supply and waste treatments systems are closely coordinated with the locations where future population growth will be concentrated. In many cases, this will require working closely with utility authorities or other governing bodies that control infrastructure decisions during the development of the plan to ensure that the respective priorities are not in conflict.

It is also important that the infrastructure and services are accessible to all segments of the population in an equitable fashion. Planners not only need to consider how the overall population is changing but they also need to understand how different demographic characteristics are changing. Demographic groups will differ in their demand for particular services. For example, if the elderly population is growing at a faster rate than other segments, that may increase the need for medical services but reduce the demand for schools. It is also important to understand where services are located in geographic space compared to those who need the service. Planners can then work to ensure that the plan improves the accessibility of services by concentrating their location in areas that can be reached safely and conveniently with existing transportation systems.

This chapter highlights the importance of being forward looking in terms of the provision of infrastructure and community services. Expanding the treatment capacity of a public water supply or wastewater treatment system is not only costly but the time it takes to get from the initial planning and design stage to an operating facility is lengthy. Construction of a new school or fire station takes time, land must be acquired, designs finalized, buildings constructed, equipment purchased, and staff hired before the facility is fully operational. Planning is needed to ensure that these facilities are available when needed to avoid placing too much pressure on existing infrastructure and to continue providing community services at the level residents have come to expect.

Effective planning minimizes costs by efficiently allocating services and matching them with projected demand. The long-term nature of capital investments underscores the importance of incorporating these activities into the CIP and annual budget process, ensuring the facilities and equipment have proper operation and maintenance to prolong their useful life.

Aerial view of downtown Elizabeth City, NC

Section 3.5

Transportation and Connectivity Element

TOPICS INCLUDE:

- Roads, highways and bridges
- Bicycle and pedestrian systems
- Ports, railways, airports, and ferries

INTRODUCTION

Transportation and connectivity are important topics that span different elements in a plan. Much like the Infrastructure and Community Facilities Element, transportation infrastructure involves careful planning to ensure that the transportation network is properly sized and has sufficient capacity to serve the community's needs. Transportation and land use are inseparably linked. Transportation networks make land accessible, more valuable and attractive for development. Once developed, land uses generate traffic which can result in a less efficient network that will require transportation capacity improvements. These improvements most often encourage increased development, which results in increased traffic. It is important to recognize the cyclic relationship between transportation and land use when developing the plan.

Roads, highways, and bridges provide the day-to-day connectivity that the majority of residents in coastal North Carolina rely on as they go about their lives and participate in the local economy. For some island communities like Bald Head Island and Ocracoke, ferries provide the only connection to the mainland for residents and businesses. In many communities, bicycle and pedestrian infrastructure is growing to complement the auto-focused transportation network, promote active lifestyles, support tourism, and meet demand from residents who increasingly want safe alternatives to driving.

CRC'S INFRASTRUCTURE CARRYING CAPACITY GOAL:
Ensure that public infrastructure systems are sized, located, and managed so the quality and productivity of Areas of Environmental Concern (AECs) and other fragile areas are protected or restored.

A community's transportation system is also important from the standpoint of economic development. While road and highway access is important for many businesses, others rely on access to port facilities, rail lines, or airports to ship their products. In an increasingly global economy, the quality of a community's transportation network can make or break an attempt to lure a desired company to the region. Since funding is limited, it is important to maximize the return on investments in transportation infrastructure through wise land use choices. It is important that the plan's policies anticipate the impact of planned transportation improvement projects on the development market (Godschalk and Rouse 2015).

A community's transportation system is directly related to each element included in a plan, and development of the policies and recommended actions in the Transportation and Connectivity Element should reinforce the other elements in the plan. The Land Use and Community Form element mentions a number of practices that promote development patterns with transportation and connectivity in mind (see Section 3.1). The development of new transportation infrastructure, such as roads, highway access, and bridges, will profoundly affect land use patterns. Ensuring that facilities for waterfront public access, parks and recreation, and other community facilities are connected to all segments of society is also important (see Sections 3.2 and 3.4). Transportation systems are also significant contributors of nonpoint runoff from stormwater. As a result, transportation improvement projects provide opportunities to improve how stormwater is treated and improve local water quality (see Section 3.3). Given the geographic location of coastal communities, the ability to evacuate residents and visitors from all or part of a community as a result of a storm event or severe flooding is another important factor that should influence transportation policy development. During disasters, a safe and operational transportation network becomes critical for both potential emergency evacuation as well as receiving aid or resources immediately after an event (see Section 3.6).

Rodanthe "Jug Handle" Bridge project under construction in the Pamlico Sound

Image Source: NCDOT

This section focuses on how a plan can work to improve a community's transportation and connectivity. It begins by addressing the road, highway, and bridge systems found in many communities. It then discusses the needs of bike and pedestrian infrastructure. It concludes by discussing the important role that ports, railways, airports, and ferries have in some multimodal transportation systems.

ROADS, HIGHWAYS AND BRIDGES

A community's roads, highways and bridges influence its land use and development patterns because they provide the main transportation system used by residents and visitors alike. They connect people to the places they live and the places they travel to on a daily basis. The efficacy of a community's transportation system is a major contributor to a community's quality of life.

For more information on connectivity see:

Planning for Street Connectivity: Getting from Here to There (PAS Report Number 515). Susan Handy, Robert G. Paterson, and Kent Butler. 2003. Published by the American Planning Association.

Life on the coast and large influxes of seasonal residents and tourists create transportation challenges for land use planners. Coastal geography limits access in some communities to single roads, highways, or bridges. The need for large numbers of visitors to access beach areas using a limited number of access points creates significant traffic problems for many barrier beach communities. Many coastal communities are fast growing due to their proximity to beaches and coastal resources. The intensification of residential and commercial uses in urbanized areas without expansion of the corresponding road capacity causes significant traffic issues that adversely affect businesses and nearby residents. Other communities are struggling with roadways that need significant

improvement to accommodate current traffic volumes or have bridges that are well beyond their designed life expectancy and are extremely expensive to replace such as the Cape Fear Memorial Bridge between Brunswick and New Hanover County. Inland coastal communities face their own challenges from the lack of highways and roads needed to attract and encourage economic growth. The lack of connectivity can increase the commuting times for residents because they lack direct routes and have to travel at slower speeds.

The Transportation and Connectivity Element involves some measure of problem solving. Transportation and access problems are linked to the community context and are influenced by geography and needs created by population growth and/or economic development. As a result, transportation projects touch on a variety of interests and concerns related to safety, accessibility, economics, and impacts on the environment. Transportation projects are expensive and communities need to be strategic when working with the NC Department of Transportation (NCDOT) and regional agencies to fund transportation improvements. The development of goals, objectives, policies, and recommended actions require coordination with agencies that play an influential role in major transportation projects.

For more information on road, bridges, and highway systems see the webpages for:

- *GO! NC – NCDOT Online GIS Portal*
- *NC DOT Traffic Volume Maps*
- *NC OneMap*
- *NC DOT 2040 Transportation Plan*
- *NC DOT Comprehensive Transportation Plans*
- *State Transportation Improvement Program*
- *NCDOT Bridge Information*
- *NCDOT planning*

For more information about building your community's transportation planning capabilities see the US DOT's *Transportation Planning and Capacity Building Program (TPCB) website.*

Recommended practices

Balance transportation infrastructure capacity and population growth

It is important to design transportation infrastructure to accommodate growth and handle seasonal fluctuations in population. The plan should ensure that roads and bridges are sufficient to handle existing and future traffic volumes. For barrier beach communities with limited access points through bridges or ferries, the seasonal population fluctuations present additional challenges due to traffic congestion and the need to evacuate the seasonal and year-round populations due to significant storm events.

Transportation projects can alleviate traffic congestion and improve flow. Potential techniques to address congestion include improved coordination of traffic lights, dedicated turn lanes, and retrofitting traditional lighted intersections with roundabouts. For example, the Town of Beaufort's *Core Land Use Plan* (2007, p. 83) includes a policy statement listing several transportation improvements including a dedicated turn lane at the intersection of a U.S. highway and a high school. Improvements can also be linked to new development. For example, in March 2018 Emerald Isle installed a roundabout near the Publix grocery store in lieu of installing a traffic signal. This roundabout is a pilot for the town to evaluate additional roundabouts that may be constructed by NCDOT.

Coordinate local plans with regional transportation investments

Local governments have little control over federal and state transportation policy, which means it is important to coordinate with the agencies that make most transportation funding decisions. In coastal NC these agencies consist of Metropolitan Planning Organizations (MPOs) and Rural Planning Organizations (RPOs). These organizations develop transportation priorities for inclusion in the State Transportation Improvement Plans (STIP). Prioritized projects would include highways and streets, bridges, overpasses, pedestrian and bicycle systems, and public transit systems. With the exceptions of emergency repairs, a project generally will not receive state or federal transportation funding unless it is included in the TIP. For example, the *2017 Ocean Isle Beach Land Use Plan* (2017, p. 4-8) includes a table of local projects included in the region's long-range transportation plan along with descriptions and expected costs. Bertie County did not have any previous transportation or thoroughfare plans, but through multi-jurisdictional cooperation recently completed a *Comprehensive Transportation Plan*, which is both a multimodal survey of existing transportation infrastructure and a guide for future transportation development. (Bertie County LUP 2016).

See the *North Carolina Association of Metropolitan Planning Organizations (NCAMPO)* and *RuralTransportation.org* for more information about their transportation planning activities

Since funding is limited, it is important to maximize the return on investments in transportation infrastructure through wise land use choices. It is important that the plan's policies anticipate the impact of planned transportation improvement projects on the development market (Godschalk and Rouse 2015).

Plan for transportation access to employment centers

It is important for the multimodal transportation system to connect where people live with where they work. Meaningful connectivity starts with planning for transportation access to employment centers to lower commute times and increase the quality of life. To improve connectivity and allow people who lack personal vehicles to participate in the economy, the plan should ensure that areas with high job density and its largest employers connect to housing via multiple modes of travel. Coordinating the regional transportation system with job clusters or areas with high employment densities also fosters economic development and improves efficiency by maximizing the return on transportation related investments (Godschalk & Rouse 2015). For example, New Hanover County's *Plan NHC* (2016, 5-9) encourages concentrating development at nodes to allow for future density levels that could better support multimodal transportation, mixed-use development, and commuting corridors. With concentrated commercial activity, these areas will become local employment centers. It also highlights the geographic location of these commercial nodes, typically at the intersection of major roads in its future land use map.

BICYCLE AND PEDESTRIAN SYSTEMS

Motor vehicles play a major role in our society, and our land use patterns reflect this. However, for a variety of reasons discussed throughout this manual, it is important for the plan to provide alternative modes of transportation in the form of sidewalks, multi-use paths, and bike lanes to provide an active transportation option that provides an alternative to motor vehicles. The Land Use and Community Form Element (Section 3.1) recommends mixing land uses to encourage residents to live, work, and play within an area accessible on foot. The Coastal Environment Element (Section 3.2) illustrates how walkways and boardwalks along the water in downtown areas provide public access, create recreational opportunities, and promote economic development. The Infrastructure and Community Facilities Element (Section 3.4) notes that creating pedestrian and bicycle friendly paths or other greenways provides a strategy to promote community health and provides an alternative means of transportation. Walkable commercial areas and off road bike paths support the tourist economy. Cycling events in rural areas can be used to promote ecotourism. The *Gates County, NC: Comprehensive Plan* (2017, p. 4-12, and p. 6-21) includes bike routes, a bicycle map, and policies that support the provision of a system of safe, coordinated bike and pedestrian trails throughout the county. In April 2018, the City of Washington hosted Cycle NC Coastal Ride which provided cyclists and their families with a fun-filled 3-day weekend and promoted tourism throughout the county.

Bicycle lane on NC Highway 12 in the Town of Duck

Recommended practices

Provide complete streets that serve all users

It is important for the plan to include policies that create a multimodal transportation system that allows residents to use a variety of transportation modes including walking and biking as well as motorized vehicles. It is equally important that individuals with mobility challenges can safely move along and across streets. As noted in other sections, opportunities to bike and walk reduce dependence on automobiles, promotes an active lifestyle, promotes a sense of community, and gives a wider range of individuals access to the local economy. Fewer cars on the road also extends the capacity of existing roads and bridges by helping offset the increased pressure resulting from population growth while reducing auto emissions that affect air quality (Godschalk & Rouse 2015).

One strategy that promotes bicycle and pedestrian transportation systems is encouraging the development of complete streets. Smart Growth America defines complete streets as streets that are "designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities." In many cases complete streets policies consider motorized and non-motorized users to have an equal right to safe and

For more information on promoting greater bicycle and pedestrian transportation see:

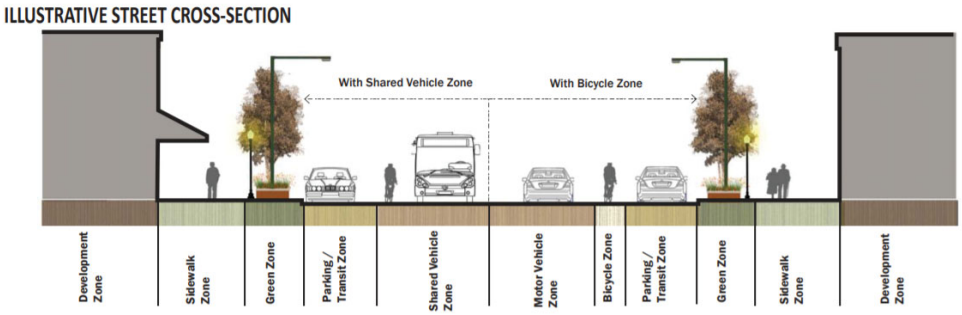
- *USDOT - Pedestrian and Bicycle Information Center*
- *WalkBikeNC* is NCDOTs master plan for improving walking and bicycling in North Carolina communities.
- NCDOT *Division of Bicycle & Pedestrian Transportation*

convenient travel. In other cases, such as on a highway, complete streets policies prioritize the needs of motorized transportation while pedestrians and bikers are encouraged to use other routes. Combining complete streets with mixed-land use strategies can further reduce reliance on automobiles (Godschalk & Rouse 2015).

Within the state of North Carolina and nationwide, Charlotte is a leader in complete streets policy and construction. Charlotte began constructing complete streets in 2005 and adopted Urban Design Street Guidelines in 2007 through a participatory planning process. These guidelines are now a national model for a strong complete streets policy. Following Charlotte and NCDOT's lead, communities in coastal North Carolina have begun to incorporate complete streets policy into their plans. For example, the New Bern, River Bend, and Trent Woods Regional Land Use Plan (2010, p. 79) includes complete streets as one of several action items that address the goal of preserving community character and ensuring sustainability. To enhance its distinct local character, the Town of Duck's *Comprehensive Pedestrian Plan* (2014) commits to complete streets and aims to be a "pedestrian first" community with dedicated bike lanes and sidewalks.

For more information about complete streets:

- See *Complete Streets NC*
- *Complete Streets Planning and Design Guidelines.* North Carolina Department of Transportation. 2012.
- *Complete Streets: Best Policy and Implementation Practices.* (PAS Report Number 559). Barbara Mccann and Suzanne Rynne. 2010. Published by the American Planning Association.
- See *Smart Growth America's website.*



Complete Street Cross-Section, NCDOT

Develop a bicycle and pedestrian master plan

While policies that promote pedestrian and bicycle use are often located throughout a plan or as a section of the Transportation and Connectivity Element, assessing impediments to non-motorized transportation at the site scale requires a specialized bicycle and pedestrian master plan. Developing a bicycle and pedestrian master plan can be included as an implementation action in the plan. If such a plan already exists, the plan's policies and future land use map should be designed to support that plan.

There are many excellent examples of bike and pedestrian plans in coastal NC communities. The Town of Leland's *Pedestrian Plan* (2016) identifies and prioritizes pedestrian and greenway projects to guide community programs, identifies projects for inclusion on the State Transportation Improvement Program (STIP), provides information to improve eligibility for other grant

funds, and works towards creating a connective pedestrian transportation network. This planning effort built on an earlier *Comprehensive Bicycle Plan for Leland* (2008). Across the Cape Fear River, the City of Wilmington developed *Walk Wilmington: A Comprehensive Pedestrian Plan* (2009) to identify pedestrian improvements, and more recently developed the *Gary Shell Cross-City Trail Master Plan* (2012) which led to the construction of a 15-mile off-road bike path through the city.

For more information about the *NCDOT Pedestrian and Bicycle Planning Grant Program* visit their webpage. Municipalities that have received grants and their developed plans can be found *here*.

Implementing a bicycle master plan can also support the tourist economy. For example, a NCDOT study of the economic impact of investments in bicycle facilities in the Outer Banks found that in 2003 tourism related to bicycling generated $60 million annually. They also concluded that 680,000 tourists, or 17% of visitors, engaged in some form of bicycling during their stay in the Outer Banks. The Town of Emerald Isle responded to NCDOT's Outer Banks case study by analyzing consumer desires and economic impacts of bike and pedestrian activity in Emerald Isle. Due to the region's heavy economic reliance on tourism and the value that tourists have placed on multimodal transportation, the community created and began implementation of the *Town of Emerald Isle Bicycle and Pedestrian Transportation Plan* (2010) which focuses on connectivity and the creation of new multi-use trails. To-date the town has created an 11-mile multi-use pathway that stretches from the Indian Beach town limits to The Point at Bogue Inlet.

PORTS, RAILWAYS, AIRPORTS AND FERRIES

Depending on the geography and local context, communities may have other significant components of their multimodal transportation system including ports, railways, airports, and ferries. These aspects of the transportation system should be included in the plan because they affect land use and economic development. The future land use map should include adjacent land uses that are compatible with the particular features of each mode of transportation. The plan also needs to ensure that the different modes of transportation are well connected and designed to accommodate population growth and economic development.

Port facilities

The coast is home to a number of working waterfronts that provide port facilities (see Section 3.2). The *NC State Ports Authority operates two major deep-water ports* – Port of Wilmington and Port of Morehead City. Each facility has connecting rail access and both ports play a significant role in the economies of surrounding communities. There are also smaller ports that are home to the state's commercial fishing industry. These ports also play an important role in their local economy and are an important part of their community's sense of place. In both cases, it is important that policies support the port's future land use needs and manage the issues associated with port operations. For example,

The Port of Morehead City
Image Source: NC State Ports Authority /NCDOT

land may be needed to accommodate future expansions in port operations, new cargo, or new technologies. Similarly, the trend towards larger ships may necessitate increased rail or truck traffic. Port operations can also involve 24-hour operations that generate noise, odors, light, and traffic. These impacts on adjacent land use need to be accommodated.

The EPA's Ports Initiative's *Community-Port Collaboration and Capacity Building* page provides tools for near-port communities to engage in port decisions that affect land use and environmental health.

Railways

Railway systems convey passengers or goods to or from a community, and have an impact on the local economy and land use. Trains have had a historic significance to the growth and land use patterns in many coastal communities. For example, the Town of Morehead City developed around a railroad line that runs through the center of downtown to serve the port, both of which continue to be major economic drivers to this day. In the City of Wilmington, railroads were the most important industry for more than 125 years. In 1840, when the Wilmington & Weldon Railroad was completed it was the longest continuous rail line in the world at 161 miles.

While railways may play a less important role in terms of moving passenger traffic in NC today, they remain a vital means of transporting goods across the U.S. and abroad via their connections to port facilities. The presence of rail access can be an extremely important tool for economic development. Much like land along a waterfront is limited, so too is access to railways. It is important that the land use plan make good use of this finite resource.

Rail lines can cause conflicts with adjoining land uses because of noise, safety concerns (e.g., spills of material being moved), and traffic. For example, the Cape Fear Region is working to address significant concerns due to expanded port operations with estimates that the increased rail traffic might cause up to 30-minute delays at some intersections.

In other cases, the abandonment of rail lines presents significant opportunities for planners to advance other issues such as constructing multi-use paths and greenway systems. The City of Wilmington and New Hanover County's joint *Comprehensive Greenway Plan* (2013) proposed providing access to downtown Wilmington by turning a deactivated railway line into a greenway trail. The greenway project known as the "Wilmington Rail Trail" is actively being pursued by local organizations. Inland, the City of Greensboro constructed the Atlantic & Yadkin Greenway on an abandoned railroad. The multi-use path connects users to parks and urban corridors.

Airports

Airports can serve a number of functions within a community, provide varying degrees of economic impact depending on their size, and can help shape regional identity. The largest airports in Coastal NC are commercial non-hub

airports located in Wilmington, New Bern, and Jacksonville. These airports are important because of their passenger traffic and economic access for business purposes. There are also smaller general aviation airports that support flights ranging from gliders and single engine planes to corporate business jets and support a variety of commercial and non-commercial uses all along NC's coast.

Airports provide an economic development tool and sometimes have adjacent industrial parks to support industries that require access to landing fields. Airports can also be used as part of a workforce development partnership. For example, Wings over Albemarle, a partnership between the College of the Albemarle and Currituck County, provides aviation maintenance technology skills.

Airports require adjacent land uses that are compatible with their operations to minimize concerns about safety, security, noise, and environmental impacts. A lack of coordinated planning can result in incompatible development conflicting with airport activities, such as tall buildings impacting radar coverage. Most airports have an airport master plan that outlines future airport development. The airport master plan can serve as a basis for collaboration with the community on its plan for future development near the airport.

For more information on planning and airports see:

The FAA's *Land Use Compatibility and Airports* is a useful guide for improving land use planning near airport operations.

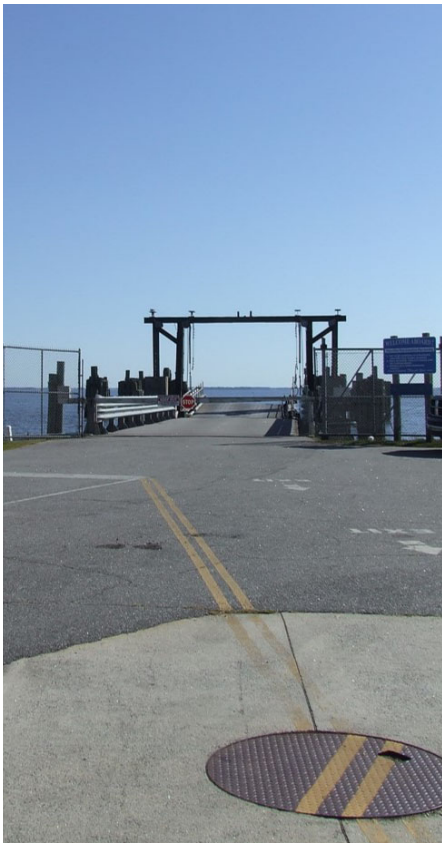
Planners and Planes: Airports and Land-Use Compatibility (PAS Report Number 562). Susan M. Schalk, and Stephanie Ward. 2010. Published by the American Planning Association.

Preserving General Aviation Airports: A Technical Guide for Compatible Land-Use Planning. Published by the North Central Texas Council of Governments.

The FAA *developed a best practices bulletin* that addresses surface access to airports.

Ferries

A plan should consider the role that ferries have in a community's overall multimodal transportation system. In some cases, ferries provide a transportation route that is quicker or more scenic than reaching the same destination by car, bicycle, or as a pedestrian. In other cases they are the only means of access. They are an integral part of coastal tourism, providing access to towns, parks, and historic sites. There are purely scenic inland ferry routes such as the Parker's Ferry in Hertford County and the Sans Souci Ferry in Bertie County. While in geographically isolated island communities, such as the villages of Bald Head Island and Ocracoke , ferries provide the only access to mainland areas.. When NC Highway 12 is damaged in Dare County, the *NC Ferry System* runs an emergency route between the villages of Stumpy Point and Rodanthe to provide a link between Hatteras Island and the mainland.



Currituck Mainland Ferry Dock

For isolated island communities it is important to tie the ferry system to the island's overall transportation system and consider the role that ferry access has in terms of the local economy and population growth. For example, the Ocracoke Island Ferry is responsible for an estimated 275% population increase on the island during peak tourist season that must be addressed by transportation and utility infrastructure (*Hyde County CAMA Land Use Plan* 2008, p. 18). To help alleviate summertime congestion on the ferry system's popular vehicle ferry, a passenger ferry now takes pedestrians and cyclists from the Hatteras Inlet Terminal directly to the Silver Lake Terminal in the heart of Ocracoke Village.

Recommended practices

Coordinate transportation plans with regional and private stakeholders

The impacts of ports, railways, airports, and ferries are regional in nature and affect multiple jurisdictions including federal and state agencies. Accordingly, it is important that policy development is coordinated with the priorities and planned investments of other communities. It may also require working closely with other jurisdictions to enact projects that address a community's transportation needs. For example, the City of Jacksonville worked with Camp Lejeune to expand pedestrian and bicycle infrastructure through reclaiming rail lines on which service had been discontinued for greenway space. The property was then deeded to Jacksonville through special legislation passed at the state level.

Link water-based public transportation to pedestrian and land-based transportation systems

Ferries provide a unique set of transportation challenges, particularly for the villages of Ocracoke and Bald Head Island where it is the only form of access. It is important that coastal communities coordinate water-based transportation systems with land-based modes of transportation (EPA & NOAA 2009). For example, Ocracoke has worked with the State of North Carolina to fund a tram system using occupancy tax revenue, which will link with their new express passenger ferry and provide coverage for visitors to explore the rest of the island.

GETTING MORE OUT OF YOUR PLAN

The transportation system plays a major role in shaping historical and current land use patterns in many communities. The connectivity provided by highway access, ports, railroads, and airports also supports economic development and growth. Given the globally connected nature of today's economy, a lack of connectivity creates challenges in terms of attracting new residents or businesses. A community's multimodal transportation system has a large impact on quality of life because it dictates how we get from where we live to where we work, shop, and play. Additionally, sidewalks, bike lanes, and multi-use paths not only provide alternative forms of transportation, but they promote active lifestyles that improve community health.

A poorly functioning transportation system can also adversely affect the quality of life. Roadway connectivity and capacity that has not kept pace with population growth can lead to traffic congestion and long commute times. In extreme situations, traffic congestion can adversely affect business along congested transportation corridors and lead to declining property values. It is important that the plan's policies and future land use map reflects the corresponding road

ADA accessible sidewalk in the Town of Columbia

capacity and steers growth and development to areas with adequate transportation infrastructure or plans for improvements to reduce congestion.

Poor planning can lead to other problems and land use conflicts. Roads that are not designed to accommodate pedestrians or bicyclists can increase the risk of accidents and fatalities. Siting residential development near airports can complicate their expansion to accommodate growing air traffic. Lack of land for port expansion can hinder their competitiveness. Insufficient rail access can limit economic development while increased rail traffic can create traffic congestion. Poorly designed transportation infrastructure can cause adverse environmental conditions by restricting the flow of water under bridges and culverts or by directing untreated stormwater into nearby lakes, rivers, or coastal waters.

These examples illustrate many of the reasons that a transportation and connectivity element is a critical piece of the larger plan. Given the interconnected nature of the transportation system and the fundamental role it plays in our daily lives, it is important that a community has a set of clear, consistent policies for guiding land development that reflect the capacity of the existing transportation system. As a community continues to expand, the transportation system will have to expand to accommodate this growth. The plan should guide these improvements.

Making major improvements to a community's multimodal transportation system also involves some measure of coordination with adjacent planning jurisdictions as well as a myriad of federal or state agencies and programs depending on the type of transportation system involved (e.g., roads, highways, ports, rail lines, airports, ferries, etc.). The larger improvements often take a considerable amount of time and expense to complete. It is therefore important to prioritize needs for transportation improvements and ensure that they are consistent with policies contained in the different elements of the plan. It is also important to coordinate with regional entities, including RPOs/MPOs, COGs, military facilities, and county governments, to gain support for the community's priorities and to ensure that they get included in the region's transportation improvement program.

Aerial view of Surf City, NC

Section 3.6

Disaster Resilience and Recovery Element

TOPICS INCLUDE:

- Major coastal hazards
- Hazard mitigation
- Adaptation and resilience
- Post-disaster recovery

INTRODUCTION

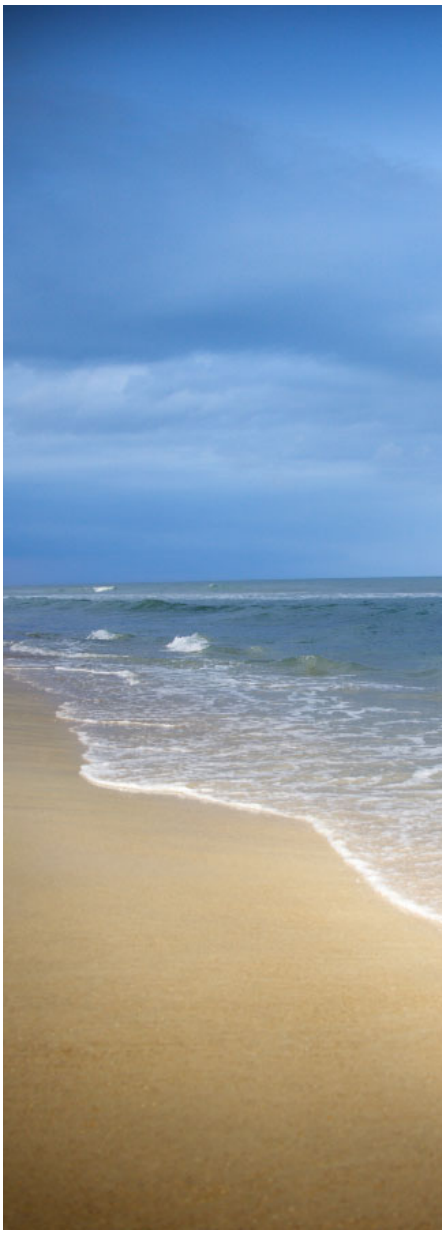
While life in a coastal community offers distinct advantages in terms of the quality of life, it is also inherently risky. The shoreline is a constantly changing natural system subject to natural hazards such as hurricanes, tropical storms, and nor'easters that result in property damage and potentially the loss of life. These hazards produce erosion, flooding, and storm surges that create hazardous conditions when juxtaposed with the built environment (EPA & NOAA 2009, p. 28). Many of the trends associated with a changing climate exacerbate these hazards causing the severity and/or frequency of the impacts to increase over time (e.g., rising sea levels and stronger storms producing higher storm surges and increased coastal erosion). Climate change has contributed to the annual average cost of billion-dollar disasters in the United States increasing from $6.2 billion between 1980-2018, to $12.6 billion between 2014-2018 (NOAA NCEI, 2019)

CRC'S NATURAL HAZARD AREAS GOAL:
Conserve and maintain barrier dunes, beaches, flood plains and other coastal features for their natural storm protection functions and their natural resources giving recognition to public health, safety, and welfare issues.

Extreme weather events cause major disruptions in coastal communities, and major natural hazard events tend to expose the greatest physical and social vulnerabilities that exist in a community. Identifying and recognizing these weak links in various systems gives communities the opportunity to more comprehensively address existing issues and become more resilient. A resilient community is one that has the ability to resist or recover rapidly from damaging storm events and long-term stressors, making resiliency a critical issue to consider in a land use or comprehensive plan. A community's level of resilience depends on how much stress or damage a community can cope with before its ability to function properly is degraded (Francis & Chadwick 2013). Because a community is made up of people and systems (e.g., transportation, water and sewer, economic, environmental, housing, etc.) that are connected and interdependent, stress or damage to one or more can affect several, if not all, others. To build resilience within and across people and systems, a community must be proactive and use

techniques designed to mitigate the impacts of coastal hazards. It also needs to learn from experience and incorporate this knowledge into plans and policies to be prepared for the next event. By doing so, the community will recover more quickly and life will return to normal sooner, with less damage to life, property, and natural resources.

The importance of protecting beaches, dunes, wetlands, and flood plains that provide storm protection functions and steering development away from high hazard areas are common themes throughout this manual. The Disaster Resilience and Recovery Element provides additional practices to help coastal communities adapt and build resilience before and after disasters. Most coastal communities have a hazard mitigation plan or participate in a multi-jurisdictional regional hazard mitigation plan. Some also have an emergency management department tasked with addressing many of the topics covered in this element. However, these plans often have limited impact on land use and public investment decisions. Hazard mitigation plans also have little bearing on CAMA permit decisions or federal consistency decisions. Coordinating the land use plan with a community's hazard mitigation plan provides a more comprehensive and proactive approach to hazard mitigation (EPA & NOAA 2009; NOAA 2011; Schwab 2010). This coordination of plans helps lower the likelihood that they contain conflicting policies or guidance for decision-making that might hinder reaching the goals of both simultaneously.



Atlantic Beach, NC

Disaster resilience policies should reflect the local context and account for the unique physical landscape and governing structure in your community and region. At a minimum, it must include policies and actions that address CAMA's Natural Hazard Areas Management Goal. Disaster resilience policies can and should link to relevant policies found in other elements of the plan that apply to systems impacted by natural hazards: land use and community form, coastal environment, natural resources and environmental sustainability, and infrastructure and community facilities.

This chapter provides an overview of coastal North Carolina's major natural hazards, followed by a series of recommended practices with useful resources and information on how to get more out of your plan and work towards a more resilient future.

MAJOR COASTAL HAZARDS

Coastal communities in North Carolina face many hazards, including hurricanes and other forms of severe weather (thunderstorms, tornadoes, and waterspouts), nor'easters, and winter storms. These storms can cause damage from wind, storm surge, and flooding. Less frequent hazards include events such as wildfires, severe drought, earthquakes, and tsunamis. Fortunately, North Carolina's coast has natural systems and coastal features such as beaches, dunes, and coastal

wetlands that provide some protection from extreme weather events. The designation of these areas as AECs subject to CAMA's permit requirements, combined with the policies in a local land use plan, provides a measure of protection for these natural features. Understanding where these natural features are located and identifying lands subject to flooding and storm surge are important so that the plan's policies can steer development away from these areas. Climate change impacts are projected to increase overall risk in coastal communities by both exacerbating multiple natural hazards (e.g. flooding, drought, etc.) and threatening the natural protective functions of beaches and wetlands.

NOAA Historical Storm Tracks allows you to explore more than 150 years of hurricane tracking data.

Hurricanes and tropical storms

Hurricanes are one of nature's most powerful and destructive phenomena. They are tropical cyclones formed by a counter-clockwise rotating low-pressure weather system and can produce a wide range of hazards including: storm surges, inland flooding from heavy rains, destructive winds, tornadoes, high surf and rip currents. The intensity of tropical cyclones is categorized by their maximum sustained wind speed using the Saffir-Simpson scale which ranges from a tropical depression at less than 39 miles per hour (mph) to a category five hurricane at greater than 157 mph, but while a higher wind speed generally corresponds to a more destructive storm, many characteristics of a storm such as forward speed, size, rainfall amount, and angle of approach can make even a tropical storm or category 1 hurricane as much or more impactful as a category 4 hurricane. As illustrated by Hurricane Florence in 2018, existing conditions within an impacted area, such as high soil moisture, can have a tremendous impact on the severity of a storm.

Damage from Hurricane Matthew in Boiling Springs, NC

Due to NC's geography, many hurricanes hit the state directly or pass near enough to the coastline to cause damage. North Carolina ranks fourth behind Florida, Texas, and Louisiana in terms of hurricane landfalls, with the Cape Hatteras region being most affected. The strongest storm to strike the state was Category 4 Hurricane Hazel on October 15, 1954, which caused extensive damage to southeastern NC. In the late 1990s, Hurricanes Fran (1996) and Floyd (1999) were each at the time, the costliest to hit North Carolina. Most recently, Hurricanes Irene (2011), Matthew (2016) and Florence (2018) have caused major damage in central and southern coastal North Carolina communities. Climate change, which is leading to more extreme rainfall events and higher sea levels, makes the threats associated with tropical storms and hurricanes even greater.

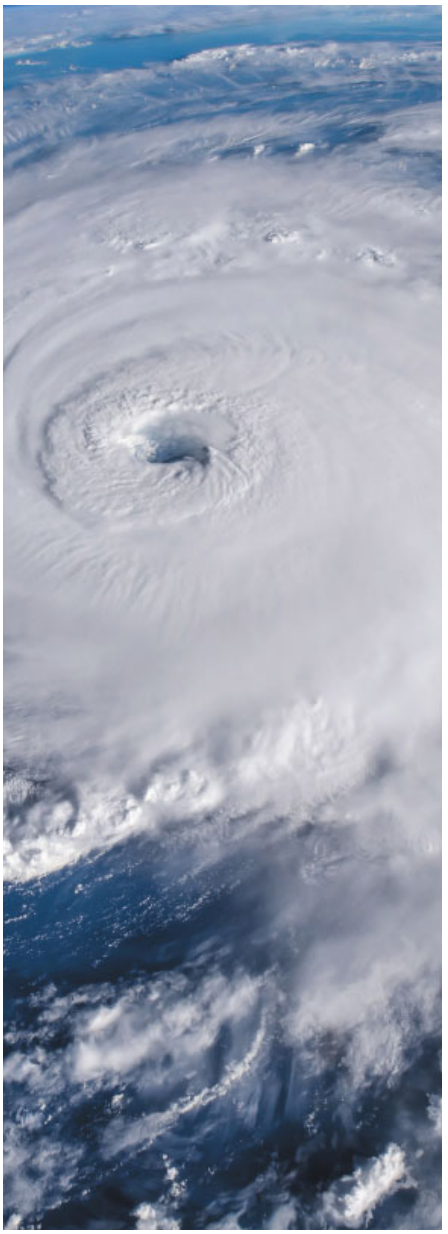
Severe weather

The coastal area is also subject to many other severe weather events such as severe thunderstorms, high winds, tornadoes, waterspouts, nor'easters, and winter storms, which occur on a regular basis and can pose threats to the coastal area throughout the year and occur with little warning.

Severe thunderstorms and the lightning that accompanies them occur frequently during the summer months, but can occur at almost any time during the year. A thunderstorm becomes "severe" when it is accompanied by hail one inch or greater, winds gusting more than 50 knots (57.5 mph), or a tornado. A severe thunderstorm can cause considerable damage under certain circumstances. Lightning can cause deaths, damage structures, produce power failures, and start fires. Thunderstorms can have strong "straight-line" winds up to more than 120 mph produced by the outflow of the storm. Straight-line winds can produce a damage path that extends for miles knocking down trees, power lines, and causing major structural damage. People living in mobile homes are especially at risk of injury and deaths because even when anchored, the structures can be damaged by winds exceeding 80 mph.

Heavy rainfall can cause flash flooding. Flash floods occur within six hours of heavy rainfall and can be quite deadly. When it rains heavily on saturated or dry soil with poor absorption ability, the runoff quickly accumulates in ditches and streams that join to form larger volumes of fast flowing water and debris. What makes flash floods dangerous is that they occur suddenly and have fast moving water that can inundate homes and flood roadways many miles downstream of the location of heavy precipitation. The changing climate has contributed to an increasing number of heavy precipitation days (greater than 3 inches) for most stations in the Southeastern U.S., and the rising trend is expected to continue (National Climate Assessment, 2018).

Tornadoes are a byproduct of severe thunderstorms. They occur quickly with little warning and can cause major structural damage and loss of life. While they occur mostly during the summer months in the early evening hours, they can occur at any time during the year or be spawned by tropical cyclones. Tornadoes are the most violent of all storms, with wind speeds that can exceed 300 mph. Damage paths can be up to a mile wide and extend for many miles. The strength of a tornado is measured using the Enhanced Fujita Scale (EF-Scale), which replaced the original Fujita Scale (F-Scale) in 2007. Fortunately, tornadoes larger than an F-2 are rare occurrences in NC.



Satellite view of a hurricane over the Atlantic

Enhanced Fujita Scale	
EF-0	65 - 85 mph winds
EF-1	86 - 110 mph
EF-2	111 - 135 mph
EF-3	136 - 165 mph
EF-4	166 - 200 mph
EF-5	>200 mph

North Carolina's geographic location exposes it to damage from severe storms known as nor'easters, which develop within about 100 miles of the coast between the Carolinas and Massachusetts. While nor'easters look almost identical to tropical cyclones, they are quite different. Tropical cyclones are warm-core low-pressure systems that feed off warm ocean temperatures while nor'easters are cold-core low-pressure systems that develop due to the very cold, dry air rushing southward from Canada moving over the warm Gulf Stream (which is often near 70° F in winter). Their counter-clockwise flow around the low-pressure system causes precipitation and wind patterns similar to a tropical cyclone. Nor'easters are usually accompanied by heavy rain (or snow), and can cause severe oceanfront or inland shoreline erosion, storm surges, flooding that is often miles inland, hurricane force winds, and even blizzard conditions. Since nor'easters often form off NC's coast, they are sometimes slow moving while the storm builds and weather systems converge. As a result, a nor'easter may last through several tidal cycles, which causes greater damage than a faster moving hurricane. In these cases, damage from a nor'easter in terms of the loss of life and property is sometimes greater than a hurricane.

To learn more about severe weather visit the *National Severe Storms Laboratory* (NSSL).

While winter storms are somewhat rare, North Carolina's coast does experience storms accompanied by snow, sleet, and freezing rain. Even a small amount of frozen precipitation can paralyze local communities, most of which lack sufficient equipment and supplies to clear and de-ice roadways. Significant freezing rain and ice storms can bring down power lines and make roadways impassable for several days. The storms can also be deadly, although most deaths occur due to traffic accidents on icy roads, heart attacks from shoveling snow, and exposure to the cold.

Storm surge

Storm surge is an abnormal rise of water generated by a storm's winds, that is over and above predicted tides. It is associated with tropical cyclones and nor'easters, where high winds moving counter-clockwise around a storm for a sustained period push water towards the shore. The surge produces a rapid rise in water that moves quickly and travels inland, especially up bays, rivers, and estuaries. The storm surge can also keep rivers and streams from draining to coastal areas, which can compound the impacts from rainfall flooding. When the storm surge coincides with normal high tides, it can cause severe flooding in coastal areas reaching up to 20 feet in extreme cases. Rising sea levels resulting from climate change are exacerbating both high tides and storm surge events as they are able to encroach further inland.

Historically, storm surge is the greatest risk to life and property from a hurricane. Storm surge in conjunction with pounding waves can increase damage to buildings, infrastructure and critical facilities and erode beaches, breach dunes, and undermine roadways and building foundations. The combination of higher

than normal tides, wind, and waves can severely damage docks, marinas, and other recreational boating facilities.

The magnitude of the potential storm surge in a geographic location depends on a variety of factors and slight changes in a storm's forward speed, wind speed, radius of winds, and angle of approach to the coast can influence its magnitude. The shape and characteristics of coastal features such as rivers, bays, and estuaries combined with the width and slope of the continental shelf can all affect the size of the potential storm surge. This uncertainty complicates the identification of land use areas that are subject to the potential impacts of storm surges.

Flooding

Flooding is one of the most common natural hazards affecting communities along North Carolina's coast. As noted above, flooding results from tropical cyclones, prolonged rain events, severe thunderstorms, tidal fluctuations, and nor'easters. Depending on the situation, the magnitude of flooding can range from just a few inches on the road to several feet, reaching the second story of commercial or residential structures. Flood waters can rise and recede quickly as "flash floods" or take days or weeks to funnel from the creeks and streams of a watershed into the major rivers. In densely populated areas, the construction of buildings, highways, driveways, parking lots and other impervious surfaces increases stormwater runoff by reducing the area that can absorb rainfall. When this occurs, stormwater systems become overwhelmed and unable to function properly, flooding adjacent roadways, property and buildings. Floods are the most common of all weather-related disasters and can be extremely costly in terms of life and property. To minimize these impacts, it is important to protect and manage floodplains and preserve natural areas (e.g., wetlands) that accommodate and store floodwaters.

Coastal communities can use FEMA's Flood Insurance Rate Maps (FIRM's) to identify areas with higher flooding risks. FEMA's FIRMs demarcate areas in a community that are prone to riverine and coastal flooding by breaking them into separate classifications. For those areas that are most likely to flood, ordinances should be in place that require building elevation to be above the 100-year (1% annual chance) flood level or base flood elevation (BFE). Each foot above the BFE is known as additional freeboard. For instance, if a new home is proposed in an area designated as AE on the FIRM, the lowest floor should be at or above the BFE as determined by the FIRM. This information can be incorporated into a plan in addition to being adopted within a Floodplain Development Ordinance. For example, the *2009 Dare County Land Use Plan Update* (2011, p. 30 & p. 58) shows flood zones in the unincorporated county and explains their significance.

While flood zones shown on FEMA FIRMs are used for flood insurance rates, they may not be adequate in developing policies that account for the full range

The National Hurricane Center (NHC) provides a *National Storm Surge Hazard Map* that estimates the potential geographic coverage of storm surge areas for different storm events.

NOAA's *Coastal Flood Exposure Mapper* helps communities visualize people, places, and natural resources exposure to coastal flood hazards including, storm surge and sea level rise.

NOAA's *Coastal Inundation Toolkit* provides a step by step guide for using various tools to assess and address coastal flooding hazards.

The Nature Conservancy's *Coastal Resilience Portal* shows potential areas for various levels of flooding and sea level rise, regional and community-level planning, and social vulnerability.

Fact check: The '100-year' floodplain means there is a 1% chance in any given year that the area will flood. It does not mean it will only flood once in every 100 years. In fact, over the course of a 30-year mortgage, a house in the 100-year flood plain has a 26% chance of being flooded at least once. In just the past 25 years, millions of North Carolinians have experienced multiple 100-year or 500-year floods. How this topic is communicated can make a tremendous difference in how flood risk is interpreted.

of flood risks present in a community. FIRMs don't include some factors that contribute to flood risk such as increasing amounts of impervious surfaces, the health of a community's stormwater system, or rising sea levels. Additionally, a changing climate is leading to more frequent extreme rainfall events in the Southeastern U.S., which has caused flooding in North Carolina communities beyond their mapped floodplain. This increasing trend and flood risk suggests that yesterday's 1% annual chance flood and the associated flood extent may not be adequate to protect infrastructure and other assets during floods and within floodplains of the future.

Mapped 100-year and 500-year floodplains are used most often because they are easily accessible, but a community that experiences major flooding damage with each extreme rainfall event or hurricane may want to consider incorporating flood risk information that goes beyond what is used for determining insurance rates. This may require more sophisticated modeling or additional staff time, but it can lead to increased education and awareness as well as policies and programs that reduce risk and increase community resilience.

Sea level rise

The N.C. Coastal Resources Commission Science Panel's *Sea Level Rise (SLR) Assessment Report* (2015), and the *N.C. Climate Science Report* (2020) both state that sea levels are rising across the coast of North Carolina. SLR rates vary spatially along the coast due to two main factors, vertical movement of earth's surface, and changes in water height due to increased volume and thermal expansion. According to geological and tide gauge data, there is more land subsidence north of Cape Lookout, which contributes to relatively higher rates of SLR along the northeastern coast. Four currently active (and one inactive) NOAA tide gauge stations have enough data to report SLR trends, located at: Duck, Oregon Inlet, Beaufort, and Wilmington.

The CRC Science Panel's 2015 SLR Assessment Report provides SLR projections out to 2045 for each station based on three scenarios, including: linear interpretation of historical trends, low greenhouse gas emissions scenario (RCP 2.6), and high greenhouse gas emissions scenario (RCP 8.5).

NC Floodplain Management Quickguide (2017): A great one-stop-shop for floodplain management regulations, data, and visual examples for NC.

At the site scale *flood.NC.gov* can help property owners identify their flood risk, impacts to their home and its contents, potential insurance rates, and mitigation opportunities.

For more information on FEMA's Flood Insurance Rate Maps and other mapping services provided by FEMA, see *FEMA's flood mapping page*. The information can also be viewed easily on NC's *Flood Risk Information System* (FRIS).

FEMA also has a useful tool designed to help communities gain a better understanding of the potential scope of damage and losses a hazard such as a hurricane, flood or earthquake could create known as Hazus. Hazus is a nationally applicable standardized methodology that uses GIS technology to estimate physical, economic and social impacts of disasters. FEMA's Hazus loss estimation technology allows a community to plan for different scenarios and disasters.

FEMA's *Hazus methodology* can be used to estimate physical, economic and social impacts of disasters.

Station	Tide Gauge Projections		IPCC RCP 2.6 + VLM		IPCC RCP 8.5 + VLM	
	RSLR in 30 years (inches)		RSLR in 30 years (inches)		RSLR in 30 years (inches)	
	Mean	Range	Mean	Range	Mean	Range
Duck	5.4	4.4-6.4	7.1	4.8-9.4	8.1	5.5-10.6
Oregon Inlet	4.3	2.7-5.9	6.3	3.9-8.7	7.3	5.0-9.9
Beaufort	3.2	2.8-3.6	6.5	4.2-8.7	7.5	5.0-10.0
Wilmington	2.4	2.0-2.8	5.8	3.5-8.0	6.8	4.3-9.3
Southport	2.4	1.9-2.8	5.9	3.7-8.2	6.9	4.4-9.4
Note: Projections were rounded to the nearest tenth of an inch.						

2045 N.C. Sea Level Rise Projection Scenarios (CRC, 2015).

The N.C. Climate Science Report, a scientific assessment of historical climate trends and potential changes specific to North Carolina, states that it is "virtually certain" that sea level rise will continue in the state.

SLR is an important consideration in hazard mitigation and resilience planning since it can exacerbate a number of other natural hazards such as hurricanes, nor'easters, storm surge, and "sunny day" tidal flooding. A long-term gradual or accelerating increase in sea level results in more impactful extreme weather events, forcing communities to plan and think differently than they may have in the past. Rising sea levels also lead to saltwater intrusion which can contaminate underground drinking water supplies. Rising groundwater levels associated with sea level rise can create environmental health issues for communities who rely on septic systems to manage wastewater, as septic fields are required to have a certain amount of vertical distance between their drainage field and the ground water table.

SLR is a risk multiplier because it can exacerbate other hazards and lead to cascading effects on society. Various SLR scenarios that go beyond a 30-year planning horizon have been mapped and can be viewed in the *Nature Conservancy's Coastal Resilience Portal* or through *NOAA's Coastal Flooding Exposure Mapper*.

Wildfires, severe drought, earthquakes and tsunamis

There are other natural hazards that communities may want to address in their plans depending on the local context. These hazards include wildfires, severe drought, earthquakes, and tsunamis. While they may pose lesser risk as compared to hurricanes and floods, they are still risks worth considering in the plan.

Wildfire is an uncontrolled burning of forested, brush, or grassed areas. Sites most vulnerable to wildfires are in the "wildland/urban interface" or where development is located adjacent to undeveloped natural areas. As the coastal population grows, people increasingly build homes in rural locations in or near natural areas. While homeowners benefit from the beauty of these locations, they also face the real danger of wildfires, which may begin due to lightning

or by accident (and on occasion intentionally). They spread quickly due to underbrush and can eventually threaten homes.

Severe droughts are another hazard of concern for communities since they can last for months, or even years. Droughts can have devastating effects on communities and the surrounding environment depending on the severity and duration of drought conditions. While drought can impact any type of community, it can have greater impacts on poorer communities with limited funding to bring in resources from other areas. Persistent drought conditions may lead to water restrictions by local or state governments to ensure that reservoirs and streams do not run too low to meet the needs of the area.

Earthquakes and tsunamis are two additional coastal hazards that are relatively low risk but have the potential to inflict considerable damage. Major earthquakes do not happen often in NC due to its geology. However, the 2011 magnitude 5.8 earthquake with an epicenter in Virginia but felt on the NC coast reminds us that they do occasionally happen. Since 1735, 22 earthquakes have caused damage in NC. In areas where the risk of earthquakes is low, building codes may not address seismic hazards making buildings vulnerable to damage. To address these issues communities may consider adopting building codes without amending or excluding seismic standards, and retrofitting older building to become more resistant to earthquakes.

While the likelihood of a tsunami is lower than an earthquake, a tsunami is still a possibility. The most likely cause of a major tsunami threatening the NC coast would be an undersea landslide off the coast of Virginia or the Carolinas where unstable sections of the continental shelf could slide into deep ocean trenches. Other potential causes of a tsunami impacting coastal NC include an undersea landslide in other parts of the Atlantic Basin, a volcanic eruption in the Canary Islands leading to a massive landslide, or a large magnitude 9.0 earthquake in the Puerto Rico Trench. While highly unlikely, many of the strategies to address storm surges will mitigate the risk of a tsunami as well.

Man-made hazards

Man-made or technological hazards of various types, size, intensity and duration may occur with little warning. These disasters can affect the safety, health and welfare of the population, and cause damage or destruction to private and public property. The events leading up to a man-made hazard may be the result of deliberate or negligent human actions, but their impact can be equally devastating. Man-made hazards include, but are not limited to biological and chemical hazards, cyber, explosion and nuclear events. Living near chemical plants, major roads or rail lines can also increase the risk of exposure to potential hazards. While manmade hazards are not addressed in this manual, some of the practices associated with natural hazards would apply to these facilities as well.

The *Firewise USA* and the *N.C. Firewise Program* provide information to mitigate the risk of fire in the wildland/urban interface. Participating Firewise communities can be found here.

Firewise Landscaping in North Carolina. Robert E. Bardon and Kelley Van Druten. Published by NC State University and the NC Forest Service.

HAZARD MITIGATION

Despite the magnitude of the potential hazards facing NC's coastal communities, there are many steps a community can take to decrease the risks associated with these hazards. Hazard mitigation encompasses sustained actions to reduce or eliminate the long-term risk to life and property from hazard events. It is an on-going process consisting of activities before, during, and after disasters designed to break the cycle of damage and repair. Hazard mitigation activities can be undertaken by governments, as well as individual property owners and businesses. The plan should be part of a community's overall hazard mitigation strategy because it not only guides land development decisions, but it should also steer development away from areas prone to repeated damage. On average, every dollar invested in mitigation practices saves society roughly $4-$6, according to the National Institute of Building Sciences (2017). Emphasizing the value or return on investment of specific proposed hazard mitigation strategies or estimating the 'cost of doing nothing' is integral to elevating their importance on the long list of community priorities.

Mitigation actions to address long-term vulnerability include:

- Local plans and regulations
- Structural projects
- Natural systems protection
- Education programs
- Preparedness and response actions

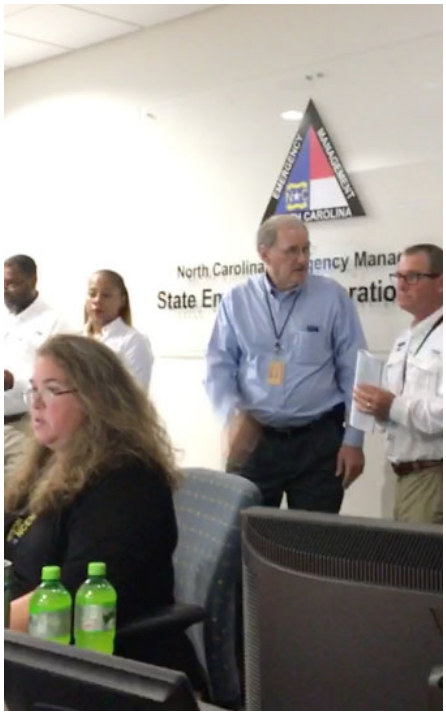
Source: *Beyond the Basics, 2018*

National Benefit-Cost Ratio Per Peril *BCR numbers in this study have been rounded Overall Hazard Benefit-Cost Ratio	Exceed common code requirements 4:1	Meet common code requirements 11:1	Utilities and transportation 4:1	Federally funded 6:1
Riverine Flood	5:1	6:1	8:1	7:1
Hurricane Surge	7:1	Not applicable	Not applicable	Not applicable
Wind	5:1	10:1	7:1	5:1
Earthquake	4:1	12:1	3:1	3:1
Wildlife-Urban Interface Fire	4:1	Not applicable	Not applicable	3:1

Hazard mitigation is a broad area and addresses a wide range of natural and man-made hazards. Many strategies mitigate natural hazards and build a community's resilience to disasters. Communities will have detailed emergency response plans and other policies and programs designed to minimize risk during the aforementioned hazards. This Section focuses primarily on planning practices designed to mitigate the risk of coastal hazards and promote disaster resilience, including land use decisions and public infrastructure and facility siting. Land use decisions are critical components of an effective hazard mitigation program. If the protective functions of coastal features such as beaches, dunes, wetlands, and flood plains are lost, it can make a region far more susceptible to damage from coastal storm events. Wise land use practices improve a community's resilience and ability to withstand damaging events and recover more quickly.

All coastal communities in NC either participate in a regional hazard mitigation plan or have a single jurisdictional plan. Developing a hazard mitigation plan is a requirement for any government who wants to apply for mitigation grant funds.

The N.C. Department of Public Safety's Division of Emergency Management encourages participation in regional hazard mitigation plans where several counties and their municipalities form a single plan and develop a mitigation strategy based on their regional and individual needs. This makes it cheaper to update the plans and allows planning departments to share the work (or cost of a consultant). Communities can also share the cost of the match required for grants. NC Emergency Management also gives regional plans priority for planning grant funds. Examples of these plans include the *Southeastern NC Regional Hazard Mitigation Plan* (2016) (covers Pender, New Hanover, and Brunswick Counties and their municipalities) and the *Albemarle Regional Hazard Mitigation Plan* (2015) (covers Dare, Currituck, Camden, Pasquotank, Perquimans, Gates, Chowan, and Hertford counties and their municipalities). While the regional approach offers many benefits, the sometimes reduced level of detail and attention given for an individual community may limit how influential it is on other community development practices. It is important that the plan is well integrated with hazard mitigation planning efforts.



NC Emergency Management Emergency Operations Center

Adaptation and resilience

Defining *resilience* must be done by and for each individual community to capture the local context and understanding of hazards, risk, and vulnerability. One common definition is "the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions" (IPCC, 2012). Discussions about long-term resilience also recognize that climate change has and is expected to continue increasing natural hazards risks and place greater stress on our natural resources, economy, and public health.

Resilience is an all-encompassing term that connects and relates to both hazard mitigation, disaster recovery as well as emergency preparedness, meaning that most actions that increase resilience are serving multiple purposes or goals. This process of building resilience over time can be thought of as a community *adapting* to changing conditions (e.g., rising sea levels, a growing and/or aging population, decaying infrastructure, increasing frequency and intensity of rainfall events, etc.) while still striving for its long-term goals.

Effective adaptation and resilience planning requires integration and coordination among local government departments who may not normally interact, such as emergency management, floodplain management, public health, and community planning. A multi-disciplinary approach helps communities connect the dots more easily in finding solutions that address multiple problems at once and more quickly adapt to change. Establishing

a process for monitoring and re-evaluation of planning actions must strike a balance between maintaining accountability and providing the flexibility to change course as new information becomes available.

The Division of Coastal Management provides a resource, *Assessing Coastal Community Resilience: a Pilot Project in North Carolina (2018)*, to assist communities seeking to become resilient. It describes a planning process for land-use planning, communications, disaster planning, and the initial assessment of a community's vulnerabilities (Gregory 2018). The project includes a combination of asset mapping, community workshops and interviews, and hotspot identification for future project implementation (e.g., flood mitigation) for the following towns: Oriental, Edenton, Duck, Pine Knoll Shores, and Hatteras Village. These maps and reports provide the towns with a starting fact-base about existing risks and vulnerabilities, and suggest potential adaptation actions to better attract grant funding or other assistance to enhance planning and implementation projects. For communities interested in walking through a similar process DCM has created a *N.C. Coastal Community Resilience Guide*.

The Town of Nags Head used a Vulnerability Consequences and Adaptation Planning Scenario (VCAPS) process to help understand its vulnerabilities and how to more effectively adapt to future conditions. Vulnerabilities identified in the VCAPS are reflected in the Focus Nags Head Comprehensive Plan (2017).

Adaptation Planning in the Town of Nags Head: Vulnerability, Consequences, Adaptation, Planning Scenarios (VCAPS) Report (2017)

Town of Nags Head North Carolina Comprehensive Plan (2017)

The Division of Coastal Management is also actively engaging local communities to address resiliency. The *N.C. Resilient Coastal Communities Program* (RCCP) aims to facilitate a community-driven process for setting coastal resilience goals, assessing existing and needed local capacity, and identifying and prioritizing projects to enhance community resilience to coastal hazards. Participating communities walk through a framework leading to the development of "shovel-ready" projects. Local governments throughout the 20 coastal counties are eligible to apply for direct technical assistance to complete a community engagement process, risk and vulnerability assessment, and develop a resilience project portfolio.

Post-disaster recovery

Hazard mitigation, adaptation, and resilience are inextricably linked to post-disaster recovery. Disaster recovery has been defined as "the differential process of restoring, rebuilding, and reshaping the physical, social, economic and natural environment through pre-event planning and post-event actions" (Smith and Wegner, 2006). Effective hazard mitigation both pre- and post-disaster reduces the level of damage, which makes future recovery easier and quicker. The recovery period provides political and financial opportunities that advance mitigation and prevent future disasters (Schwab 2010). It allows the community to restore and improve upon the pre-disaster living conditions, and make necessary changes to reduce risks of future disasters. The ability of a community to seize these opportunities and 'build back better' may depend on whether planning for short- and long-term disaster recovery has been done prior to the event, in the aftermath, or both.

A summary of past and projected climate conditions for extreme heat, heavy rainfall events, sea level rise and other trends can be found in the following reports:

2020 North Carolina Climate Science Report

2019 N.C. State Climate Summary

Southeast Chapter of the 2018 National Climate Assessment

The emphasis of post-disaster recovery planning is to restore and improve the pre-disaster living conditions, while also making the necessary changes designed to reduce risks of future disasters. It goes beyond simply being an exercise in risk reduction and emergency response. For example, it may include rebuilding structures to new standards or setting them back farther from the hazard. It may involve moving critical public infrastructure and facilities out of harm's way to reduce future damage. It may require purchasing land that is unsuitable for future development and using it to provide open space or recreational opportunities. It can even involve using the recovery process to promote other community objectives such as economic development.

The plan has an important role in connecting hazard mitigation, post-disaster recovery, and resilience efforts. Post-disaster recovery planning involves the development of a set of strategies or 'blueprint' designed to help a community rebuild after a disaster occurs. Since the plan and its policies are considered the community's blueprint outside of the disaster context, their coordination and integration are crucial.

Recommended practices

Incorporate climate adaptation and resilience throughout the plan

Climate change affects nearly every aspect of society in coastal communities (e.g., populations, housing, the economy, natural systems, community facilities, and future land use). This means that striving for long-term climate change resilience serves as an opportunity to integrate considerations into other decisions and investments, including the community's vision for the future. Just as communities try to project population changes decades into the future, they should also consider how projected changes in climate exacerbate natural hazard risks for sensitive and vulnerable people, places, and infrastructure.

Integrating climate adaptation and resilience is not an easy or quick task, but DCM's *Coastal Community Resilience Guide* can help by walking communities through a step-by-step process, providing relevant data and analysis, communication tips, and examples of success stories. One of the first and most important steps is to bring together key internal staff, but also to reach out to other public, private, and non-profit organizations with expertise in climate change science, impacts, and solutions to serve as advisors and facilitators. These groups are especially important for smaller communities with less capacity in order to understand and translate climate change projections into forward-looking planning and actions. These groups can serve as "resilience champions" for the community.

Thorough public engagement and an updated climate-informed risk assessment of vulnerable assets and populations can eventually lead to a set of prioritized

DCM's N.C. *Coastal Community Resiliency Guide* and the N.C. Office of Recovery and Resiliency's *Natural Hazards Resilience: A Quick Start Guide for North Carolina Communities* both outline a process for building resilience and climate change considerations into existing efforts such as comprehensive land use, hazard mitigation, or capital improvement planning.

For more information and resources see The Nature Conservancy's *Coastal Resilience website*.

strategies to improve or revise policies, ordinances, and other decisions to build long-term resilience. These strategies may entail including sea level rise projections as part of a land suitability analysis, conducting a quantitative risk and vulnerability assessment, developing a conservation overlay district to prohibit development or limit density in designated current and future floodplains, or including objectives or policies to develop educational programs for all types of residents (non-permanent, non-English speaking, etc.) about flood insurance, resilient home building, and disaster preparedness. Strategies should address at multiple geographic scales from the facility or building level (energy efficiency, stronger, smarter construction), the neighborhood or site level (multi-use green spaces, natural stormwater controls, disaster recovery plans), to the community and regional level (wetland conservation, resilient transportation).

Plan for post-disaster recovery before an event

A plan for post-disaster recovery, whether it's separate and stand-alone or included as part of the emergency operations plan, contains official policies and implementation tools, including ordinances, that are activated before and after a hazard event to coordinate and guide recovery and rebuilding efforts. It may designate a recovery management team to oversee recovery efforts. The plans frequently describe lines of authority, coordination measures, and processes for expedited review, permitting, and inspection of the repair and reconstruction of damaged buildings and structures. Post-disaster recovery plans should be consistent with the policies contained in the comprehensive plan and hazard mitigation plan. Creative planners will also design mitigation measures to achieve several community goals simultaneously. For example, a property buyout program may primarily be used to reduce flood risk, but it could also help enhance environmental health, create recreational opportunities (e.g., public access) and preserve open space through the reuse of property as a waterfront park.

A post-disaster recovery plan is important because the period immediately following a disaster has the potential for a great deal of confusion and it is possible for the many people involved to take actions that serve conflicting purposes. Decisions also have to be made quickly when problems urgently demand attention. Therefore, it is important that the post-disaster recovery plan provides a framework within which these critical decisions are made. The community vision statement can provide inspiration for the framework. Having a post-disaster recovery plan will help the community avoid short-term decisions that adversely affect its long-term resilience, such as rebuilding critical community facilities in locations highly vulnerable to coastal hazards.

While disasters are themselves inherently unpredictable, the aftermath of a disaster often follows a predictable sequence of events similar to past disasters but with the response varying mostly based on the magnitude of the event. Thus,

Building resilience and adapting to climate change in most cases complements and supports past or ongoing planning efforts geared toward 'smart growth', 'sustainability', and 'low-impact development'.

The U.S. Environmental Protection Agency's *Smart Growth Fixes for Climate Adaptation and Resilience: Changing Land Use and Building Codes and Policies to Prepare for Climate Change (2017)* offers examples of policy options that support all of these goals by identifying the climate threat addressed as well as the level and type of policy change (e.g. Collaboration/Partnerships, Education/Outreach, Incentives, Land Preservation, Pilot Program, Planning/Mapping, Regulatory). A *table of the policy options* outlined in the document is also available.

Additionally, Appendix C (pgs. 93—95) of *Plan Integration for Resilience Scorecard (PIRS) Guidebook* offers a consolidated list of potential policy tools that can be used to reduce risk and increase resilience, particularly to flooding. Each sub-section contains the policy tool, a description, and an example of a measurement.

a general post-disaster recovery plan should respond to readily anticipated challenges confronted during the recovery and reconstruction phase. The location of temporary housing should be pre-identified, recognizing it could be more permanent than is envisioned following a major disaster. Temporary business locations may have to be created to assist with recovery efforts and provide needed goods and services while their physical structures are rebuilt. The selection of locations for debris storage and procedures for its eventual removal need to be considered. Priorities for reopening roads, bridges, and ferries should be established so that the community's transportation connectivity can be quickly restored. Staging areas for the reconstruction and restoration of public infrastructure and community facilities (e.g., water, sewer, utilities, etc.) may need to be established. It may also be necessary to permit the reoccupation of homes that suffered substantial damage to address short-term housing needs.

Post-disaster recovery policies can be included in a plan or a separate stand-alone plan. For example, Brunswick County has a stand-alone *Disaster Recovery Plan* (2009), while Bertie County addresses post-disaster recovery in its *Emergency Operations Plan* (2015). While many of these separate plans are developed by the emergency management office, local planners should be involved in their development. Similarly, it is important for the plan to support the policies of separate post-disaster recovery plans. These stand-alone documents do not have the same impact on land use decision making as a comprehensive or land use plan; therefore, it is useful to cross reference the plans' policies and priorities to provide a consistent framework for local decision making that promotes disaster resilience.

For more information on post-recovery planning:

- FEMA's *Pre-Disaster Recovery Planning Guide for Local Governments* (2017)
- *Planning for Flood Recovery and Long-Term Resilience in Vermont: Smart Growth Approaches for Disaster-Resilient Communities*. U.S. Environmental Protection Agency. 2014. Published by the U.S. Environmental Protection Agency.
- *Planning for Post-Disaster Recovery: Next Generation* (PAS Report Number 576). James C. Schwab, (ed.). 2014. Published by the American Planning Association.
- *Post-Disaster Recovery Planning Forum: How-To Guide. Partnership for Disaster Resilience*. 2006. Published by the Partnership for Disaster Resilience.
- *National Disaster Recovery Framework*. 2016. Published by FEMA.

Protect hazard-prone areas

The challenge of coastal living is balancing the advantages of being in close proximity to the water with the inherent risks posed by natural hazards. The choices of where and how to develop have significant impacts on a community's resiliency. Perhaps the most important practices involve protecting the beaches, dunes, wetlands, estuarine marshes, and flood plains that provide some measure of protection from coastal hazards (Godschalk and Rouse 2015; EPA & NOAA 2011; Schwab 2010).

Regulatory tools such as zoning and local ordinances can ensure that fewer vulnerable structures are built in high-hazard areas, which are areas subject to a higher relative risk from hazards than other areas in a community. Local ordinances can include use regulations that only permit open-space uses or place development restrictions such as setbacks to minimize flood exposure. Alternatively, communities can zone these areas as conservation to restrict land development potential. For example, Pender County revised their UDO

standards to require the arrangement of lots to avoid flood prone areas as a way to restrict and reduce development in hazard prone areas. The Coastal Environment Element (Section 3.2) provides examples of measures to protect beach and dune areas and address shoreline erosion, while the Natural Resources and Environmental Sustainability Element (Section 3.3) provides examples of protecting coastal wetlands.

The other way to protect the mitigation functions of beaches, dunes, wetlands, estuarine marshes, and flood plains is for the plan to include policies that discourage development in high-hazard areas (Godschalk and Rouse 2015). It is important to integrate risk as a siting principle in planning and decision-making (EPA & NOAA 2011). The Investing in Comprehensive Planning (Section 1.2) identifies land suitability analysis as a process for identifying land areas most appropriate for future land uses while identifying attributes that make land unsuitable for development such as high hazard areas.

Subdivision Design and Flood Hazard Areas (PAS Report Number 584). James C. Schwab et al. 2016. Published by the American Planning Association.

Steer public investment away from high hazard areas

Another way to limit development in high-hazard areas is to have a policy that limits public expenditures for infrastructure and community facilities in these areas (Godschalk and Rouse 2015; Schwab 2010). This policy serves several functions. It limits damage to public infrastructure and community facilities, which speeds the recovery process and saves taxpayers the cost of rebuilding. It discourages private development in these areas by denying property owners access to infrastructure that might otherwise incentivize development (such as sewer or roads). It also sends the signal that development in these areas comes at great risk. For example, Pender County's *Comprehensive Land Use Plan* (2010, II-45) used planning objectives such as discouraging extension of public water and sewer to areas that are heavily impacted by hazards, and revising UDO standards to require the arrangement of lots to avoid flood prone areas, as ways to restrict and reduce development in hazard prone areas.

It is important to locate critical public infrastructure and community facilities outside of high-hazard areas when practicable. It is also important to make plans to manage the risks to infrastructure and community facilities when they are in a high-hazard area (Crouch et al, 2014). This helps limit interruptions to these facilities, which can be quite disruptive during and after a disaster.

Plan for the evacuation of the population from high hazard areas

Hurricane season coincides with the tourist season in coastal NC. Severe storms require voluntary or mandatory evacuations which can require evacuating not only permanent residents, but also the seasonal population that occupies many of the beaches and coastal areas. The plan provides the foundation for a successful evacuation plan by ensuring that its land development policies

consider the population (permanent and seasonal) that can be safely evacuated in the time that various contingency plans require (Schwab 2010). This is critically important for communities with limited accessibility from roads, bridges, and ferries given their geography. Communities with well-connected transportation networks (see Section 3.5) provide more options for evacuations during a disaster (EPA & NOAA 2011). A breakdown in community transportation systems during a disaster is common and creates dislocations. It is important to ensure that policies in the Transportation and Connectivity Element (Section 3.5) reflect the need for evacuation and recovery (Schwab 2010). For example, Currituck County's *2006 Land Use Plan* (2009, p. 9-12) supports a new mid-county bridge to improve emergency access to and evacuation from the Currituck Outer Banks. It also makes emergency evacuation a priority in the development and approval of transportation plans and improvements included in the NCDOT Transportation Improvement Program (2009, p. 9-16).

Protect socially vulnerable and at-risk populations

Vulnerable neighborhoods face higher risks than other areas when disasters occur and may require special interventions including policies and recommended actions designed to mitigate the risks experienced by those neighborhoods. A neighborhood may be vulnerable for a variety of reasons including its location, lack of access to resources, socio-economic status of its residents, or the lack of planning. It is also important to consider the seasonal population, which may not understand the risks and be in rental neighborhoods located in vulnerable areas. Accordingly, the Disaster Resilience Element should consider the needs of vulnerable communities located within its planning jurisdiction. This may require a variety of actions, depending on the needs of the vulnerable communities (e.g., outreach and education, additional evacuation time, temporary shelters, or transportation).

The needs of at-risk populations should be considered during the planning process. This population includes children, seniors, pregnant women, individuals with medical and mental disorders, persons of low income, and non-English speaking individuals (Godschalk and Rouse 2015). The at-risk population often has a higher risk of being adversely affected by a disaster than the general population. The responsibility to help these individuals also falls on local government during times of crisis. It is important that, to the extent practicable, facilities where they reside, such as nursing homes and affordable housing, are located safely out of high-hazard areas. Many at-risk individuals live throughout the community. Plans for sheltering, caring for, or evacuating these individuals should be developed. Because few communities in coastal NC have a public transportation system, evacuation is a particularly important issue to consider.

Mapping vulnerable populations: A valuable resource that communities can use to learn more about the vulnerable populations in their jurisdiction is the Center for Disease Control's (CDC's) *Social Vulnerability Index (SVI) map* which uses census data to map populations vulnerable to hazards. The information is useful for emergency managers and planners to learn more about where vulnerable populations are located. The site includes *prepared county maps*.

City of Fayetteville Resiliency Element (2017) addresses economic and social equity resilience.

Georgetown Climate Center: Equitable Adaptation Legal & Policy Toolkit, Equitable Disaster Preparedness, Response & Recovery. This toolkit highlights best and emerging practice examples of how communities are addressing disproportionate socioeconomic risk to climate impacts and engaging vulnerable populations.

For these vulnerable populations, short- and long-term recovery requires additional attention and consideration. From communicating immediate needs (e.g., food, clothing, medication, hygiene products, water, etc.) to ensuring access to information about the complex array of local, state, and federal recovery programs, socially vulnerable populations must be included. Making sure these populations are involved, engaged, and adequately represented throughout planning processes is crucial to understanding their needs as it relates to the community's resilience.

The initial steps in protecting vulnerable and at-risk populations are not particularly expensive. For example, New Hanover County has a voluntary special needs registry that individuals can access through the *NHC Emergency Management website*, by calling the emergency management offices, or by stopping in at the emergency management headquarters in Wilmington. The registry is designed to help the department know where at-risk populations are located and what their needs are in the event of an emergency or disaster requiring evacuation. The registry also provides vital information, such as the address and medical needs of the individual, to first responders. Individuals are eligible to register if they are frail, elderly, medically needy, and/or disabled. If such a registry is widely used, it can identify vulnerable neighborhoods, such as a neighborhood with a high concentration of elderly residents living at home.

Coordinate land use planning with local hazard mitigation plans

All of North Carolina's coastal communities have a hazard mitigation plan (or are included in a multi-jurisdictional regional hazard mitigation plan) developed in accordance with FEMA's requirements and are eligible to receive certain types of non-emergency disaster assistance such as funding for mitigation projects. State, tribal, and local governments engage in hazard mitigation planning to identify the risks and vulnerabilities in their communities due to a wide range of natural disasters. Plans aim to increase the awareness of threats, hazards, and vulnerabilities as well as develop long-term strategies to break the cycle of damage, reconstruction, and repeated damage. A hazard mitigation plan on its own does not have the same level of legal standing that a locally adopted plan and implementing ordinances possess. It is therefore critical that the plan and hazard mitigation plan have complementary goals, objectives, and policies that are mutually reinforcing (EPA & NOAA 2011; Schwab, 2010; NOAA 2009). Depending on the timing of each planning process, the hazard mitigation plan may need to be updated to reflect the policies and priorities from the Disaster Resilience and Recovery Element. Conversely, the development of an updated hazard mitigation plan should reflect the land use and hazard related policies found in the plan. This level of coordination ensures that local decision-making properly reflects the risks associated with coastal hazards.

For more information on ways to integrate hazard mitigation into the plan see:

Hazard Mitigation: Integrating Best Practices into Planning (PAS Report Number 560). James C. Schwab (ed.). 2010. Published by the American Planning Association.

Planning for the Unexpected: Land-Use Development and Risk (PAS Report Number 531). Laurie Johnson, Laura Dwelley Samant, and Suzanne Frew. 2005. Published by the American Planning Association.

Integrating Hazard Mitigation Into Local Planning: Case Studies and Tolls for Community Officials. 2013. Federal Emergency Management Agency.

Participate in the National Flood Insurance Program's Community Rating System

The National Flood Insurance Program (NFIP) sets minimum standards for floodplain regulation and offers subsidized insurance to communities who create a flood plain ordinance to meet the NFIP requirements. All of North Carolina's coastal communities participate in the NFIP. North Carolina Emergency Management maps coastal and inland floodplain boundaries under its Floodplain Mapping Program and assists local governments in the adoption of local ordinances that regulate development in areas identified as floodplains and flood hazard areas. The maps are accepted by FEMA and are available *on FEMA's website* and in the state's *Flood Risk Information System*. NFIP standards aim to reduce the impact of flooding on structures. By adopting the standards and regulations outlined by the NFIP, your community can qualify for lower insurance rates.

NC Marine Patrol Officer after Hurricane Florence near Burgaw, NC

The Community Rating System (CRS) recognizes communities that have policies exceeding the minimum standards outlined in the NFIP by rewarding them with flood insurance premium discounts. The CRS has a classification system that ranks communities on a scale of 1-10. In this case, 1 is the highest ranking a community can achieve. A community moves through the ranks by receiving points for floodplain management activities. The total number of points a community earns delineates their classification. A community in the 10 classification, for example, receives no discounts from their NFIP insurance rates. A community ranked in the 1 classification qualifies property owners in the floodplain for up to a 45% discount on the NFIP insurance rate which benefits property owners directly. Not only will their insurance premiums be lower, but their property and the community is now more resilient in the face of potentially damaging flood events.

There are limits to how much the CRS rating can be lowered in coastal North Carolina due to rating thresholds being linked to NC's Building Code Efficiency Grading System (BCEGS). A number of factors including limits on the frequency NC allows its state building code to be updated have effectively lowered its BCEGS rating, which effectively caps the CRS ratings. Nevertheless, communities can work to increase their CRS rating to the maximum extent practicable, to improve resilience and lower insurance costs for property owners. In 2017, Morehead City created a *Floodplain Management Plan (FMP)* with the goal "to reduce or eliminate risk to people and property from flood hazards". Along with the FMP, Morehead City completed a Program for Public Information and a Repetitive Loss Area Analysis. Based on this and other CRS activities undertaken by the town, they scored enough points for a Class 6. However, due to NCs BCEGS rating, the town is limited to a Class 7 (15% reduction in premiums in SFHA, 5% in non-SFHA). Previously the town was a Class 8 (10% in SFHA 5% in non-SFHA).

TIPS FOR MAXIMIZING CRS CREDITS

- Get the most points through activity 420 for 'open space preservation' in the floodplain. The amount of credits (max of 1,450) is determined by a ratio of open space preserved within a community special flood hazard area.
  - Digital Coast: *How to Map Open Space for Community Rating System Credit*.
  - Coastal North Carolina communities can also partner with The Nature Conservancy through their *CRS Explorer* tool to identify areas eligible for CRS credit.
- Participate in the National Weather Service *StormReady* and *TsunamiReady* programs. Participation in these programs under CRS Activity 610 can earn communities up to 55 points. Many NC coastal *communities already participate* in both programs.
- Adopt higher regulatory standards. While all communities participating in the NFIP must construct new buildings within the special flood hazard area to at least the base flood elevation (BFE) or flood depth of the 0.1% annual chance flood, the community can go beyond this standard by including a 'freeboard' or additional height requirement. Freeboard reduces the risk posed by a flooding event by reducing exposure or chance the water levels will get higher than the now higher reference level. Each foot of freeboard adopted can add 100 CRS points under Activity 430 for higher regulatory standards with a maximum of 300 points for having a 3-foot freeboard standard.
- Provide education and outreach on flood risks under CRS Activity 330. An outreach project can earn up to 200 points, an additional 80 points available if the outreach is implemented as part of a Program for Public Information (PPI). *Hyde County's Flood Planning and Resilience Guide* is a great example of an outreach project.

More detailed information on the CRS program *can be found here*. Current ratings can be found on the *NC CRS participation map*.

Dare County moved from a Class 8 to a Class 7 in May 2017 by completing several activities to improve their rating. The county amended ordinances (subdivision, zoning, mobile home park, travel trailer park) to require "under construction" elevation certificates, recordation of non-conversion agreements, and flood hazard acknowledgements and disclosures; conducted a Repetitive Loss Area Analysis, and developed a Program for Public Information (PPI) in partnership with the Town of Manteo. The *2009 Dare County Land Use Plan Update* (2010, pp. 181-182) makes it the county's policy to support, as minimum standards, the administration and enforcement of all applicable floodplain management regulations and the NFIP. It also has an implementation strategy designed to administer the county flood ordinance and continue participation in the CRS to reduce flood insurance rates for property owners in unincorporated Dare County.

GETTING MORE OUT OF YOUR PLAN

Hazard mitigation and post-storm disaster recovery plans provide important tools and strategies that communities use to meet safety, economic, environmental, transportation, and quality of life goals (EPA & NOAA 2011, p. 5.). It is important to integrate hazard mitigation and post-storm disaster recovery into the larger context of the plan's development. Building resilience into the plan should be addressed in the initial public engagement process, and coordinated across community departments. Having the relevant

staff members work through a checklist that inventories existing efforts and answers questions about their relationship to each other in building resilience can be useful for reframing issues or putting added emphasis on certain topics to be addressed in the plan (e.g., *New Jersey Office of Coastal Management's Getting to Resilience Checklists*). This requires much more than simply listing projects and priorities from the planning jurisdiction's hazard mitigation plan; instead, it requires thinking comprehensively about the hazards affecting a community, identifying areas and populations that are highly vulnerable physically and/or socially, and then developing a comprehensive set of policies that transcend the different land use elements to minimize these risks. It also involves prioritizing mitigation efforts given resource availability (Schwab 2010). This ensures the plans are pursing complementary goals, objectives, policies, and recommended actions.

Integrating hazards into a plan is the easy part. Putting mitigation into practice is much more difficult. It is common for concerns about hazards to diminish once the immediate threat or response to a disaster has passed (Schwab 2010). However, incorporating the risk of hazards into broader visioning and goal setting and applicable policies and implementation tools such as functional plans (e.g., parks & recreation, open space, etc.), zoning and subdivision ordinances, and the future land use map will continue steering decision makers towards the creation of a disaster resilient community when the importance of these issues wanes (Schwab 2010).

Another way to sustain the focus on creating a disaster resilient community is to incorporate hazard mitigation into the capital improvement program (CIP) and the annual budget process. Hazard mitigation projects can involve significant expenditures designed to reduce risk and promote other policy objectives, such as acquiring open space, improving stormwater drainage systems, or purchasing equipment to enhance emergency response capabilities. The CIP should also include prohibitions against public investments in areas vulnerable to the elevated risks of coastal hazards (e.g., extending a sewer line into a vulnerable undeveloped shoreline area).

Plans should encourage better design concepts that contribute to and enhance resilience across several aspects of a community. The Resilient Design Institute has developed a set of *10 Resilient Design Principles* that describe how buildings, landscapes, communities and regions can be developed or improved to better withstand long-term stressors such as sea level rise as well as major shocks like hurricanes, while maintaining function and desired level or service.

Planning should emphasize the connections between land use and hazards because of the educational value the process provides the public and stakeholders. A focus on hazards and risk during the planning process helps educate future leaders about the importance of these issues and builds support for the broader community goal of developing a disaster resilient community.

Developing a disaster resilient community is just the first step on a longer journey to developing a community that is resilient in many other ways. For example, Norfolk, VA developed a *Norfolk Resilient Strategy* (2015) built around the *City Resilience Framework*. This framework addresses a much broader range of stresses beyond just natural hazards such as high unemployment, insecure municipal finances, economic inequality, poverty, lack of investment, and the lack of a diversified economy. Taking this more holistic view of resilience may be more challenging, but it creates opportunities to strengthen or reform systems that are continually impacted

or degraded by natural hazard events. As these examples demonstrate, promoting disaster resilience is just the first step towards creating a more resilient community that copes and recovers quickly from a wide range of adverse economic, social, or environmental conditions.

Wilmington waterfront

Appendix A

Glossary

This glossary provides definitions for some of the commonly used terms included in the guide. For additional definitions, consult the American Planning Association's A Planners Dictionary (2004).

Accessory dwelling units are units located on the property of a single-family house, either in an attic or over a garage or as a small freestanding building in the back or side yard.

Active recreation is a recreational activity that requires infrastructural facilities and leaves a considerable impact on the environment (e.g., playgrounds, jungle gyms, ball fields, etc.).

Affordable housing are housing units where the occupant is paying no more than 30 percent of gross income for housing costs, including taxes and utilities, thus making it within the means of middle-, moderate-, or low-income families (APA, A Planners Dictionary).

Affordable housing needs assessment is a document designed to better understand the current and future housing needs in a community by analyzing changes in population, the economy, housing costs, and housing conditions.

Annexation is the process by which municipalities extend their municipal services, regulations, and taxing authority to new territories either voluntarily or involuntarily.

Area of environmental concern (AEC) is an area designated to protect land of environmental, social, economic, and esthetic value from unregulated development (e.g., estuaries, coastal wetlands, etc.) pursuant to CAMA.

Build out analysis estimates the amount of development that can occur if all developable land is consumed or converted to residential and other uses based on current or proposed land use regulations.

Business Improvement District (BID) is a tool used for community-based economic development that is funded by an ad valorem tax on property within the district.

Capital improvement plan (CIP) is a document designed to outline the capital projects and their anticipated completion dates, equipment purchases based on the budget, and an evaluation of current and future infrastructural needs.

Charrette is an intensive workshop where the planning team, citizens, and public officials work together over a multi-day period in an intensive fashion to find a solution that has support from all parties.

Citizen advisory committee is a board of citizens appointed by local government officials who provide the citizen's perspective on planning issues by reviewing staff reports, studying critical issues impacting their community, and encouraging more public involvement in the planning process.

Coastal Resources Commission (CRC) is a citizen commission whose members are appointed by the governor, Speaker of the House, and Senate Pro Tempore. The CRC designates areas of environmental concern, adopts rules and policies for coastal development within those areas, and certifies local land use plans.

Commercial node is an area with concentrated commercial development.

Community-based economic development is economic development that promotes, supports and invests in businesses that serve local needs.

Community workshops can be used to engage members of the public who are unwilling or unable to be a part of monthly planning board meetings. The workshops normally address broad issues, but can provide opportunity for deliberation and should be conducted early in the planning process.

Conduit bonds are used to facilitate economic development. It is a type of investment sold by local government where the revenue from the bond is directed at a private entity that uses the money to finance a development project that benefits a community in some way.

Conservation subdivision regulations can leverage private development to permanently protect a portion of the property through a conservation easement. It also allows developers to build homes on smaller, clustered lots in return for a conservation easement on the remainder of the lot, creating a common open space.

Design standards are specific criteria and requirements related to the form and appearance of development within a neighborhood, corridor, special district, or the entire community.

Drainage basins are the areas of land that drain rainwater and snowmelt to a river, lake, estuary, or ocean.

Economic development plan is a community or region wide plan designed to outline ways to attract or capitalize on economic activity.

Endangered species is one that is in imminent danger of extinction throughout all or a significant portion of its range.

Environmentally fragile areas are wetlands, natural heritage areas, areas containing endangered species, prime wildlife habitats, or maritime forests.

Extraterritorial planning jurisdiction is an area adjacent to a community where it can apply its territorial authority.

Floor area ratio (FAR) is the ratio of a building's total floor area to the size of the lot on which it is located.

Farmland protection plan is a plan that outlines goals related to the preservation of farmland within a community.

Focus groups are useful when planners want to engage the public on more specific details of the comprehensive plan, such as parks and recreation or transportation.

Food desert is an area that lacks access to fresh or high-quality food.

Goals are general statements that reflect the desired outcomes that planners and decision makers hope to achieve for a community.

Green businesses are businesses that have a minimized impact on the environment and produce products that are environmentally friendly through sustainable business models and practices.

Greenfield sites are areas of open land or greenspace that are being reviewed for development.

Green infrastructure is a strategically planned and managed network of green open spaces including parks greenways, and protected lands that provide vegetation that captures, stores, and infiltrates runoff in urban settings.

Groundwater is water that is located underneath the land surface.

Groundwater Recharge is when water moves downward, through the soil, and drains into an aquifer. This is the primary method through which water enters an aquifer.

Hazard mitigation plan is a document designed to outline mitigation policies and practices for hazards likely to impact a community (e.g. hurricanes, flooding, fires, etc.) through identifying risks within the community.

Historic Preservation Commission is a community board that designates, preserves and enhances the character of historic districts within a community.

Housing stock is the total number of residential units in an area. It often includes the quality, price, and availability of these units.

Inclusionary zoning can be used to create regulations increasing housing choice by providing the opportunity to construct more diverse and economical housing to meet the needs of low- and moderate-income families (APA, A Planners Dictionary).

Infill development is developing vacant, under-used or run-down buildings or parcels within a community's geographic boundaries.

Land suitability analysis (LSA) is a systematic process utilizing environmental and infrastructure attributes to identify land areas appropriate for development.

Land use models use existing and projected quantitative data combined with economic and social theory to estimate changes in the types and impacts of long-term land uses.

Large-lot zoning is a zoning principle that can be used to protect farmland and forested land by establishing minimum lot size in an effort to limit development density.

Long-range actions are typically implemented within four to seven years or more of the plans adoption and often involve the efforts needed to carry out or implement the mid-range actions once they are initiated. These actions may also involve much more sizable long-term commitment and investments such as the need to expand water, sewer, and transportation infrastructure or to build other public facilities.

Low density zoning is a zoning principle used to preserve rural character by creating lots generally between two and five acres.

Low impact development (LID) is a method of developing that respects the natural topography of site through use of natural features to limit stormwater runoff.

Mid-range actions are typically implemented within two to three years of the plans adoption. These include high priority actions that require additional study or more detailed planning as well as those for which sufficient resources need to be allocated to support implementation efforts.

Multifamily housing is a building that contains separate dwelling units for multiple families, such as an apartment building.

Municipal separate storm sewer system (MS4) is a conveyance or system of conveyances that is owned by a state, city, town, village or other public entity that discharges to waters of the U.S.; is designed or used to collect or convey stormwater; is not a combined sewer; and not part of a sewage treatment plant, or publicly owned treatment works.

Municipal service district is a district within a community or town that receives services other than or beyond what is provided to the rest of the community.

Natural heritage areas are places with important wildlife habitat, rare plants, and areas largely undisturbed by human activity.

Nonpoint source pollution is generated by rainfall or snowmelt moving over and through the ground. As the water moves, it picks up pollutants (e.g., sediment, nutrients, metals, toxins, oil, etc.) and deposits them in a water body.

Objectives represent one or more aspects of a goal and are narrower, precise, measurable, and specific.

Onsite sewage disposal systems are used to collect, treat and release sewage from individual buildings including residences and small office buildings.

Open house is a public engagement method that should be used towards the end of the planning process. It provides an opportunity for professional staff and advisory committee members to share the plan with the public and answer questions.

Open space is land that is generally left free from residential, commercial, and industrial development.

Open space plan can be used by a community to outline goals and objectives for preservation and conservation of open space.

Participatory planning is the theory that the public stands to be impacted a great deal by the planning process, through quality of life and land values, and thus must be involved in creating the comprehensive plan.

Passive recreation is recreation occurring outdoors that has minimal impact on the land, water, or other resources (e.g., hiking, bicycling, boating, dog-walking, etc.).

Peak population consists of the combination of permanent and seasonal residents, as well as the transient visitors within a planning area on a typical day during the height of tourist season.

Permanent population consists of the population that lives in the planning district on a permanent basis and is determined by the number of persons per permanent dwelling unit.

Permanent residents generally reside on a permanent basis or spend a majority of their time living within a planning area.

Place of residence is the location where a person lives or resides, regardless of where they work.

Place of work is the location where an employed person performs his or her job, and where a usually employed person performs the primary job used to determine his/her other economic characteristics such as occupation, industry, and status in employment.

Permanent easement is a tool used for land preservation to restrict the future use or development of property in perpetuity.

Point source pollution is any single identifiable source of pollution from which pollutants are discharged (e.g., pipes, sewer outfalls, smokestacks, etc.).

Policies represent a general rule or set the course of action a community takes to achieve its goals and objectives by guiding decision making and setting parameters for how a program operates.

Present-Use Value (PUV) property tax exclusion is a tax program designed to help preserve agricultural and forest land by deferring property taxes on land owners as long as they use their land for qualifying practices.

Project development financing is when local governments issue debt, or borrow money, to fund capital costs that enable, facilitate, or benefit private development in the project development district. Public debt is secured and repaid using property tax revenue generated by new private investment in the district surrounding the public project.

Public Water Supply Wellfields are areas of rapidly draining sands extending from the earth's surface to a shallow groundwater table that supplies public drinking water.

Resilience is a community's ability to rebound, positively adapt to, or thrive amidst changing conditions or challenges – including disasters and climate change – and maintain quality of life, healthy growth, durable systems, and conservation of resources for present and future generations. (adapted from Colorado's Resiliency Framework)

Saltwater intrusion is the movement of saline water into freshwater aquifers, which can contaminate drinking water supplies.

Scenario planning is a technique whereby different outcomes for the future are developed by comparing different policy frameworks and development patterns.

Seasonal residents are those who reside within the planning area for a period of time during the community's "season", which is usually less than six months. These people often own or rent second homes in the planning area.

Seasonal vacant units are those seasonal housing units intended for occupancy only during certain seasons of the year and are found primarily in resort areas.

Sensitive habitat areas are identified by the North Carolina Natural Heritage Program and are designated for protection of rare species, their habitat, and vital ecological processes.

Sensitivity Analysis is the examination of the level of uncertainty associated with a mathematical calculation or a forecast by changing the data or assumptions used in the calculations (e.g., varying occupancy rates to determine peak population estimates).

Short-range actions are those actions usually implemented within a year of the plan's adoption. These actions are generally high priority and require little additional study or resources to be implemented (e.g., updating policy documents or changing existing ordinances to implement the plan's policies).

Single-family house is a free-standing, detached residential building.

Stakeholder interviews are similar to focus groups in that they can be used by planners to gather more detailed and specific information on topics within the plan.

Storm surge occurs when strong winds push water on shore during a storm causing a rise in seawater level.

Surveys are a method of collecting information from random people, with the goal of extrapolating the results to a larger population. Surveys can be used to gauge preferences, public support levels for policy proposals, and identify problems in the early stages of the planning process.

Tax Increment Financing (TIF) – See Project Development Financing.

Threatened species is one that is likely to become endangered within the foreseeable future.

Transient visitors are generally tourists who visit the planning area for a short period, such as for the day or the weekend, and stay with friends or occupy hotels/motels (e.g., beachgoer, visitor, shopper, etc.).

Unified development ordinance (UDO) is a land development code that includes subdivision, site planning, and zoning controls all in one document (APA, A Planners Dictionary).

Vision statement is a statement used to guide the planning process, balancing aspirational goals for the community with specific ways to achieve these larger goals.

Voluntary Agricultural District (VAD) is a tool used by cities and counties to encourage clustering and preservation of farm and forested land by providing a range of benefits to landowners in return for protecting farm and forested land from future development.

Watershed is an area of land that drains rainwater and snowmelt to a river, lake, estuary, or ocean.

Watershed protection plan is used to systematically address water quality problems in a particular watershed.

Appendix B

CAMA Land Use Plan Matrix

Matrix for Land Use Plan Elements

Matrix for Land Use Plan Elements – 15A NCAC 7B .0702	
	Page Reference(s)
Organization of the Plan	
• Matrix that shows the location of the required elements as set forth in this Rule	
Community Concerns and Aspirations	
• Description of the dominant growth-related conditions that influence land use, development, water quality and other environmental concerns in the planning area	
Description of the land use and development topics most important to the future of the planning area, including:	
• Public Access	
• Land Use Compatibility	
• Infrastructure Carrying Capacity	
• Natural Hazard Areas	
• Water Quality	
Community Vision	
• Description of the general physical appearance and form that represents the local government's plan for the future. It shall include objectives to be achieved by the plan and identify changes that may be needed to achieve the planning vision.	
Existing and Emerging Conditions	
Population, Housing and Economy	
Discussion of the following data and trends:	
• Permanent population growth trends using data from the two most decennial Censuses	
• Current permanent and seasonal population estimates	
• Key population characteristics including age and income	
• Thirty-year projections of permanent and seasonal population in five-year increments	
• Estimate of current housing stock, including permanent and seasonal units, tenure, and types of units (single-family, multifamily, and manufactured)	
• Description of employment by major sectors and community economic activity	
Natural Systems	
Description of natural features in the planning jurisdiction to include:	
• Areas of Environmental Concern (AECs) as set forth in Subchapter 15A NCAC 07H	
• Soil characteristics, including limitations for septic tanks, erodibility, and other factors related to development	
• Environmental Management Commission (EMC) water quality classifications and related use support designations	
• Division of Marine Fisheries (DMF) shellfish growing areas and water quality conditions	
• Flood and other natural hazard areas	
• Storm surge areas	
• Non-coastal wetlands, including forested wetlands, shrub-scrub wetlands and freshwater marshes	
• Water supply watersheds or wellhead protection areas	
• Primary nursery areas	
• Environmentally fragile areas, such as wetlands, natural heritage areas, areas containing endangered species, prime wildlife habitats, or maritime forests	

Natural Systems, contd.	Page Reference(s)
• Additional natural features or conditions identified by the local government	
Environmental Conditions	
Discussion of environmental conditions within the planning jurisdiction to include an assessment of the following conditions and features:	
• Status and changes of surface water quality; including:	
- Impaired streams from the most recent Division of Water Resources (DWR) Basin Planning Branch Reports	
- Clean Water Act 303 (d) List	
- Other comparable data	
• Current situation and trends on permanent and temporary closures of shellfishing waters as determined by the Report of Sanitary Survey by the Shellfish Sanitation and Recreational Water Quality Section of the DMF	
• Areas experiencing chronic wastewater treatment malfunctions	
• Areas with water quality or public health problems related to non-point source pollution	
• Areas subject to recurrent flooding, storm surges and high winds	
• Areas experiencing significant shoreline erosion as evidenced by the presence of threatened structures or public facilities	
• Environmentally fragile areas (as defined in Part (c)(2)(A)(ix) of this Rule) or areas where resources functions are impacted as a result of development	
• Natural resource areas that are being impacted or lost as a result of incompatible development. These may include, but are not limited to the following: coastal wetlands, protected open space, and agricultural land.	
Existing Land Use and Development	
MAP of existing land use patterns	
• Description of the existing land use patterns	
• Estimates of the land area allocated to each land use category	
• Characteristics of each land use category	
MAP of historic, cultural, and scenic areas designated by a state or federal agency or by the local government	
• Descriptions of the historic, cultural and scenic areas	
Community Facilities	
Evaluation of existing and planned capacity, location and adequacy of community facilities to include:	
MAP of existing and planned public and private water supply service areas	
• Description of existing public and private water supply systems to include:	
- Existing condition	
- Existing capacity	
- Documented overflows, bypasses or other problems that may degrade water quality or constitute a threat to public health as documented by the DWR	
- Future water supply needs based on population projections	
MAP of existing and planned public and private wastewater service areas	
• Description of existing public and private wastewater systems to include:	
- Existing condition	
- Existing capacity	
- Documented overflows, bypasses or other problems that may degrade water quality or constitute a threat to public health as documented by the DWR	
- Future wastewater system needs based on population projections	
MAP of existing and planned multimodal transportation systems and port and airport facilities	
• Description of any highway segments deemed by the NC Department of Transportation (NCDOT) as having unacceptable service as documented in the most recent NCDOT Transportation and/or Thoroughfare Plan	

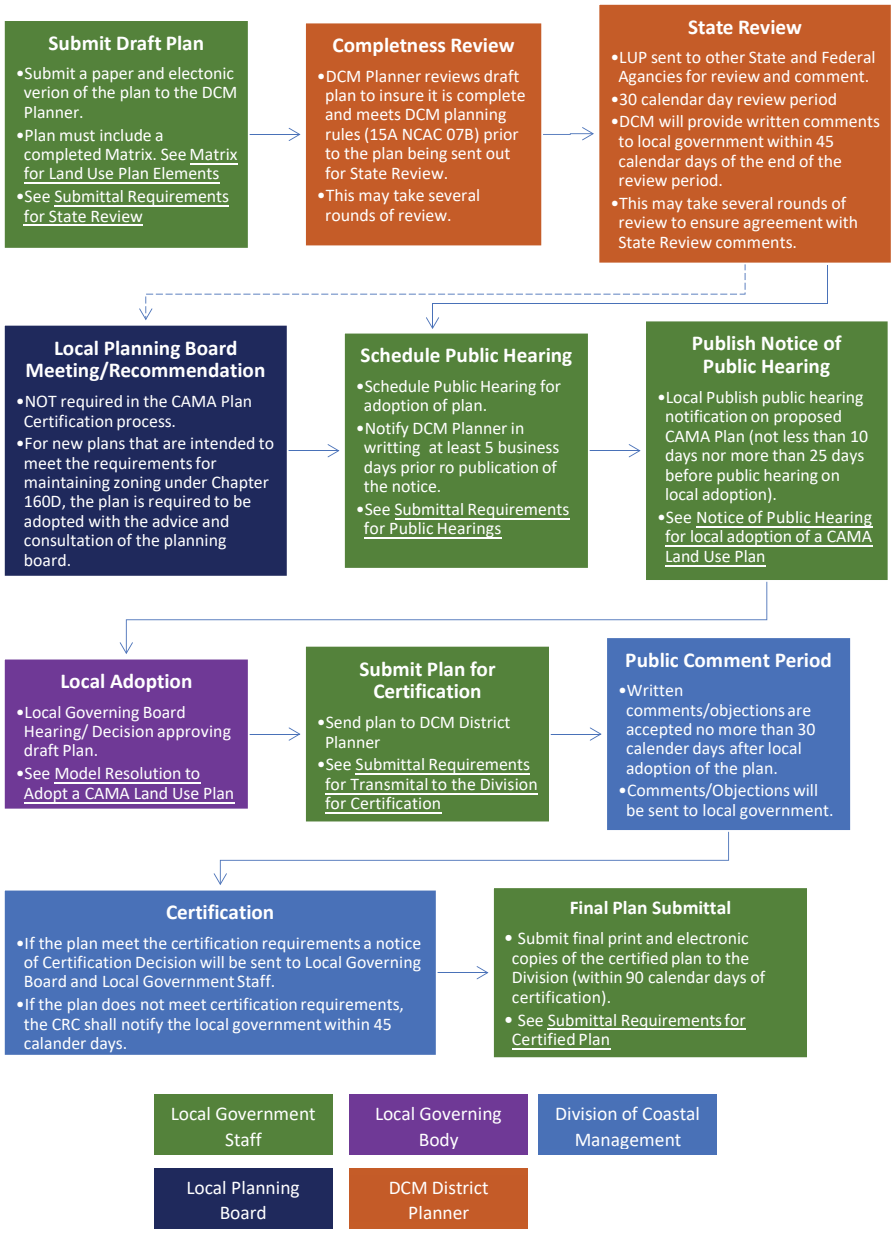
Community Facilities, contd.	Page Reference(s)	
• Description of highway facilities on the current thoroughfare plan or current transportation improvement plan		
• Description of the impact of existing transportation facilities on land use patterns		
• Description of the existing public stormwater management system		
• Identification of existing drainage problems and water quality issues related to point-source discharges of stormwater runoff		
	Policy Citation(s)	**Page Reference(s)**
Future Land Use		
Policies		
• Policies that exceed the use standards and permitting requirements found in Subchapter 7H, State Guidelines for Areas of Environmental Concern		
Policies that address the Coastal Resources Commission's (CRC's) management topics:		
Public Access Management Goal: *Maximize public access to the beaches and the public trust waters of the coastal region.*		
The planning objectives for public access are local government plan policies that:		
• Address access needs and opportunities		
• Identify strategies to develop public access		
• Address provisions for all segments of the community, including persons with disabilities		
• For oceanfront communities, establish access policies for beach areas targeted for nourishment		
Land Use Compatibility Management Goal: *Ensure that development and use of resources or preservation of land balance protection of natural resources and fragile areas with economic development, and avoids risks to public health, safety, and welfare.*		
The planning objectives for land use compatibility are local government plan policies that:		
• Characterize future land use and development patterns		
• Establish mitigation criteria and concepts to minimize conflicts		
Infrastructure Carrying Capacity Management Goal: *Ensure that public infrastructure systems are sized, located, and managed so the quality and productivity of AECs and other fragile areas are protected or restored.*		
The planning objectives for infrastructure carrying capacity are local government plan policies that:		
• Establish service criteria		
• Ensure improvements minimize impacts to AECs and other fragile areas		
Natural Hazard Areas Management Goal: *Conserve and maintain barrier dunes, beaches, floodplains, and other coastal features for their natural storm protection functions and their natural resources giving recognition to public health, safety, and welfare issues.*		
The planning objectives for natural hazard areas are local government plan policies that:		
• Establish mitigation and adaptation concepts and criteria for development and redevelopment, including public facilities		
• Minimize threats to life, property and natural resources resulting from erosion, high winds, storm surge, flooding, or other natural hazards		
Water Quality Management Goal: *Maintain, protect and where possible enhance water quality in all coastal wetlands, rivers, streams, and estuaries.*		
The planning objectives for water quality are local government plan policies that:		
• Establish strategies and practices to prevent or control nonpoint source pollution		
• Establish strategies and practices to maintain or improve water quality		

Future Land Use Map	Page Reference(s)
MAP of future land uses that depicts the policies for growth and development and the desired future patterns of land use and development with consideration given to natural system constraints and infrastructure	
• Descriptions of land uses and development associated with the future land use map designations	
Tools for Managing Development	
• Description of the role of plan policies, including the future land use map, in local decisions regarding land use and development	
• Description of the community's development management program, including local ordinances, codes, and other plans and policies	
Action Plan and Implementation Schedule	
• Description of actions that will be taken by the local government to implement policies that meet the CRC's management topic goals and objectives, specifying fiscal year(s) in which each action is anticipated to start and finish	
• Identification of specific steps the local government plans to take to implement the policies, including adoption and amendment of local ordinances, other plans, and special projects	

Appendix C

CAMA Land Use Plan and Plan Amendment Certification Processes

DCM's Land Use Plan Certification Process



LUP Certification Process – LUP Guide
Updated 9/1/2022

Notice of Public Hearing for local adoption of a CAMA Land Use Plan

Notice is hereby given that the <Local Governing Body> will conduct a public hearing on _____ at _____ PM to review the <Local Government> Coastal Area Management Act (CAMA) Land Use Plan. The meeting will be held at _____. All interested citizens are encouraged to attend.

Following the public hearing, the <Local Governing Body> will consider adoption of the Land Use Plan. Once adopted, the plan will be submitted to the Director of the North Carolina Division of Coastal Management for certification.

Written objections, comments, or statements of support shall be submitted to the Division of Coastal Management's District Planner, <District Planner's name and mailing address> no more than 30 calendar days after local adoption of the plan. Further information can be obtained by contacting the District Planner at <District Planner's phone number>.

Copies of the Land Use Plan are available for review by the public at the <designated county of local government office> _____during normal office hours. The public is encouraged to review the Land Use Plan and to attend the public hearing. For additional information, please contact the Director of the <Local Government> Planning Department at _____.

Tabling a Decision

Occasionally, the local governing body decides to table a decision on the final draft plan perhaps to address concerns brought up at the meeting or to obtain further clarification on an item addressed in the plan. As long as the approved motion to table includes reconsideration at a specified date, time, and location no additional published notices are required.

Model Resolution to Adopt CAMA Land Use Plan

RESOLUTION OF THE <Local Governing Body> OF <Local Government>, NORTH CAROLINA, ADOPTING THE _____PLAN

WHEREAS, from _____ 20** through _____ 20**, the <Local Government> drafted a Coastal Area Management Act (CAMA) Land Use Plan with the assistance of its consultant, <Name of Consultant>, and conducted a series of public workshops and meetings as part of a comprehensive public participation program under the leadership of the <Name of Committee/s> Committee; and

WHEREAS, on _____, the Planning Board recommended approval of the adoption of the draft Plan; and

WHEREAS, the <Local Government> conducted a duly advertised public hearing on the draft Plan at the Regular Meeting of the <Local Governing Body> on _____; and

WHEREAS, at the Regular Meeting on _____the <Local Governing Body> of <Local Government>, North Carolina found the policies and Future Land Use Map in the draft Plan to be consistent with the <Local Government> desired vision for the future and unanimously approved to adopt the draft Plan and

WHEREAS, the adopted Plan will be submitted as required by state law to the District Planner for the Division of Coastal Management under the North Carolina Department of Environmental Quality and forwarded to the Division Director; and

WHEREAS, a review of the adopted Plan by the Coastal Resources Commission will be scheduled; and the CRC will then decide on certification of the locally adopted Plan;

WHEREAS, a certified copy of <Local Government> CAMA Land Use Plan will be forwarded to the Office for Coastal Management for federal approval.

NOW, THEREFORE, BE IT RESOLVED THAT the <Local Governing Body> for <Local Government>, North Carolina has adopted the draft Plan; and

BE IT FURTHER RESOLVED that the <Manager/Administrator> of <Local Government> is hereby authorized to submit the adopted Plan to the State for certification as described above.

Adopted this * day of * 20**.

Submittal Requirements for State Review

The following items are to be submitted to the DCM District Planner:

- A color print copy of the entire draft Plan.
- A digital copy on USB drive of the entire draft Plan. Digital files should be provided in a Word and/or .pdf format and file names should clearly identify file content.
- The draft plan must include a completed Organizational Matrix indicating where the CRC's rules requirements have been met within the plan.

Submittal Requirements for Notifying DCM District Planner about Public Hearing on CAMA Plan

The following items are to be submitted to the DCM District Planner at least 5 business days prior to publication of a public hearing notice:

- Written notice of the public hearing for local adoption.
- A copy of the proposed CAMA Plan.

Submittal Requirements for Transmittal to the Division for Certification

The following items are to be submitted to the DCM District Planner after local adoption of the land use plan adoption of the plan:

- Two (2) color print copies of the locally adopted Land Use Plan. On the cover, include the local adoption date and provide a location to insert a CRC certification date.
- Two (2) USBs that include a digital copy of the local adopted Land Use Plan. Digital files should be provided in a Word and/or .pdf format and file names should clearly identify file content.
- Certified statement of local government adoption action (Resolution of Adoption) with official signature and seal from the local government.
- Affidavit of publication - signed and notarized proof that the notification process was followed per G.S. 113A-110 (to include the not less than 10 days nor more than 25 days' notice in the newspaper and statement of other notices provided) for the local government.

Submittal Requirements for Certified Plan

The following items are to be submitted within 90 calendar days after certification of the Plan:

- A color print copy of the entire Plan with the CRC certification date of the plan added to the cover.
- A digital copy on USB drive of the entire Plan with the CRC certification date of the plan added to the cover. Digital files should be provided in a Word and/or .pdf format and file names should clearly identify file content.

DCM's Land Use Plan Amendment Certification Process

LUP Amendment Certification Process
Update 9/1/2022

Submittal Requirements for Notifying DCM District Planner about Public Hearing on CAMA Plan Amendment

The following items are to be submitted to the DCM District Planner at least 5 business days prior to publication of a public hearing notice:

1. Written notice of the public hearing for local adoption.

2. A copy of the proposed CAMA Plan amendment.

Notice of Public Hearing for amendment to a Certified CAMA Land Use Plan

Amendment of the <Local Government> CAMA Land Use Plan

Amendment of the <Local Government> CAMA Land Use Plan

Notice is hereby given that the <Local Governing Body> will conduct a public hearing on _____ at _____ PM to review an amendment to the <Local Government> Coastal Area Management Act (CAMA) Land Use Plan. The meeting will be held at _____. All interested citizens are encouraged to attend.

Following the public hearing, the <Local Governing Body> will consider adoption of the Land Use Plan amendment. Once adopted, the amended plan will be submitted to the Coastal Resources Commission for certification.

Written objections, comments, or statements of support shall be submitted to the Division of Coastal Management's District Planner, <District Planner's name and mailing address> no more than 30 calendar days after local adoption of the plan amendment. Further information can be obtained by contacting the District Planner at <District Planner's phone number>.

Copies of the Land Use Plan amendment are available for review by the public at the <designated county or local government office> _____ during normal office hours. The public is encouraged to review the Land Use Plan amendment and to attend the public hearing. For additional information, please contact the Director of the <Local Government> Planning Department at _____.

Model Resolution to Adopt CAMA Land Use Plan Amendments

RESOLUTION OF THE <Local Governing Body> OF <Local Government>, NORTH CAROLINA, AUTHORIZING AN AMENDMENT TO _____PLAN

WHEREAS, the <Local Government> desires to amend its CAMA Land Use Plan, specifically the <map /text/ policy> related to _____>, and

WHEREAS, the CAMA Land Use Plan <currently shows/states>; and

WHEREAS, the <Local Government> desires to amend the CAMA Land Use Plan to <show/state>; and

WHEREAS, on _____ the Planning Board recommended _____ of the draft amendment to the CAMA Land Use Plan; and

WHEREAS, the <Local Government> conducted a duly advertised public hearing on the draft amendment to the CAMA Land Use Plan at the Regular Meeting of the <Local Governing Body> on _____; and

WHEREAS, at the Regular Meeting on _____ the <Local Governing Body> of <Local Government>, North Carolina found the draft amendment to be consistent with the <Local Government> desired vision for the future and approved to adopt the draft amendment; and

WHEREAS, the locally adopted amendment will be submitted as required by State law to the District Planner for the Division of Coastal Management under the North Carolina Department of Environmental Quality and forwarded to the Division Director; and

WHEREAS, a review of the locally adopted amendment by the Coastal Resources Commission will be scheduled; and the CRC will then decide on certification of the amendment;

NOW, THEREFORE, BE IT RESOLVED by the <Local Governing Body> of <Local Government>, North Carolina, that <map /text /policy page citations> in the CAMA Land Use Plan be amended as follows:
<amendment>

BE IT FURTHER RESOLVED that the <Local Governing Body> of <Local Government>, North Carolina, has adopted the draft amendment; and

BE IT FURTHER RESOLVED that the < Manager/Administrator> of <Local Government> is hereby authorized to submit the adopted CAMA Land Use Plan amendment to the State for certification as described above.

Adopted this _____ day of _____ 20___.

(for Joint Resolution, have both County and Town attest signatures)

Submittal Requirements for Transmittal to the Division for Certification

The following items are to be submitted to the DCM District Planner after local adoption of the land use plan amendment:

- Two (2) color print copies of the locally adopted Land Use Plan as amended. On the cover, include the local adoption date of the amendment and provide a location to insert a CRC certification date.
- Two (2) USBs that include a digital copy of the local adopted Land Use Plan as amended. Digital files should be provided in a Word and/or .pdf format and file names should clearly identify file content.
- Certified statement of local government adoption action (Resolution of Adoption) with official signature and seal from the local government.
- Affidavit of publication - signed and notarized proof that the notification process was followed per G.S. 113A-110 (to include the not less than 10 days nor more than 25 days' notice in the newspaper and statement of other notices provided) for the local government.

Submittal Requirements for Certified Plan

The following items are to be submitted within 90 calendar days after certification of the Plan amendment:

- A color print copy of the entire Plan with the CRC certification date of the plan amendment added to the cover.
- A digital copy on USB drive of the entire Plan with the CRC certification date of the plan amendment added to the cover. Digital files should be provided in a Word and/or .pdf format and file names should clearly identify file content.

Appendix D

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