

CAROLINA BEACH

Town Council Workshop

Tuesday, October 27, 2026 — 9:00 AM

Council Chambers, 1121 N. Lake Park Boulevard, Carolina Beach, NC



AGENDA

CALL TO ORDER

DISCUSSION ITEMS

1. Review the Resilient Coastal Communities Program (RCCP) Phases 1 & 2
2. Presentation by the Bike/Ped Committee

COUNCIL COMMENTS

ADJOURNMENT



AGENDA ITEM COVERSHEET

PREPARED BY: Jeremy Hardison

DEPARTMENT: Community
Development

MEETING: Town Council 10/27/2026

SUBJECT: Review the Resilient Coastal Communities Program (RCCP) Phases 1 & 2

BACKGROUND:

Presentation by Tara Marden Senior Coastal Geologist/Project Manager

ACTION REQUESTED:

Discussion only

FINAL REPORT

Town of Carolina Beach

Resilient Coastal Community Planning Process



North Carolina
**RESILIENT
COASTAL
COMMUNITIES
PROGRAM**



Risk and Vulnerability Assessment Candidate Projects and Project Screening

Town of Carolina Beach, New Hanover County, North Carolina

PREPARED FOR

Town of Carolina Beach

In partnership with the Division of Coastal Management

PREPARED BY

Coastal Protection Engineering of North Carolina

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Inspire
PLACEMAKING COLLECTIVE

OCTOBER 2026



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1. Community Overview

The Town of Carolina Beach is a developed barrier island community located in New Hanover County on the northern portion of Pleasure Island (Figure 1). Bounded by the Atlantic Ocean to the east, Snow's Cut and the Atlantic Intracoastal Waterway to the north, and the Cape Fear River and Carolina Beach State Park along portions of the west, the Town is closely tied to dynamic coastal processes and a constrained physical setting.

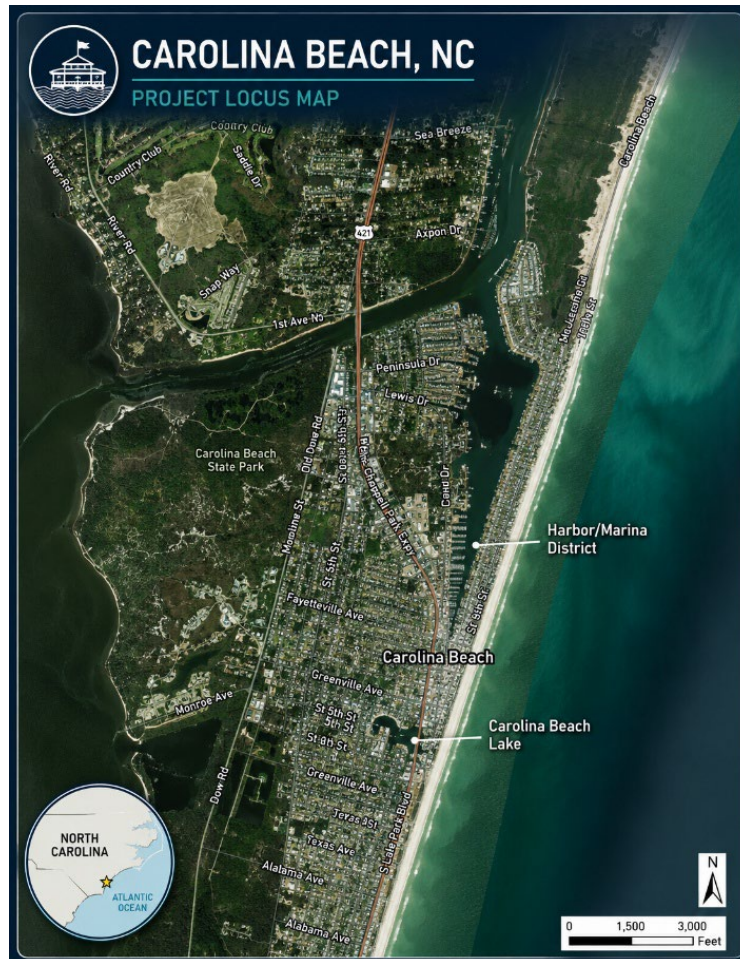


Figure 1. Map of Carolina Beach, NC

Carolina Beach functions as both a permanent residential community and a major coastal destination, with substantial seasonal visitation that increases demands on transportation, utilities, stormwater systems, public access infrastructure, and emergency services. As a result, coastal hazards affect not only homes and businesses, but also the broader systems that support public safety, tourism, mobility, environmental quality, and everyday community function.

The Town's vulnerability is shaped by the interaction of natural coastal processes with an urbanized barrier-island landscape that offers limited room for retreat, stormwater storage, or major infrastructure expansion. The Carolina Beach RCCP process consistently identified flooding



hotspots, dune erosion and overwash, aging stormwater infrastructure, flood-prone roads and neighborhoods adjacent to Myrtle Grove Sound, and vulnerable utility and pump station locations as key concerns. These issues are reflected in the range of flooding conditions already experienced across Town, from recurrent tidal inundation in low-lying areas to intense rainfall flooding that disrupts streets, businesses, and community access. Figure 2 provides representative examples of these flood conditions in Carolina Beach.



Figure 2. Representative flooding conditions in Carolina Beach, including high tide flooding in a low-lying residential area (left) and rainfall flooding affecting a commercial corridor (right). These examples illustrate the range of coastal and stormwater flooding challenges that affect community access, infrastructure performance, and overall resilience. Photo credits: Tommy Horn (left) and Suzi Drake (right).

The Town also benefits from a substantial body of prior planning and technical work that has informed this RCCP effort. Previous studies and plans have addressed Canal Drive flooding, Carolina Beach Lake stormwater function, water use and harbor management, watershed restoration, multimodal mobility, hazard mitigation, and redevelopment planning. These efforts demonstrate that Carolina Beach has already recognized many of its major resilience challenges and has begun identifying both structural and non-structural strategies to address them. The RCCP process builds on that foundation by organizing existing knowledge, incorporating local input, and translating vulnerability findings into a more coordinated resilience framework.

Carolina Beach's resilience planning is also occurring within the context of significant long-term infrastructure investment. Through the Town's CB2045 Infrastructure Plan, Carolina Beach has outlined a phased framework for more than \$70 million to address the Town's critical utility, stormwater, and facility maintenance needs, supported by recurring revenue bond financing beginning in 2025 and extending through 2033. That plan includes major water, wastewater, and stormwater projects, including a new water tank, wastewater treatment plant repairs and upgrades, and later-phase North End water, sewer, and stormwater work, underscoring the scale of the Town's ongoing infrastructure needs and the importance of aligning resilience planning with broader capital investment priorities.



The mission that emerged through the Carolina Beach RCCP process is to plan for a community ready to actively prepare for increasing coastal hazards while promoting accessibility, economic welfare, and high quality of life for residents. In support of that mission, five (5) shared resilience goals for Carolina Beach were developed to provide the organizing framework for the Town’s resilience strategy and for the development of future candidate projects and implementation priorities. Figure 3 illustrates these five guiding goals.

Shared Resilience Goals for Carolina Beach



Figure 3. Shared resilience goals for the Carolina Beach RCCP process, illustrating the five guiding objectives of the Town’s resilience strategy.

2. Community Action Team

The Carolina Beach RCCP process was guided by a Community Action Team (CAT) that served as the project’s local advisory group. As presented during the kickoff meeting, the role of the CAT was to serve as the local voice of the project by helping ensure that the resilience strategy reflected real conditions and community priorities. CAT members were asked to share knowledge of local flooding, erosion, and infrastructure issues; identify what is most important to protect; review maps, data, and asset inventories for on-the-ground accuracy; provide feedback on resilience concepts and adaptation strategies; and help shape a final resilience strategy and project portfolio that is realistic, community-supported, and fundable. This role remained central throughout the process as the project moved from critical asset identification to vulnerability assessment and then into concept development and prioritization. Figure 4 identifies the members of the Carolina Beach CAT who served as the project advisory group throughout the RCCP process.



Figure 4. Carolina Beach Community Action Team (CAT) members who served as the project advisory group for the Carolina Beach RCCP process.



Figure 5 summarizes the role of the Carolina Beach CAT in the RCCP process. Throughout the planning effort, the CAT served as an important advisory body by contributing local knowledge and experience, helping identify important community assets, building community and partner consensus, providing feedback on resilience strategies, and helping shape the final resilience strategy.



Figure 5. Summary of the role of the Community Action Team in the RCCP process.

In addition to the CAT, the broader project team supporting the Carolina Beach RCCP process included Town staff, representatives from the North Carolina Division of Coastal Management, Coastal Protection Engineering, and Inspire Placemaking Collective. Figure 6 illustrates the overall project team structure and shows how the Town, State, and consultant team were organized to support development of the Carolina Beach RCCP strategy.



Figure 6. Carolina Beach RCCP project team organizational chart showing the core teams supporting development of the resilience strategy.



The CAT remained actively engaged throughout the Carolina Beach RCCP process as the consultant team worked to refine the inventory of critical infrastructure and natural assets, review existing plans and technical studies, assess hazard exposure and vulnerability, and begin framing resilience concepts. Presentations to the CAT repeatedly emphasized the need to confirm which assets were most important to Town functions, identify assets with recurring flooding or access problems, distinguish between public, private, and shared-responsibility assets, and establish a common understanding of what should be carried forward into the Risk and Vulnerability Assessment.

The CAT remained engaged throughout the RCCP process through a series of meetings and project-review milestones summarized in Section 3.

3. Community Engagement Strategy

Community engagement has been a central component of the Carolina Beach RCCP process and has been used to ensure that the Town’s resilience strategy reflects local experience, community priorities, and on-the-ground knowledge of flooding, erosion, infrastructure limitations, and coastal change. Consistent with the broader RCCP framework, engagement in Carolina Beach has been designed not only to inform the public about the project, but also to gather input that can help validate vulnerability findings, identify priority issues and locations, and shape resilience concepts and candidate projects for future implementation. As summarized in Figure 7, the Carolina Beach engagement process was structured around a set of core objectives that guided how outreach activities, public input, and project development were carried out throughout the RCCP process.



Figure 7. Community engagement objectives used to guide outreach for the Carolina Beach RCCP process.

As presented to the CAT, the engagement strategy was intended to build shared understanding of flooding and resilience issues, ensure that proposed strategies reflect local values and experiences, and create buy-in, transparency, and long-term support for implementation. The engagement approach emphasized equitable participation by identifying a broad range of audiences, including residents and neighborhoods, businesses and local organizations, infrastructure and policy stakeholders, and historically underrepresented and vulnerable populations. Engagement objectives included ensuring equitable representation in the planning process, validating CAT-developed vulnerability findings, identifying priority issues and locations, gathering input to inform



resilience project ideas in Phase 2, and building community trust and long-term alignment around the Town's resilience strategy.

The Carolina Beach project team used multiple methods to support these engagement goals, including public open houses and workshops, online questionnaires and interactive mapping tools, QR-code feedback stations, partnerships with local organizations and homeowners' associations, website updates, social media and email communications, and live polling or comment tools during meetings. This multi-format approach was intended to make participation more accessible, provide opportunities for both digital and in-person input, and create multiple ways for residents and stakeholders to share experiences related to flooding hotspots, drainage concerns, shoreline issues, and local resilience needs.

Community engagement began early in the Carolina Beach RCCP process and was closely integrated with CAT discussions and broader project milestones. As reflected in the kickoff materials, the Carolina Beach Drone Show was identified as an early outreach opportunity to meet residents where they already gather, share maps and project information, and invite participants to identify locations of concern, describe past storm impacts, and suggest ideas for future resilience projects. Subsequent CAT materials documented that the public outreach event had been completed, that the project website and questionnaires were live, and that meaningful input had been gathered from residents. The December CAT meeting also highlighted website and questionnaire metrics, the use of hotspot and critical infrastructure maps, and the need for continued online participation as part of the ongoing engagement process.

Figure 8 and Figure 9 illustrate this progression by showing the overall project schedule and engagement milestones, as well as one of the public meetings used to gather direct community input during the Carolina Beach RCCP process. The final public meeting and open house was held on September 16, 2026, at 6:00 PM at the Carolina Beach Multipurpose Room to present the assessment findings and project portfolio and receive additional community input before completion of the RCCP process.

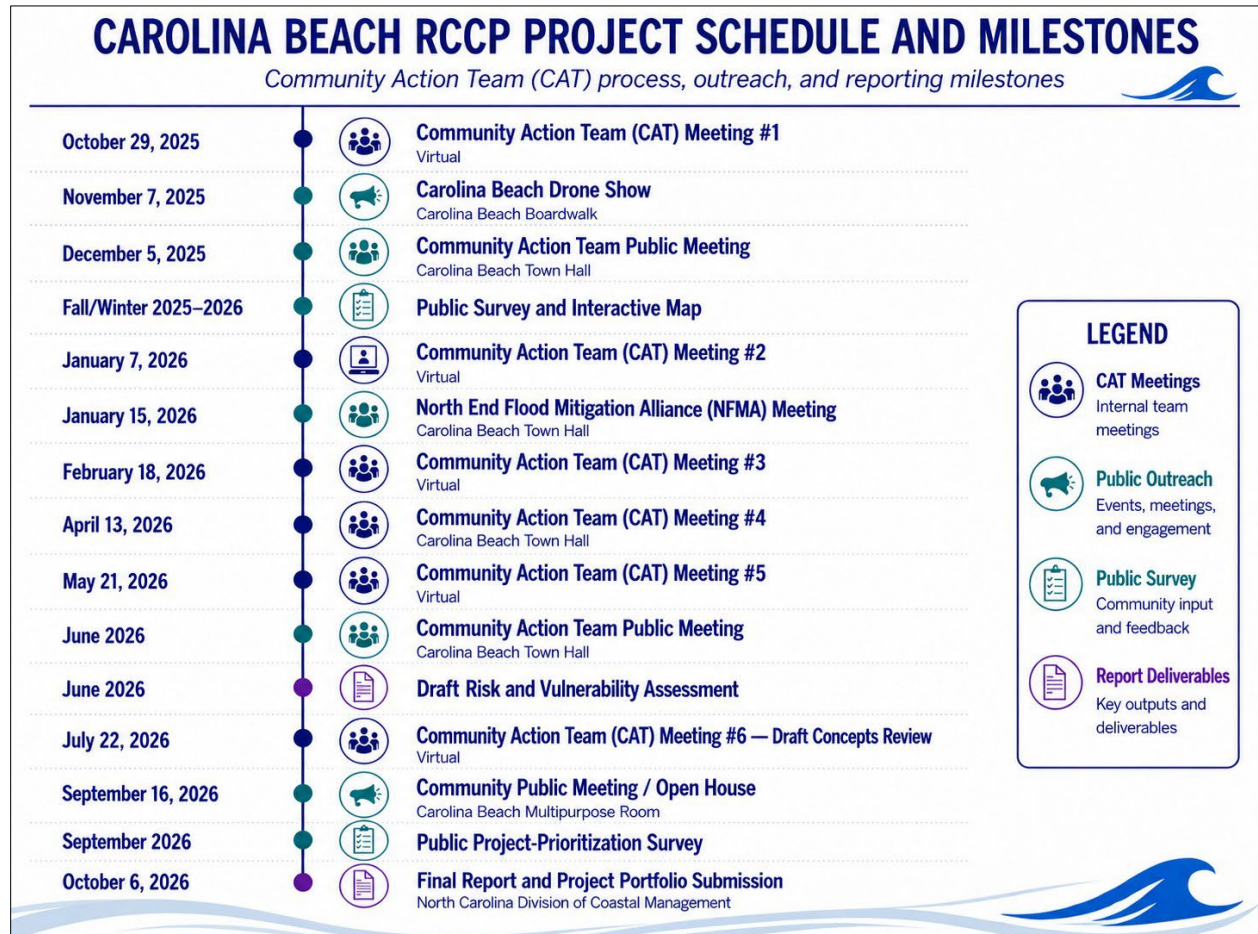


Figure 8. Carolina Beach RCCP project schedule and milestones, showing the sequence of CAT meetings, public outreach events, online engagement activities, and key report deliverables throughout the planning process.



Figure 9. North End Flood Mitigation Alliance public outreach meeting at Carolina Beach Town Hall on January 15, 2026, where participants reviewed project information, discussed flooding concerns, and provided input on local resilience priorities.



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The engagement strategy also incorporated web-based and map-based tools to support ongoing participation and broaden opportunities for community input. CAT materials referenced a public engagement portal, online surveys, and an interactive map that allowed participants to submit location-specific comments, identify flooding concerns, and review both community hotspot information and mapped critical assets. Physical maps were also made available for participants who had not yet engaged online, helping expand accessibility across different comfort levels with digital tools. Together, these in-person and online methods allowed the project team to gather new information, compare public observations with mapped hazards and infrastructure, and confirm whether identified flooding problem areas, critical assets, and resilience priorities aligned with local knowledge and lived experience. Figure 10 summarizes the overall community engagement effort, including outreach methods, online survey and interactive mapping tools, participation metrics, resident-reported flooding hotspots, and selected survey results that informed the Carolina Beach RCCP process.

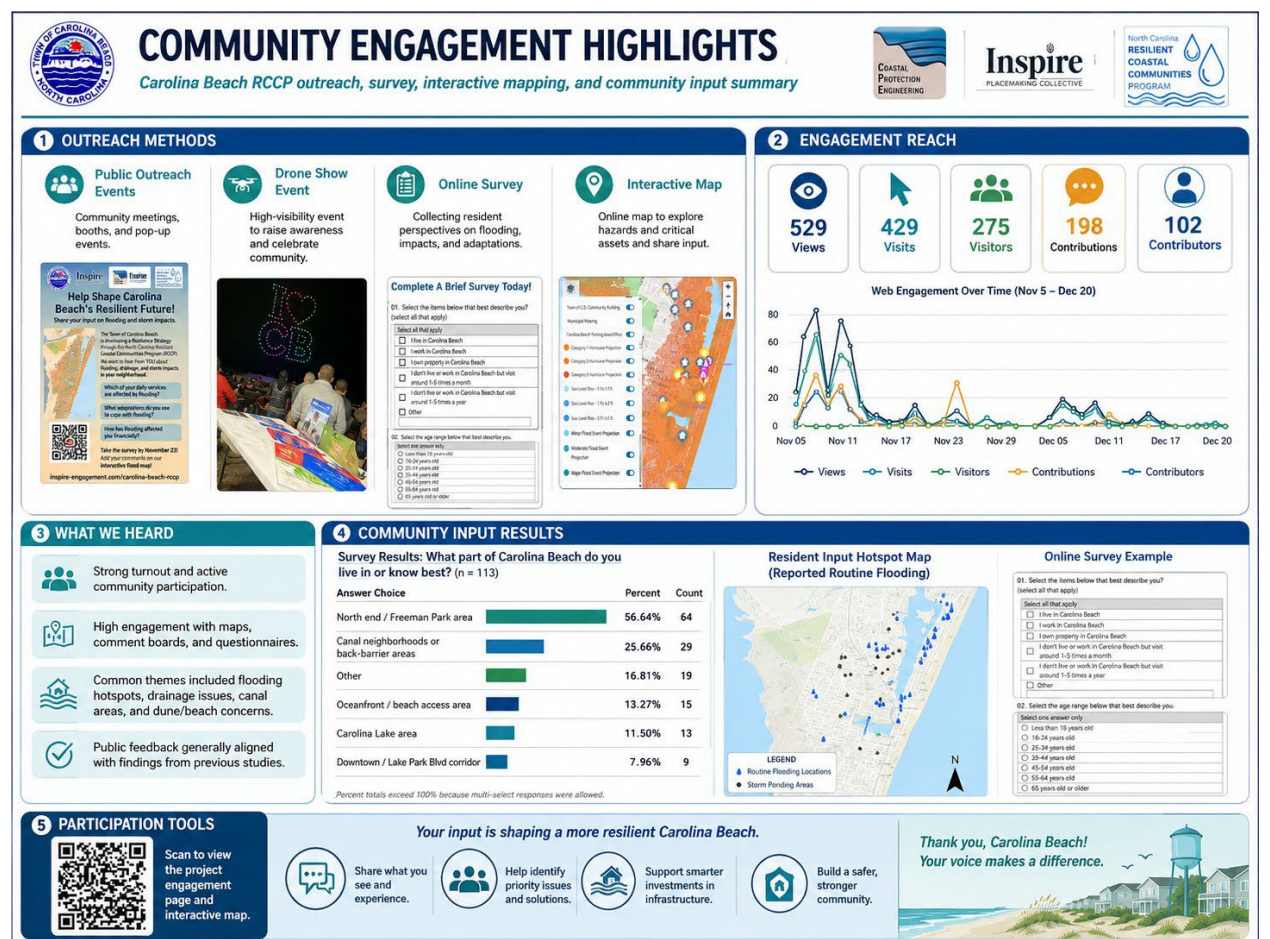


Figure 10. Community engagement highlights from the Carolina Beach RCCP process, including public outreach methods, online survey and interactive mapping tools, engagement metrics, resident-reported flooding hotspots, and selected survey results summarizing community input on flooding, drainage, and resilience priorities.



The content of engagement in Carolina Beach has been closely tied to the Town’s major resilience concerns. Public and CAT discussions repeatedly focused on flooding hotspots, stormwater and drainage limitations, dune erosion and overwash, vulnerable infrastructure, shoreline change, and the role of natural systems such as beaches, dunes, wetlands, and marshes in providing protection. This engagement also helped reinforce the mission and goals of the project by connecting technical analysis with the lived experience of residents, businesses and local stakeholders. As a result, community engagement served both an informational and a technical function: it built public understanding of the project while also helping validate findings, refine focus areas, and inform the resilience concepts and candidate project portfolio.

Overall, Carolina Beach’s community engagement strategy has been designed to create a more informed, locally grounded, and community-supported resilience planning process. By combining CAT participation, public events, web-based outreach, interactive mapping, and ongoing communication, the engagement effort has helped ensure that the Town’s final RCCP products are informed not only by technical datasets and prior studies, but also by the experience of the people and stakeholders who know the community best.

4. Review of Existing Plans and Technical Studies

A substantial body of planning and technical work has already been completed for Carolina Beach that is directly relevant to the RCCP process. Figure 11 provides an overview of the principal plans, studies, and technical documents reviewed for this effort. Together, these prior documents address land use, hazard mitigation, stormwater management, transportation, watershed restoration, shoreline vulnerability, and harbor management, and they provide important context for understanding the Town’s existing resilience challenges and opportunities. Review of these materials helps identify the issues most consistently recognized across previous planning efforts, the areas of Town most frequently targeted for resilience action, and the project types that have the strongest basis for further consideration through the RCCP process.

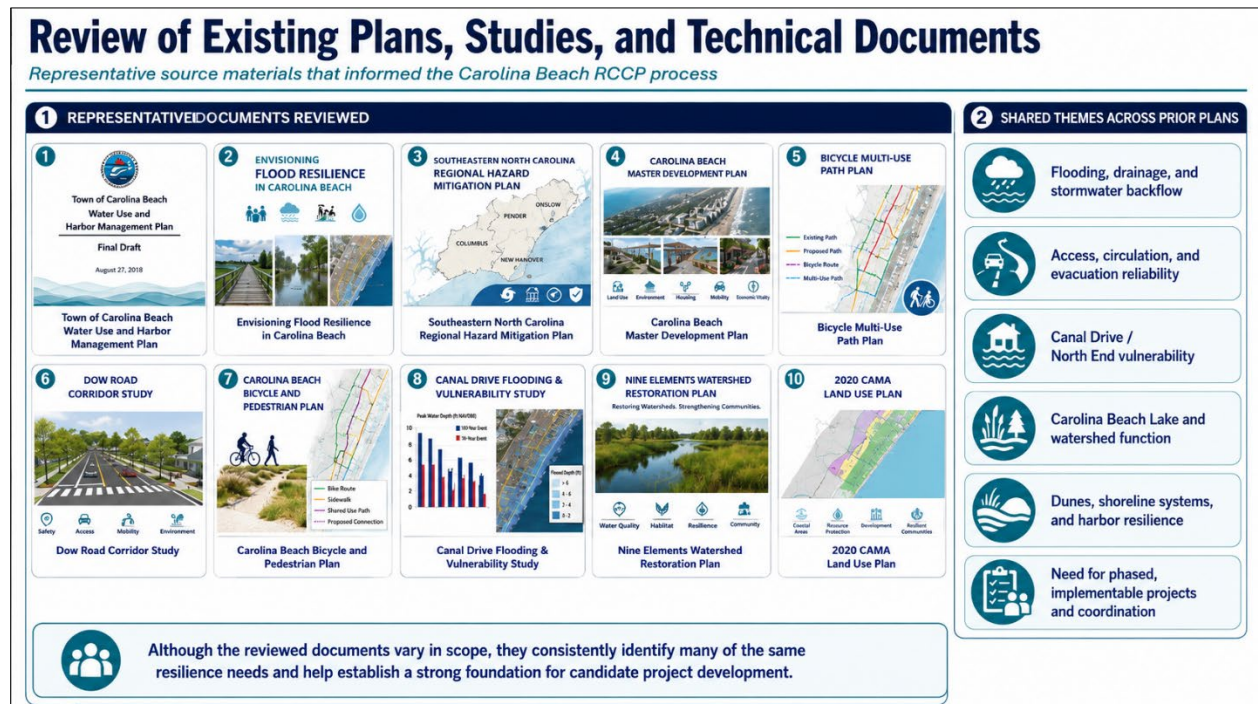


Figure 11. Representative plans, studies, and technical documents reviewed for the Carolina Beach RCCP process and the shared resilience themes that emerge across them.

The figures that follow provide plan-specific summaries of the resilience-focused strategies and adaptation measures identified across this body of prior work. Figure 12 through Figure 21 highlight key concepts and actions drawn from the *Envisioning Flood Resilience in Carolina Beach* study, the 2020 CAMA Land Use Plan, the Water Use and Harbor Management Plan, the Southeastern North Carolina Regional Hazard Mitigation Plan, the Carolina Beach Master Development Plan, the Bicycle Multi-Use Path Plan, the Dow Road Corridor Study, the Carolina Beach Bicycle and Pedestrian Plan, the Canal Drive Flooding & Vulnerability Study, and the Carolina Beach Nine Elements Watershed Restoration Plan. Taken together, these figures illustrate the strong consistency across prior planning efforts and show that many of the same priorities, including stormwater management, shoreline protection, access and mobility, infrastructure resilience, environmental stewardship, and long-term adaptation planning, have repeatedly emerged as central components of resilience planning in Carolina Beach.

Envisioning Flood Resilience in Carolina Beach

This study, led by NC State University’s Sunny Day Flooding Project, evaluated current and future flooding risks along Canal Drive using field data, flood sensors, and hydrodynamic modeling. The study tested multiple structural and nature-based strategies, including pumps, bulkhead improvements, drainage canal modifications, and a flood barrier, to compare how each performs under present-day and projected sea-level-rise conditions. Findings showed that flooding along Canal Drive is driven by a combination of tides, wind, rainfall, and high groundwater, and that while several concepts can reduce short-term flood depth and duration, their effectiveness declines over time as sea levels rise and outfalls become increasingly submerged.



Resilience Concepts and Adaptation Measures Presented in the Envisioning Flood Resilience in Carolina Beach Report									
Concept / Strategy									
Purpose / Resilience Function	Prevent saltwater overtopping during high tides; delay tidal inundation.	Short-term reduction in flood depth/duration; removes surface water more quickly.	Eliminates tidal flooding and reduces combined freshwater + saltwater flooding (~27% reduction).	Increases storage and improves drainage 30–40%.	Cuts off tidal inflow; eliminates saltwater flooding entirely.	Adds minor benefit; limited by high groundwater and lack of infiltration capacity.	Protects against erosion rather than flood depth; supports habitat and sediment stability.	Mitigate tidal backflow in storm drains.	Reduces long-term exposure and runoff; complements engineered solutions.
Notes & Cost Range	• ~ \$4 million total • May lengthen drainage time for rainwater and affect marsh areas.	• ~ \$8 million • Effectiveness limited by groundwater level and discharge constraints.	• ~ \$12 million combined system	• Requires extensive redesign of underground infrastructure.	• \$15–50 million + \$500k maintenance every 12 years • Affects navigation and water quality.	• Limited feasibility; groundwater often already at surface.	• Useful as complementary measure for coastal protection.	• Field data show similar performance, minimal improvement.	• Limited near Yacht Basin since area is already built out.

Figure 12. Flood adaptation strategies identified in The Envisioning Flood Resilience in Carolina Beach study.

For the RCCP effort, this study is especially valuable because it moves beyond problem identification and directly evaluates how specific adaptation concepts may perform under both current and future conditions. That makes it particularly useful for screening concepts based not only on whether they work in the short term, but also on whether they remain practical and effective as flooding conditions intensify. Overall, the study found that no single measure fully resolves Canal Drive flooding and that long-term resilience will likely require a combined, adaptive approach integrating engineered improvements, maintenance, and consideration of water-quality and habitat impacts.

2020 Carolina Beach CAMA Land Use Plan

This Plan for Carolina Beach establishes a long-range framework for guiding growth, redevelopment, infrastructure investment, and natural resource management in a built-out barrier island setting. The plan identifies flooding, stormwater drainage failures, beach and inlet erosion, aging infrastructure, and redevelopment pressure in high-hazard areas as major challenges, and it emphasizes the need to balance development with protection of dunes, wetlands, floodplains, and other coastal resources. The plan also incorporates resilience-focused policies related to stormwater management, shoreline protection, mobility, hazard mitigation, and environmental stewardship.



Resilience-Focused Actions from the CAMA Land Use Plan				
Section / Policy Code	Goal or Topic	Key Actions / Strategies	Anticipated Timeline	Resilience Focus
 LU-2	Canal Drive Flooding Improvements	Assess problems and develop long-term stormwater and flood mitigation solutions in coordination with the Canal Drive Flooding Committee. Ensure no net water-quality loss.	 2020 – 2030	 Addresses chronic tidal and storm flooding; integrates habitat and water-quality protection.
 LU-3	Carolina Beach Lake Stormwater Management	Maintain dredged lake and pumps; implement best drainage practices; evaluate future sea-level-rise impacts; discourage development in flood-prone areas.	 2020 – Ongoing	 Expands stormwater capacity and anticipates climate-driven changes in water levels.
 LU-4	Freeman Park Operations	Maintain Park as conservation land and dune buffer; enforce protection of natural state; explore future nourishment options.	 Ongoing / 2023	 Protects dune ecosystem providing natural storm and erosion defense.
 IC-1	Water and Wastewater Infrastructure	Expand wells and wastewater facilities in low-impact areas (e.g., MOTSU buffer); coordinate on desalination; require public-system connections.	 Ongoing	 Ensures resilient water supply and prevents groundwater contamination from sea-level rise.
 IC-2	Stormwater Design and Parking	Develop stormwater management standards for parking; implement low-impact design; integrate drainage improvements.	 2020 – 2023	 Reduces impervious runoff and improves drainage to handle heavy rainfall.
 NH-1	Natural Hazard Areas	Maintain dunes, beaches, and floodplains for their storm-protection functions; continue funding and maintenance of the rock revetment.	 Ongoing	 Conserves barrier-island defenses against flooding, erosion, and sea-level rise.
 LC-14	Wetlands Preservation	Continue protecting wetlands and discourage or prohibit filling of jurisdictional wetlands ("404" wetlands).	 Ongoing	 Maintains natural flood storage and water-quality resilience.
 LC-15	Protect Beaches and Natural Areas	Prohibit industrial extraction; protect dune and beach ecology; preserve natural storm buffers.	 Ongoing	 Enhances natural shoreline protection and habitat resilience.

Figure 13. Land use resilience strategies identified in the 2020 CAMA Land Use Plan for Carolina Beach.

For the RCCP effort, the CAMA Land Use Plan provides an important policy foundation that links resilience to broader decisions about land use, infrastructure, and natural resource protection. It is particularly useful because it reinforces that flood resilience in Carolina Beach is not only an engineering issue, but also a planning and redevelopment issue in a highly constrained coastal setting. Overall, the 2020 CAMA Land Use Plan helps frame the Carolina Beach RCCP process within a longer-term resilience context that integrates land use, infrastructure, hazard mitigation, and protection of natural coastal systems.

The Water Use and Harbor Management Plan

This Plan was developed by the Town of Carolina Beach to guide sustainable use of Myrtle Grove Sound and the harbor area in response to growth, development pressure, and increasing demand for water access. The plan identifies key issues including poor flushing and circulation in the harbor, water quality degradation from stormwater runoff and marina operations, shoreline erosion associated with bulkheads and vessel wakes, and the loss of intertidal habitat. It provides a framework for balancing commercial, recreational, and residential water-dependent uses while improving water quality, protecting natural resources, and preserving traditional maritime activities.



Resiliency Solutions Related to Flooding, Sea Level Rise, and Climate Change from <i>The Water Use and Harbor Management Plan</i>		
Resiliency Focus Area	Recommended Solutions	Resilience Benefit
 Stormwater & Water Quality	- Implement stormwater BMPs to reduce runoff from impervious surfaces. - Retrofit Canal Drive and Carolina Beach Lake drainage systems to prevent backflow and tidal flooding. - Continue partnerships with UNCW for water quality monitoring.	 Reduces nutrient loading and flood risk; improves harbor water quality resilience.
 Shoreline Stabilization & Erosion Control	- Replace or retrofit aging bulkheads with more sustainable solutions that allow limited intertidal habitat. - Maintain dune and wetland buffers as natural erosion barriers. - Manage wake impacts through speed enforcement and mooring regulation.	 Slows shoreline erosion, preserves habitat, and buffers against storm surge.
 Floodplain Management	- Enforce development limits in AE and VE flood zones. - Update harbor ordinances to restrict permanent floating homes and structures in hazard areas. - Maintain flood-protective structures such as the Canal Drive seawall and harbor bulkheads.	 Minimizes property damage and maintains navigational safety during storm events.
 Habitat and Wetland Protection	- Protect remaining salt marshes and managed pine wetlands identified by NC CREWS. - Avoid dredging or marina expansion that would degrade submerged aquatic vegetation or nursery areas.	 Preserves ecological resilience and natural flood storage capacity.
 Harbor Infrastructure & Mooring Design	- Designate public mooring fields outside shellfish or nursery zones. - Provide pumpout facilities and enforce “no sewage discharge” policies. - Integrate CAMA and USACE standards into harbor permitting.	 Reduces pollution and improves adaptive management under changing water levels.
 Emergency & Climate Readiness	- Maintain anchorage areas and the west-side dredge basin as storm refuges for vessels. - Identify long-term dredging and sediment management needs to maintain navigation under sea-level rise scenarios.	 Enhances community preparedness and continuity of maritime operations.

Figure 14. Harbor resilience strategies identified in the Water Use and Harbor Management Plan.

The plan is highly relevant to the RCCP effort because it shows that resilience in Carolina Beach extends beyond roadway flooding and drainage problems alone. It helps frame harbor and soundside areas as places where water quality, shoreline stability, habitat protection, navigation, and infrastructure management all intersect under changing coastal conditions. Overall, the Water Use and Harbor Management Plan helps position resilient harbor management in Carolina Beach within a broader coastal resilience context that integrates stormwater management, shoreline protection, habitat conservation, and adaptive harbor operations.

The Southeastern North Carolina Regional Hazard Mitigation Plan

This Plan provides the regional framework for reducing hazard risk across Brunswick, New Hanover, Onslow, and Pender counties, including Carolina Beach. The 2021 update integrates risk reduction, resilience, and climate adaptation into local planning and outlines strategies to minimize losses from hurricanes, flooding, coastal erosion, wildfires, and other hazards. The plan links hazard mitigation to community planning, infrastructure investment, and natural resource protection, while also supporting local eligibility for federal mitigation funding programs such as HMGP and BRIC.



Resiliency Solutions Related to Flooding, Sea-Level Rise, and Climate Change <i>from The Southeastern North Carolina Regional Hazard Mitigation Plan</i>		
Resilience Focus Area	Recommended Mitigation Actions	Resilience Benefits
 Flood Hazard Mitigation	- Conduct detailed floodplain mapping and risk assessments using NCEM's Risk Management Tool. - Elevate or retrofit repetitive loss properties. - Maintain and enhance stormwater infrastructure in flood-prone areas (e.g., Canal Drive, Carolina Beach Lake). - Update floodplain ordinances to align with new FEMA FIRM maps and CRS requirements.	 Reduces exposure of property and infrastructure to flood damage; maintains CRS discounts and FEMA funding eligibility.
 Sea-Level Rise & Coastal Hazards	- Protect and maintain beach and dune systems through nourishment and vegetation management. - Coordinate sediment management with the USACE and state agencies. - Restrict high-density development in inlet and ocean hazard zones.	 Increases shoreline resilience and reduces long-term erosion and inundation risk.
 Stormwater & Drainage Improvements	- Expand and modernize drainage systems to accommodate higher-intensity rainfall events. - Integrate green infrastructure (bioswales, retention ponds, living shorelines) into redevelopment.	 Improves capacity to handle flash flooding and reduces pollutant runoff into coastal waters.
 Infrastructure Hardening & Critical Facilities	- Assess and retrofit emergency facilities, utilities, and wastewater systems against flooding and wind hazards. - Ensure continuity of operations planning for essential services.	 Protects public safety and minimizes downtime during and after disasters.
 Natural Resource Protection	- Preserve wetlands and floodplains as natural buffers. - Promote land acquisition or easements in repetitive flood-loss areas. - Implement conservation zoning to prevent future development in sensitive areas.	 Maintains natural flood absorption and habitat resilience to climate impacts.
 Community Preparedness & Education	- Increase public awareness through outreach, surveys, and resilience education. - Engage residents in CRS and Resilient Coastal Communities Program initiatives.	 Enhances community-level preparedness and fosters a culture of adaptation.

Figure 15. The Southeastern NC Regional Hazard Mitigation Plan Resilience Solutions.

The plan is especially relevant to the RCCP effort because it connects local resilience planning in Carolina Beach to a wider regional strategy for hazard reduction and climate adaptation. It also helps show that projects related to flooding, drainage, shoreline protection, critical infrastructure, and preparedness are not isolated local concerns, but part of broader resilience priorities shared across the southeastern North Carolina coast. Overall, the Regional Hazard Mitigation Plan helps place Carolina Beach's flood resilience, stormwater management, infrastructure hardening, natural resource protection, and public preparedness priorities within a broader regional resilience context.

The Carolina Beach Master Development Plan

The Carolina Beach Master Development Plan establishes a long-range vision for revitalizing the Central Business District and Boardwalk Core Area while preserving the Town's natural coastal identity. The plan emphasizes redevelopment, tourism enhancement, environmental stewardship, and improved public spaces, with a focus on creating a year-round destination supported by better streetscapes, pedestrian networks, open space, and mixed-use development. Its guiding vision promotes sustainable growth, smart design, and integration of environmental resilience into future development and capital improvements.



Resiliency Solutions Related to Flooding, Sea-Level Rise, and Climate Change <i>from the Carolina Beach Master Development Plan</i>		
Focus Area	Resiliency Solutions / Strategies	Resilience Benefit
 Beach & Dune Management	- Integrate the proposed Beach Boardwalk into the dune system to reinforce dune stability while maintaining public access. - Preserve the beach's bio-physical function for flood and hurricane protection.	 Strengthens natural coastal defenses against storm surge, erosion, and sea-level rise.
 Environmental Stewardship & "Green" Design	- Establish an Environmental Education Center as a flagship facility promoting ecological awareness and environmental planning. - Adopt green infrastructure principles ("smart buildings," "green sites," "sustainable neighborhoods").	 Builds climate literacy, encourages low-impact development, and institutionalizes sustainability.
 Stormwater & Water Quality	- Apply best-management practices (BMPs) to minimize runoff, improve groundwater recharge, and reduce pollutants. - Design streetscape systems with native plantings and bioswales to improve drainage.	 Reduces flooding and enhances water quality and infiltration capacity.
 Urban Design & Building Resilience	- Enforce building elevation and flood-proofing standards consistent with FEMA and CAMA regulations (e.g., 0–60 ft and 120 ft ocean setbacks). - Require shadow, height, and open-space studies for developments over 50 ft.	 Limits exposure of structures to flood and storm damage; preserves light, air, and coastal views.
 Multi-Modal & Pedestrian Circulation	- Create a multi-modal transit hub linked to Wilmington, bike lanes, and pedestrian promenades. - Design complete streets with traffic calming and reduced impervious areas.	 Reduces car dependence, improves emergency evacuation and storm recovery access.
 Habitat & Natural Resource Protection	- Protect wetlands, maritime forests, and beach habitats through conservation zoning and native landscaping. - Feature sea turtles and dune ecosystems in streetscape themes to promote awareness.	 Preserves biodiversity and enhances ecological resilience to climate change.
 Implementation & Adaptation	- Use grants (PARTF, DCM Access, BIG, LWCF) to fund resilience-oriented infrastructure. - Develop design standards emphasizing environmental integrity, coastal access, and hazard mitigation.	 Ensures continuous investment in adaptive, environmentally responsible infrastructure.

Figure 16. Resilience-focused strategies identified in the Carolina Beach Master Development Plan.

The plan is especially relevant to the RCCP effort because it frames resilience as part of broader community design and redevelopment rather than as a stand-alone hazard issue. It helps connect flood adaptation, public access, economic vitality, and environmental stewardship in the Central Business District and Boardwalk area, where the Town's identity, infrastructure, and tourism economy are closely intertwined. Overall, the Master Development Plan contributes to the Carolina Beach RCCP process by positioning redevelopment, public access, environmental stewardship, and long-term design improvements within a broader resilience and revitalization context.

The Bicycle Multi-Use Path Plan

The Bicycle Multi-Use Path Plan was developed to create a connected, safe, and accessible bicycle and pedestrian network linking residential neighborhoods, the Central Business District, Carolina Beach State Park, and Kure Beach. The plan focuses on improving non-motorized mobility, reducing congestion on Lake Park Boulevard, and supporting environmentally sensitive transportation connections through a combination of on-street bike lanes, off-street multi-use paths, and shared-use roadways.



Resilience-Focused Strategies from the Bicycle and Multi-Use Path Plan		
Resilience Focus Area	Proposed Solutions / Strategies	Resilience Benefit
 Flood-Resilient Transportation	- Route multi-use paths along existing roadways and higher elevations to avoid flood-prone areas. - Design paths using pervious or raised surfaces in low-lying zones.	 Ensures continuous, safe transportation during high-water events and reduces maintenance needs.
 Stormwater & Drainage	- Integrate grass swales and vegetated shoulders along multi-use paths to manage runoff. - Coordinate drainage improvements with NCDOT to prevent ponding on path surfaces.	 Improves stormwater infiltration, reduces localized flooding, and enhances water quality.
 Reduced Emissions & Climate Adaptation	- Promote non-motorized travel to reduce vehicle emissions and energy use. - Encourage local commuting by bicycle to offset greenhouse gas impacts.	 Contributes to long-term climate-change mitigation by lowering transportation-related emissions.
 Environmental Protection	- Use existing transportation corridors to minimize disturbance to dunes, wetlands, and maritime forests. - Incorporate educational signage on natural resources and coastal ecosystems.	 Preserves sensitive habitats and raises awareness of climate and coastal issues.
 Public Health & Emergency Access	- Develop dual-use trails that can serve as emergency or evacuation routes during hurricanes. - Provide direct linkages between neighborhoods, civic facilities, and emergency shelters.	 Increases redundancy in transportation infrastructure and supports safe evacuation during storm events.
 Sustainable Infrastructure	Apply low-impact design principles, including native landscaping, recycled materials, and minimal impervious coverage.	 Enhances infrastructure durability and environmental compatibility under changing climate conditions.

Figure 17. Bicycle and pedestrian resilience strategies identified in the multi-use path plan.

The plan is especially relevant to the RCCP effort because it links non-motorized transportation, environmental sensitivity, and community connectivity in a way that supports long-term resilience. It reinforces that pathways, bike lanes, and shared-use corridors can also function as part of a safer, more adaptable transportation network in a flood-prone coastal setting. Overall, the Bicycle Multi-Use Path Plan supports the Carolina Beach RCCP process by advancing a low-impact, flood-resilient mobility framework that improves community connectivity, supports emergency access, and promotes environmentally compatible transportation planning.

The Dow Road Corridor Study

The Dow Road Corridor Study was prepared to evaluate transportation, environmental, and safety improvements along Dow Road between U.S. 421 (Lake Park Boulevard) in Carolina Beach and K Avenue in Kure Beach. While earlier concepts considered extending Dow Road farther south, the final study shifted its focus to improving the existing corridor after environmental constraints and agency concerns made expansion into sensitive areas infeasible. The study therefore emphasized upgrades that could improve traffic operations, bicycle and pedestrian safety, intersection function, and multimodal connectivity within the existing alignment, while minimizing ecological impacts and avoiding additional pressure on wetlands, conservation lands, and other sensitive natural resources.



Resilience-Focused Strategies from the Dow Road Corridor Study		
Resilience Focus Area	Recommended Strategies	Resilience Benefit
 Natural Resource & Habitat Protection	Avoided extension through wetlands, MOTSU buffer, and Fort Fisher natural areas; coordinated with NC Wildlife, DENR, and USACE to prevent impacts to rare species, wetlands, and archeological sites.	 Preserves ecological integrity, floodplain function, and coastal resilience by avoiding disturbance of natural buffers.
 Stormwater & Water Quality	- Proposed 10-ft multi-use path and grass buffers along Dow Road; stormwater improvements to reduce runoff and improve drainage; - Minimized impervious expansion by staying within existing ROW.	 Reduces localized flooding, enhances infiltration, and protects adjacent wetlands from polluted runoff.
 Transportation Resilience	- Realigned the sharp Dow Road / K Avenue curve to improve safety and drainage; - Added left-turn lanes and improved intersection visibility; - Retained Dow Road as a two-lane corridor to reduce environmental footprint.	 Increases roadway safety and reliability during heavy rainfall or evacuation conditions.
 Multimodal & Climate-Smart Design	- Added dedicated bike lanes on both sides of Dow Road and a 10-ft multi-use path connecting Carolina Beach State Park to K Avenue; - Designed per AASHTO and ADA standards.	 Promotes low-carbon transportation, provides safe evacuation routes for cyclists and pedestrians, and enhances connectivity during storm events.
 Public Safety & Evacuation Access	- Dow Road identified as a hurricane evacuation bypass for U.S. 421; - Improvements to signage and intersection geometry to facilitate emergency movement.	 Strengthens evacuation and recovery capacity under future storm and sea-level-rise conditions.
 Land-Use Coordination	- Restricted roadway improvements to existing alignment; - Prevented new development pressure in MOTSU buffer and parklands.	 Limits impervious expansion and protects flood-storage capacity in conservation zones.

Figure 18. Dow Road resilience strategies identified in the Dow Road Corridor Study.

The study is especially relevant to the RCCP effort because it shows how resilience and mobility goals can be pursued within a constrained coastal corridor while still avoiding impacts to wetlands, conservation lands, and other sensitive natural systems. It helps frame Dow Road as not only a transportation route, but also an important access and evacuation corridor whose improvement must balance safety, function, and environmental stewardship. Overall, the Dow Road Corridor Study supports the Carolina Beach RCCP process by advancing a resilient retrofit approach that improves safety, mobility, storm preparedness, and evacuation function within the existing corridor while avoiding impacts to sensitive natural systems.

The Carolina Beach Bicycle and Pedestrian Plan

The Carolina Beach Bicycle and Pedestrian Plan provides a comprehensive roadmap for improving multimodal transportation and enhancing livability across Pleasure Island. Building on earlier bicycle and pedestrian planning efforts, the plan identifies high-priority corridors such as Lake Park Boulevard, Dow Road, Harper Avenue, and St. Joseph Street for sidewalks, multi-use paths, crossing improvements, and other safety upgrades. Developed through an extensive public engagement process, the plan emphasizes connectivity, safety, and equitable access for users of all ages and abilities, while also providing prioritized projects, cost estimates, and implementation guidance.



Resilience-Focused Strategies from <i>The Carolina Beach Bicycle and Pedestrian Plan</i>		
Resilience Focus Area	Recommended Strategies	Resilience Benefit
 Flood-Resilient Mobility	- Prioritizes construction of raised multi-use paths (MUPs) and boardwalk-style connectors in flood-prone areas such as Lewis Drive and Snow's Cut Trail. - Encourages pervious surfaces and vegetated buffers.	 Maintains access during storm events and improves water infiltration to reduce roadway flooding.
 Stormwater Management	- Integrates vegetated buffers and drainage gaps in constrained right-of-way side paths to allow natural runoff infiltration. - Coordinates path design with stormwater and utility planning.	 Reduces ponding and erosion, improving resilience of active transportation corridors under heavy rainfall.
 Emergency Access & Evacuation	Provides redundant north-south and east-west non-vehicular routes (Harper Ave MUP, Island Greenway, Neighborhood Connectors) to supplement Lake Park Boulevard and Dow Road.	 Supports safe evacuation and emergency response mobility during hurricanes and flood events.
 Climate-Smart Transportation	- Expands non-motorized connectivity to schools, parks, and commercial areas. - Implements Bicycle Boulevards and Neighborhood Slow Zones to reduce emissions and vehicle dependency.	 Lowers carbon footprint and supports adaptation to future energy and transportation shifts.
 Environmental & Habitat Protection	- Focuses improvements within existing ROWs and disturbed corridors; avoids dune, wetland, and maritime forest impacts. - Promotes coordination with land use ordinance updates (2024).	 Preserves ecological buffers that provide natural flood protection and climate resilience.
 Public Safety & Equity	- Adds crosswalk beacons, refuge islands, and traffic-calming features at high-crash intersections. - Enhances pedestrian visibility and access for vulnerable users.	 Reduces injury risk, promotes safe mobility during adverse weather, and enhances inclusive access.

Figure 19. Summary of resilience strategies from the Carolina Beach Bicycle and Pedestrian Plan.

The plan is especially relevant to the RCCP effort because it frames transportation resilience in terms of connectivity, safety, and equitable access rather than roadway function alone. It reinforces that a more connected pedestrian and bicycle network can support flood adaptation, emergency mobility, and long-term livability across Carolina Beach and Pleasure Island. Overall, the Carolina Beach Bicycle and Pedestrian Plan supports the RCCP process by linking multimodal mobility, emergency access, stormwater-sensitive design, and environmental protection within a broader framework for resilience and community livability.

Canal Drive Flooding & Vulnerability Study (2019)

The *Canal Drive Flooding & Vulnerability Study* provides a detailed assessment of chronic tidal and stormwater flooding along Canal Drive and Florida Avenue, focusing on the area adjacent to the Carolina Beach Yacht Basin. The study evaluates how low or deteriorated bulkheads, unarmored shoreline segments, and stormwater backflow contribute to recurring roadway and property flooding under king tide, storm surge, rainfall, and future sea-level-rise conditions. It also documents the condition and elevations of shoreline structures, outfalls, and inlets, providing a strong technical basis for future flood mitigation and shoreline adaptation efforts in one of the Town's most vulnerable areas.



Resilience-Focused Strategies from the Canal Drive Flooding & Vulnerability Study (2019)		
Resilience Focus Area	Recommended Strategies	Resilience Benefit
 Shoreline & Bulkhead Elevation	Raise bulkheads to 30-year elevations (4.7–5.7 ft NAVD); construct new bulkheads where lacking; reinforce or replace aging timber, vinyl, or concrete structures.	Reduces tidal overtopping, protects public and private property, and preserves roadway function during king tides and storm events.
 Stormwater System Resilience	Replace duckbill valves with WaStop inline check valves; reline stormwater pipes; inspect abandoned outfalls; adjust inlet elevations; encourage permeable surfaces and onsite stormwater storage.	Prevents backflow, improves conveyance during elevated basin levels, and reduces floodwater pooling on Canal Drive.
 Flood Monitoring & Adaptive Management	Use the new water-level and weather monitoring station; implement a public reporting system (photos, depth, location); conduct 6-month and annual reprioritization cycles using updated data.	Supports quicker detection of problem areas, data-driven capital planning, and continuous improvement of flood mitigation strategies.
 Private Property Adaptation	Educate owners on shoreline vulnerabilities; promote bulkhead elevation, vegetated buffers, gutters, and cisterns; reduce impervious coverage.	Decreases localized flooding pathways, reduces burden on the public stormwater system, and enhances overall neighborhood resilience.
 Infrastructure Maintenance & Longevity	Establish scheduled inspection and cleaning for all backflow devices; monitor structural decay in stormwater piping; ensure abandoned lines are sealed.	Extends the lifespan of critical infrastructure and maintains system performance during high tide and heavy rainfall events.
 Community Engagement & Coordination	Provide access to GIS vulnerability maps; develop guidelines for private improvements; integrate citizen reports into townwide prioritization.	Builds shared responsibility, improves situational awareness, and strengthens collaborative resilience planning.

Figure 20. Resilience-focused strategies identified in the Canal Drive Flooding & Vulnerability Study (2019).

For the RCCP effort, the study is especially important because it frames Canal Drive flooding as a compound shoreline and drainage problem rather than simply a roadway flooding issue. Its findings help clarify that effective long-term resilience in this area will likely require coordinated action across bulkhead improvements, backflow prevention, stormwater retrofits, monitoring, maintenance, and private property adaptation. Overall, the study provides a critical resilience blueprint for one of Carolina Beach’s highest-priority flood problem areas.

Carolina Beach Nine Elements Watershed Restoration Plan

The *Carolina Beach Nine Elements Watershed Restoration Plan* is a comprehensive watershed management framework developed to identify water quality impairments, pollutant sources, and restoration priorities across the Town’s watersheds. The plan integrates analysis of land use, hydrology, stormwater infrastructure, bacterial impairments, shellfish closures, and flooding drivers, including the influence of tides, stormwater discharge, storm surge, and sea-level rise. It also incorporates findings from the *Canal Drive Flooding & Vulnerability Study*, recognizing the relationship between elevated basin water levels, stormwater backflow, chronic inundation, and degraded water quality.



Resilience-Focused Strategies from the Carolina Beach Nine Elements Watershed Restoration Plan <i>Building a resilient watershed through nature-based solutions, smart infrastructure, and collaborative action.</i>		
Resilience Focus Area	Recommended Strategies	Resilience Benefit
 Stormwater Volume Reduction & LID	Implement bioretention (rain gardens), permeable pavement, vegetated swales, infiltration practices, and onsite retention; reduce impervious surfaces; retrofit priority drainage areas.	Decreases runoff volumes, reduces pollutant loading, and mitigates flooding during rainfall and high-water events.
 Green Infrastructure & Nature-Based Practices	Install green streets, bioswales, stormwater wetlands; enhance riparian buffers; restore vegetated drainage corridors.	Provides natural filtration, increases infiltration, and improves watershed adaptability under rising water tables and sea-level rise.
 Flooding & Tidal Water Level Management	Integrate data and guidance from the Canal Drive Flooding & Vulnerability Study; plan improvements based on tidal drivers such as astronomical tides, storm surge, and backflow.	Reduces nuisance and chronic tidal flooding and supports long-term adaptation to sea-level rise.
 Water Quality Improvement Measures	Target bacterial hot spots; prioritize pollutant load reductions; coordinate stormwater retrofits near impaired shellfish waters; reduce contaminant exposure pathways.	Improves suitability for recreation and shellfish habitat, reduces closures, and improves public health outcomes.
 Watershed Monitoring & Adaptive Management	Implement long-term monitoring of water quality, tidal conditions, and hydrology; update progress milestones; adjust strategies as conditions evolve.	Ensures resilience plans evolve with climate trends, local flooding patterns, and updated data.
 Community Incentives & Education	Offer stormwater incentive programs, promote homeowner improvements such as cisterns, guttering, and permeable driveways, and provide public outreach and education on pollution sources.	Builds shared responsibility, enhances community-wide resilience, and reduces cumulative watershed impacts.
 Regulatory Coordination & Implementation Planning	Align watershed goals with DEQ standards, EPA Nine Elements criteria, local ordinances, and stormwater permitting; integrate restoration actions with capital improvement planning.	Creates consistent, enforceable, and well-funded pathways for long-term resilience implementation.

Figure 21. Key resilience strategies from the Nine Elements Watershed Restoration Plan.

For the RCCP process, the plan provides an important bridge between water quality restoration and flood adaptation. It is particularly useful because it recognizes that chronic flooding, stormwater backflow, shellfish water impairments, and tidal influences are interconnected, and that effective long-term resilience will require coordinated action across infrastructure, watershed management, and environmental protection. Overall, the Nine Elements Watershed Restoration Plan supports the Carolina Beach RCCP process by linking water quality improvement, stormwater retrofits, green infrastructure, tidal flooding adaptation, and long-term watershed monitoring within a climate-aware resilience framework.

Synthesis of Shared Resilience Priorities and Focus Areas

Review of the plans, studies, and technical documents prepared for Carolina Beach over the past two decades shows a strong and consistent alignment around the Town’s principal resilience needs. Although these documents vary in scope and purpose, ranging from land use planning and hazard mitigation to watershed restoration, transportation, and Canal Drive flood studies, they repeatedly identify many of the same vulnerabilities, focus areas, and adaptation strategies. Taken together, they provide a strong foundation for the RCCP process by highlighting the issues that have been most consistently recognized across prior planning efforts and by identifying the locations and project



types that are most frequently viewed as priorities for future resilience action. Table 1 and Table 2 summarize the shared resilience priorities and the geographic areas most frequently targeted for resilience concepts across the reviewed documents.

Table 1. Shared resilience priorities identified across prior Carolina Beach plans and studies.

Priority	Shared Resilience Priority	Summary
1	Modernize and Retrofit the Stormwater System	Repair, replace, or redesign backflow devices, pipes, outfalls, inlets, and other drainage infrastructure to address tidal flooding, intense rainfall, and future water-level rise.
2	Adapt to Rising Tides, Groundwater, and Sea-Level Rise	Incorporate future water levels into infrastructure design, zoning, stormwater planning, and redevelopment decisions.
3	Strengthen Natural Shoreline Defenses	Maintain and enhance dunes, beaches, wetlands, marshes, and other natural buffers through nourishment, conservation, and nature-based stabilization.
4	Improve Water Quality Through Green Infrastructure	Expand use of rain gardens, bioswales, permeable pavement, stormwater wetlands, and other low-impact development practices to reduce runoff and pollutant loading.
5	Elevate or Reinforce Bulkheads and Shoreline Structures	Improve bulkheads and other shoreline protection features where low or deteriorated structures contribute to chronic flooding and erosion.
6	Protect and Modernize Critical Infrastructure	Harden water, sewer, pump stations, electrical systems, harbor infrastructure, and other critical facilities against flood and storm impacts.
7	Guide Redevelopment Away from Hazard Areas	Limit redevelopment intensity in high-risk zones and apply resilient design standards in flood-prone areas.
8	Expand Resilient Mobility and Evacuation Networks	Improve multimodal and redundant transportation routes so key corridors remain functional during storms, evacuation, and recovery.
9	Commitment to Ongoing Monitoring and Adaptive Management	Use tidal monitoring, flood sensors, water-quality monitoring, infrastructure inventories, and periodic reassessment to guide implementation and reprioritization.
10	Engage and Educate the Community	Support long-term resilience through workshops, surveys, outreach, public reporting, and incentives for private resilience actions.

Review of prior plans and studies also shows that resilience concepts are concentrated most consistently in five geographic focus areas across the Town, highlighting the locations where flooding, drainage, access, shoreline conditions, and critical infrastructure concerns have most often driven proposed resilience actions.



Table 2. Geographic focus areas most frequently targeted for resilience concepts in prior Carolina Beach plans and studies.

Priority Area	Why It Is Consistently Prioritized	Common Resilience Concepts
Canal Drive / North End	Chronic tidal flooding, stormwater backflow, groundwater rise, low or failing bulkheads, drainage limitations, and roadway vulnerability make this the most frequently referenced focus area.	Bulkhead elevation and replacement, backflow prevention, stormwater retrofits, pumps, flood barriers, monitoring systems, and long-term sea-level-rise adaptation measures.
Central Business District / Lake Park Boulevard Corridor	This corridor is repeatedly identified because of its transportation, evacuation, commercial, and community importance, combined with flood exposure and limited retrofit space.	Green streets, stormwater retrofits, resilient parking and streetscape improvements, multimodal upgrades, evacuation improvements, and redevelopment controls tied to flood resilience.
Carolina Beach Lake and Adjacent Neighborhoods	The lake and surrounding area are central to stormwater storage, watershed management, water quality, and neighborhood flood resilience.	Stormwater storage improvements, green infrastructure, watershed retrofits, water-quality BMPs, and resilient parkland or natural buffer enhancements.
Harbor and Marina District	The harbor area is repeatedly targeted because of overlapping issues related to water quality, shoreline erosion, habitat protection, dredging, marina operations, and infrastructure vulnerability.	Harbor BMPs, pump out facilities, living shorelines, bulkhead improvements, sediment management, and storm refuge planning.
Oceanfront Dune System	The dune system is consistently recognized as the Town's first line of defense against storm surge, erosion, and overwash, particularly in highly used public shoreline areas.	Dune reinforcement, beach nourishment, vegetated dune buffers, access management, and land use controls in high-erosion areas.

These recurring priorities and focus areas provide an important bridge between the review of prior plans and the Carolina Beach vulnerability assessment. Rather than starting from scratch, the RCCP effort builds on a substantial body of previous planning and technical work that already points to a consistent set of resilience needs, opportunity areas, and project types. The assessment that follows refines those findings by linking hazards, critical assets, and local priorities through a structured screening and scoring framework.

5. Risk and Vulnerability Assessment

The Risk and Vulnerability Assessment provides the technical foundation for the Carolina Beach RCCP effort. Its purpose is to identify the assets, systems, and geographic areas most vulnerable to coastal hazards and to establish a defensible basis for resilience planning, concept development, and future project prioritization. Consistent with the RCCP framework, this assessment was used to refine understanding of how flooding and related coastal stressors affect Carolina Beach's built and natural systems and where those effects are likely to have the greatest consequences for community function, safety, and long-term resilience.



5.1 ASSESSMENT APPROACH

The Carolina Beach assessment was organized around three primary tasks: 1) Identifying the hazards most relevant to the Town, 2) Developing and refining an inventory of critical assets, and 3) Evaluating the relative vulnerability of those assets using a planning-level scoring framework. The assessment builds on existing hazard planning, prior local studies, Town staff input, CAT review, and public engagement rather than creating an entirely new hazard framework. This approach is consistent with the RCCP requirement to use local hazard mitigation planning as a foundation and to focus on how already recognized hazards affect community-specific assets and systems.

The assessment was completed at a screening and planning level. It relied on available hazard layers, prior studies, local knowledge, CAT input, and public feedback rather than new field investigation, engineering design, or alternatives analysis. As a result, the assessment is intended to identify relative priorities and inform future concept development rather than serve as a final engineering diagnosis of each asset or location.

5.2 HAZARDS EVALUATED AND DATA SOURCES

Based on the RCCP process, prior planning documents and Carolina Beach's barrier-island setting, the assessment focused on the hazards most relevant to the Town's built and natural systems. These hazards include storm surge and coastal flooding, chronic tidal flooding and sunny-day flooding, sea-level rise, heavy rainfall and pluvial flooding, severe weather associated with hurricanes and tropical storms, dune erosion and overwash, shoreline change and flood-related infrastructure stress associated with stormwater backflow and elevated groundwater conditions. These hazards were identified through a combination of the RCCP CAT process, the Southeastern North Carolina Regional Hazard Mitigation Plan, prior Carolina Beach flood and drainage studies and the Town's own local experience with recurring coastal and stormwater flooding.

The Carolina Beach vulnerability assessment relied on a combination of national coastal hazard datasets, locally compiled critical asset mapping, prior technical studies and supporting planning datasets. The principal geospatial hazard and supporting planning inputs used for the assessment included:

- NOAA Sea Level Rise Viewer projections, reviewed using screening layers for 0 to 1 foot, 1 to 2 feet, and 2 to 3 feet of sea-level rise relative to current tidal conditions;
- NOAA high tide flooding projections, including minor, moderate and major flood event projection layers;
- NOAA SLOSH v4 hurricane storm surge data, reviewed using Category 1, Category 2 and Category 3 hurricane projection layers;
- FEMA National Flood Hazard Layer (NFHL) floodplain data, including mapped Special Flood Hazard Areas and regulatory flood zones, used as a supporting screening layer to identify areas subject to current mapped flood risk and provide additional context for asset exposure and vulnerability;



- NOAA Coastal Change Analysis Program impervious surface data, used as a supporting planning layer to better understand developed conditions, runoff potential and the relationship between highly impervious areas and stormwater-related flooding concerns; and
- Locally compiled critical asset mapping, including public and non-public critical assets developed through Town staff coordination, CAT input, public review and project team screening.

These datasets were reviewed at both the Townwide scale and in more focused hotspot areas where the interaction between hazard exposure and critical assets is especially important. Detailed map panels were developed for locations such as Canal Drive / Yacht Basin and the Carolina Beach Lake area, where sea-level rise and hurricane storm surge layers were overlaid with mapped public and non-public critical assets to better understand localized vulnerability patterns. Figure 22 summarizes the principal mapped hazard screening layers used in the Carolina Beach vulnerability assessment. Additional supporting datasets, including NOAA impervious-surface information and locally compiled critical asset mapping, were used to provide context for developed conditions, runoff potential and asset exposure but are not shown as separate hazard panels in the figure.

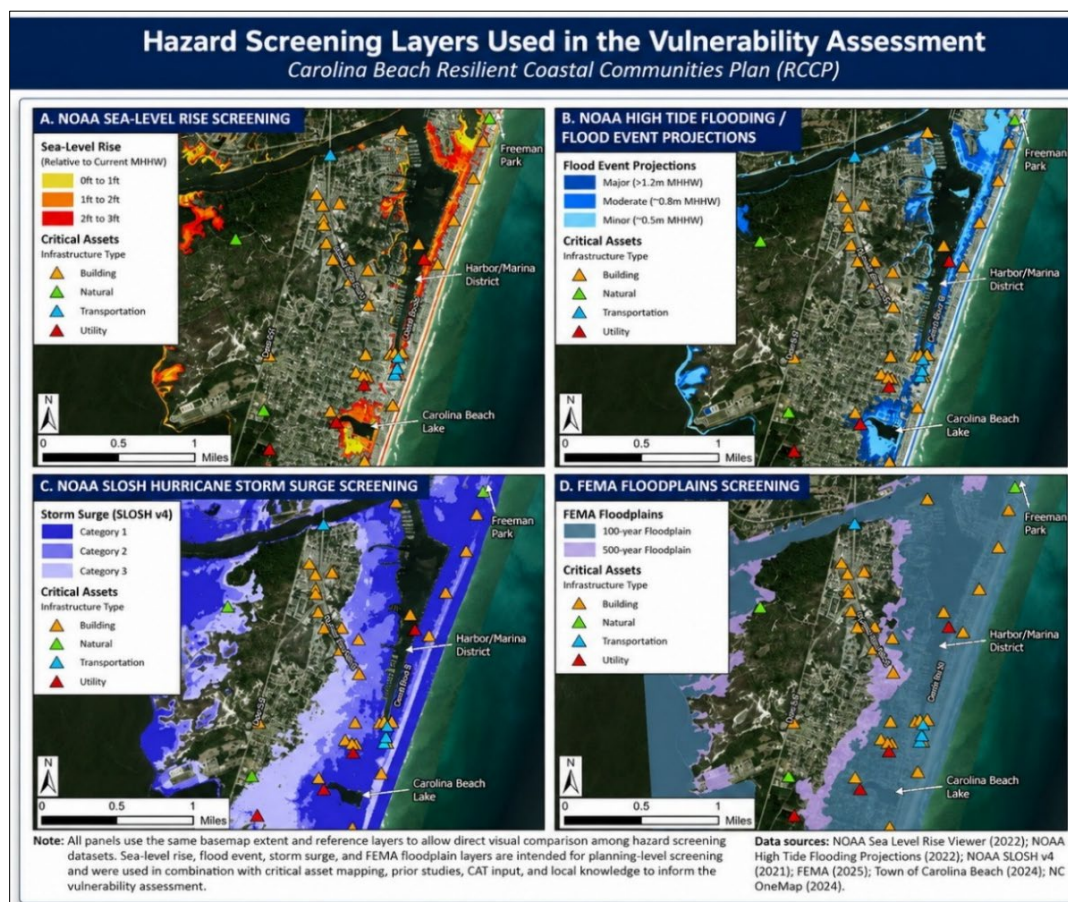


Figure 22. Hazard screening layers used in the Carolina Beach vulnerability assessment, including sea-level rise, high tide flooding, hurricane storm surge, and FEMA Floodplain layers.



5.3 COMPOUND FLOODING AND RAINFALL CONTEXT

Flood risk in Carolina Beach is influenced by the combined effects of coastal water levels, heavy rainfall, and limited drainage capacity. As a low-lying barrier-island community, the Town has constrained drainage pathways and limited stormwater storage. Flooding can occur when intense rainfall generates runoff faster than the stormwater system can convey it, particularly when high tides or elevated receiving waters submerge outfalls or cause backflow through drainage infrastructure. These conditions are especially important in sound-adjacent and other low-lying developed areas, where roadway ponding and standing water may persist during and after storm events.

Figure 23 summarizes the principal factors considered when evaluating rainfall and compound flooding in Carolina Beach. These factors included heavy rainfall, high tides and elevated receiving waters, stormwater backflow, limited outfall capacity, elevated groundwater, documented flooding hotspots, findings from prior drainage studies, and input from the Community Action Team and the public. Considering these interrelated factors allowed the vulnerability assessment to address the broader drainage conditions affecting the Town rather than focusing solely on direct coastal inundation.

Rainfall and Compound Flooding Considerations in the Carolina Beach Assessment		
Planning-level summary of rainfall-related and compound flooding factors considered in the RCCP vulnerability assessment.		
Factor	How It Affects Carolina Beach	How It Was Reflected in the Assessment
 1. Heavy rainfall / pluvial flooding	Causes roadway ponding, drainage surcharge, and local flooding during intense storm events.	Recognized as a core hazard through prior studies, CAT input, and public hotspot mapping.
 2. High tide / elevated receiving waters	Reduces drainage efficiency and limits stormwater discharge during rainfall events.	Considered through compound flooding narrative and review of low-lying flood-prone areas.
 3. Stormwater backflow	Allows tidal water to enter the drainage system and worsen roadway flooding.	Reflected through prior Canal Drive studies, outfall issues, and stormwater system review.
 4. Limited outfall capacity	Slows drainage and increases flood duration in low-lying and canal-adjacent areas.	Considered through known drainage constraints and prior local flood analyses.
 5. Elevated groundwater	Reduces infiltration and contributes to persistent standing water during and after rainfall.	Recognized through prior studies and local understanding of low-lying coastal conditions.
 6. Known flooding hotspots	Repeatedly flood under combined rainfall and tidal conditions.	Identified through CAT input, public comments, and hotspot mapping.
 7. Prior drainage studies	Provide site-specific documentation of rainfall-related flooding and drainage limitations.	Used as a primary source for interpreting rainfall and compound flooding risk.
 8. CAT and public input	Adds lived experience and local confirmation of where rainfall flooding occurs most frequently.	Used to validate hotspot areas and prioritize systems for further consideration.

Figure 23. Factors considered in evaluating rainfall and compound flooding in Carolina Beach.

The interaction of rainfall, tides, groundwater, and stormwater infrastructure is important because many flood-prone areas in Carolina Beach experience flooding from multiple sources rather than from a single hazard. Prior local studies, flooding-hotspot mapping, and community input



consistently identified roadway ponding, drainage surcharge, stormwater backflow, and prolonged inundation as recurring concerns. Rainfall and compound flooding were therefore treated as important components of the Town’s vulnerability profile and helped inform the evaluation of critical assets, geographic focus areas, and potential resilience projects.

NOAA Atlas 14 precipitation-frequency estimates provide additional context regarding the intensity of rainfall that may affect Carolina Beach. Partial Duration Series point estimates for the primary coordinate point of Carolina Beach indicate that a 10-year average-recurrence-interval event may produce approximately 3.19 inches of rainfall in 1 hour and 7.64 inches in 24 hours. A 100-year event may produce approximately 4.69 inches in 1 hour and 13.3 inches in 24 hours. These estimates illustrate why stormwater capacity, roadway ponding, and the interaction of rainfall with elevated coastal water levels remain central resilience concerns for the Town.

Source: NOAA/National Weather Service, NOAA Atlas 14, Volume 2, Version 3.0, Precipitation Frequency Data Server. Point precipitation-frequency estimates for the primary coordinate point of Carolina Beach, North Carolina (34.0352° N, 77.8936° W), based on the Partial Duration Series (PDS), accessed September 2, 2026. Reported values are point estimates in inches.

5.4 CRITICAL ASSET INVENTORY

A central part of the assessment was the identification and refinement of a critical asset inventory relevant to flood risk and community resilience. Throughout the CAT process, the project team worked to confirm and refine the inventory of critical infrastructure, identify natural features and natural infrastructure that provide flood protection and water-quality benefits, incorporate locally important assets identified by CAT members and Town staff, distinguish between public, private, and shared-responsibility assets, and identify assets with known or recurring flooding, access, or maintenance challenges.

The resulting inventory included transportation corridors, evacuation routes, flood-prone intersections, pump stations, sewer lift stations, water and wastewater facilities, communications assets, public safety and municipal facilities, school and shelter functions, selected community-support assets, and natural or shoreline-related features important to resilience. The final asset list and scoring matrix reflect a deliberate effort to evaluate not only formally designated critical infrastructure, but also corridors and support assets whose disruption would have disproportionate consequences for evacuation, stormwater performance, utility continuity, public safety, and everyday community access. Figure 24 illustrates the Townwide distribution of the critical assets included in the planning-level inventory and highlights how those assets are distributed across major functional categories.

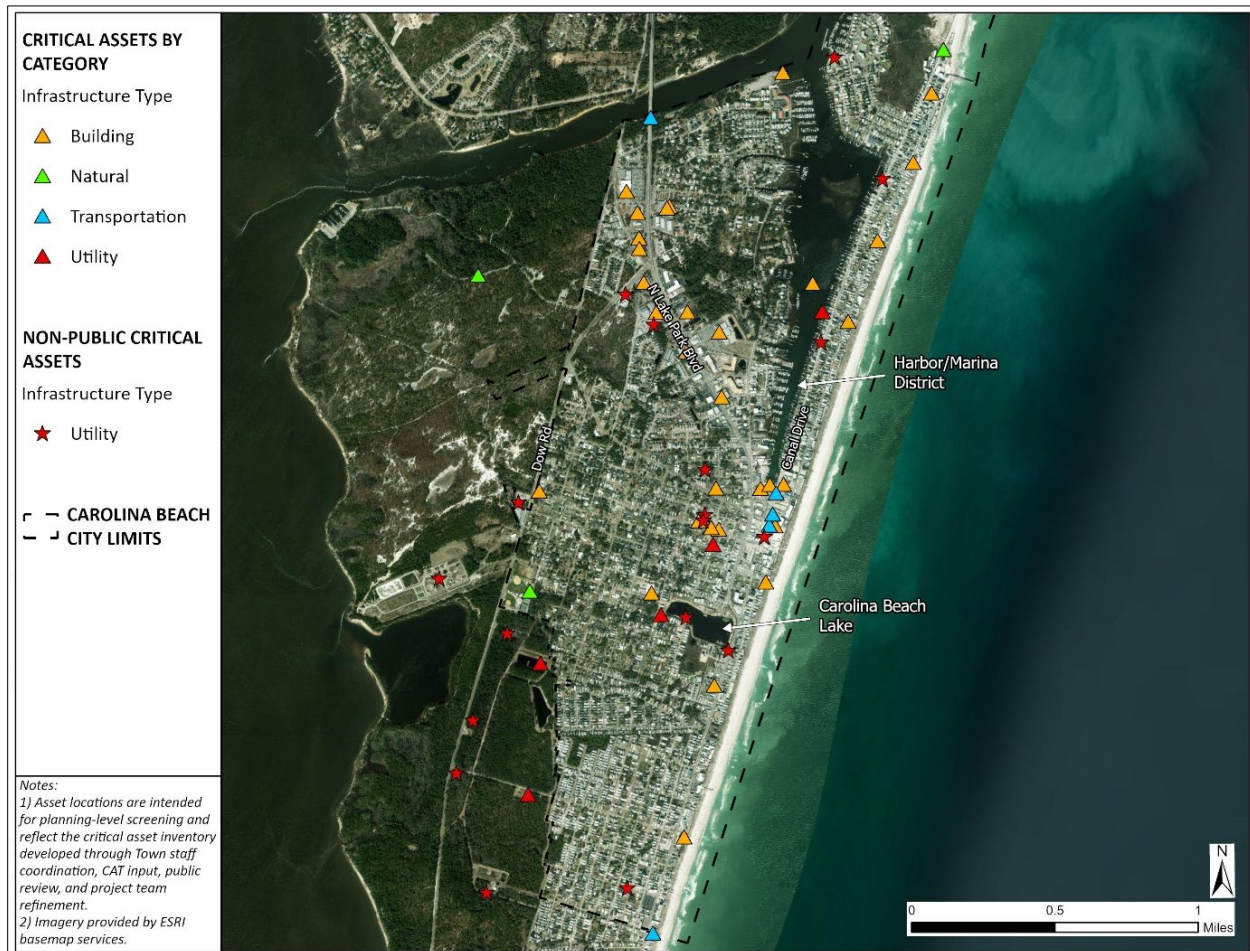


Figure 24. Townwide critical assets map for Carolina Beach, showing the distribution of public and non-public assets included in the vulnerability assessment and organized by major category, including transportation and access, stormwater and drainage, utility and infrastructure, public safety, community support, and natural shoreline resilience features.

5.5 VULNERABILITY SCORING FRAMEWORK

Critical assets were evaluated using a planning-level vulnerability framework based on three factors: exposure, sensitivity, and adaptive capacity. Exposure reflects how likely an asset is to be affected by flooding or other mapped hazard datasets. Sensitivity reflects the importance of the asset and the degree of disruption that would result if it were impaired. Adaptive capacity reflects how easily the Town can work around, replace, or recover from disruption to that asset.

Each factor was scored on a scale of 0 to 3, and a composite vulnerability score was calculated for each asset using the following equation:

$$\text{Vulnerability Score} = \text{Exposure} + \text{Sensitivity} - \text{Adaptive Capacity}$$



Table 3. Vulnerability scoring framework used in the Carolina Beach assessment.

Factor	Description	Score Range
Exposure	Likelihood that the asset will be affected by flooding or other mapped hazard datasets	0 – 3
Sensitivity	Importance of the asset and degree of disruption if impaired	0 – 3
Adaptive Capacity	Ability of the Town to work around, replace, or recover from disruption	0 – 3

Under this framework, individual factor ratings were assigned as follows: 0 = none; 1 = low; 2 = medium; and 3 = high. Composite vulnerability scores ranged from 0 to 6, with scores from 0 to 2 classified as low vulnerability, scores from 3 to 4 classified as medium vulnerability, and scores from 5 to 6 classified as high vulnerability.

This approach was particularly useful for Carolina Beach because vulnerability is not determined by hazard exposure alone. Some assets may be highly exposed but less critical to overall Town function, while others may be only moderately exposed yet highly sensitive because they serve essential roles in evacuation, stormwater management, utilities, public safety, or everyday community access. Similarly, some assets have practical alternatives or system redundancies, while others are difficult to bypass or replace during an emergency. By considering all three factors together, the methodology captures both physical flood susceptibility and the functional importance of each asset, providing a more meaningful basis for identifying priority vulnerabilities across the Town.

5.6 SOCIAL VULNERABILITY CONTEXT

In addition to evaluating physical hazard exposure and asset vulnerability, the Carolina Beach RCCP process considered social vulnerability as an important component of overall community resilience. Social vulnerability influences how easily residents can prepare for, respond to, and recover from flood and storm impacts. Factors such as income constraints, age, disability, household composition, housing type, transportation access, and language barriers can affect the severity of impacts even where physical hazard exposure is similar.

For Carolina Beach, social vulnerability was reviewed as a contextual planning layer rather than as a direct input to the final asset-by-asset scoring methodology. The project team reviewed census geography and the CDC/ATSDR 2022 Social Vulnerability Index (SVI) to better understand how vulnerability may vary across the community and to help identify populations that may face greater difficulty during flood events, evacuations, service interruptions, or post-storm recovery.

For this planning-level assessment, the SVI national percentile ranks were grouped using quartile breaks consistent with the CDC/ATSDR SVI interactive-map classification: 0.0000–0.2500 = low; 0.2501–0.5000 = low to medium; 0.5001–0.7500 = medium to high; and 0.7501–1.0000 = high. These qualitative descriptions are project-specific interpretive labels rather than required CDC classifications. Higher percentile values indicate greater relative social vulnerability.

Carolina Beach spans two census tracts in New Hanover County: 37129012201 and 37129012202. Census Tract 37129012201 has an overall 2022 national SVI percentile rank of 0.1885, indicating a



low overall level of social vulnerability under the quartile classification used for this assessment. Census Tract 37129012202 has an overall 2022 national SVI percentile rank of 0.2702, indicating a low-to-medium overall level of social vulnerability. Taken together, these results indicate that Carolina Beach has relatively low overall tract-level social vulnerability compared with census tracts nationally, although some variation exists within the Town and remains relevant to resilience planning.

Table 4. 2022 Social Vulnerability Index summary for Carolina Beach census tracts

Census Tract	Overall National SVI Percentile Rank	Overall Interpretation	Notable Theme Findings
37129012201	0.1885	Low	Socioeconomic Status: 0.3708 (low to medium); Household Characteristics: 0.0808 (low); Racial & Ethnic Minority Status: 0.1372 (low); Housing Type & Transportation: 0.3086 (low to medium)
37129012202	0.2702	Low to Medium	Socioeconomic Status: 0.6587 (medium to high); Household Characteristics: 0.0691 (low); Racial & Ethnic Minority Status: 0.1056 (low); Housing Type & Transportation: 0.2206 (low)

Source: Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry, Geospatial Research, Analysis, and Services Program, CDC/ATSDR Social Vulnerability Index 2022 Database, U.S., census-tract level, accessed September 2, 2026. Overall and theme values are national percentile rankings; higher values indicate greater relative social vulnerability. Qualitative labels use the quartile thresholds described above.

Although Carolina Beach does not exhibit uniformly high overall social vulnerability, some parts of the community may face greater financial or socioeconomic constraints in preparing for, responding to, or recovering from flood and storm impacts. This is important in a barrier-island context where access routes are limited and evacuation, communication, service continuity, and post-storm recovery may be more difficult for households with fewer resources or less flexibility. Accordingly, social vulnerability is treated in this report as a supporting lens for interpreting physical vulnerability findings and shaping future outreach, project prioritization, and implementation strategies, even though it was not directly incorporated into the final asset-scoring formula.

5.7 KEY FINDINGS

The assessment process, together with CAT review, prior planning work and vulnerability mapping, consistently identified several major vulnerability themes in Carolina Beach. As shown in Figure 25, these themes reflect the Town’s most important resilience concerns and help explain why certain asset types, systems, and geographic areas emerged as priority focus areas through the assessment.

Transportation and Access. Transportation and access vulnerability emerged as one of the Town’s most important resilience concerns. Key roadway corridors, evacuation routes, and selected intersections play an outsized role in maintaining emergency movement, everyday circulation, and



access to homes, businesses, and public facilities. Because Carolina Beach is a constrained barrier-island community, disruption to even a small number of access routes can have disproportionate consequences. The assessment and CAT review emphasized the importance of corridors and nodes associated with the Canal Drive and North End area, Carolina Beach Avenue North, Lake Park Boulevard, Dow Road, and key evacuation-supporting intersections.

Stormwater and Drainage. Stormwater and drainage limitations also emerged as one of the Town’s strongest vulnerability themes. CAT materials, prior studies, and public engagement repeatedly identified chronic flooding hotspots, inadequate drainage capacity, stormwater backflow, and the challenge of managing both rainfall runoff and elevated receiving water levels. This is especially important in canal-adjacent and low-lying areas, where flooding may persist even outside major storm events because runoff cannot effectively drain when tides are high or outfalls are submerged.

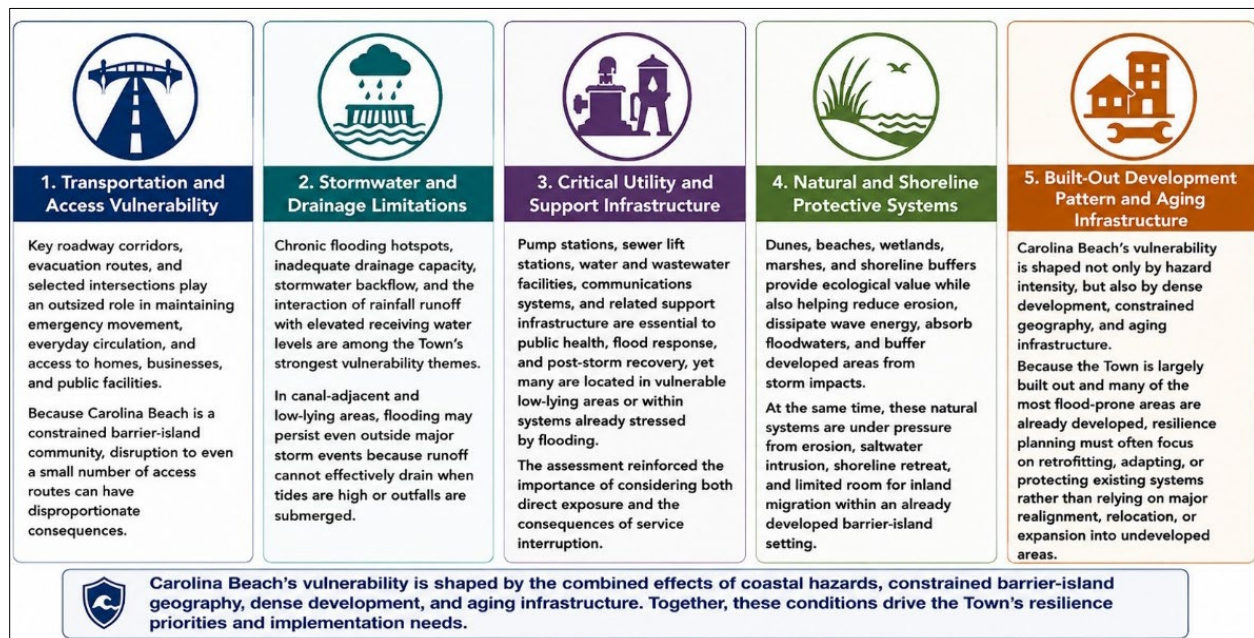


Figure 25. Major vulnerability themes identified in the Carolina Beach assessment, highlighting the Town’s principal resilience concerns related to transportation and access, stormwater and drainage limitations, critical utility and support infrastructure, natural and shoreline protective systems, and the constraints associated with a built-out barrier-island setting and aging infrastructure.

Critical Utility and Support Infrastructure. Critical utility and support infrastructure was another major area of concern. Pump stations, sewer lift stations, water and wastewater facilities, communications systems, and related support infrastructure are essential to public health, flood response, and post-storm recovery, yet many are in vulnerable low-lying areas or within systems already stressed by flooding. The final scoring reinforced the importance of considering both direct exposure and the consequences of service interruption. The Town has already implemented backup-power and flood-hardening improvements at several critical utility facilities, reducing some operational vulnerability; however, these systems remain important because of the consequences associated with service interruption.



Natural and Shoreline Protective Systems. Natural and shoreline protective systems also play a major role in Town resilience. Dunes, beaches, wetlands, marshes, and shoreline buffers provide ecological value while also helping reduce erosion, dissipate wave energy, absorb floodwaters, and buffer developed areas from storm impacts. At the same time, these natural systems are under pressure from erosion, saltwater intrusion, shoreline retreat, and limited room for inland migration within an already developed barrier-island setting.

Built-Out Development Pattern and Aging Infrastructure. The assessment further underscores that Carolina Beach’s vulnerability is shaped not only by hazard intensity, but also by dense development, constrained geography, and aging infrastructure. The Town is largely built out, and many of the most flood-prone areas are already developed. As a result, resilience planning in Carolina Beach must often focus on retrofitting, adapting or protecting existing systems rather than relying on major realignment, relocation, or expansion into undeveloped areas. This makes phased implementation, project screening, and coordination with property owners and outside agencies especially important.

5.8 PRIORITY VULNERABILITY AREAS

The Carolina Beach RCCP process identified several priority areas where hazards, asset importance and recurring local concerns overlap most strongly. As shown in Figure 26, these areas include the Canal Drive / North End area, Carolina Beach Lake, the Lake Park Boulevard / Central Business District corridor, the Dow Road corridor, the oceanfront dune and public access system, and the harbor / marina district. These locations emerged consistently through CAT input, prior technical studies, hazard screening, and the vulnerability assessment as the parts of Town where flood exposure, critical infrastructure, access, shoreline dynamics, and everyday community function intersect most significantly.

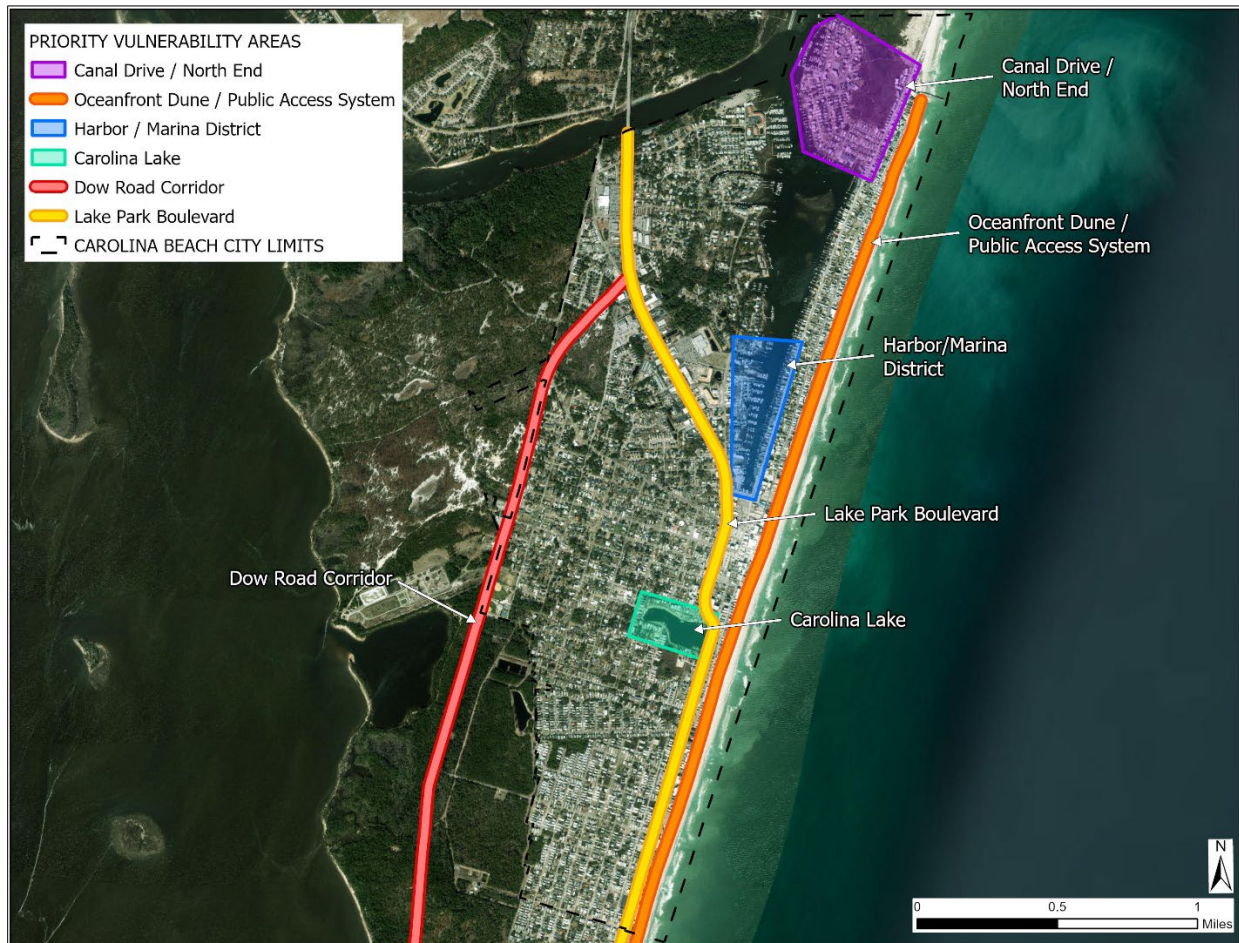


Figure 26. Priority vulnerability areas identified through the Carolina Beach RCCP process, highlighting locations where hazard exposure, recurring flooding, critical asset importance, and local resilience concerns overlap most strongly, including the Canal Drive / North End area, oceanfront dune and public access system, harbor / marina district, Carolina Beach Lake, Dow Road corridor, and Lake Park Boulevard / Central Business District corridor.

Canal Drive / North End. The Canal Drive / North End area emerged as one of the Town’s most significant resilience challenges, with chronic flooding, tidal backflow, drainage limitations, roadway exposure, shoreline vulnerability, and utility risk occurring in combination. The project’s detailed mapping of sea-level rise and hurricane storm surge in the Canal Drive / Yacht Basin area illustrates that both public and non-public critical assets are located within areas affected by projected inundation, with vulnerability increasing under higher coastal water levels and stronger storm scenarios. Prior studies and CAT input consistently identified this area as a major hotspot and a priority for future resilience action.

Carolina Beach Lake. Carolina Beach Lake and its contributing drainage system also emerged as a key vulnerability area, where stormwater storage, conveyance, water quality, and adjacent infrastructure function are closely linked. The hurricane storm surge mapping around the lake area shows that a wide portion of the surrounding developed corridor is affected under higher-category



scenarios, reinforcing the importance of this system to both stormwater management and broader community function.

Lake Park Boulevard / Central Business District Corridor. The Lake Park Boulevard / Central Business District corridor was identified as another important focus area because drainage, access, tourism-related function and community activity intersect in a dense developed setting where disruption has outsized consequences. The final assessment and concept-development process both recognized this corridor as one where flood exposure, circulation and community use overlap.

Dow Road Corridor. Dow Road and related access corridors are important from both a resilience and emergency mobility standpoint because they support transportation redundancy, storm response and evacuation reliability. Likewise, key intersections and secondary routes that support circulation around the Town remain important even where their direct flood exposure may differ.

Oceanfront Dune and Public Access System. The oceanfront dune and public access system, including areas such as Freeman Park and other shoreline access points, was also identified as a priority because of ongoing exposure to erosion, dune loss, overwash, and storm damage. Townwide sea-level rise and flood event mapping shows that oceanfront-adjacent and sound-side fringe areas are both affected by rising coastal water levels and recurrent flood conditions, underscoring the importance of shoreline and natural-system protection as part of the Town's resilience strategy.

Harbor / Marina District. Selected harbor, marina, and shoreline management areas remain important to the Town's resilience because drainage, shoreline stability, water quality, navigation, and infrastructure function overlap in these locations. These areas were not treated as isolated problem spots, but as locations where multiple systems interact and where the consequences of disruption are especially significant. They therefore became the principal focus areas for subsequent concept development and candidate project identification.

5.9 VULNERABILITY SCORING RESULTS SUMMARY

The final vulnerability scoring process provides two complementary ways of understanding resilience priorities in Carolina Beach. Individual assets were first evaluated using the exposure, sensitivity and adaptive capacity criteria described in Section 5.5 to develop a composite vulnerability score. Those individual results were then reviewed to identify the assets and systems with the greatest relative vulnerability and summarized by major asset category to identify broader patterns across the Town. Together, these views help distinguish specific facilities, corridors and infrastructure elements that warrant attention while also showing where vulnerability is concentrated across interconnected public systems.

For transparency, the detailed individual asset scoring matrix is presented below. The matrix shows the planning-level exposure, sensitivity, adaptive capacity and resulting composite vulnerability scores for the assets evaluated through the screening process. The scoring was intended as a comparative planning tool rather than a final engineering assessment, allowing different types of assets to be considered within a consistent framework and helping identify where combinations of hazard exposure, functional importance and limited adaptive capacity may create greater resilience concerns.



FINAL CAROLINA BEACH RCCP REPORT
NEW HANOVER COUNTY, NC
OCTOBER 2026

Item 1.

Detailed Vulnerability Scoring Matrix for Individual Assets				
Carolina Beach				
EXPOSURE SCORE (0-3) 0-1 Low 2 Moderate 3 High SENSITIVITY SCORE (0-3) 0-1 Low 2 Moderate 3 High ADAPTIVE CAPACITY SCORE (0-3) 0-1 Low Capacity 2 Moderate Capacity 3 High Capacity COMPOSITE VULNERABILITY SCORE (0-6) 0-2 Low 3-4 Medium 5-6 High				
Asset / System	Exposure Score (0-3)	Sensitivity Score (0-3)	Adaptive Capacity Score (0-3)	Composite Vulnerability Score (0-6)
1. Power Substation - Dow Rd	0	3	1	2
2. Power substation - Ocean Blvd & Dow Rd	1	2	2	1
3. Pump Station - Lumberton Ave	2	3	2	3
4. Pump Station - Carolina Beach Lake	3	3	2	4
5. Pump Station - Spartanburg Ave	1	3	2	2
6. Pump Station - CB Town Hall	0	3	2	1
7. Pump Station - Dow Road	1	3	2	2
8. Pump Station - Texas Ave	3	3	2	4
9. Pump Station - Cape Fear Blvd	2	3	2	3
10. Pump Station - Lake Park Blvd	3	3	2	4
11. Pump Station - Georgia Ave	3	3	2	4
12. Water Tower - Alabama Ave	0	3	2	1
13. Water Treatment Facility - Raleigh Ave & 3rd St	3	3	2	4
14. Water Tower - Dow Rd	1	3	2	2
15. Sewer Lift Station - Canal Dr. & Oystershell Ln	3	3	2	4
16. Sewer Lift Station - Clam Shell Ln	3	3	2	4
17. Sewer Lift Station - Canal Dr	3	3	2	4
18. Sewer Treatment Plant - Dow Rd & Clarendon Ave	2	2	1	3
19. Maintain Henniker's Ditch Stormwater Drainage Pathway	2	3	1	4
20. Stormwater Pond - West of Island Greenway	2	2	3	1
21. Emergency Siren	1	3	1	3
22. Masonboro Sound Water Level/MET Sensor	3	2	1	4
23. Snow's Cut Bridge (primary ingress/egress)	3	3	0	6
24. N Lake Park Blvd	2	3	2	3
25. Dow Rd	2	3	1	4
26. Harper Ave	2	2	1	3
27. Carl Winner Dr	3	2	1	4
28. Carolina Beach Ave N	3	3	1	5
29. Florida Ave	3	2	1	4
30. Critical intersection for storm evacuation - Canal Dr & Carolina Beach Ave N	2	3	1	4
31. Critical intersection for storm evacuation - Carl Winner Dr & Canal Dr	2	3	1	4
32. Critical intersection for storm evacuation - Harper Ave & Canal Dr	3	3	2	4
33. Town CB Admin/Police	0	3	1	2
34. Hamlet Ave Ocean Rescue Facility/Emergency Vehicle Beach Access	3	2	3	2
35. CB Fire Dept - Dow Rd	0	3	1	2
36. St. Paul's Methodist Church Structure - Storm Shelter	2	2	1	3
37. Snow's Cut Boat Ramp	3	3	3	3
38. BellSouth ATT Telecommunications	3	3	1	5
39. Gas Station - Lake Park Blvd & Spartanburg Ave	3	2	2	3
40. Gas Station - Proximity	2	1	2	1
41. Gas Station - Canal Dr & Pelican Ln	3	1	2	2
42. Grocery Store - Sea Merchant	2	1	2	1
43. Grocery Store - Publix	2	2	2	2
44. Grocery Store - Food Lion	0	2	2	0
45. Island Quick Mart - Lake Park Blvd and Carl Drive	2	2	2	2
46. Carolina Beach Elementary School	3	3	2	4
47. Bame Ace Hardware	2	3	2	3
48. Freeman Park	3	1	2	2
49. CB Boardwalk	3	2	2	3
50. Mike Chappell Park	1	0	1	0
51. CB State Park	2	2	3	1
52. Wilmington Health Family Medicine CB	0	3	2	1
53. Pleasure Island Health Urgent Care	0	3	2	1
54. Pharmacy Walgreens	0	3	2	1
55. Pharmacy CVS	0	3	2	1

Figure 27. Detailed individual asset vulnerability scoring matrix used in the Carolina Beach RCCP assessment, showing planning-level exposure, sensitivity, adaptive capacity and composite vulnerability scores for the assets evaluated through the screening process



Review of the individual scores identified a group of assets and infrastructure elements that emerged as the Town’s highest vulnerability priorities. The highest-scoring results include critical access and evacuation infrastructure, stormwater and utility systems and selected flood-prone roadway and facility assets. These results are particularly important because disruption to these systems can affect not only the asset itself but also emergency access, evacuation, drainage performance, utility continuity and everyday community function.

Figure 28 highlights the highest-scoring individual assets identified through the planning-level assessment. The figure is intended to focus attention on the assets with the greatest relative vulnerability and provide a clear connection between the scoring results and the resilience strategies and candidate projects developed later in the RCCP process.

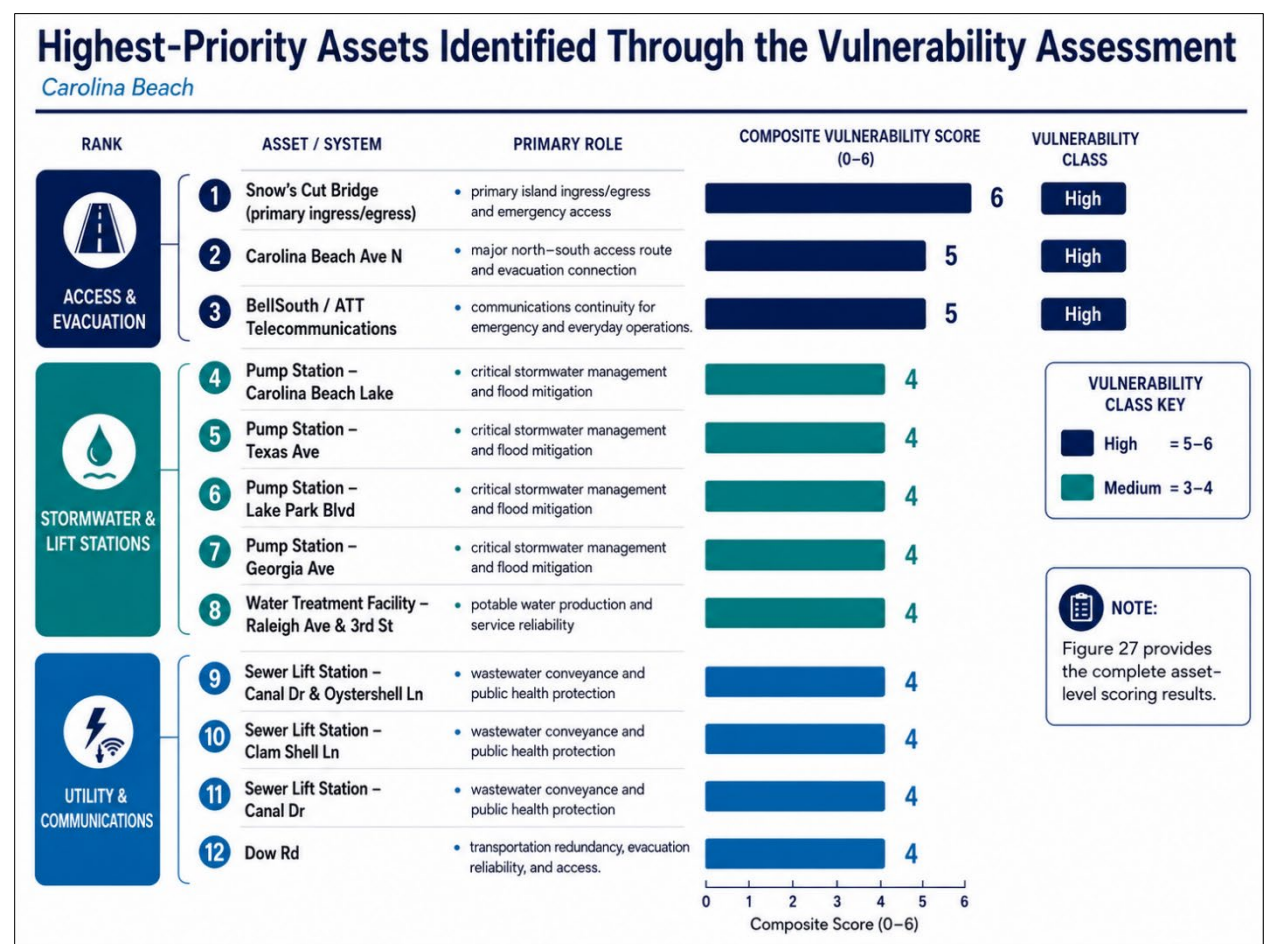


Figure 28. Highest-priority assets identified through the Carolina Beach vulnerability assessment using final composite vulnerability scores on the report’s 0–6 scale. Shown assets represent the highest-scoring individual facilities, corridors and infrastructure. The figure presents selected higher-scoring assets; reference numbers do not distinguish priority among assets with equal scores. Figure 27 provides the complete scoring results.

When the individual asset results are grouped by major asset category, broader patterns in the Town’s vulnerability become apparent. Transportation and access assets contain the strongest



concentration of moderate- and high-vulnerability scores, reflecting the importance of key corridors, intersections and evacuation routes in a low-lying barrier-island community. Stormwater and drainage systems also show a substantial concentration of moderate vulnerability, consistent with recurring flooding, backflow and conveyance limitations identified throughout the assessment. Utility and infrastructure assets similarly include several moderate- and high-vulnerability results, reinforcing the importance of maintaining critical services during and following flood events.

By comparison, public safety and municipal assets, community support assets and natural and shoreline systems generally scored lower within the planning-level framework. These lower category-level scores do not indicate that these systems are unimportant. Rather, they reflect the relative combination of exposure, sensitivity and adaptive capacity assigned through the scoring process and should be considered alongside the qualitative findings, geographic focus areas and local priorities identified elsewhere in the assessment. Figure 29 summarizes these category-level patterns and provides an overall view of where vulnerability is concentrated across the Town’s major asset systems.



Figure 29. Vulnerability scoring results by major asset category, showing how high-, medium- and low-vulnerability assets are distributed across transportation and access, stormwater and drainage, utility and infrastructure, public safety and municipal, community support and natural shoreline systems in Carolina Beach.



Taken together, the individual asset scores, highest-priority results and category-level patterns reinforce several consistent resilience priorities for Carolina Beach: protecting access and evacuation function, improving drainage and stormwater performance, maintaining utility continuity and addressing the corridors, facilities and systems that most strongly influence community function during routine flood events and following major storms. These findings provide the basis for the candidate project identification and screening process presented in Section 6.

5.10 ASSESSMENT LIMITATIONS

The Risk and Vulnerability Assessment was completed at a screening and planning level. It relied on available hazard layers, prior studies, local knowledge, CAT input, public feedback, and planning-level scoring rather than new field investigation, detailed engineering modeling, or alternatives analysis. As a result, the assessment should be understood as a structured planning tool used to identify relative priorities and inform future concept development rather than as a final engineering diagnosis of each site or asset.

This limitation is particularly important for Carolina Beach because several of the Town's most consequential resilience issues, including Canal Drive flooding, Carolina Beach Lake function, stormwater backflow, shoreline conditions and access vulnerabilities, have already been the subject of prior technical studies that evaluated local conditions in greater detail than was possible within this RCCP scope. The RCCP assessment builds on that body of work and helps organize it into a resilience planning framework, but it does not replace the need for future survey, drainage analysis, feasibility review, conceptual engineering, and site-specific design evaluation before projects are advanced toward implementation.

Taken together, the assessment findings establish the geographic focus areas, asset types and infrastructure systems that most strongly influence Carolina Beach's resilience needs and provide the basis for screening candidate projects.

6. Candidate Projects and Project Screening

Building on the Risk and Vulnerability Assessment, the next phase of the Carolina Beach RCCP process focused on identifying and screening candidate projects and policy actions that respond to the Town's highest-priority resilience needs. These concepts were developed from multiple sources, including the vulnerability assessment, priority geographic focus areas, prior plans and technical studies, CAT input, public engagement, project team evaluation of feasibility and implementation potential, and supplemental planning and zoning concepts prepared by Inspire. Together, these inputs were used to develop a preliminary concept list reflecting the Town's most significant flood and resilience challenges and the concepts with the strongest technical, local, strategic and policy basis for further consideration.

Following preparation of the preliminary concept list, the project team reviewed the draft concepts with Town staff and the CAT and incorporated additional information regarding projects that have already been completed, are funded or programmed, are being addressed through ongoing Town initiatives, or require refinement to better reflect current conditions and remaining needs. As a result, the final concept portfolio is narrower and more targeted than the initial screening list. Rather than



functioning as a broad inventory of every possible resilience action, it is intended to highlight concepts that continue to fill meaningful gaps in the Town’s resilience strategy.

Several concepts originally screened through the RCCP process were determined to be largely completed, already underway, or better addressed through other Town programs and therefore are not carried forward as primary concepts in this report. These include Canal Drive outfall backflow retrofits, critical utility backup power, Pump Station Hardening Bundle #1, the Canal Drive Sewer Lift Station Hardening Bundle, Florida Avenue drainage / spot elevation improvements as a stand-alone project, Lake Park Boulevard Green Street Retrofit, Hamlet Avenue Emergency Beach Access Restoration, Canal Drive / Florida Avenue stormwater monitoring and maintenance, Snow’s Cut Bridge Approach Drainage and Access Protection, and Water Treatment / Sewer Treatment Facility Floodproofing.

The removal of these concepts does not mean that the underlying resilience issues have necessarily been eliminated. In several cases, completed or programmed Town work addressed only part of the original concern, and remaining issues have been incorporated into revised concepts. This is particularly true along Canal Drive and Florida Avenue, where stormwater improvements and bulkhead construction have reduced some vulnerabilities but recurring tidal flooding remains a concern.

The candidate concepts were screened using a planning-level framework that considered relative priority, feasibility, relative cost, permitting complexity, anticipated benefits, constructability, and supporting context from previous studies. The resulting project list does not represent final design decisions or a binding capital improvement program, but rather a structured portfolio of resilience concepts and policy tools to guide future project development, funding strategy, regulatory updates, and phased implementation.

6.1 PROJECT SCREENING CRITERIA

Candidate concepts were screened using a planning-level set of criteria intended to compare likely implementation characteristics as well as strategic value. The screening criteria included relative priority, feasibility, relative cost, permitting complexity, benefits, and constructability, along with qualitative notes regarding prior-study support, coordination needs, phasing opportunities, and other implementation considerations.

- **Relative Priority** reflects the degree to which a concept responds to the Town’s highest-priority vulnerabilities, critical assets, and geographic focus areas identified through the assessment.
- **Feasibility** reflects the extent to which a concept appears implementable from a technical, institutional, regulatory, property-ownership, and logistical standpoint at a planning level.
- **Relative Cost** provides a comparative indication of likely capital investment or staff effort.
- **Permitting Complexity** reflects the probable difficulty of advancing a concept through environmental review, regulatory approvals, property coordination, and jurisdictional processes.



- **Benefits** reflect the extent to which a concept is expected to reduce risk, improve resilience, or provide co-benefits such as water-quality improvement, habitat protection, access reliability, or operational value.
- **Constructability** reflects the relative ease or difficulty of implementation, considering site access, staging, utility conflicts, existing development, environmental resources, and other physical constraints.

These criteria were not intended to produce final engineering rankings or require the Town to implement projects strictly in numerical order. Rather, they provide a consistent framework for comparing concepts and identifying projects that may be appropriate for near-term advancement, additional feasibility study, phased implementation, or longer-term planning.

6.2 CANDIDATE PROJECT SCREENING MATRIX

Figure 30 provides a planning-level summary of the candidate project screening completed through the Carolina Beach RCCP process after review and refinement of the initial concept list. The figure highlights representative concepts that remain under consideration and organizes them by general implementation characteristics, including relative priority, feasibility, cost, permitting complexity, benefits, and constructability.

The screening matrix is intended as a planning and prioritization tool rather than a funding allocation mechanism or final capital improvement program. The groupings reflect general implementation priority and readiness; concepts within each grouping are not individually ranked and may advance in different sequences as conditions and opportunities warrant. Future implementation will also depend on project readiness, available funding, grant eligibility, local match requirements, regulatory feasibility, staffing capacity, property availability and Town priorities at the time funding opportunities become available.

The current RCCP Phase 3 and Phase 4 funding cycle is now open, with applications due November 10, 2026. Under the current funding guidance, Phase 3 is intended to advance prioritized nature-based solution (NBS) projects identified through RCCP Phases 1 and 2 or through an equivalent resilience-planning process. Eligible activities may include engineering and design, technical studies or analyses that advance an NBS project toward shovel readiness, and the development or refinement of local ordinances that enhance resilience. Accordingly, concepts identified in this plan that advance nature-based solutions and satisfy the applicable eligibility requirements may be considered for RCCP funding. Other infrastructure, planning, and policy concepts remain important components of the Town's broader resilience strategy and may be pursued through other State, Federal, regional, or local funding programs.

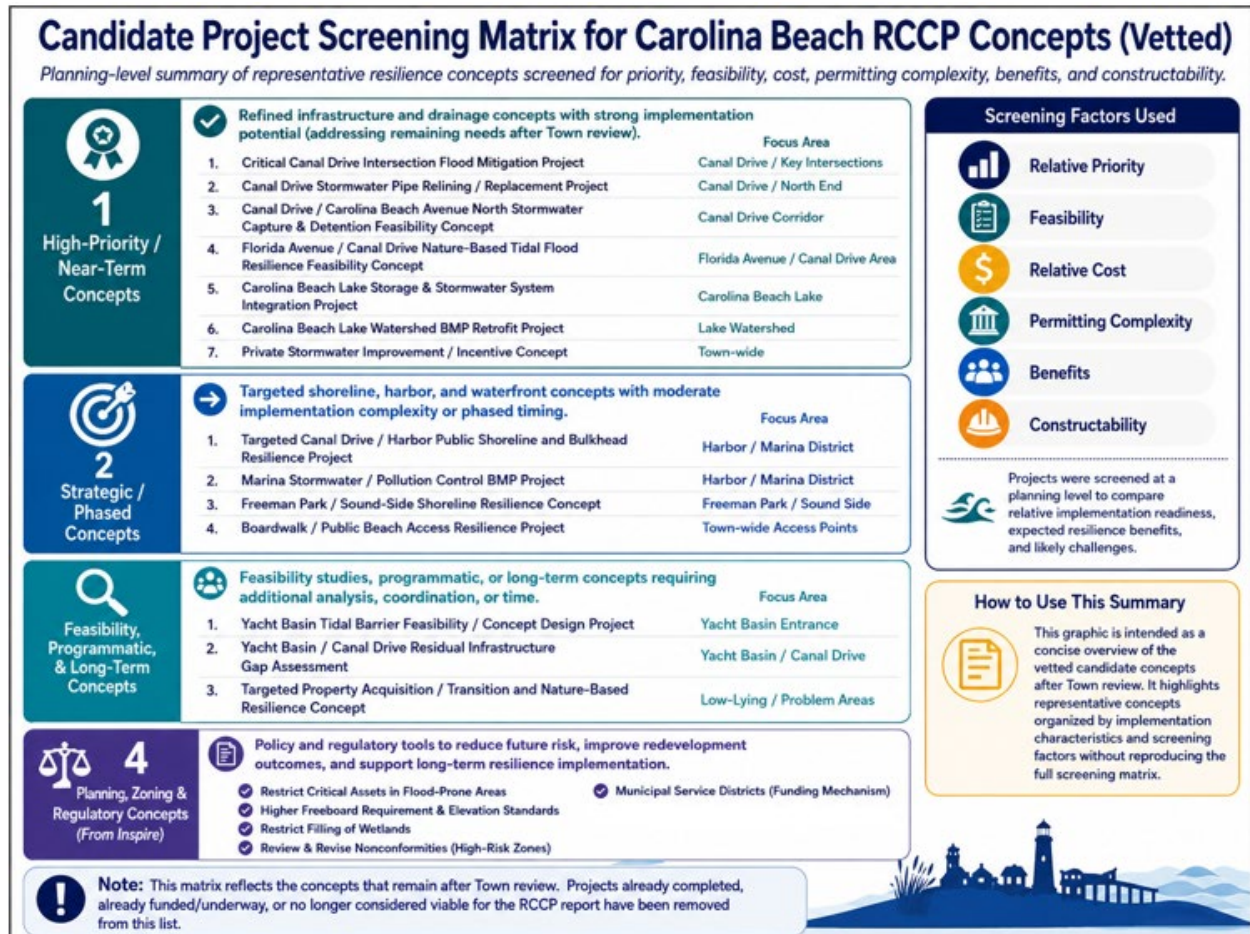


Figure 30. Candidate project screening matrix for Carolina Beach RCCP concepts. Projects are grouped by general implementation priority and readiness. Numbering within each grouping is for reference only and does not indicate relative priority or order of implementation.

6.3 PROJECT GROUPINGS AND IMPLEMENTATION TIERS

To support interpretation of the candidate project screening matrix, the screened concepts were grouped into broad implementation-oriented categories based on their relative immediacy, complexity, and role in the overall resilience strategy. These groupings distinguish more implementable near-term actions from concepts better suited to phased advancement, feasibility analysis, programmatic development, or longer-term policy implementation.

High-Priority / Near-Term Concepts

These concepts address remaining resilience needs that appear comparatively actionable because they have clearer implementation pathways, focused scopes, or strong alignment with current Town priorities. They generally represent targeted drainage, stormwater, nature-based, and lake-related concepts that could be advanced incrementally or through follow-up feasibility and design work.

Representative concepts in this group include the Critical Canal Drive Intersection Flood Mitigation Project, Canal Drive Stormwater Pipe Relining / Replacement Project, Canal Drive / Carolina Beach Avenue North Stormwater Capture and Detention Feasibility Concept, Florida Avenue / Canal Drive



Nature-Based Tidal Flood Resilience Feasibility Concept, Carolina Beach Lake Storage and Stormwater System Integration Project, Carolina Beach Lake Watershed BMP Retrofit Project, and Private Stormwater Improvement / Incentive Concept.

Strategic / Phased Concepts

These concepts remain important components of the Town's resilience strategy but are likely to require phased implementation, location-specific refinement, property coordination, or additional design before advancement. Representative concepts include targeted Canal Drive / Harbor public shoreline and bulkhead improvements, Marina Stormwater / Pollution Control BMP improvements, Freeman Park / sound-side shoreline resilience measures, and selected Boardwalk / Public Beach Access resilience improvements where future needs remain unresolved.

Projects 4 and 10 may be advanced together to evaluate both Town-owned Delaware Avenue street ends, the Florida Avenue / northern Canal Drive neighborhood, and the connected marsh system extending north into Freeman Park. Projects 5 and 6 are also complementary: Project 5 addresses lake storage, dredging and system operations, while Project 6 addresses runoff and pollutant loading from the contributing watershed. These connections do not change the established implementation groupings.

Feasibility, Programmatic, and Long-Term Concepts

Some concepts are sufficiently complex, uncertain, or dependent on future coordination that are better framed initially as feasibility efforts, gap assessments, or long-term programmatic strategies rather than immediate construction projects. These include the Yacht Basin Tidal Barrier Feasibility / Concept Design Project, the Yacht Basin / Canal Drive Residual Infrastructure Gap Assessment, Targeted Property Acquisition / Transition and Nature-Based Resilience Concept, and other concepts that require additional technical, regulatory, property, or funding evaluation before a specific implementation pathway can be established.

Planning, Zoning, and Regulatory Concepts

A separate set of planning, zoning, and regulatory concepts was developed to complement the physical resilience strategy. These concepts are described in Section 6.5. These concepts include restricting critical assets from locating in flood-prone areas, increasing freeboard and expanding elevation standards into the 500-year floodplain, restricting the filling of wetlands, revising nonconformity standards in high-risk areas, and exploring Municipal Service Districts as a mechanism to fund localized resilience infrastructure.

Taken together, the project and policy groupings described above help distinguish concepts that appear appropriate for near-term advancement from those better suited to phased implementation, feasibility study, programmatic development or policy intervention.

6.4 CANDIDATE PROJECT AND POLICY DESCRIPTIONS

The candidate concepts identified through the Carolina Beach RCCP process vary in scale, complexity, implementation readiness, and type. Some are physical infrastructure or shoreline projects, while others are nature-based, programmatic, feasibility-level, or policy concepts intended to complement future capital improvements.



Table 5 summarizes the principal physical, programmatic, nature-based, and feasibility-level concepts retained after Town and CAT review. These summaries are planning level in nature and are not intended to represent final design, final project scope, or final regulatory language.

Table 5. Refined physical, programmatic, nature-based, and feasibility-level concepts.

Concept	Project Description / Function	Primary Hazard or Issue Addressed	Implementation Notes
Critical Canal Drive Intersection Flood Mitigation Project	Address flooding, ponding, and circulation disruption at key Canal Drive intersections, including Carolina Beach Avenue North, Carl Winner Drive, and Harper Avenue, through measures such as grading changes, inlet upgrades, curb modifications, localized pipe work, spot elevation, and, where feasible, stormwater storage or detention in nearby Town-owned areas.	Primarily rainfall flooding, ponding, and disruption at circulation and evacuation chokepoints	Best understood as a phased intersection and drainage improvement package. Florida Avenue tidal flooding is addressed separately through the Florida Avenue / Canal Drive Nature-Based Tidal Flood Resilience Feasibility Concept. Water-table constraints would need to be evaluated if underground storage is pursued.
Canal Drive Stormwater Pipe Relining / Replacement Project	Rehabilitate or replace deteriorated stormwater pipes, inlets, and related conveyance infrastructure in the Canal Drive / North End area where structural or hydraulic deficiencies contribute to persistent rainfall flooding or poor drainage performance.	Rainfall flooding, reduced stormwater conveyance, infrastructure deterioration	The North End is located within the Town's Area F stormwater mapping area. The Town is currently completing and consolidating the Area F stormwater information, with the overall mapping effort expected to be completed later in 2026. Detailed infrastructure-location information is not intended for public release; however, generalized findings regarding identified system issues may be available once the Town's review is complete. Specific pipe-relining, replacement, abandonment, or other corrective actions should therefore be identified after



Concept	Project Description / Function	Primary Hazard or Issue Addressed	Implementation Notes
			the Area F information has been completed and reviewed by the Town. Future improvements may be advanced through the Town's capital program or outside grant funding, depending on the deficiencies identified.
Canal Drive / Carolina Beach Avenue North Stormwater Capture and Detention Feasibility Concept	Evaluate whether rainfall runoff moving along Carolina Beach Avenue North and down side streets toward Canal Drive could be intercepted using French drains or similar collection systems and redirected to underground detention beneath Town-owned street ends or beach-access areas.	Rainfall runoff contributing to Canal Drive flooding	Best treated initially as a feasibility and design study. Potential systems would require pretreatment and regular sediment maintenance. Implementation could be phased at side streets adjacent to the areas experiencing the most severe rainfall flooding.
Florida Avenue / Canal Drive Nature-Based Tidal Flood Resilience Feasibility Concept	Evaluate nature-based and hybrid measures to reduce recurring tidal flooding in the Florida Avenue / northern Canal Drive neighborhood, including both Town-owned Delaware Avenue street ends: the southern end adjoining the harbor south of Florida Avenue and the northern end across Virginia Avenue adjoining the connected marsh system. Coordinate with Project 10 to evaluate how tidal water moves between the neighborhood, marsh and Freeman Park. Potential measures include marsh	Tidal flooding, sea-level rise, roadway flooding, shoreline vulnerability	Begin with targeted survey and hydrologic/hydraulic analysis of both Delaware Avenue street ends and the connected neighborhood and marsh system. Coordinate with Project 10 to identify flood pathways, test nature-based and hybrid alternatives, and advance feasible measures toward design and permitting. Evaluate effects on rainfall drainage and adjacent properties so that improvements do not trap runoff or redirect flooding. Privately owned low-lying parcels, including 107 Florida Avenue and 1007 Canal Drive, may also warrant evaluation where willing-owner



Concept	Project Description / Function	Primary Hazard or Issue Addressed	Implementation Notes
	preservation or enhancement, living shoreline treatments, low vegetated berms and complementary drainage improvements, where feasible.		participation, easement, acquisition or other appropriate property control is available. The concept does not assume a specific project location or solution.
Carolina Beach Lake Storage and Stormwater System Integration Project	Maintain and improve Carolina Beach Lake's stormwater-storage function through dredging design, sediment management, agency coordination and permitting, coordinated with the lake's pumping and surrounding drainage infrastructure. Evaluate floating treatment wetlands and other feasible complementary nature-based measures for water-quality improvement, habitat benefits and compatibility with lake storage and operations. Coordinate with Project 6 to address runoff and pollutant loading from the contributing watershed.	Rainfall flooding, stormwater surcharge, lake-system performance	Builds on substantial Town work already completed or underway, including previous lake dredging, shoreline stabilization, pump improvements, and ongoing stormwater-system upgrades. The Town's Carolina Beach Lake Pump Force Main project is funded, designed, and bid and is expected to proceed toward construction. The force main is intended to improve the Town's ability to draw down Carolina Beach Lake during significant rainfall events and convey pumped lake water toward Henniker's Ditch, thereby reducing the potential for lake overtopping and adjacent flooding. Additional lake dredging and management of dredged material remain relevant future considerations. Further work should review available bathymetric, sediment-quality and prior dredging information and obtain targeted updates needed for dredging design, sediment handling, reuse or disposal, and permitting. Existing shoreline stabilization bags and limited perimeter space may constrain nature-based opportunities. Floating



Concept	Project Description / Function	Primary Hazard or Issue Addressed	Implementation Notes
			treatment wetlands would require evaluation of anchoring, maintenance, water-level fluctuations and compatibility with pumping, dredging access and flood-storage capacity. Their inclusion does not establish RCCP funding eligibility.
Carolina Beach Lake Watershed BMP Retrofit Project	Implement distributed green-infrastructure and watershed retrofit measures in neighborhoods draining to Carolina Beach Lake, including bioretention, vegetated swales, pretreatment, infiltration where feasible, and related stormwater controls.	Rainfall flooding, runoff, ponding, pollutant loading, watershed contribution to lake flooding	Best understood as a phased bundle of neighborhood-scale nature-based and green-infrastructure improvements. Freshwater wetland properties surrounding and south of the lake may also warrant evaluation for long-term conservation or acquisition to preserve stormwater-storage, wetland, and natural flood-management functions. Coordinate with Project 5 to identify feasible watershed retrofits that complement lake storage, dredging and operations by reducing runoff and pollutant loading before water enters the lake.
Private Stormwater Improvement / Incentive Concept	Encourage or incentivize private-property stormwater improvements such as permeable materials, small-scale retention, storage practices, guttering, cisterns, or other Town-approved measures that reduce runoff entering the municipal stormwater system.	Private rainfall runoff contributing to public drainage problems	Programmatic rather than a capital project. Future implementation could consider fee or utility-related incentives for approved private improvements that demonstrably reduce runoff or reduce demand on the Town stormwater system.



Concept	Project Description / Function	Primary Hazard or Issue Addressed	Implementation Notes
Targeted Property Acquisition / Transition and Nature-Based Resilience Concept	Evaluate voluntary acquisition or property-transition opportunities in selected low-lying or repeatedly flood-prone areas where public ownership could support a defined resilience purpose. Potential uses could include protection of existing marsh or wetlands, stormwater storage, natural floodplain function, shoreline restoration, living shoreline improvements, public open space, or other nature-based flood-management measures.	Chronic tidal and/or rainfall flooding, sea-level rise, long-term vulnerability	Requires site-specific screening, willing property owners, identification of a clear post-acquisition public purpose, and a viable acquisition funding source. Potential locations discussed through the RCCP process include privately owned low-lying properties along Canal Drive / Florida Avenue and freshwater wetland properties surrounding Carolina Beach Lake where conservation could preserve natural flood-storage and resilience functions. RCCP funding cannot be used for property acquisition itself; however, eligible nature-based planning, design, or implementation activities on publicly controlled property may be candidates for RCCP or other resilience funding.
Targeted Canal Drive / Harbor Public Shoreline and Bulkhead Resilience Project	Address remaining shoreline, bulkhead, and transition issues at Town-owned street ends and other public shoreline locations along Canal Drive / Florida Avenue and within the harbor / marina area where tidal overtopping, erosion, shoreline instability, or access issues affect public infrastructure.	Tidal flooding, overtopping, erosion, shoreline instability	This is not intended as a corridor-wide bulkhead program or a program for improvements on private property. The Town has completed public bulkhead improvements at Sandpiper, Starfish, Scotch Bonnet, Sailfish, Seagull, Scallop, and Dolphin. Additional permitted improvements at Oystershell, Seahorse, and Clamshell are expected to begin in fall 2026. Future work should therefore focus on remaining Town-owned shoreline gaps, transition points, and public locations where additional



Concept	Project Description / Function	Primary Hazard or Issue Addressed	Implementation Notes
			shoreline resilience improvements may be warranted. The wider Town right-of-way at Delaware Avenue also represents a potential future opportunity to integrate shoreline stabilization with public access, stormwater management, parking, and a possible kayak launch; however, no project at Delaware Avenue is currently funded.
Marina Stormwater / Pollution Control BMP Project	Improve runoff control and pollution management in the harbor / marina district through stormwater BMPs, pretreatment, sediment controls, and related support improvements.	Rainfall runoff, water-quality degradation, sediment transport, contamination concerns	Builds on ongoing Town work. Existing controls are already in place at some locations and additional sediment traps are being installed. Future work should focus on remaining gaps and opportunities for nature-based or green-infrastructure enhancements where feasible.
Freeman Park / Sound-Side Shoreline Resilience Concept	Evaluate nature-based and hybrid measures along Freeman Park's sound-side shoreline, adjacent dredge-spoil islands and the connected marsh extending south toward Virginia Avenue and the northern Delaware Avenue street end. Coordinate with Project 4 to assess tidal flooding, drainage, erosion and wave exposure across the connected marsh and North End neighborhood. Potential measures	Shoreline erosion, wave exposure, habitat vulnerability, tidal flooding, sea-level rise and drainage constraints affecting the connected marsh and North End neighborhood.	Coordinate with Project 4 and Freeman Park land-management planning to complete targeted survey, shoreline and marsh assessment, and hydrodynamic and wave analysis of the connected system. Use the analysis to identify flood pathways and vulnerable shoreline areas, compare feasible nature-based and hybrid alternatives, and advance preferred measures toward preliminary design and permitting. Evaluate neighborhood flood reduction, rainfall drainage,



Concept	Project Description / Function	Primary Hazard or Issue Addressed	Implementation Notes
	include marsh preservation or enhancement, living shorelines, stabilization of vulnerable dredge-spoil island edges and vegetated berms where feasible.		habitat benefits and potential effects on adjacent properties. Confirm ownership, access and regulatory requirements for each proposed improvement.
Boardwalk / Public Beach Access Resilience Project	Improve the resilience of public beach access structures, dune crossovers, and related facilities where erosion, overwash, storm surge, or other coastal hazards continue to affect public access.	Erosion, overwash, storm surge, public-access vulnerability	Should focus only on unresolved future needs beyond work already underway. The Town continues to coordinate with the USACE and is replacing traditional wooden crossovers with Mobi-Mats where appropriate.
Yacht Basin Tidal Barrier Feasibility / Concept Design Project	Evaluate whether a tidal barrier or similar system at the Yacht Basin entrance could reduce chronic tidal inflow and saltwater flooding affecting the Canal Drive system.	Chronic tidal flooding, saltwater intrusion	Best framed as a long-term feasibility / concept-design effort rather than an immediate implementation project. The concept is likely to be expensive, operationally complex, environmentally sensitive, and is not currently considered a leading near-term priority.
Yacht Basin / Canal Drive Residual Infrastructure Gap Assessment	Identify unresolved drainage and shoreline infrastructure gaps remaining after ongoing Town improvements, such as abandoned outfalls, deficient pipe segments, remaining public bulkhead transitions, or other system deficiencies.	Residual rainfall drainage and tidal shoreline vulnerabilities	Best framed as a targeted gap assessment rather than a broad capital project. The Town's ongoing Area F stormwater mapping and other infrastructure information should inform the assessment once that work is completed and reviewed. Detailed infrastructure-location information is not intended for public release, but generalized findings may help identify the types of remaining deficiencies that warrant



Concept	Project Description / Function	Primary Hazard or Issue Addressed	Implementation Notes
			future action. Older abandoned pipes or outfalls may warrant plugging, decommissioning, rehabilitation, or other corrective action where they contribute to flooding or system inefficiency.

Together, the retained concepts represent the principal physical, nature-based, programmatic, and feasibility-level strategies identified after Town and CAT review. They are intended to guide future refinement, funding discussions, feasibility analysis, design development, and phased implementation rather than establishing final project scope or mandatory implementation priority.

6.5 PLANNING, ZONING, AND REGULATORY CONCEPTS

A separate set of planning, zoning, and regulatory concepts were developed to complement the physical resilience concepts described above. These are not engineering or capital projects, but rather policy tools, regulatory standards, and land-use interventions designed to reduce future exposure, improve redevelopment outcomes, and create longer-term implementation mechanisms. As summarized below in Table 6, these concepts focus on where and how vulnerable uses are allowed to locate, how redevelopment is managed in high-risk areas, how wetlands and natural flood-storage areas are protected, and how the Town may create future funding tools to support localized resilience improvements.

Table 6. Planning, zoning, and regulatory concepts.

Concept	Key Policy / Regulatory Action	Hazards Addressed	Implementation Notes
Restrict Critical Assets from Locating in Flood-Prone Areas	Update UDO Section 3.4 (Table of Uses) to restrict or apply higher standards to selected critical public, institutional, safety, care, and educational uses within the 0.2-percent-annual-chance floodplain / Shaded X Zone. Targeted uses would include facilities such as healthcare, childcare, schools, libraries, medical clinics, post offices, municipal fire,	Flooding, sea-level rise, vulnerability of critical assets	Policy intervention; staff-level implementation; short-term timeframe. Inspired by approaches used in Wrightsville Beach and Topsail Beach, where local planning and zoning tools are used together to limit highly vulnerable uses in hazard-prone areas.



Concept	Key Policy / Regulatory Action	Hazards Addressed	Implementation Notes
	police, and rescue operations.		
Higher Freeboard Requirement	Increase the Town's freeboard requirement from 2 feet to 3 feet above Base Flood Elevation and amend the UDO height exception provisions so structures are not penalized in height calculations for building more resiliently. Extend elevation requirements into the 500-year floodplain by requiring new construction and substantial improvements in the Shaded X Zone to elevate above the applicable BFE.	Flooding, sea-level rise	Policy intervention; staff-level implementation. This concept is intended to be coordinated with the upcoming state reassessment of flood maps. Comparable approaches have been used in Nags Head and in Charlotte-Mecklenburg's broader "community floodplain" standards.
Restrict the Filling of Wetlands	Revise local code to more clearly limit filling, grading, excavation, or development in wetlands, including coastal, non-coastal, and jurisdictional wetlands, except where authorized by applicable permits. Establish a 75-foot buffer around coastal wetlands and define limited allowable activities such as public access points, pathways, boardwalks, and certain stormwater or educational uses.	Rainfall flooding, coastal storm surge, sea-level rise	Policy intervention; staff-level implementation; short-term timeframe. This concept is intended to strengthen protection of wetlands as natural flood-storage and resilience features and would likely require edits to both flood damage prevention and stormwater sections of the code.
Review and Revise Nonconformities	Update UDO Section 3.49 to create a tiered framework for nonconforming structures in flood-prone areas. Standards would become more restrictive as hazard exposure increases, with different rules for the	Vulnerability and resilience in flood-prone redevelopment areas	Policy intervention; staff-level implementation; short-term timeframe. This concept is intended to gradually reduce long-term structural vulnerability and phase out the most problematic



Concept	Key Policy / Regulatory Action	Hazards Addressed	Implementation Notes
	Shaded X Zone, AE Zone, and VE Zone, including cumulative improvement tracking, limits on expansion, and full compliance requirements after substantial damage in the highest-risk areas.		nonconforming conditions in high-risk zones.
Municipal Service Districts	Explore establishment of geographically distinct Municipal Service Districts under N.C.G.S. §160A-536 to generate dedicated local revenue for stormwater, drainage, and flood-protection improvements in the most hazard-prone areas. Revenue could support green stormwater systems, culvert expansion, pump retrofits, backflow preventers, neighborhood flood-storage basins, and related bundled resilience improvements.	Rainfall flooding, tidal flooding, coastal hazard exposure	Policy / funding mechanism; moderate timeframe. This concept is not a physical project, but rather a governance and finance tool that could help fund localized resilience improvements beyond standard municipal service levels. Properties within an established district would provide dedicated revenue for improvements benefiting that district. A one-time special assessment could also be considered for a discrete project, although it would not provide the ongoing revenue stream associated with an MSD. Nags Head and Duck provide relevant case-study examples.

Together, these concepts broaden the RCCP portfolio beyond physical infrastructure improvements alone and provide a policy-based framework for reducing future risk through land use, redevelopment standards, protection of natural flood-storage areas, and local funding mechanisms. They are best understood as complementary to the Town’s physical resilience projects and as potential tools for shaping more resilient development and redevelopment over time.

The perimeter drainage concept included in the draft portfolio was not retained as a separate recommendation following additional Town and CAT review because drainage impacts associated with development and redevelopment are already addressed through the Town’s existing development and stormwater review processes.



7. Conclusion and Next Steps

The Carolina Beach RCCP process built on a substantial body of prior planning and technical work, combined with local knowledge, CAT input, public engagement, a structured vulnerability assessment, Town review of project concepts, and supplemental planning and zoning input from Inspire, to identify the Town's principal resilience challenges and organize them into a refined portfolio of candidate projects and policy actions. Together, the assessment findings and project screening results help clarify where flood risk, access vulnerability, drainage limitations, shoreline management needs, natural-system opportunities, and long-term redevelopment pressures are most significant and where future resilience actions may provide the greatest value.

The concepts presented in this report are planning level in nature and are intended to support future refinement, prioritization, funding strategy, regulatory development, feasibility analysis, design, and phased implementation rather than represent final project designs. Near-term opportunities include targeted drainage and detention feasibility work, continued refinement of Canal Drive stormwater concepts and Carolina Beach Lake storage and watershed strategies, evaluation of nature-based tidal-flood resilience opportunities along Florida Avenue and Canal Drive, selected harbor and waterfront improvements, distributed watershed and private-property stormwater strategies, and policy updates intended to reduce future exposure in flood-prone areas.

The current RCCP emphasis on nature-based solutions creates an opportunity to evaluate Projects 4 and 10 together as a connected North End neighborhood, marsh and Freeman Park system and advance feasible nature-based or hybrid measures toward design, permitting and implementation. Projects 5 and 6 provide a complementary lake and watershed approach, including evaluation of floating treatment wetlands and watershed green infrastructure where feasible. Funding eligibility will depend on the proposed scope and applicable program requirements. Other infrastructure and policy concepts remain important components of the Town's broader resilience strategy and may be advanced through separate State, Federal, regional or local funding programs.

Overall, the report provides both a technical foundation and a practical framework for advancing resilience planning in Carolina Beach over time. It helps the Town distinguish between concepts that may be suitable for near-term advancement, those requiring additional feasibility analysis or phased implementation, and those better addressed through longer-term policy, regulatory, programmatic, or capital planning efforts.

8. References

APTIM Coastal Planning & Engineering of North Carolina, Inc. 2019. *Town of Carolina Beach Canal Drive Flooding and Vulnerability Study*. Draft report, February 2019. Prepared for the Town of Carolina Beach, North Carolina.

Bonnin, G. M., D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley. 2006. *Precipitation-Frequency Atlas of the United States, NOAA Atlas 14, Volume 2, Version 3.0*. National Oceanic and Atmospheric Administration, National Weather Service, Silver Spring, Maryland.
https://www.weather.gov/media/owp/hdsc_documents/Atlas14_Volume2.pdf.



Centers for Disease Control and Prevention and Agency for Toxic Substances and Disease Registry. 2022. *CDC/ATSDR Social Vulnerability Index 2022 Database, United States*. Geospatial Research, Analysis, and Services Program. <https://www.atsdr.cdc.gov/place-health/php/svi/svi-data-documentation-download.html>. Accessed September 2, 2026.

ESP Associates, Inc. 2021. *Southeastern North Carolina Regional Hazard Mitigation Plan*. Final report, January 2021. Prepared for Brunswick, New Hanover, Onslow, and Pender counties and participating municipal governments. <https://www.carolinabeach.gov/DocumentCenter/View/145/Hazard-Mitigation-Plan-PDF>.

Federal Emergency Management Agency. n.d. *National Flood Hazard Layer*. <https://www.fema.gov/flood-maps/national-flood-hazard-layer>. Accessed September 2, 2026.

Imperial, M. T., and K. Theodorson. 2008. *Town of Carolina Beach Water Use and Harbor Management Plan*. Final draft, August 27, 2008. Prepared for the Town of Carolina Beach Planning Department. <https://www.carolinabeach.gov/DocumentCenter/View/144/Harbor-Management-Plan-PDF>.

McKim & Creed. 2011. *Bicycle Multi-Use Transportation Plan*. Prepared for the Town of Carolina Beach, North Carolina. <https://www.wmpo.org/wp-content/uploads/2020/05/Carolina-Beach-Bicycle-Multi-Use-Plan.pdf>.

North Carolina Department of Environmental Quality, Division of Coastal Management. 2025. *North Carolina Resilient Coastal Communities Program Planning Handbook*. Version 2. <https://www.deq.nc.gov/coastal-management/resilience/rccp-planning-handbook-2025-v2/open>.

North Carolina Department of Environmental Quality, Division of Coastal Management. 2026. *North Carolina Resilient Coastal Communities Program Phase 3 Request for Applications*. Applications opened September 1, 2026. <https://www.deq.nc.gov/about/divisions/division-coastal-management/coastal-resiliency/rccp-overview>. Accessed September 2, 2026.

North Carolina General Assembly. n.d. *North Carolina General Statutes, Chapter 160A, Article 23, Section 160A-536: Purposes for which districts may be established*. https://www.ncleg.gov/EnactedLegislation/Statutes/HTML/BySection/Chapter_160A/GS_160A-536.html. Accessed September 2, 2026.

North Carolina State University, Sunny Day Flooding Project. 2025. *Envisioning Flood Resilience in Carolina Beach: Results Summary for Carolina Beach Town Council*. <https://sunnydayflooding.com/flood-modeling/carolina-beach-modeling/>. Accessed September 2, 2026.

National Oceanic and Atmospheric Administration, National Hurricane Center. n.d. *National Storm Surge Risk Maps, Version 4: Sea, Lake, and Overland Surges from Hurricanes Model Maximum of Maximums*. <https://www.nhc.noaa.gov/nationalsurge/>. Accessed September 2, 2026.



National Oceanic and Atmospheric Administration, Office for Coastal Management. n.d. *Coastal Change Analysis Program High-Resolution Land Cover Data*.

<https://coast.noaa.gov/digitalcoast/data/ccaphighres.html>. Accessed September 2, 2026.

National Oceanic and Atmospheric Administration, Office for Coastal Management. n.d. *Sea Level Rise Viewer and Sea Level Rise Inundation Data*. <https://coast.noaa.gov/digitalcoast/tools/slr.html>.

Accessed September 2, 2026.

National Oceanic and Atmospheric Administration, Office for Coastal Management. n.d. *Sea Level Rise Viewer High Tide Flooding Data*.

https://coast.noaa.gov/slrdata/High_Tide_Flooding/index.html. Accessed September 2, 2026.

Peter J. Smith & Company, Inc. 2008. *Master Development Plan for the Town of Carolina Beach, North Carolina*. May 2008. <https://www.carolinabeach.gov/DocumentCenter/View/142/CB-Master-Development-Plan-PDF>.

Town of Carolina Beach. 2020. *CAMA Land Use Plan*. Adopted September 8, 2020; certified November 18, 2020. <https://www.carolinabeach.gov/DocumentCenter/View/140/2020-Land-Use-Plan-PDF>.

Town of Carolina Beach. 2023. *CB2045 Infrastructure Plan*. Twenty-year infrastructure and financial plan presented to the Carolina Beach Town Council on March 28, 2023.

Town of Carolina Beach. 2026. *Town of Carolina Beach Unified Development Ordinance*. Sections 3.4 and 3.49. https://library.municode.com/nc/carolina_beach/codes/code_of_ordinances. Accessed September 2, 2026.

Town of Carolina Beach, Cape Fear Council of Governments, and North Carolina Coastal Federation. 2020. *Carolina Beach Nine Elements Watershed Restoration Plan*.

<https://www.carolinabeach.gov/DocumentCenter/View/146/Watershed-Management-Plan-PDF>.

VHB. 2025. *Carolina Beach Bicycle and Pedestrian Plan*. Prepared for the Town of Carolina Beach in coordination with the North Carolina Department of Transportation Integrated Mobility Division.

April 2025. <https://www.carolinabeach.gov/DocumentCenter/View/141/Bicycle-and-Pedestrian-Plan-PDF>.

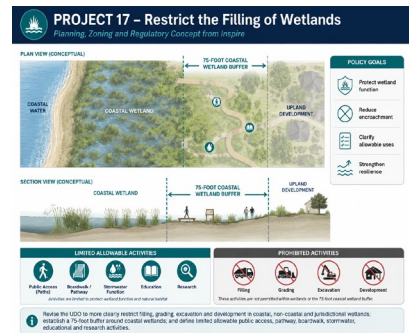
Wilbur Smith Associates. 2009. *Final Corridor Study: Dow Road, Carolina Beach, North Carolina*. Prepared for the Wilmington Metropolitan Planning Organization. October 5, 2009.

https://www.wmpo.org/wp-content/uploads/2016/05/2009-10_DRCS_PlanFINAL.pdf.

CAROLINA BEACH RCCP

Planning-Level Project Portfolio

Physical, Nature-Based, Programmatic, Feasibility and Policy Concepts



Town of Carolina Beach, North Carolina

Prepared through the North Carolina Resilient Coastal Communities Program

October 2026

RTFOLIO OVERVIEW

This portfolio presents the physical, nature-based, programmatic, feasibility-level and policy concepts retained after the vulnerability assessment, review of prior plans and studies, Community Action Team and public input, and detailed Town review. It is designed as an implementation roadmap: concise enough to use in funding and scoping discussions, while retaining the information needed to advance individual concepts.

How to Use This Portfolio

- Use the portfolio roadmap and summary tables to compare concepts across implementation pathways.
- Use each two-page project spread to understand the need, proposed approach, next step, cost, partners and funding path.
- Treat all scopes, costs and schedules as planning-level information that must be refined through project-specific survey, engineering, permitting and coordination.
- Use the policy toolkit as a coordinated set of planning and funding actions rather than as capital construction projects.

RCCP Phase 3 and Phase 4 Funding Context

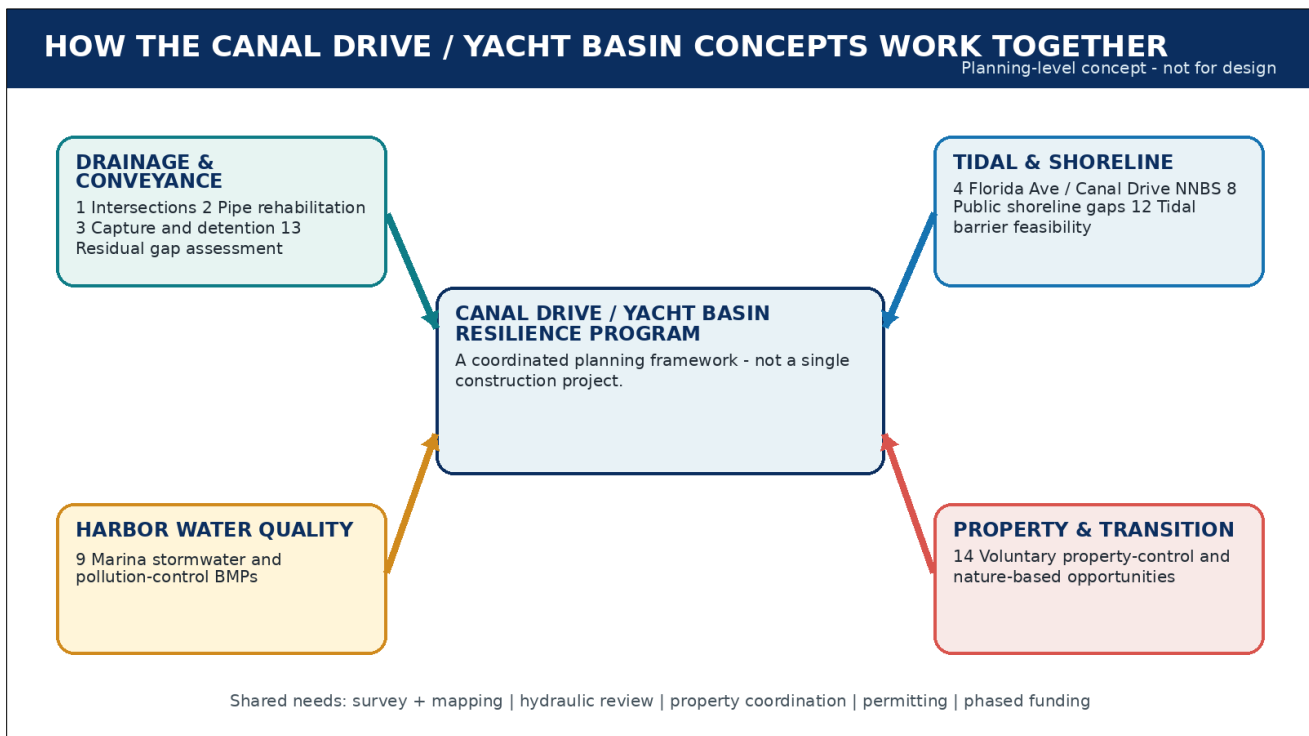
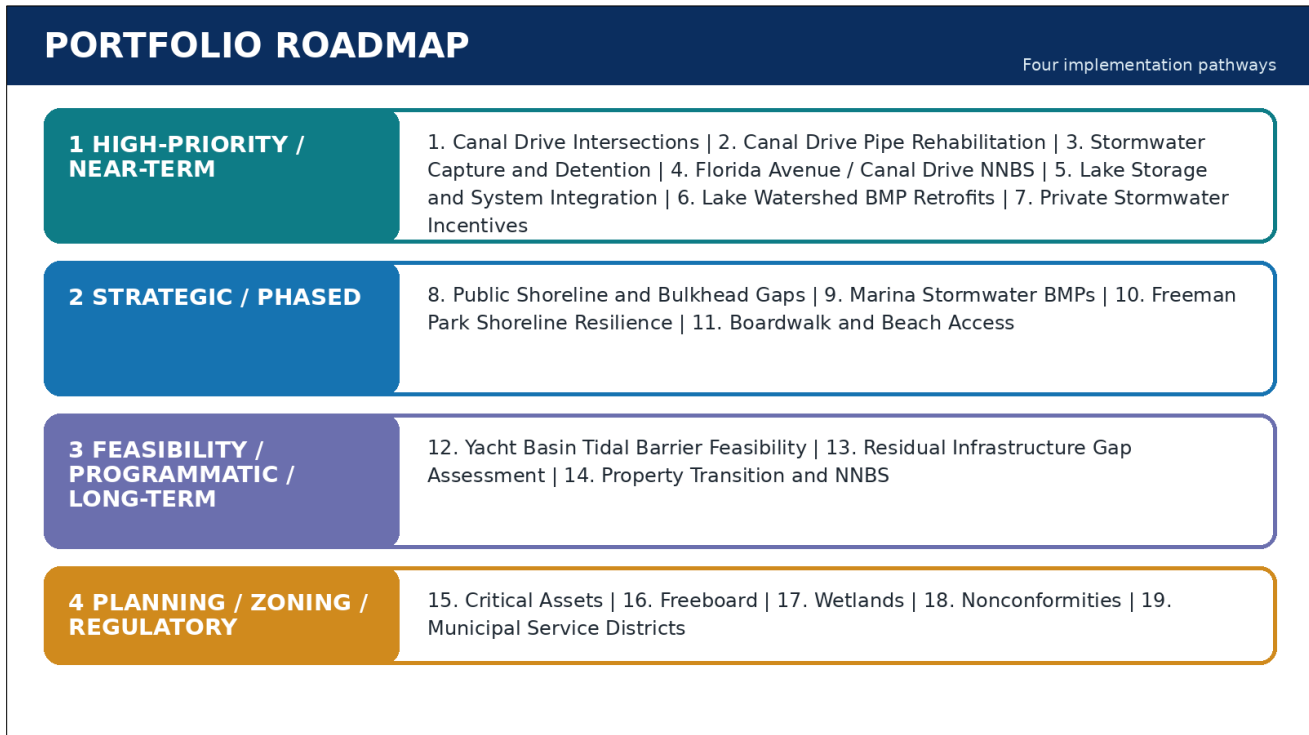
RCCP Phase 3 and Phase 4 funding applications must be evaluated against the issued Request for Applications (RFA). Inclusion in this portfolio does not establish funding eligibility or guarantee an award. Concepts better suited to other funding programs remain important parts of the Town's broader resilience strategy.

Relative Cost

\$	Planning, study, program development or small implementation activity
\$\$	Moderate feasibility, design or targeted implementation cost
\$\$\$	Substantial capital investment
\$\$\$\$	Major or highly variable capital investment

Potential funding sources are illustrative and subject to current program eligibility, matching requirements and application guidance.

PORTFOLIO ROADMAP



Several Canal Drive and Yacht Basin concepts are related but retain distinct purposes and implementation paths.

PROJECT SUMMARY

#	Concept	Pathway	Immediate Next Step
1	Critical Canal Drive Intersection Flood Mitigation Project	Near-Term	Complete targeted survey and drainage analysis, identify one or more pilot locations and prepare concept alternatives and planning-level costs.
2	Canal Drive Stormwater Pipe Relining / Replacement Project	Near-Term	Complete the Area F mapping and Town review, prioritize rehabilitation projects and early-action segments, and consider applying the same approach in other areas of Town where mapping or investigation identifies deteriorated stormwater infrastructure.
3	Canal Drive / Carolina Beach Avenue North Stormwater Capture and Detention Feasibility Concept	Near-Term	Complete topographic survey, hydrologic/hydraulic analysis, subsurface investigation, utility review and conceptual alternatives for a pilot location.
4	Florida Avenue / Canal Drive Nature-Based Tidal Flood Resilience Feasibility Concept	Near-Term	Complete targeted survey and flood-pathway analysis of both Town-owned Delaware Avenue street ends and the connected neighborhood and marsh system. Coordinate with Project 10 to develop feasible nature-based or hybrid concepts.
5	Carolina Beach Lake Storage and Stormwater System Integration Project	Near-Term	Review prior lake plans, update bathymetry and sediment data, and develop dredging design, sediment management and permitting. Coordinate with Project 6 and evaluate floating treatment wetlands and other feasible complementary nature-based measures.
6	Carolina Beach Lake Watershed BMP Retrofit Project	Near-Term	Prepare a watershed retrofit prioritization map and advance feasible nature-based demonstration projects for design and permitting, coordinated with Project 5.
7	Private Stormwater Improvement / Incentive Concept	Near-Term	Complete a program feasibility and rate-policy review, then develop a pilot incentive or rebate program.
8	Targeted Canal Drive / Harbor Public Shoreline and Bulkhead Resilience Project	Strategic	Inventory remaining public-shoreline gaps and prioritize unresolved Town-owned locations for survey and concept design.
9	Marina Stormwater / Pollution Control BMP Project	Strategic	Complete a harbor stormwater audit and identify priority BMP retrofits and operational practices.
10	Freeman Park / Sound-Side Shoreline Resilience Concept	Strategic	Coordinate with Project 4 and Freeman Park planning to evaluate the connected North End marsh and sound-side shoreline system and identify feasible nature-based measures for flood mitigation, erosion reduction and habitat resilience.
11	Boardwalk / Public Beach Access Resilience Project	Strategic	Prepare an access vulnerability inventory and integrate priority retrofits into the Beach Management Plan and capital program.

#	Concept	Pathway	Immediate Next Step
12	Yacht Basin Tidal Barrier Feasibility / Concept Design Project	Feasibility	Conduct only a high-level fatal-flaw and economic screening before committing to a full feasibility study.
13	Yacht Basin / Canal Drive Residual Infrastructure Gap Assessment	Programmatic	Complete the Area F mapping and prepare a concise action list addressing remaining infrastructure and public-shoreline gaps.
14	Targeted Property Acquisition / Transition and Nature-Based Resilience Concept	Long-Term	Establish screening criteria, evaluate candidate parcels, and pursue owner engagement only after Town policy direction and a viable funding source are established.
15	Restrict Critical Assets from Locating in Flood-Prone Areas	Policy / Regulatory	Complete planning and legal review, prepare draft UDO amendments, and conduct the required public process.
16	Higher Freeboard Requirement	Policy / Regulatory	Prepare ordinance alternatives and conduct stakeholder and public review in coordination with the flood-map reassessment.
17	Restrict the Filling of Wetlands	Policy / Regulatory	Complete legal and planning review, develop mapped and text alternatives, and conduct the required public process.
18	Review and Revise Nonconformities	Policy / Regulatory	Conduct legal review and prepare tiered ordinance options and administrative procedures.
19	Municipal Service Districts	Policy / Funding	Conduct a municipal finance and legal feasibility study and evaluate illustrative district scenarios.

Projects 1-7 are high priority / near-term concepts. Project 4 is intentionally placed before the two Carolina Beach Lake concepts to match the ordering used in the main RCCP report. Projects 4 and 10 may be advanced together to evaluate both Town-owned Delaware Avenue street ends, the northern Canal Drive neighborhood and the connected marsh system extending into Freeman Park. Projects 5 and 6 are complementary: Project 5 addresses lake storage, dredging and system operations, while Project 6 addresses runoff and pollutant loading from the surrounding watershed. These connections do not change the established project priorities.

ONGOING, COMPLETED OR OTHERWISE ADDRESSED INITIATIVES

The following items were reviewed but are not carried forward as stand-alone portfolio projects because the Town has completed the work, funded or programmed it, or is addressing it through existing operations or regulatory requirements.

Initiative	Current Status
Canal Drive outfall backflow retrofits	Substantially completed.
Critical utility backup power	Completed.
Pump Station Hardening Bundle #1	Completed
Canal Drive sewer lift station hardening	Completed; lift stations have been upgraded for flood protection and include backup power.
Florida Avenue drainage / spot elevation	Roadway regrading, reprofiling and drainage improvements are complete. Remaining tidal-flooding concerns are addressed under Project 4.
Lake Park Boulevard Green Street retrofit	Removed following Town and CAT review.
Canal Drive / Florida Avenue monitoring and maintenance	Not retained as a stand-alone project.
Snow's Cut Bridge approach drainage	Removed as a current RCCP project.
Water and sewer treatment facility floodproofing	Completed / addressed through existing State-mandated protection protocols.
Hamlet Avenue emergency beach access restoration	Removed following Town and CAT review because no specific unresolved resilience need was identified.

PROJECT 1 | Critical Canal Drive Intersection Flood Mitigation Project

High-Priority / Near-Term Concept

CANAL DRIVE INTERSECTION FLOOD-MITIGATION CONCEPT

CAROLINA BEACH, NORTH CAROLINA

A PHASED, INTERSECTION-BASED STRATEGY — TARGETED SOLUTIONS, NOT ONE PROJECT CORRIDOR



PRIORITY INTERSECTIONS — EXISTING CONDITIONS (DRY WEATHER)



TARGETED IMPROVEMENT TOOLBOX



Targeted grading



Inlet / curb /
pipe upgrades



Spot-elevation
improvements



Underground storage /
detention where feasible

Project Need and Proposed Approach

Address flooding, ponding and circulation disruption at the Canal Drive / Carolina Beach Avenue North, Carl Winner Drive and Harper Avenue intersections through targeted grading, inlet, curb, pipe and spot-elevation improvements. Where feasible, the concept may also include underground stormwater storage or detention in nearby Town-owned areas.

Location

Canal Drive intersections with Carolina Beach Avenue North, Carl Winner Drive and Harper Avenue.

Current Status

This concept was retained following Town and CAT review as a targeted intersection and drainage improvement strategy.

Source: RCCP vulnerability assessment; CAT input; Town staff review; CPE engineering review.

PATH TO IMPLEMENTATION

Recommended Next Step

Complete targeted survey and drainage analysis, identify one or more pilot locations and prepare concept alternatives and planning-level costs.

Timeline

1-2 years for feasibility and preliminary design; phased construction thereafter.

Relative Cost

\$\$ for feasibility/design; construction cost to be determined.

Lead and Partners	Town Stormwater Department with engineering support. Partners: Public Works, Planning, utility providers, affected property owners, NCDOT where applicable.
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Key Feasibility Considerations

Confirm drainage areas, roadway elevations, inlet and pipe capacity, groundwater elevation, utility conflicts, available public land, storage volume and discharge constraints.

Funding Path

No dedicated project funding is identified in this planning-level portfolio. Potential sources, subject to eligibility: Golden LEAF Flood Mitigation Program, Clean Water State Revolving Fund, FEMA mitigation programs, NCDEQ stormwater funding, State infrastructure grants and local stormwater/capital funds.

Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Rainfall flooding, tidal influence on drainage, roadway ponding and compound flooding.

Benefits: Reduced ponding and roadway closure risk, improved evacuation and emergency access and improved drainage performance at high-consequence intersections.

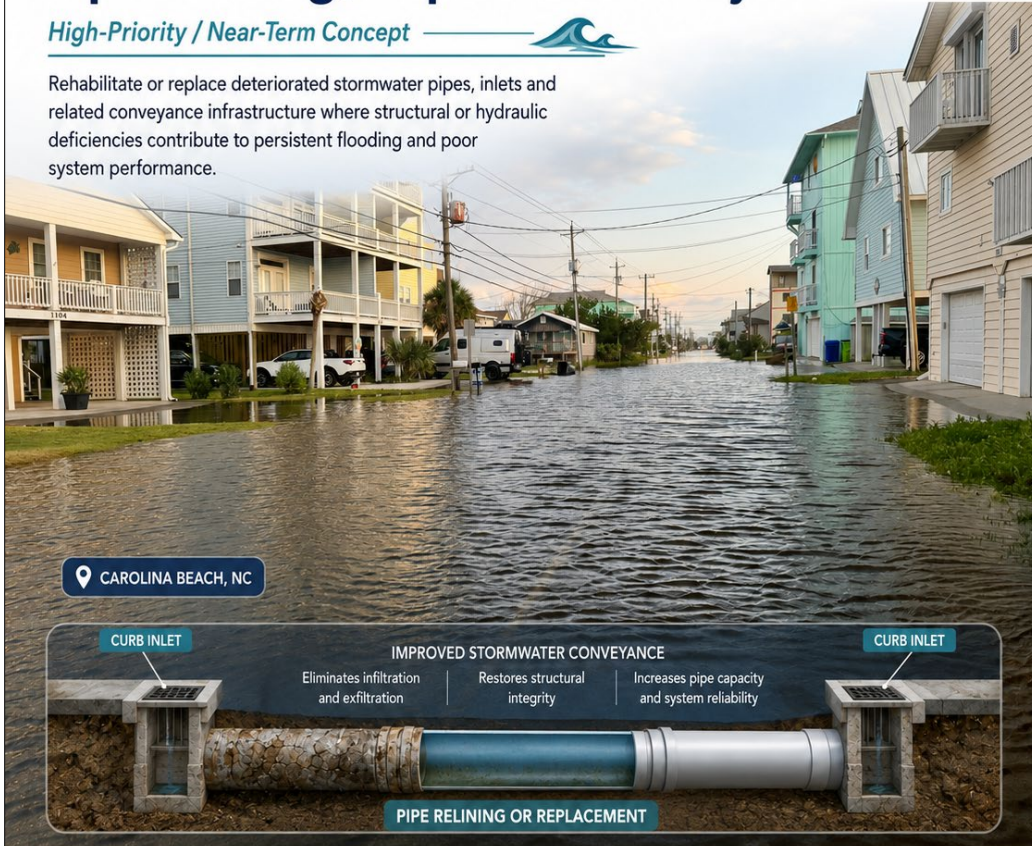
PROJECT 2 | Canal Drive Stormwater Pipe Relining / Replacement Project

High-Priority / Near-Term Concept

Canal Drive Stormwater Pipe Relining / Replacement Project

High-Priority / Near-Term Concept

Rehabilitate or replace deteriorated stormwater pipes, inlets and related conveyance infrastructure where structural or hydraulic deficiencies contribute to persistent flooding and poor system performance.



PROJECT BENEFITS



Reduces flooding and nuisance ponding



Restores system integrity and reliability



Improves drainage performance and conveyance



Cost-effective long-term solution



Protects homes, roadway and waterfront



Upgrading Canal Drive's aging stormwater infrastructure will reduce flooding, extend asset life, and enhance coastal community resilience.



Project Need and Proposed Approach

Rehabilitate or replace deteriorated stormwater pipes, inlets and related conveyance infrastructure where structural or hydraulic deficiencies contribute to persistent flooding and poor system performance. Although Canal Drive and Area F are the initial focus, the assessment and rehabilitation approach could be applied elsewhere in Town as additional stormwater infrastructure needs are identified.

Location

Canal Drive / North End stormwater network, including Area F of the Town's mapping program.

Current Status

The North End is located within the Town's Area F stormwater mapping area.

Source: Prior Canal Drive studies; RCCP vulnerability assessment; Town staff review; CPE engineering review.

PATH TO IMPLEMENTATION

Recommended Next Step	Complete the Area F mapping effort and Town review of the findings, then develop a prioritized rehabilitation plan and identify early-action segments for future capital or grant-funded improvements.
Timeline	Area F mapping and Town review first; 1-2 years for prioritization and design after the findings are available.
Relative Cost	\$\$-\$\$\$ depending on segment length and replacement method.
Lead and Partners	Town Stormwater Department and Public Works. Partners: Engineering consultant, utility providers, affected property owners, NCDEQ where applicable.

Key Feasibility Considerations

- Confirm completion of the Area F mapping effort and Town review of the findings
- Identify the types of abandoned, deficient, or otherwise problematic infrastructure present
- Determine where relining, replacement, disconnection or another repair is appropriate
- Account for the Town's limitations on public release of detailed infrastructure-location information.

Funding Path

Townwide stormwater mapping effort is ongoing. Potential sources, subject to eligibility: Local stormwater funds, Golden LEAF Flood Mitigation Program, Clean Water State Revolving Fund, FEMA mitigation funding and other State capital or infrastructure grants.

Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Rainfall flooding, tidal backflow interactions, reduced drainage capacity and infrastructure deterioration.

Benefits: Improved conveyance, reduced leakage and structural failure, better targeting of capital funds and improved performance of backflow controls.

PROJECT 3 | Canal Drive / Carolina Beach Avenue North Stormwater Capture and Detention Feasibility Concept

High-Priority / Near-Term Concept

Canal Drive / Carolina Beach Avenue North STORMWATER CAPTURE AND DETENTION FEASIBILITY CONCEPT



Project Need and Proposed Approach

Evaluate whether runoff moving south along Carolina Beach Avenue North and down side streets toward Canal Drive can be intercepted using French drains or similar collection features and redirected into underground detention chambers beneath Town-owned beach-side street ends. The chambers would temporarily store runoff and release it at a controlled rate following rainfall events.

Location

Selected side streets and Town-owned beach-side street ends along Carolina Beach Avenue North adjacent to the most flood-prone portions of Canal Drive.

Current Status

This concept replaces the earlier low-point pumping and dune-infiltration idea, which raised concerns related to tidal-water pumping, elevation differences, cost, maintenance and feasibility.

Source: Town field review; CPE engineering discussion; RCCP vulnerability assessment.

PATH TO IMPLEMENTATION

Recommended Next Step	Complete topographic survey, hydrologic/hydraulic analysis, subsurface investigation, utility review and conceptual alternatives for a pilot location.
Timeline	1-2 years for feasibility and preliminary design.
Relative Cost	\$ for feasibility; construction cost to be determined.
Lead and Partners	Town Stormwater Department with engineering support. Partners: Public Works, Planning, utility providers, NCDEQ, New Hanover County, affected property owners.

Key Feasibility Considerations

Confirm contributing drainage areas, runoff volumes, groundwater elevation, subsurface storage depth, utilities, pretreatment, sediment management, maintenance access, discharge rate, and suitable pilot locations.

Funding Path

No dedicated funding is currently identified for this feasibility concept. Potential sources, subject to eligibility: Golden LEAF Flood Mitigation Program, Clean Water State Revolving Fund, NCDEQ stormwater grants, FEMA mitigation programs and local stormwater funds.

Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Rainfall flooding, stormwater ponding and compound flooding along Canal Drive.

Benefits: Reduces runoff reaching Canal Drive, decreases ponding at vulnerable locations and creates a scalable phased approach.

PROJECT 4 | Florida Avenue / Canal Drive Nature-Based Tidal Flood Resilience Feasibility Concept

High-Priority / Near-Term Concept

FLORIDA AVENUE / CANAL DRIVE NATURE-BASED TIDAL RESILIENCE CONCEPT

Both Delaware Avenue street ends • Coordinate with Project 10 / Freeman Park



Conceptual illustration only. Evaluate northern street end and connected marsh jointly with Project 10. Final measures require survey, feasibility analysis and design.

Project Need and Proposed Approach

Evaluate nature-based and hybrid measures to reduce recurring tidal flooding in the Florida Avenue / northern Canal Drive area, including both Town-owned Delaware Avenue street ends at Florida Avenue and Virginia Avenue. Recent drainage improvements have addressed portions of the stormwater problem, but tidal flooding remains unresolved. Evaluate public right-of-way and shoreline areas and privately owned low-lying parcels where willing-owner participation or property control is possible. Potential measures include marsh preservation or enhancement, living shorelines, low vegetated berms and coordinated drainage improvements. Coordinate with Project 10 to evaluate the connected Freeman Park marsh system and develop feasible nature-based flood-mitigation and erosion-control measures.

Location

Florida Avenue / northern Canal Drive corridor, including both Town-owned Delaware Avenue street ends: the harbor-facing end at Florida Avenue and the marsh-facing end at Virginia Avenue connected to Freeman Park. Include other public locations and willing-owner parcels, including the vicinity of 107 Florida Avenue and 1007 Canal Drive.

Current Status	Recent Florida Avenue roadway and drainage improvements are complete, but tidal flooding remains a concern. The graphic shows the southern treatment concept and the northern street-end photo with potential tidal pathways to be verified during feasibility analysis.
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Source: CAT follow-up concepts; Town staff discussion; Canal Drive Flooding and Vulnerability Study; RCCP vulnerability assessment; CPE engineering review.

PATH TO IMPLEMENTATION

Recommended Next Step	Complete targeted survey and hydrologic/hydraulic feasibility analysis of both Delaware Avenue street ends and the connected neighborhood and marsh system. Coordinate with Project 10 to screen nature-based and hybrid alternatives and develop preferred concepts for further engineering and permitting, with property-control, cost and maintenance considerations.
Timeline	1-2 years for feasibility, survey and concept design; implementation timing would depend on property control, permitting and funding.
Relative Cost	\$-\$\$ for feasibility; implementation cost to be determined.
Lead and Partners	Town Stormwater Department and Planning with coastal / civil engineering support. Partners: NCDCM, NCDEQ, NC Coastal Federation, property owners, New Hanover County, conservation partners and utility/public works staff.

Key Feasibility Considerations

Confirm tidal-flow pathways, ground and roadway elevations, marsh and wetland limits, property ownership and right-of-way boundaries, bulkhead elevations and gaps, and permitting constraints. Evaluate the neighborhood and connected Freeman Park marsh system together. Determine whether berms, marsh enhancement, living shorelines or combined measures could reduce flooding without trapping rainfall or redirecting water onto adjacent properties.

Funding Path

No dedicated funding is currently identified. Potential sources, subject to eligibility: RCCP Phase 3/4, NFWF, NOAA, NCDEQ/DCM resilience grants, local funds and acquisition/conservation funding where property control is required. A combined Phase 3 study with Project 10 must advance a feasible nature-based solution toward implementation.

Preliminary Hazard, Benefit, and Implementation Assessment

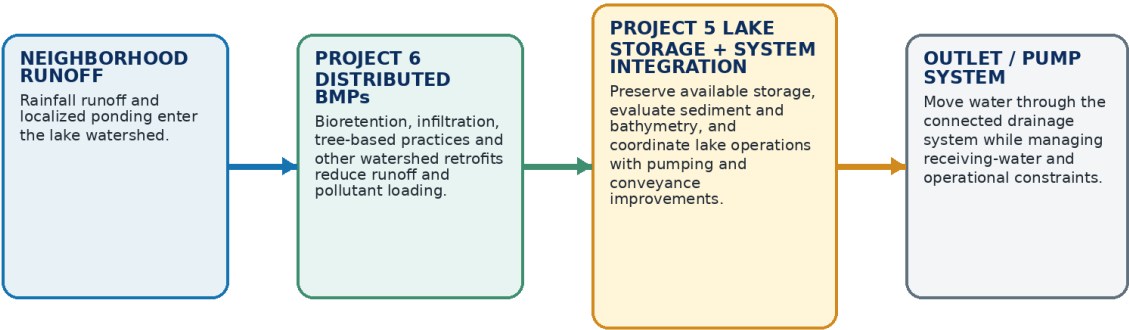
Hazards: Tidal flooding, sea-level rise, roadway flooding, shoreline vulnerability and compound flood conditions.

Benefits: Potential reduction in recurring tidal flooding, protection or enhancement of existing marsh, improved roadway access, habitat and water-quality co-benefits and a nature-based adaptation opportunity in a high-priority area.

PROJECT 5 | Carolina Beach Lake Storage and Stormwater System Integration Project

High-Priority / Near-Term Concept

CAROLINA BEACH LAKE - STORAGE AND WATERSHED RELATIONSHIP
Planning-level concept - not for design



The two projects are complementary: watershed BMPs reduce inflow; lake/system work preserves and manages storage.
Conceptual planning graphic; site-specific conditions and design require further study.

Project Need and Proposed Approach	Maintain and improve the stormwater function of Carolina Beach Lake through storage preservation, dredging as needed, improved hydraulic connections and coordination with surrounding drainage infrastructure. Develop dredging design, sediment management and disposal options, and associated permitting. Evaluate complementary nature-based measures, including floating treatment wetlands for water-quality improvement and other measures where space and site conditions permit. Coordinate with Project 6 to address runoff and pollutant loading from the surrounding watershed. Evaluate these measures for feasibility, maintenance requirements and compatibility with lake storage and pumping operations.
Location	Carolina Beach Lake and connected drainage and pumping infrastructure, including conveyance toward Henniker's Ditch.
Current Status	The Town has completed prior dredging and shoreline stabilization and is advancing additional stormwater-system improvements.

Source: Prior lake dredging and shoreline work; RCCP assessment; Town staff review; CPE engineering review.

PATH TO IMPLEMENTATION

Recommended Next Step	Review prior dredging plans, sediment testing, permits and available infrastructure information; complete updated bathymetry and any necessary sediment sampling; and establish appropriate dredging limits, depths and sediment management options. Prepare dredging and disposal design and coordinate agency review and permitting. Evaluate the feasibility of floating treatment wetlands and other complementary nature-based measures, accounting for lake storage, pumping, maintenance access and the funded force-main improvements.
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Timeline	1-3 years for investigation, design, permitting and phased implementation.
Relative Cost	\$\$\$-\$\$\$\$ depending on dredging volume and disposal requirements.
Lead and Partners	Town Stormwater Department and Public Works. Partners: Engineering consultant, NCDEQ, USACE if applicable, New Hanover County, disposal-site owners.

Key Feasibility Considerations

Confirm previous dredging limits and design elevations, available flood-storage capacity, sediment quantity and quality, construction access and suitable sediment reuse or disposal locations. Account for existing shoreline stabilization bags and limited perimeter space. Evaluate floating treatment wetlands for water-quality benefits, anchoring, fluctuating water levels, maintenance and compatibility with pumping and lake operations. Confirm whether other nature-based measures are feasible without reducing flood storage or obstructing drainage. Additional dredging depth should be evaluated against operating water levels and pumping capacity to determine the actual increase in usable flood storage.

Funding Path

The Carolina Beach Lake Pump Force main project is funded, designed and bid. Potential sources, subject to eligibility: Local stormwater funds, Clean Water State Revolving Fund, Golden LEAF, FEMA mitigation programs, NCDEQ grants, State capital funds.

Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Rainfall flooding, stormwater surcharge, elevated groundwater and lake capacity limitations.

Benefits: Restored flood-storage capacity, improved pumping and conveyance, reduced rainfall flooding and improved long-term lake performance.

PROJECT 6 | Carolina Beach Lake Watershed BMP Retrofit Project

High-Priority / Near-Term Concept



Carolina Beach Lake Watershed BMP Retrofit Project

High-Priority / Near-Term Concept



NATURE-BASED SOLUTIONS



CLEANER WATER



HEALTHIER NEIGHBORHOODS



RESILIENT COASTAL COMMUNITY



PROJECT OVERVIEW

Implement a phased package of distributed green infrastructure and watershed retrofit measures in neighborhoods draining to Carolina Beach Lake, including bioretention, swales, pretreatment, infiltration practices and related stormwater controls.



Location / Geographic Focus: Neighborhoods and drainage subareas contributing runoff to Carolina Beach Lake.

PROJECT BENEFITS



Improves water quality in Carolina Beach Lake



Reduces flooding and localized stormwater impacts



Enhances neighborhood resilience and livability



Supports habitat and natural systems



EXISTING CONDITIONS



Shoreline park and open space around Carolina Beach Lake



Stormwater outfall and rock-lined channel conditions



Lake-edge greenspace provides opportunities for green retrofits



Outfall discharge points that can benefit from pretreatment



Neighborhood streets where distributed BMPs can be installed



PHASED, DISTRIBUTED APPROACH

A phased strategy prioritizes high-impact neighborhoods and drainage subareas to deliver cost-effective, nature-based improvements that protect water quality, enhance resilience, and sustain Carolina Beach Lake for future generations.



PLAN & PRIORITIZE



IMPLEMENT BMPs



MONITOR & ADAPT

Project Need and Proposed Approach

Implement a phased package of distributed green infrastructure and watershed retrofit measures in neighborhoods draining to Carolina Beach Lake, including bioretention, vegetated swales, rain gardens, pretreatment, infiltration practices where suitable, and related stormwater controls. Coordinate with Project 5 to identify feasible locations that reduce runoff and pollutant loading before water reaches the lake and complement lake dredging, storage and potential floating treatment wetlands.

Location

Neighborhoods and drainage subareas contributing runoff to Carolina Beach Lake.

Current Status

The Town has already implemented stormwater education and maintenance programs and has completed substantial lake improvements. Potential conservation of freshwater wetland properties surrounding and south of the lake is addressed separately under Project 14, where acquisition or conservation could preserve natural flood-storage and resilience functions.

Source: Nine Elements Watershed Restoration Plan; RCCP vulnerability assessment; Town staff review; CAT project team input.

PATH TO IMPLEMENTATION

Recommended Next Step	Prepare a watershed retrofit prioritization map using available drainage information, public property and right-of-way locations, and planned infrastructure work. Confirm site suitability, available space, groundwater conditions and maintenance responsibilities, then advance one or more feasible nature-based demonstration projects for design and permitting. Coordinate project selection with the lake improvements evaluated under Project 5.
Timeline	1-3 years for prioritization and pilot implementation; ongoing phased program thereafter.
Relative Cost	\$-\$\$\$ per small project; cumulative program cost varies by number and scale of retrofits.
Lead and Partners	Town Stormwater Department and Planning. Partners: NCDEQ, Cape Fear River Watch or watershed partners, New Hanover County, property owners, schools or civic organizations.

Key Feasibility Considerations

Identify priority sub catchments, available public right-of-way, groundwater constraints, maintenance responsibilities, pollutant hotspots and opportunities to coordinate with planned street or utility work.

Funding Path

No dedicated funding is currently identified for the remaining watershed retrofit program. Potential sources, subject to eligibility: RCCP Phase 3/4 for eligible nature-based planning/design/implementation, EPA 319, Clean Water State Revolving Fund, NCDEQ stormwater grants, NFWF/NOAA resilience programs and local stormwater funds.

Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Rainfall flooding, ponding, pollutant loading, bacterial impairment and watershed contribution to lake flooding.

Benefits: Reduced runoff and pollutant loading, improved lake performance, visible neighborhood benefits and scalable implementation.

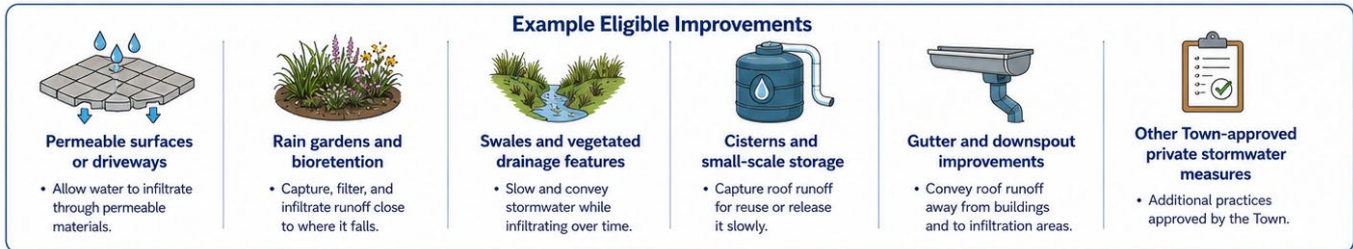
PROJECT 7 | Private Stormwater Improvement / Incentive Concept

High-Priority / Near-Term Concept

Private Stormwater Improvement / Incentive Concept

High-Priority / Near-Term Concept

Illustrative property-scale improvements for flood-prone residential areas in Carolina Beach.



Illustrative examples only. Specific improvements would be voluntary and subject to Town guidance and site suitability.

Project Need and Proposed Approach	Create a voluntary program that encourages property owners to install Town-approved measures that reduce runoff entering the public stormwater system. Eligible practices could include permeable surfaces, cisterns, gutters, small-scale storage, rain gardens, swales, or other approved improvements.
Location	Town-wide, with initial focus on flood-prone drainage areas and neighborhoods contributing runoff to constrained public systems.
Current Status	The Town already requires stormwater and drainage review for development and redevelopment and conducts stormwater education as a Phase II community.

Source: Nine Elements Watershed Restoration Plan; Town stormwater program; CPE engineering recommendation; RCCP process.

PATH TO IMPLEMENTATION

Recommended Next Step	Complete a program feasibility and rate-policy review, then develop a pilot incentive or rebate program.
Timeline	1-2 years for program design and pilot launch.

Relative Cost	Staff time plus pilot incentives; annual program cost to be determined.
Lead and Partners	Town Stormwater Department, Finance and Planning. Partners: Property owners, local contractors, NC Cooperative Extension, NCDEQ, community organizations.

Key Feasibility Considerations

Define eligible practices, design standards, inspection requirements, credit value, administrative process, legal authority, funding source and methods to verify performance over time.

Funding Path

No dedicated funding is currently identified for a private-property incentive program. Potential sources, subject to eligibility: Local stormwater utility revenue, NCDEQ outreach grants, EPA 319, Clean Water State Revolving Fund, foundation grants.

Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Rainfall flooding, private runoff contributions, stormwater system loading and water-quality impacts.

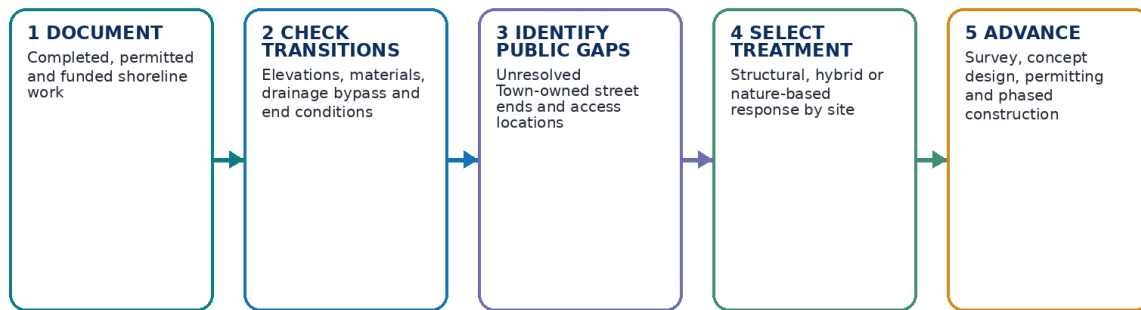
Benefits: Reduces runoff at its source, expands community participation, lessens strain on public infrastructure and supports water quality.

PROJECT 8 | Targeted Canal Drive / Harbor Public Shoreline and Bulkhead Resilience Project

Strategic / Phased Concept

PUBLIC SHORELINE RESILIENCE - RESIDUAL GAP APPROACH

Planning-level concept - not for design



Use confirmed Town records and public shoreline locations; do not infer private-property commitments.

Conceptual planning graphic; site-specific conditions and design require further study.

Project Need and Proposed Approach	Address remaining shoreline, bulkhead and transition issues at Town-owned street ends and other public shoreline locations along Canal Drive / Florida Avenue and in the harbor / marina district where tidal overtopping, erosion, shoreline instability, drainage bypass, or access issues affect public infrastructure.
Location	Remaining unresolved Town-owned shoreline segments, public street ends and public access areas along Canal Drive / Florida Avenue and the harbor / marina district.
Current Status	The Town has completed public bulkhead improvements at Sandpiper, Starfish, Scotch Bonnet, Sailfish, Seagull, Scallop and Dolphin. This concept is limited to unresolved Town-owned shoreline gaps and transition points; it is not a corridor-wide bulkhead program and does not propose improvements on private property

Source: Canal Drive Flooding and Vulnerability Study; Town staff review; CAT and CPE engineering input.

PATH TO IMPLEMENTATION

Recommended Next Step	Complete a public-shoreline residual gap inventory using the confirmed completed and fall-2026 bulkhead locations and prioritize a small number of unresolved Town-owned locations for survey and concept design.
Timeline	1-3 years for gap assessment and design; phased construction thereafter.
Relative Cost	\$\$-\$\$\$\$ depending on location and structure type.
Lead and Partners	Town Stormwater/Public Works with Planning and engineering support. Partners: NCDCM/DCM, USACE, utility providers, engineering consultant and adjacent property owners where coordination is needed.

Key Feasibility Considerations

- Use the confirmed inventory of completed and permitted Town bulkhead locations to identify remaining public gaps and transition elevations
- Confirm design elevations, utilities, habitat impacts, maintenance responsibilities, and whether nature-based or hybrid treatments are feasible at remaining public shoreline locations. Evaluate Delaware Avenue separately as a potential integrated public shoreline, access, and stormwater opportunity.

Funding Path

The Town has completed seven public bulkhead improvements and permitted improvements at Oystershell, Seahorse and Clamshell are expected to begin in fall 2026. Potential sources, subject to eligibility: Local capital/stormwater funds, FEMA mitigation programs, State shoreline/resilience grants and nature-based grant programs where an eligible hybrid or natural shoreline component is incorporated.

Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Tidal flooding, shoreline erosion, overtopping, drainage bypass and sea-level-rise exposure.

Benefits: Reduced overtopping and erosion, improved continuity between shoreline structures, protection of public access and infrastructure and better drainage performance.

PROJECT 9 | Marina Stormwater / Pollution Control BMP Project**Strategic / Phased Concept****HARBOR / MARINA STORMWATER BMP TOOLBOX**

Planning-level concept - not for design

PRETREATMENT

Catch-basin inserts, hydrodynamic separators and gross-solids capture

SEDIMENT CONTROL

Targeted traps, maintenance access and source-area housekeeping

INFILTRATION

Bioretention or permeable practices where soils, groundwater and space allow

OPERATIONS

Spill prevention, vessel-service practices, inspection and routine maintenance

Select BMPs after confirming pollutant sources, drainage pathways, tidal interaction and maintenance responsibility.

Conceptual planning graphic; site-specific conditions and design require further study.

Project Need and Proposed Approach	Build on existing harbor and marina stormwater controls through additional pretreatment, sediment capture, infiltration, spill prevention and operational best management practices.
Location	Harbor / marina district, waterfront parking areas, street drainage and discharge points entering the Yacht Basin or Myrtle Grove Sound.
Current Status	The Town has incorporated infiltration into a newly paved parking lot and is installing additional sediment traps.

Source: Water Use and Harbor Management Plan; Nine Elements Watershed Restoration Plan; Town staff review; RCCP process.**PATH TO IMPLEMENTATION**

Recommended Next Step	Complete a harbor stormwater audit and identify priority BMP retrofits and operational practices.
Timeline	1-3 years for audit and phased improvements.
Relative Cost	\$-\$\$\$ depending on number and scale of BMPs.
Lead and Partners	Town Stormwater Department, Harbor/Marina management and Public Works. Partners: NCDEQ, marina operators, commercial users, NC Coastal Federation, watershed organizations.

Key Feasibility Considerations

Identify pollutant sources, drainage pathways, maintenance needs, vessel-operation concerns, available public space and opportunities to coordinate with planned waterfront improvements.

Funding Path

The Town has already completed or is advancing some marina stormwater improvements. Potential sources, subject to eligibility: EPA 319, Clean Water State Revolving Fund, NCDEQ grants, local stormwater funds, NOAA/NFWF coastal grants and RCCP only for eligible nature-based or hybrid BMP components.

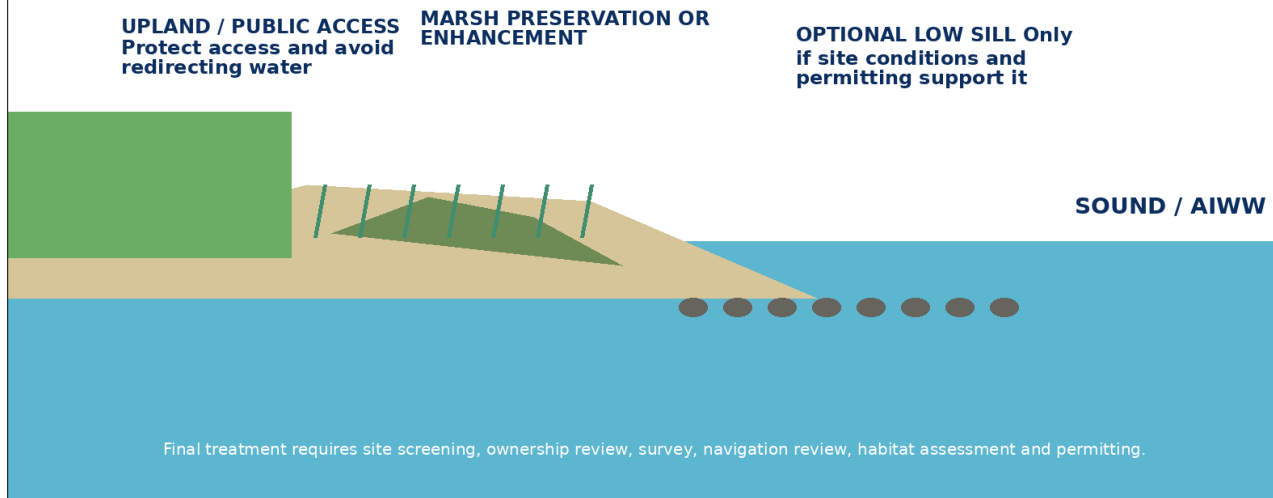
Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Stormwater runoff, sediment transport, bacterial and pollutant loading and tidal interaction with drainage.

Benefits: Reduced sediment and pollutant discharge, improved water quality, support for recreation and shellfish waters and enhanced public waterfront conditions.

PROJECT 10 | Freeman Park / Sound-Side Shoreline Resilience Concept**Strategic / Phased Concept****FREEMAN PARK - CONCEPTUAL SOUND-SIDE SHORELINE OPTIONS**

Planning-level concept - not for design

*Conceptual planning graphic; site-specific conditions and design require further study.*

Project Need and Proposed Approach	Evaluate nature-based and hybrid measures along Freeman Park's sound-side shoreline and the connected marsh extending south toward Virginia Avenue and the northern Delaware Avenue street end. Coordinate with Project 4 to evaluate tidal flooding, drainage, erosion and wave exposure across the connected marsh and North End neighborhood. Potential measures include marsh preservation or enhancement, living shorelines, stabilization of vulnerable dredge-spoil island edges, and vegetated berms where feasible. The analysis would identify measures that protect habitat and reduce flood or erosion impacts without increasing flooding on adjacent properties.
Location	Freeman Park's Intracoastal Waterway / sound-side shoreline, adjacent dredge-spoil islands and connected marsh extending south to Virginia Avenue and the Town-owned northern Delaware Avenue street end. Coordinate with Project 4's evaluation of both Delaware Avenue street ends and the Florida Avenue / northern Canal Drive neighborhood.
Current Status	Town staff and the project team identified the AIWW side of Freeman Park as one of the Town's stronger opportunities for a nature-based shoreline project because the property is publicly controlled, relatively undeveloped and subject to shoreline erosion, tidal conditions and vessel-wake impacts.

Source: Town staff review; CPE coastal review; examples from NC Coastal Federation projects; RCCP process.

PATH TO IMPLEMENTATION

Recommended Next Step	Coordinate with Project 4 and Freeman Park planning to complete targeted survey, shoreline and marsh assessment, and hydrodynamic and wave analysis of the connected system. Identify flood pathways and vulnerable shoreline areas, test feasible nature-based and hybrid alternatives, and advance preferred measures toward preliminary design and permitting. Evaluate effects on neighborhood flooding, rainfall drainage, habitat and adjacent properties.
Timeline	1-3 years for site screening and concept design.
Relative Cost	\$ for feasibility; \$\$-\$\$\$ for pilot construction depending on scale.
Lead and Partners	Town Planning/Parks with coastal engineering support. Partners: NC Coastal Federation, NCDCM, USACE, NCDEQ, local conservation partners.

Key Feasibility Considerations

- Screen shoreline condition, fetch and wave energy, bathymetry, wetland and habitat constraints, navigation, public access, ownership, permitting and compatibility with land-management plans.
- Evaluate connections between the marsh and neighborhood drainage, including the northern Delaware Avenue street end at Virginia Avenue, and confirm that proposed measures would not trap rainfall or redirect flooding onto adjacent properties.

Funding Path

Freeman Park land-management planning is underway. Together, Projects 4 and 10 offer a strong fit for RCCP Phase 3 funding by evaluating the connected North End neighborhood and Freeman Park marsh system and advancing feasible nature-based measures toward design, permitting and implementation. Other potential funding sources and partnerships, subject to eligibility, include NFWF, NOAA, NCDEQ/DCM, NC Coastal Federation partnerships, USACE programs and local funds. RCCP Phase 4 may support subsequent implementation of eligible measures. Funding remains subject to program requirements and competitive review.

Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Shoreline erosion, habitat loss, wave exposure, sea-level rise and localized access vulnerability.

Benefits: Erosion reduction, habitat enhancement, demonstration value, public education and adaptation experience transferable to other sound-side areas.

PROJECT 11 | Boardwalk / Public Beach Access Resilience Project

Strategic / Phased Concept

PUBLIC BEACH ACCESS RESILIENCE - CONCEPTUAL SECTION

Planning-level concept - not for design



Conceptual planning graphic; site-specific conditions and design require further study.

Project Need and Proposed Approach	Improve the resilience of public beach access structures, dune crossovers and related facilities in areas subject to storm surge, erosion, overwash and repeated maintenance needs.
Location	Boardwalk area and selected public oceanfront beach access points.
Current Status	The Town continues to coordinate with USACE and is replacing traditional wooden dune crossovers with Mobi-Mats where appropriate. Future work under this concept should focus only on unresolved needs beyond improvements already underway

Source: RCCP assessment; Town staff review; Beach Management Plan and USACE coordination.

PATH TO IMPLEMENTATION

Recommended Next Step	Prepare an access vulnerability inventory and integrate priority retrofits into the Beach Management Plan and capital program.
Timeline	1-5 years depending on location and coordination.
Relative Cost	\$-\$ per access location; larger boardwalk work may be \$\$\$\$.
Lead and Partners	Town Public Works, Parks/Recreation and Planning. Partners: USACE, NCDWM, accessibility partners, tourism organizations.

Key Feasibility Considerations

Identify unresolved high-maintenance or high-risk access points, confirm dune impacts, ADA needs, design standards, utilities, permitting and consistency with federal/state beach projects.

Funding Path

Beach-management and access planning are ongoing Town activities. Potential sources, subject to eligibility: DCM Public Beach and Coastal Waterfront Access grants, FEMA mitigation funding, USACE coordination, local occupancy tax or capital funds.

Preliminary Hazard, Benefit, and Implementation Assessment

Hazards: Storm surge, overwash, erosion, sea-level rise, wave impacts and wind exposure.

Benefits: Maintains safe public access, reduces storm preparation and repair needs, supports dune continuity and improves accessibility.

PROJECT 12 | Yacht Basin Tidal Barrier Feasibility / Concept Design Project

Feasibility, Programmatic and Long-Term Concept

PROJECT 12 – YACHT BASIN TIDAL BARRIER FEASIBILITY / CONCEPT DESIGN PROJECT

Feasibility, Programmatic and Long-Term Concept



Project Need and Proposed Approach

Explore whether a movable or otherwise controlled tidal barrier at the Yacht Basin entrance could reduce chronic saltwater flooding and tidal inflow into the Canal Drive drainage system while maintaining navigation and water quality.

Location

Entrance to the Carolina Beach Yacht Basin and connected Canal Drive drainage area.

Current Status

Town and engineering review indicated that this concept may be costly, operationally complex, environmentally sensitive and unlikely to be a near-term priority.

Source: Prior flood-resilience study concepts; RCCP screening; Town and CPE engineering review.

PATH TO IMPLEMENTATION

Recommended Next Step	Conduct only a high-level fatal-flaw and economic screening before committing to a full feasibility study.
Timeline	2-5 years for initial screening and feasibility; longer for design, permitting and implementation if advanced.
Relative Cost	\$\$ for initial screening; \$\$\$\$ for detailed study/design and potential implementation.

Lead and Partners

Town Manager/Planning with coastal engineering support. Partners: USACE, NCDCM, NCDEQ, Coast Guard, marina users, property owners.

Key Feasibility Considerations

Evaluate preliminary economic viability, navigation, flushing and water quality, environmental impacts, ownership, operations, failure modes, storm surge, sedimentation, permitting and alternative strategies.

Funding Path

No dedicated funding is currently identified for tidal-barrier feasibility or concept design. Potential sources, subject to eligibility: USACE planning assistance, FEMA mitigation/planning programs, NOAA/NFWF where applicable, State planning funds and local funds.

Benefits and Preliminary Assessment

Hazards: Chronic tidal flooding, sea-level rise, saltwater inflow and compound flooding.

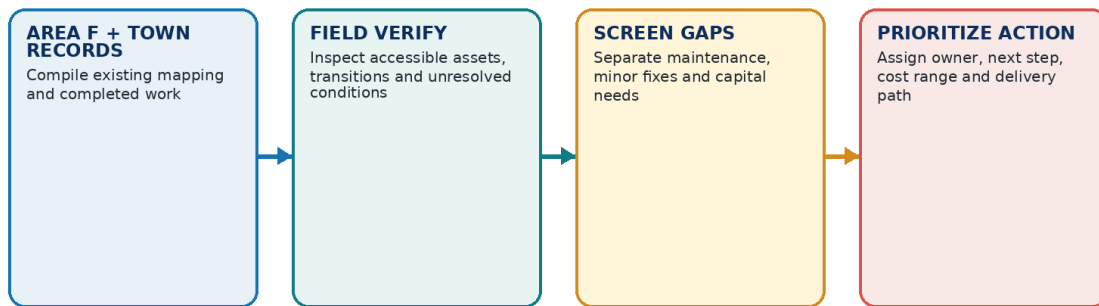
Benefits: Potential reduction in tidal inflow and chronic flooding if technically, environmentally and economically feasible.

PROJECT 13 | Yacht Basin / Canal Drive Residual Infrastructure Gap Assessment

Feasibility, Programmatic and Long-Term Concept

RESIDUAL INFRASTRUCTURE GAP ASSESSMENT

Planning-level concept - not for design



Public-facing products should remain generalized where detailed infrastructure-location information is sensitive.

Conceptual planning graphic; site-specific conditions and design require further study.

Project Need and Proposed Approach	Identify unresolved infrastructure gaps remaining after ongoing Town bulkhead, outfall, backflow and drainage improvements. The assessment would focus on abandoned outfalls, remaining pipe deficiencies, bulkhead transitions and other localized pathways that may continue to permit flooding, leakage, erosion, or drainage bypass.
Location	Yacht Basin shoreline, Canal Drive / Florida Avenue, street ends and connected drainage infrastructure.
Current Status	Much of the originally proposed bulkhead and outfall work has been completed or programmed.

Source: Canal Drive Flooding and Vulnerability Study; Town field review; CPE engineering observations.

PATH TO IMPLEMENTATION

Recommended Next Step	Combine the assessment with completion and Town review of the Area F stormwater mapping and prepare a concise residual-gap action list based on generalized findings and remaining public shoreline needs.
Timeline	1-2 years.
Relative Cost	\$\$-\$\$\$ depending on survey, inspection and subsurface investigation needs.
Lead and Partners	Town Stormwater Department/Public Works. Partners: Engineering consultant, property owners, utility providers, NCDEQ/DCM.

Key Feasibility Considerations

Confirm whether older pipes remain connected, inspect abandoned outfalls, document bulkhead transition elevations, integrate stormwater mapping and identify residual maintenance or capital needs.

Funding Path

Area F stormwater mapping is ongoing. Potential sources, subject to eligibility: Local stormwater funds, Golden LEAF Flood Mitigation Program, Clean Water State Revolving Fund and other State infrastructure or asset-management grants.

Benefits and Preliminary Assessment

Hazards: Residual tidal flooding, drainage-system leakage, shoreline overtopping and infrastructure deterioration.

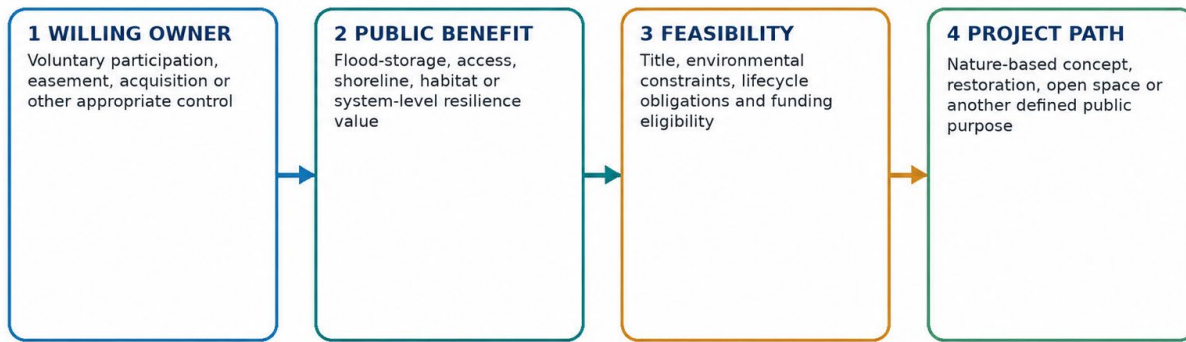
Benefits: Closes remaining flood pathways, improves confidence in completed investments and supports efficient maintenance and capital planning.

PROJECT 14 | Targeted Property Acquisition / Transition and Nature-Based Resilience Concept

Feasibility, Programmatic and Long-Term Concept

VOLUNTARY PROPERTY-TRANSITION SCREENING

Planning-level concept - not for design



Screening framework only—not an acquisition map or commitment for any specific parcel.

Conceptual planning graphic; site-specific conditions and design require further study.

Project Need and Proposed Approach	Evaluate voluntary acquisition, conservation easement, or property-transition opportunities in selected low-lying or repeatedly flood-prone areas where public control could support a defined resilience purpose. Potential post-acquisition uses could include protection or enhancement of marsh and wetlands, stormwater or tidal-flood storage, living shoreline or shoreline restoration, public open space, drainage access, or other nature-based flood-management functions.
Location	Potential screening areas include the privately owned low-lying marsh parcels at 107 Florida Avenue and 1007 Canal Drive and selected freshwater wetland properties surrounding and south of Carolina Beach Lake, where conservation could preserve natural flood-storage and resilience functions.
Current Status	No formal buy-out or acquisition program has been established through this effort.

Source: CAT discussion and follow-up; Town staff discussion; RCCP VA; CPE review; Inspire property-transition discussion.

PATH TO IMPLEMENTATION

Recommended Next Step	Establish screening criteria and evaluate a small number of candidate parcels for resilience benefit and acquisition feasibility. Pursuing owner engagement only after Town policy direction and a viable acquisition funding source are identified.
Timeline	2-5 years depending on property-owner interest, funding cycles and the associated nature-based project.

Relative Cost	\$\$-\$\$\$\$ for acquisition depending on parcel value; separate nature-based project costs would vary.
Lead and Partners	Town Manager, Planning, Finance and Stormwater/Public Works, with legal and technical support. Partners: Property owners, NCDCM, NC Emergency Management/FEMA where eligible, New Hanover County, land trusts/conservation partners, NC Coastal Federation and grant agencies.

Key Feasibility Considerations

Confirm willing ownership, parcel value, acquisition or easement eligibility, environmental conditions, intended public resilience use, long-term maintenance, funding sources, legal restrictions, equity implications, and whether acquisition would materially advance a defined flood-resilience project.

Funding Path

No formal acquisition program or dedicated acquisition funding has been established through this effort. Potential sources, subject to eligibility: Property acquisition would require non-RCCP sources such as FEMA/State acquisition programs where eligible, conservation funding, CAMA/local acquisition funds, or local funds. RCCP Phase 3/4 may be considered separately for eligible nature-based planning/design/implementation after public control is established.

Benefits and Preliminary Assessment

Hazards: Chronic tidal and/or rainfall flooding, sea-level rise, wetland vulnerability, shoreline exposure and long-term land-use risk.

Benefits: Permanent reduction of future exposure, preservation or enhancement of natural flood-storage functions, creation of space for nature-based resilience improvements and avoidance of development that could worsen flooding.

PLANNING AND POLICY TOOLKIT

Projects 15-19 are planning, zoning, regulatory and funding tools developed to complement the physical resilience portfolio. They do not require the same multi-page engineering format as the capital and feasibility concepts. The following one-page action cards focus on the policy decision, implementation path and principal considerations.

FIVE COORDINATED POLICY TOOLS

15		PROTECT CRITICAL ASSETS	Keep essential facilities out of future flood-risk areas.
16		REQUIRE HIGHER FREEBOARD	Increase elevation standards to reduce future flood damage and disruption.
17		PROTECT WETLANDS	Limit fill and preserve flood-storage, water-quality, and habitat functions.
18		ADDRESS NONCONFORMITIES	Support resilient repair, adaptation, and redevelopment.
19		FUND LOCAL RESILIENCE	Use municipal service districts to fund localized resilience improvements.

Common Implementation Sequence

1. Confirm Direction	Town staff and elected officials confirm the intended policy objective and scope.
2. Technical Review	Planning, legal, floodplain, finance and other specialists test feasibility and consistency.
3. Draft	Prepare ordinance language, administrative procedures, mapping or financial scenarios.
4. Engage	Conduct the required public, stakeholder, board and elected-official review.
5. Implement	Adopt, administer, monitor and periodically update the tool.

Policy language in this portfolio is conceptual and should not be interpreted as final ordinance text or legal advice.

PROJECT 15 | Restrict Critical Assets from Locating in Flood-Prone Areas

Planning, Zoning and Regulatory Concept

PROJECT 15 - Restrict Critical Assets from Locating in Flood-Prone Areas

Planning, Zoning and Regulatory Concept

PLANNING AND ZONING TOOLKIT

- 1 Restrict Critical Assets in Flood-Prone Areas
- 2 Higher Freeboard Requirement
- 3 Restrict Filling of Wetlands
- 4 Review and Revise Nonconformities
- 5 Municipal Service Districts

Regulatory Approach



Update UDO Section 3.4 (Table of Uses).



Restrict or apply higher regulatory standards to selected critical public, institutional, safety, care, and educational uses within the 0.2% annual chance / 500-year floodplain.



Targeted uses include healthcare and care facilities, schools, libraries, clinics, post offices, public pools, and municipal fire, police, rescue, and utility operations.



Where It Applies



Risk Avoidance

Keep critical functions out of future flood risk.



Continuity of Essential Services

Improve reliability during flood events.



Land-Use Resilience

Guide long-term redevelopment to safer locations.



Policy Consistency

Align zoning with hazard and resilience planning.



Primary Hazards Addressed

Flooding, sea-level rise, and vulnerability of critical assets.



Examples / Precedent

Inspired by planning analysis and examples from Wrightsville Beach and Topsail Beach.



Strengthening regulatory standards today reduces future flood risk, protects essential community services, and builds a more resilient coastal community.

Policy Action

Update UDO Section 3.4 (Table of Uses) to restrict or apply higher regulatory standards to selected critical public, institutional, safety, care and educational uses within the 0.2% annual chance / 500-year floodplain. Targeted uses include healthcare facilities, childcare facilities, schools, libraries, medical clinics, post offices, municipal fire, police, and rescue operations.

Where It Applies

Town-wide regulatory application within the Shaded X / 500-year floodplain.

Recommended Next Step

Planning and legal review followed by draft UDO amendments and public process.

Lead / Timeline / Cost

Town Planning Department with legal counsel. Short term: approximately 1 year. Staff time.

Key Benefit

Avoids creation of new high-consequence vulnerabilities and improves long-term continuity of public services.

PROJECT 16 | Higher Freeboard Requirement

Planning, Zoning and Regulatory Concept



RAISE. PROTECT. ADAPT.

Increasing the freeboard requirement to 3 feet above Base Flood Elevation (BFE) builds resilience, reduces flood damage, and prepares Carolina Beach for rising seas and stronger storms.



HOW IT WORKS

Freeboard is the additional height above the Base Flood Elevation (BFE). Raising the required freeboard from 2 ft to 3 ft provides an extra foot of protection for new construction and substantial improvements.

APPLIES TO



New Construction



Substantial Improvements



Shaded X / 500-Year Floodplain
Special Flood Hazard Areas

EXAMPLE APPLICATIONS IN CAROLINA BEACH



Living floor set at least 3 ft above BFE.



Raised to meet 3 ft freeboard standard.



Garages and accessory structures also raised.



Applies to all new and substantially improved structures town-wide.



Policy Solution: Flood-damage ordinance and UDO amendment

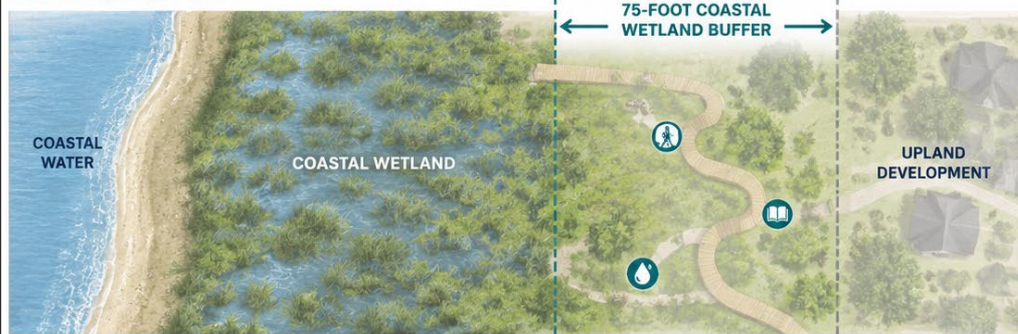
Supports resilience, reduces future exposure, and protects our community.

Policy Action	Increase the Town's freeboard requirement from 2 feet to 3 feet above Base Flood Elevation and amend UDO height exceptions to provide a corresponding structural-height allowance. Extend elevation standards into the Shaded X / 500-year floodplain for new construction and substantial improvements.
Where It Applies	Town-wide, with specific application in Special Flood Hazard Areas and the 500-year floodplain.
Recommended Next Step	Prepare ordinance alternatives and conduct stakeholder and public review.
Lead / Timeline / Cost	Town Planning, Inspections and Floodplain Administration. Short to moderate term, coordinated with flood-map reassessment. Staff time and limited consultant/legal support.
Key Benefit	Reduces future flood damage, supports adaptation to sea-level rise and avoids penalizing property owners for resilient elevation.

PROJECT 17 | Restrict the Filling of Wetlands

Planning, Zoning and Regulatory Concept

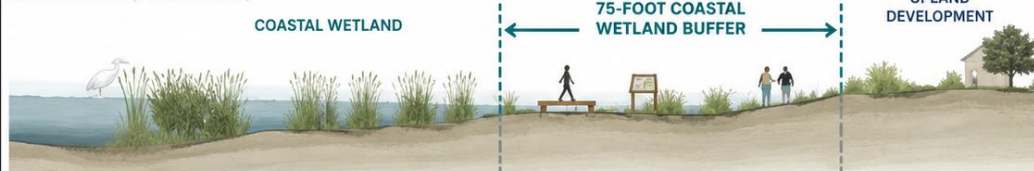
PLAN VIEW (CONCEPTUAL)



POLICY GOALS

-  Protect wetland function
-  Reduce encroachment
-  Clarify allowable uses
-  Strengthen resilience

SECTION VIEW (CONCEPTUAL)



LIMITED ALLOWABLE ACTIVITIES



Activities are limited to protect wetland function and natural habitat.

PROHIBITED ACTIVITIES



These activities are not permitted within wetlands or the 75-foot coastal wetland buffer.

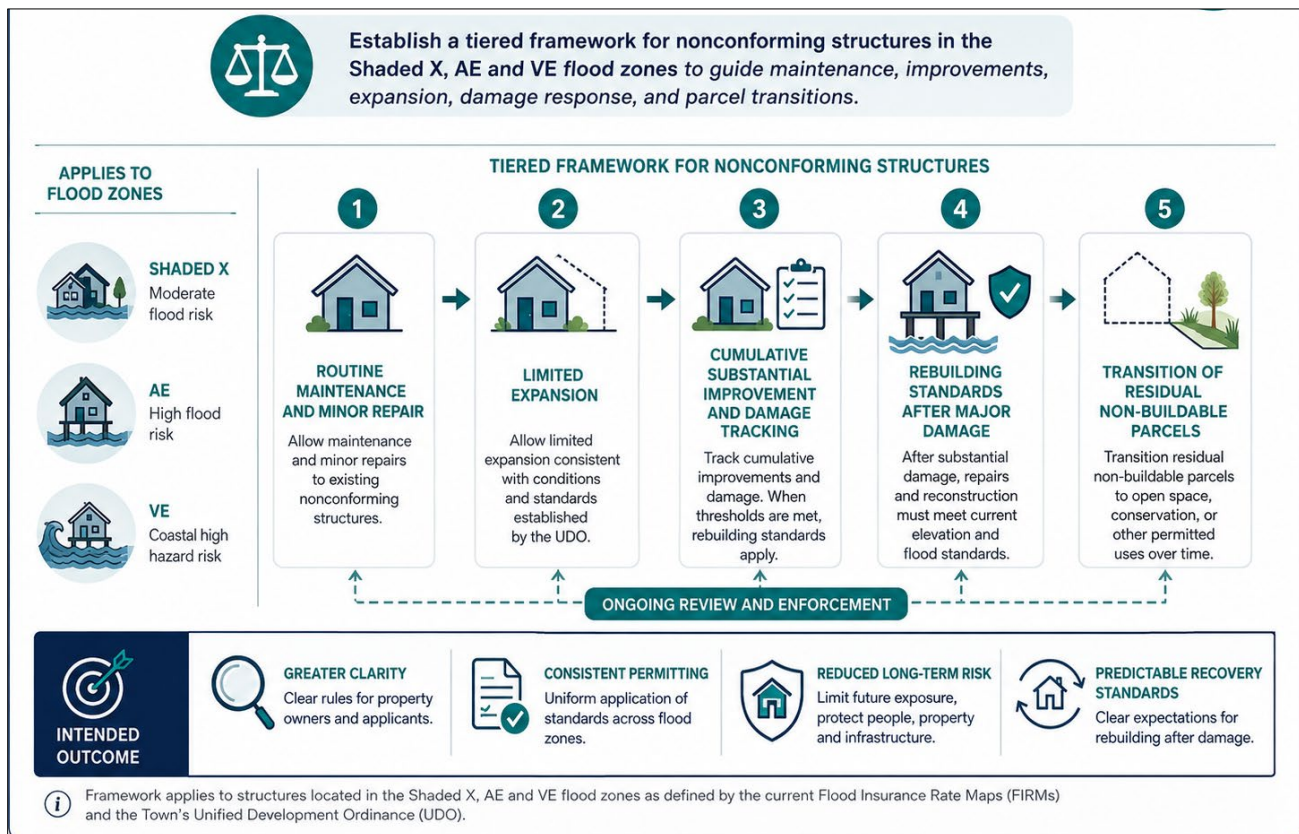


Revise the UDO to more clearly restrict filling, grading, excavation and development in coastal, non-coastal and jurisdictional wetlands; establish a 75-foot buffer around coastal wetlands; and define limited allowable public access, pathway, boardwalk, stormwater, educational and research activities.

Policy Action	Revise the UDO to more clearly restrict filling, grading, excavation, and development in coastal, non-coastal, and jurisdictional wetlands; establish a 75-foot buffer around coastal wetlands; and define limited allowable activities such as public access points, pathways, boardwalks, and certain stormwater or educational uses.
Where It Applies	Town-wide wetlands and proposed coastal wetland buffers.
Recommended Next Step	Complete legal and planning review, develop mapped and text alternatives and conduct public process.
Lead / Timeline / Cost	Town Planning and Stormwater Departments. Short to moderate term. Staff time and legal/planning support.
Key Benefit	Preserves natural storage and ecological function, reduces fill-related flood displacement and protects water quality.

PROJECT 18 | Review and Revise Nonconformities

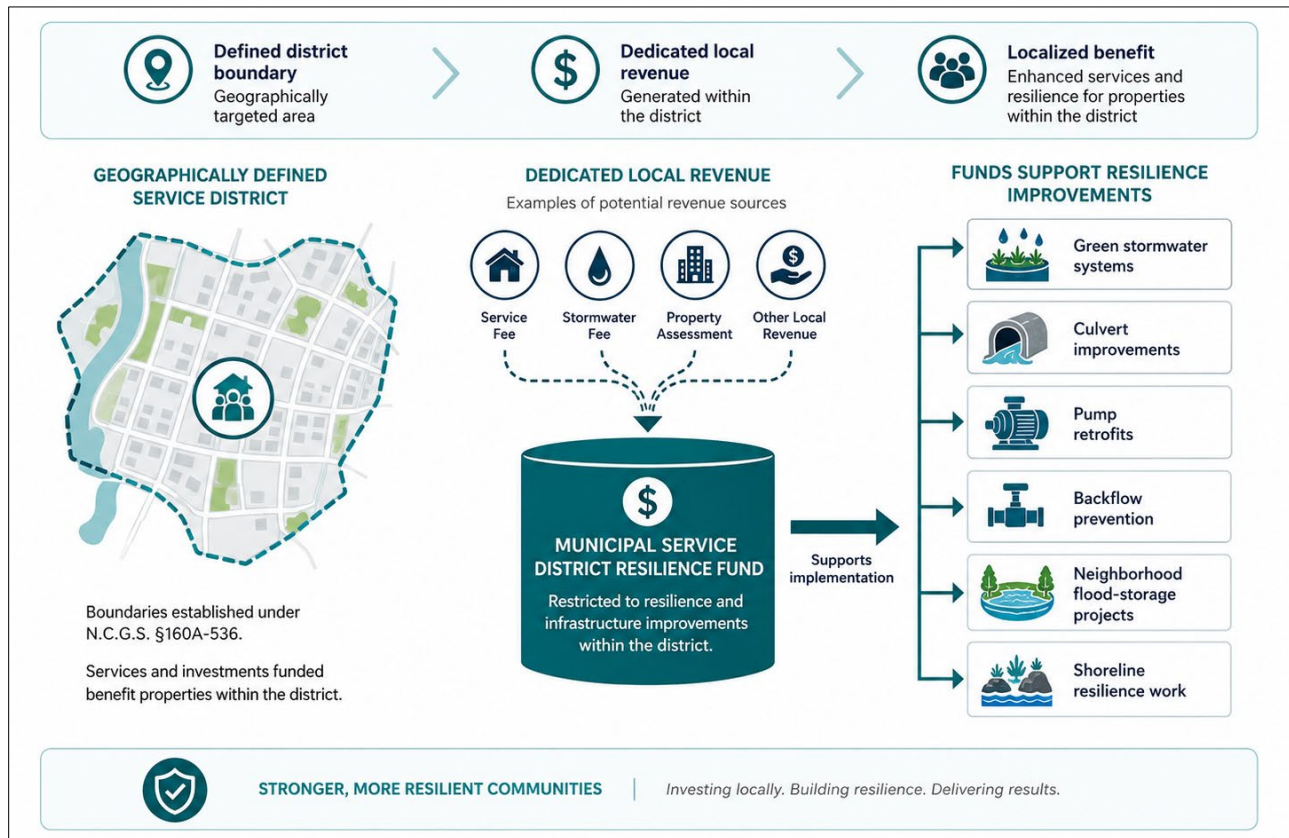
Planning, Zoning and Regulatory Concept



Policy Action	Update UDO Section 3.49 to establish a tiered framework for nonconforming structures in the Shaded X, AE and VE flood zones. The framework would address maintenance, cumulative substantial improvement and damage, limited expansion, rebuilding standards and transition of residual non-buildable parcels.
Where It Applies	Town-wide application to nonconforming structures in flood-prone areas.
Recommended Next Step	Conduct legal review and prepare tiered ordinance options with administrative procedures.
Lead / Timeline / Cost	Town Planning, Inspections, Floodplain Administration and legal counsel. Short to moderate term. Staff time plus legal and planning support.
Key Benefit	Gradually reduces the most vulnerable nonconforming conditions and improves the resilience of post-damage rebuilding.

PROJECT 19 | Municipal Service Districts

Planning, Zoning and Regulatory Concept



Policy Action	Explore geographically defined Municipal Service Districts under N.C.G.S. §160A-536 to generate dedicated local revenue for stormwater, drainage, flood protection and resilience improvements that provide enhanced services within the district. Revenue could support green stormwater systems, culvert improvements, pump retrofits, backflow prevention, neighborhood flood-storage projects, shoreline work, or other localized resilience investments.
Where It Applies	Potential hazard-based districts in the Town's most flood-prone areas; exact boundaries to be determined.
Recommended Next Step	Conduct a municipal finance and legal feasibility study and test illustrative district scenarios.
Lead / Timeline / Cost	Town Council, Town Manager, Finance and Planning. 2-3 years for evaluation and potential establishment. \$ for study; staff time and legal/financial consulting.
Key Benefit	Could create a dedicated and transparent funding stream for localized resilience needs, provide predictable maintenance/capital funding and help supply local match for outside grants. A one-time special assessment could also be evaluated for a discrete project, but it would not provide the continuing revenue stream associated with an MSD.

PUBLIC PROJECT PRIORITIZATION RESULTS

Public input was collected through the Carolina Beach RCCP project website from September 12 through September 25, 2026. Participants were invited to review the 19 project concepts, rank them according to their preferences, and identify the factors they considered most important when prioritizing resilience projects. The following summary reflects the survey results exported by Inspire on September 28, 2026.

The survey recorded 59 contributors and 64 submissions. Of those submissions, 60 included project rankings and four did not answer the ranking question. Thirty-eight submissions ranked all 19 concepts, while 22 provided partial rankings. Because some participants ranked only a portion of the concepts, the number of rankings received varies by project.

Understanding the Results

Average rank represents the average position assigned to a concept by the submissions that ranked it. A lower average rank indicates a higher public preference. For example, an average rank of 6.18 means that a concept was placed approximately sixth, on average, among the submissions that included it. Unranked concepts were excluded from that concept's average rather than assigned a last-place position.

The table below lists concepts in order of average rank. Project numbers correspond to the portfolio's concept identifiers and do not indicate priority order. First-place selections show how many submissions placed a concept first.

Project No.	Concept	Average rank	Submissions ranking concept	First-place selections
17	Restrict the Filling of Wetlands	5.52	52	15
2	Canal Drive Stormwater Pipe Relining/Replacement	6.18	50	14
1	Critical Canal Drive Intersection Flood Mitigation	6.67	51	6
3	Canal Drive/Carolina Beach Avenue North Stormwater Capture and Detention	7.25	48	3
8	Targeted Canal Drive/Harbor Public Shoreline and Bulkhead Resilience	8.06	49	1
4	Florida Avenue/Canal Drive Nature-Based Tidal Flood Resilience	8.43	53	3
15	Restrict Critical Assets from Locating in Flood-Prone Areas	8.70	47	2
7	Private Stormwater Improvement/Incentive	8.71	48	2
10	Freeman Park/Sound-Side Shoreline Resilience	9.40	50	0

Project No.	Concept	Average rank	Submissions ranking concept	First-place selections
9	Marina Stormwater/Pollution Control BMP	9.43	47	0
13	Yacht Basin/Canal Drive Infrastructure Gap Assessment	9.76	46	0
14	Targeted Property Acquisition/Transition and Nature-Based Resilience	9.83	47	1
11	Boardwalk/Public Beach Access Resilience	10.38	50	4
16	Higher Freeboard	10.46	48	2
6	Carolina Beach Lake Watershed BMP Retrofit	10.49	45	2
5	Carolina Beach Lake Storage and Stormwater System Integration	10.89	45	3
18	Review and Revise Nonconformities	11.50	46	0
12	Yacht Basin Tidal Barrier Feasibility/Concept Design	11.58	43	1
19	Municipal Service Districts	12.38	42	1

Key Findings

Restricting the filling of wetlands received the strongest overall public preference, with an average rank of 5.52 and 15 first-place selections. Canal Drive stormwater pipe relining/replacement was the highest-ranked infrastructure concept, with an average rank of 6.18 and 14 first-place selections.

Several other Canal Drive concepts also received strong support, including intersection flood mitigation, stormwater capture and detention, shoreline and bulkhead resilience, and nature-based tidal flood resilience in the Florida Avenue neighborhood. These results reinforce the importance of addressing recurring flooding, drainage limitations and shoreline conditions along Canal Drive and the North End.

The Freeman Park concept placed ninth by average rank. The two Carolina Beach Lake concepts placed fifteenth and sixteenth. These positions describe public preferences among the surveyed concepts; they do not measure technical effectiveness, project readiness or eligibility for a particular funding program.

Factors Important to Participants

Participants also rated the importance of four factors when prioritizing projects. Ratings used a five-point scale, with five representing the greatest importance.

Prioritization factor	Average importance rating	Responses
Ability to address flooding and coastal hazards	4.48	63
Risk reduction and safety	4.41	61
Community benefit	4.28	61
Feasibility	3.93	61

The results indicate that participants placed particular importance on addressing flooding and coastal hazards, reducing risk, improving safety and providing community benefits.

Relationship with Technical Priorities and Town Decisions

The report used scoring and screening to establish priorities. It scored the vulnerability of assets, then assessed project concepts against factors such as relative priority, feasibility, cost, permitting, benefits and constructability. That process, together with CAT and Town input, informed which concepts were included in the high priority/near-term group.

The public survey provides an additional perspective on community preferences. Its results supplement the technical assessment and project screening and do not change the established priority groups in the report or portfolio. The survey's order of preference should therefore be distinguished from the report's technical priorities and the Town's decisions about which projects to advance.

Interpretation and Limitations

The survey was voluntary and reflects the preferences of those who participated. It is not a statistically representative sample of the entire community. The export recorded 59 contributors and 64 submissions; the submission count does not represent 64 separate participants.

Partial rankings also affect comparisons: concepts received different numbers of rankings, and participants who ranked fewer concepts had fewer positions available in their lists. Average ranks should therefore be considered alongside participation counts, first-place selections, technical findings and Town and CAT input.

Source: Inspire, Carolina Beach RCCP survey results and response export, September 28, 2026.

PORTFOLIO USE AND NEXT STEPS

This portfolio is intended to support annual capital planning, grant strategy, feasibility scoping, policy development and coordination with Town departments, residents, property owners and partner agencies. It should be updated as projects are completed, funded, refined or removed.

Projects Identified for Phase 3 Applications

The Town intends to pursue Phase 3 applications for two coordinated projects:

- **North End/Freeman Park:** Advance Projects 4 and 10 together to evaluate northern Canal Drive, Florida and Virginia avenues, both Town-owned Delaware Avenue street ends, and the connected marsh system extending into Freeman Park. The work would examine flooding, drainage, tidal circulation and erosion as part of a connected system and advance feasible nature-based or hybrid measures for flood mitigation, shoreline protection and marsh resilience.
- **Carolina Beach Lake:** Advance the related lake concepts through dredging design, sediment characterization, sediment management and disposal planning, agency coordination and permitting, together with evaluation and development of feasible nature-based components, such as floating treatment wetlands or watershed stormwater improvements.

These selections reflect the Town's priorities, the opportunity to combine related concepts, and the potential to advance nature-based solutions through available funding. The North End/Freeman Park project offers a more direct connection to marsh and shoreline resilience. The lake project's nature-based components require further development to establish their feasibility, benefits and fit with the funding requirements.

Selecting these projects for Phase 3 applications does not revise the portfolio's existing priorities or diminish the importance of other concepts. Other projects may advance through separate funding opportunities, maintenance programs, capital improvements or future planning efforts.

Recommended Near-Term Portfolio Actions

- Develop Phase 3 applications for the combined North End/Freeman Park project and Carolina Beach Lake, confirming eligible scopes and feasible nature-based components.
- Complete or consolidate the Area F stormwater mapping and use the findings to define the relationship between Projects 2 and 13.
- Advance coordinated survey, hydrodynamic and feasibility analysis for Projects 4 and 10, including both Town-owned Delaware Avenue street ends, the connected marsh and Freeman Park, to identify and develop feasible nature-based and hybrid improvements.
- Document how Carolina Beach Lake storage, pumping, force main improvements and watershed BMPs function as an integrated system.
- Maintain one current inventory of completed, permitted, funded and unresolved public shoreline improvements.
- Assign a responsible department and annual status to each portfolio concept.

Portfolio Maintenance

Update Frequency	Review at least annually and before major grant cycles.
Minimum Status Fields	Lead, next action, funding status, schedule, major decisions and completed work.

Retire or Reframe	Remove completed concepts; combine overlapping actions; reframe concepts when new information changes the implementation path.
Public Communication	Use generalized graphics where detailed infrastructure or private-property information is sensitive.

Stronger Community. Safer Shoreline. Better Future.



AGENDA ITEM COVERSHEET

PREPARED BY: Kim Ward, Town Clerk

DEPARTMENT: Clerk

MEETING: Town Council 10/27/2026

SUBJECT: Presentation by the Bike/Ped Committee

BACKGROUND:

Presentation by the Bike/Ped Committee.

ACTION:

Presentation and discussion only.