



COMPREHENSIVE AND CAMA LAND USE PLAN



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Acknowledgments

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STEWART

Contents

Community Vision and Goals	8
Duck 2027 Goals.....	8
Community Goals.....	9
1: Future Land Use	11
Guiding Growth and Redevelopment	11
Existing Character	12
Overall.....	12
Existing Vernacular.....	12
Future Land Use Map and Character Areas	14
Future Land Use Map.....	14
Future Land Use Character Area Descriptions.....	15
Duck Village	16
Buildings and Parking.....	16
Access and Circulation.....	16
Special Features.....	17
Boardwalk District	18
Buildings and Parking.....	18
Access and Circulation.....	18
Commercial Recreation	20
Buildings and Parking.....	20
Access and Circulation.....	20
Resort Mixed Use	21
Buildings and Parking.....	21
Access and Circulation.....	21

:	
Cottage Residential	22
Buildings and Parking	22
Access and Circulation	22
Compact Residential	23
Buildings and Parking	23
Access and Circulation	23
Conservation & Civic	24
Conservation	24
Unique Partners and Civic Uses	24
2: Tools for Managing Development	27
Management Topics and Recommendations	27
Coastal Resources Commission Goals and Objectives for Land Use Management Topics	28
3: Existing and Emerging Conditions	45
Population, Housing, & Economy	45
Population	45
Housing	48
Local Economy	49
Commuting Patterns	49
Building and Construction	50
Additional Description of Dominant Growth Related Conditions	50
CAMA Priorities, Concerns, and Aspirations	50
Natural Systems	52
Areas of Environmental Concern (AECs)	52
Environmentally Fragile Areas	56
Status	61

Erosion, Soils, and Septic Suitability.....	62
Water Quality.....	64
Hazards, Storm Surge, and Flooding.....	66
Vulnerability and a Changing Climate.....	66
Local Stormwater Flooding Concerns.....	68
Identified Flood Zones.....	68
NOAA Sea Level Rise Projections.....	70
Community Facilities.....	72
Water Supply & Wastewater Systems.....	72
Electrical System.....	74
Parks and Open Space.....	76
Other areas.....	76
Historic, Cultural, & Scenic Areas.....	78
Transportation Systems.....	78
Existing Land Use & Development.....	80
Existing Land Use and Tax Value Patterns.....	80
<i>Appendix A: The Plan Development Process.....</i>	<i>85</i>
Update Process and Schedule.....	85
<i>Appendix B: Stakeholder Interviews.....</i>	<i>89</i>
Interview participation.....	89
Primary stakeholder concerns:.....	90
Stakeholder input.....	90
Walkability.....	90
Programs and Events.....	90
Traffic Congestion.....	90
Public Access to Water.....	90

:

Housing.....	91
Reputation.....	92
Neighborhood Connectivity.....	92
Village Atmosphere.....	92
Coastal Vulnerability	92
Stormwater and flooding.....	93
Parking.....	93
Balancing Needs.....	93
Redevelopment.....	94
Tourism.....	94
Utilities.....	94
USACE Research Facility.....	95
Appendix C: SWOT Analysis.....	97
Strengths, Weaknesses, Opportunities, & Threats (SWOT).....	97
Strengths.....	98
Weaknesses.....	99
Opportunities.....	100
Threats.....	101
Appendix D: Public Survey.....	103
Process and Results.....	103
Residency and Relationship to the Town.....	104
Priorities.....	106
Appendix E: Public Open Houses.....	109
Engagement format and purpose.....	109
Public Open House Meeting #1.....	110
Stormwater and Flooding.....	110
Access and Open Space.....	111

Connectivity and Congestion.....	111
Natural Resources and Parks.....	112
Lived Experience.....	112
Community Vision and Goals.....	113
Public Feedback.....	114
Public Open House Meeting #2.....	120
Appendix F: Existing Plan Review.....	123
Building on previous efforts.....	123
Plan Assessment: Town of Duck 2007 CAMA Land Use Plan.....	124
Plan Assessment: Town of Duck Comprehensive Pedestrian Plan.....	137
Plan Assessment: Town of Duck 2027 Vision.....	141
Plan Assessment: Hazard Mitigation Plan.....	144
Appendix G: Seasonal Population Projection Methodology.....	149
Seasonal Population Estimate.....	149
Guests of Year-Round Residents.....	152
Other Lodging.....	152
Permanent Population Projections.....	152
Peak Population Projection.....	154
Appendix H: Supporting Materials.....	157
Existing Land Use.....	158
Multimodal Transportation System.....	160
FEMA Flood Hazard Areas.....	162
Town Water Supply.....	163
Appendix I: CAMA Land Use Plan Matrix.....	165
CAMA Matrix.....	166-170

Community Vision and Goals

Community Vision Statement

"In 2027, the Town of Duck, North Carolina, is a thriving coastal community. We respect and value our delicate, yet dynamic barrier island environment - clean waters and beaches, maritime forests, wetlands, and dunescapes. Residents and visitors alike are drawn to neighborhoods that reflect our small town atmosphere. Our village is a source of pride, offering diverse experiences by way of a cohesive and eclectic mix of independent businesses, shops, and restaurants. At the hub of our community is the Town Hall and Park, where we interact, share ideas, and build connections. Duck's vitality, founded on grassroots engagement, encourages meaningful participation from all of its stakeholders. Long-term financial stability, sustainable services, measured growth and a focus on quality of life distinguish Duck as a preeminent destination for everyone."



Community Goals

1 Duck and Our Village

Duck Village is the heart of Duck. Our collection of small shops, restaurants, offices, parks and boardwalks together shape the Duck experience. The Village has a continuous coastal residential style that creates an energetic and walkable experience. Our quality of life is enhanced through innovative solutions that preserve the Village's unique character.

2 Enhanced Moveability

Duck is a pedestrian first community that is safe and easy to navigate by walking and cycling. Our multi-use trail, sidewalks, soundside boardwalk, and beach provide a variety of ways to explore and discover Duck. Collaboration with various organizations enables us to optimize our traffic flow in our unique seasonal environment.

3 Vibrant Thriving Business Community

Duck's business community plays an essential role in creating the Duck experience. A high level of collaboration and coordination ensures that we have a vibrant town where each and every individual can enjoy our unique recreation, arts, music, shopping, dining, and lodging.

4 Environmental Stewardship

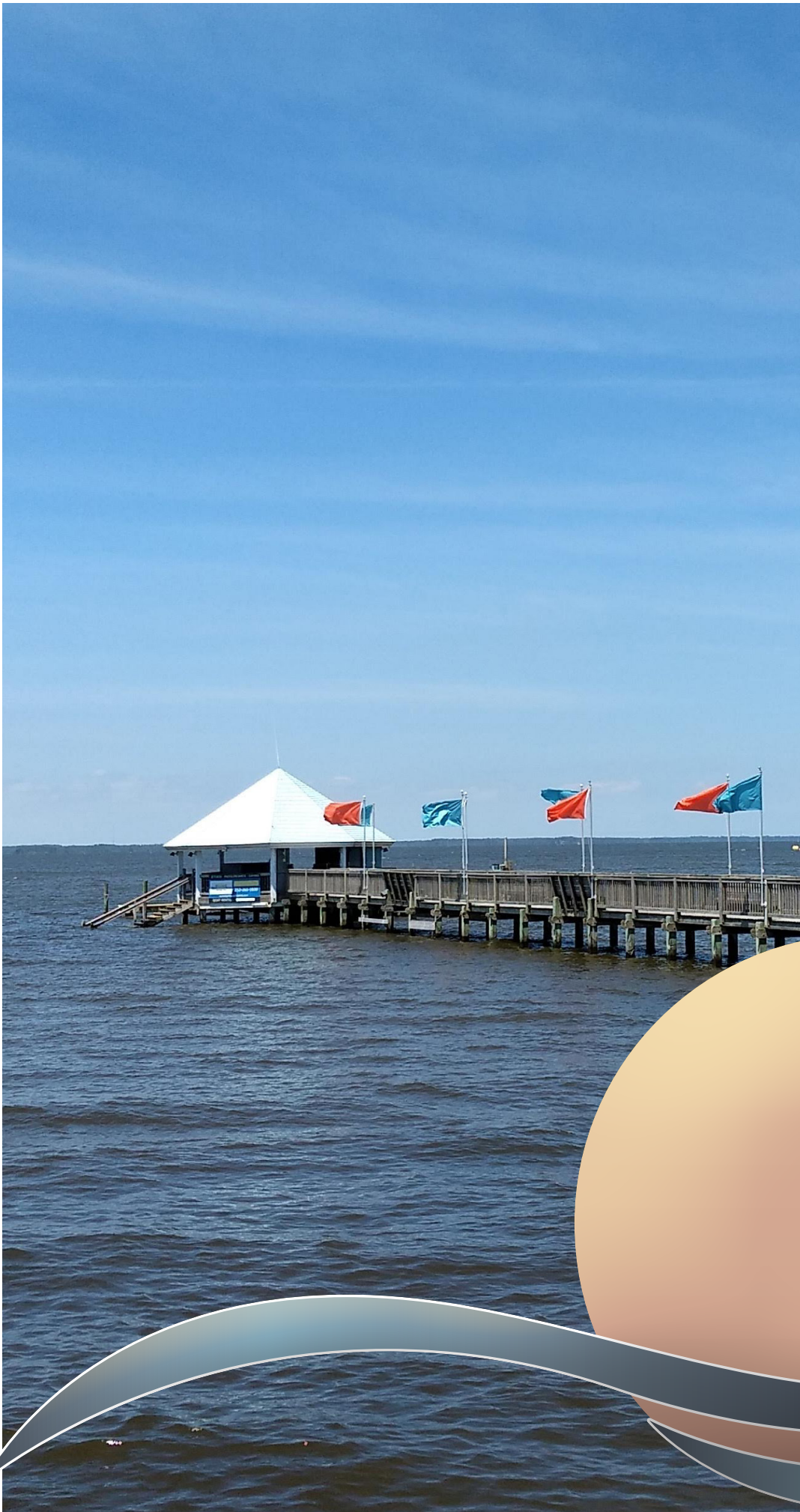
Residents and visitors respect Duck's fragile, extraordinary environment. We protect and preserve opportunities for our residents and visitors to enjoy our ocean, sound, and natural coastal habitats. Our pristine, safe, uninterrupted beaches are our most valuable asset. Our resilience and adaptability, guided by environmental awareness and forward thinking, ensure our sustainability as a community.

5 Active Engaged Community

Duck is built on participation. We are an inclusive community that welcomes and embraces the diversity, talents, and expertise of all of our stakeholders. Pride and ownership is felt by all who live, work, and visit here. People feel connected by a shared motivation to preserve the unique nature of this special place.

6 Responsive Responsible Leadership

Duck maintains a responsive and responsible government. Council, staff, and the community work together to offer high quality services that add value to the Town. We have an educated, experienced and motivated staff to execute the Town's objectives. Duck is an innovative and respected leader within the Outer Banks region. Continuity of leadership preserves our established values and vision.



7



Future Land Use

Guiding Growth and Redevelopment

Community input and preferences, infrastructure investments, environmental constraints, direction from town leadership, and other factors influenced the herein established Future Land Use Map (FLUM) and character areas that will help shape the community's future. The FLUM and character areas represent the community's vision for the future and will be one of the factors that guides decision makers and town staff in future rezoning, land use, or permit issuance decisions. However, the issuance of CAMA and development permits will be based on the adopted standards of the Town Code and the Coastal Resources Commission's (CRC's) permitting rules that implement the Coastal Area Management Act. A FLUM is also valuable for communicating public investment priorities and community norms to private sector investors. This plan is a guidance and policy document, and is not intended to be used as a direct, regulatory tool.

Based on the community's satisfaction with the current balance of uses in town, the environmental constraints, and scarcity of greenfield development opportunities, the future looks very much like the present. Although development of a nature similar to the existing conditions should be expected to be the rule, there are still opportunities to enhance the public realm, improve standards, and elevate the experience of being in Duck. The character areas established here can be used to further refine the land use vernacular and enrich the distinct local, coastal community feel. This chapter begins by defining what is generally found in different areas of town and then describes aspirational goals and standards that can build upon history, past successes, and local flavor to further distinguish the "Duck Experience."

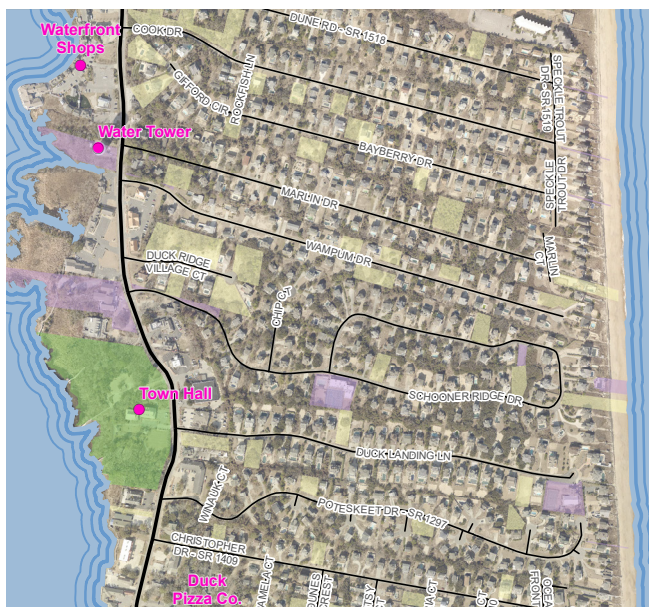
Existing Character

These character areas are described in more detail on the following pages and are meant to provide aspirational qualities for future development decisions in Duck. The associated existing land use category for each character area is included in parenthesis in each section.

Overall

Duck's linear form significantly defines its character. Duck Road runs north-south along the Currituck Sound and is Duck's main commercial road. Most residential roads, which are typically private, are culs-de-sac that extend east from the Highway.

Development and density in Town is limited by zoning restrictions and the dependence on septic for wastewater treatment. With these limitations, development in Duck is generally of a smaller scale than neighboring towns.



Typical development pattern is spurs off of the main spine of Duck Road.

Existing Vernacular

Duck Village

Buildings in Duck Village typify the coastal style popular around town and generally include pitched roofs. Commercial sites are usually one of two types: a single building on a parcel with parking often to the side of the building or between the building and the street, or a multi-building development around shared parking.

Unlike typical town centers, which feature a prominent main street onto which buildings and their tenants face, Duck has a linear center with two fronts: Duck Road and the boardwalk. Buildings on the east side of Duck Road face the road and are sometimes set back by parking. Buildings on the west side of the road often have activity focused on the boardwalk and sound side as well.

Roadside Commercial

These parcels frequently house commercial recreational uses between Duck Road and the Currituck Sound. Buildings are stylishly coastal and are generally no more than two stories high. The structures are set back from the street to allow for access to the water.

The Sanderling Resort

The Sanderling Resort's buildings contain a range of uses and are larger in scale than most of the town's development. Much of the open space contains recreational amenities.

Single Family Residential

In a sense, Duck is a collection of neighborhood associations. Homes on the interior

of the island are sited to take advantage of the street. Along the beaches and the Sound, homes are accessible from the street but front the water, with patios and pools set within the dunes on the ocean side.

Attached Residential

Multifamily housing in Duck varies in scale, typology, and layout. These homes are some of the taller buildings in the Town, reaching four stories in some locations. Developments generally contain several distinct buildings of clustered homes with shared parking.

Accessory Dwellings

There are Accessory Dwelling Units (ADUs) in residential and Village Commercial areas of the town. Many apartments are located above businesses and often function as seasonal or workforce housing.

Recreation

Recreation in Duck mostly revolves around the boardwalk, the outdoors (the beach, sound, parks, cycling, running, walking, boating, etc.), events, the Village shops, and socializing at the many restaurants. A majority of neighborhoods in Duck own and maintain private recreational amenities such as beach access, sound access, swimming pools, tennis courts, and/or clubhouses. In addition, a variety of public access and recreational facilities are permitted throughout the town. Existing facilities include the Town Park, Duck Trail, Soundside Boardwalk, crabbing/fishing piers, and kayak launch.



Town Hall Park



Boardwalk



Watersports on the Sound

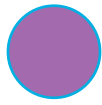
1: Future Land Use

Future Land Use Map and Character Areas

Future Land Use Map

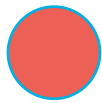


Future Land Use Character Area Descriptions



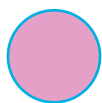
Duck Village

The social and cultural heart of the town is embodied by its commercial coastal village: a mix of pedestrian-oriented uses with civic space and all the retail, services, and recreational amenities of a small coastal town.



Commercial Recreation

These commercial areas cater to destination-oriented traffic and accommodate recreational and tourist-oriented uses as well as restaurants and other social activity.



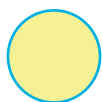
Resort Mixed Use

This distinctive area stretches from ocean to sound and comprises a mix of uses necessary to support a destination resort, including a resort hotel, resort-related offices and services, attached residential, restaurants, recreational amenities and classes, and occasional special events.



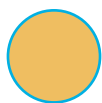
Conservation & Civic

These are largely undeveloped areas that support conservation of natural resources or as refuges for local wildlife. They may also house natural resource-dependent facilities or civic uses. The beach, dunes, and open water in the Atlantic and Sound are included.



Cottage Residential

Single family detached homes are the predominant land cover in town, which includes year-round residences, vacation homes, and shorter term rentals, as well as associated amenities (community facilities, docks, beach walkways, boat launches, etc.) This relaxed residential character remains fairly distinct from neighboring towns by virtue of it's coziness, low density, and abundant natural vegetation.



Compact Residential

These limited areas of attached residential housing have associated open spaces or community amenities and smoothly transition to the surrounding neighborhoods through design and landscaping.



Boardwalk District

The Duck boardwalk is the town's second main street, opening to vibrant storefronts on one side and to beautiful views of the Currituck Sound on the other. The boardwalk is used for exercise, relaxation, shopping, recreation, and more.

Duck Village

General Character

Characterized by a vibrant, walkable pedestrian-friendly experience with inviting facades. Charming storefronts interest people walking by and feature small-scale commercial, retail, and restaurants.



This standalone building with its inviting facade is an example of the Village vernacular.

Buildings and Parking

Buildings in Duck Village should be inviting and not overwhelming to pedestrians. Storefronts should be mostly transparent or have covered porch areas that span the width of the building. Sites should also address their main pedestrian frontage(s), which means both Duck Road and the boardwalk for sites that stretch between the highway and the sound. Parking should be on the side or rear of the site to enhance the pedestrian access and street frontage. Shared parking and cross-access between neighbors enhances the community feel.

Access and Circulation

Duck Road allows vehicular access to businesses and parking, and sidewalks and the boardwalk serve pedestrians. Sidewalks and crosswalk improvements, pedestrian-scale lighting, wayfinding signage, and landscaping slow traffic and enhance safety for pedestrians and cyclists. In addition to convenient connections from the sidewalk to the front

District Characteristics

Building Height	Primarily 1-2 stories, with 3 stories rarely seen except perhaps as a decorative flourish
Parking	Off-street, often communal, located to the side or rear
Pedestrian Access	The sidewalks and boardwalk allow pedestrian access to businesses and North-South travel
Site Elements	Stormwater retention, heritage trees dispersed throughout
Building Placement	Buildings should address their pedestrian frontages

door of each business, all lots in the Village should have sidewalks along all road frontages, including side roads for the length of the lot.

Special Features

With its extensive grounds and activities, Town Hall and the surrounding park function as a recreational centerpiece and gathering area. The playground and rich

woodland offer a respite to pedestrians traveling Duck Road or the boardwalk in the summer.

Sites west of Duck Road connect the village activity with the Currituck Sound and boardwalk. Sites east of Duck Road connect the village activity with the residential neighbors behind them. For these eastern properties, compatibility with neighbors is essential.



Pedestrian improvements in front of Town Hall.



A newer development with multiple buildings that face inward.



The Cotton Gin represents the local architectural typology for standalone buildings.

Boardwalk District

General Character

The west side of Duck Village is defined by the Duck boardwalk, which serves as a north-south pedestrian connection. The boardwalk is the town's second main street, opening to vibrant storefronts and to the Currituck Sound. Any structure or lot adjacent to the boardwalk is included in this overlay-style district. On the boardwalk, pedestrian activity, recreation, natural beauty, and transportation are prioritized. Connections to adjacent businesses add to the boardwalk experience.



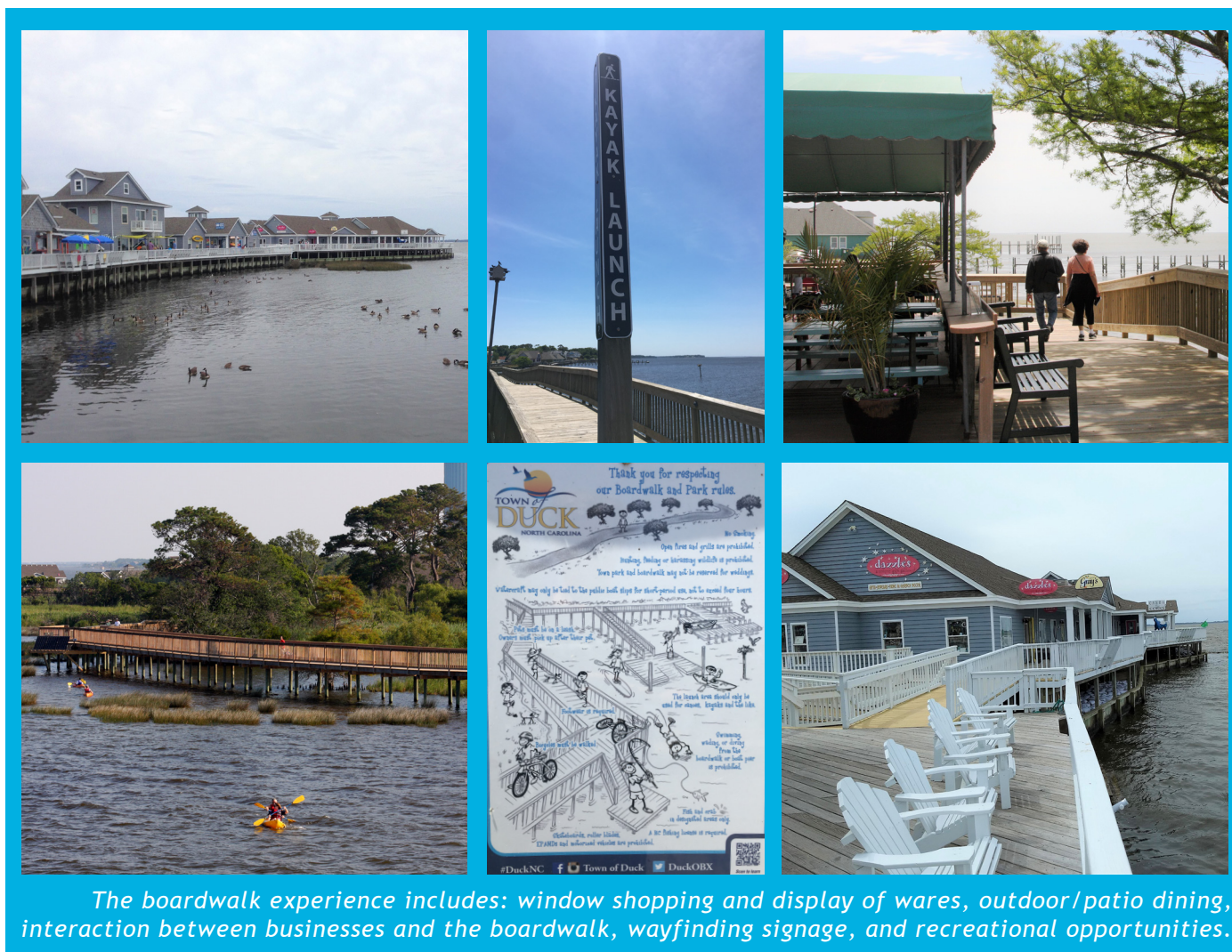
Opportunities exist to increase the connection to businesses fronting on the boardwalk.

Buildings and Parking

The boardwalk serves as a valuable north-south pedestrian path along the Sound. The retail shops and restaurants along it are popular, and should open up to and interact directly with the actual boardwalk. Interaction between buildings and pedestrians should be encouraged through additional connections, outdoor seating, welcoming facades, and other activation strategies. Users generally park at a participating business or walk from their house and then travel along the boardwalk.

Access and Circulation

Some buildings have direct entrances from the boardwalk, but others do not and users must exit the boardwalk to access them. Business should be encouraged to open up directly to the boardwalk which should further blend the public and private realms. Additional wayfinding may be desirable to raise awareness of neighboring businesses and recreational opportunities. There is also an opportunity to increase activity by adding more water-based recreational access such as docks, wildlife viewing, and docking and launch areas.



The boardwalk experience includes: window shopping and display of wares, outdoor/patio dining, interaction between businesses and the boardwalk, wayfinding signage, and recreational opportunities.

District Characteristics

Building Height	1 to 1.5 stories fronting on the boardwalk is pedestrian-scale
Parking	Off-street, at access points; includes bicycle parking
Pedestrian Access	Boardwalk allows access to businesses and N-S travel
Site Elements	Mix of public and semi-public seating with overlooks at areas of interest; connection to the water and recreation
Building Placement	Buildings should include frontage on both the boardwalk and Duck Road; this may require multiple buildings or long building layouts

Commercial Recreation

General Character

These relatively standalone commercial areas are destinations for recreation and dining, including socializing and occasional events. Interaction with the waterfront is a draw and adds to the atmosphere. Depending on the specific activities, compatibility with residential neighbors is important.



Sites usually house multiple uses that may combine restaurant, retail, and/or recreation.

Buildings and Parking

These uses are typically found in buildings of no more than two stories in the coastal style popular throughout town. Structures are generally set back from the street to increase connection to the water, which means parking is usually most visible from the road. Activity is heavier at the water's edge with docks and piers extending into the sound. A mix of uses on one site is advantageous in order to maximize activity and use. Parking is often not shared between neighbors and should be attractively landscaped to maintain curb appeal.

Access and Circulation

Due to the nature of outdoor recreation in Duck, these lots typically front the water on one side and are accessible by automobile on the other. The properties have large parking lots that allow plenty of parking for users. Boat access may also be available.

District Characteristics

Building Height	Most are 2 stories, with few higher
Parking	Off-street
Pedestrian Access	Connections should be required to the street and encouraged to neighboring nonresidential sites
Site Elements	Landscaping should soften surface parking, and buffers are required adjacent to residential neighbors
Building Placement	Varies with lot orientation, but generally water-oriented

Resort Mixed Use

General Character

This distinctive node stretches from ocean to sound and comprises a mix of uses necessary to support a destination resort, including a resort hotel, resort-related offices and services, attached residential, restaurant(s), and recreational amenities. The single ownership, quality of operations, and distinct brand make it a unique site.

Associated ELU Category:
Commercial or mixed use



The Sanderling Resort is a well-known coastal vacation destination and resort community.

Buildings and Parking

These buildings house a range of uses and are larger in scale than most buildings in town. Hotel buildings reach up to four stories in height, with restaurants and other commercial structures generally at a lower height. Buildings and signage are visually cohesive thanks in part to common ownership, but sites vary in uses and also massing. Parking is often shared, with significant overflow available at certain times of the year.

Access and Circulation

Buildings are accessed from off-street parking lots, but pedestrians can also enter from the beach or sidewalk. Buildings are separated from the street by parking and, at times, landscaping. Development is typically interior-facing and self-contained. Landscaping buffers adjacent single family residential neighbors. Interactions between adjacent non-residential uses should be facilitated by a well-connected sidewalk network.

District Characteristics

Building Height	Up to 4 stories
Parking	Off-street, with some shared parking
Pedestrian Access	Internally-oriented, with some cross- and external-connectivity
Site Elements	Amenities for outdoor recreation; ample landscaping and external buffers; shared stormwater management possible
Building Placement	Varies, but typically focused inward and buffered from the street and neighbors

Cottage Residential

General Character

The counterpoints to the active Village are the relaxed single family residential neighborhoods that include year-round, vacation, and shorter term rentals. Character is maintained by community norms, zoning controls, neighborhood covenants, and other physical limitations. These neighborhoods encourage people to walk for recreation or transportation.

Associated ELU category: Single Family Residential



Buildings and Parking

These single-family homes generally contain 2-3 stories elevated over a parking area. Lots vary in size but are usually uniform on a street with homes set back from the street. Common architectural features include porches that span the width of the home and shingle or lap siding. Homes are oriented toward the water where possible. Buildings are separated by relatively narrow side setbacks. Lot coverage and scale are closely regulated by the town as well as physical septic limitations.

Access and Circulation

This style of development is typically found on the side roads to Duck Road. Streets are low-speed, mostly privately owned and terminate in culs-de-sac. Due to low amounts of vehicular traffic, sidewalks are unnecessary and streets commonly feature beach access at their terminus. Connectivity could be improved by providing voluntary bicycle and pedestrian connections between adjacent neighborhoods.

District Characteristics

Building Height	2-3 stories max., typically with surface parking underneath
Parking	Off-street, typically in front of or underneath the structure
Pedestrian Access	Individual entrances; occasional connections to adjacent neighborhoods
Site Elements	Typical single family residential elements; stormwater should be contained on-site; natural vegetation retained
Building Placement	Typically 25 feet from street, with setback yards on all sides

Compact Residential

General Character
 Attached residential living with shared parking, stormwater areas, open spaces, or neighborhood recreational facilities. These quaint multi-family areas are attractively landscaped and seem almost like villages nestled amongst the dunes.

Associated ELU category:
 Multifamily Residential

Access and Circulation

Future redevelopment may benefit from orienting the homes toward the road in order to allow ease of access for all users. Sites should utilize coordinated stormwater management to avoid unnecessary flooding. Connectivity to adjacent neighbors should be integrated into site design for cyclists and pedestrians. Currently, additional vehicular connections between neighborhoods are not desired.

Buildings and Parking

Most multifamily developments in Duck blend in with the prominent coastal style of the town, albeit at a larger scale. Existing developments effectively break up the larger massing with articulated facades and decks that mimic those found on single family homes. The clusters of homes lend themselves to attractive open spaces around the dwellings.



District Characteristics	
Building Height	2-3 stories
Parking	Off-street, shared or unit-designated parking
Pedestrian Access	Individual entrances, accessed from parking area
Site Elements	Attractive landscaping, stormwater retention, and resident recreational amenities like pools and tennis courts
Building Placement	Homes are clustered around shared parking areas and do not necessarily address the street

Conservation & Civic

General Character

These are largely undeveloped areas that support conservation of natural resources or as refuges for local wildlife. They may also house natural resource-dependent facilities or civic uses. The beach, dunes, and open water in the Atlantic and Sound are included.

Associated ELU category: Public

Conservation

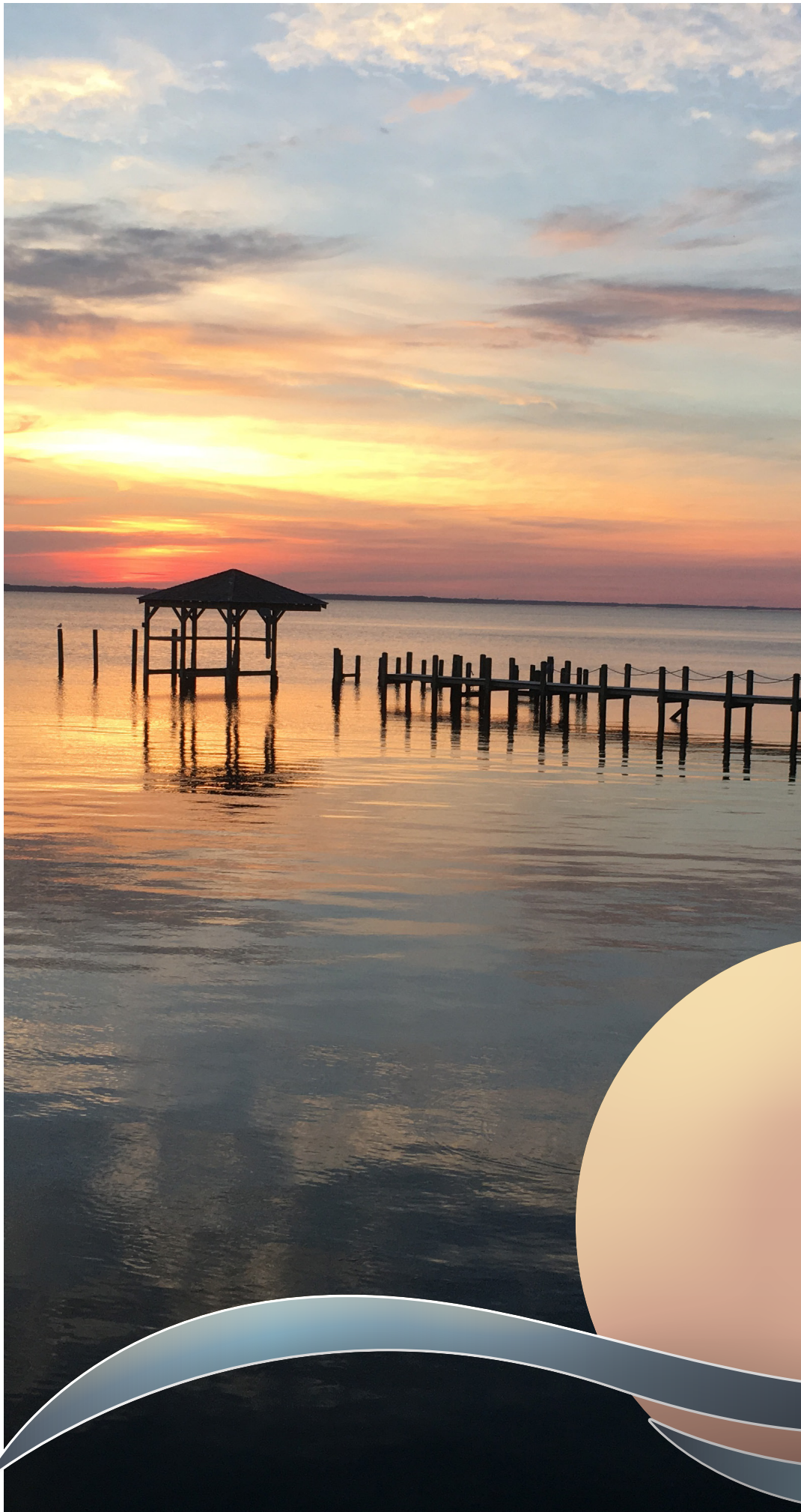
The economy and lifestyle of Duck relies heavily on the natural environment. Rising seas, storms, and erosion threaten the shores from both sides. Conservation or restoration of these precious natural assets is essential to the quality of life in Duck. Coordinated effort can potentially help secure these assets for future generations. In turn, caring for and restoring the beach and sound can also help protect the built environment.

Unique Partners and Civic Uses

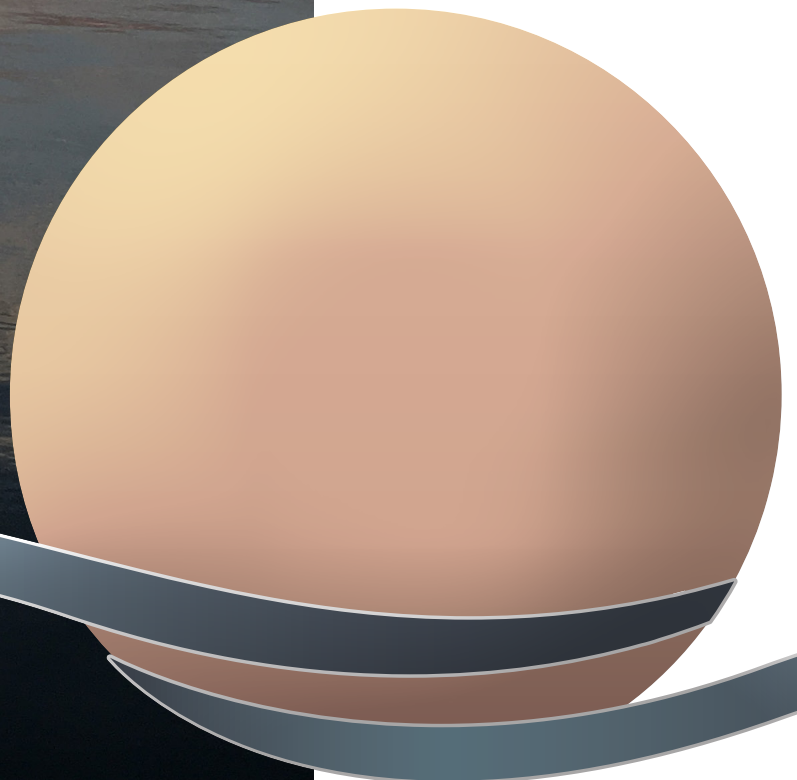
The U.S. Army Corps of Engineers' (USACE) only coastal Atlantic research facility and associated researchers are housed in the middle of town. Continuing to protect this area's integrity and primarily natural condition helps support the USACE mission. This prime conservation land also houses the Town's Fire and Police Departments.



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Tools for Managing Development

Management Topics and Recommendations

The Coastal Resources Commission (CRC) outlines five Land Use Plan Management Topics that must be addressed in a Coastal Area Management Act (CAMA) land use plan, including Public Access, Land Use Compatibility, Infrastructure Carrying Capacity, Natural Hazard Areas, and Water Quality. A CAMA-compliant land use plan must address these management topics to ensure that plans support the goals of the CRC. Each CAMA-required management topic includes a Management Goal and a Planning Objective, which are specified in the state statutes governing land use planning in coastal communities, followed by recommendations for future action. Some recommendations may align with more than one management topic.

A CAMA land use plan also affords the opportunity for a local government to address areas or issues of local concern, which may be asset-based, programmatic, regulatory, geographic, or otherwise. These issues were identified during the land use plan development process and are included herein. The issues do not necessarily directly align with the CAMA management topic structure, but are locally important nonetheless. These recommendations are not required to have associated timelines for completion or implementation, although in some cases these may be provided. Not all of the recommendations contain specific action items, but that should not be perceived as any less a call to action. In addition, not all of the recommendations outlined herein are immediately ripe for implementation, and (as with the Future Land Use Map) local discretion and leadership will determine priorities and timelines. Policies that are not able to be implemented immediately will guide future development decisions on the Town level, so that all future development will bring the reality of Duck closer to the vision. While the FLUM and policies are intended to provide guidance during land use decisions, the issuance of CAMA and development permits will be based on adopted standards in the Town Code and the Coastal Resources Commission's (CRC's) permitting rules that implement the Coastal Area Management Act, per Chapter 154 of the Town Code.

In the following pages, policies and implementation steps are identified by the following:

- (P) - policy
- (I) - implementation step

2: Tools for Managing Development

Coastal Resources Commission Goals and Objectives for Land Use Management Topics

The following management goals and planning objectives of the Coastal Resources Commission are required to be identified in CAMA Land Use Plan management recommendations, even though these are not necessarily higher order or exclusive of the community's other goals. They reflect the community's concerns and aspirations for each topic. Since this document is also a Comprehensive Plan, not all recommendations herein are directly related to CRC management topics. This plan is a guidance and policy document, and is not intended to be used as a direct, regulatory tool.

Goals for: Land Use Compatibility (LUC)

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.

Planning Objectives: The plan shall include policies that characterize future land use development patterns and establish mitigation concepts to minimize conflicts.

Goals for: Natural Hazard Areas (NHA)

Management Goal: Conserve and maintain the barrier dune system, 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.

Planning Objectives: The plan shall include policies that establish mitigation and adaptation concepts and criteria for development and redevelopment, including public facilities, and that minimize threats to life, property, and natural resources resulting from erosion, high winds, storm surge, flooding, or other natural hazards.



Goals for:

Infrastructure Carrying Capacity (ICC)

Management 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.

Planning Objectives: The plan shall include policies that establish service criteria and ensure improvements minimize impacts to AECs and other fragile areas.

Goals for:

Public Access (PA)

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

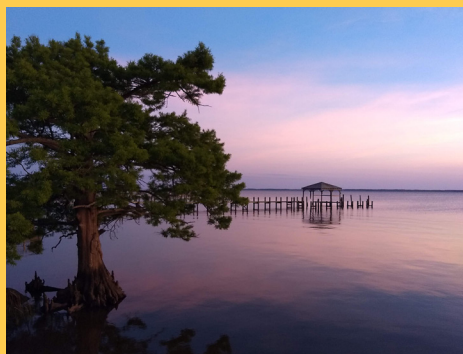
Planning Objectives: The plan shall include policies that address access needs and opportunities, with strategies to develop public access and provisions for all segments of the community, including persons with disabilities. Oceanfront communities shall establish access policies for beach areas targeted for nourishment.

Goals for:

Water Quality (WC)

Management Goal: Maintain, protect, and where possible enhance water quality in coastal wetlands, oceans, and estuaries.

Planning Objectives: The plan shall include policies that establish strategies and practices to prevent or control non-point source pollution and maintain or improve water quality.



2: Tools for Managing Development

1: Preserve, protect, and enhance the Atlantic Ocean Shoreline and ensure future generations are able to enjoy its beauty and bounty and can continue to use the beach and water for active and passive recreation and leisure activities.

- 1.1: Remain open to partnerships and opportunities for increasing public access to the ocean. (P, I)
- 1.2: Renourish and maintain the beach. (P, I)
- 1.3: Preserve the natural value and ecosystem services of the beach and dunes. (P, I)
 - 1.3.1: Conserve and maintain barrier dunes, beaches, and other coastal features for their natural storm protection functions and their innate beauty and recreational value. (P, I)

Discussion: This will require partnering with willing HOAs or other private property owners, seeking assistance from county, state, or federal government, or encouraging third-party partnerships that enhance beach access for homeowners, renters, or vacationers.

Discussion: Continue to evaluate the necessity of and opportunities for beach nourishment, renourishment and continue to balance the distribution of proportional costs based upon proportional benefits.

Discussion: These areas benefit from sand fencing, dune plantings and dune restoration, and exploring alternatives for stormwater management.

Relevant CAMA Land Use Management Topics and Implementation Goal						
Policy or Action	PA	LUC	ICC	NHA	WQ	Time frame
1.1	X					O
1.2	X					O, 2023
1.3		X			X	O
1.3.1				X		A
1.3.2		X		X		O
1.3.3		X				O

O - Ongoing
 A - Annual
 Year - Anticipated fiscal year to begin (2023 = FY 2022-2023)
 O+Year - Ongoing Effort with a projected fiscal year for the next significant project

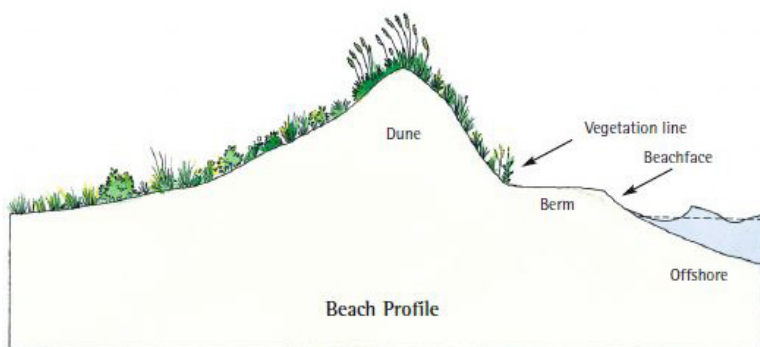


Sand fencing and dune plantings help trap windblown sand and rebuild dunes.

- 1.3.2: Protect sea turtles and other aquatic, amphibious, and beach-reliant animals and their habitat. (P, I)
- 1.3.3: Maintain reasonable limitations on beach driving. (P)

Discussion: Continue to protect the beach for sea turtle nesting habitat by implementing best practices, including but not limited to timing of beach nourishment activities, maintenance of native dune vegetation, restrictions on beachward artificial lighting, minimization of human interference in nesting behaviors, etc.

Discussion: Recreational beach driving is not compatible with other uses of the beach at certain times of the year, including some recreational uses (sunbathing, walking, etc.) and environmental uses (sea turtle nesting, dune grass restoration, beach nourishment, etc.). Minimal use of low-impact vehicles (e.g. – four wheelers) by town staff or emergency services for maintenance or health/safety concerns is necessary year-round. The USACE may also continue to use vehicles on its stretch of beach for activities related to its mission.



Dunes help protect from damaging storm-driven waves, and are built through the complex interactions of sand, water, and wind.

Image from: The Dune Book, NC Sea Grant, 2003.

*"Sand dunes have repeatedly proven to provide protection from waves and storm-induced erosion during infrequent but severe storms such as hurricanes."
- The Dune Book, NC Sea Grant, 2003.*

2: Tools for Managing Development

2: Preserve, protect, and restore the Currituck Sound shoreline and ensure future generations are able to enjoy its beauty and ecosystem services.

•2.1: Conserve and maintain the wetlands, and other coastal features for their natural storm protection functions, water quality benefits, habitat value, innate beauty, and recreational value. (P, I)

•2.1.1: Pursue efforts to restore eroded portions on the coastline of the Currituck Sound to enhance buffering of storm- and wind-driven waves, reduce erosive forces, increase stormwater runoff filtration, improve water quality, and otherwise enhance coastal habitat. (P, I)

•2.2: Enhance the Duck Boardwalk and its relationship to the Currituck Sound (P, I)

•2.2.1: Explore opportunities to extend the pedestrian connection northward to the next commercial cluster. (P, I)

•2.2.2: Explore opportunities to increase the number of pedestrian access points between the Duck Road sidewalk and the boardwalk. (P, I)

•2.2.3: Add new connections between adjacent businesses and the Duck Boardwalk. (P)

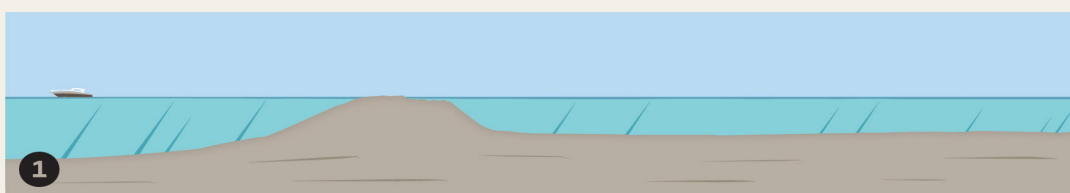
•2.2.4: Add new kayak launches or boat docking opportunities along the Boardwalk. (P, I)

Discussion: Shoreline erosion on the sound side of Duck has resulted in the loss of habitat as well as storm-buffering wetlands and uplands. The future of both residential and commercial properties along the sound may be brightened by the addition of storm-mitigation structures and coastline restorations including options such as breakwaters (living or structural), wetland restoration, backfilling, bulkheads, or other measures. These efforts must be coordinated with other jurisdictions having authority, such as the NC Division of Coastal Management and the NC Division of Marine Fisheries. The recent beach renourishment project can serve as an example when determining cost-sharing and participation for affected property owners.

Relevant CAMA Land Use Management Topics and Implementation Goal						
Policy or Action	PA	LUC	ICC	NHA	WQ	Time frame
2.1		X		X	X	0
2.1.1		X		X	X	0, 2023
2.2	X	X				0
2.2.1	X	X				2021
2.2.2	X	X				0
2.2.3	X	X				0
2.2.4	X	X				0

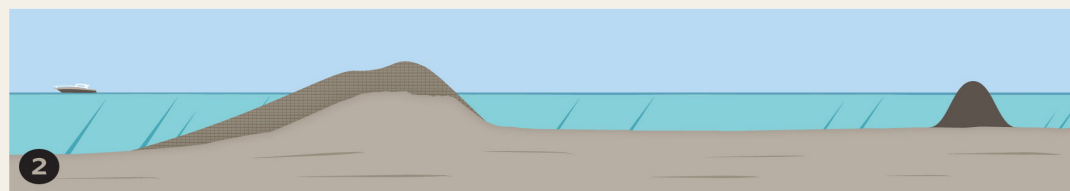


Discussion: Restoration on the Currituck Sound might involve natural wave breaks or living shorelines with backfilled coastal marsh. This would replace wetlands previously lost to erosion, and could also treat stormwater runoff from roads and neighborhoods. The resultant increased water quality would benefit submerged ecosystems and habitat, including submerged aquatic vegetation.



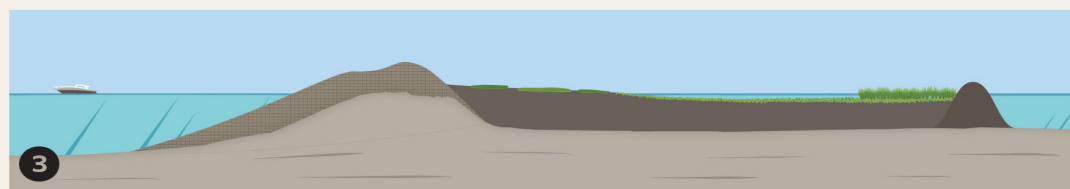
1

In many instances a barrier island has eroded away to little more than a sand bar. The dunes have disappeared, and little, if any, vegetation remains.



2

Sand is pumped in to build beach and dune, and a temporary dike is installed to contain the marsh on the coastal side (right) of the island until it fills in naturally.



3

Muddy sediment is pumped in to create the back marsh, and then grasses and aquatic vegetation are planted.

*Rebuilding coastal marsh may require filling some open water habitat, but resultant marshland would provide coastal habitat and storm-protection ecosystem services.
Source: www.audubon.org/magazine/fall-2017/louisiana-restoring-its-barrier-islands-defend*

2: Tools for Managing Development

- 2.2.5: Explore opportunities to add other nature-compatible user amenities such as outdoor seating, shade structures, wayfinding signage, scenic views, and other focal points along the boardwalk. (P, I)

Discussion: Animals associated with maritime forests, such as the northern oak hairstreak butterfly, will only thrive if maritime forests are fully protected. This habitat type has been so impacted by development that the only remaining viable conservation strategy is to protect it wherever it still occurs.

3: Preserve and protect terrestrial ecosystems.

- 3.1: Preserve and protect remaining stands of intact maritime forests. (P)

- 3.2: Continue tree preservation and landscaping site development standards. (P)

Discussion: Vegetation helps reduce stormwater flooding and helps treat stormwater. It also improves air quality by trapping dust, sand, and other airborne particles.

- 3.2.1: Implement best practices for fire and storm safety in site development and neighborhood design requirements that also balance with the benefits of native vegetation. (P)

- 3.2.2: Provide opportunities to educate the public about the variety and importance of natural ecosystems. (P, I)

Relevant CAMA Land Use Management Topics and Implementation Goals						
Policy or Action	PA	LUC	ICC	NHA	WQ	Time frame
2.2.5	X	X	X			2023
3.1		X		X		O
3.2		X				
3.2.1		X		X	X	2021
3.2.2						A
4.1		X				
4.1.1		X		X		O
4.1.2		X		X		O, 2020
4.2			X			O, 2020
4.3		X				
4.3.1		X				O
4.3.2		X				O
4.3.3		X	X			2020

4: Guide the character, location, and type of development and activity in town to reinforce the “Duck Experience”.

•4.1: Implement the Future Land Use Map and character areas. (P, I)

- 4.1.1: Review the Future Land Use Map when deciding rezoning decisions and when issuing permits. (P, I)

- 4.1.2: Review existing zoning districts, dimensional standards, and land development regulations for the potential to implement character area recommendations. (P)

•4.2: Ensure that development of land minimizes negative direct and secondary environmental impacts, avoids risks to public health, safety, and welfare and is consistent with the carrying capacity of the land. (P, I)

•4.3: Enhance the character and success of Duck Village and commercial areas. (P)

- 4.3.1: Support the development of small, specialty-type shops and the vitality of existing, local businesses. (P)

- 4.3.2: Deter adult- or sexually-oriented businesses that would harm the family-oriented character of the town. (P)

- 4.3.3: Work with local businesses and redevelopment projects to coordinate adequate (and sometimes shared) parking and loading/off-loading areas. (P)

Discussion: The Future Land Use Map (FLUM) and character areas represent the community's vision for guiding rezoning and land use decisions. It is important to regularly review and update zoning districts and development regulations, policies, partnerships, and incentives to help realize this community vision. In all cases, public involvement and restraint are advisable in rezoning (especially upzoning) any properties. Large-scale remapping and communitywide-, districtwide-, or leapfrog-rezonings are all inadvisable. Also inadvisable is any excessive lengthening of the commercial areas along Duck Road, which can lead to a strip development condition that will dilute the village feel and degrade the Duck Experience.



Walkable, local shops are the lifeblood of the Duck Village Experience.

2: Tools for Managing Development

- 4.3.4: Refine the Duck Village aesthetic through public investments and meaningful, objective, and administratively-administered standards and incentives. (P)
- 4.3.5: Coordinate with the Sanderling Resort to create a distinct, pedestrian-friendly commercial and mixed use node that reinforces local character, history, and current user needs. Coordinate with other commercial uses to enhance access and appearance. (P, I)
- 4.3.6: Seek opportunities to provide workforce housing at modest scale in commercial and attached residential areas of Duck while minimizing impacts on adjoining residential neighborhoods. (P)



Continue to increase pedestrian access, circulation networks, safety, and comfort.

- 4.4: Encourage and provide high quality, event programming at Duck Town Hall, Duck Town Park, and Town Green and amphitheater. (P)

5: Protect and preserve Duck’s coastal residential character.

- 5.1: Closely protect the character of existing single family neighborhoods as well as multi-family enclaves through the adoption and enforcement of appropriate development standards. (P, I)
- 5.2: Enhance the town’s reputation as a multi-generational, travel-and-recreate tourist destination, with a unique, small-town, neighborhood feel. (P)
- 5.3: Remain open to participating in voluntary connections between neighborhoods for pedestrians, cyclists, and small emergency service vehicles (e.g - 4-wheelers, not fire trucks). (P)

Relevant CAMA Land Use Management Topics and Implementation Goals						
Policy or Action	PA	LUC	ICC	NHA	WQ	Time frame
4.3.4		X				O, 2020
4.3.5		X				O
4.3.6						O, 2021
4.4						A, 2020
5.1						O
5.2						O
5.3						O
5.4						O
6.1			X	X		A
6.2			X		X	O
6.3			X		X	O
6.4					X	O
7.1				X		O, 2020

- 5.4: Support legislation providing local governments with tools to protect and enhance the scale and character of development in Duck. (P, I)

6: Engage in efforts to improve local flooding and stormwater management.

- 6.1: Develop solutions to flooding and stormwater management along Duck Road and throughout the town to ensure safe public access. (P, I)
- 6.2: Coordinate with and reduce barriers for residents and outside agencies trying to address local flooding and stormwater concerns. (P, I)
- 6.3: Ensure any stormwater or flooding solutions do not negatively impact water quality or negatively impact shared resources such as the beach. (P, I)
- 6.4: Reduce runoff through minimizing impervious surface coverage, encouraging tree preservation, and accommodating low impact development solutions to stormwater management. (P, I)

7: Improve the community's resiliency to rising seas and changing climate.

- 7.1: Evaluate existing freeboard requirements and other development standards and determine potential benefits of increasing them. (P, I)

Discussion: Some neighborhoods or individual lots experience temporary flooding during high intensity rain events and/or when the local water table is high. The Town has previously worked with NCDOT to address flooding concerns along Duck Road, which is the spine for all local and thru traffic, even though the Town does not own any right-of-way. The Town should encourage stormwater solutions pioneered by homeowners or neighborhoods, and may choose to partner or assist based on the merits of each individual case.



Landscaped retention ponds and swales collect and treat stormwater and can also function as parks or amenities.

Existing freeboard requirements for structure elevation should be evaluated to determine if it is possible to increase the safety factor while still balancing concerns about neighborhood character and maximum structure heights. As seas continue to rise, it is likely that current structure elevation standards will need to be revised.

2: Tools for Managing Development

- 7.2: Develop spatial projections for future, expanded floodplains and modify local regulations to address development and safety standards in these areas. (P, I)
- 7.3: Create a Climate Adaptation Plan, including explicit identification and assessment of vulnerabilities, prioritization of adaptation/mitigation projects and actions (with probable costs), and establishment of timelines for implementation. (P, I)
- 7.4: Coordinate with Dare County to explore community-wide septic system and drainfield monitoring, remediation, and continuity of operations planning. (P, I)

Discussion: As seas continue to rise, floodplains will expand past their current boundaries and currently unregulated structures may become vulnerable to flood events or wind-driven waves. Choosing a relevant time-horizon and using best available sea rise projections, modeling for expanded floodplains can be performed that will give a proactive estimate of which properties and structures can be expected to be impacted. Adopting enhanced elevation criteria for these anticipated future floodplain areas can increase the lifespan and safety of structures.

Currently identified County priorities:

- » Elevation of portions of NC 12
- » Identification of low-lying septic fields and structures subject to future inundation or failure and planning for retirement, relocation, or remediation
- » Mitigation of erosion and storm impacts on both the beach and sound
- » Mitigation and planning for higher intensity rainfall events and associated flooding

Discussion: As seas rise, some septic fields will begin to fail, with negative impacts to the served structures as well as local water quality. Establishing an up-to-date monitoring program can ensure these facilities do not degrade local water quality.

Relevant CAMA Land Use Management Topics and Implementation Goal						
Policy or Action	PA	LUC	ICC	NHA	WQ	Time Frame
7.2			X	X		2020
7.3		X	X	X		2025
7.4			X		X	2030
7.5		X		X		0
7.5.1			X	X		2030
7.5.2			X	X		0, 2020

•7.5: Adapt to rising seas.

•7.5.1: Research and adopt an anticipated level of sea rise for future years relevant to development projects of varying time horizons (e.g. - 20 years, 50 years, 100 years). (P, I)

•7.5.2: Update regulatory standards for existing and proposed development to meet or exceed associated performance criteria. (P, I)

Discussion: Development that is permitted today may become unsafe or otherwise compromised as seas continue to rise in the future. Identifying the projected lifespan of different types of development and preparing these structures to remain viable throughout their lifespan can increase future resiliency and reduce future losses and service interruptions.

Resilient regulation

When renovating, maintaining, or building new infrastructure, consideration should be given to the conditions these structures will have to endure throughout their lifespans. Duck should evaluate existing development standards using NOAA's sea level rise projections and modify the town's development regulations to require additional elevation based on the anticipated lifespan of the investment.

Example of additional elevation for structures and infrastructure in order to mitigate the projected impacts of Sea Level Rise (SLR)

Infrastructure lifespan and anticipated SLR	Project type	Examples of infrastructure or site elements that should be elevated, enhanced, or armored
Present day to 2040 or 1.74 feet of SLR	Temporary or short-lifespan components and finishings	<ul style="list-style-type: none"> • Asphalt pavement, pavers, ROW finishes • Trees, plantings, green infrastructure, and LID site elements • Street furniture, benches, trash cans, etc. • Temporary buildings • Storage facilities
2040 to 2060 or 3.05 feet of SLR	Moderate lifespan facility improvements and components on a regular replacement schedule	<ul style="list-style-type: none"> • Electrical, HVAC, and mechanical components, compressors, lifts, pumps, etc. • Concrete paving, retaining walls, culverts • Outdoor recreational facilities • Emergency energy generation equipment • Stormwater detention facilities
2060-2100+ or 6.76 feet of SLR	Long-lived buildings and infrastructure and other assets that cannot be relocated or elevated without highly significant investment	<ul style="list-style-type: none"> • Most buildings and signature or monumental structures • Major infrastructure (bridges, wastewater treatment plants, etc.) • Road reconstruction and road elevations • Subgrade sewer infrastructure (pipes, outfalls, catch basins, etc.) • Energy generation and transmission facilities

Source: Adapted for Town of Duck from the NYC Mayor's Office of Recovery and Resiliency, *Climate Resiliency Design Guidelines - Version 3.0 (March 2019)* and using Intermediate High scenario sea level rise projections from NOAA SLR Viewer, <https://coast.noaa.gov/digitalcoast/tools/slr>.

2: Tools for Managing Development

- 7.5.3: Implement higher standard and work with local utilities to improve the resilience of public infrastructure. (P, I)
- 7.6: Study areas of habitual flooding in neighborhoods and roadways to identify solutions to flooding issues. (P, I)
- 7.7: Evaluate the impacts of sea level rise and shoreline erosion on the soundfront and oceanfront to improve the long-term resiliency of the community. (P, I)

8: Promote and enhance Duck Road, Duck Trail, and the pedestrian experience

- 8.1: Maintain existing improvements and enhance opportunities for pedestrian, bicycle, and other forms of transportation in Duck. (P, I)
 - 8.1.1: Encourage participation and reduce barriers to businesses and homes connecting safe pedestrian access from their entrances to the Duck Trail sidewalk network and Duck Boardwalk. (P)
- 8.2: Ensure a safe, efficient automobile transportation system, with NC 12 remaining a two-lane facility with turn lanes as needed. (P)
- 8.3: Support the construction of a mid-Currituck County bridge, in order to provide transportation alternatives and maintain NC 12 as a two-lane facility. (P, I)

Relevant CAMA Land Use Management Topics and Implementation Goal						
Policy or Action	PA	LUC	ICC	NHA	WQ	Time Frame
7.5.3				X		0
7.6					X	2025
7.7						0
8.1	X					0
8.1.1		X				0
8.2		X				0
8.3						0
9.1		X				0
9.1.1						0
9.1.2						0
9.1.3						0
9.2						0
9.2.1		X	X			2022
9.2.2						0

9: Enhance and support police, fire, and public safety initiatives

•9.1: Ensure safety of residents and visitors. (P)

- 9.1.1: Implement best practices in public safety, beach safety, and risk management. (P, I)

- 9.1.2: Maintain best practices for fire and storm safety in site development and neighborhood design that balances other local goals. (P)

- 9.1.3: Pursue innovative visitor and resident monitoring and communication that enhances public safety and awareness of local traffic rules, precautions, and conditions. (P, I)

•9.2: Plan for facilities and expansions necessary to protect the public health and safety. (P)

- 9.2.1: Expand/Rebuild the Fire and Police Department building on the USACE property and restore the previous site to its predevelopment condition. (P)

- 9.2.2: Maintain public safety staff and resources at an appropriate level to meet the needs and expectations of the community. (P)



Approximate location for Police/Fire station expansion, on the USACE property adjacent to the current station.

2: Tools for Managing Development

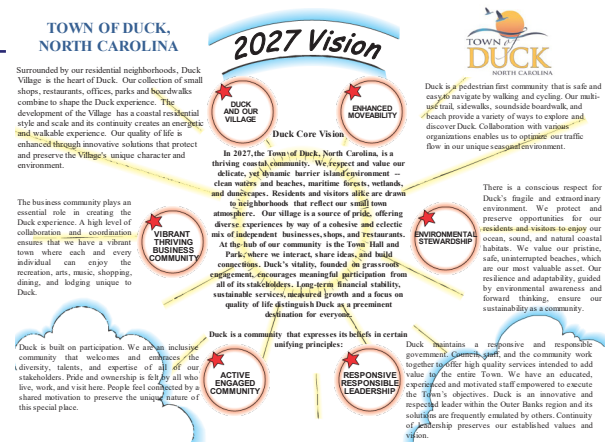
10: Maintain a connected and accessible local government

- 10.1: Provide frequent, current, and high-quality communication between government, citizens, and businesses. (P)
- 10.2: Confirm and update as necessary the established community vision and goals. (P)
- 10.3: Continue intergovernmental coordination with the USACE, Federal, State, County, Regional, and other governmental agencies, non-profits, private-sector, and other interested, willing partners in the pursuit of mutually agreeable interests. (P, I)

- 10.3.1: Continue coordination with USACE to facilitate operational success at the field station. (P)
- 10.3.2: Coordinate with neighboring jurisdictions, local builders, and other interest groups to establish more resilient development standards. (P)

11: Facilitate and coordinate with utility providers to provide effective and efficient levels of service

- 11.1: Coordinate and support upgrades by utility providers, including undergrounding, that increase operational redundancy and reduce interruption intervals during natural disasters. (P, I)
- 11.2: Provide efficient, economical, and environmentally appropriate collection and disposal of solid waste. (P)



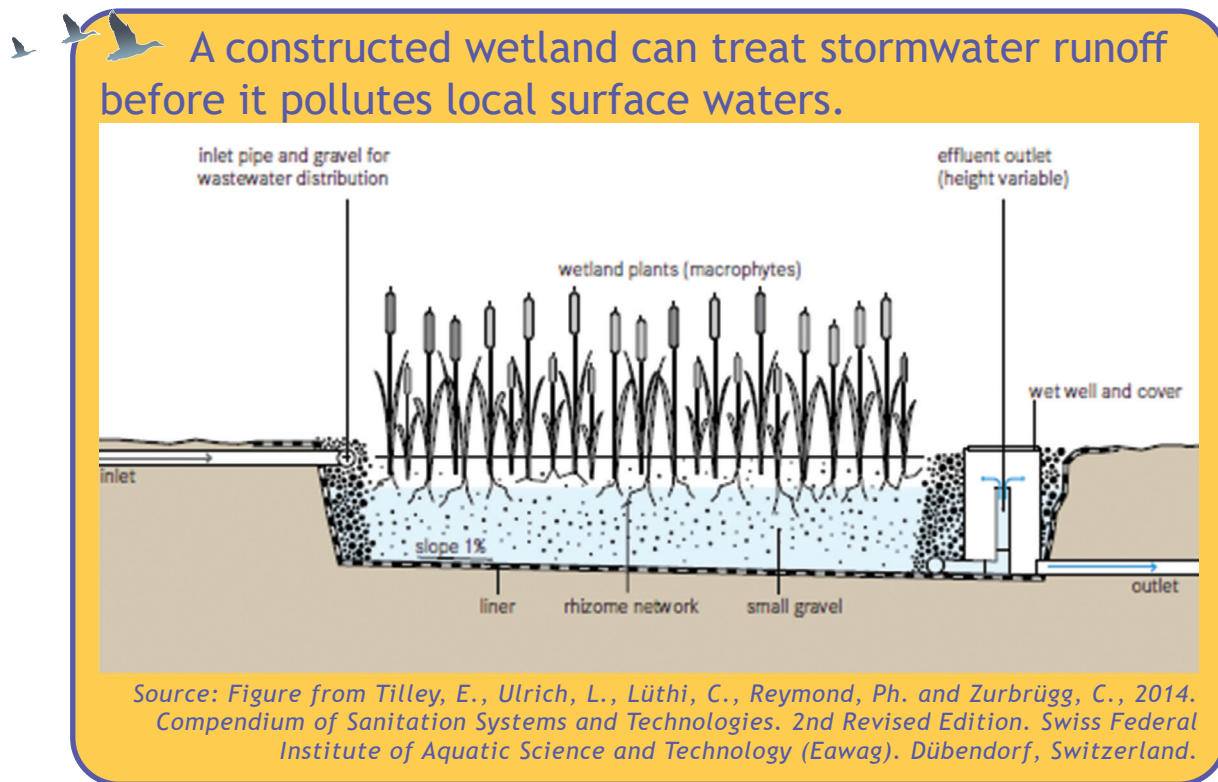
Town leadership has made a practice of regularly engaging citizens in visioning- and goal-setting engagement events to ensure the lines of communication are open between citizens and their government.

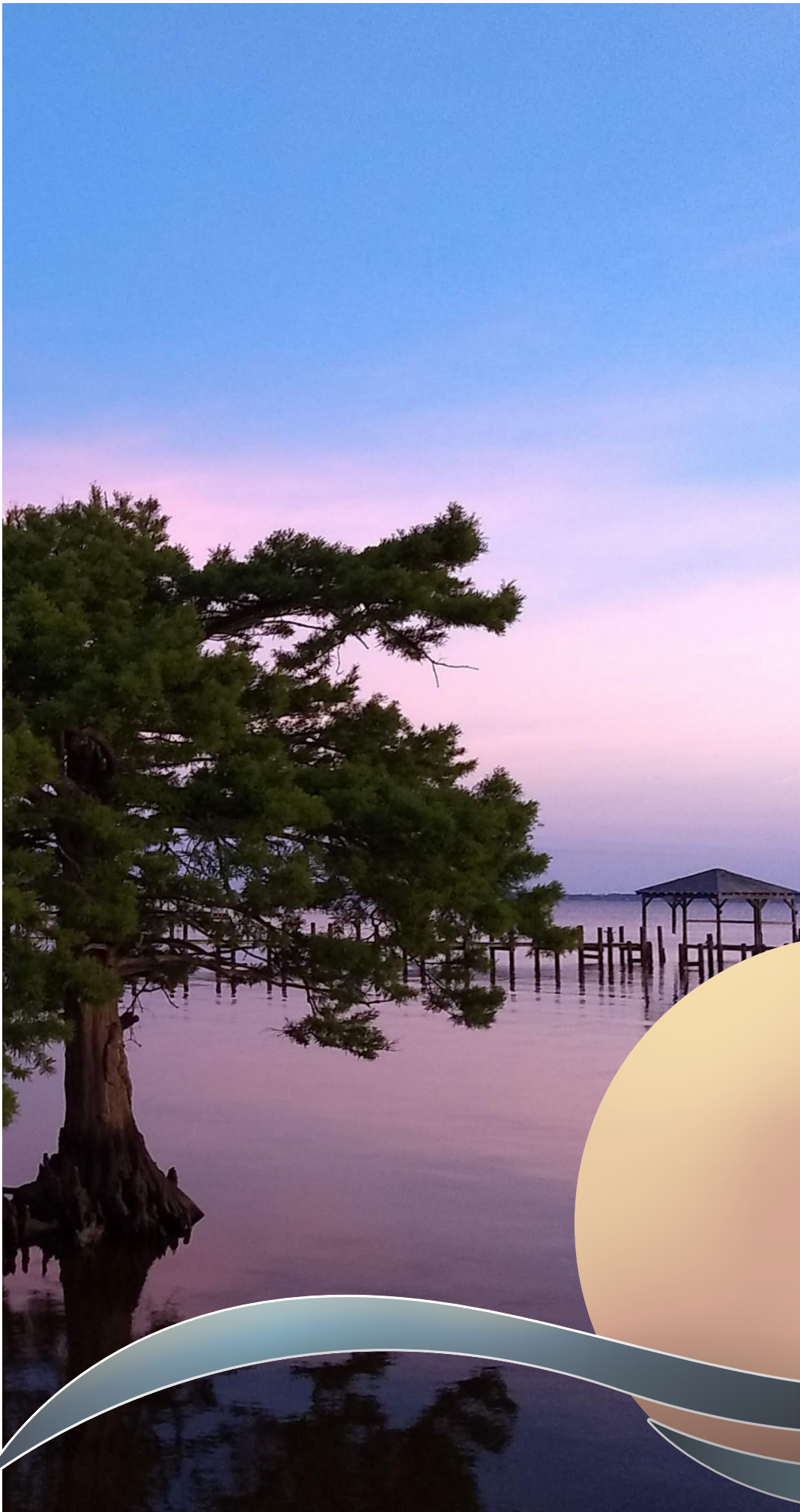
Policy or Action	Relevant CAMA Land Use Management Topics and Implementation Goal					Time Frame
	PA	LUC	ICC	NHA	WQ	
10.1						0
10.2						2022
10.3						0
10.3.1						0
10.3.2			X	X		0
11.1				X		0
11.2			X		X	0
12.1			X		X	0
12.2.1					X	2030
12.2					X	0
12.3						0, 2021

12: Water Use and Resources

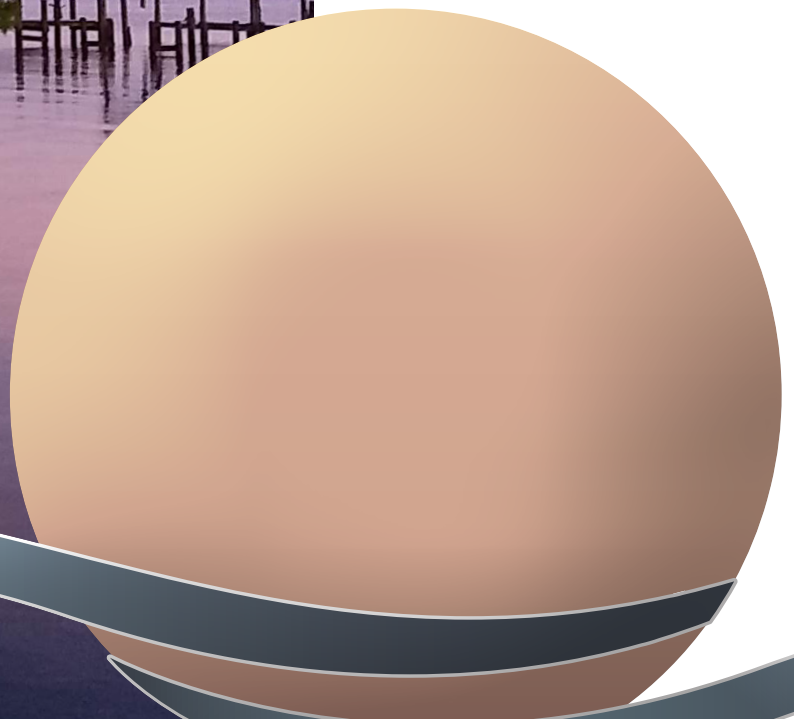
- 12.1: Encourage water conservation and environmentally-friendly water use. (P)
- 12.2: Ensure properly installed and maintained septic tank/drain field systems. (P)
 - 12.2.1: Coordinate with the Dare County Environmental Health Department to develop an enhanced monitoring and remediation program for septic drain fields that are vulnerable to malfunction due to high water tables. (P)
- 12.3: Maintain, protect, and (where possible) enhance water quality in all coastal wetlands and estuaries. (P, I)

Discussion: Stormwater upgrades and constructed wetlands can help treat stormwater runoff before it reaches the sound. Likewise, any environmental educational efforts, habitat restoration, or plantings will also likely have positive water quality impacts. These efforts could be partnered with shoreline restoration to achieve multiple objectives.





3





Existing and Emerging Conditions

Population, Housing, & Economy

Population

The population of this coastal town fluctuates depending on the time of year, specifically between Memorial Day and Labor Day when the peak vacation season is in full effect. During that time, the 400± full-time residents are also accompanied by part-time residents, vacationers, and weekend and day trippers. As of July 2019, there were 579 registered voters, although these are not necessarily current residents. The census counts are performed decennially and estimated on years in between but voter registration requires attestation of the location as a primary residence.

Due to the relatively small permanent population of Duck, tiny variations in measurement, estimation, rounding, or projection can cause large relative changes over the long range projection timeframes required by a CAMA Land Use Plan. It is also important to remember that the town is nearly fully developed, and that combined with the lack of central sewer infrastructure and the community's desire for low- to moderate-density, the carrying capacity of the town is significantly limited.

Population Estimates and Projections

The Town of Duck has a small, coastal village feel and many permanent residents were once vacationers. Due to the small geographic and demographic size of Duck, a combination of US Census and state demographer data must be used to estimate population. The annual growth rate for permanent residents was 1.2% from 2010 to 2018. The permanent population is estimated at 400 for year 2018 (Source: NC State Demographer, 2018).

3: Existing and Emerging Conditions



Population Projections: CAMA Land Use Plans require 30-year population projections, but the state only provides 20-year projections for counties. It is up to each individual jurisdiction to provide a reasonable method of population projection.

Understanding Population Projections

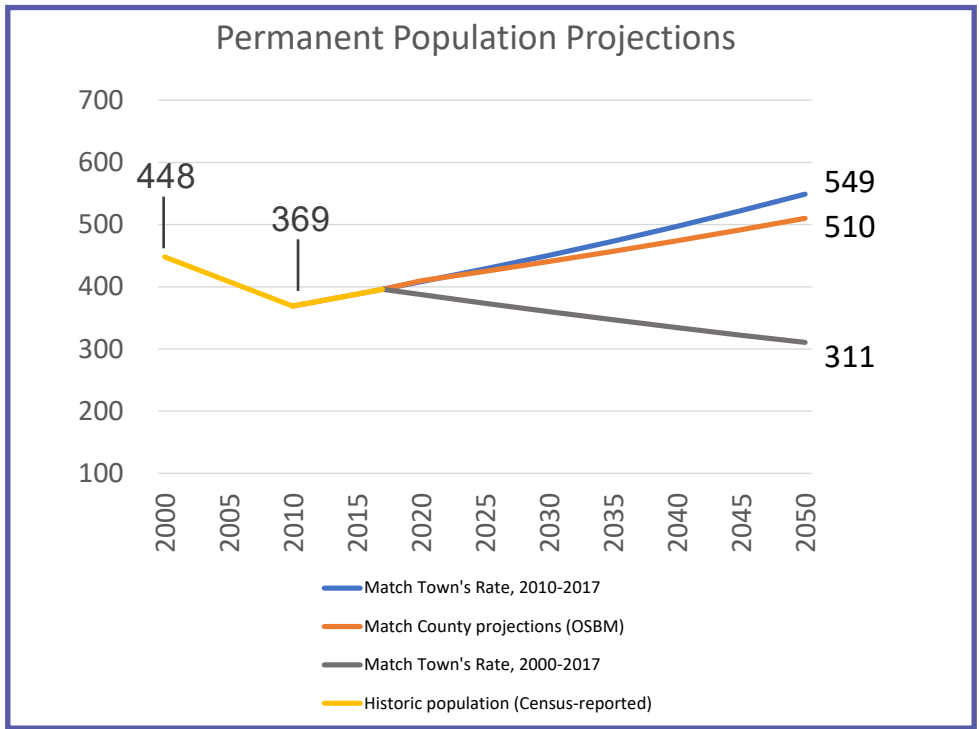
Permanent Population
Persons who usually reside in the planning area, year-round.

Peak Seasonal Population
Persons who are temporary residents in the planning area, such as tourists and vacationers, but who normally reside in another location; does not include day-trippers.

Permanent Population Projections

Estimating and projecting permanent population for a small town is challenging. Although a range of population projections are presented herein for the purposes of discussion, the population of Duck is expected to remain fairly steady

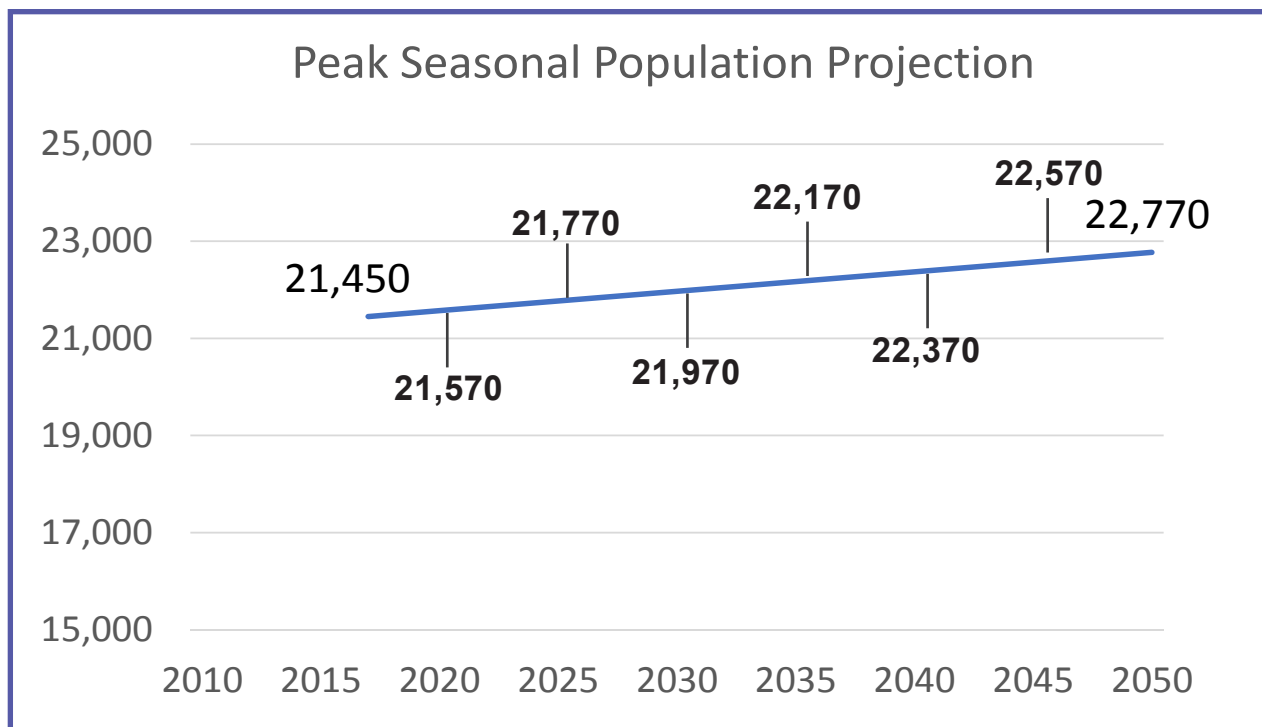
moving forward, at somewhere between 400 and 500 residents. For the purposes of planning, the difference is negligible. For full population projection methodology, see Appendix G, page 149. For full permanent population projection numbers, see page 153.



Seasonal Population Projections

The peak seasonal population was created by estimating and projecting forward the amount of visitors to short-term rentals, seasonally occupied units, guests of year-round residents, and other lodging. Minimal increases in seasonal population are expected over the next 30 years. This is in part because the town is limited by available land for septic facilities and no central sewer infrastructure exists. The

community has also favored density limitations that maintain local character. Few remaining developable lots exist. However, redevelopment has the potential for increasing population beyond current projections. For more information, including on the methodology for estimation and projection, refer to Appendix G, page 149.

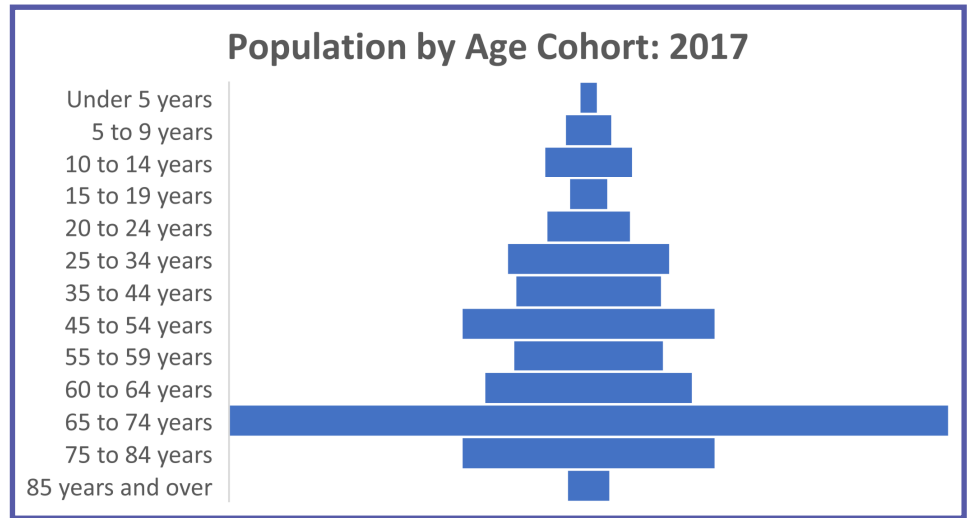


3: Existing and Emerging Conditions

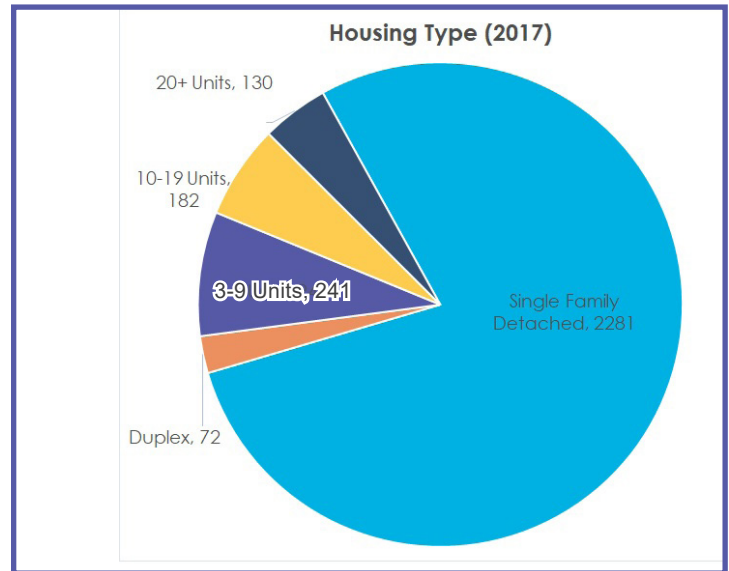
Demographic Characteristics

The largest individual age cohort in Duck continues to be people aged 65-74. When combined with those aged 45-64, they constitute nearly 3/4 of the population of the town.

Since 2010, the 65+ age group has experienced an 86.3% growth rate as the US population has aged and the overall population has grown. Other age groups that have experienced significant changes include those aged 25-34 which saw 105.3% growth from 2010 to 2017.



Vacation housing:
Duck has a uniquely high proportion of housing stock dedicated to seasonal use, vacationing, or rental properties.

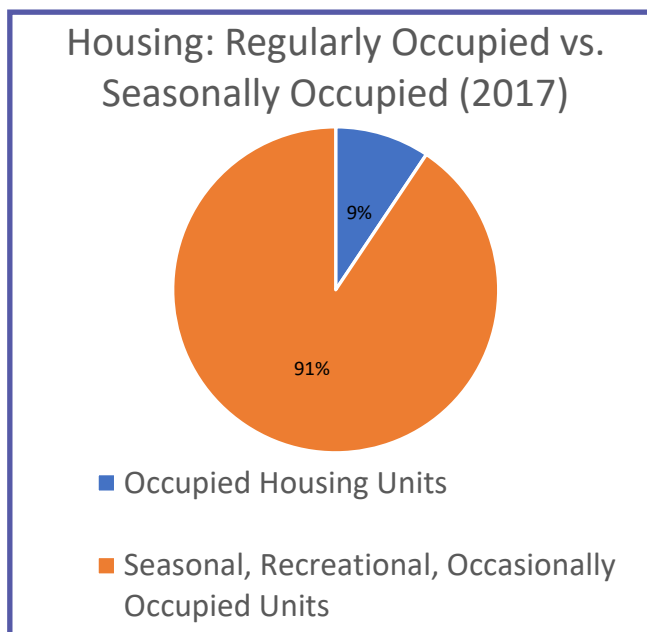


Housing

Residential units in Duck are predominantly single family units constructed after 1970, with a majority of homes built between 1980-89. As of 2017, there are 2,906 total housing units, and only 273, or 9%, of those are occupied by year-round residents, whereas the other 2,633 are

not (i.e. - vacation or rental homes). The proportion of resident occupied housing has increased by 3% since 2010 - a net gain of 84 units.

Source: US Census and 2017 American Community Survey.



Local Economy

As of 2017, the Duck economy is mainly driven by retail (19.9%), arts, entertainment, recreation, accommodation and food services (17.3%), educational services, health care, and social assistance (15.3%), and finance, insurance, and real estate and rentals and leasing (12.8%). From 2010 to 2017, retail saw a 49% increase, along with educational services, health care and social assistance with 57% growth compared to finance, insurance, and real estate experiencing a 68% decrease in industry employment.

The median household income in 2017 was \$76,875. This was the same as in 2010, with some dips in 2011, 2016, and 2013.

Employment by Industry: 2017 (Residents of Duck)	#	%
Retail Trade	39	19.9%
Arts, entertainment and recreation, and accommodation and food services	17	12.6%
Educational services, and health care and social assistance	30	15.3%
Finance and insurance, and real estate and rental and leasing	25	12.8%
Public administration	19	9.7%
Construction	18	9.2%
Professional, scientific, and management, and administrative and waste management services	16	8.2%
Transportation and warehousing, and utilities	5	2.6%
Information	3	1.5%
Manufacturing	3	1.5%
Wholesale Trade	2	1%
Other services, except public administration	2	1%
Agriculture, forestry, fishing and hunting, and mining	0	0%

Commuting Patterns

Commuting in Duck is primarily via car, truck, or van. 4.1% of the population walks to work, and 1.5% take either a bicycle, taxi, motorcycle, or other form of transportation. The remaining 13% of the working population works from home and does not commute. For those who do commute, the mean travel time to work is 17.4 minutes.

Source: US Census and 2017 American Community Survey.

3: Existing and Emerging Conditions

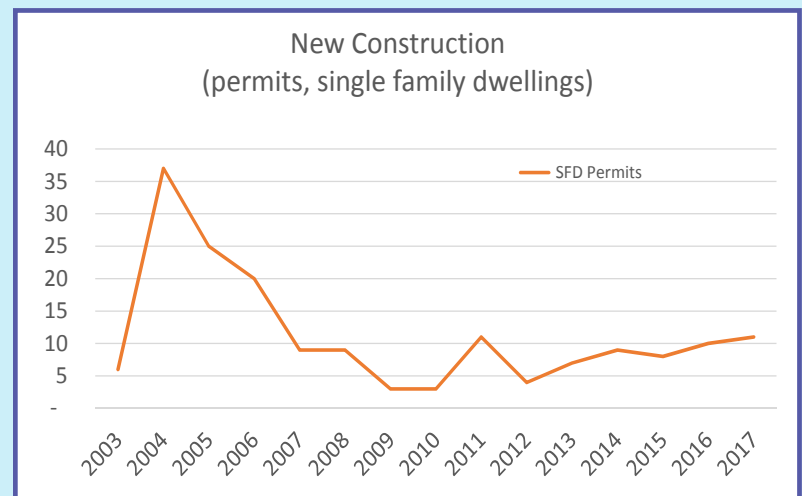
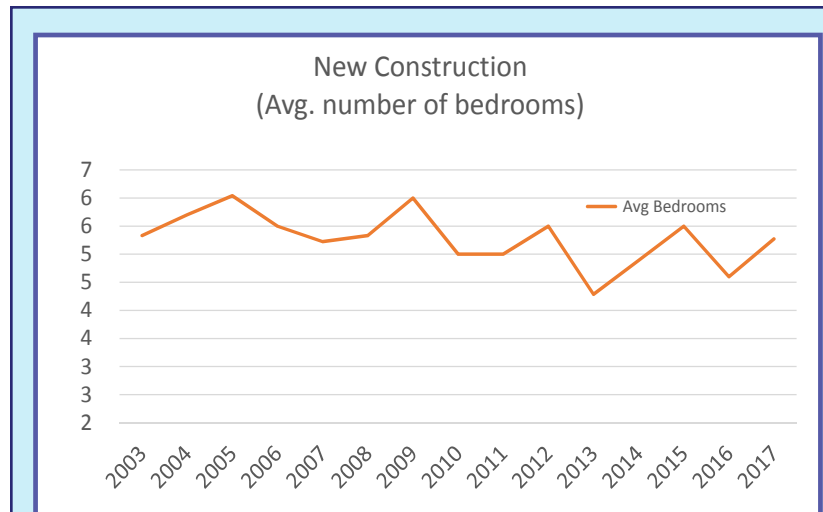
Building and Construction

Being a small town that is mostly built out and with few remaining vacant lots, most construction is redevelopment of existing lots and buildings. The key takeaways of construction activity include:

- » New single family construction permits are steady.
- » New construction value is rising.
- » The number of bedrooms per home is not rising.
- » Average home size is steady (or slightly falling).

Additional Description of Dominant Growth Related Conditions

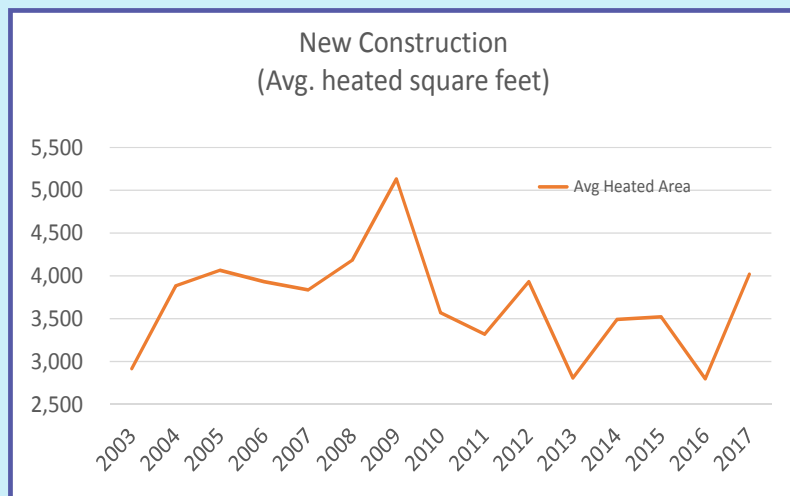
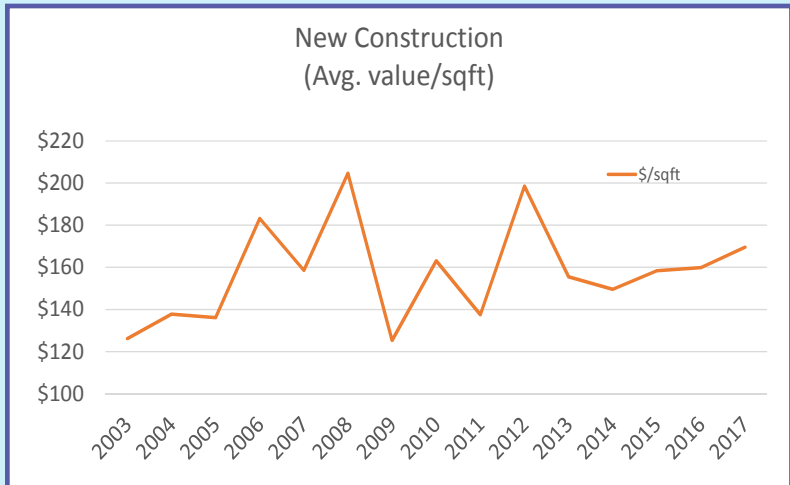
A description of dominant growth related conditions can be found throughout this document, in particular in this chapter and in the SWOT analysis and stakeholder summaries in the appendices. The town does not have sewer service, so relies heavily on septic treatment which consequently limits the intensity of development to some degree. The town is considered nearly entirely "built-out" and most residential and nonresidential development is actually redevelopment of existing lots although very limited new development also has occurred and a minimal number of undeveloped lots do exist (see Existing Land Use Map). The town is limited by geography, being surrounded by water on both sides, a nature preserve to the north, and another town to the south.



CAMA Priorities, Concerns, and Aspirations

The CAMA land use and development topics most important to the community include:

- » **Public Access:** Little concern from residents, although there are few public access points, because many private access points exist. Residents would like to preserve the shoreline to continue accessing it for recreation and leisure.
- » **Land Use Compatibility:** The



Source: Town of Duck.

environmental beauty of the area is a significant concern for residents. Feedback indicated future land use should guide development in a way that reinforces the "Duck Experience."

- » Infrastructure Carrying Capacity: Transportation congestion (north-south) and pedestrian safety are a concern to residents, although in the future septic system failures may become a concern. The community in the future would like to pursue efforts to mitigate future stormwater issues and to enhance

safety along Duck Road (NC-12) for drivers and pedestrians.

- » Natural Hazard Areas: Erosion on the ocean and sound are very concerning and threaten the integrity of the community. Preservation, protection, and restoration are very important to the Duck Community's future.
- » Water Quality: Addressing stormwater concerns is important, although the impacts on water quality are secondary to concerns about damage to private property. Efforts to prevent septic leakage will help fulfill the community's desire to protect water quality.

Since this effort also included comprehensive planning components, the community was more concerned about other issues, such as community character. Additional description of the importance of CAMA land use and development topics can be found throughout this document, particularly in this chapter and in the SWOT analysis, stakeholder summaries, and public meeting summaries in the appendices.

3: Existing and Emerging Conditions

Natural Systems

The quality of life of residents and visitors of Duck is inextricably linked to the area's natural systems. Ecotourism is the primary economic driver. One of the primary purposes of a CAMA Land Use Plan is to establish a rational and coordinated local management program for coastal resources. Identification and recognition of Areas of Environmental Concern (AECs) and other environmental assets is critical to the plan.

Areas of Environmental Concern (AECs)

- Description of AECs adapted from NC Department of Environmental Quality (www.deq.nc.gov).

AECs are areas of natural importance designated by the NC Coastal Resources Commission (CRC). The State Guidelines for Areas of Environmental Concern (15A NCAC 7H) require that local land use plans give special attention to the protection of appropriate AECs because of their environmental, social, economic, and aesthetic value.

Four categories of AECs have been established by the CRC:

» Estuarine and Ocean System: This system is the broad network of brackish sounds, marshes, and surrounding shores. CAMA permits are required for development in the four subcomponents of this system, which include:

- **Coastal Wetlands.** These areas are considered to be unsuitable for

all development activities and other land uses that alter their natural functions. They are defined as any salt marsh or other marsh subject to regular or occasional flooding by tides (including wind tides) and contains one or more of the following plant species: Cord Grass, Black Needlerush, Glasswort, Salt Grass, Sea Lavender, Bulrush, Saw Grass, Cat-tail, Salt Meadow Grass, or Salt Reed Grass.

- **Estuarine Waters.** These areas are the dominant component of the entire estuarine and ocean system and provide important habitat for a diverse range of shellfish, birds, and other marine wildlife. Conservation of estuarine waters is usually the highest priority use for these areas. Development activities which are water dependent and require water access and cannot function elsewhere (e.g.



Estuarine waters and estuarine coastal shoreline.

simple access structures, structures to prevent erosion, boat docks, marinas, wharves and mooring pilings) may be allowed within this AEC.

- **Public Trust Areas.** Public trust areas include coastal waters and submerged tidal lands below the mean high water line (MHWL). The water and submerged tidal lands are held in trust for the public to use through such activities as fishing, swimming, and boating. The state's policy is to ensure that the public is able to maintain access to these waters. Structures and activities in public trust areas must not be detrimental to the public trust rights and the biological and physical functions of the estuary or ocean. Projects which would directly or indirectly

block or impair existing navigation channels, increase shoreline erosion, deposit spoils below normal high water, cause adverse water circulation patterns, violate water quality standards, or cause degradation of shellfish waters are considered incompatible with the management policies of public trust areas.

- **Coastal Shorelines.** The estuarine shoreline is the non-ocean shoreline, extending from the normal high water level or normal water level along the estuarine waters, estuaries, sounds, bays, fresh and brackish waters and public areas (15NCAC 7H.0209). Coastal Shorelines include all lands within 75 feet of the normal high water level of estuarine waters. This definition also includes lands within



Duck has important and valuable estuarine habitats.

Submerged Aquatic Vegetation

Threatened by:

- nutrient pollution (incl. wastewater)
- sediment pollution
- untreated stormwater runoff

Provide benefits to:

- essential fish habitat
- shoreline stabilization
- wave attenuation

Ecosystem value: \$7,700/acre

Coastal Wetlands

Threatened by:

- wetland filling
- erosion
- shoreline hardening

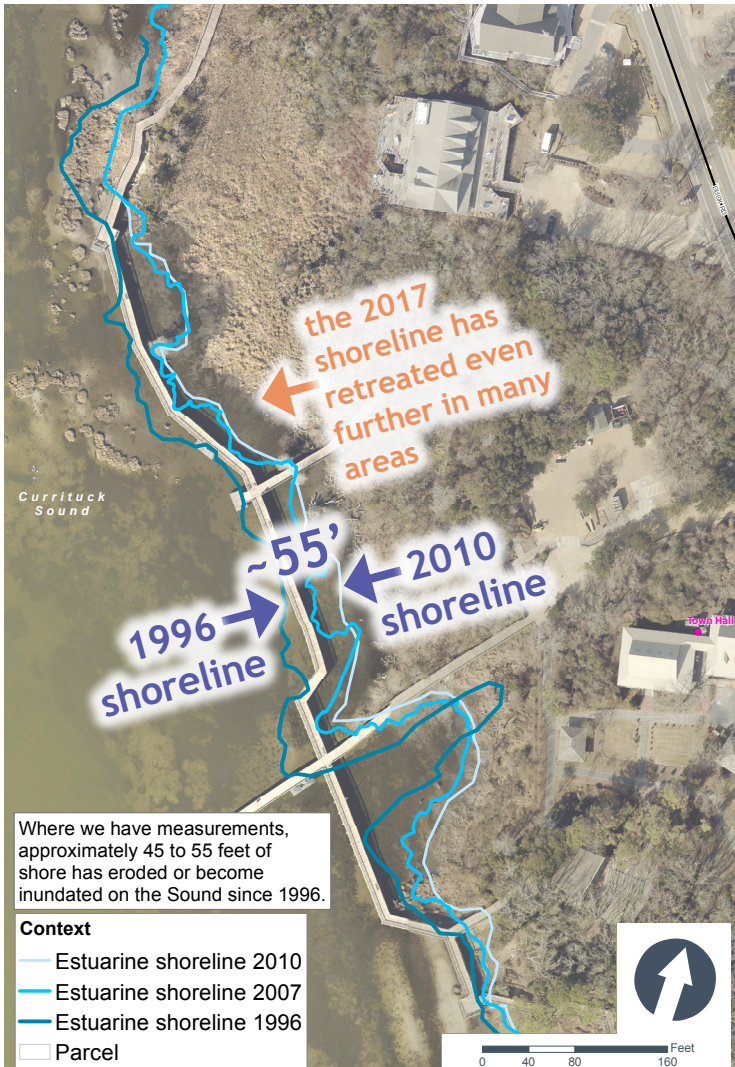
Provide benefits to:

- filtering pollutants and stormwater runoff
- trap sediment
- wave attenuation
- reduce shoreline erosion
- habitat for finfish and shellfish

Ecosystem value: \$13,360/acre

Source: NCDEQ, North Carolina Coastal Habitat Protection Plan, 2016

3: Existing and Emerging Conditions



The Sound-side coastal shoreline and associated salt marshes have eroded over time. These important areas provide valuable habitat, stormwater filtration, and protect the town from storm surge and wind-driven waves. Unlike the ocean-side, options for restoring these marshes are limited, even though public support exists for such restoration.

30 feet of the normal high water level of public trust waters located inland of the dividing line between coastal fishing waters and inland fishing waters. Generally, development in this area must not cause significant damage to any estuarine resources, must not interfere with

public access to navigable waters or public resources, have limited hard (impervious) surfaces, preserve natural barriers to erosion, and must take steps to prevent pollution of the estuary by sedimentation and runoff.

» **Ocean Hazard Areas:** Oceanfront beaches and dunes protect buildings and the environment behind them by absorbing the force of wind and waves. The Town of Duck is situated on a barrier island between the ocean and the Currituck Sound. Barrier islands are dynamic environments subject to shoreline changes and flooding which may be exacerbated by storms. The Ocean Hazard Areas include the following:

- **Ocean Erodeable AEC.** This covers North Carolina's beaches and any other oceanfront lands that are subject to long-term erosion and significant shoreline changes. This AEC exhibits a substantial possibility of excessive erosion and significant shoreline fluctuation. The oceanward boundary of this area is the mean low water line. The landward extent of this area is the distance landward from the first line of stable and natural vegetation as defined in 15A NCAC 07H .0305(a)(5) to the recession line established by multiplying the long-term annual erosion rate times 90; provided that, where there has been no long-term erosion or the rate is less than two feet per year, this distance shall be set at 120 feet landward from the first line of stable natural vegetation. For the purposes of this Rule, the erosion rates are the long-term average based on

available historical data. The current long-term average erosion rate data for each segment of the North Carolina coast is depicted on maps entitled "2011 Long-Term Average Annual Shoreline Rate Update" and approved by the Coastal Resources Commission on May 5, 2011 (except as such rates may be varied in individual, contested cases or in declaratory or interpretive rulings). In all cases, the rate of shoreline change shall be expressed as no less than two feet of erosion per year.

Note: The CRC updates long-term erosion rates about every 5 to 10 years, using aerial photographs to examine shoreline changes. These maps are available on the Division of Coastal Management website.

- **Inlet Hazard AEC.** This covers the lands next to ocean inlets, which are often highly unstable and subject to high rates of erosion or accretion. *Note: This is not a consideration for the Town of Duck as there are no nearby inlets.*
- **Unvegetated Beach AEC.** These beach areas have no stable natural vegetation and generally stretches from the the ocean to the first line of stable natural vegetation in the dune. There are none within the Town's jurisdiction.

» **Public Water Supplies:** Protection of fresh water supply sources is vital to human health and economy. Protection of public water supply areas prevents damage to fresh water supplies which are vulnerable to pollution, sea-level rise, and salt water intrusion. The Town of Duck receives all of its drinking water from the Dare County Water Department wells located in Kitty Hawk. *Note: There are no public water*



Duck Road is nearly at sea level and protected with rip-rap at a low point.



Shallow waters and natural shorelines are interspersed with manmade structures and hardened shorelines on the Sound.



Healthy dunes and stable vegetation help protect structures from waves and wind.



The seawall on this heavily modified shoreline provides scarce habitat and increases localized erosion.

3: Existing and Emerging Conditions

supply AECs in the Town of Duck.

- » **Natural and Cultural Resources:** These are specific sites designated to receive protection because they contain environmental or cultural resources that are important to the entire state. The CRC formally designates these resources through a nomination process. *Note: There are no identified AECs of this type in the Town of Duck, although it is possible that the USACE Field Research Facility property may be an important Coastal Complex or Remnant Species refuge at some point in the future.*



The Ocean Erodible Area of Environmental Concern.

Environmentally Fragile Areas

Wetlands

The NC Coastal Region Evaluation of Wetland Significance (NC-CREWS) designates several wetland types in Duck, as shown on the map. Most occur on the sound, although there are some isolated, forest-associated wetland types located centrally.

Shoreline and nearshore habitat

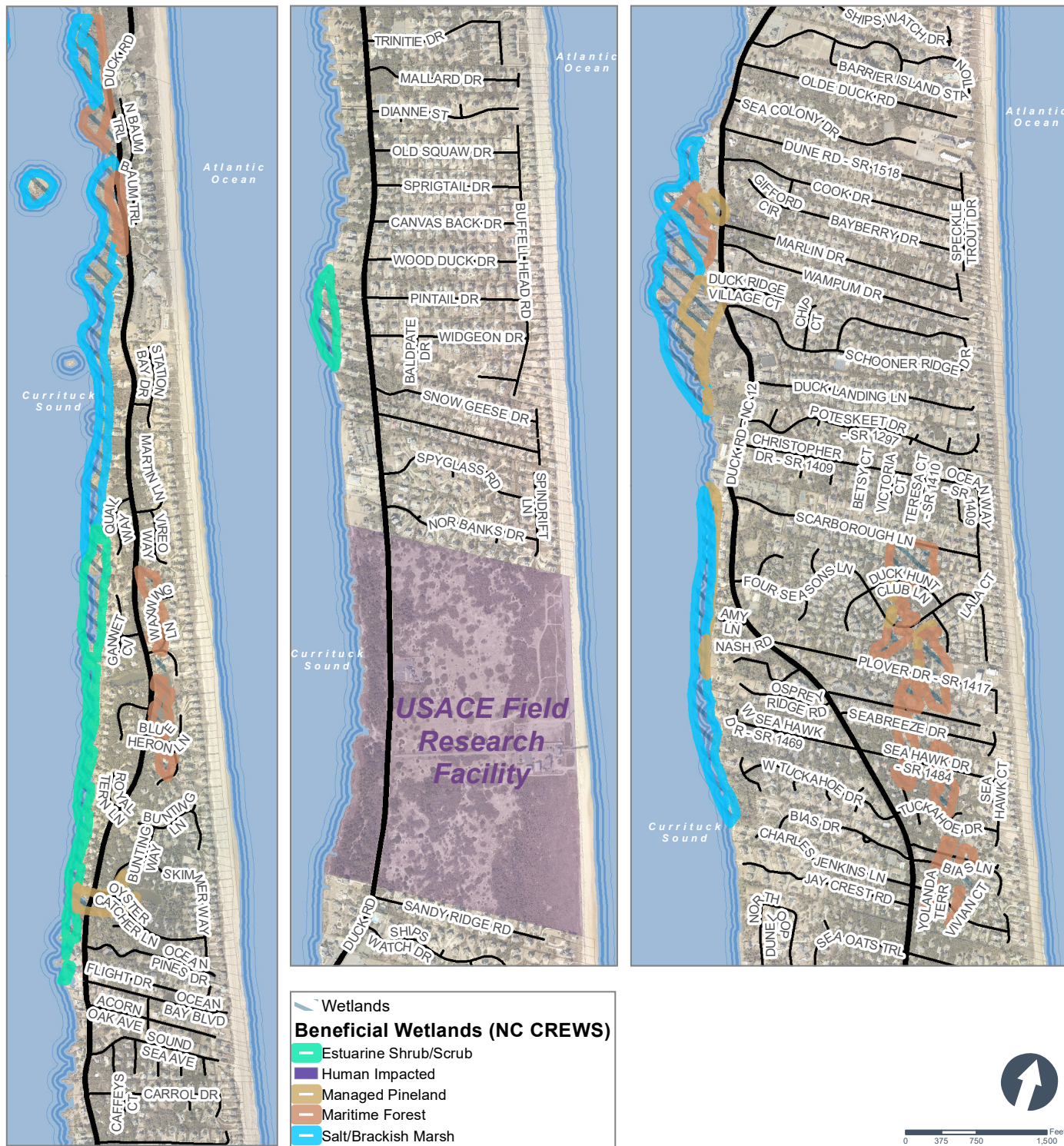
Within the town, there are three broad classifications of Estuarine Shoreline along the Currituck Sound, including:

- » Marsh
- » Modified (usually bulkheads or seawalls)
- » Sediment Bank (sediment deposited by floodwaters)



The town boardwalk provides a view of saltwater marsh wetlands and submerged aquatic habitat.

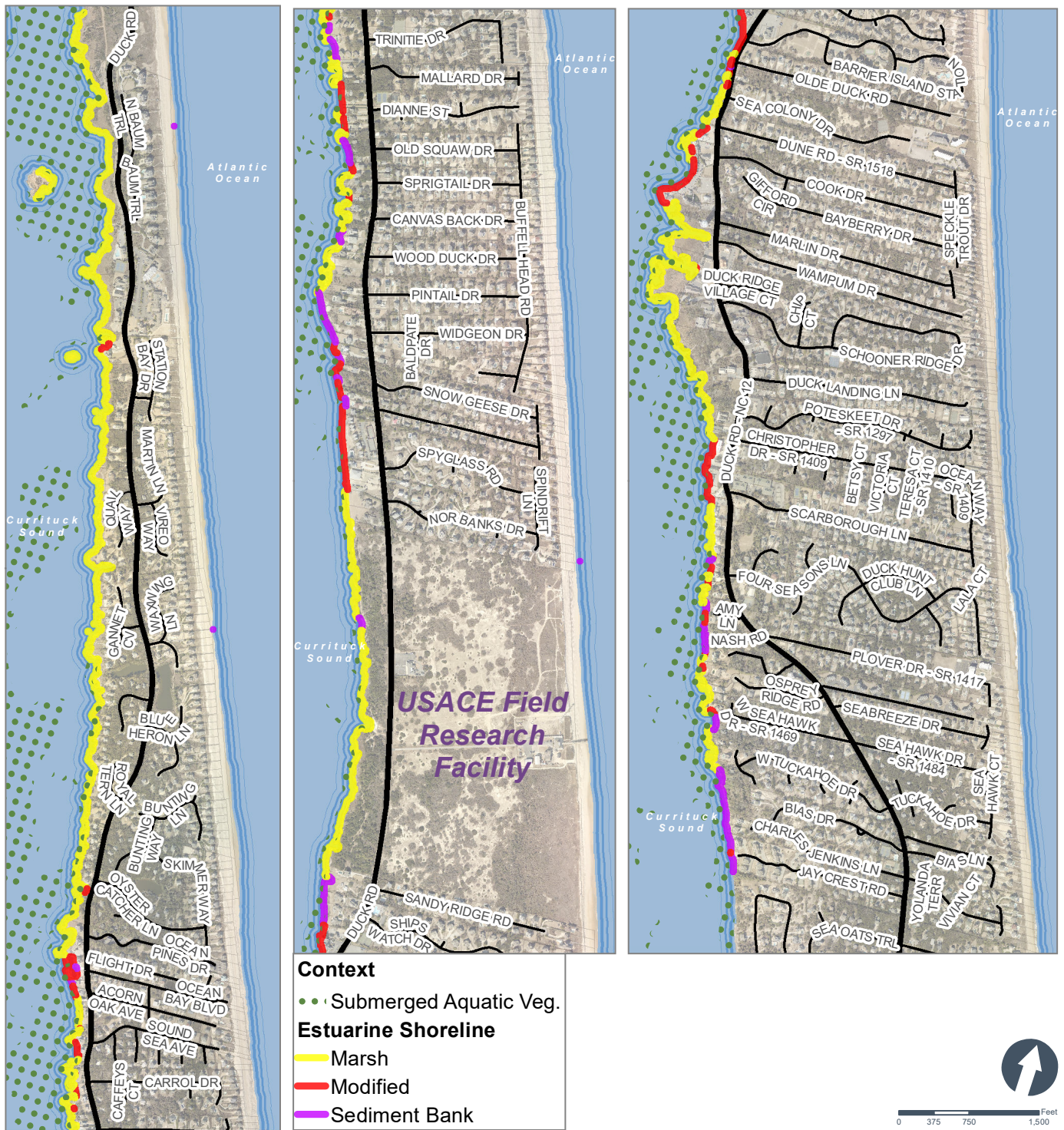
Wetland Types



A number of wetland types throughout the study area are identified by the NC Coastal Region Evaluation of Wetland Significance (NC-CREWS).

3: Existing and Emerging Conditions

Estuarine Shoreline and Submerged Aquatic Vegetation



Shoreline and nearshore estuarine habitat.

Prime Wildlife Habitat and Natural Resources, and Endangered and Threatened Species

- Contributed by Brooke Massa, NC Wildlife Resources Commission

In the sound there are recent observations of federal and state threatened West Indian manatees (*Trichechus manatus*) and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). On the coastal side (near shore), there are recent observations of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and historical observations of shortnose sturgeon (*Acipenser brevirostrum*). Both sturgeon are endangered at the state and federal level.

There are recent observations of state and federally threatened loggerhead sea turtles (*Caretta caretta*) and green

sea turtles (*Chelonia mydas*), state and federally listed endangered leatherback sea turtles (*Dermochelys coriacea*) and Kemp's ridley sea turtles (*Lepidochelys kempii*). These species rely on beach and dune habitat for nesting and sound waters for foraging.

Pine Island is composed of Tidal Freshwater Marsh (Needlerush Subtype), Maritime Shrub (Stunted Tree Subtype), and Maritime Evergreen Forest (Mid Atlantic Subtype) natural communities and has rare dune plants, including Long Beach Seedbox (*Ludwigia brevipes*), Awl-leaf Mudwort (*Limosella australis*), Carolina Grasswort (*Lilaeopsis carolinensis*), Sand Heather (*Hudsonia tomentosa*), Saltmarsh Spikerush (*Eleocharis halophila*). This is habitat for Black Rail (*Laterallus jamaicensis*), a federally proposed threatened and state special concern species of bird that has been observed in the area in the 1980s (more recent surveys did not find it). Northern Oak Hairstreak (*Satyrium favonius ontario*) and Giant Swallowtail butterflies are also in this area.

On land, the larger refuges of Pine Island (just north of town and owned and managed by the Audubon Society) and the USACE Field Research Facility (in the middle of town) provide the largest habitat refuges for terrestrial species in and adjacent to the study area. There is a historical observation of a rainbow snake (*Farancia erythrogramma*) as well.

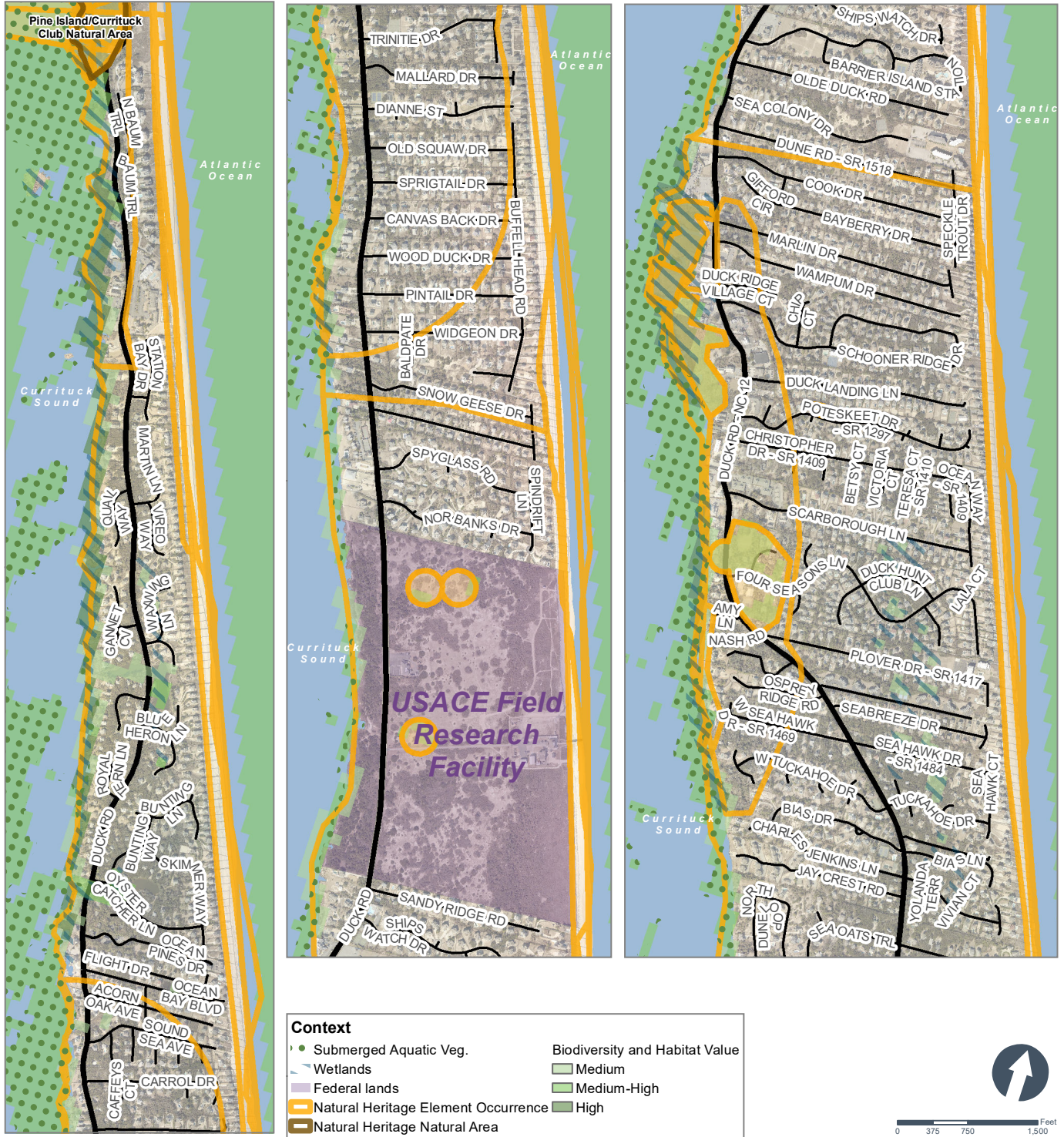
Butterflies in the area (including Pine



*Kemp's ridley sea turtle, an endangered species.
Photo credit: NOAA Fisheries*

3: Existing and Emerging Conditions

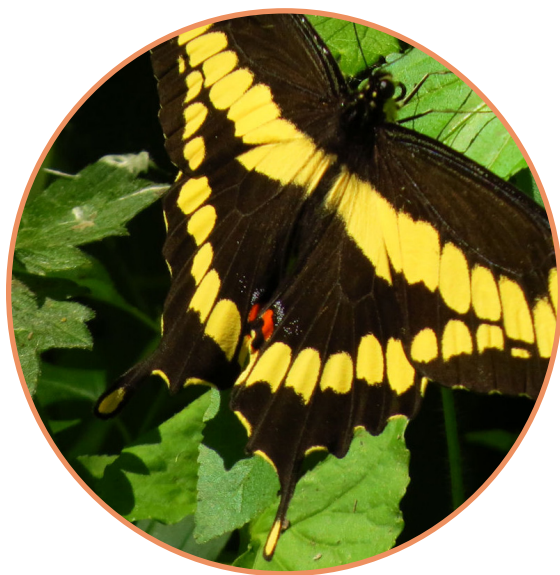
Environmentally Fragile Areas, Natural Resources, Habitat, and Biodiversity



Biodiversity and habitat resources are generally concentrated at the interface between water and land and in large parcels of land with intact natural land cover.

Island) include the Giant Swallowtail (*Papilio cresphontes*) and Duke’s skipper (*Euphyes dukesi*) – both state rare. Butterflies (and all animals) associated with maritime forests will only thrive if maritime forests are fully protected. This habitat type has been so impacted by coastal development that the only remaining viable conservation strategy is to protect it wherever it still occurs.

Rare plants observed in Duck, include: Toothed Flatsedge (historical observation, state special concern), Chapman's Redtop (state rare), Clematis catesbyana (state rare), and Maritime Pinweed (*Lechea maritima* var. *virginica*) (state endangered). These plants are primarily associated with dune or maritime forest communities, so protection and restoration of these ecosystems will enhance



Giant Swallowtail (Papilio cresphontes), a state rare species.
Source: Wikipedia

their population viability. Most of the rare plants found in or around Duck are considered ‘imperiled’, meaning there are less than 20 known populations in the state. Some are ‘critically imperiled,’ with likely less than 5 populations in the state. Protection and restoration of these natural communities will also support the rare butterfly species that occur there.

(Citations: NC Natural Heritage Program. Natural Heritage Data Explorer [web application]. NCDNCR, Raleigh, NC. (Accessed November 2019 and online at: www.ncnhp.org.) and the NC Wildlife Action Plan, NC Wildlife Resources Commission, 2015.)

Status

Because Duck is largely built-out, no existing Environmentally Fragile Areas or Natural Resource areas are imminently threatened by development. The remaining maritime forests outside of the USACE property are remnant fragments with no specific development pressures.

Primary Nursery Areas, Shellfishing Areas, and Associated Waters

There are no identified Primary Nursery Areas located in or around Duck. However, the Currituck Sound is important to fisheries production and supports commercial and recreational fishing. A good portion of the benthic habitat in the Sound adjacent to the town has Submerged Aquatic Vegetation (SAV), which is an important fin-fish habitat. The majority of this SAV is an invasive, exotic species, but it is important habitat nonetheless.

3: Existing and Emerging Conditions

The I-16 shellfish harvesting area encompasses a large portion of the Currituck Sound watershed, including the towns of Duck and Corolla on the Outer Banks, and Grady, Jarvisburg, and Currituck on the mainland. The area is permanently closed to shellfishing.

Duck's planning area represents a small portion of the land bordering area I-16. Per the 2013 Sanitary Survey, there are no point source wastewater treatment plant discharges in the planning area. Non-point source pollution conditions that potentially negatively affect shellfish quality in area I-16 that are relevant to Duck include:

- » The prevalence of onsite wastewater facilities that can leech wastewater during extreme saturation;
- » Stormwater runoff that transports bacteria and contaminants from the land.
- » Residential subdivision
- » Areas of growing concern, including several watersport businesses on the Currituck Sound.

Erosion, Soils, and Septic Suitability

The primary soil type(s) are sand variants. Like many barrier islands, this area is generally poorly aggregated, well-drained, well-aerated, and highly erodible.

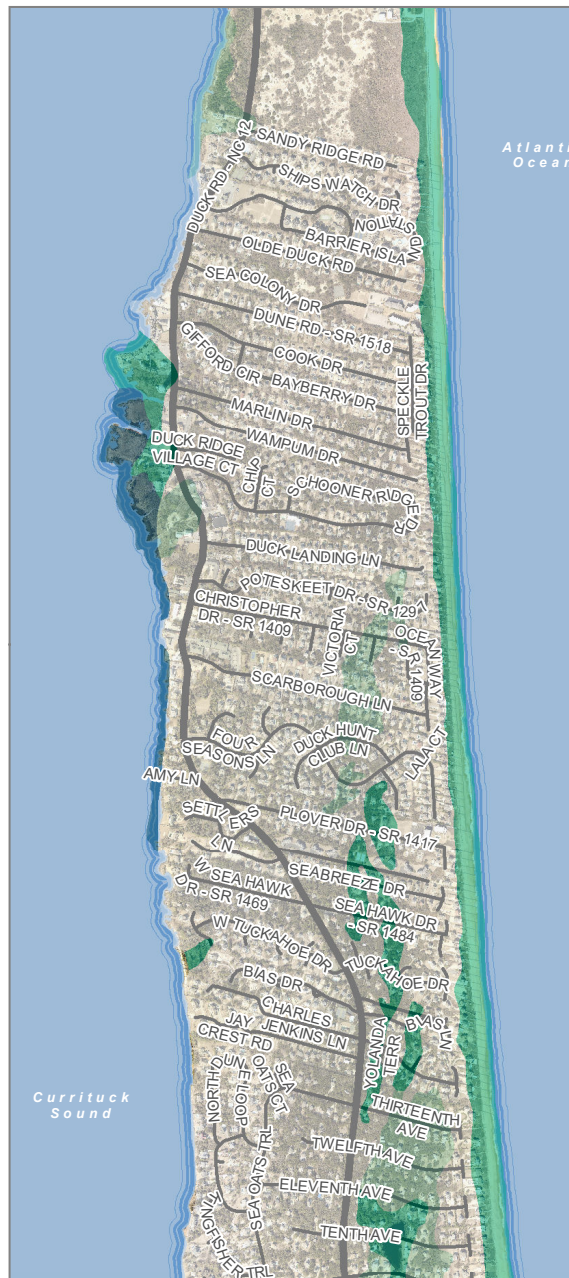
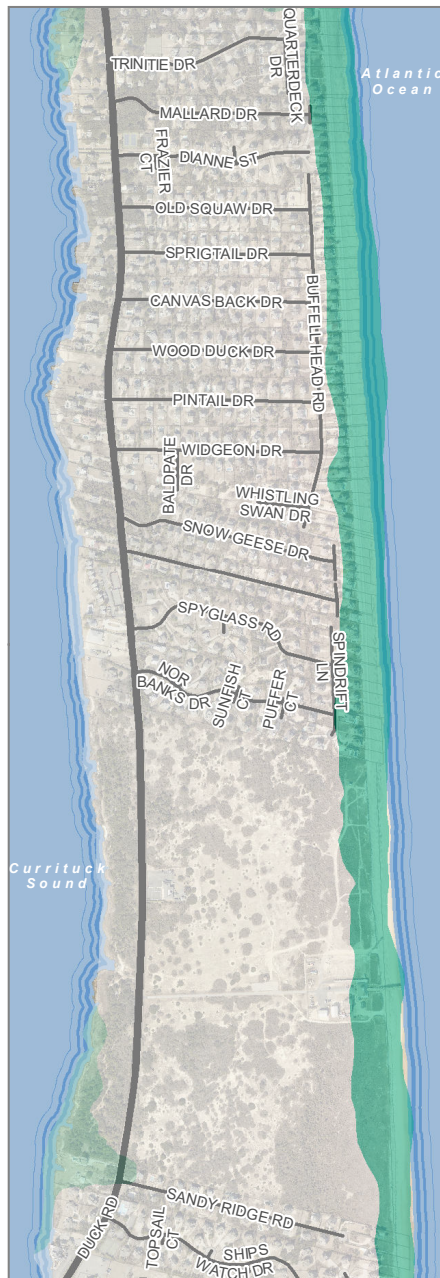
Erosion most threatens the area of town bordering the Atlantic. To combat erosion, Dare County undertook a beach renourishment project in 2017, which helped combat beach erosion in the Northern

part of Duck. Currently, no structures are imminently threatened by erosion due to the presence of the beach.

Most of the town utilizes wastewater treatment provided via septic systems. This lack of central wastewater treatment is at least partly responsible for the limited density of the area. The soils in town are generally sandy and the federal soil maps (NRCS) designates the soils as "Very limited" for septic system suitability. This indicates that the soil has "one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected." The Dare County Health Department permits and oversees regulation of septic systems in Duck.

Being a barrier island, the depth of soil to the water table is also fairly shallow. The water table is also artificially raised because properties use County-provided water which comes in on public water pipes, but is released into the septic system to filter through the soil. This creates a "mound" of water under neighborhoods and is exacerbated by storms that saturate the soil. This artificial elevation of the water table is exacerbated by the increased visitation during the tourist season (generally Memorial Day to Labor Day). Under these elevated water table conditions, some septic systems may be compromised, and in the most extreme saturation circumstances, water may seep out of the hillsides, potentially

SOILS



Soil Drainage

- Excessively drained
- Moderately well drained
- Poorly drained
- Very poorly drained



Soils and erosion rates are typical of a coastal barrier island.

3: Existing and Emerging Conditions

bringing partially treated septic wastewater with it. In systems closer to the coast, that wastewater will pollute the water.

As sea level continues to rise it will elevate the natural water table. Generally speaking, septic systems in this area need a minimum of 18" of separation from bottom of pipe or drain field to top of the water table. Without this minimum separation, the wastewater is not adequately treated. Some lower lying septic fields may become compromised or fail as sea levels rise, which will lead to increased pollution of surrounding waters unless these fields are relocated or retrofitted.

Water Quality

Water bodies in Duck are suitable for recreation (see table), and are ranked by the state based on their best use. There are no streams and most water bodies are tidal. There are no identified "SA" or "high quality" waters adjacent to Duck. "SA" waters are suitable for market shellfishing, and are by definition high quality waters. Shellfishing waters in the Currituck Sound are closed to harvesting, and are identified as "SC". This indicates that the best use of these waters is for supporting aquatic life and secondary human recreation such as paddling and boating. Waters in the Atlantic Ocean at Duck are identified as "SB", which means these waters are suitable for primary recreation, such as swimming, diving, surfing, etc. See table at right.

There are currently no known chronic wastewater treatment system

malfunctions. The Dare County Health Department handles septic system permitting and inspections.

There are currently no watershed restoration or management plans that identify Total Maximum Daily Loads (TMDLs) for the Currituck Sound near Duck. On the sound-side, the water is significantly fresh enough that it does not support oysters. These waters are also listed as closed for shellfishing by the state.

There are also large tracts of submerged aquatic vegetation (SAV) in the sound, which is an important habitat type and indicates decent to good water quality. Although much of the SAV in this area is exotic species, it is still important for water quality and habitat.

There are no 303(d) listed water bodies in Duck's jurisdiction.

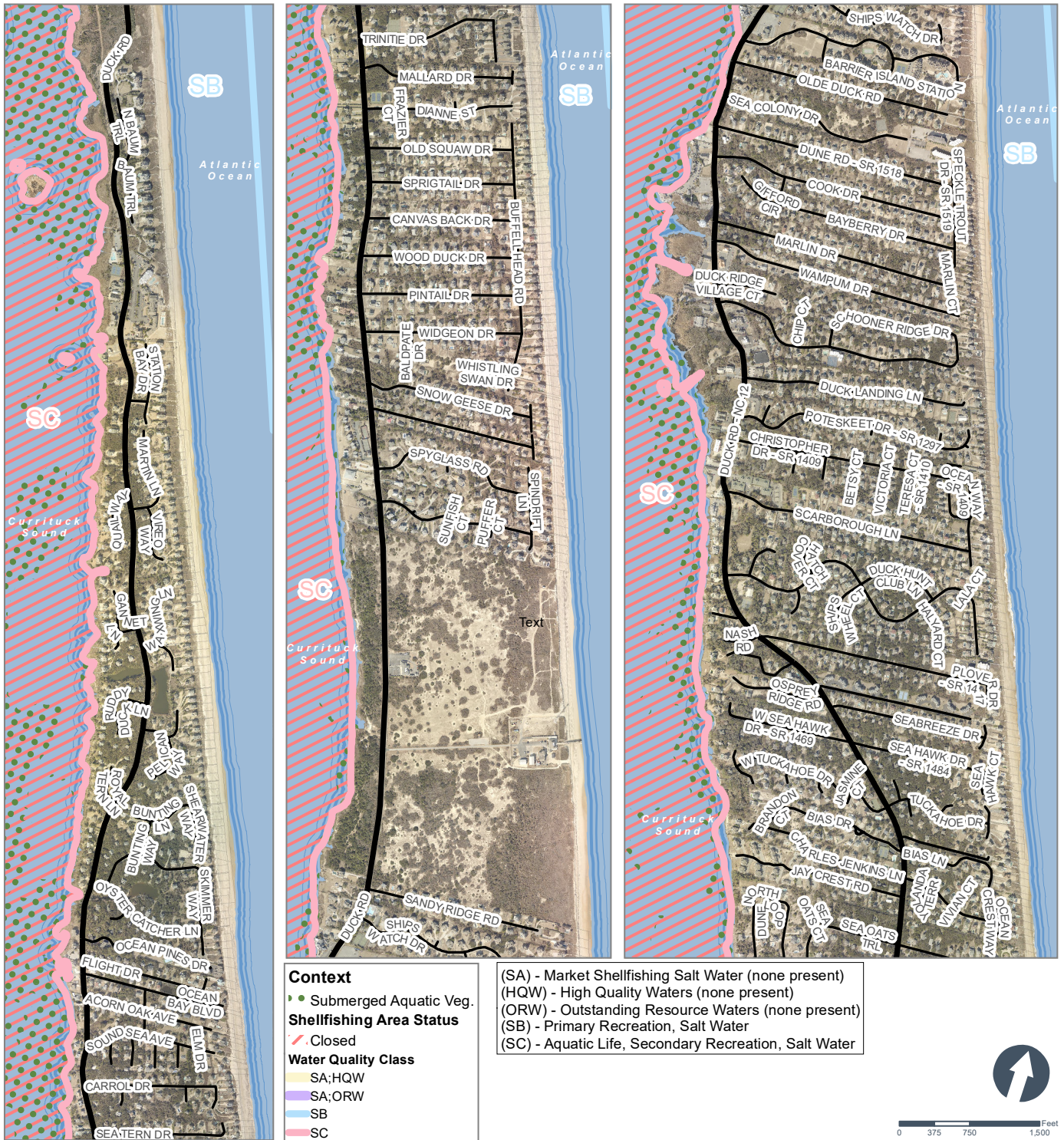
There are no identified impaired streams or changes in surface water quality (currently identified as SC) for subbasin 03-01-56 in the 2007 Pasquotank River Basinwide Water Quality Plan.

There are no identified areas experiencing water quality or public health problems related to non-point source pollution.

Waters of the Town of Duck		
Symbol	Description	Location
SB	Tidal Salt Waters (Primary Recreation)	Ocean
SC	Tidal Salt Waters (Secondary Recreation - minimal skin contact)	Currituck Sound

Source: NC Division of Water Resources (DWR)

Water Quality and Shellfish Map



Shellfishing waters, submerged aquatic habitat, and water quality.

3: Existing and Emerging Conditions

Hazards, Storm Surge, and Flooding

A fairly high bluff runs through the southern and middle portions of town, and the northern area is slightly more low lying. The more developed area on either side of Duck Road is fairly susceptible to storm surge from storms in the Currituck Sound and some areas are known to flood during those storms. Compared to communities on the Outer Banks, the ocean side has high dunes and is fairly resistant to storm surge from storms in the Atlantic. Flooding events will likely increase as seas continue to rise.

Other areas of stormwater flooding concern were identified by the community during the public open house workshop. These areas are often on private property or on private roads. Previously, the Town has collaborated with NCDOT to solve localized flooding problems on Duck Road.

No particular area of town is more susceptible to high winds than any other portion of town. The water tower is the tallest structure.

STORM EVENTS

Probabilities for different intensity of storm events through time.

	Probability of at least one storm event				
	1 Year	10 Years	30 Years	50 Years	100 Years
1-in-10 year storm	10.0%	65.1%	95.8%	99.5%	99.9%
1-in-50 year storm	2.0%	18.3%	45.5%	63.6%	86.7%
1-in-100 year storm	1.0%	9.6%	26.0%	39.5%	63.4%
1-in-500 year storm	0.2%	2.0%	5.8%	9.5%	18.1%
1-in-1,000 year storm	0.1%	1.0%	3.0%	4.9%	9.5%
			<i>Length of typical mortgage</i>	<i>Within lifespan of most structures</i>	<i>Within lifespan of sturdy structures</i>

Vulnerability and a Changing Climate

For the past nine decades, seas have been rising in the Duck area, as recorded at the USGS tide gauge in Sewell's Point in nearby Virginia. Combined with locally significant land subsidence, the relative sea level rise is projected to be greater than along other stretches of the Atlantic coast. Recent evidence also suggests that global greenhouse gas emissions are not being effectively curtailed, which indicates that seas will continue to rise and likely at an increasing rate. (Source: Intergovernmental Panel on Climate Change. 2018. Special Report, and sealevelrise.org/states/northcarolina)

A warmer atmosphere also holds more moisture. Scientists predict (and recent observations have begun to corroborate) that this will mean that future storms will carry and drop more rainfall. It then follows



Observed sea levels near Duck have risen an average of:

1.82 inches per decade at Duck USACE station, since 1978

1.85 inches per decade at Oregon inlet, since 1977

1.83 inches per decade at Sewell's Point, VA since 1927

Source: NOAA tide gauge data

Modeled Storm Surge Inundation



Potential susceptibility to storm surge varies depending on location.

3: Existing and Emerging Conditions

that nuisance and damaging stormwater flooding events will increase and be more severe up and down the coast.

A warmer ocean surface also has the potential to foster stronger storms. The storms of the future will be stronger than those of the present. Stronger winds from these storms may lead to greater debris cleanup and tree maintenance needs. It is possible that at some time in the future a particularly powerful storm may create a new inlet, which may have significant effects on the Currituck Sound if salt water influx increases.

Severe heat days are also predicted to be more common in the future. This will present hazards to people partaking in outdoor activities.

Rising seas and consequently higher water tables will also impede the ability of septic systems to function. Underground salt water intrusion or overwash from storm-driven waves into areas where infrastructure exists (pipes, wires, foundations, parking areas, etc.) has the potential to reduce the operational lifespan of those facilities and lead to increased maintenance costs.

Flood zones will continue to move upland as seas rise. This may lead to a future condition where many structures are not adequately protected from flooding or do not meet best practices for building code standards.

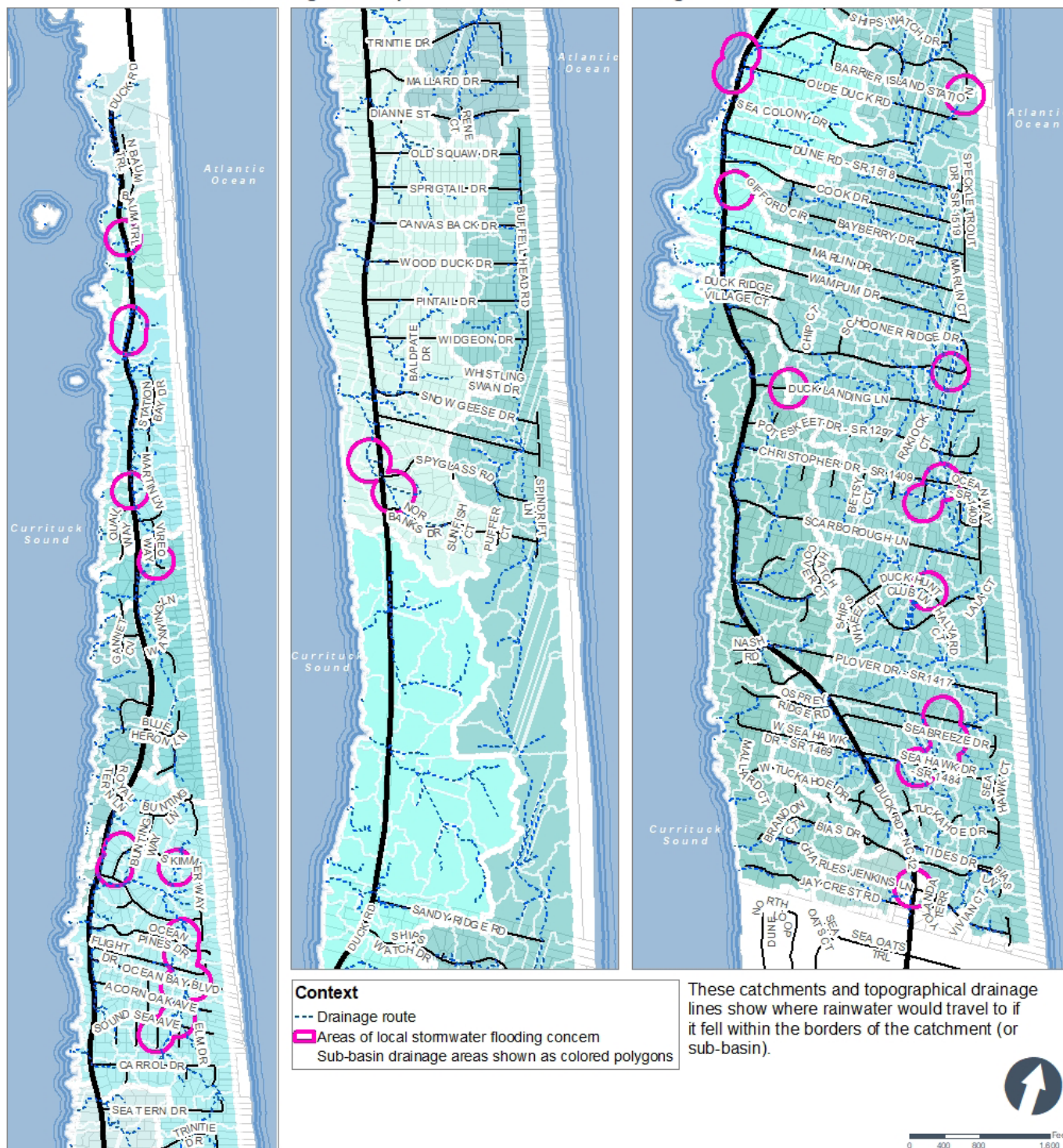
Local Stormwater Flooding Concerns

At the public open house meeting, attendees were asked to mark areas where they have knowledge of flooding or stormwater back up concerns. These areas were marked on a map that was created from topographical data and shows linked drainage catchments in the town. This information can be used by private citizens, contractors, and others to identify solutions to these local stormwater flooding issues. Local officials also confirmed that the portion of Duck Road north of the village and south of the USACE property has a tendency to experience overwash from the sound during strong southwesterly storms.

Identified Flood Zones

Per the National Flood Insurance Program map, the oceanfront VE (Velocity Hazard from storm waves) Zone & sound front AE (1% chance of flooding annually) zone within the study area are vulnerable to erosion and flood hazards, especially during winter storm events and hurricanes. VE zones are located for the entirety of the Atlantic Coast of Duck and include residential parcels. AE zones are found long the Currituck sound and largely do not overlap with land mass. A full map of the FEMA Flood Hazard Areas can be found in Appendix H.

Drainage Analysis and Local Flooding Concerns



Community identified areas of flooding concern from the public meeting are overlain on a catchment analysis that shows where rainwater flows along drainages. This information can be used to identify candidate locations for wetland restoration or green stormwater infrastructure where the drainage lines intersect public land, common areas, vacant parcels, or rights-of-way.

3: Existing and Emerging Conditions

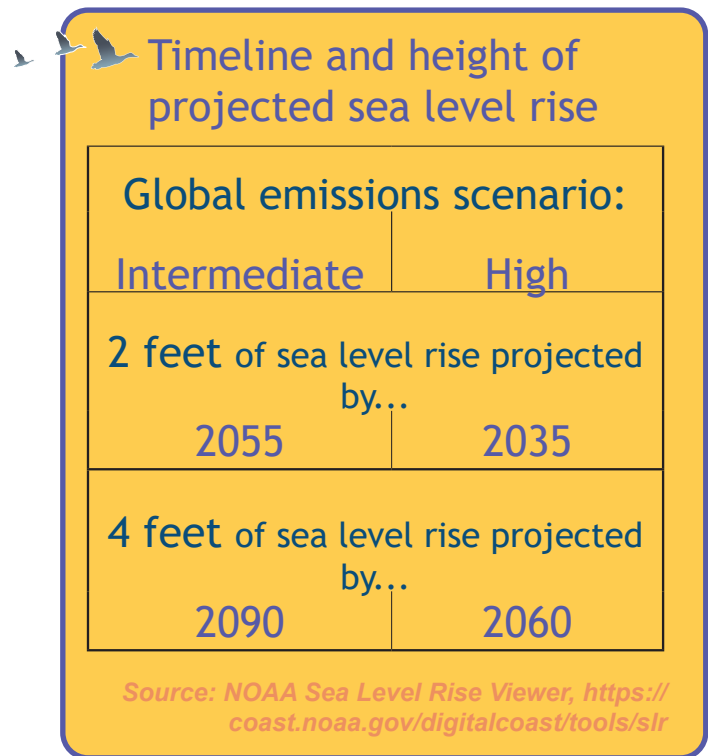
NOAA Sea Level Rise Projections

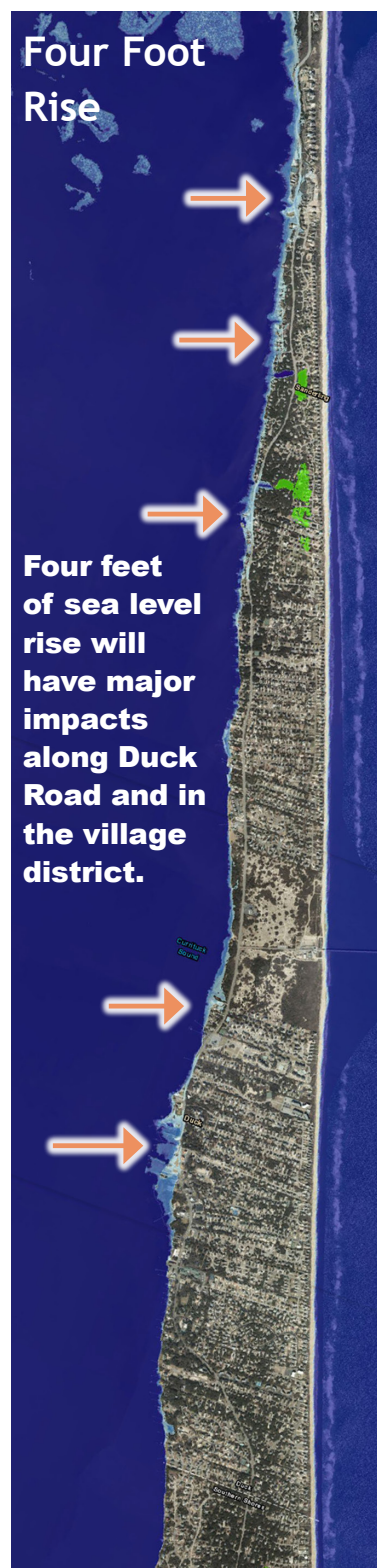
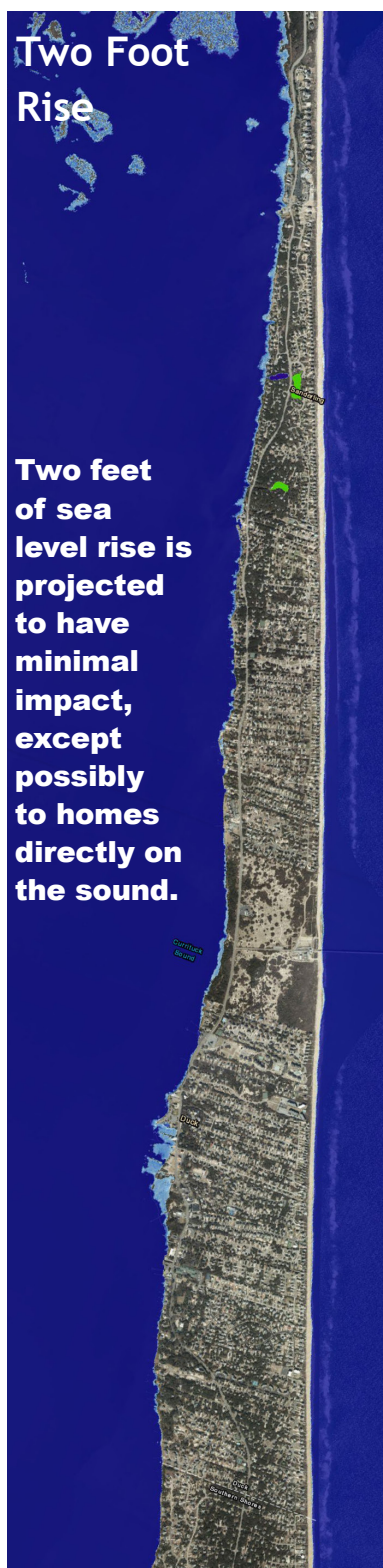
As seas rise globally, the Town of Duck is also threatened by local land subsidence, which means that the land is submerging even faster than in other locations on the east coast. Understanding and preparing for these threats using the best available data and projections can help the community mitigate the negative impacts of sea level rise.

Unless mitigating actions are taken, The National Oceanic and Atmospheric Administration (NOAA) projects that sea level rise will cause chronic inundation of some properties, with major impacts possibly occurring as early as 2060. Though 2060 is beyond the horizon of this plan, it is still relevant to long-range decision-making. Many of the structures constructed and renovated today have lifespans beyond 50 years. The best available projections from NOAA indicate the following potential sea level rise scenarios, based on worldwide carbon emissions rates:

- » **Intermediate Scenario:** Seas are 1.87 feet higher by 2060 (2' rise shown in graphic to the right)
- » **High Scenario:** Seas are 3.67 feet higher by 2060 (4' rise shown in graphic to the right)

Source: NOAA Sea Level Rise Viewer (<https://coast.noaa.gov/digitalcoast/tools/slr>).





Scenarios for future sea level rise are shown: Two feet rise (on the left) and four feet rise (on the right). Depending on factors outside of local control, these might be a reality in as little as 15 to 40 years. Source: NOAA SLR Viewer, <https://coast.noaa.gov/digitalcoast/tools/slr>

3: Existing and Emerging Conditions

Community Facilities

Water Supply & Wastewater Systems

Wastewater Treatment

There is no sewer infrastructure in the town, and all wastewater is treated onsite (or nearby) via septic systems, and as such, it is not feasible to know the condition or capacity of such systems. There are a very minimal number of community

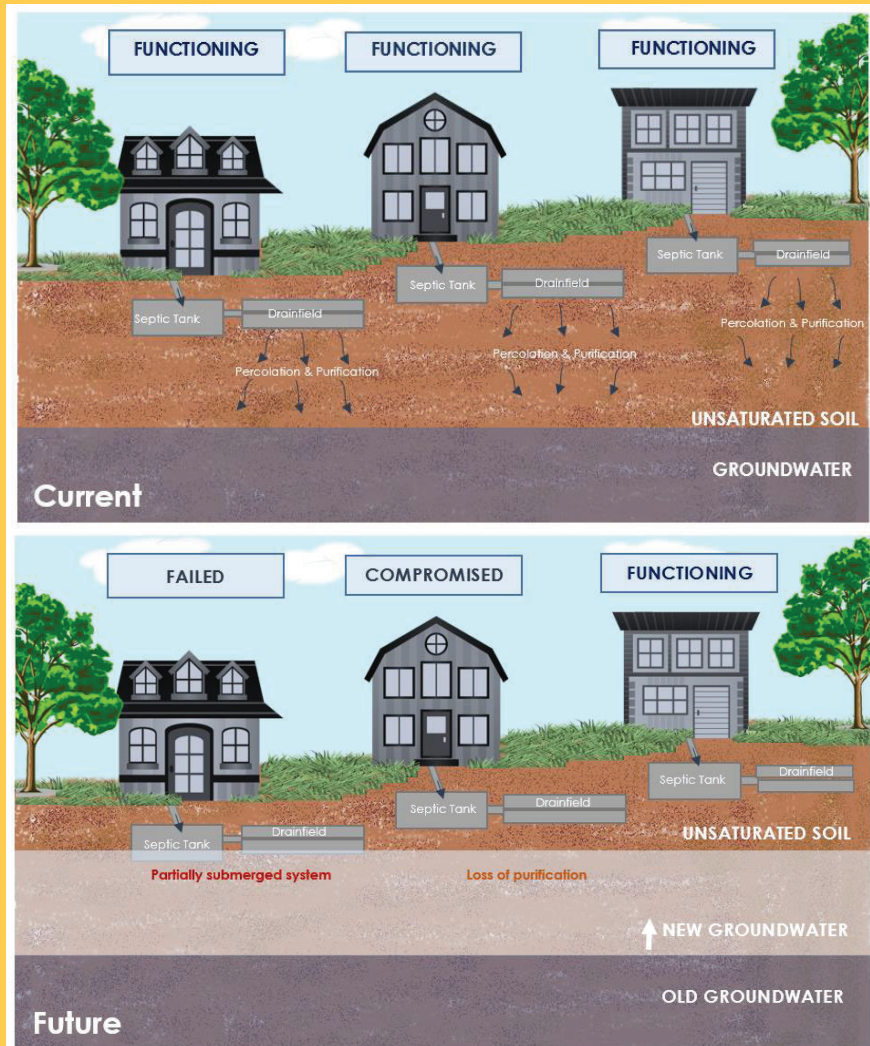
septic facilities. Development in the town is limited by the available land for septic facilities, and future population projections are dependent on development of septic facilities. As mentioned previously, available land for septic system expansion is very limited.

As seas rise, steps will need to be taken to ensure the proper function of septic system on low-lying properties. Elevation modeling can help identify potential problem areas. Wastewater that is not fully



If septic systems are not properly maintained or lack adequate separation from ground water, they can transmit insufficiently treated wastewater into nearby water bodies. This nutrient pollution can lead to excessive algae growth and degradation of the waters that support local quality of life, economy, and property values.

Source: *Septic Systems Vulnerable to Sea Level Rise* (Nov. 2018), Miami-Dade County, FL (Dr. Samir Elmir)



Digital Elevation Model with Areas of Potential Future Septic Failure (at 2' SLR)



Modeling and monitoring can help identify where rising seas might pose a unique challenge for septic-reliant coastal communities.

3: Existing and Emerging Conditions

treated can pollute local waters, which may lead to health and environmental impacts and/or property value declines.

One private onsite community septic system exists at the Sanderling Resort. The Resort has an agreement with Pine Island for interconnection. There are no known capacity issues or plans for expansion.

Wellhead Protection Areas and Drinking Water

Within the Town of Duck, there is no water supply protection, recharge, or harvesting infrastructure. The town's water comes from the Dare County Water Department well in Kitty Hawk and is piped north to the water tower and customers in the town. Based on information from the Dare County Regional Water System Local Water Supply Plan (<https://www.ncwater.org/WUDC/app/LWSP/report.php?pwsid=04-28-030&year=2020>, 2020) and interview with the representative of the Dare County Water Department, the water supply infrastructure is in good condition. Demand is highest during the summer tourist season, which has pushed demand as high as 6.0 MGD during the busiest seasons. This particular water plant has a production capacity of 5.0 million gallons per day (MGD) with potential to accommodate expansions that would bring it up to 8.0 MGD (Dare County Regional Water System Northern Beaches Capacity Increase Study, 2012) Based on the Dare County Water Department population projections, the Dare County Water demand will increase by 2.0 MGD between its two plants for its total service area.

The projected population counts used by the County Water Department are higher than the project projections in pages 46-47. Based on the permanent and seasonal population projections from pages 46-47, and the Dare County Water Department estimate of 73.5 gallons/per day/ per resident, Duck will require an estimated 1.64 MGD in the peak season in 2030, including 33,300 gallons per day for the permanent population.

There are no private water supply systems in town and no documented issues such as overflows.

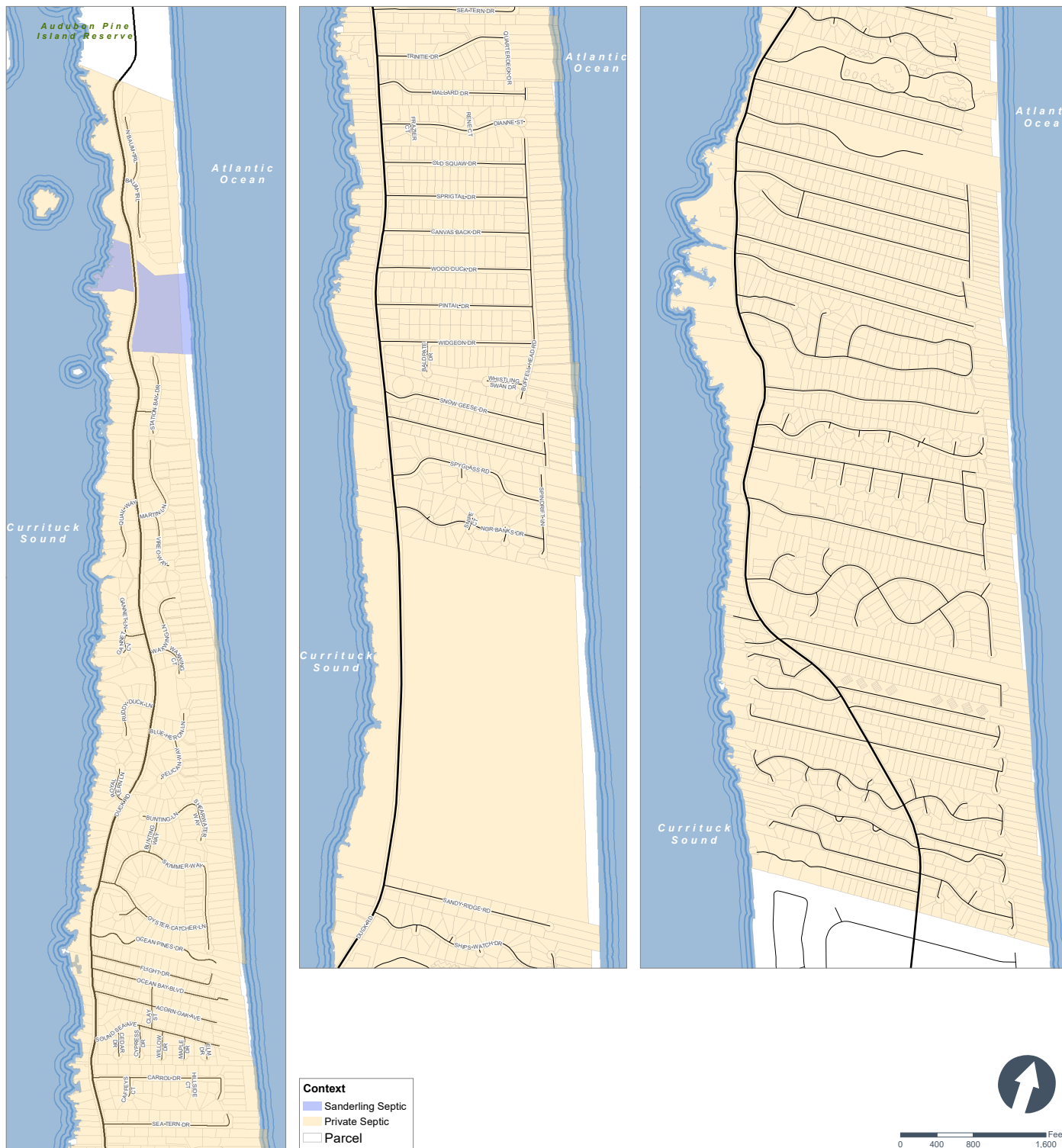
Stormwater Systems

There are a few Town-owned stormwater conveyance systems, mostly retroactively installed in response to nuisance flooding issues identified by locals. Most stormwater is handled by ditches in NCDOT or private rights-of-way. The Town has a successful track record of teaming with other organizations (usually NCDOT) to achieve these successes. Each project has successfully alleviated the original issue. No drainage problems or water quality issues specific to point-source discharge has been identified.

Electrical System

The town's electricity is provided from an electric substation to the south. A future additional substation in the north may be added by Dominion Energy after the Mid-Currituck Bridge, which could provide added redundancy.

Wastewater Service



The whole Town is under private septic service, with the Sanderling Resort as the sole exception.

3: Existing and Emerging Conditions

Parks and Open Space

Beaches and waterways

The Town provides access to the Currituck Sound at several locations along the boardwalk. Access to the ocean is generally from private neighborhoods on their privately maintained access points. Options for new public access points were severely limited before Duck was even incorporated, mostly due to subdivisions and land use decisions that occurred when the land was under the jurisdiction of the County.

Parks

The Town has purchased and developed a community property in the Village District along Duck Road. This property includes Town Hall, Town Park, a stage, amphitheater, boardwalk with kayak launch, nature trail, picnicking areas, a playground, parking lot, town staff offices, and community meeting hall. Citizens and visitors appreciate the events and programs in this public space. Some private neighborhoods also have recreational facilities.

Greenways and Trails

The Town has aggressively pursued implementation of their Pedestrian Plan and have achieved great success in improving the pedestrian realm. The town has heavily invested

in bicycle and pedestrian upgrades, particularly in the Village District. These improvements have been well received by visitors and residents.

Other areas

United States Army Corps of Engineers (USACE) Coastal and Hydraulics Field Research Facility

The only coastal federal USACE research facility on the east coast is in Duck. It currently houses about 20 researchers and



Public beach access in Duck.

Constraints:

- Nearly all oceanfront lots are already developed
- All access is through private neighborhoods
- Legislation passed at the state level specifically omits the language necessary to enable the Town to condemn land for public beach access
- Infringement on Homeowners Associations covenants and/or deed restrictions is extremely infeasible
- Unwilling public (USACE) and private (landowners) partners stifle options

Other considerations:

- Vast majority of properties (~95%) already have private access
- Only local funding sources used for beach nourishment
- Only local funds planned for beach maintenance

staff and has plans to expand and add another dozen or so personnel. In the past, some public access to the ocean was provided here, but that privilege has since been removed except for emergency and surf rescue services and there are no plans to provide beach or sound access on the property. It is now reserved exclusively for research activities.

Audubon Pine Island Reserve

Although not within town limits, this major natural resource borders the northern edge of Duck. It provides a large natural refuge for animals, plants, fishes, and other critters. In order to remain functioning, the Reserve has plans in place to elevate and relocate structures as seas continue to rise.



Approximately 95% of residential lots in Duck have some form of access to the ocean.

The few neighborhoods without dedicated access to the ocean include:

- Duck Ridge Village
- Founders Ridge
- Jay Crest
- Nantucket Village
- Osprey Ridge
- West Winds
- and a handful of Sound-front homes

Public access to the Sound is available in multiple locations along the Duck boardwalk.

3: Existing and Emerging Conditions

Historic, Cultural, & Scenic Areas

There are no state-designated historical, cultural, or scenic areas in the town. An old cemetery has been preserved at Town Park. State-identified (<https://www.ncdcr.gov/about/history/division-historical-resources>) resources include:

- » Caffey's Inlet Lifesaving Station
- » Larmore House, at 108 Acorn Oak Drive
- » (former) Emerson Rogers House
- » (former) Duck Post Office

Town Hall and its surrounding facilities form the unofficial cultural center of Duck. It hosts the Bias Speaker Series, a rotating art gallery that is free and open to the public, and other classes and events on the grounds. Additionally, organizations such as HOAs utilize the town meeting spaces regularly.



Caffey's lifesaving station. Source: Historic Architecture Research. Project Records (UA110.041), Special Collections Research Center

Transportation Systems

The Town does not own any roads or rights-of-way - they are all either private or NCDOT roads, and these entities are responsible for their maintenance. North-to-south connectivity is limited primarily to Duck Road. During high water storm events, it is possible to get overwash onto sections of Duck Road.

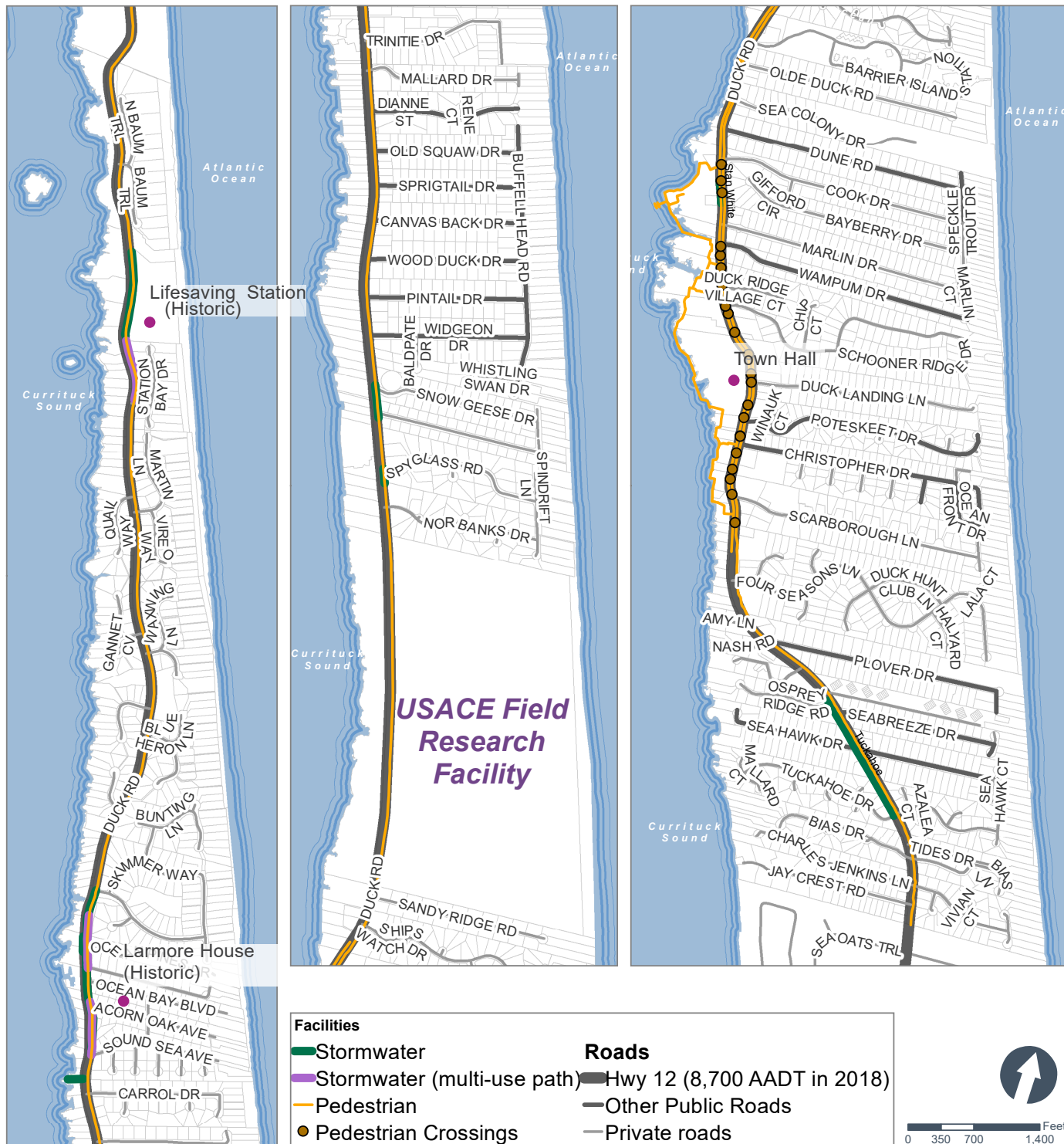
Traffic in Duck is congested due to through traffic on NC-12. Congestion is heaviest during the tourist season.

The Mid-Currituck Bridge north of town is planned and officially supported by the Town. It would provide an additional connection from Corolla to the mainland at Aydlett. This bridge is outside of the town limits of Duck, but is anticipated to significantly reduce thru-traffic in the town, per the "Mid-Currituck Bridge Traffic and Revenue Forecasts" report produced by the Currituck Development Group in 2011. This report states that NC-12 experiences a Level of Service of E or F in Duck in the summer months, and predicts that by 2035, will be operating at an LOS F during the summer without the bridge project. The 2015 Dare County CTP recommends NC-12 for future bus service. It also states that the portion of NC-12 in Duck is near capacity as of 2012, with a small portion over capacity. It is projected to be over capacity in 2035.

With Duck Road serving as the main spine of the Town's transportation network, supported by a system of primarily private road, land use follows a strict pattern: residential uses on the private roads, and most all other uses along Duck road.

There are no ports or airports in the town.

Transportation Systems and Stormwater Facilities



Primarily due to land use and subdivision decisions made prior to the town's incorporation, vehicular connectivity between neighborhoods is limited and north-south connectivity is primarily achieved along Duck Road. Pedestrian connectivity is somewhat less limited, and recent improvements have helped. A larger version of this map is available on page 160-161.

3: Existing and Emerging Conditions

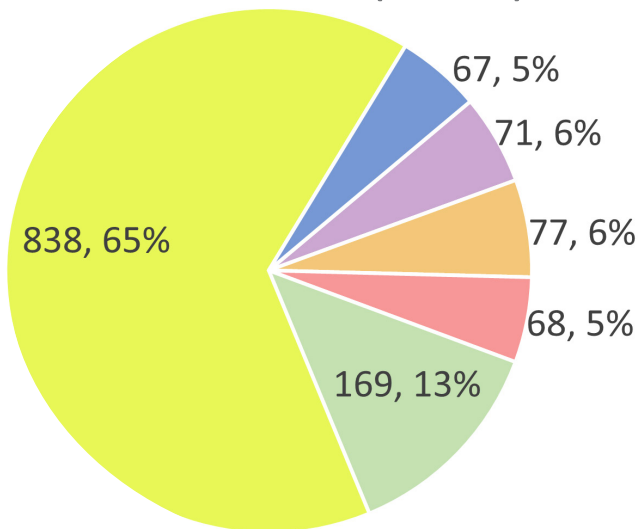
Existing Land Use & Development

Existing Land Use and Tax Value Patterns

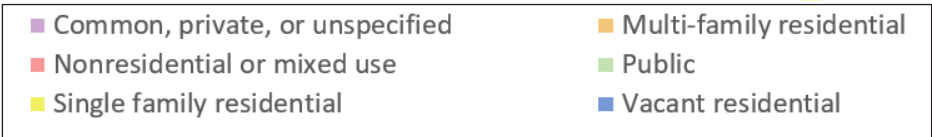
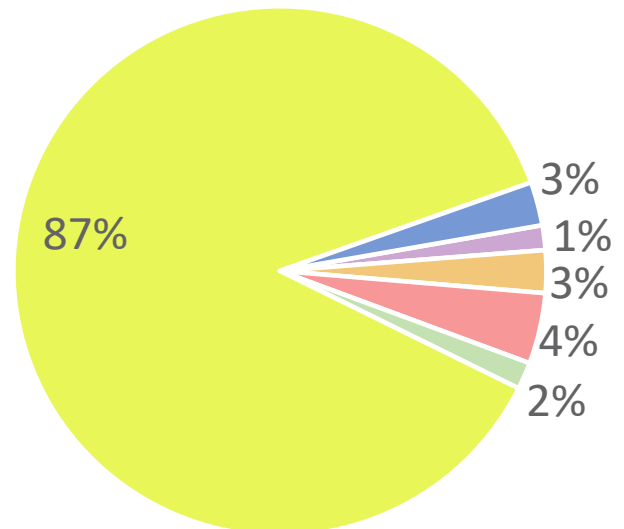
The Town of Duck stretches from the Currituck Sound on the west to the Atlantic Ocean on the east, and from the county line on the north to the Town of Southern Shores on the south. Like many towns, the majority of the area is occupied by single family residential homes, with additional multi-family residential at select locations. A majority of commercial uses are centrally located in Duck Village with several small commercial nodes located north of the Village along Duck Road. There are two large areas of publicly-owned land - one is the Town Hall and town park, and the other is the USACE Field Research Facility.

The majority of the town's taxable property value lies in residential uses, with the vast majority of that within single family residential properties. Most of these neighborhoods have private streets and/or homeowner's associations. The short-term rentals within many of these homes also drives local sales tax and economic activity. Publicly-owned properties (like the USACE facility) do not contribute tax dollars directly to the Town's coffers.

Land area (acres)



Total tax value



Existing Land Use

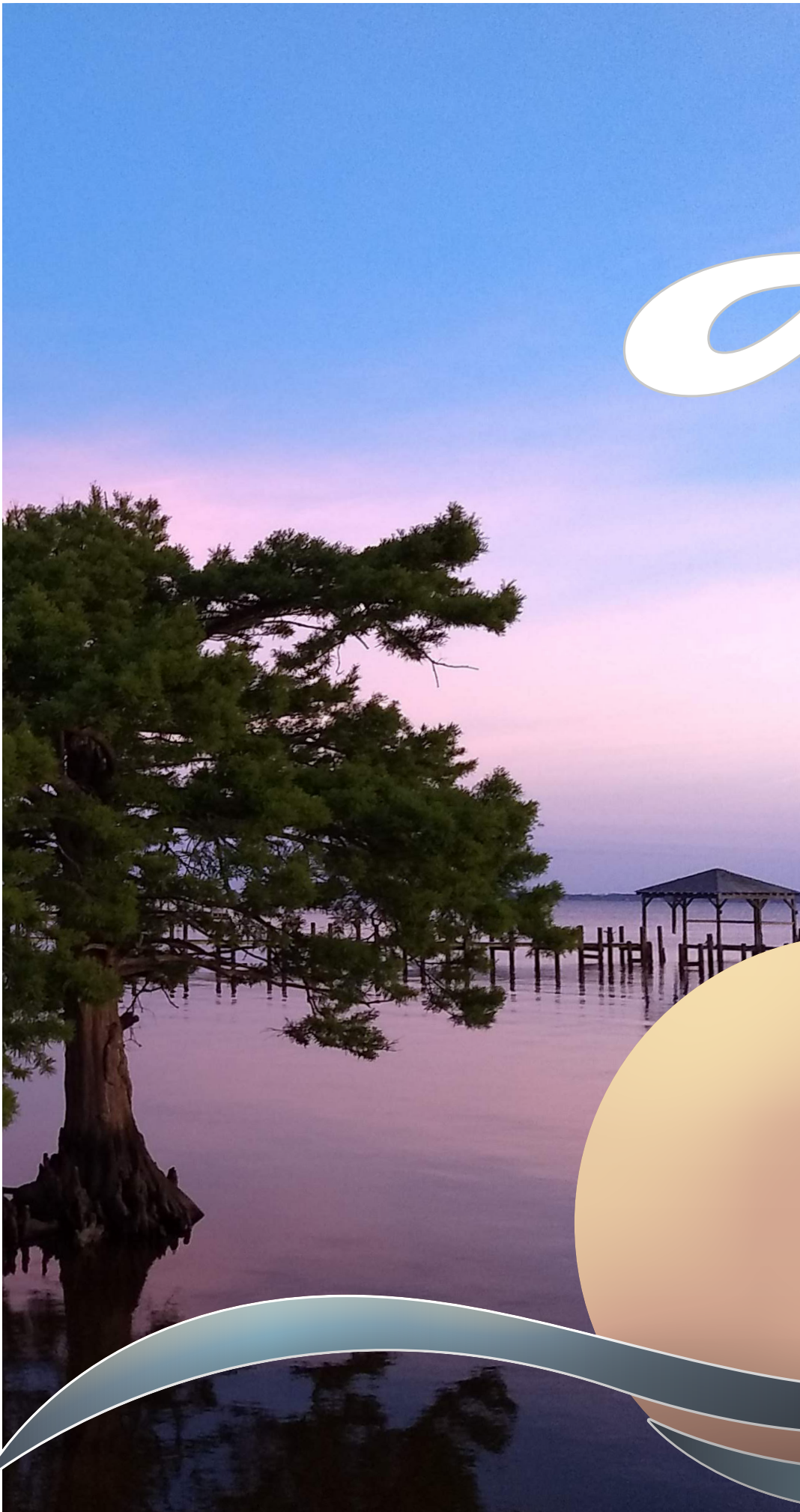


Existing Land Use was determined using current tax parcel data and fact-checked by local knowledge. A larger version of this map is available in Appendix H.

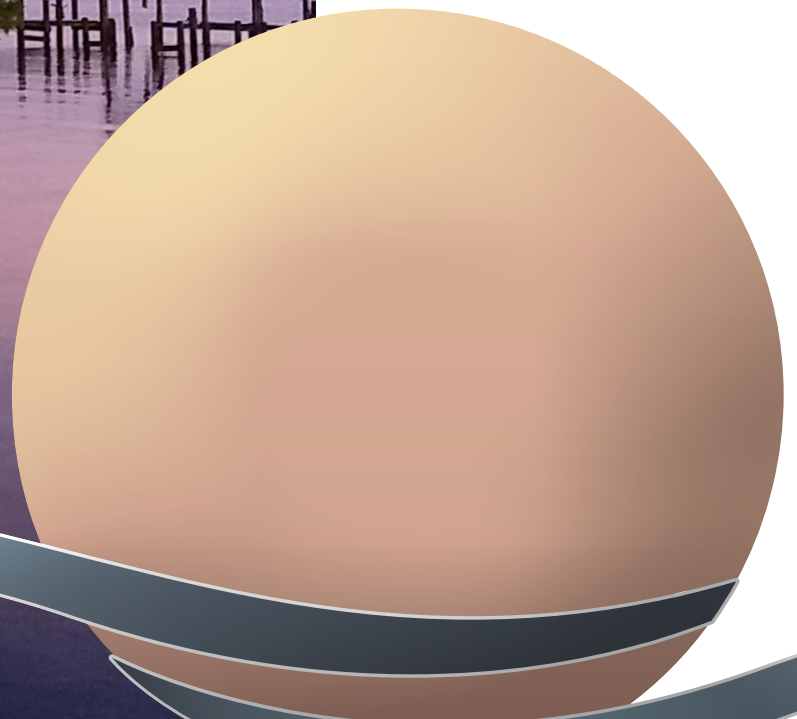
3: Existing and Emerging Conditions

Existing Land Use Descriptions		
Symbol	Characteristics	Associated Existing Character Area
Single Family Residential	Single family homes, sometimes elevated. Primarily found in private developments. Detached homes in Duck represent over 65% of the land area. While there are some single story homes, many have two to three stories of livable space set over a parking area.	Single Family Residential
Multifamily Residential	Apartment, condo, or townhome-style residences with common open space and shared parking.	Attached Residential
Commercial or Mixed Use	These parcels frequently house commercial recreational uses between Duck Road and the Currituck Sound. Buildings are stylishly coastal and are generally no more than two stories high. The structures are set back from the street to allow for access to the water. This use also includes The Sanderling and other resort areas.	Roadside Commercial, Duck Village, Sanderling Resort
Public	Public land is very limited in Duck. It is primarily composed of the USACE Research Facility land and some open space around Duck Town Hall.	Recreation, Other
Common, private, or unspecified	This land is primarily space dedicated to utilities or recreation amenities that are private to HOAs.	Duck Village, Single Family Residential, other
Vacant Residential	Vacant homes among single family residential parcels	Single Family Residential

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A





Appendix A: The Plan Development Process

Update Process and Schedule

The Town of Duck began updating its Comprehensive and CAMA Land Use Plan in May of 2019. The plan will build on the visioning and goals work already performed in 2017. Feedback from stakeholders, members of the public, and elected and appointed officials was essential to plan development. The basic process used for updating the plan is recorded here.

Project schedule

2019

2020

PHASE	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
1. PROJECT INITIATION	■														
2. INVENTORY & ANALYSIS		■													
3. PLAN DEVELOPMENT & REVIEW				■											
4. IMPLEMENTATION & ADOPTION											■				

Appendix A: The Plan Development Process

The people:

Town Staff



There is no substitute for the in-depth local knowledge and expertise that these professionals provide.

Stakeholders



One of many stakeholder group meetings.

Advisory Committee



Advisory Committee meeting

The process:

Interviews

Focal groups with subject area expertise share insight and help identify issues and challenges.

Review and Direction

This appointed committee reviews all intermediate work products and guides the information and recommendations produced by the consultant.

The product:

Town Vision & Goals

The town's previous visioning and goal setting provides a firm ground for beginning the plan.

Stakeholder Summary

A summary of the issues and opportunities impacting the community in the current day and near future.

SWOT Analysis

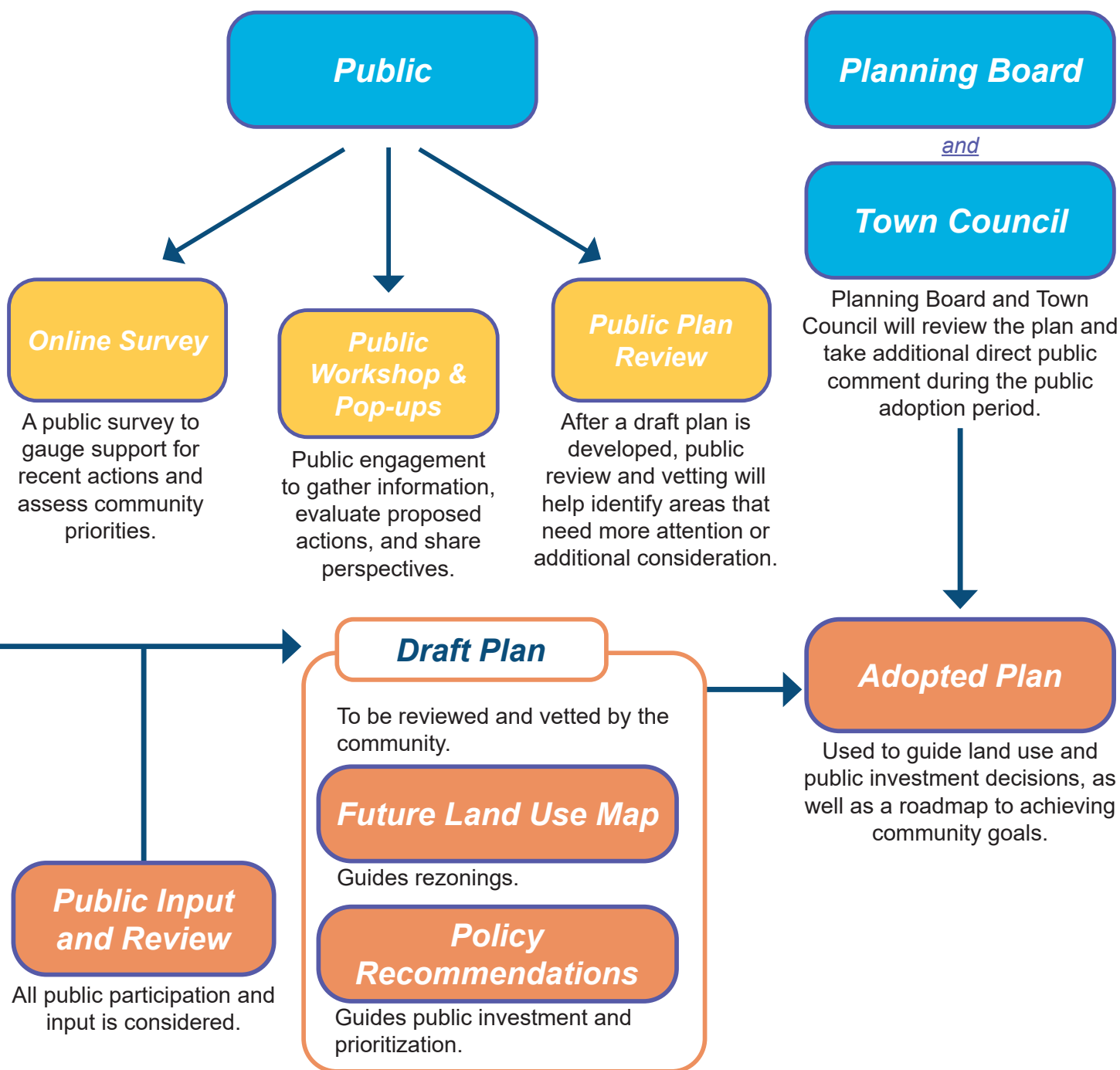
An inventory of the community's Strengths, Weaknesses, Opportunities, and Threats.

Survey Summary

Used to inform recommendations and inquiry.

Supportive actions:

Background Plans & Demographic Research, GIS & Mapping, Asset Inventory, Vulnerability Assessment, Policy & Regulatory Research, Public Comment Compilation, Document Revisions, Character Area Development, Etc.



Summary of outreach record and access

In addition to required legal noticing, the plan update was regularly publicly advertised.

Project hashtag: #DuckLUP

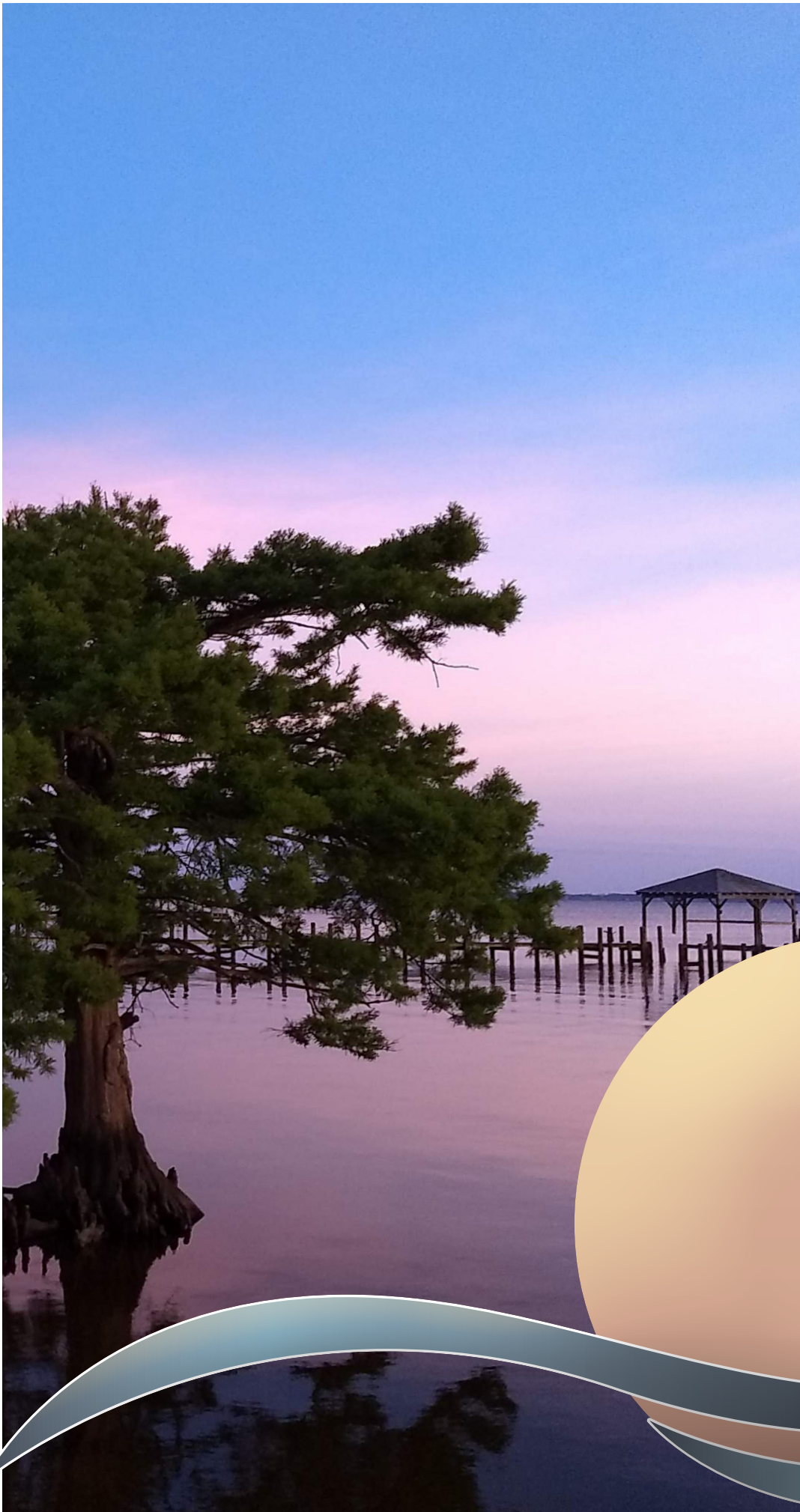
Project website: www.townofduck.com/lup/

Facebook: Town of Duck

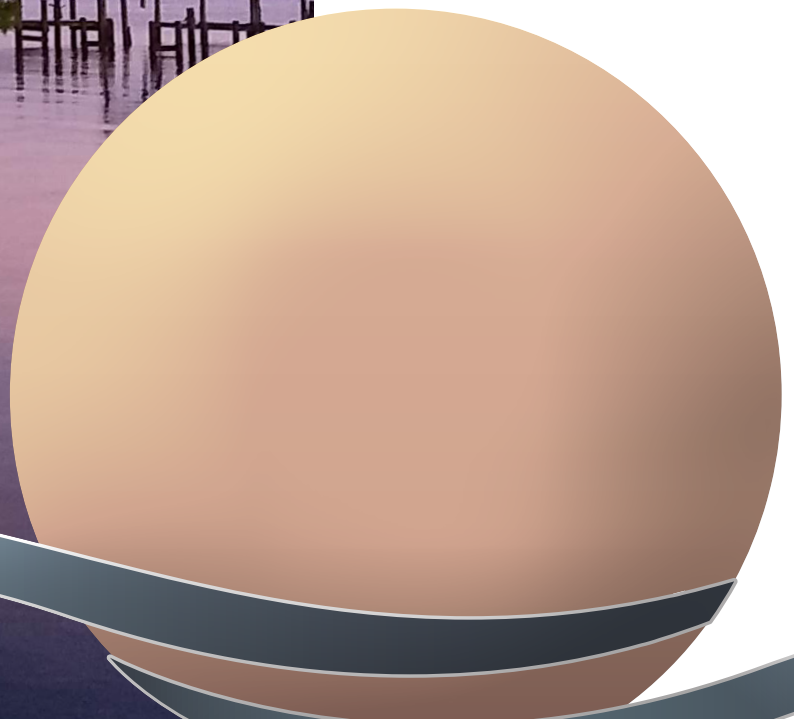
Town's e-newsletter:

Town's Twitter: DuckOBX

www.townofduck.com/duck-nc-newsletter-signup/



B





Appendix B: Stakeholder Interviews

Interview participation

Over an intensive two-day period, representative stakeholders were interviewed to identify opportunities, challenges, issues, values, goals, and priorities for the future of Duck. These views do not represent the town's but are a collection of views from vested parties that work, live, or own or operate property or facilities in the town or greater region.

Representatives were present from each of the following stakeholder groups:

- » Outer Banks Association of Realtors
- » Dare County Environmental Health Department
- » Local Commercial Business Owners
- » NC Division of Coastal Management
- » NCDOT
- » The Sanderling Resort
- » Homebuilders Association
- » Local Homeowners Associations and property managers
- » Residents and members of the community
- » Town staff department heads and associated engineering consultants
- » Local US Army Corp. of Engineers
- » Utility providers (electric and water)
- » Outer Banks Visitors Bureau

Stakeholder input

Walkability

The Town of Duck is very walkable and pedestrian friendly. It is vital that the safety of pedestrians and their experience continues to be prioritized. Crosswalks are being installed in highly traveled intersections. Restrictive parking keeps vehicles in the residential areas while visitors make their way to shops, dining, and the boardwalk on foot. Support for recent pedestrian improvements and the boardwalk is ubiquitous and it is used as a secondary "main street" for foot-traffic to businesses oriented to the Currituck Sound.



Programs and Events

Residents, visitors, and day-trippers treasure the various events and programs put on by the town. These events build the community and social fabric, and volunteer events (like the beach re-vegetation) strengthen coastal environmental resiliency as well as grow the beauty and value of the area.

Traffic Congestion

Duck sits just north of the Wright Memorial Bridge, and traffic headed through town to Corolla often causes significant congestion, especially during the tourist season. Highway NC12 is the only road that passes through the town, which increases visibility and revenue for businesses, but also significantly slows traffic through town and disrupts the town functions.

Public Access to Water

Due primarily to land use decisions made prior to Duck's incorporation, there are no public beach access points. The Town does not currently own or maintain any beach access points, although most homes do have access to the ocean, usually through a shared, private access.

Primary stakeholder concerns:

Pedestrian facilities

Traffic congestion and connectivity

Vacation rentals and housing

Village character

Most of the streets in the town are private and are designed to serve each neighborhood's respective residents, guests, and visitors. To some extent this may add to the town's perception as an exclusive, destination, resort community. Stakeholders recognize that there is no easy solution to this lack of public ocean access. Support may exist for building public beach access in areas where there has

been repeated storm damages/loss, but no opportunities are currently identified and acquisition of property may not be the only hurdle to overcome. Public access to the Currituck Sound is much better, and some interest exists for enhancing that and creating more connectivity between docks and businesses.

Housing

Vacation and rental units make up more than 90% of the housing supply in Duck, and tourism is the economic driver for the town. There are still reasonably sized homes and these quaint beach cottages help define the character of the town's residential neighborhoods, and contribute to its charm. The town has not yet seen the surge in large square footage, multi-bedroom (i.e. - 5 or 6+ bedrooms) vacation rental homes that other towns in the region have experienced. The town's reputation and success have contributed to some expansions of commercial operations that have begun to infringe on their residential neighbors. Balancing the needs of these groups will be a negotiation between close neighbors.



Stormwater and flooding

Coastal resiliency

Programs and events

Balancing uses and expansions

Appendix B: Stakeholder Interviews

Reputation

Duck is recognized nationally (and perhaps internationally) for its reputation and the experience that exists only here. Vacationers and property owners know that there is something special here that is not found anywhere else.

Neighborhood Connectivity

The land use decisions made prior to the town's incorporation have created a series of disconnected neighborhoods. This poses challenges for both traffic congestion as well as EMS/Police/Fire response. Creating connectivity through existing neighborhoods and platted lots is no small feat.



Village Atmosphere

The unique development character and natural features of the town are the foundation for the "Duck Experience" that brings visitors from all over. The walkable village district, restrictions on franchises, natural vegetation and landscaping, and

local flavor all contribute. Town projects that enhance the public realm have coordinated with businesses to create an environment where everyone prospers and make the town unique from everywhere else on the east coast.



Coastal Vulnerability

Rising seas, subsiding land, higher intensity storms, and erosion are issues that threaten the very existence of a town built on a small barrier island bluff. This changing and sometimes violent environment has led to community driven efforts to increase resiliency to these threats, including a very successful beach nourishment and replanting program. Infrastructure needs to be prepared for not only today's storms, but the storms in the future that may be stronger. Loss of wetlands on the Sound side of town has increased vulnerability to storms that come out of the southwest. Residents are very keen on finding and implementing measures that will protect their



investment and lifestyle.

Stormwater and flooding

Rising seas are one thing, but the majority of flooding comes from the increasingly more intense rain storms and is causing regular, localized, nuisance flooding. Previous mitigation along Highway NC12 has been successful, and serves as a model for partnering with the state. However, the artificially high water table created in part by the obligatory use of septic systems means that there is less capacity for stormwater to soak into the ground. Retrofitting stormwater mitigation measures is further complicated by the prevalence of private streets, which leave fewer options for public stormwater interventions.

Parking

A fine balance exists between wanting to accommodate more visitors to businesses and still preserve the walkable experience of the commercial district. Business owners and stakeholders recognize that

tradeoffs and compromise are necessary to maintain the success of the village. Still, a general feeling pervades that there may exist room for improvement, possibly through some type of alternative small-scale transit opportunities.

Balancing Needs

With tourism as the primary economic driver, it is important to balance the needs of residents, business owners, and visitors. The successful commercial district is also seeking ways to enhance businesses that sometimes impact the surrounding residential neighborhoods. With land at a premium, it is important to find ways to maximize investment as well as stay good neighbors.



Appendix B: Stakeholder Interviews

Redevelopment

The majority of the town was already platted and developed before incorporation. Combined with the reliance on on-site septic wastewater treatment, this puts significant limitations on the potential for redevelopment to be more dense. Conversely, this may be the very factor that maintains the town's unique character. Regardless, redevelopment will be the rule as the town moves forward into the future.



Tourism

The Visitor's Bureau participates heavily in local amenity development, including beach nourishment. Among other priorities, the Bureau wants to grow shoulder season visitation and income. They also note the difficulty for workers to find housing close to their jobs, and the problems that are associated - traffic congestion, auto-reliance, etc.

Utilities

Water

The County's maintains a water supply plan that looks forward 60 years, and directs investments to maintain that resource. All water to the town comes from a pump station to the south, where a desalinization well is being upgraded from 10 MGD to 11 MGD. The water tower in Duck is a one million gallon facility with approximately 20 years of anticipated serviceable life remaining from today. An interconnection between Dare and Currituck Counties would provide overall higher resiliency and redundancy, but has yet to be achieved. Maintenance of underground pipes continues to be a concern, especially on the sound side, where erosion and washout are a concern.



Electric

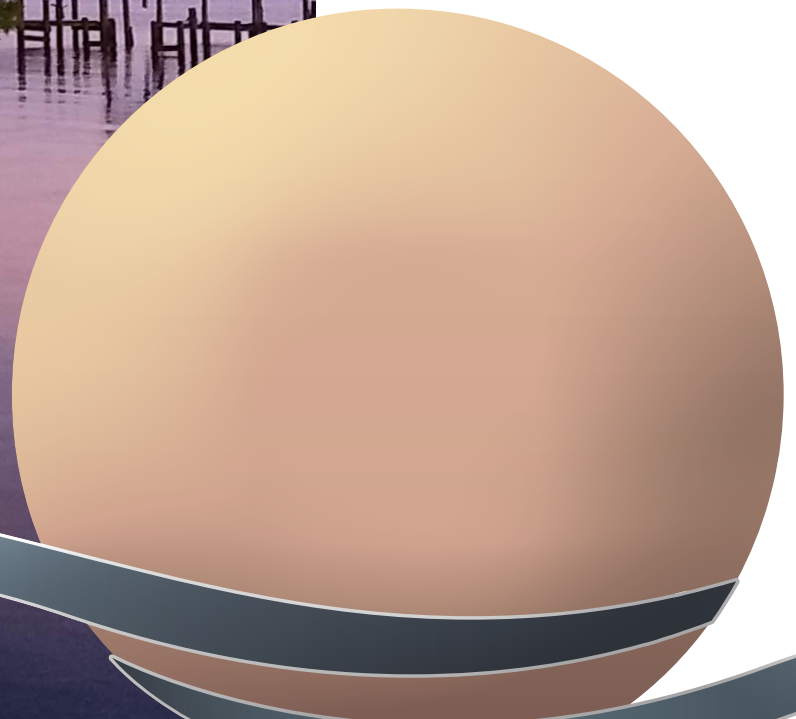
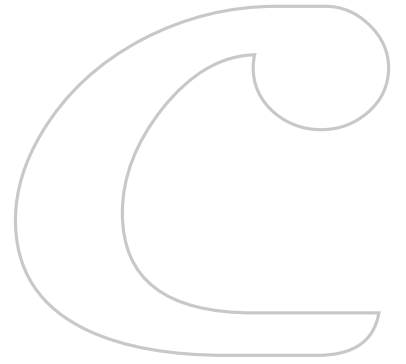
The nearest electric substation is in Kitty Hawk. Dominion Power is researching the impacts expected from the growth in Corolla, and a possible expansion of

service area to the north. In the future, if an electric feeder line is brought from the north it would require a CAMA permit, but could provide additional electric redundancy for the town. Burying electric lines is an expensive endeavor that may increase maintenance costs when shifting sands move or break underground lines.

USACE Research Facility

The U.S. Army Corps. of Engineers Coastal and Hydraulics Laboratory currently employs 24 full-time employees and has plans to expand, including the addition of an annex building. Due to the sensitive nature of the research conducted on site, the facility does not provide public waterfront access and that status is highly unlikely to change. The facility location is unique for a federal research station, and as such is prized.







Appendix C: SWOT Analysis

Strengths, Weaknesses, Opportunities, & Threats (SWOT)

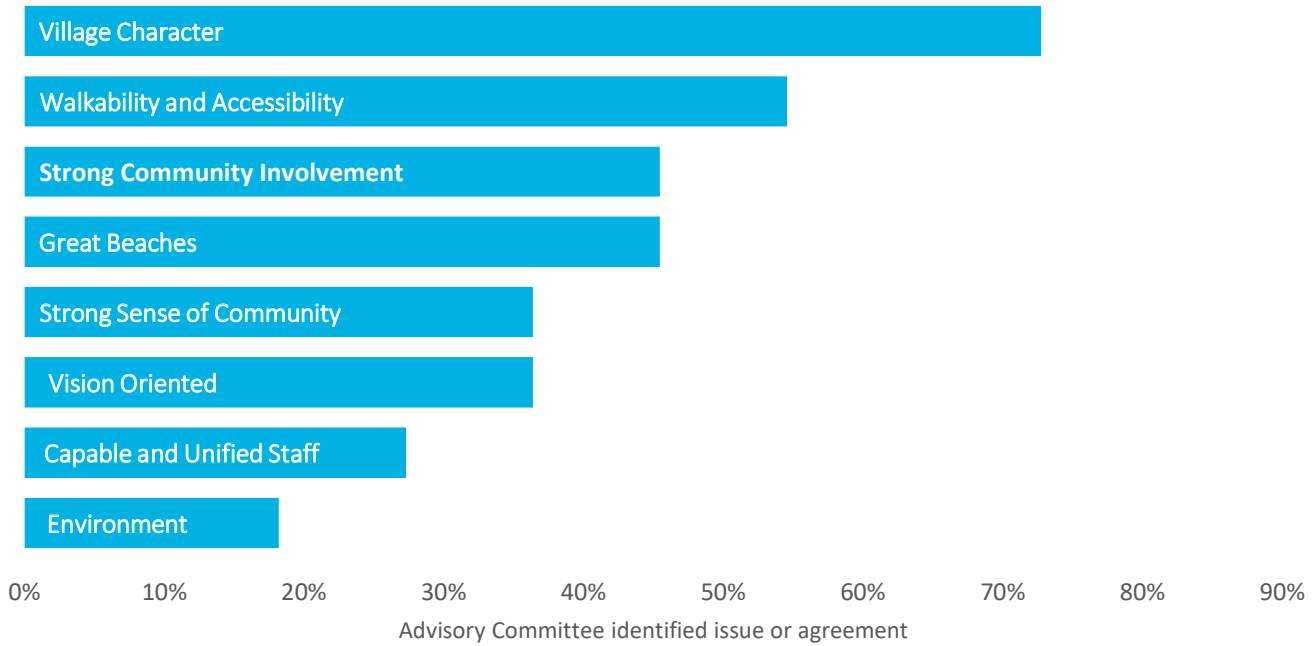
The Council-appointed Advisory Committee is composed of nine community members of diverse perspectives, appointed by the Duck Town Council. Committee members are responsible for guiding the plan update process. Committee members gathered together on May 23rd for a preliminary evaluation and discussion of the community's greatest assets and weaknesses in order to better understand future threats and opportunities.

During the first Advisory Committee meeting for the Comprehensive and CAMA Land Use Plan Update, attendees identified the community's Strengths, Weaknesses, Opportunities, and Threats (SWOT). This conceptual framework is a useful tool for identifying areas for future exploration and analysis. This coarse tool is just a first cut at describing the issues within the community. It was very useful in identifying avenues of future investigation and assessing informational needs that would later be provided by the broader community.

SWOT	Pros / Positive	Cons / Against
Current	Strengths	Weaknesses
Future	Opportunities	Threats

The SWOT conceptual framework.

Strengths



Strengths are assets that make the town attractive. Committee members generally agreed that the greatest strength of the community is its coastal village character and sense of place. This includes the friendly, community-oriented, small-town atmosphere.

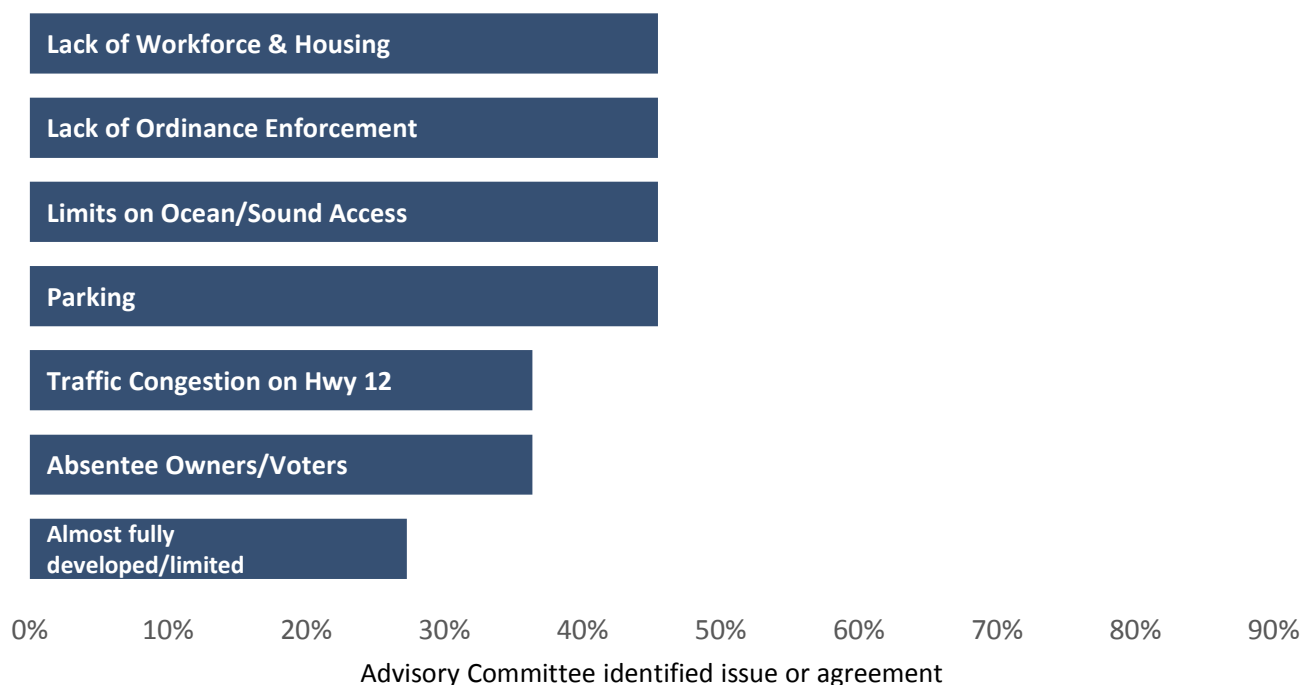
This is supported by strong community involvement in town events and planning efforts. The town's public walkways, boardwalk, and parks are valued as places to gather, socialize, and connect to nature.

*Strengths with only one vote include:

- controlled development, and
- tax base from residential stock



Weaknesses



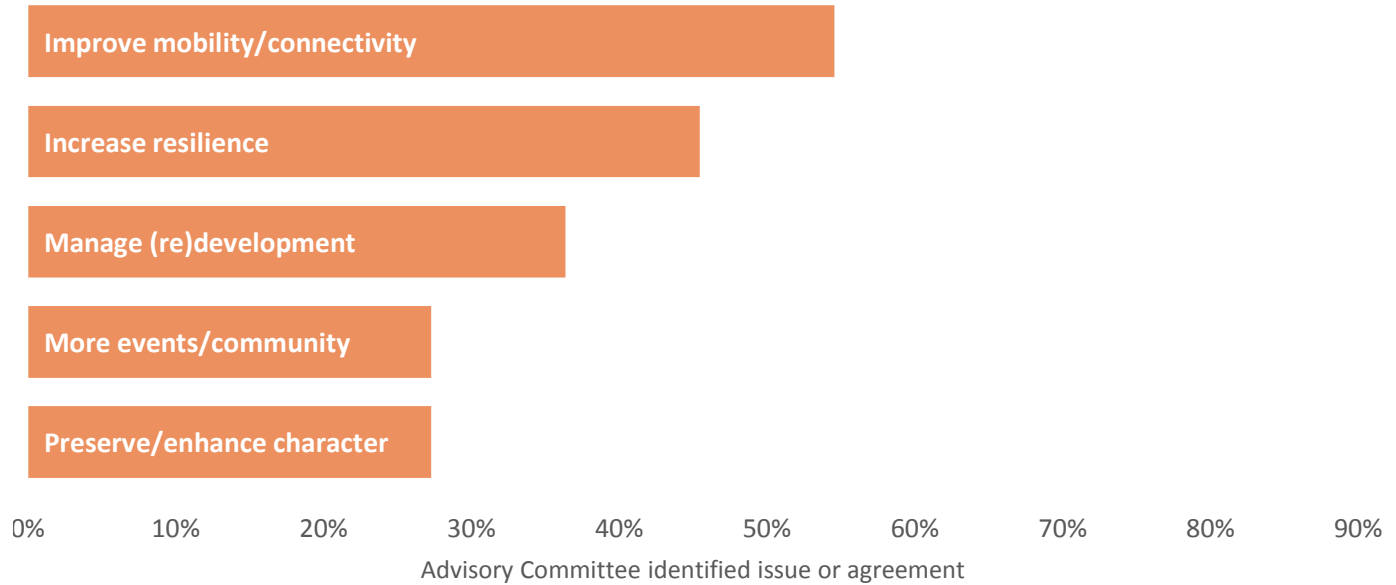
Weaknesses are potential issues that are challenges to be aware of in the planning process. An aging demographic and restricted housing options for workers and their families, space limitations especially relating to parking and redevelopment, and a perceived lack of town ordinance enforcement topped the list. Limits on waterfront access are compounded by land use decisions made prior to incorporation. Challenges with engaging and governing in a unique destination/resort community also were concerns, including traffic congestion.

*Weaknesses with only one vote include:

- stormwater and flooding



Opportunities



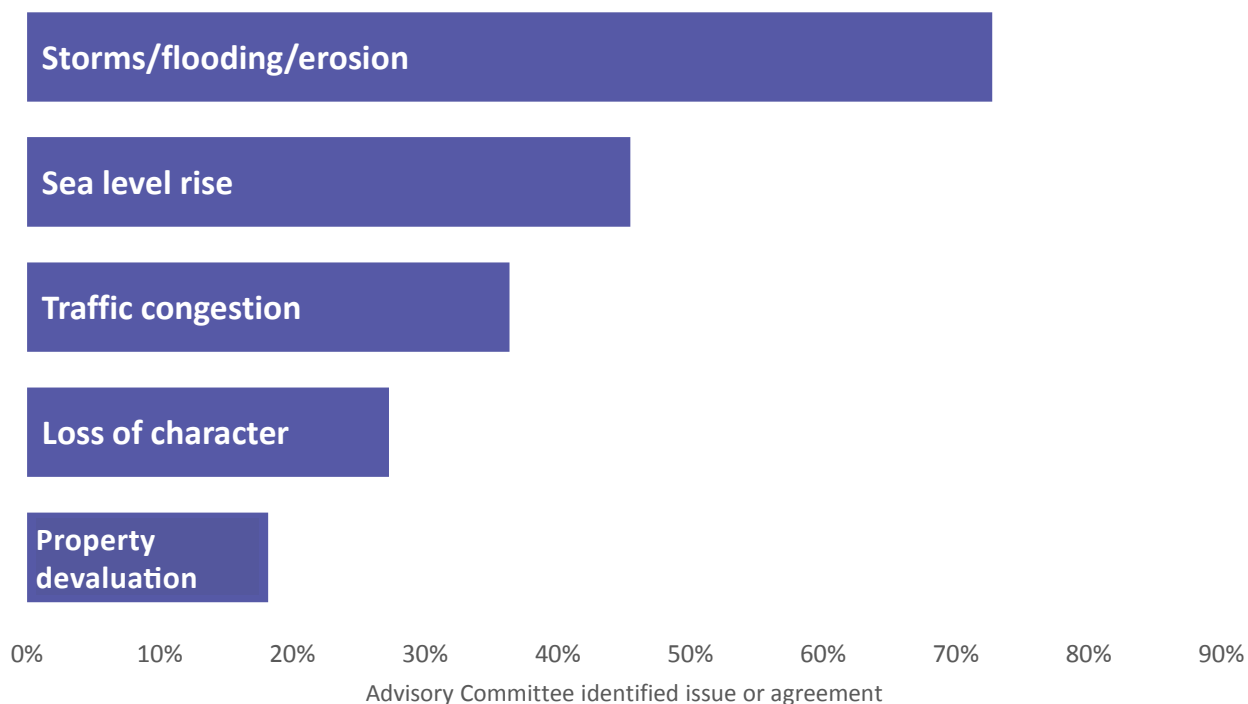
Opportunities are a way to protect or enhance value. The various areas that emerged included the improvement of various mobility options, such as achieving connectivity between subdivisions, expanding bike lanes, and public transportation. Committee members also value preserving and enhancing the Duck experience, through beach nourishment and sound-side protection, and community building events. Resilience was also discussed, which may include storm, flooding, economic, or other hazards requiring planning and/or recovery.

*Opportunities with only one vote include:

- housing for workers,
- "go green", and
- grant funding



Threats

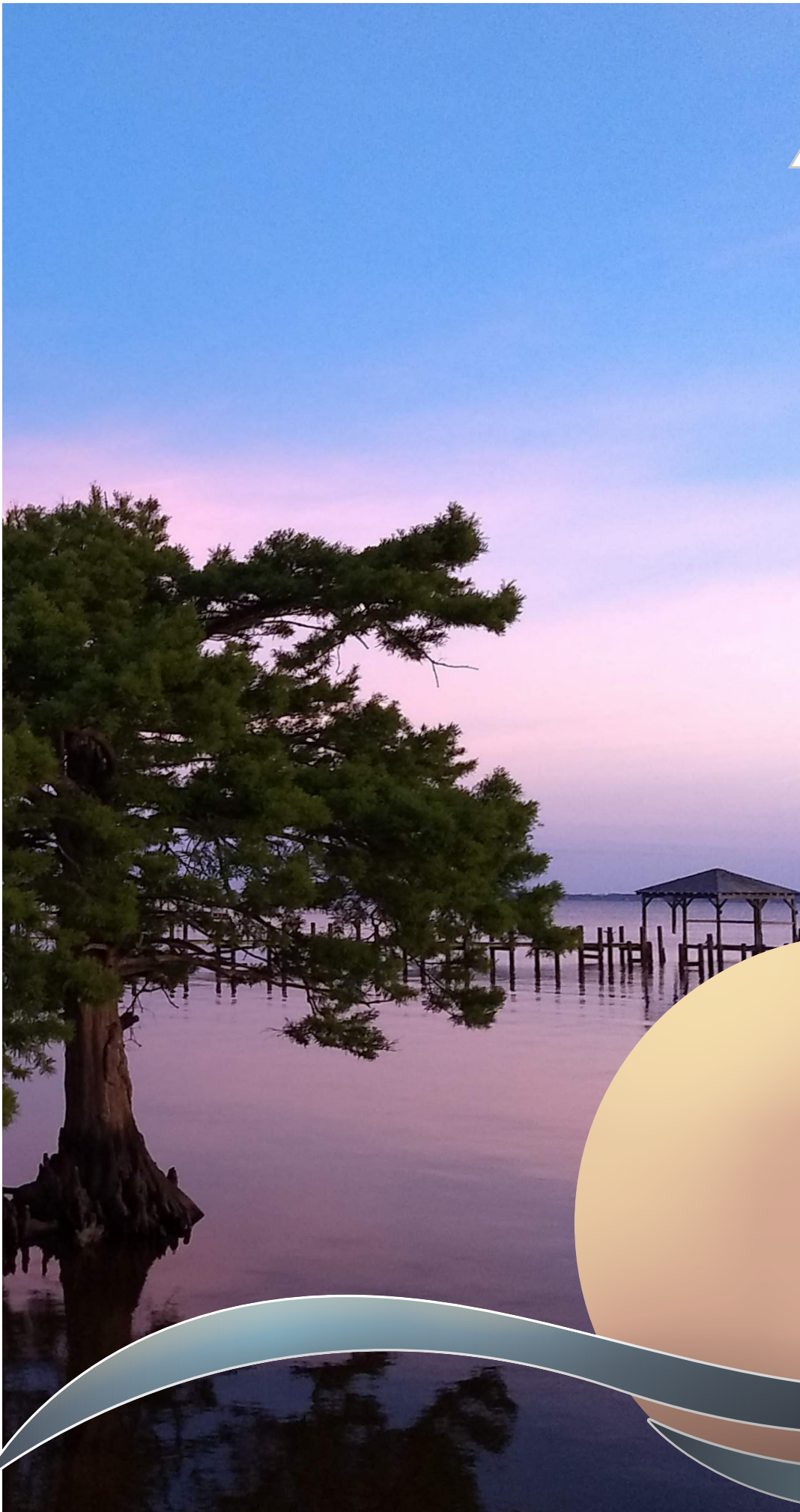


Threats are issues that may need to be addressed in order to ensure the continuing success of the town. The most pressing threats are related to environmental hazards such as rising sea levels, damaging storms, erosion, and flooding, especially to the town's vulnerable commercial district near the water. Congestion was also identified as a major threat.

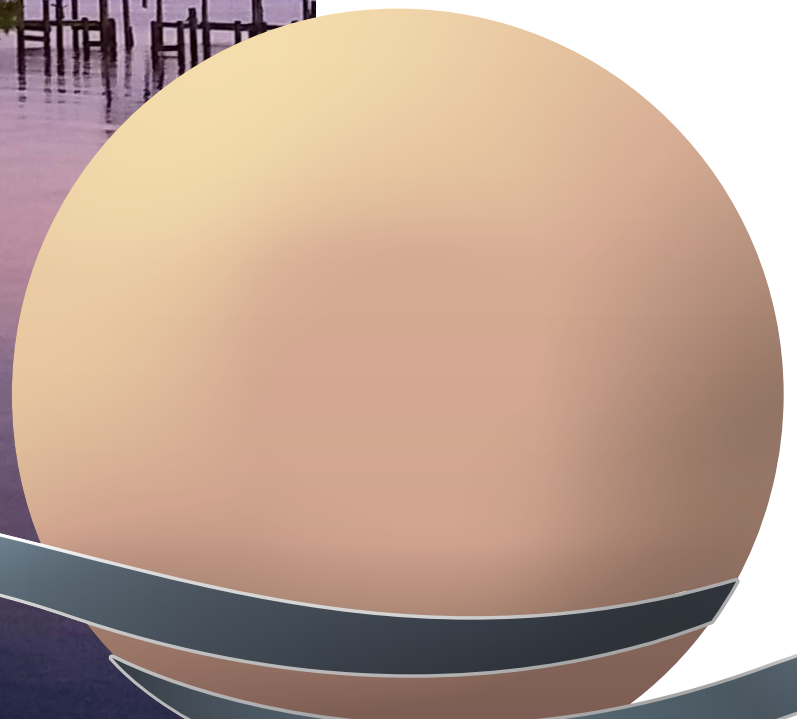
*Threats with only one vote include:

- a lack of workers,
- commercial encroachment into residential areas, and
- varying levels of community buy-in from (often absentee) property owners





D





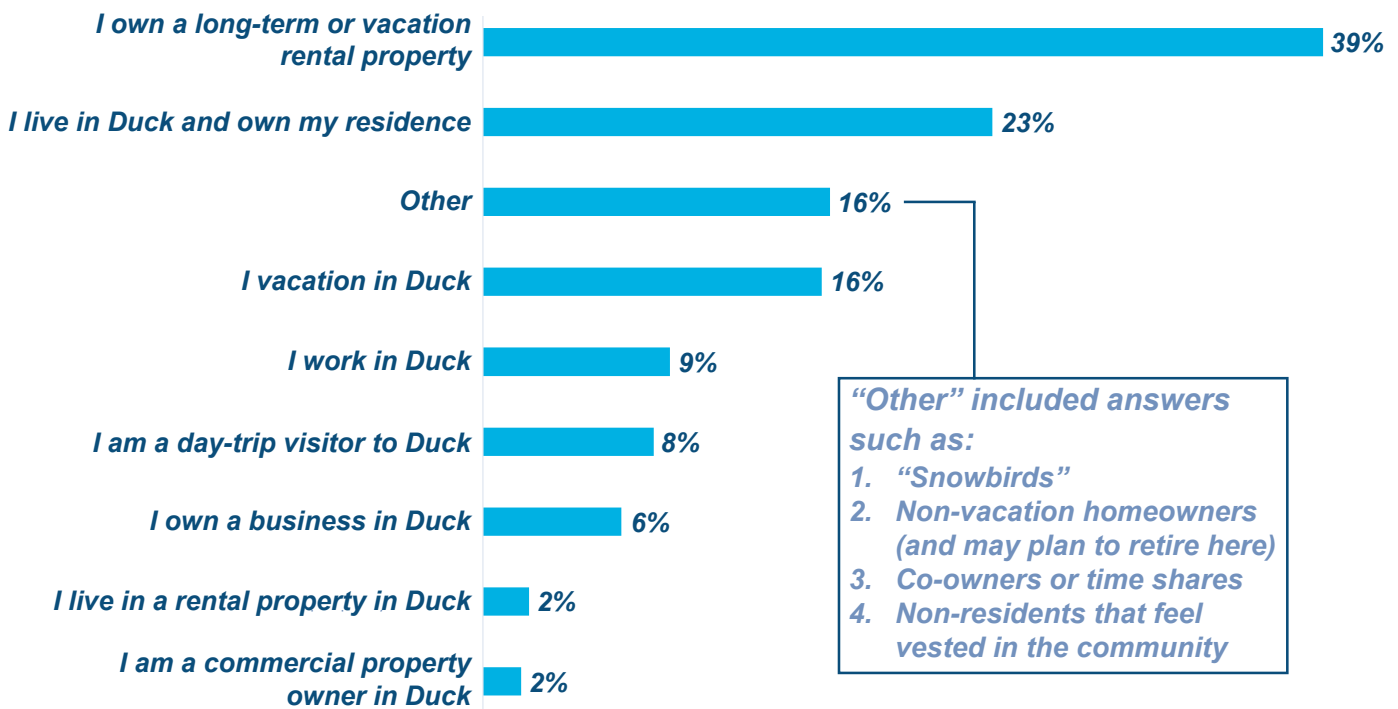
Appendix D: Public Survey

Process and Results

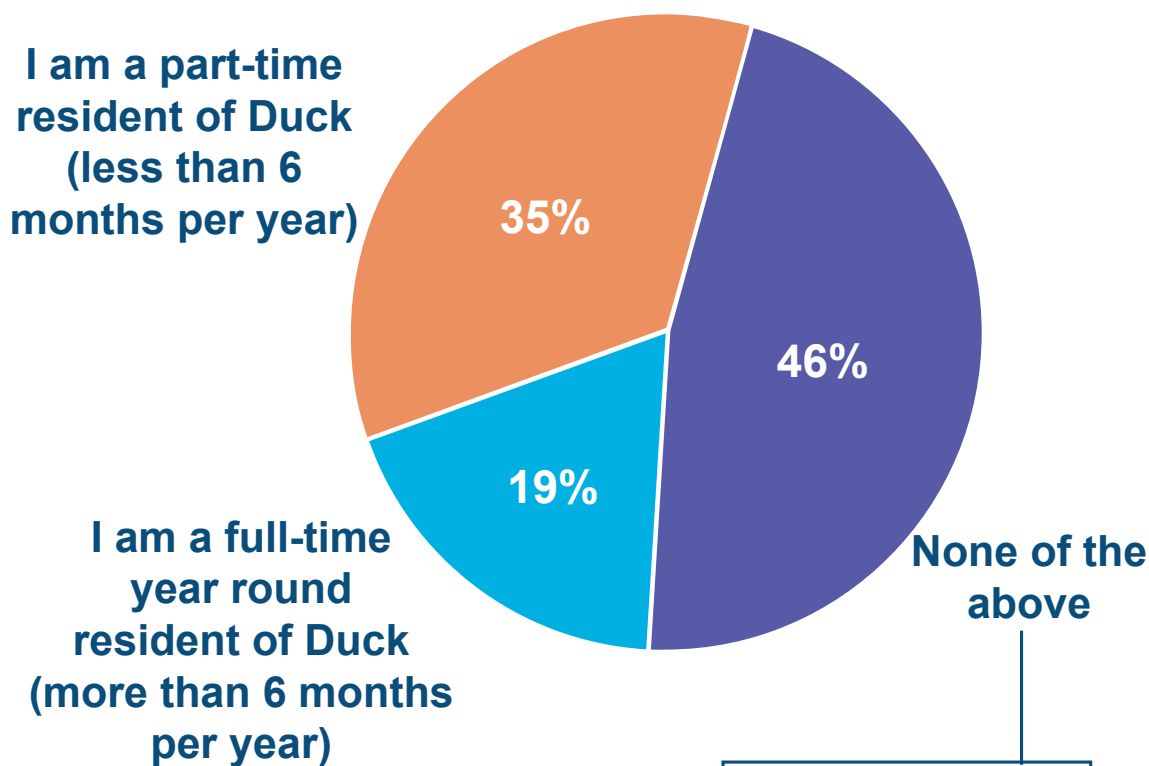
Over 800 respondents took the online survey to share their backgrounds, perspectives, concerns, priorities, and experiences. The survey opened July 24th and closed August 23rd. It was available online and in hardcopy format at the Town offices. The relatively high response rate was likely due to the Town's proactive advertisement and outreach efforts. In part, the questions were designed based on input and insight gained during the initial stakeholder interviews and the first Advisory Committee meeting. This allowed the survey to be tailored to local needs and concerns, and help hone in on key, local issues. This results from this survey are summarized on the following pages and helped guide plan development and inquiry by the Advisory Committee. The survey results were also presented at the first public meeting.

Residency and Relationship to the Town

Q1: *How do you relate to the town?*
(multiple responses were allowed)



Q2: *Do you live in Duck?*



Note: Many of these respondents do not live in the town, but may own property, work in, or visit Duck.

Priorities

Q3: How do you feel about recent changes in Duck?

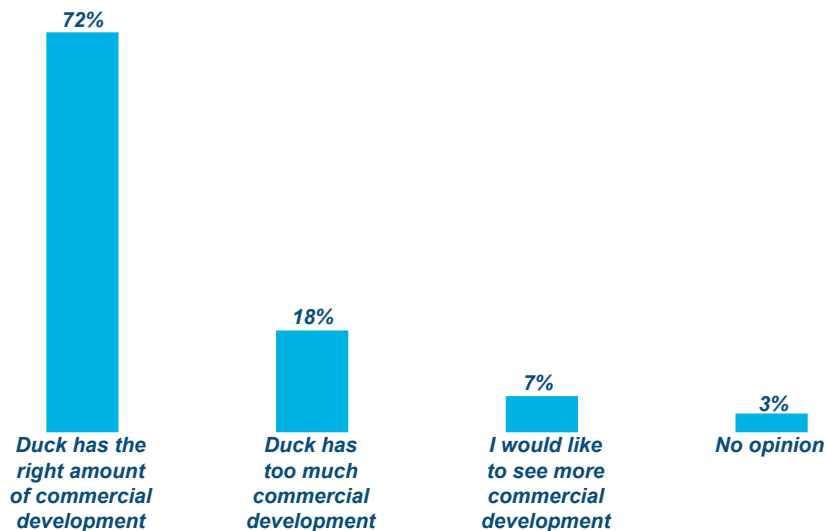
Majority of respondents like the recent changes and want to see more:

1. Town programs and events (movies, classes, etc.)
2. Sidewalks in Duck Village
3. Boardwalk improvements and mileage
4. Beach nourishment

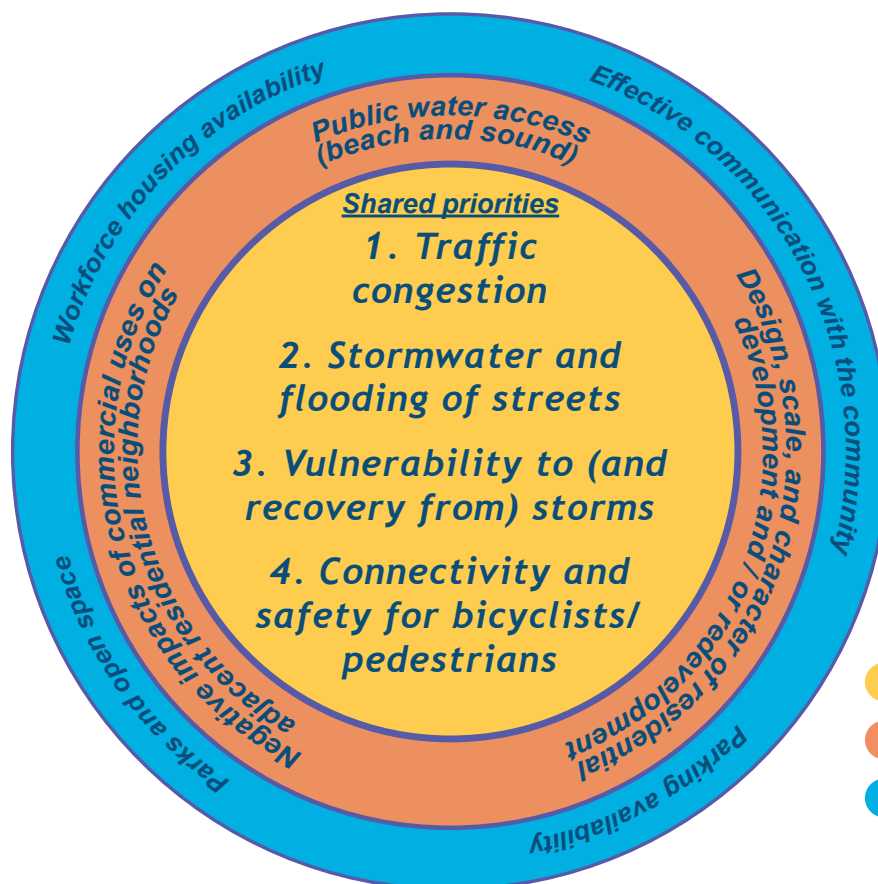
Majority of respondents like the recent changes and are satisfied with maintaining what we have:

1. Town Park and improvements
2. Design, scale, and character of residential and commercial development in the town

Q5: How are commercial uses and commercial development perceived?

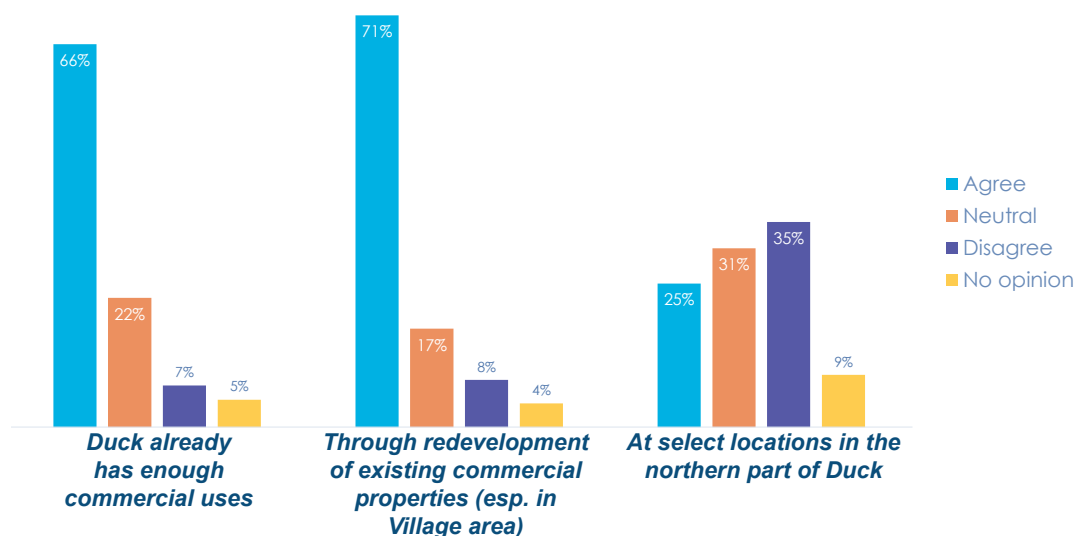


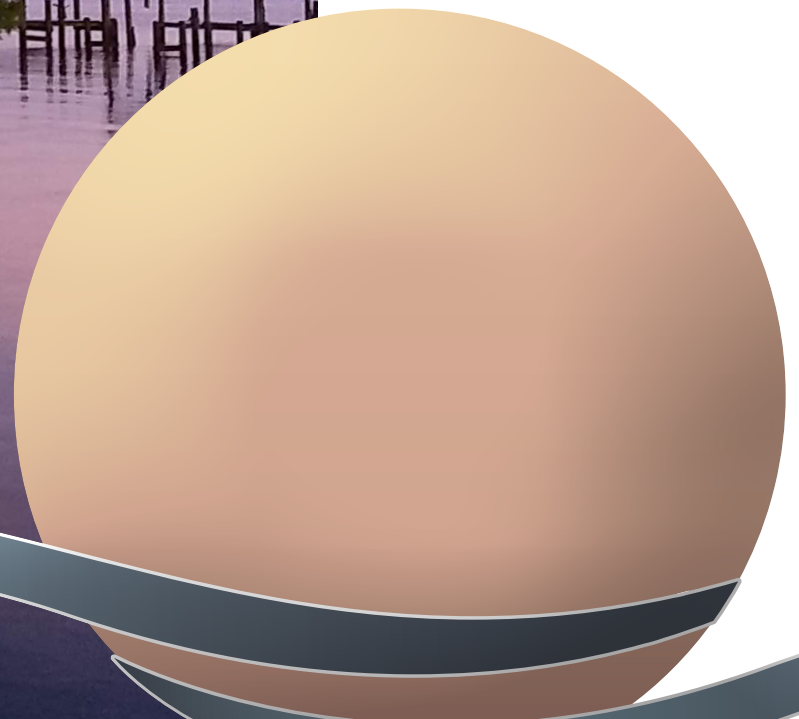
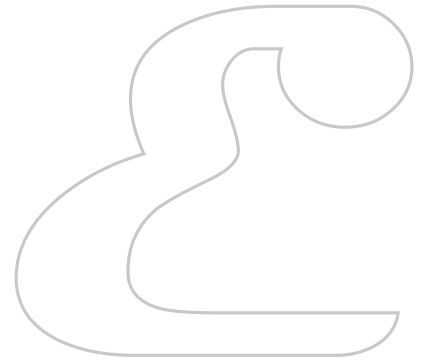
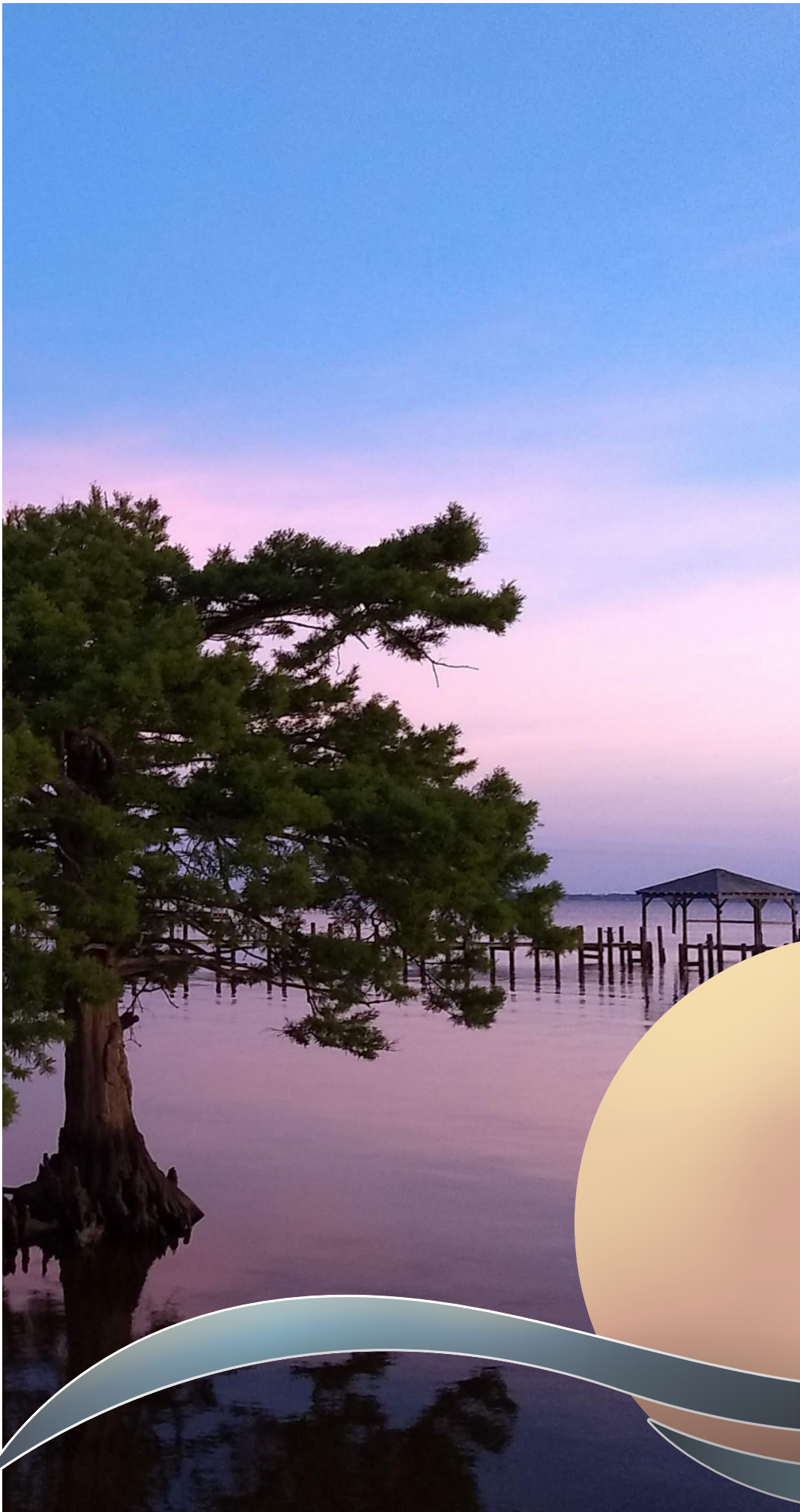
Q4: What are the top challenges for Duck?



- Top Priority
- Second Priority
- Third Priority

Q6: How should we accommodate commercial development?







Appendix E: Public Open Houses

Engagement format and purpose

Two public open houses were held to gather information and comment from the public. Public engagement is an integral and valuable component of any planning process and is also a requirement of a state CAMA land use plan. Public involvement is also an adopted goal from the Town's 2027 Vision document.



Scenes from the first public open house workshop.

Public Open House Meeting #1

The first was an open workshop-style format where information was gathered from the community regarding community values, opportunity and problem areas were identified, and preferences were gauged for certain types of interventions. Results of the public survey were also on display for review and comment. Members of staff and the consultant team were on hand to listen, discuss options, and take comment. The Public Open House was held on September 17, 2019 .

Stormwater and Flooding

Recent stormwater projects have addressed some local flooding problems, but stormwater management can also be combined with parks and water quality improvements. Treating runoff can also increase local water quality, especially in the Sound.

In Duck, the public water supply and on-site septic treatment results in an artificially elevated local water table which reduces groundwater storage capacity for stormwater. A GIS-based catchment analysis was created from LIDAR (topographical elevation) data that showed where rain water would likely flow after falling. Respondents also marked where flooding occurred in their neighborhoods.

Stormwater preference questions:

Would you support vacant parcels being converted to stormwater parks?	Yes 32	No 1	Maybe 10
Would you support public easements along streets for stormwater management? <i>(Ditches, pipes, storm drains, etc.)</i>	Yes 28	No, not necessary 0	Maybe 10
Would you support water quality enhancement projects that treat stormwater runoff? <i>(Ponds, infiltration trenches, wetlands, etc.)</i>	Yes 34	No 0	Maybe 5

Access and Open Space

Open space access, recreation, natural views and landscapes, and water access all contribute to the quality of life and are major tourism drivers. The northern outer banks have spectacular natural open spaces and natural resources. Attendees were polled on their perspectives related to enhancing access to certain natural assets. Responses varied by resource and facilities.

Public water access and open space questions:

<p>Would you support more boating access on the Sound?</p>	<p><i>Kayak/Canoe</i></p> <p>29</p>	<p><i>Full boat ramp</i></p> <p>5</p>	<p><i>No thanks</i></p> <p>20</p>
	<p><i>Northward</i></p> <p>15</p>	<p><i>Southward</i></p> <p>0</p>	<p><i>Happy-with what we have</i></p> <p>36</p>
	<p><i>Yes</i></p> <p>9</p>	<p><i>Not necessary</i></p> <p>49</p>	<p><i>Maybe</i></p> <p>5</p>
<p>Would you support a boardwalk extension?</p>			
<p>Would you support the town making public beach access a priority?</p>			

Connectivity and Congestion

Due to the land use decisions made prior to incorporation, the town has a majority of single access streets and cul-de-sacs, which hinders connectivity. Options for new connections are limited, and Duck Road is the only north-south route; it is the spine of the transportation network. Multimodal transportation and informal connections also supplement vehicular transportation options.

Connectivity preference questions:

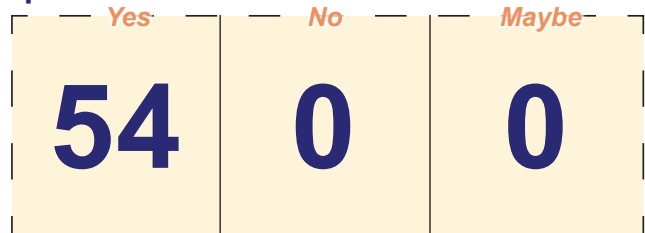
<p>Emergency vehicle access?</p>	<p><i>Yes</i></p> <p>44</p>	<p><i>No</i></p> <p>4</p>	<p><i>Depends-on the location</i></p> <p>10</p>
	<p><i>Yes</i></p> <p>28</p>	<p><i>No, not necessary</i></p> <p>11</p>	<p><i>Depends-on the location</i></p> <p>16</p>
	<p><i>Yes</i></p> <p>4</p>	<p><i>No</i></p> <p>42</p>	<p><i>Depends-on the location</i></p> <p>9</p>
<p>Pedestrians and bicycles?</p>			
<p>Golf carts?</p>			

Natural Resources and Parks

The town (and especially the commercial district) is vulnerable to erosion, storms, and waves coming from the Currituck Sound, but restoring marshland can mitigate those effects. Pursuing restoration would involve coordinating with state and possibly also federal agencies, but could be a win-win for all involved.

Marsh restoration question:

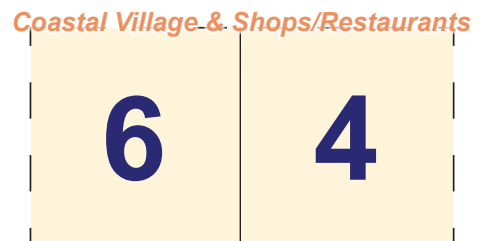
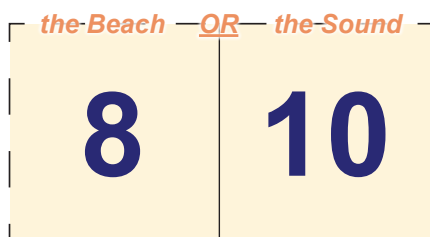
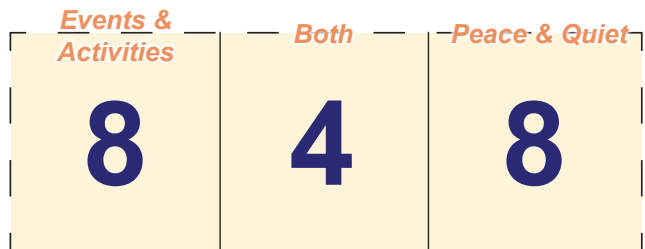
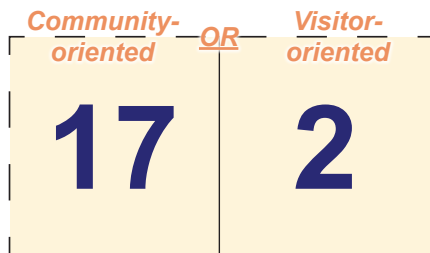
Would you support marsh restoration on the Currituck Sound?



Lived Experience

A place is more than a collection of infrastructure and natural systems; it is also people and their experiences. In this open-ended exercise attendees were polled on their perspective and experience.

Questions relating to the "Duck Experience" and the importance of certain local features.



Community Vision and Goals

Public meeting attendees were polled as to which of the Town's adopted goals (★) meant the most to them individually.

Enhanced Moveability	3	Environmental Stewardship	16
Duck and our Village	8	Enhanced Moveability	7
Active Engaged Community	4	Responsive Responsible Leadership	13

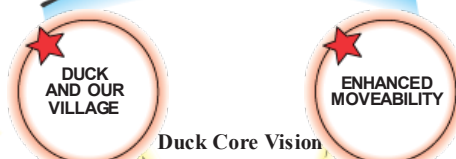
TOWN OF DUCK, NORTH CAROLINA

Surrounded by our residential neighborhoods, Duck Village is the heart of Duck. Our collection of small shops, restaurants, offices, parks and boardwalks combine to shape the Duck experience. The development of the Village has a coastal residential style and scale and its continuity creates an energetic and walkable experience. Our quality of life is enhanced through innovative solutions that protect and preserve the Village's unique character and environment.

The business community plays an essential role in creating the Duck experience. A high level of collaboration and coordination ensures that we have a vibrant town where each and every individual can enjoy the recreation, arts, music, shopping, dining, and lodging unique to Duck.

Duck is built on participation. We are an inclusive community that welcomes and embraces the diversity, talents, and expertise of all of our stakeholders. Pride and ownership is felt by all who live, work, and visit here. People feel connected by a shared motivation to preserve the unique nature of this special place.

2027 Vision



Duck Core Vision

In 2027, the Town of Duck, North Carolina, is a thriving coastal community. We respect and value our delicate, yet dynamic barrier island environment -- clean waters and beaches, maritime forests, wetlands, and dunescapes. Residents and visitors alike are drawn to neighborhoods that reflect our small town atmosphere. Our village is a source of pride, offering diverse experiences by way of a cohesive and eclectic mix of independent businesses, shops, and restaurants. At the hub of our community is the Town Hall and Park, where we interact, share ideas, and build connections. Duck's vitality, founded on grassroots engagement, encourages meaningful participation from all of its stakeholders. Long-term financial stability, sustainable services, measured growth and a focus on quality of life distinguish Duck as a preeminent destination for everyone.

Duck is a community that expresses its beliefs in certain unifying principles:



Duck is a pedestrian first community that is safe and easy to navigate by walking and cycling. Our multi-use trail, sidewalks, soundside boardwalk, and beach provide a variety of ways to explore and discover Duck. Collaboration with various organizations enables us to optimize our traffic flow in our unique seasonal environment.

There is a conscious respect for Duck's fragile and extraordinary environment. We protect and preserve opportunities for our residents and visitors to enjoy our ocean, sound, and natural coastal habitats. We value our pristine, safe, uninterrupted beaches, which are our most valuable asset. Our resilience and adaptability, guided by environmental awareness and forward thinking, ensure our sustainability as a community.

Duck maintains a responsive and responsible government. Council, staff, and the community work together to offer high quality services intended to add value to the entire Town. We have an educated, experienced and motivated staff empowered to execute the Town's objectives. Duck is an innovative and respected leader within the Outer Banks region and its solutions are frequently emulated by others. Continuity of leadership preserves our established values and vision.

Appendix E: Public Open Houses

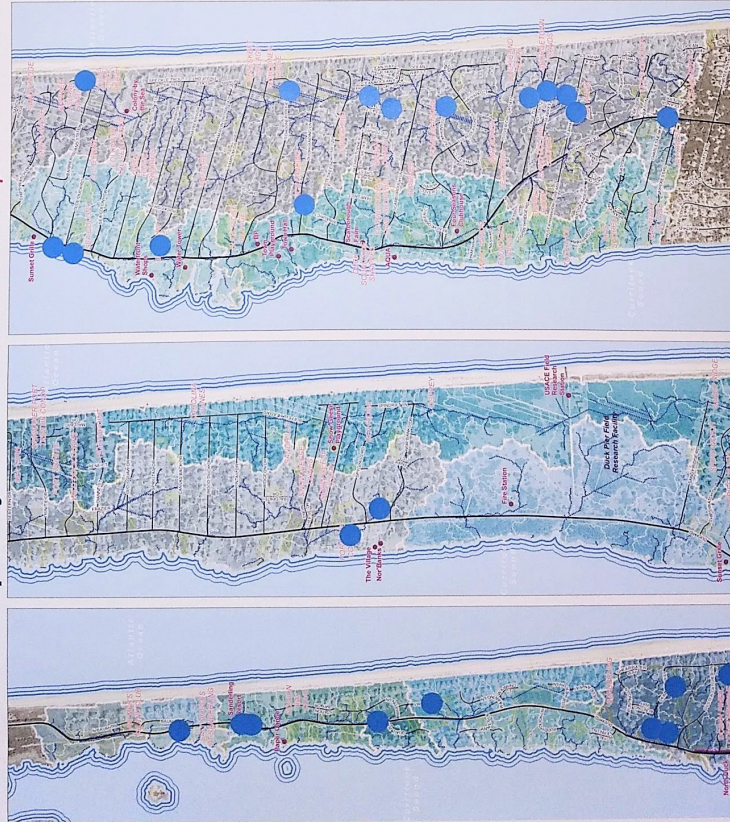
Public Feedback

The following images show the responses to the preference boards at the meeting in September 17, 2019.

STORMWATER AND FLOODING

Recent stormwater projects have addressed some local flooding problems, but stormwater management can also be combined with parks and water quality improvements. Treating runoff can also increase local water quality, especially in the Sound.

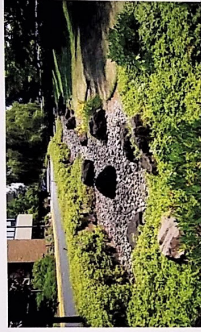
Which areas frequently flood? Place dots on the map.



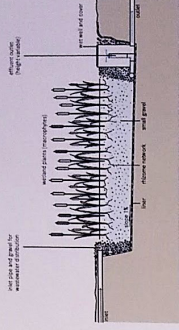
These catchments and topographical drainage lines show where rainwater would travel to if it fell within the borders of the map (or sub-basin). Using this information can inform the development of future stormwater projects.

Drainage and Stormwater
 — Drainage route
 — Sub-basin drainage area
 — Town stormwater projects
 Existing use
 Vacant residential
 Common, private, or unspecified

This catchment analysis shows where water flows locally and can be used to identify candidate locations for wetland restoration or green stormwater infrastructure where the drainage lines intersect public land, common areas, vacant parcels, or rights-of-way.



This landscaped retention pond collects and treats stormwater and also functions as a park.



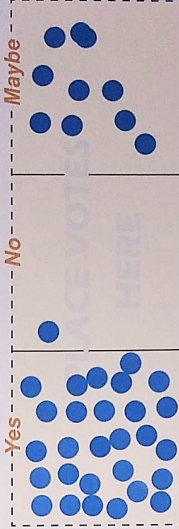
A constructed wetland can treat stormwater runoff before it pollutes local surface waters.

Source: Adapted from Tillya, E., Ulrich, L., Luthi, C., Raymond, Ph. and Zurbögg, C., 2014. Compendium of Sanitation Systems and Technologies, 2nd Revised Edition. Swiss Federal Institute of Aquatic Science and Technology (dswg). (Basel: Birkhäuser, Switzerland)

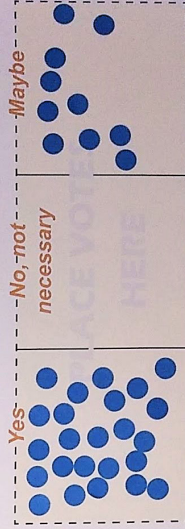
The nature of public water supply and on-site septic treatment results in an artificially elevated local water table which reduces ground storage capacity for stormwater.

PLEASE PLACE ONLY ONE VOTE PER PERSON PER QUESTION

Would you support vacant parcels being converted to stormwater parks?



Would you support public easements along streets for stormwater management? (Ditches, pipes, storm drains, etc.)



Would you support water quality enhancement projects that treat stormwater runoff? (Ponds, infiltration trenches, wetlands, , etc.)



CONNECTIVITY AND CONGESTION

State Highway 12 (Duck Road) is the only north-south route. Most neighborhood streets are private and do not connect.

Neighborhood connectivity
Place a dot where there are opportunities for new or improved EMS, pedestrian, bicycle or golf cart connections.

Due to the land use decisions made prior to incorporation, the town has a majority of single access streets and cul-de-sacs, which hinders connectivity.

Would you support additional connectivity between neighborhoods for...

PLEASE PLACE ONLY ONE VOTE PER PERSON PER QUESTION

	Yes	No	Depends on the location
Emergency vehicle access? (Police/Fire/EMS)	10 dots	5 dots	10 dots
Pedestrians and bicycles?	10 dots	5 dots	10 dots
Golf carts?	10 dots	5 dots	10 dots



Based on driveway address, parcels were coded as follows:
 Subdivisions with emergency services (EMS, Police, Fire, etc.) access (mostly prior to incorporation, the lack of secondary connectivity is apparent). Additional connections could increase safety and reduce congestion on Hwy 12.

Context
 Subdivisions
 Parcel
 Access
 one access road
 two or more access roads

Options for new connections are limited since the town doesn't own any streets or rights-of-way. However, the town could pursue and maintain access easements, which might include additional sidewalks, landscaping, lighting, benches, or stormwater infrastructure (pipes, ditches, etc.).

Benefits of connectivity:

- Reduced traffic congestion on Hwy 12
- Better emergency services access (Police, Fire, Ambulance)
- Safer routes for pedestrians

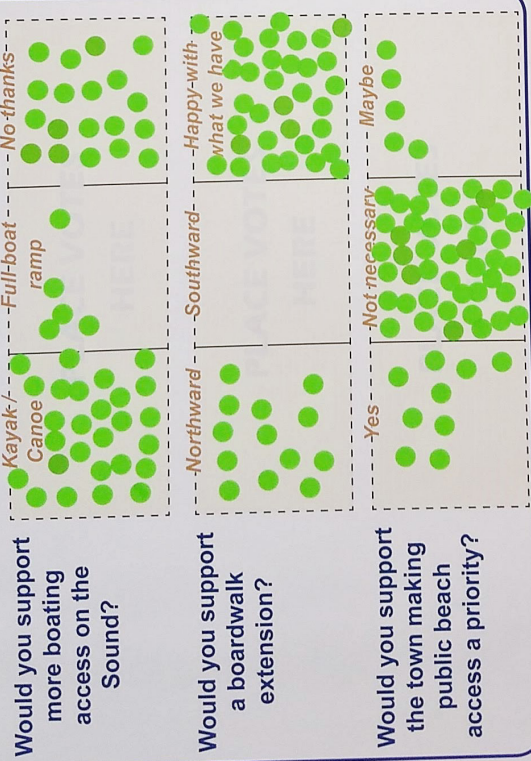


ACCESS AND OPEN SPACE

Open space access, recreation, natural views and landscapes, and water access all contribute to the quality of life and are major tourism drivers.

Access to the water is one of the major drivers for residents and tourists alike.

PLEASE PLACE ONLY ONE VOTE PER PERSON PER QUESTION



Would you support more boating access on the Sound?

Would you support a boardwalk extension?

Would you support the town making public beach access a priority?

Public beach access in Duck
Constraints:

- Nearly all oceanfront lots are already developed
- Access only available through private neighborhoods
- Lack of state legislation enabling the town to condemn beach access
- Infringement on Homeowners Associations covenants and/or deed restrictions may be infeasible
- Unwilling public and private partners

Other considerations:

- Majority of properties already have private access
- Only local funding sources used for beach nourishment
- Only local funds planned for beach maintenance

Approximately 95% of residential lots in Duck have some form of access to the beach. Neighborhoods without dedicated access to the ocean include:

- Duck Ridge Village
- Founders Ridge
- Jay Crest
- Nantucket Village
- Osprey Ridge
- West Winds
- and a handful of Sound-front homes

Public access to the Sound is available in multiple locations along the Duck boardwalk.

Which open space do you visit most?
 Place dots on the map.

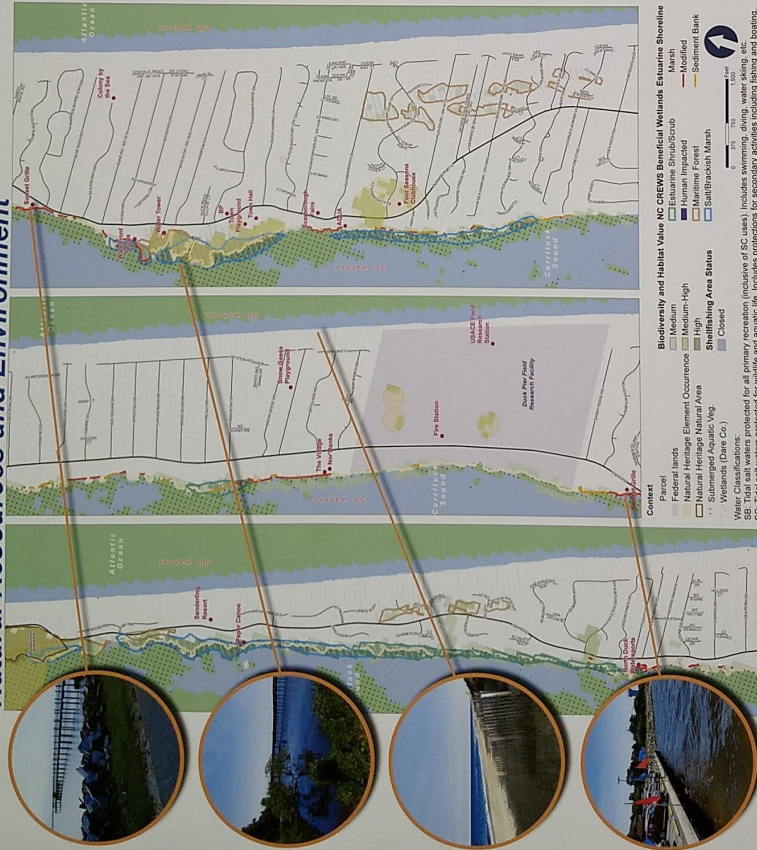


There are no town-owned roads or right-of-way, all streets are either private or state-owned.

NATURAL RESOURCES AND PARKS

Parks, open space, habitat, and natural resources are vital to the community. Some natural processes, like erosion, are also potential hazards to the community. Opportunities may exist to bolster both natural and human habitats.

Natural Resources and Environment



Sound restoration might involve natural wave breaks with backfilled coastal marsh which also could treat stormwater runoff

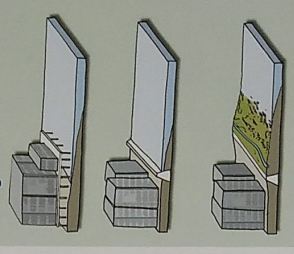
1 In many instances a barrier island has eroded away to little more than a sand bar. The dunes have disappeared, and little, if any, vegetation remains.

2 Sand is pumped in to build beach and dune, and a temporary dike is installed to contain the marsh on the coastal side (right) of the island until it fills in naturally.

3 Muddy sediment is pumped in to create the back marsh, and then grasses and other vegetation are planted.

Source: www.audubon.org/magazine/fall/2017/foreshore-restoring-the-beach-islands-46

Options for adapting in place to rising seas



Source: Public Press, San Francisco

Increasingly, "living shorelines" are used to protect from shoreline erosion. Hard armoring (bulkheads, seawalls, rip-rap, rocks, etc.) have been shown to increase local erosion and degrade habitat.

The town (and especially the commercial district) is vulnerable to erosion, storms, and waves coming from the Currituck Sound, but restoring marshland can mitigate those effects.

PLEASE PLACE ONLY ONE VOTE PER PERSON PER QUESTION

Would you support marsh restoration on the Currituck Sound?

Yes (Yellow dots) / No (White dots)

Duck has important and valuable estuarine habitats.

Submerged Aquatic Vegetation
 Ecosystem value: \$7,700/acre
 Threatened by: nutrient pollution (incl. wastewater), sediment pollution
 Provide benefits to: untreated stormwater runoff, essential fish habitat, shoreline stabilization, wave attenuation

Coastal Wetlands
 Ecosystem Value: \$13,300/acre
 Threatened by: wetland filling, erosion, shoreline hardening
 Provide benefits to: filtering pollutants and stormwater runoff, trap sediment, wave attenuation, habitat for finfish and shellfish

VISION, GOALS, & THE DUCK EXPERIENCE

The Town of Duck regularly updates the 2027 Vision statement. How can the information presented in this meeting and your lived experience be best reflected in that Vision? What goals do we need to set to make that vision a reality?

Community Vision and Goals

Which goal (★) means the most to you? Use a dot to mark your top priorities.

TOWN OF DUCK, NORTH CAROLINA

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2027 Vision

★ DUCK AND OUR VILLAGE

★ ENHANCED MOVABILITY

Duck Core Vision

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★ VIBRANT THRIVING BUSINESS COMMUNITY

★ ENVIRONMENTAL STEWARDSHIP

★ ACTIVE ENGAGED COMMUNITY

★ RESPONSIVE RESPONSIBLE LEADERSHIP

Duck is a community that expresses its beliefs in certain unifying principles:



Duck is a pedestrian first community that is safe and easy to navigate by walking and cycling. Our multi-use trail, sidewalks, soundside boardwalk, and beach provide a variety of ways to explore and discover Duck. Collaboration with various organizations enables us to optimize our traffic flow in our unique seascape environment.

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Lived Experience

What is the "Duck Experience" to you?
What needs to happen to create the Duck you want to see in the future?

What is important to you?
(Write key words in the space below, or check the answers to which you relate.)

Events & Activities OR Peace & Quiet
Community-oriented OR Visitor-oriented
The Beach OR the Sound
Coastal Village & Shops/Restaurants
Quick recovery from storms
What else?
USE public & goods that are in the community for good
add thinkers & cross walk
EMPHASIS PROPER USE OF NEW TRAIL BIKES in bike lane.

Public Open House Meeting #2

The second public open house meeting was held on March 3rd, 2020, after the plan was published on the Town's website online for public review. This meeting at Town Hall was an opportunity to gather more public comment on the final draft of the plan prior to it being reviewed by elected and appointed officials. The meeting format included a presentation of plan highlights followed by open question-and-answer with Town staff and facilitators. Comments were collected (both that evening and online for a one-month period) and delivered to the Advisory Committee for their review and determination if the draft plan required any further revisions prior to moving forward in the plan adoption process. The Advisory Committee

met on May 14, discussed public comment received to date, and recommended revisions that were incorporated prior to the plan proceeding to Planning Board and Town Council for the public review and adoption process.



Scenes from the second public open house workshop.

PLAN HIGHLIGHTS

Cooperate with the Sanderling Resort to encourage a distinct, pedestrian-friendly commercial and mixed use node that reinforces local character, history, and current user needs.

Adapt to rising seas.

- Coordinate with Dare County in community-wide septic system monitoring, remediation, and continuity of operations planning.
- Coordinate with Dare County Environmental Health Department to develop an enhanced monitoring and remediation program for septic drain fields that are vulnerable to malfunction due to high water tables.

Continue habitat preservation and landscaping site development standards.

- Preserve and protect remaining stands of intact maritime forests.
- Protect sea turtles and other aquatic, amphibious, and beach-rant animals and their habitat.

Protect and preserve Duck's coastal residential character.

- Closely protect the character of existing single family neighborhoods as well as multi-family enclaves through the adoption and enforcement of appropriate development standards.
- Enhance the town's reputation as a family-oriented tourist destination.
- Support legislation providing local governments with tools to protect and enhance the scene and character of development in Duck.

Engage in efforts to improve local flooding and stormwater management.

- Develop solutions to flooding or stormwater management along Duck Road and throughout town.
- Coordinate with and reduce barriers for residents and outside agencies trying to address local flooding and stormwater concerns.
- Ensure any stormwater or flooding solutions do not negatively impact water quality or negatively impact shared resources such as the beach.
- Reduce runoff through minimizing impervious surface coverage, encouraging tree preservation, and accommodating low impact development solutions to stormwater management.
- Maintain, protect, and (where possible) enhance water quality in all coastal wetlands and estuaries.

Create a Climate Adaptation Plan, including explicit identification and assessment of vulnerabilities, prioritization of adaptation/mitigation projects and actions (with probable costs), and establishment of timelines for implementation.

Encourage connections between neighborhoods for pedestrians, cyclists, and vehicles (especially emergency vehicles).

Improve the community's resiliency to rising seas and changing climate.

- Evaluate existing feedback requirements and other development standards and determine potential benefits of increasing them.
- Research and adopt an advanced level of sea level rise for future years relevant to development projects of varying time horizons (e.g., 20 years, 50 years, 100 years).



Preserve, protect, and enhance the Atlantic Ocean Shoreline.

- Conserve and maintain barrier dunes, beaches, and other coastal features for their natural storm protection functions and their innate beauty and recreational value.
- Remain open to partnerships and opportunities for increasing public access to the ocean.
- Renourish and maintain the beach.
- Preserve the natural value and ecosystem services of the beach and dunes.

Continue coordination with USACE to facilitate operational success at the field station.

- Enhance and support police, fire, and public safety initiatives.
- Expand/Rebuild the Fire and Police Department building on the USACE property and restore the previous site to its predevelopment condition.

Preserve, protect, and restore the Currituck Sound shoreline.

- Conserve and maintain the wetlands and other coastal features for their natural storm protection functions, water quality benefits, habitat value, innate beauty, and recreational value.
- Restore eroded portions of Currituck Sound coastline to enhance buffering of storm-driven waves, reduce erosive forces, increase stormwater runoff filtration, improve water quality, and enhance coastal habitat.

Promote and enhance Duck Road, Duck Trail, and the pedestrian experience, including connections to the Currituck Sound.

- Maintain existing improvements and enhance opportunities for pedestrian, bicycle, and other forms of transportation along the Currituck Sound.
- Explore opportunities to extend the Duck Boardwalk or other pedestrian connection northward to the next commercial cluster.
- Add new connectors between adjacent businesses and the Duck Boardwalk.
- Add new kayak launches or boat docks opportunities along the Boardwalk.
- Within the Village, expand the street sidewalk network for the length of one lot off of the Duck Road corridor, to reduce potential conflicts between pedestrians and vehicles turning onto or off of Duck Road, and enhance pedestrian connections to structures along the corridor.

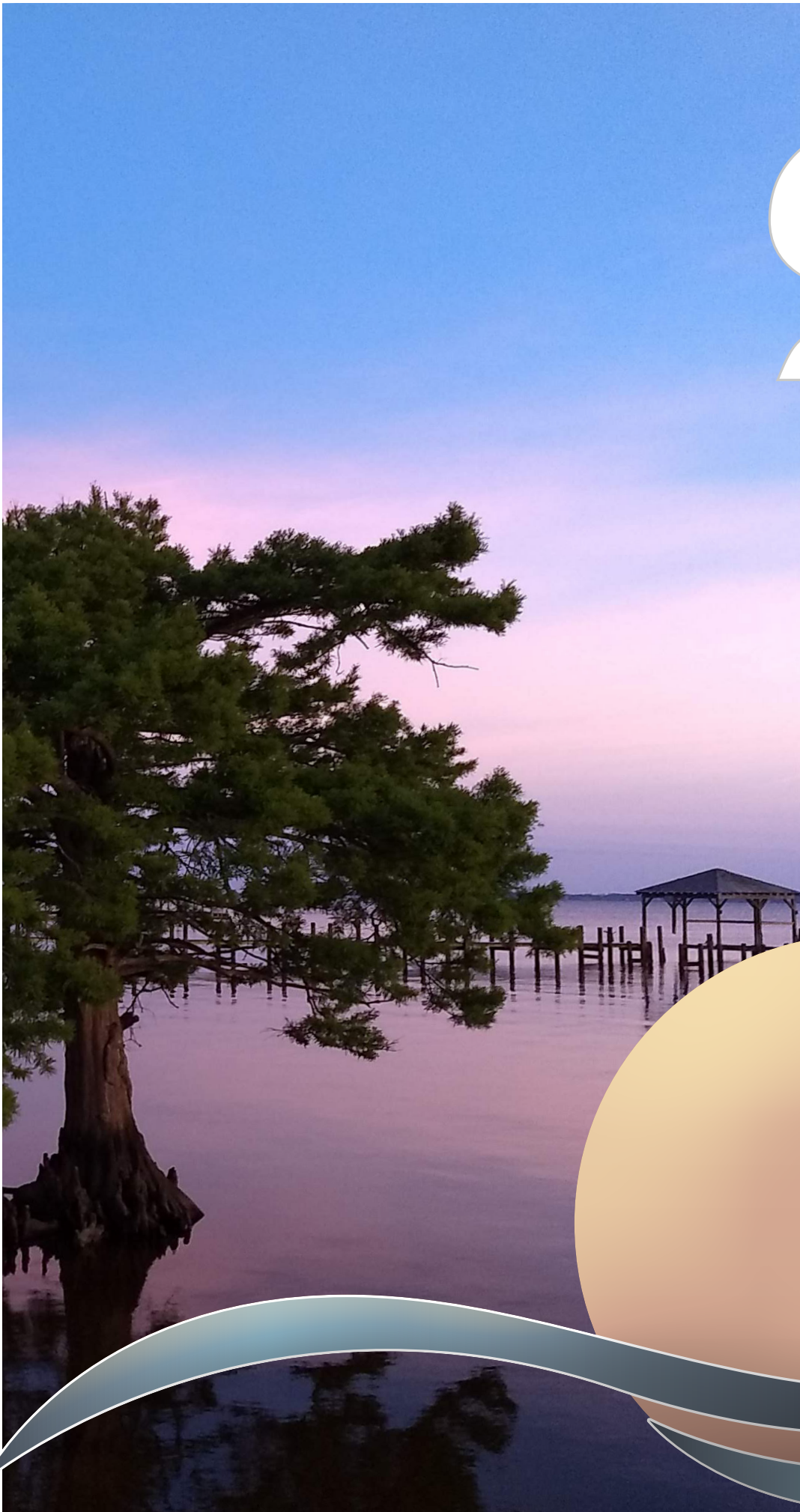
Enhance the character and success of Duck Village and commercial areas.

- Support the development of small, specialty-type shops and the vitality of existing local businesses.
- Work with local businesses and redevelopment projects to coordinate adequate (and sometimes shared) parking and loading/unloading areas.
- Rethink the Duck Village aesthetic through public investments and thoughtful, objective, and administratively-administered standards and incentives.
- Coordinate with other commercial uses to enhance access and appearance.

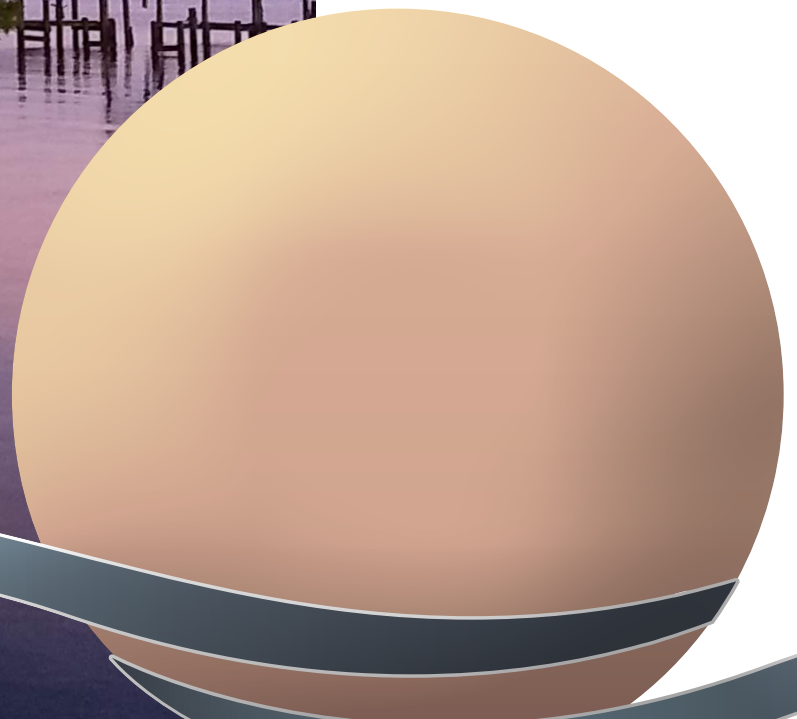
Maintain a connected and accessible local government.

- Encourage and provide high quality, event programming at Duck Town Hall, Duck Town Park, and Town Green and amphitheater.
- Provide frequent, current, and high-quality communication between government and citizens.
- Pursue innovative visitor and resident communication that enhances public safety and awareness of local traffic rules, regulations, and conditions.

Recommendation summary board that was on display at the second public open house workshop.



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Appendix F: Existing Plan Review

Building on previous efforts

No planning effort occurs in a vacuum, and it is important to recognize and assess previous efforts to determine effectiveness and opportunities for future improvement. This appendix compiles the reviews of those previous planning efforts, which were presented by town staff to the advisory committee and used as background for developing this plan update. The Town of Duck's existing land development management program includes the following regulatory ordinances and related plans:

- » Town of Duck Zoning Ordinance
- » Community Development Management Program
- » Duck CAMA Core Land Use Plan (2005)
- » Town of Duck Comprehensive Pedestrian Plan
- » Town of Duck 2027 Vision Plan (Comprehensive Plan)
- » Dare County Hazard Mitigation Plan
- » Dare County Comprehensive Transportation Plan

The Town's land development management program is administered by the Duck Department of Community Development.

The Duck Planning Board serves in an advisory capacity to the Town Council on development matters.

Plan Assessment: Town of Duck 2007 CAMA Land Use Plan

IMPLEMENTATION STATUS REPORT (2019)

I. All local, state, federal, and joint actions that have been undertaken successfully to implement its certified CAMA land use plan

CAMA Management Topics

Public Access – strategies for maximizing community access to beaches and public trust areas.

1. Partnered with Dare County and several other towns on the Outer Banks on a beach/dune nourishment project covering approximately 1.7 miles of the beach and dune system in Duck.
2. Annually coordinate a volunteer beach grass planting program to stabilize dunes around neighborhood beach accessways.
3. Annually contract to provide life-guard services at twelve strategic locations along the public beach.
4. Acquired and developed approximately 9.4 acres of land on the Currituck Sound with a Town administration building, meeting hall, stage, amphitheater, parking areas, and public park.
5. Constructed three phases of a soundside boardwalk (totaling 0.8 mile) providing public views and access to

Currituck Sound. The boardwalk includes two piers/boat docks, kayak launch, and crabbing dock.

Land Use Compatibility – management of land use and development in a way that minimizes its primary and secondary impacts on natural and man-made resources.

1. Adopted a 2027 Vision outlining the Town’s goal of maintaining its small-town atmosphere, low density neighborhoods, and commercial village with a mix of independent shops and restaurants.
2. Amended Town development standards in keeping with the goal of maintaining the community’s relatively low density residential and village-scale commercial development.
3. Evaluate and reference the compatibility the CAMA Land Use Plan during the review of every development project, rezoning, and text amendment considered by the Town.
4. Adopted specific standards to ensure the village scale, pedestrian orientation, and compatibility of development within Duck Village.
5. Adopted standards for filling and grading activities that limit the amount of fill, stormwater runoff, and erosion/sedimentation.

Infrastructure Carrying Capacity – strategies to ensure that infrastructure is available to support anticipated and planned development and that it is

managed to protect areas of environmental concern and other fragile areas.

1. Coordinated with local and State agencies on the review and approval of proposed development projects to ensure that infrastructure standards are met and capacity is not exceeded.
2. Established relatively low-density residential zoning and large minimum lot sizes to ensure capacity for individual wastewater (septic) systems.
3. Adopted standards limiting the maximum size of residences and septic system capacity to limit development density and its impacts on local infrastructure.
4. Conducted a thorough study and adopted standards permitting solar and wind energy facilities as renewable energy sources.
5. Completed five significant projects to address recurring stormwater management issues along Duck Road (N.C. Highway 12) and the Duck Trail shared use path.
6. Developed and adopted a Comprehensive Pedestrian Plan for the Town of Duck.
7. Participated in the creation and adoption of the Dare County Comprehensive Transportation Plan.
8. Served as an active member of the Albemarle Regional Planning Organization on regional transportation issues.
9. Constructed a 0.8 mile soundside

boardwalk over three phases as a transportation alternative and recreational amenity for the Town.

10. Constructed the first two phases of sidewalk and bike lane improvements through Duck Village.
11. Completing design and permitting for a third phase of sidewalk and bike lane improvements through the northern portion of Duck Village.
12. Annually maintain and repair sections of the existing Duck Trail shared use path along Duck Road.

Natural Hazard Areas – policies to reduce the community’s vulnerability to natural hazards.

1. Adopted and enforce FEMA flood maps and a flood damage prevention ordinance meeting all requirements of State and federal agencies.
2. Adopted a multi-jurisdictional Hazard Mitigation Plan in cooperation with other communities in Dare County and the Albemarle Region identifying solutions to reduce the risks to human life and property from natural hazards. This plan is currently in the process of being updated.
3. Completed a project with the National Oceanic & Atmospheric Administration (NOAA) and N.C. Division of Coastal Management to develop a resiliency plan for the Town of Duck.
4. Obtained a CAMA planning grant and contracted with the Program for the

Appendix F: Existing Plan Review

Study of Developed Shorelines at Western Carolina University to complete a vulnerability assessment for the Town.

5. Supported efforts by the Audubon Society to obtain funding to conduct environmental assessments and gauge changing conditions in Currituck Sound.

6. Implement a public information strategy outlining many projects and activities to educate residents, visitors, and businesses about the risks of flooding and other natural hazards, as well as opportunities to prevent or minimize damage during these events.

7. Prepare and review an Emergency Preparedness, Response, and Recovery Plan on an annual basis.

8. Adopted and enforce policies and regulations that limit the scale and intensity of development in hazard prone areas.

9. Required a land disturbance permit regulating vegetation removal, grading, erosion, and stormwater issues on developing properties.

10. Adopted stormwater management standards to minimize the impacts of commercial and other higher intensity development on the surrounding environment.

11. Adopted ordinances requiring greater setbacks for beachfront accessory structures, prohibiting the use of sandbags to artificially stabilize dunes or structures, limitations on beach pushes, and prohibition of hardened beach access

structures in the beach nourishment area.

12. Partnered with Dare County and several other towns on the Outer Banks on a beach/dune nourishment project covering approximately 1.7 miles of the beach and dune system in Duck in 2017. The Town is already engaging with these communities on studies and arrangements for a potential beach renourishment project in the future.

13. Conduct numerous public education efforts using educational brochures, website pages, newsletter articles, videos, and other programs to educate property owners about topics such as water quality, stormwater management, flood damage prevention, and dune stabilization.

14. Conduct an annual dune planting project (sea oats and beach grass) to stabilize the primary dune throughout the Town of Duck. This funded effort has been supplemented by a volunteer beach grass planting program.

15. Provide “dune care” signs to neighborhoods to post at community beach access walkways along the primary oceanfront dune and “keep off the dune” signs along the oceanfront.

Water Quality – land use and development policies and strategies to protect quality waters and to restore quality in waters that are non-supporting.

1. Constructed five significant stormwater management improvements along Duck Road (N.C. Highway 12) in the

areas of Tuckahoe Drive, The Waterfront Shops, South Snow Geese Drive, Sound Sea Village, and Flight Drive.

2. Participate in the Science Panel of the Alliance to Revive the Currituck Sound, seeking ways to improve the water quality and health of the Currituck Sound.

3. Coordinated with the U.S. Army Corps of Engineers to conduct water quality testing in the Currituck Sound.

4. Educated local residents and visitors about the importance of water quality through “Nature on the Boardwalk” tours that included water quality sampling.

5. Supported efforts by the Audubon Society to establish the Audubon Resilience Institute and obtain funding to conduct environmental assessments and gauge changing conditions in Currituck Sound.

Local Issues:

In addition to the CAMA Management Topics, the Town of Duck identified 23 local development issues that were incorporated into the adopted land use plan.

Atlantic Ocean Shoreline

1. Partnered with Dare County and several other towns on the Outer Banks on a beach/dune nourishment project re-establishing approximately 1.7 miles of beach and dune system in Duck.

2. Contract the planting of sea oats and beach grass on an annual basis to

help stabilize the dune system. This effort is supplemented by a volunteer beach grass planting program involving over 130 different community volunteers.

3. Annually contract to provide life-guard services at twelve strategic locations along the public beach.

4. Negotiated beach access for life-guards across two privately owned properties

5. Participate in the Dare County Shoreline Management Commission, which oversees and advocates for the preservation and restoration of shorelines.

6. Employ a Local Permit Officer to enforce CAMA regulations and assist the N.C. Division of Coastal Management and local property owners with the CAMA permitting process.

7. Adopted ordinances requiring greater setbacks for beachfront accessory structures, prohibiting the use of sandbags to artificially stabilize dunes or structures, and limiting the use of hardened beach access structures.

8. Adopted ordinances that prohibit beach fires, fireworks, and commercial activities on the beach.

Beach Driving

1. Adopted an ordinance setting standards for beach driving and limiting beach driving to the months between October 1st and April 30th every year.

Appendix F: Existing Plan Review

Beach Renourishment and Maintenance

1. Partnered with Dare County and several other towns on the Outer Banks on a beach/dune nourishment project covering approximately 1.7 miles of the beach and dune system in Duck.
2. Contract the planting of sea oats and beach grass on an annual basis to help stabilize the dune system. This effort is supplemented by a volunteer beach grass planting program involving over 130 different community volunteers.
3. Provide property owners, residents, visitors, and management companies with information about maintaining the constructed beach and dune system.

Commercial Development

1. Adopted standards to ensure the village scale, pedestrian orientation, and compatibility of commercial development within Duck Village.
2. Reviewing commercial development standards for the Village Commercial district to provide flexibility for businesses to develop uniquely sized and shaped properties in a manner consistent with the character of Duck Village.
3. Partnered with the Duck Merchants Association to market and support local businesses in Duck. Such efforts include the development of a website, brochures, and signage.

Community Appearance

1. Adopted design guidelines for

commercial buildings, utilities, lighting, and landscaping.

2. Adopted standards to ensure the village scale, pedestrian orientation, and compatibility of commercial development within Duck Village.
3. Adopted standards limiting the maximum size of residences and septic system capacity depending on lot sizes to ensure compatible development in residential areas.
4. Adopted development requirements to preserve and/or plant trees and vegetation on every property.

Currituck Sound Shoreline

1. Hired a Local Permit Officer to enforce CAMA regulations and assist the N.C. Division of Coastal Management and local property owners with the CAMA permitting process.
2. Adopted standards for filling and grading activities that limit the amount of fill, stormwater runoff, and erosion/sedimentation.
3. Designed and engineered a marsh restoration project in the Currituck Sound along the Town Park property to stabilize the shoreline and serve as a pilot project for other soundfront improvements in Duck.
4. Participated in the Science Panel of the Alliance to Revive the Currituck Sound, seeking ways to improve the water quality and health of the Currituck Sound.

Development Design Standards

1. Adopted design guidelines for commercial buildings, utilities, lighting, and landscaping.

Duck Trail

1. Maintain and repair sections of the approximately 5.4 mile Duck Trail shared use path along Duck Road on an annual basis.
2. Completed six projects to address recurring stormwater management issues along the Duck Trail shared use path.
3. Designed and permitted a planned project involving the construction of sidewalks, crosswalks, and other pedestrian improvements throughout Duck Village.
4. Constructed the first two phases of sidewalk and bike lane improvements through Duck Village.
5. Completing design and permitting for a third phase of sidewalk and bike lane improvements through the northern portion of Duck Village.

Federal Properties

1. Coordinated projects and improvements (including beach nourishment) with the U.S. Army Corps of Engineers Field Research Facility.
2. Negotiated with the USACE to lease additional property to house an expansion of the existing public safety (Fire/Police) building on the USACE Field Research Facility property.

3. Obtained beach access for life-guards and public safety staff through the USACE Field Research Facility site.

Intergovernmental Relations

1. Entered into a mutual aid agreement between the Duck Fire Department and surrounding communities on the Outer Banks including all municipalities, Dare County, and several departments in Currituck County.
2. Entered into a mutual aid agreement between the Duck Police Department, other town police departments, and the Dare County Sheriff's Department.
3. Established a reciprocal agreement with the towns of Kitty Hawk and Kill Devil Hills to provide building inspection services.
4. Participated in a statewide mutual aid agreement with communities across North Carolina for disaster assistance and recovery.
5. Partnered with other local and regional governments on a variety of planning efforts – solid waste, hazard mitigation, flood damage prevention, transportation, etc.
6. Partnered with Dare County and several other towns on the Outer Banks on construction of a beach/dune nourishment project covering all or parts of four towns.

Overhead Utility Lines

1. Successfully negotiated with

Appendix F: Existing Plan Review

Dominion Energy to remove several sections of overhead utility lines along Currituck Sound.

2. Coordinated with Dominion Energy to main and improve the location of underground power lines in the area of the Town's sidewalk improvements.

Parking and Loading/Off-Loading Areas

1. Constructed a large public parking area adjoining the Town Park and boardwalk access.

2. Adopted standards in the Village Commercial district permitting flexible parking layouts and shared parking arrangements.

Public Safety

1. Added full-time and part-time staff to the Duck Fire Department, most recently with the addition of three new full-time firefighters in FY 2018-19.

2. Added full-time and part-time staff to the Duck Police Department, most recently with the addition of two full-time police officers in the FY 2018-19.

3. Increased the number of lifeguard stands and staffing for contracted life guard services to address increased public beach usage during the summer months.

4. Conducted a space needs study, conceptual architectural plan, site plans, and environmental studies for the construction of a new, larger Public Safety

Building housing the Fire, Police, and Ocean Safety departments. Funding has been approved to complete the design, engineering, and permitting for this project.

Redevelopment

1. Adopted standards to ensure that redevelopment is consistent with the scale and character of existing development in the surrounding area.

2. Mitigate flooding issues by requiring substantial renovations to be brought into compliance with flood damage prevention standards.

Residential Development

1. Amended Town development standards in keeping with the goal of maintaining the community's relatively low density, residential scale of development.

2. Adopted relatively large minimum lot size standards to maintain the existing character of the Town and ensure capacity for individual wastewater (septic) systems.

3. Adopted standards limiting the maximum size of residences and septic system capacity depending on lot sizes to maintain the existing character of the Town and limit development density.

4. Established provisions for the development of accessory dwelling units to allow housing that can serve moderate income persons.

Septic Tank Use

1. Coordinated all permitting activities with the Dare County Environmental Health Department.
2. Established relatively low-density residential zoning and relatively large minimum lot sizes to ensure capacity for individual wastewater (septic) systems.
3. Adopted standards limiting the maximum size of residences and septic system capacity depending on lot sizes to maintain the existing character of the Town and limit development density.

Sexually Oriented Businesses

1. Adopted an ordinance limiting potential locations and addressing the community's concerns about sexually oriented businesses.

Solid Waste Management

1. Adopted a ten-year Solid Waste Management Plan in cooperation with other communities in Dare County.
2. Contract with a private firm to provide curbside trash and recycling pick-up and disposal. Such services are increased as the Town's population increases during the summer months.
3. Entered into a partnership with Dare County and the Town of Kitty Hawk to allow Duck residents to dispose of large waste items at the recycling center in Kitty Hawk.

Stormwater Management

1. Adopted stormwater management

standards to minimize the impacts of commercial and other higher intensity development on the surrounding environment.

2. Completed six significant projects to address recurring stormwater management issues along Duck Road (N.C. Highway 12) and the Duck Trail shared use path.

Tourism

1. Adopted village development standards and added pedestrian improvements to enhance Duck Village as a tourist destination for shopping, eating, and recreation.
2. Host over 90 public events (concerts, movies, performances, and presentations) a year at the gazebo on the Town Green and in the Amphitheater at the Town Park. These events drew over 20,000 attendees to Duck in 2018.
3. Established the Duck Jazz Festival and 4th of July Parade as major events drawing many thousands of visitors to Duck.

Town Commons Area

1. Acquired and developed nearly 9.4 acres of land on the Currituck Sound with a Town administration building, meeting hall, public park, entertainment facilities, and parking area.
2. Host over 90 public events (concerts, movies, performances, and presentations) a year at the gazebo on the Town Green and in the Amphitheater at the Town Park.

Appendix F: Existing Plan Review

Transportation

1. Developed and adopted a Comprehensive Pedestrian Plan for the Town of Duck.
2. Participated in the creation and adoption of the Dare County Comprehensive Transportation Plan.
3. Participated in the creation and adoption of the Albemarle Regional Bicycle Plan.
4. Serve as active members of the Albemarle Regional Planning Organization prioritizing transportation projects and studying regional transportation issues.
5. Constructed a 0.8 mile soundside boardwalk over three phases as a transportation alternative and recreational amenity for the Town.
6. Maintained and repaired sections of the existing Duck Trail shared use path along Duck Road.
7. Designed and permitted a planned project involving the construction of sidewalks, crosswalks, and other pedestrian improvements throughout Duck Village.
8. Constructed the first two phases of sidewalk and bike lane improvements through Duck Village.
9. Completing design and permitting for a third phase of sidewalk and bike lane improvements through the northern portion of Duck Village.

Uses of and Activities In and On Ocean and Sound Waters

1. Created a special Ocean and Sound overlay zoning district extending 1,000 feet from the shoreline that sets standards for activities within the portions of the Atlantic Ocean and Currituck Sound that abut the Town of Duck.

II. Any actions that have been delayed and reasons for the delay

1. The Town contracted with an engineering firm to conduct a preliminary study for potential bicycle/pedestrian improvements along the west side of Duck Road. Due to the physical constraints and significant costs identified by the study, the Town has not subsequently proceeded with this project.
2. The Town ceased pursuing a full marsh restoration project in the Currituck Sound along the Town Park property when concerns were raised by the Fish & Wildlife Service about potential impacts on submerged aquatic vegetation (although an invasive species) in the project area. A scaled-down project featuring sills may be considered over the next couple of years.
3. The placement of additional utility lines underground has been limited due to the significant cost of such improvements that would have to be borne by the Town.

III. Any unforeseen land use issues that have arisen since certification of the CAMA land use plan

1. Pending revisions to FEMA flood insurance rate maps suggest that nearly 80% of properties will be removed from SFHA flood zones. This change has led to the need for greater public education about flood damage prevention and the development of higher flood prevention standards in the areas affected by the changes.

2. Completion of the beach nourishment project and establishment of a static vegetation line within the beach nourishment project area have changed the manner in which the Town regulates development in this area.

3. The Town has seen an influx of businesses seeking to engage in outdoor entertainment activities. The Town has faced the challenge of accommodating changing business practices while preserving the character and environment of Duck Village.

4. Construction of the public boardwalk and sidewalks has led to increased emphasis on encouraging bicycle and pedestrian access to local businesses.

IV. Consistency of existing land use and development ordinances with current CAMA land use plan policies

1. The Town of Duck has closely followed the goals, policies, and objectives of the adopted CAMA Land Use Plan. As mentioned previously, compatibility with the land use plan has been evaluated during the review of every development project, rezoning, and text amendment

considered by the Town. Many of the current Town ordinances were adopted in an effort to support the goals, policies, and objectives found in the CAMA Land Use Plan. Among many benefits, these ordinances help preserve the Town's relatively low-density residential character, limit development's impact on the environment, and minimize property damage during storms.

ACTION PLAN

ACTION ITEM 1: Develop, adopt, and implement sound and ocean zoning overlays.

Complete. Ordinance adopted in 2007.

ACTION ITEM 2: Develop, adopt, and implement village commercial development

zoning options.

Complete. Ordinance adopted in 2004.

ACTION ITEM 3: Develop, adopt, and implement commercial development/building

design guidelines and standards.

Complete. Design standards adopted in 2004.

ACTION ITEM 4: Develop, adopt, and implement tree and vegetation protection ordinance.

Complete. Ordinance adopted in 2007.

ACTION ITEM 5: Develop, adopt, and implement property grading and filling

Appendix F: Existing Plan Review

regulations.

Complete. Ordinance adopted in 2005.

ACTION ITEM 6: Develop, adopt, and implement capital improvements plan (CIP).

A five-year CIP is adopted annually as part of the Town's budget. The most recent CIP adoption occurred on June 5, 2019.

ACTION ITEM 7: Acquisition of property and/or acceptance of easements on an as

needed basis to meet public objectives.

Complete and ongoing.

1. 9.4 acres of land on the Currituck Sound was purchased and developed with a Town administration building, meeting hall, public park, entertainment facilities, and parking area.

2. Dozens of easements were acquired from soundfront property owners to accommodate the construction of the Town's soundside boardwalk.

3. Over 120 easements were acquired from oceanfront property owners to accommodate the construction of the beach nourishment project.

4. The Town is negotiating with the U.S. Army Corps of Engineers to lease additional property to house an expansion of the existing public safety (Fire/Police) building on the USACE Field Research Facility property.

5. The Town acquired permanent easements from 14 property owners and temporary easements from 20 property owners to allow for the construction of the first two phases of sidewalk improvements through Duck Village.

6. The Town obtained authorization to maintain existing ditches and improvements for stormwater drainage near the Sanderling Resort and acquired easements to maintain stormwater drainage near the Caffey's Inlet neighborhood.

ACTION ITEM 8: Seek State assistance to prepare shoreline access plan.

Not complete. The Town has not taken any action toward this objective.

ACTION ITEM 9: Develop and implement a municipal property master plan.

Complete. All improvements in the master plan including the town hall, meeting hall, town park, stage, and amphitheater have been constructed.

ACTION ITEM 10: Continue community outreach and public participation programs.

Complete and ongoing.

1. The Town has a full-time community outreach/public information position and assistant working with public outreach and event coordination.

2. The Town engages residents and out-of-town property owners through the use of traditional media and social media including videos, newsletters, posters,

pamphlets, weekly e-news, Facebook, Instagram, and Twitter.

3. The Town engages a variety of stakeholders as issues arise and maintains contact lists for neighborhood associations, business owners, engineers, surveyors, real estate management companies, and oceanfront/soundfront property owners.

4. The Town has coordinated with Dare County and other local municipalities on large-scale media efforts to educate the public about significant projects and issues (beach nourishment, flooding risks, beach safety, etc.).

5. The Town is annually engaging in public education programs (direct mail, website, social media, etc.) regarding flood maps, flooding risks, flood management, and flood insurance.

ACTION ITEM 11: Develop program to support/encourage business alliance formation.

Complete and ongoing. The Duck Merchants Association is an active and vibrant presence in the Duck community. The Town supports DMA activities by hosting meetings, assisting with website development, and coordinating events.

ACTION ITEM 12: Develop programs to interact with/through civic groups.

Complete and ongoing.

1. Important information is disseminated through local neighborhood

associations through newsletters, emails, website, and social media.

2. Town employees frequently participate in meetings with the Duck Merchants Association and local neighborhood associations.

3. Civic groups are invited to participate as key stakeholders during the development of plans.

ACTION ITEM 13: Participate in multi-jurisdictional beach management planning.

Complete and ongoing.

1. The Town partnered with Dare County and several other towns on the Outer Banks on the studies, design, and funding for a beach/dune nourishment project completed in 2017.

2. The Town is already engaging with Dare County and other partner towns on studies and plans necessary to implement a beach renourishment project when necessary in a few years.

ACTION ITEM 14: Participate in multi-jurisdictional regional transportation.

Complete and ongoing.

1. The Town participated in the creation and adoption of the Dare County Comprehensive Transportation Plan.

2. The Town participated in the creation and adoption of the Albemarle Regional Bicycle Plan.

3. The Town serves as an active member of the Albemarle Regional Planning

Appendix F: Existing Plan Review

Organization prioritizing transportation projects and studying regional transportation issues.

ACTION ITEM 15: Develop Town-based computer mapping program.

Complete.

1. The Town purchased and operates its own GIS computer mapping system.
2. Information from the Town's GIS has been shared with other agencies and planning consultants to help build regional resources and assist with planning efforts.

ACTION ITEM 16: Codify Town ordinances.

Complete and ongoing. The Town contracts with American Legal Corporation to annually codify and update the Town Code.

ACTION ITEM 17: Conduct annual Town Council retreat.

Complete and ongoing. The Town's annual retreat is conducted over two days in late-winter, most recently on February 20-21, 2019.

ACTION ITEM 18: Develop a storm water management plan.

Complete and ongoing.

1. The Town has retained an engineer to assist with evaluating, prioritizing, and designing stormwater management improvements.

2. The Town has completed six significant projects to address recurring stormwater management issues along Duck Road (N.C. Highway 12) and the Duck Trail shared use path.

3. The Town plans to study stormwater drainage issues within several residential neighborhoods with isolated, recurring flooding issues.

4. The Town prepared and submitted an Emergency Floodwater Management Pumping Plan which was approved by the Water Resources Division of NCDENR.

ACTION ITEM 19: Develop (in-house) CAMA permitting capability.

Complete and ongoing.

1. The Town has two employees who are trained and certified as CAMA Local Permit Officers.

2. The Town issued 24 CAMA permits in 2018.

ACTION ITEM 20: Examine potential for an interconnected Duck Trail along the west side of NC 12 and along the Currituck Sound shore line.

Complete and ongoing.

1. The Town contracted with an engineering firm to conduct a study of this potential project. Due to the physical constraints and significant costs identified by the study, the Town has not subsequently proceeded with this project.

2. During FY 2018-19, the Town

completed construction of a 0.8 mile sidewalk and bike lane along the west side of Duck Road (NC Hwy 12) through Duck Village.

3. In early 2019, the Town contracted with an engineering firm to study and design an extension to the sidewalk and bike lane further to the north of Duck Village.

ACTION ITEM 21: Prepare land use plan implementation.

Complete and ongoing. The Town prepares these reports when requested every other year.

Plan Assessment: Town of Duck Comprehensive Pedestrian Plan

Summary Recommendations:

Sidewalks

The Plan recommends the addition of sidewalks to both sides of NC 12 within the Village Center to provide additional capacity within the corridor, separate pedestrians from vehicular and bicycle lanes, and channelize pedestrians to marked crosswalk locations.

Partially Accomplished and Ongoing

- Phases I and II complete.
- Phase III funded and scheduled for construction in FY 2019-20.
- Potential Phase IV being studied, under contract for preliminary design.

Crosswalks

The Plan recommends for adding, removing, and consolidating marked crosswalks, to help develop a system of crossings that works with the other improvements included herein. Several of the crosswalk locations are recommended to include a median refuge island.

Accomplished

- All crosswalks in Duck Village installed during Phases I and II.

Bike Lanes

In conjunction with the installation of sidewalks, the shoulders with the Village Center should be

converted to formal bike lanes with standard pavement markings and signs.

Partially Accomplished and Ongoing

- Phases I and II complete.
- Phase III funded and scheduled for construction in FY 2019-20.
- Potential Phase IV being studied, under contract for preliminary design.

Paved Shoulders

The extension of paved shoulders on roadway sections north and south of the Village Center would provide accommodation for bicyclists in addition to the shared use path along these roadway sections.

Not Started

Appendix F: Existing Plan Review

- Preliminary evaluation shows very challenging topography south of Duck Village.
- Town can coordinate with NCDOT on northern shoulders.

Shared Use Paths

The Plan recommends minor extensions of the existing shared use path north and south of the Village Center, to connect to existing and proposed facilities and improve the transition into the Village. The Plan also recommends consideration of a longer term project to install a new shared use path on the west side of NC 12 south of the Village.

Accomplished and Ongoing

- Connection to southern path completed in 2018.
- Connection to northern path scheduled for construction as part of Phase III in 2020.

Pedestrian Level Lighting

Illumination of marked crosswalks will benefit the high levels of night-time pedestrian, bicycle, and vehicular travel. In addition, over the long-term, pedestrian lighting could be installed throughout the Village Center.

Accomplished

- Lighting added at several existing crosswalks in 2017.
- Crosswalk lighting added at all existing and newly installed crosswalk in

Phases I and II.

Intersection Improvements

As part of new sidewalk construction, pedestrian landings and marked crosswalks of intersecting streets would be incorporated. Additional improvements to corner radii and sight lines should also be made where appropriate. For the shared use path north and south of the Village, pavement markings, signage, and sight lines should be analyzed and improved where necessary.

Accomplished

- Intersection and crosswalk improvements north and south of Duck Village were completed in 2017.

Gateways

To enhance the transitions into the Village Center, the Plan recommends Gateway treatments including raised median islands and warning signs.

Accomplished

- Gateway medians installed at the northern and southern ends of Duck Village as part of Phase I.

Drainage

The Town has taken significant actions to remediate stormwater ponding that impedes pedestrian, bicycle, and vehicular traffic; the Plan recommends continuation of these efforts at additional specific locations, with construction details and costs to be determined.

Accomplished and Ongoing

- Existing stormwater drainage issues have been addressed by stormwater management projects in several areas along the Duck Trail.
- Additional areas are being evaluated for future stormwater management improvements.

Intelligent Transportation Systems

The use of traffic video cameras, web interface, and/or advance warning message signs could convey benefits to the overall transportation system in the Town.

Accomplished

- Police Department has installed permanent electronic speed limit and messaging signs where speed limits decrease north and south of Duck Village.

Encouragement Programs

The Town has recently taken significant steps to encourage walking as a way to access the Town's many destinations. The Plan recommends that these programs be continued and expanded. Elements such as walking and bicycling maps, walking tours, wayfinding programs, tip sheets, and working with bicycle rental shops to promote use of bicycle lights and helmets could all enhance the culture of walking in the Town.

Accomplished and Ongoing

- Wayfinding maps have been installed at multiple locations along the

sidewalks in Duck Village.

- 30,000 pedestrian/bicycle brochures including maps and safety information are produced and distributed each year.
- When available through safety programs, the Town has handed out bike lights and fluorescent wristbands at large public events.

Education Programs

The Town should treat education as an integral part of the overall improvement of the pedestrian

system, to be pursued concurrently with infrastructure improvements. The Plan includes

recommendations for distribution of information through real estate rental companies, professional development for Town staff, coordination with state education programs, and outreach at Town events.

Accomplished and Ongoing

- Pedestrian/bicycle brochures including maps and safety information are distributed to rental agencies and businesses each year.
- Safety information is posted on the Town's website and reinforced through social media campaigns.

Enforcement Programs

The Town Police Department should continue to enforce speed limits throughout the Town, combined with targeted

Appendix F: Existing Plan Review

enforcement of legal crosswalk behavior (both by motorists and pedestrians). In addition, the Plan suggests consideration of a program to cite good behavior.

Partially Accomplished and Ongoing

- The Police Department enforces vehicular traffic speeds, but finds it challenging to enforce pedestrian/bicyclist behavior with limited staff.

Evaluation Programs

To help monitor the progress and results of Plan implementation, the Town should conduct annual pedestrian and bicycle counts, and compare the results to similar counts taken in 2009 and 2013. In addition, the Plan recommends an annual report on count and crash data, infrastructure improvements, outreach events, and public feedback.

Partially Accomplished and Ongoing

- Brief pedestrian/bicycle traffic counts were taken north and south of Duck Village in 2017.
- Town installed a pedestrian/bicycle traffic counter by the southern end of Duck Village in partnership with ITRE in 2017.
- Additional studies have not been conducted.

Complete Streets Policy

To complement recently adopted NCDOT policy, the Town should consider adopting its own Complete Streets Policy to

encourage development that accommodates all roadway users.

Not Started

- Through its capital improvements program, Town has funded the installation of complete streets throughout Duck Village, but has not attempted to adopt a formal policy.

Development Partners

The Plan recommends ordinance enactment and coordination with private interests to ensure that new development and redevelopment projects help implement the Plan's goals. In particular, opportunities exist to coordinate on sidewalk construction and connection, pedestrian access through parking lots, and neighborhood connections.

Accomplished and Ongoing

- Town has consistently evaluated development proposals for consistency with pedestrian/bicycle recommendations in the current land use plan and 2027 Vision.
- Duck Deli constructed a portion of public sidewalk as part of its redevelopment.
- 1184 Duck Road granted an easement for construction of a sidewalk.

Access Management

The Town should continue efforts to improve property access and reduce conflict points between motor vehicles,

pedestrians and bicyclists.

Accomplished and Ongoing

- Town has limited development proposals to a single curb cut off Duck Road.

Plan Assessment: Town of Duck 2027 Vision

Three to Five Year Goals:

(1) Continue to partner with and support the business community and the Duck Merchants Association, including increasing the exposure and accessibility of all businesses

Accomplished and Ongoing

- Host meetings of the Duck Merchants Association
- Promote DMA in mailings, website links, events
- Partner on special events (Yuletide Festival, Easter Egg Hunt)
- Post maps of Duck businesses

(2) Implement the Town of Duck Beach Nourishment Project, develop a maintenance plan for the current project, and continue to monitor all areas of the Town to identify possible future projects

Accomplished and Ongoing

- 1.7 miles of beach/dune nourishment completed in 2017
- Annually - Contracted and volunteer dune planting programs

- Monitor beach/off-shore conditions to determine if/when renourishment is necessary

(3) Maintain the amenities of the Town to their current standard and make improvements where necessary and/or appropriate, including modifications and enhancements to improve the Duck experience

Accomplished and Ongoing

- Annually maintain/repair soundside boardwalk
- Annually maintain and improve Town Park facilities

(4) Continue the 5-Year Financial Plan to optimize our resources

- Address human resources, infrastructure, fund balance, revenues, demographics, future circumstances and capacity
- Develop a fiscal plan that sets a tax rate designed to reasonably fund projects and services and reflects the desire for stable or limited tax growth
- Work to get the most value for our tax dollars and communicate these decisions to all stakeholders
- Evaluate outcomes, both qualitatively and quantitatively

Accomplished and Ongoing

- Five-year financial plan updated annually as part of the budget process
- Town in positive fiscal condition

Appendix F: Existing Plan Review

now and moving forward

(5) Continue to explore and analyze the feasibility of a northern extension of the boardwalk

Underway

- Contracted for SAV survey
- Discussed preliminary project design with consultants
- Not green-lighted or funded at this time

(6) Continue to implement thoughtful strategies designed to engage the stakeholders of the Town

- Foster community participation with ongoing events, including shoulder and off-season experiences
- Maintain high level of communication and inclusion
- Enhance our network of volunteers and ensure continuity
- Learn more about seasonal stakeholders
- Explore strategies/forum for HOAs to connect and engage with the Town and each other, including the use of technology

Accomplished and Ongoing

- Weekly e-news to approximately 2,000 subscribers
- Strong social media presence on Facebook, Twitter, and Instagram

- Biannual newsletter mailed to property owners

- Stakeholders included in relevant discussions

- Developed network of nearly 130 community volunteers

(7) Complete the long-term plan for the renovation or reconstruction of the public safety building

Underway

- Conceptual design/environmental studies completed

- Awaiting approval of alternative land lease from U.S. Army Corps of Engineers

(8) Continue to advocate for traffic improvements including the construction of the Mid-Currituck Bridge, opposition to the widening of NC12, evaluation and implementation of stormwater improvements, and evaluation of public parking alternatives

Ongoing

- Mid-Currituck Bridge project is funded and scheduled, but legal delays expected

- Completed several stormwater management improvements

- Herron property purchase attempted

- Parking study discussed, but not prioritized

(9) Develop a strong relationship between the property managers and the Town ensuring that

- there is a strong awareness of public safety interface
- appropriate information is shared with property owners and visitors

Accomplished and Ongoing

- Email list of neighborhood contacts for relevant information

(10) Implement all facets of the Town of Duck Comprehensive Pedestrian Plan

Accomplished and Ongoing

- Completed Phase 1 & 2 sidewalks and bike lanes in Duck Village
- Installed gateway medians, pedestrian crosswalks, and crosswalk lighting
- Completing Phase 3 design and specifications for permitting
- Evaluating Phase 4 constraints and potential design
- Completed several stormwater management improvements
- Annually repave sections of the Duck Trail north and south of Duck Village

(continued on next page)

Appendix F: Existing Plan Review

Plan Assessment: Hazard Mitigation Plan

Town of Duck - Hazard Mitigation Plan Update 2019 - status assessment (04/24/2019)

Action #	Description/Strategy	Hazard(s) Addressed	Relative Priority	Lead Agency / Department	Potential Funding Source	Implementation Status
DCK1	Continue to fund enforcement of current hazard mitigation regulations.	All Hazards	High	Town Council	General Fund	Town Council continues to annually fund a Code Enforcement Position and; Certified Floodplain Manager as well as continuing education training.
DCK2	Improve stormwater drainage in vulnerable areas	Hurricanes, Nor'easters, Flooding	High	Town Council, Town Staff	General Fund	Town Staff continues to identify and resolve localized roadway flooding issues as funding and resources become available. The Town has identified low lying areas through GIS mapping and associated flood risks to those areas resulting from rain events. The Town has submitted an emergency floodwater management plan for review and consideration by NCDWR to address these areas. The Town also continues to implement stormwater management projects along NC12 to mitigate flooding and standing water. Drainage Projects along NC12 at Duck Ridge Village Court, Station Bay Marina and along the Duck Trail have been budgeted in fiscal year 2019-20.
DCK3	Adopt and apply development policies that balance protection of natural resources and fragile areas with residential and economic development	Hurricanes, Nor'easters, Thunderstorms, Wildfire, Flooding	Medium	Town Council	General Fund	Town Staff is working with OBX CRS Users Group on the development of a new floodplain ordinance with higher regulatory standards for areas within the Special Flood Hazard Area (SFHA) as well as areas that are not located within the SFHA to address known flood risks. These standards are being prepared in expectation of the adoption of new Flood Insurance Rate Maps from FEMA in 2020. Town Council adopted a Resolution establishing a policy related to the Emergency Pumping of Floodwaters September, 2018.
DCK4	Develop policies that minimize threats to life, property, and natural resources resulting from development located in or adjacent to hazard areas, such as those subject to erosion, high winds, storm surge, flooding, or sea level rise.	Hurricanes, Nor'easters, Thunderstorms, Wildfire, Flooding	Medium	Town Council	General Fund	Adoption of revised Flood Insurance Rate Maps and Flood Damage Prevention Ordinance, local participation in CAMA LPO program, participation in the FEMA Community Rating System, enforcement of NC State Building Code Revisions and amendments including wind-borne debris provisions. The Town has also revised policies related to oceanfront development including additional setbacks for accessory structures, new dune walkway standards, and remedies for structures encroaching on the ocean beach. Annual beach profile surveys initiated in 2017 continue to assess changing shoreline patterns.
DCK5	Develop location, density, and intensity criteria for new, existing development and redevelopment including public facilities and infrastructure so that they can better avoid or withstand natural hazards.	Hurricanes, Nor'easters, Thunderstorms, Wildfire, Flooding	Medium	Town Council	General Fund	Town Code revisions including lot coverage regulations, limitations on residential dwelling size, increased setbacks for accessory structures, additional elevation requirements for V-Zone structures and incentives for use of permeable and semi-permeable materials for driveways and parking have been adopted. Town Council adopted additional limitations on the scale of development through house size limitations and increased setback requirements January, 2019.
DCK6	Identify areas most at risk and investigate strategies to reduce risk from wild land/urban interface fires	Wildfire	Medium	Fire Department, Town Staff	General Fund	Fire department staff will be utilizing resources to include utilizing new GIS mapping tools to identify areas that may be vulnerable in order to determine effective risk reduction strategies.
DCK7	Collaborate with Duck Fire and Town Staff to educate the homeowners, developers and landscapers on designing fire safe communities.	Wildfire	Medium	Fire Department, Town Council	General Fund	Fire department staff is initiating a phased approach with Phase I implementation focusing on education and awareness. Future phases will look at regulatory implementation and a formalized plan.
DCK8	Continue education efforts to promote dune maintenance.	Hurricanes, Nor'easters, Flooding, Erosion	High	Town Staff, Hired Consultant, Division of Coastal Management	General Fund, Grant Fund	Town distributes information and promotes the proper installation of sand fence encourages the planting of native vegetation. The Town implemented volunteer based beach planting program November, 2017 with funding expected to be continued. The program has garnered support from residents, non-residents and local volunteer groups.
DCK9	Keep effective construction techniques for coastal communities available online.	Hurricanes, Nor'easters, Flooding, Erosion	High	Town Staff	General Fund	Town of Duck Floodplain webpage reworked 9/18 to include Continue to provide FEMA/NC Department of Insurance publications on Coastal Construction Techniques.
DCK10	As a FEMA CRS commuity, we will take advantage of the various mitigation strategies promoted by this program.	Hurricanes, Nor'easters, Flooding, Erosion	High	Town Council, Town Staff	General Fund	The Town continues to develop actions and strategies that will lower its CRS rating and therefore provide lower flood insurance premiums to property owners within the Town. See also DCK3

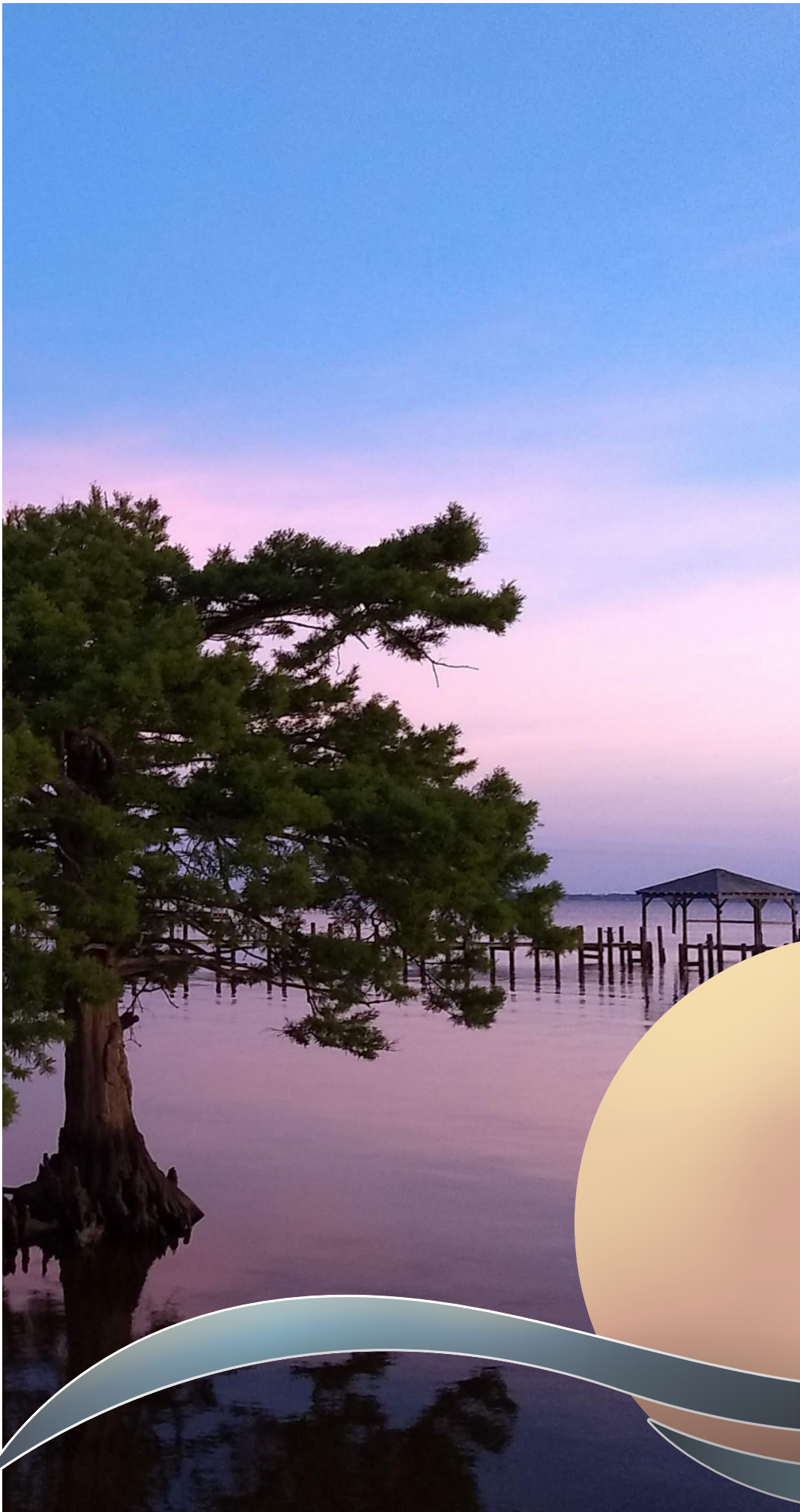
DCK11	Mitigate ocean over wash and sound erosion by identifying vulnerable areas, developing public outreach information and disseminating this information to the public.	Hurricanes, Nor'easters, Flooding, Erosion	High	Town Council	General Fund	The Town has been monitoring high oceanfront erosion areas by documenting storm damage and taking photos/Go Pro and aerial drone video. A beach erosion study has been completed for the Town by the USACOE and Coastal Planning and Engineering which documents erosion patterns and existing conditions. As a result of these findings, annual beach profile surveys were initiated in 2017 to assess changing patterns and will continue annually. These survey are expected to soon be supplemented with aerial drone technology to develop 3D imaging analysis. The Town still needs to develop a method to track sound side erosion. Information regarding these findings are disseminated through social media, the Town website and direct email correspondence to oceanfront owners and to soundfront owners once that database is completed.
DCK12	Increase the amount of open space throughout the town by seeking land donations or making land purchases. Develop an open space plan to further enhance these areas.	Hurricanes, Nor'easters, Flooding, Erosion	High	Town Council	General Fund	The Town owns an 11-acre park in the center of the Village Commercial area which is partially maintained as open space. As the Town is 90 percent developed, there are few areas available to purchase and maintain as open space. Additionally, Town funds for property acquisitions are limited. Future activities in this area will largely depend on the success of the Town in acquiring property with available grants.
DCK13	Support programs and initiatives to annually assess shoreline changes (erosion and accretion)	Hurricanes, Nor'easters, Flooding, Erosion	High	Town Council	General Fund	The Town has been monitoring high oceanfront erosion areas by documenting storm damage and taking photos/Go Pro and aerial drone video. A beach erosion study has been completed for the Town by the USACOE and Coastal Planning and Engineering which documents erosion patterns and existing conditions. The Town enacted an additional tax to support beach management activities, and annual beach profile surveys were initiated in 2017 to assess changing patterns. These survey are expected to soon be supplemented with aerial drone technology providing 3D imaging analysis that will further enhance the Town's ability to track shoreline change. These techniques may likely be carried over to assess soundside shoreline changes as well.
DCK14	Stay informed, involved and supportive relative to Federal, State, and/or regional studies, initiatives and efforts concerning beach re-nourishment and maintenance	Hurricanes, Nor'easters, Flooding, Erosion	High	Town Council	General Fund	The Town participates in the annual program established by the Dare County Shoreline Commission to provide funds for beach maintenance. The Town has started discussions 3/2019 regarding beach re-nourishment in conjunction with Dare County and the Towns of Kill Devil Hills, Kitty Hawk and Southern Shores.
DCK15	Provide residents with information and links to technical assistance concerning beach re-nourishment and maintenance activities and options such as sand fencing	Hurricanes, Nor'easters, Flooding, Erosion	High	Town Council	General Fund	The Town website, social media and direct email communication is utilized for dissemination of information. The Town provides information and issues CAMA permits to oceanfront property owners seeking to maintain their primary and frontal dunes.
DCK16	Lobby the NC Board of Transportation and the NC Department of Transportation and NC Turnpike Authority for the construction of the Mid-County Bridge.	Hurricanes, Nor'easters, Flooding, Erosion	High	Town Council, NCDOT	NCDOT	The Town Council has issued several resolutions to support the construction of the Mid-Currituck Bridge and to identify the Town's preferred design alternative for the project. The Town has sent letters to NCDOT and NC Turnpike Authority Staff providing comments on the project studies that have been underway for several years. The Town frequently discusses the project at regular Town Council meetings and is kept informed of the status of the project by Town staff and residents who serve on a local committee to support construction of the bridge.
DCK17	Address drainage issues on NC 12 as applicable and provide funding for necessary stormwater improvements.	Hurricanes, Nor'easters, T-storms, Flooding, Erosion	High	Town Council	General Fund NCDOT	Engineering is ongoing to rectify localized drainage problems on parts of NC 12 and funding is being provided in the CIP annually. Pending projects include pedestrian improvements along the west side of NC12 in the Village which include a sidewalk with both landscaping and stormwater features, and Duck Trail improvements north of Waxwing Lane and Station Bay Drive. Going into FY 2019-2020, as funding permits, projects are expected to include improvements on the east and west side of NC12 at Wee Winks, south of Four Seasons Lane and at NC12 and Station Bay Marina. Collaboration with NCDOT continues as needed.
DCK18	Continue to provide effective public information and education materials to disseminate data on hazards, and educate beachgoers on beach safety (rip currents, beach holes, beach fires, etc.)	All Hazards Rip Currents	High	Town Council, Town Manager, Public Information Officer, Ocean Rescue	General Fund	Continue collaboration through the County's Joint Information Center (JIC) and Emergency Management tools to include methods such as regroup and other joint marketing techniques designed for large scale public dissemination. Continue annual and in-season evaluations and reviews regarding public safety staffing, life-guard stand locations, and effective means to communicate threats (ocean conditions, storms hazardous conditions); i.e. social media, life guard advisories, use of flag notification systems and signage at beach access locations.

Appendix F: Existing Plan Review

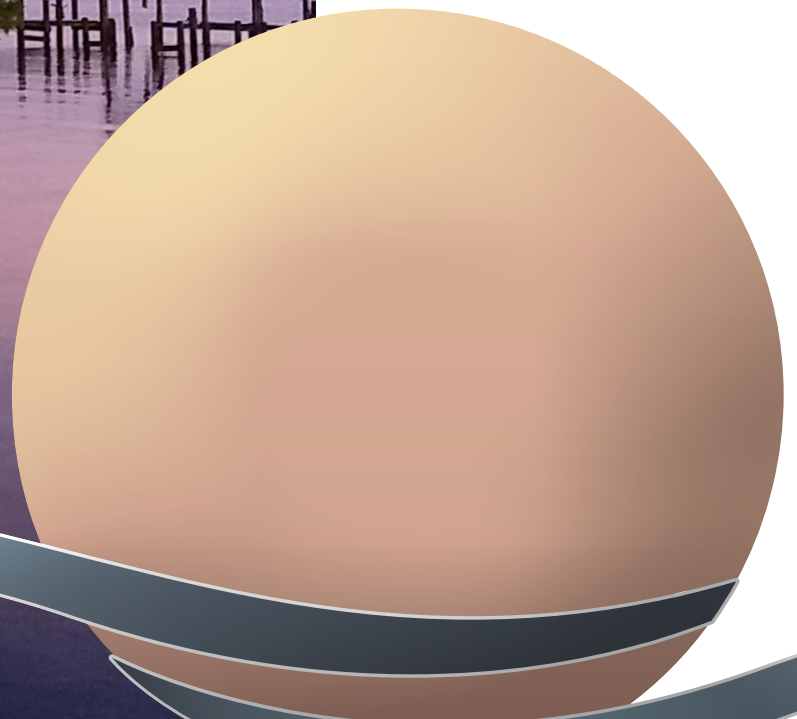
DCK19	Participate in the Dare/Currituck County Local Emergency Preparedness Committee (LEPC)	All Hazards	Low/ Medium	Public Safety	General Fund	Dare and Currituck County Emergency Management initiated meetings in 2017 for consideration of forming a joint LEPC. The Outer Banks Regional LEPC was established in order to improve capabilities to meet all threats and hazards not just HAZMAT. Public safety personnel is and will continue to participate in meetings and joint trainings to improve multi-jurisdictional emergency response to all hazards.
DKC20	Annual Review of Emergency Operations Plan	All Hazards	Low/ Medium	Town Staff	General Fund	Continue to review the Town's Emergency Operations Plan annually in order to address any lessons learned, priorities, procedures, or additions to ensure effective implementation of the plan.
DCK21	Continue development and improvement related to the dissemination of public information to stakeholders	All Hazards	High	Town Council, Town Staff	General Fund	The Town effectively utilizes its website, social media, and direct email and telephone communications to communicate threats to and from its stakeholders (i.e.; property owners, residents, business owners, and vacationers), however continual research and development of new and effective means of communication are constantly pursued. Collaboration with the County's Joint Information Center (JIC) and Emergency Management has helped with the development of new techniques and technology to disseminate information. Ongoing collaboration with Duck Merchant's Association is maintained through quarterly and monthly meetings. Databases for the purpose of direct email communications with oceanfront and soundfront owners are maintained and updated regularly.

(end of plan assessments)

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Appendix G: Seasonal Population Projection Methodology

Seasonal Population Estimate

Duck, like other coastal North Carolina beach communities, experiences large seasonal surges in population. Seasonal population in Duck is primarily driven by the short-term rental market and seasonal occupants and second homeowners who classify their primary residence elsewhere. The data on permanent residents shows additional bedrooms which are likely used for lodging overnight guests which contribute to some degree to the increase in population. Bed and breakfasts or other short-term options are limited in number and do not greatly influence the estimate of peak seasonal occupancy. Day-travelers are not accounted for in these calculations and may be significant, especially for popular festivals and events. By combining the number of year-round residents with the average peak seasonal population estimate described in greater detail below yields a 2017 peak seasonal population (permanent plus seasonal guests) estimate of 21,450 for the Town of Duck.

Appendix G: Seasonal Population Projection Methodology

Starting Estimates and Assumptions

Population Type	Definition	2017 Estimate
Peak Population	Permanent plus seasonal population. This is an approximation of the planning area's population on a "typical" peak day during the high season.	21,450
Permanent Population	Persons who usually reside in the planning area	369
Peak Seasonal Population	Peak Seasonal Population Persons who are temporarily residing in the planning area, such as tourists and vacationers, but who normally reside in another location. This estimate does not include day-trippers.	21,060

A summary of overnight visitors that was used to calculate the peak seasonal population is described in the table below.

Total Overnight Visitors in the Peak Month

	Low Estimate	High Estimate
Peak Population	17,100	23,000
Permanent Population	370	1,110
Peak Seasonal Population		270
Total	17,740	24,380
Average		21,060

Short-Term Rentals & Seasonally Occupied Units

Data on the overall number of short-term rentals is difficult to ascertain. While the most current data from the 2017 American Community Survey Estimates indicates there are 2,633 vacant housing units for seasonal or recreational use. For comparison, AirDNA data pulled in May 2019 indicate 324 active rentals, though this only accounts for listings active on Airbnb and not the whole short-term rental market or second homes which are only seasonally occupied. AirDNA data also indicates a peak month of July with a 100% occupancy, an average rental size of 4.3 bedrooms, with an average of 10.6 guests per

rental. “Whole house rentals” are classified as 99% of the rental market. This information is corroborated based on conversations relating to the short-term rental market in the area.

The following assumptions are made:

- » Census data from 2017 on seasonal, recreational and occasionally occupied units (2,633) was used to calculate the seasonal occupancy. Most of these units exceed four bedrooms.
- » The short-term rentals reflect the general housing stock within Duck (based on the number of bedrooms and unit distribution).
- » Peak occupancy rate for units used is 90%.
- » July is assumed to be the peak month which correlates with AirDNA data and Occupancy Tax data from Dare County.

To develop the seasonal population that corresponds to the short-term occupants, ranges from 1-14 persons per housing unit were assigned based on the number of bedrooms per unit. A low and high estimate of persons is used based on bedrooms for each type of housing unit which corresponds to the general housing stock within Duck:

Estimated Short-Term Occupancy in the Peak Month

Number of Bedrooms	Occupancy Rate	Housing Unit Distribution (i)	Housing Units	Low Occupancy Estimate	High Occupancy Estimate
Studio	90%	4%	116	104	209
1 Bedroom		6%	153	275	412
2 Bedroom		7%	195	526	877
3 Bedroom		13%	337	1,517	2,502
4 Bedroom		38%	1008	7,261	8,620
5 or more bedrooms		31%	824	7,417	10,380
			2,633	17,100	23,000

i) American Community Survey 2017 data on unit distribution in Duck

Appendix G: Seasonal Population Projection Methodology

Guests of Year-Round Residents

Another factor that contributes to the seasonal population in the peak months are over-night guests of the permanent population. With 65% of housing units exceeding four bedrooms and an average of 2 people per household in the permanent population, the expectation for guests within the year-round housing units is relatively high compared with other communities. A low estimate of 2 guests per permanently occupied housing unit and a high estimate of 4 guests per unit is used to estimate peak seasonal guests.

Estimated Guests of Year-Round Duck Residents in the Peak Month

Persons per Unit	1.95	
Permanently Occupied Housing Units (ii)	3.69	
	Low Estimate	High Estimate
Guests of Year-Round Residents	1 per unit	3 per unit
	370	1,110

Other Lodging

Other lodging options in Duck are limited but consist of a Bed and Breakfast and the Sanderling Resort. This lodging has not been altered or changed significantly since the 2004 CAMA report which estimated the peak seasonal population from other lodging options in Duck at 270 persons.

Permanent Population Projections

Permanent population projections were extrapolated based on three different scenarios: matching the county growth rate projected by NC Office of State Budget Management, matching the Town's growth rate 2010-2017, and matching the town's growth rate from 2000-2017.

	2000	2010	2017	2020	2025	2030	2035	2040	2045	2050
Dare County Growth Projections (NC OSBM)		33,920		38,055		40,983		43,203		
Historic Population, Census-Reported	448	369	396							
Match County Projections		369	396	410	425	441	457	474	492	510
Match Town's Growth Rate, 2010-2017			396	408	429	450	473	497	523	549
Match Town's Growth Rate, 2000-2017			396	387	373	360	347	334	322	311

Appendix G: Seasonal Population Projection Methodology

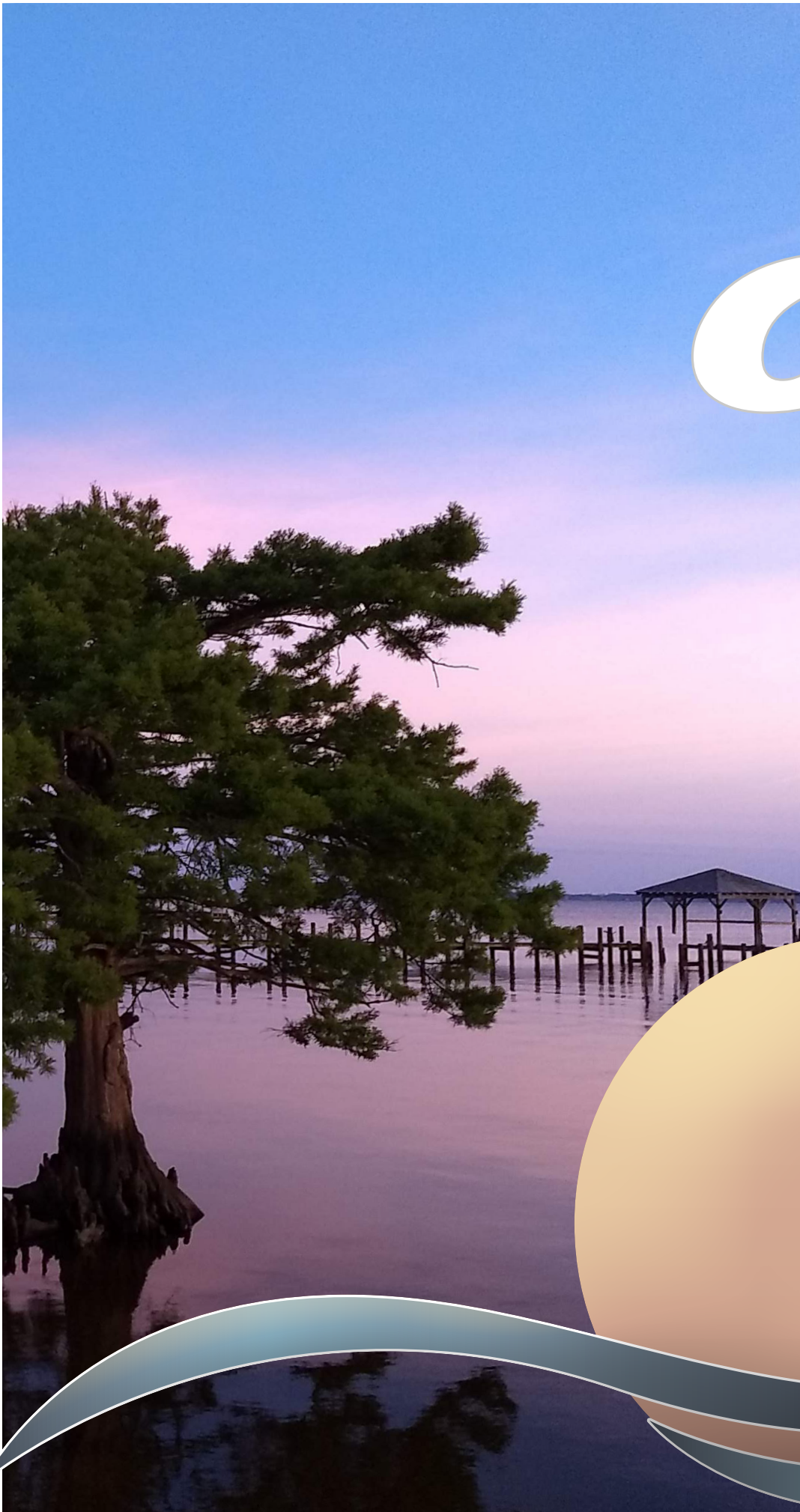
Peak Population Projection

Any increase in seasonal population in the future will be largely tied to the residential development market and overall housing economy. The majority (92%) of new single family permitted property within the town is part of the seasonal market and it is unlikely that any new hotels or other types of lodging will be constructed for overnight visitors. Specifically, larger homes with more bedrooms being redeveloped in place of smaller, older homes. This may attribute to small increases in the seasonal population over the coming years. Permit data from the Town of Duck between 2003 and 2017 shows a median number of 6 bedrooms and 12 occupants in new development. Since 2010, an average of 8 new homes per year are being built. While the overall number of units in this scenario remains flat because these homes are primarily redevelopment of homes on existing lots, the seasonal population is projected using approximately 40 new occupants per year to represent the additional persons occupying additional bedrooms in the newly redeveloped housing, which yields a 2017 peak population estimate of 21,450 for the town of Duck.

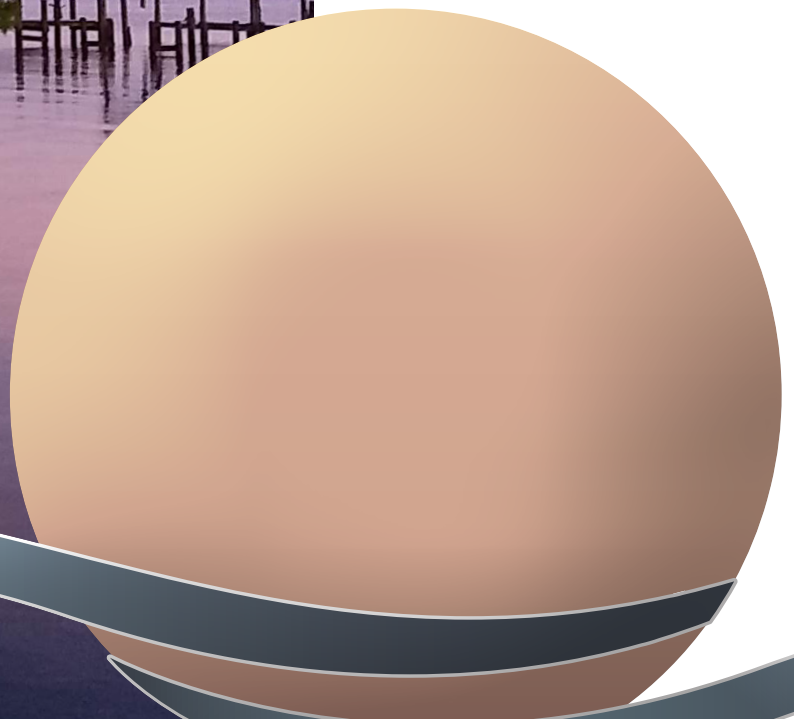
Duck Peak Population Projection

2017	2020	2025	2030	2035	2040	2045	2050
21,450	21,570	21,770	21,970	22,170	22,370	22,570	22,770

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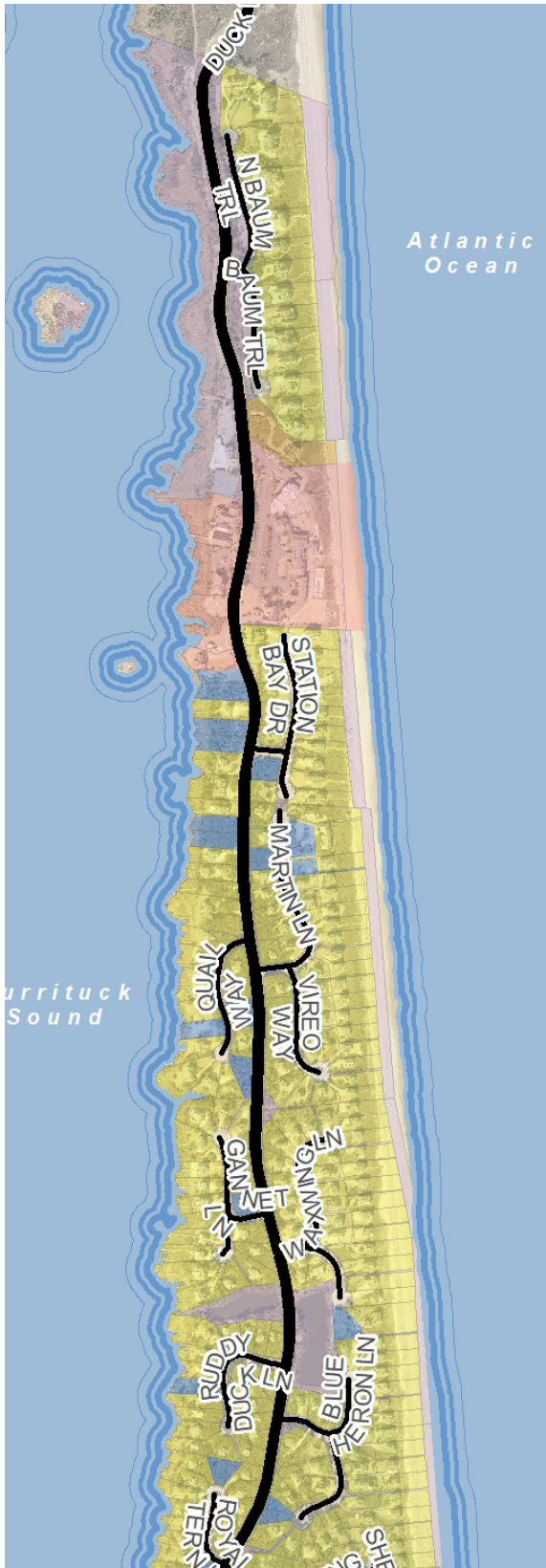


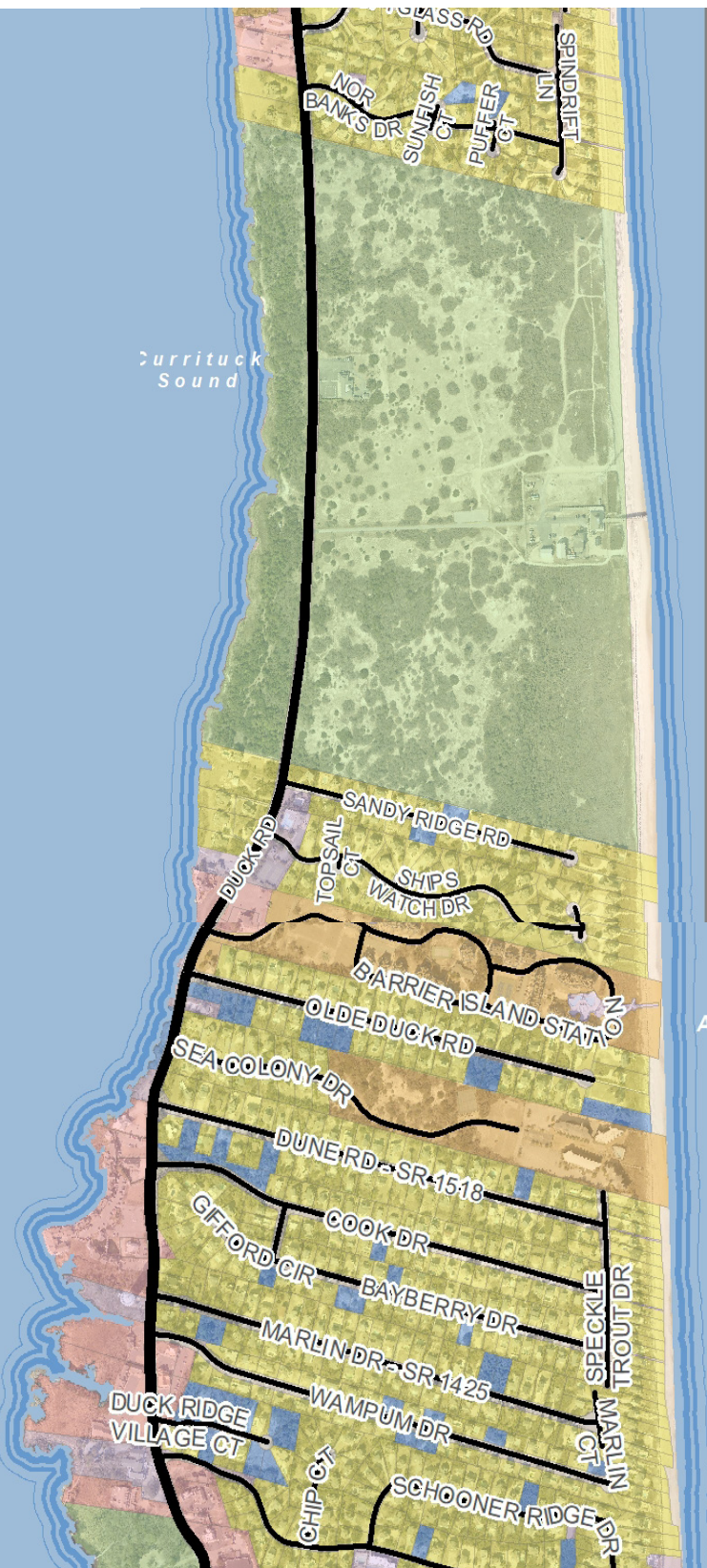
Appendix H: Supporting Materials

The following materials are also available upon inquiry with the Town.

Appendix H: Supporting Materials

Existing Land Use

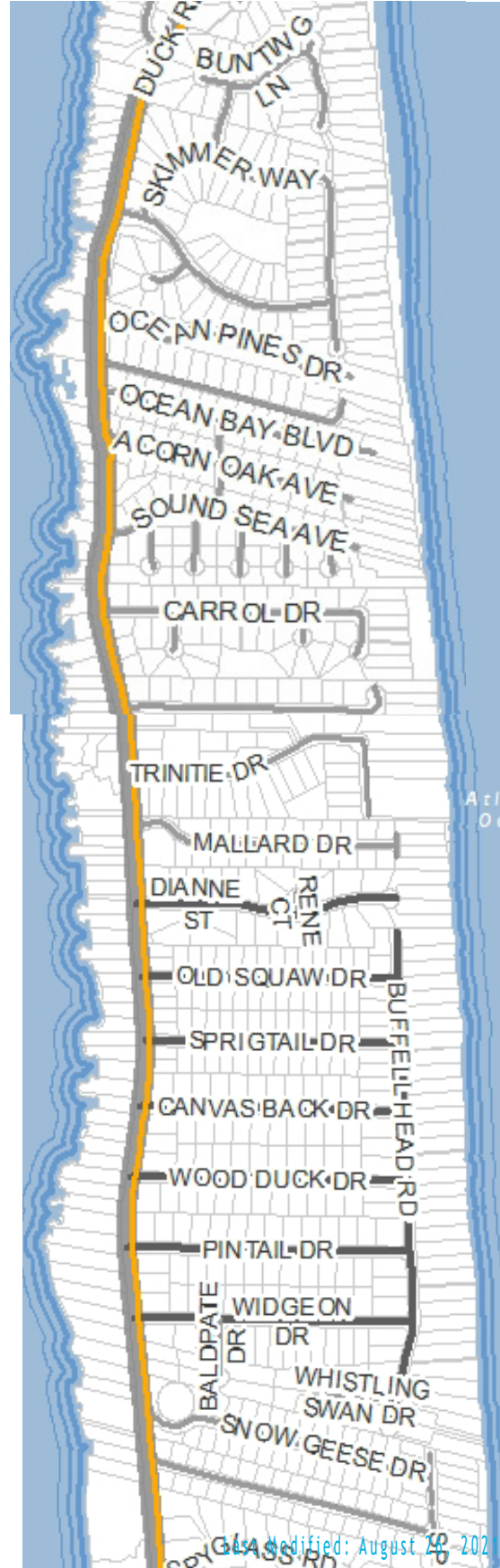
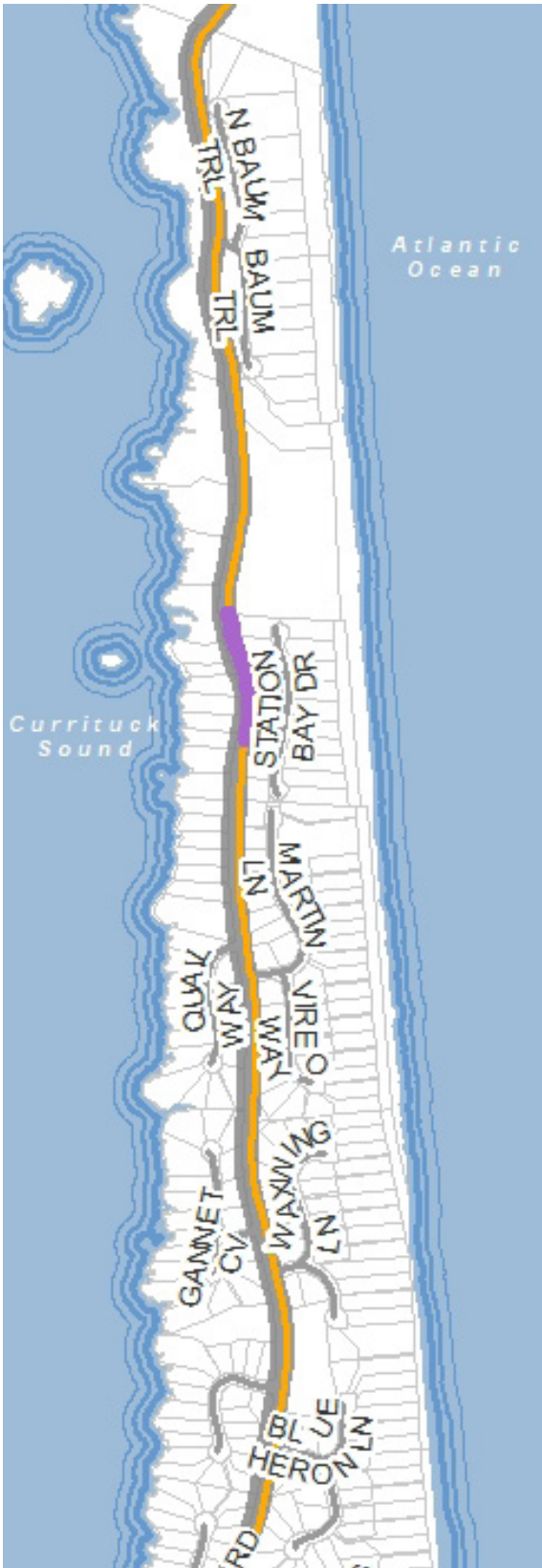


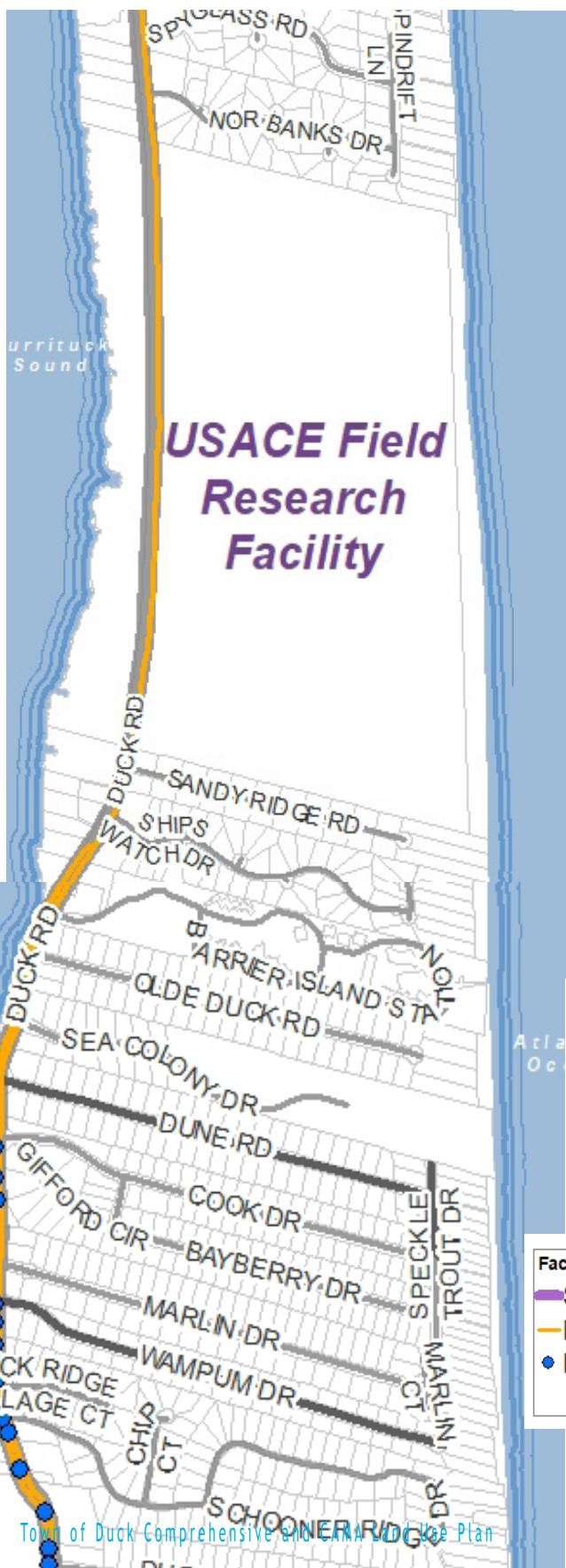


Existing land use

- Vacant residential
- Single family residential
- Multi-family residential
- Commercial or mixed use
- Public
- Common, private, or unspecified

Appendix H: Supporting Materials Multimodal Transportation System





Facilities

- Stormwater (multi-use path)
- Pedestrian
- ◆ Pedestrian Crossings

Roads

- Hwy 12 (8,700 AADT in 2018)
- Other Public Roads
- Private roads

FEMA Flood Hazard Areas

Flood Hazard Areas



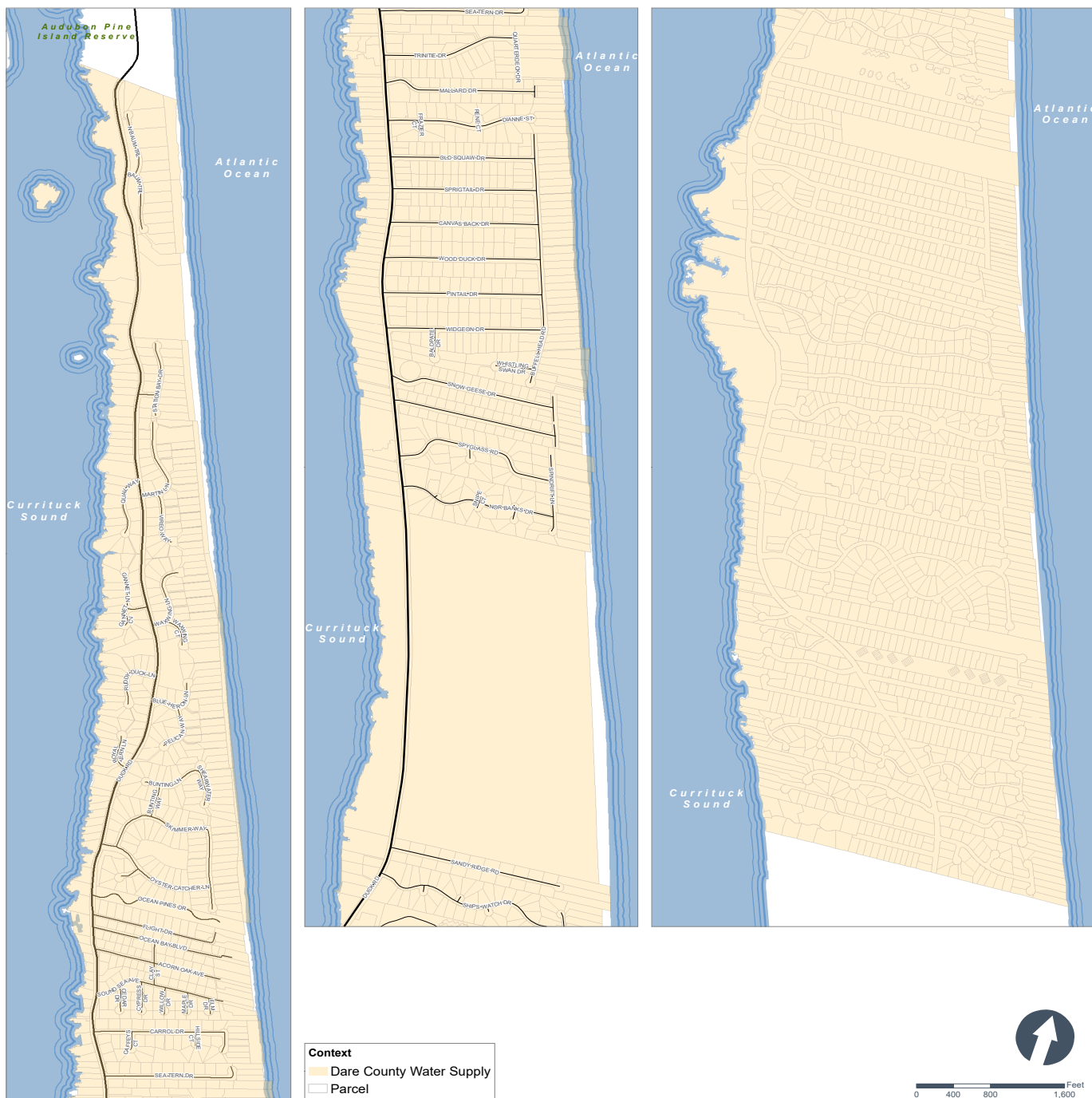
Town of Duck Comprehensive and CAMA Land Use Plan

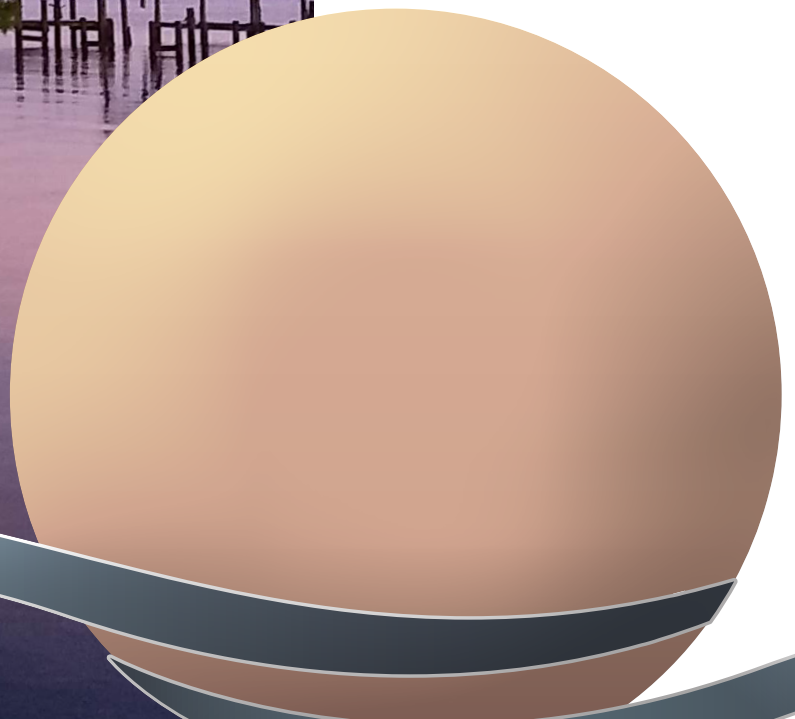
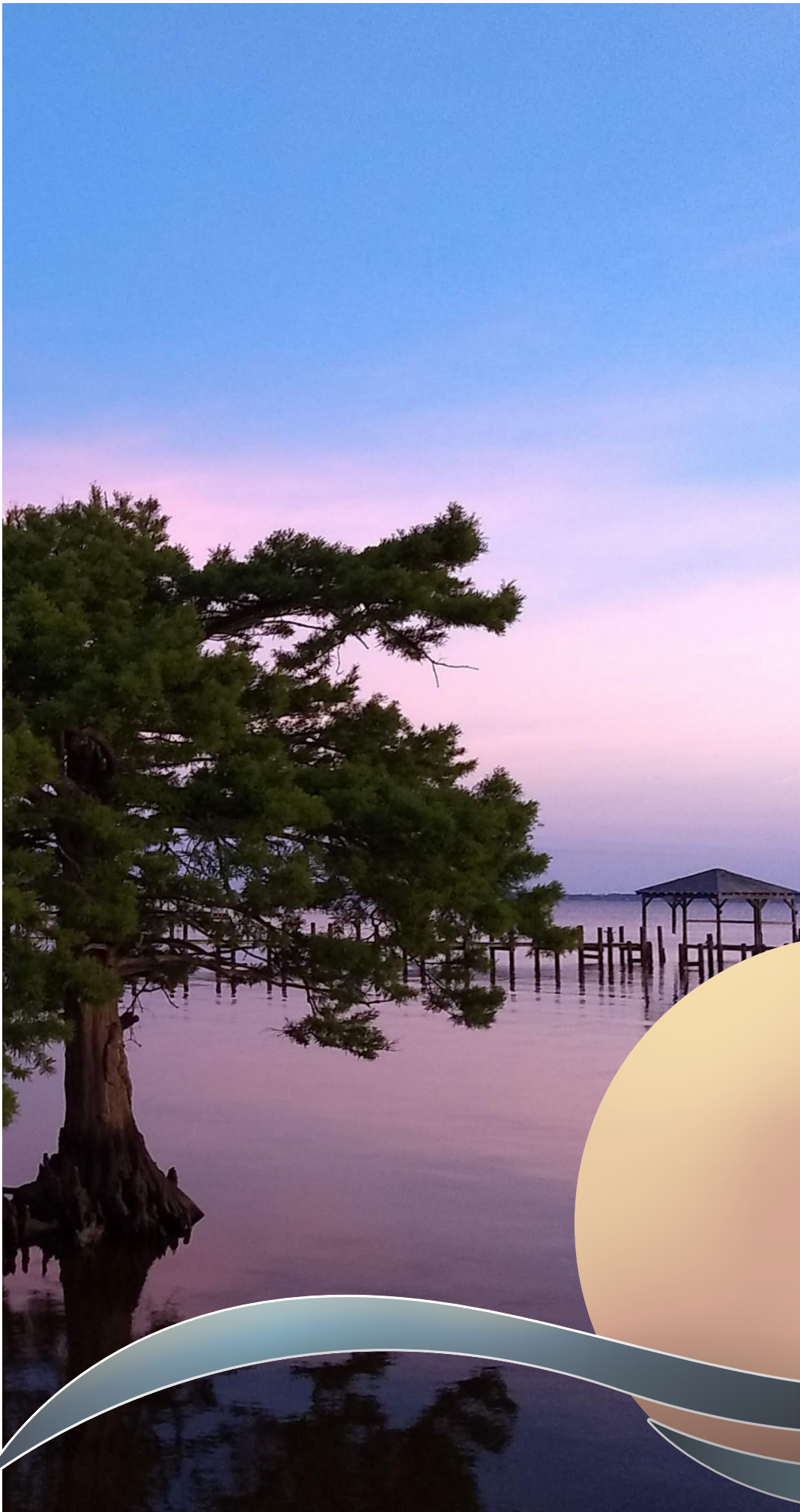


Date: 12/17/2020
 DISCLAIMER: This map was created using the best available data and is provided without warranty of any representation of accuracy or completeness. The information herein does not necessarily represent a legal survey. The date is shown and is a correct date of electronic.
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Town Water Supply

Town Water Supply







Appendix I: CAMA Land Use Plan Matrix

CAMA Matrix

The following matrix is required by the state to be included in CAMA land use plans.

<Matrix begins on next page>

Appendix I: CAMA Land Use Plan Matrix

Matrix for Land Use Plan Elements – 15A NCAC 7B .0702	Page Reference(s)
Organization of the Plan	
<ul style="list-style-type: none"> Matrix that shows the location of the required elements as set forth in this Rule 	Appendix I, p.166-170
Community Concerns and Aspirations	
<ul style="list-style-type: none"> Description of the dominant growth-related conditions that influence land use, development, water quality and other environmental concerns in the planning area 	Particularly pages 50-51, but also p.45-49, and Appendices B, C, D, and E
Description of the land use and development topics most important to the future of the planning area, including:	
<ul style="list-style-type: none"> Public Access 	50
<ul style="list-style-type: none"> Land Use Compatibility 	50
<ul style="list-style-type: none"> Infrastructure Carrying Capacity 	51
<ul style="list-style-type: none"> Natural Hazard Areas 	51
<ul style="list-style-type: none"> Water Quality 	51
Community Vision	
<ul style="list-style-type: none"> 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. 	8 (Vision)
Existing and Emerging Conditions	
Population, Housing and Economy	
Discussion of the following data and trends:	
<ul style="list-style-type: none"> Permanent population growth trends using data from the two most decennial Censuses 	45-47, 149 (Appendix G)
<ul style="list-style-type: none"> Current permanent and seasonal population estimates 	46-47
<ul style="list-style-type: none"> Key population characteristics including age and income 	48-49
<ul style="list-style-type: none"> Thirty-year projections of permanent and seasonal population in five-year increments 	46-47, Appendix H (152-153)
<ul style="list-style-type: none"> Estimate of current housing stock, including permanent and seasonal units, tenure, and types of units (single-family, multifamily, and manufactured) 	48-49
<ul style="list-style-type: none"> Description of employment by major sectors and community economic activity 	49
Natural Systems	
Description of natural features in the planning jurisdiction to include:	
<ul style="list-style-type: none"> Areas of Environmental Concern (AECs) as set forth in Subchapter 15A NCAC 07H 	52-55
<ul style="list-style-type: none"> Soil characteristics, including limitations for septic tanks, erodibility, and other factors related to development 	62-63
<ul style="list-style-type: none"> Environmental Management Commission (EMC) water quality classifications and related use support designations 	64-65
<ul style="list-style-type: none"> Division of Marine Fisheries (DMF) shellfish growing areas and water quality conditions 	61-62
<ul style="list-style-type: none"> Flood and other natural hazard areas 	66-69
<ul style="list-style-type: none"> Storm surge areas 	66-69

Matrix for Land Use Plan Elements – 15A NCAC 7B .0702, Cont.	Page Reference(s)
<ul style="list-style-type: none"> Non-coastal wetlands, including forested wetlands, shrub-scrub wetlands and freshwater marshes 	56-57
<ul style="list-style-type: none"> Water supply watersheds or wellhead protection areas 	74
<ul style="list-style-type: none"> Primary nursery areas 	62
<ul style="list-style-type: none"> Environmentally fragile areas, such as wetlands, natural heritage areas, areas containing endangered species, prime wildlife habitats, or maritime forests 	52-61
<ul style="list-style-type: none"> Additional natural features or conditions identified by the local government 	58, 64,66 , 68, 70-71
Environmental Conditions	
Discussion of environmental conditions within the planning jurisdiction to include an assessment of the following conditions and features:	
<ul style="list-style-type: none"> Status and changes of surface water quality; including: 	
<ul style="list-style-type: none"> - Impaired streams from the most recent Division of Water Resources (DWR) Basin Planning Branch Reports 	64
<ul style="list-style-type: none"> - Clean Water Act 303 (d) List 	64
<ul style="list-style-type: none"> - Other comparable data 	64
<ul style="list-style-type: none"> Current situation and trends on permanent and temporary closures of shell-fishing waters as determined by the Report of Sanitary Survey by the Shellfish Sanitation and Recreational Water Quality Section of the DMF 	61-62
<ul style="list-style-type: none"> Areas experiencing chronic wastewater treatment malfunctions 	64
<ul style="list-style-type: none"> Areas with water quality or public health problems related to non-point source pollution 	64
<ul style="list-style-type: none"> Areas subject to recurrent flooding, storm surges and high winds 	66-68
<ul style="list-style-type: none"> Areas experiencing significant shoreline erosion as evidenced by the presence of threatened structures or public facilities 	62
<ul style="list-style-type: none"> 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 	61
<ul style="list-style-type: none"> 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. 	61
Existing Land Use and Development	
MAP of existing land use patterns	81, 158-159
<ul style="list-style-type: none"> Description of the existing land use patterns 	12-13, 79-82
<ul style="list-style-type: none"> Estimates of the land area allocated to each land use category 	80
<ul style="list-style-type: none"> Characteristics of each land use category 	82
MAP of historic, cultural, and scenic areas designated by a state or federal agency or by the local government	79
<ul style="list-style-type: none"> Descriptions of the historic, cultural and scenic areas 	18-19, 24, 78-79
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	163
<ul style="list-style-type: none"> Description of existing public and private water supply systems to include: 	

Appendix I: CAMA Land Use Plan Matrix

Matrix for Land Use Plan Elements – 15A NCAC 7B .0702, Cont.	Page Reference(s)	
- Existing condition	74	
- Existing capacity	74	
- Documented overflows, bypasses or other problems that may degrade water quality or constitute a threat to public health as documented by the DWR	72-74	
- Future water supply needs based on population projections	74	
MAP of existing and planned public and private wastewater service areas	75	
<ul style="list-style-type: none"> Description of existing public and private wastewater systems to include: 		
- Existing condition	72	
- Existing capacity	72	
- Documented overflows, bypasses or other problems that may degrade water quality or constitute a threat to public health as documented by the DWR	72	
- Future wastewater system needs based on population projections	72	
MAP of existing and planned multimodal transportation systems and port and airport facilities	79, 160-161	
<ul style="list-style-type: none"> 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 	78	
<ul style="list-style-type: none"> Description of highway facilities on the current thoroughfare plan or current transportation improvement plan 	78-79	
<ul style="list-style-type: none"> Description of the impact of existing transportation facilities on land use patterns 	78	
<ul style="list-style-type: none"> Description of the existing public stormwater management system 	74	
<ul style="list-style-type: none"> Identification of existing drainage problems and water quality issues related to point-source discharges of stormwater runoff 	74	
	Policy Citation(s)	Page Reference(s)
Future Land Use		
Policies		
<ul style="list-style-type: none"> Policies that exceed the use standards and permitting requirements found in Subchapter 7H, State Guidelines for Areas of Environmental Concern 	n/a	n/a
Policies that address the Coastal Resources Commission's (CRC's) management topics:		
Public Access Management Goal:		
<i>Maximize public access to the beaches and the public trust waters of the coastal region.</i>		
The planning objectives for public access are local government plan policies that:		
<ul style="list-style-type: none"> Address access needs and opportunities 	1.1, 2.2	30, 32
<ul style="list-style-type: none"> Identify strategies to develop public access 	1.1	30
<ul style="list-style-type: none"> Address provisions for all segments of the community, including persons with disabilities 	1.1	30

Matrix for Land Use Plan Elements – 15A NCAC 7B .0702, Cont.	Page Reference(s)	
<ul style="list-style-type: none"> For oceanfront communities, establish access policies for beach areas targeted for nourishment 	1.1	30
<p>Land Use Compatibility Management Goal:</p> <p><i>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.</i></p>		
<p>The planning objectives for land use compatibility are local government plan policies that:</p>		
<ul style="list-style-type: none"> Characterize future land use and development patterns 	4.1	35
<ul style="list-style-type: none"> Establish mitigation criteria and concepts to minimize conflicts 	4.2, 4.3	35
<p>Infrastructure Carrying Capacity Management Goal:</p> <p><i>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.</i></p>		
<p>The planning objectives for infrastructure carrying capacity are local government plan policies that:</p>		
<ul style="list-style-type: none"> Establish service criteria 	12.2	43
<ul style="list-style-type: none"> Ensure improvements minimize impacts to AECs and other fragile areas 	12.3, 6.3	37, 43
<p>Natural Hazard Areas Management Goal:</p> <p><i>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.</i></p>		
<p>The planning objectives for natural hazard areas are local government plan policies that:</p>		
<ul style="list-style-type: none"> Establish mitigation and adaptation concepts and criteria for development and redevelopment, including public facilities 	2.1, 7.2	32, 38
<ul style="list-style-type: none"> Minimize threats to life, property and natural resources resulting from erosion, high winds, storm surge, flooding, or other natural hazards 	1.2, 1.3, 2.1, 6.1-6.4	30, 31, 32, 37
<p>Water Quality Management Goal:</p> <p><i>Maintain, protect and where possible enhance water quality in all coastal wetlands, rivers, streams, and estuaries.</i></p>		
<p>The planning objectives for water quality are local government plan policies that:</p>		
<ul style="list-style-type: none"> Establish strategies and practices to prevent or control nonpoint source pollution 	6.3, 12.2	37, 43
<ul style="list-style-type: none"> Establish strategies and practices to maintain or improve water quality 	2.1, 3.2, 6.4, 12.3	32, 34, 37, 43
<p>Future Land Use Map</p>	Page Reference(s)	
<p>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</p>	14-15	
<ul style="list-style-type: none"> Descriptions of land uses and development associated with the future land use map designations 	15-24	
<p>Tools for Managing Development</p>		
<ul style="list-style-type: none"> Description of the role of plan policies, including the future land use map, in local decisions regarding land use and development 	11, 27	

Appendix I: CAMA Land Use Plan Matrix

Matrix for Land Use Plan Elements – 15A NCAC 7B .0702, Cont.	Page Reference(s)
<ul style="list-style-type: none"> Description of the community’s development management program, including local ordinances, codes, and other plans and policies 	123-146
Action Plan and Implementation Schedule	
<ul style="list-style-type: none"> 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 	30-43
<ul style="list-style-type: none"> 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 	30-43

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COMPREHENSIVE
AND CAMA
LAND USE PLAN



Prepared by:



STEWART