CAROLINA BEACH RCCP
NORTH END FLOOD MITIGATION ALLIANCE

Town of Carolina Beach | Coastal Protection Engineering (CPE)
Inspire Placemaking Collective | NC Division of Coastal Management

CAROLINA BEACH RCCP PROJECT TEAM

TOWN OF CAROLINA BEACH

- Jeremy Hardison – Community Development Director
- Ed Parvin – Deputy Town Manager
- Sheila P. Nicholson – Administrative Services Officer
- Gigi Baggarley – GIS Administrator
- Role: Partnering with RCCP team, supporting CAT, and coordinating municipal resources.

STATE OF NORTH CAROLINA

- Makenzie Todd – Coastal Resiliency Coordinator
- Kasen Wally – Coastal Resiliency Specialist
- Jennifer Fickler – Coastal Resiliency Specialist
- Role: Providing technical guidance, reviewing deliverables and support community resilience planning.

CAROLINA BEACH RCCP PROJECT TEAM

COASTAL PROTECTION ENGINEERING

- Tara Marden – RCCP Project Manager and Senior Coastal Geologist
- Adam Priest – CPE Resident Professional Engineer (CB resident)
- Stephanie Spranger – UNCW Coastal Engineering Intern
- Role: Leading the RCCP process for Carolina Beach, managing project phases, schedules, and deliverables.

INSPIRE PLACEMAKING COLLECTIVE

- Jay McLeod, AICP – Director of Comprehensive Planning
- Robbie Addington, AICP – Planner
- Addie Sherman – Senior Graphic Designer
- Role: Leading GIS database and project website, community engagement, and public-facing resources.

RESILIENT COASTAL COMMUNITIES PROGRAM

The Resilient Coastal Communities Program (RCCP) is a state–local partnership led by the NC Division of Coastal Management that provides technical assistance, planning support, and grant funding to help coastal communities identify risks, develop resilience strategies, and implement projects that strengthen long-term coastal resilience.

Phases:

- 1. Community Engagement & Risk/Vulnerability Assessment
- 2. Planning, Project Selection & Prioritization
- 3. Engineering & Design
- 4. Implementation

*Carolina Beach Focus: Phases 1 & 2 – Engage the CAT and community to assess vulnerabilities and develop resilience strategy.

PHASE 1: RISK & VULNERABILITY ASSESSMENT

Purpose:

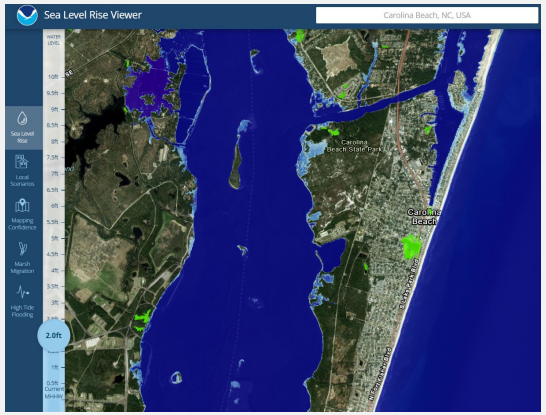
Establish a clear, data-driven understanding of Carolina Beach's coastal risks as the foundation for resilience planning.

Key Tasks:

- Collect and analyze data on infrastructure, natural systems, and hazards
- Assess vulnerabilities to flooding, storms, and sea level rise
- Develop a Public Engagement Plan and work with the CAT
- Communities define their long-term aspirations for resilience, considering social, environmental, and economic factors.
- Integrate local knowledge and existing plans (Land Use, Stormwater, Hazard Mitigation, etc.)

Local Focus Areas:

- Flooding hotspots – canals, low-lying neighborhoods, drainage issues
- Erosion and storm impacts – dune overwash, shoreline change
- Infrastructure at risk – roadways, stormwater systems, marinas
- Natural buffers – beaches, dunes, wetlands





COASTAL PROTECTION ENGINEERING

PHASE 2: PLANNING & PROJECT IDENTIFICATION

What happens in Phase 2

Identify projects:

- Based on the Phase 1 vulnerability assessment, communities identify a range of potential projects to address hazards like flooding and erosion.

Prioritize projects:

- Communities select and prioritize a portfolio of projects to form their resilience strategy. This selection is based on local needs, risk exposure and input from stakeholders.

Update CAMA Land Use Plans:

- For some communities, Phase 2 involves integrating the resilience strategy into their Coastal Area Management Act (CAMA) Land Use Plan, which guides future development and public investments.





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CAROLINA BEACH COMMUNITY ACTION TEAM (CAT) MEMBERS



Voting Members:

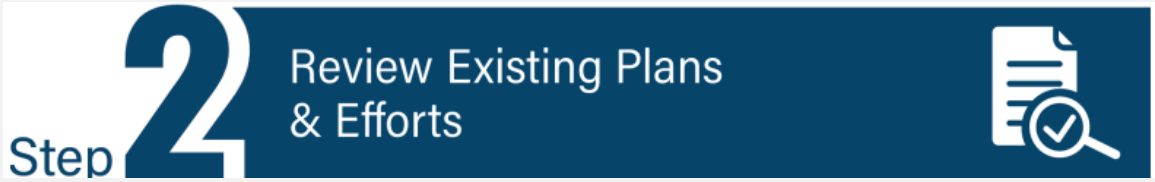
- Stephen Taylor
- Joseph Starks
- Matthew Lettrich
- Stefanie Young
- Debi Haynes



- Staff Liaison: Jeremy Hardison

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REVIEW OF EXISTING DATA & REPORTS



- Reviewed 10 existing plans/studies
- Prepared summaries for each
- Extracted resilience concepts and recommendations
- Identified repeated strategies and shared priority areas
- Established foundation for concept development

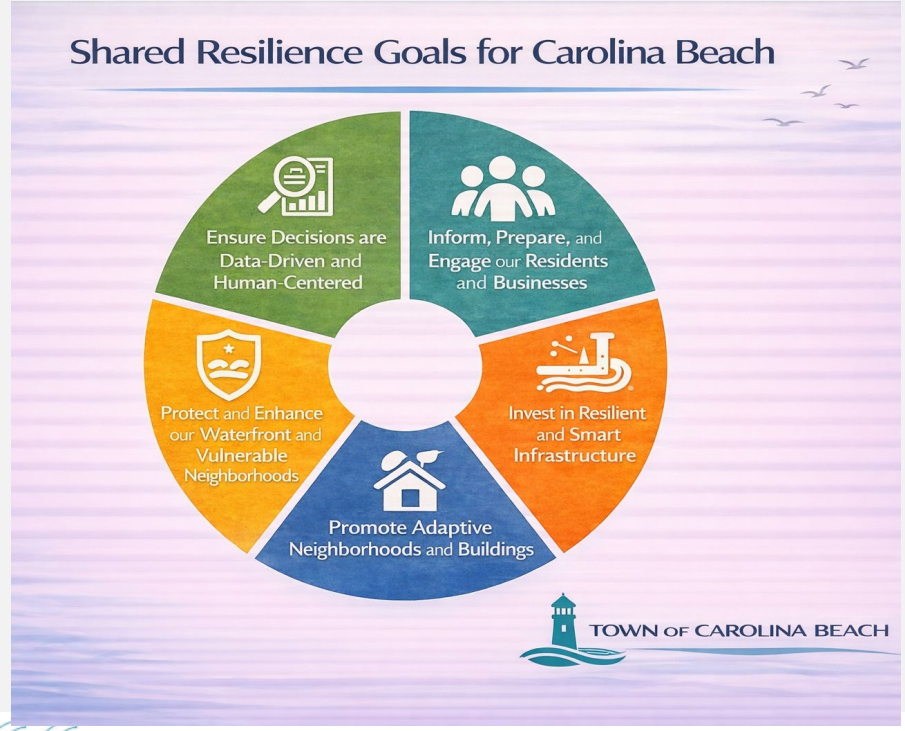
Resiliency Solutions Related to Flooding, Sea Level Rise, and Climate Change

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.

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PROJECT GOALS AND MISSION

Step 3 Set Vision and Goals



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.

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PROJECT GOALS AND MISSION

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.

Carolina Beach RCCP Mission Statement

The mission of the Carolina Beach Resiliency Coastal Communities Plan (**RCCP**) is to **build a safer**, stronger, and more adaptable coastal community by understanding local **flood risks**, protecting natural and human-built environments, and developing implementable **strategies** that reduce vulnerability to chronic flooding due to **infrastructure**, sea-level rise, and storms.

Through science-driven analysis and community partnership, the RCCP seeks to ensure that Carolina Beach remains a thriving, resilient barrier island for generations to come.

TOWN OF CAROLINA BEACH

COASTAL PROTECTION ENGINEERING

COMMUNITY ACTION STRATEGY

Step 4 Develop a Community Engagement Strategy

Why Engagement Matters
- Builds shared understanding of flooding and resilience issues
- Ensures strategies reflect local values, experiences, and priorities
- Creates buy-in, transparency, and long-term support for implementation

Who We Engage
- Residents & Neighborhoods
- Businesses & Local Organizations
- Infrastructure & Policy Stakeholders
- Historically Underrepresented & Vulnerable Populations

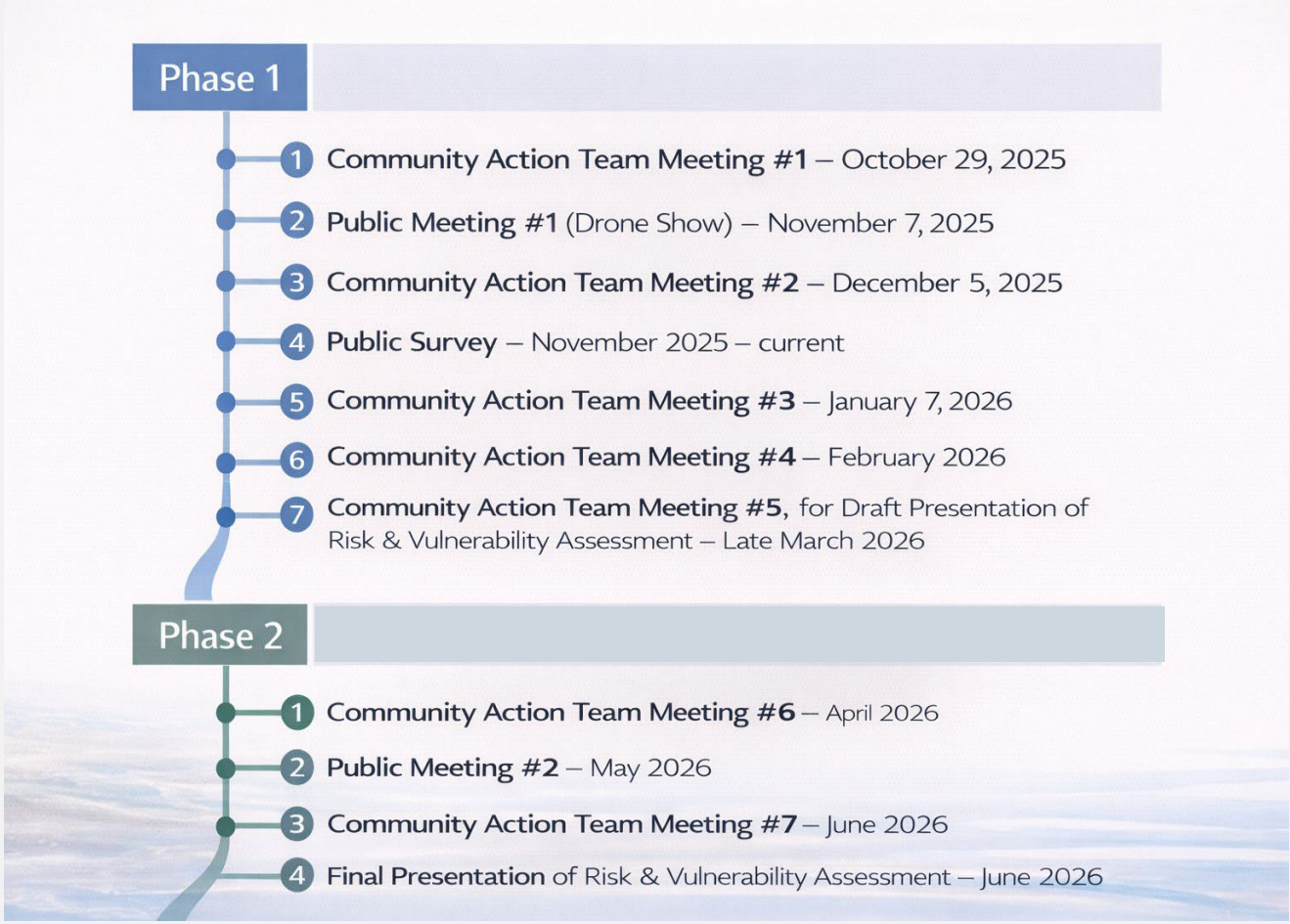
How We Engage
- Public open houses & workshops
- Online surveys + interactive mapping tools
- QR-code feedback stations around town
- Partnerships with local organizations & HOAs
- Social media, website updates, & email campaigns
- Live polling & comment tools during meetings

Engagement Objectives
- Ensure equitable representation in the planning process
- Validate CAT-developed Vulnerability Assessment findings
- Identify priority issues and locations
- Gather input to develop resilience project ideas (Phase 2)
- Build community trust, awareness, and long-term alignment



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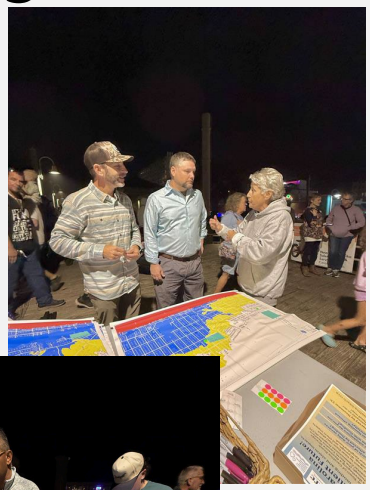
SCHEDULE



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PUBLIC OUTREACH EVENT NOVEMBER 7, 2025

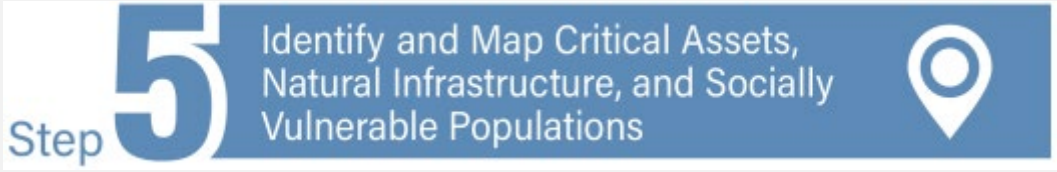


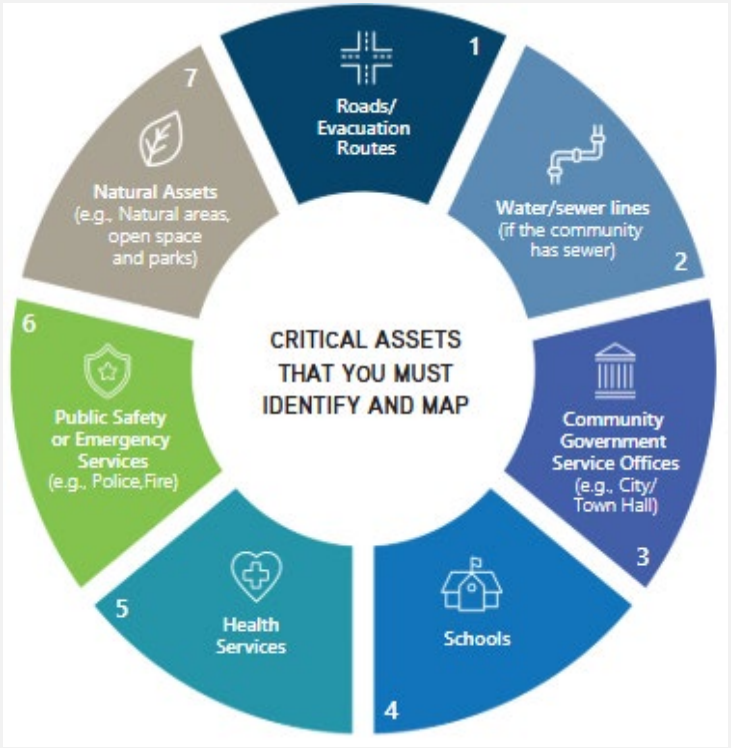






IDENTIFY CRITICAL ASSETS

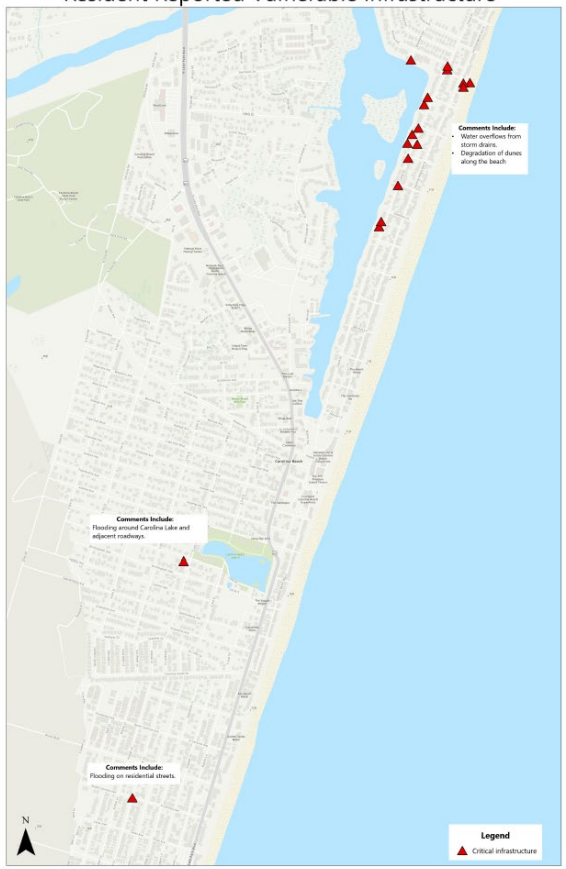




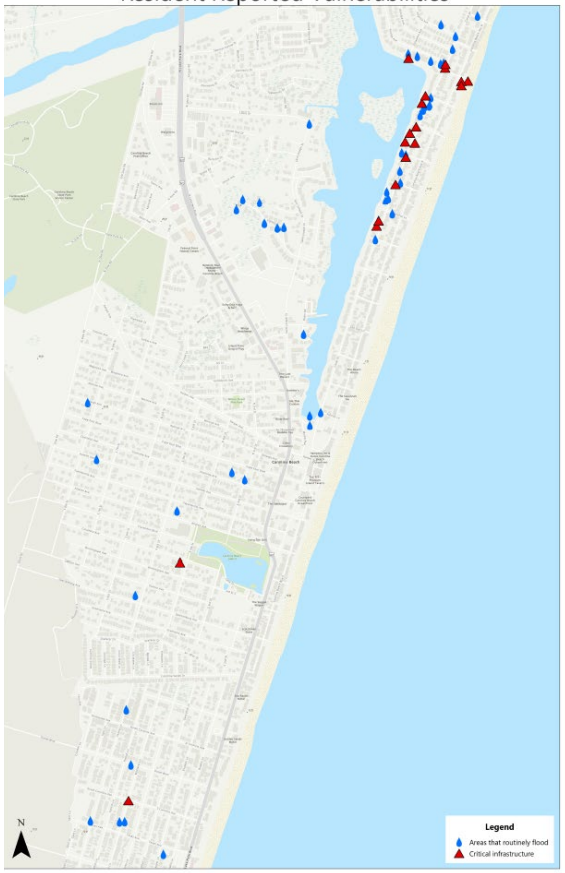
- Confirm and refine the inventory of **critical infrastructure** relevant to flood risk and community resilience
- Identify and map **key natural features and natural infrastructure** that provide flood protection, water quality, and ecological benefits
- Incorporate **locally important assets** identified by CAT members, Town staff, and community stakeholders
- Validate asset function, condition, and relevance using **local knowledge and available GIS data**
- Distinguish between **public, private, and shared responsibility assets**
- Identify assets with known or recurring **flooding, access, or maintenance challenges**
- Establish a shared understanding of which assets will be **carried forward into the risk and vulnerability assessment**

IDENTIFY CRITICAL ASSETS - WEBSITE & QUESTIONNAIRE METRICS

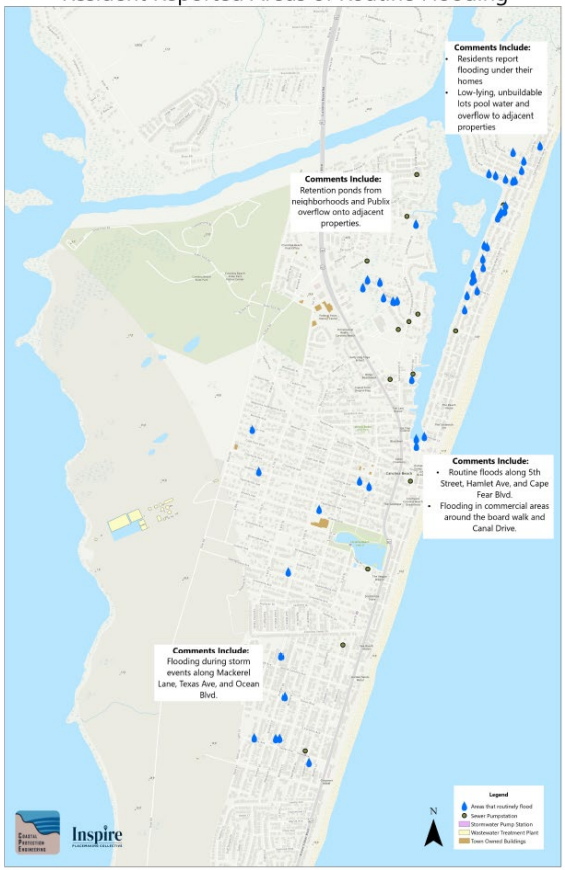
Resident Reported Vulnerable Infrastructure



Resident Reported Vulnerabilities



Resident Reported Areas of Routine Flooding



RISK AND VULNERABILITY ASSESSMENT

Step 6 Conduct Risk & Vulnerability Assessment

- Risk Evaluation
- Vulnerability Characterization
- High-Risk Area Identification
- Critical Infrastructure Assessment
- Priority Vulnerabilities Summary

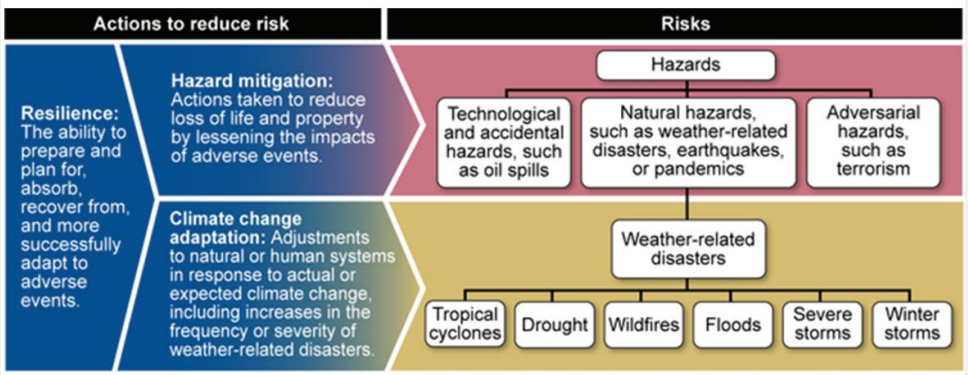


Figure 7 | Source: GAO analysis of Presidential Policy Directive 8, previous GAO work, and National Oceanic and Atmospheric Administration data. | GAO-16-454

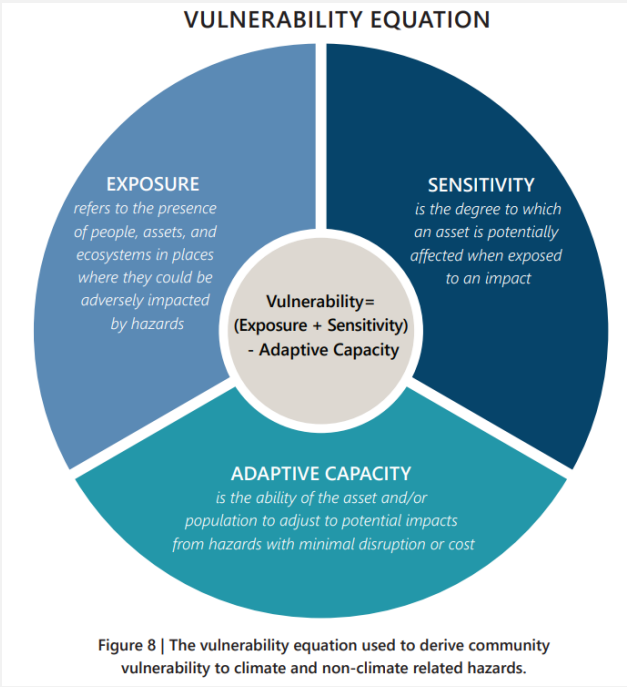


Figure 8 | The vulnerability equation used to derive community vulnerability to climate and non-climate related hazards.

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KEY VULNERABILITIES – CAROLINA BEACH

🌊 Coastal & Flooding Risks

- Oceanfront and canal-side areas experience chronic flooding from storms, king tides, and sea-level rise
- Dune erosion and overwash reduce natural storm protection

🏠 Infrastructure at Risk

- Flood-prone roads and neighborhoods near the canal system
- Aging stormwater infrastructure limits drainage capacity
- Utilities and pump stations located in vulnerable low-lying zones

🌿 Natural Systems Under Pressure

- Loss of dunes, wetlands, and maritime forest reduces resilience
- Habitat stress from saltwater intrusion and shoreline retreat

⚠️ Climate & Development Challenges

- Increasing storm intensity and rainfall exceed system design
- Limited room for inland migration or managed retreat due to dense development







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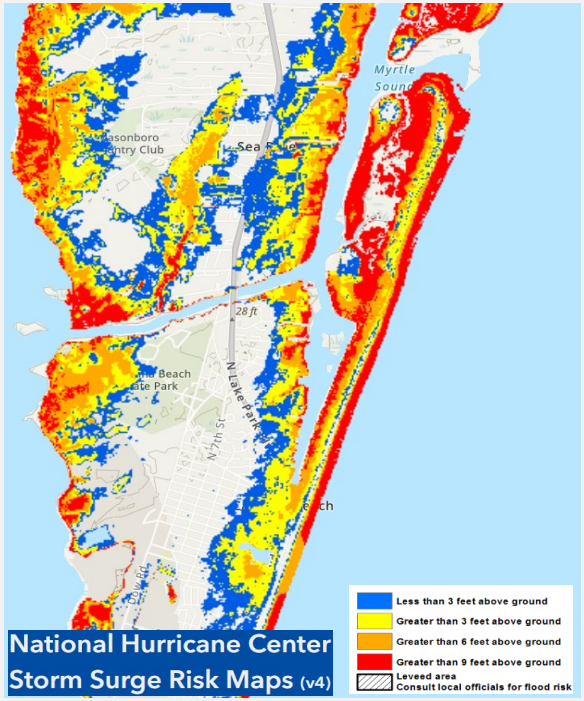
RISK AND VULNERABILITY ASSESSMENT DATA SETS

POTENTIAL HAZARDS

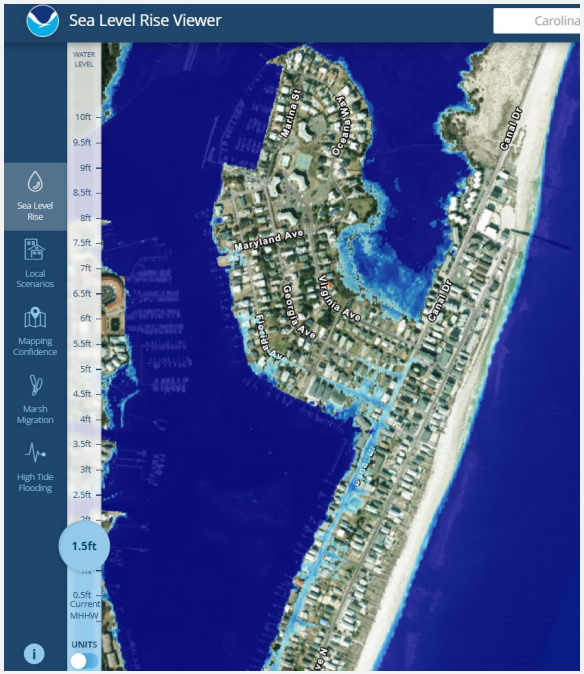
- Sea level rise
- Flooding (rainfall, tidal, and riverine)
- Damaging storms, tornadoes, and winds
- Storm surge
- Shoreline erosion
- Drought, Heat Waves, and Wildfire

NON-CLIMATE STRESSORS

- Aging or potentially undersized infrastructure
- Population dynamics
- Economic shifts
- Increased subsidence
- Altered drainage patterns
- Land cover change (i.e., increased development and impervious surface area)



National Hurricane Center Storm Surge Risk Maps (v4)





NEXT STEPS - PHASE 2

PHASE 2 INCLUDES THE FOLLOWING KEY STEPS:

1. REVIEW YOUR RISK AND VULNERABILITY ASSESSMENT
2. IDENTIFY A SUITE OF POTENTIAL SOLUTIONS THAT ALIGN WITH THE RESULTS OF YOUR ASSESSMENT
3. DEVELOP, CONSOLIDATE, AND PRIORITIZE PROJECTS

Step 1 Identify a Suite of Potential Solutions



Identify a Suite of Potential Solutions

Step 2 Consolidate and Prioritize Projects



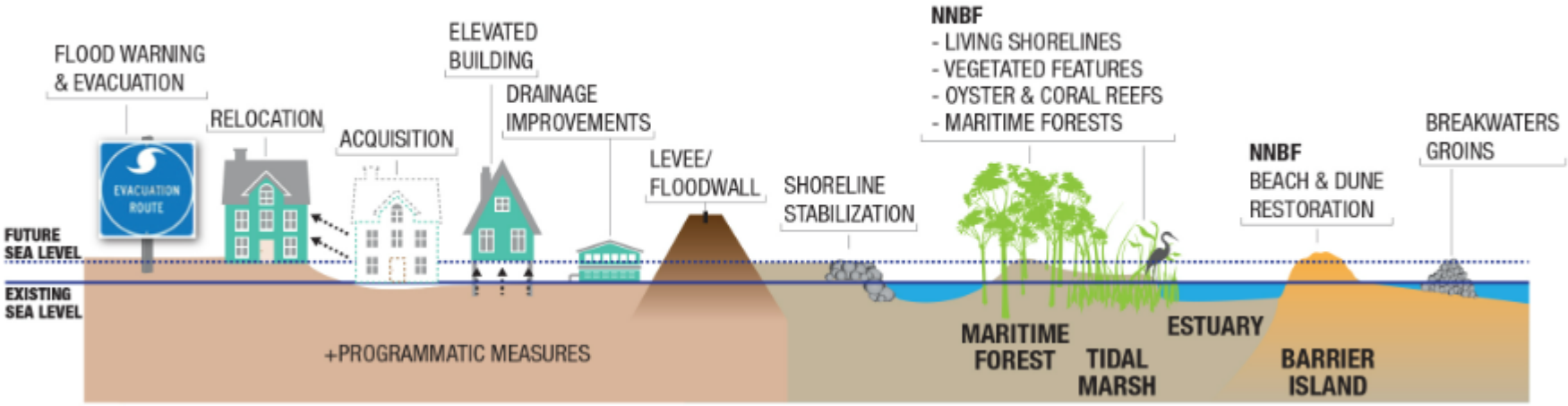
Consolidate and prioritize strategies

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Step 1

Identify a Suite of Potential Solutions

Approaches to Coastal Risk Reduction

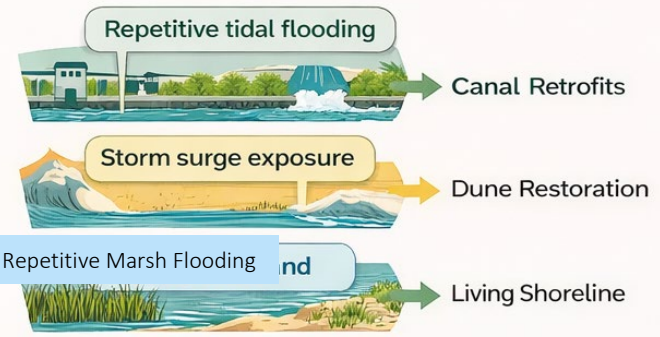


Source: U.S. Army Corps of Engineers (NACCS, 2015)

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Step 2 Consolidate and Prioritize Projects

Hazards → Strategies – Carolina Beach



Strategy → Location Matrix – Carolina Beach

Strategy	Oceanfront Dunes	Carolina Beach Lake	Canals	North End Dunes	Tier
Canal Retrofits	✓		✓	✓	Tier 1
Dune Restoration	✓	✓		✓	Tier 1
Living Shoreline	✓	✓	✓	✓	Tier 2

Tier 1 - High Priority • Tier 2: Medium Priority

Strategy → Location Matrix – Carolina Beach

Tier 1 - High Priority • Tier 2: Long-term / Monitor

RCCP Phase 2
Strategy Prioritization Scorecard

Objective: Consolidate and prioritize top resilience strategies for implementation.

1 - Low / Limited 5 - High / Strong

Strategies	Risk Reduction & Resilience Benefit	Feasibility	Cost & Funding Potential	Community Support & Equity	Environment & Co-Benefits	Total
Living Shoreline	5	4	4	4	5	26
Stormwater Pump Upgrade	4	3	3	4	5	20
Dune Restoration	5	5	4	4	4	27
Tier 1 - High Priority	5	4	3	4	4	27

Table Key:
- 1 - Low / Limited
- 2
- 3
- 4
- 5 - High / Strong

Prioritization Tiers
- Tier 1 - High Priority Projects
  - Implement first
- Tier 2 - Medium Priority Projects
  - Good but may need further development
- Tier 3 - Longer-Term Strategies
  - Monitor & revisit later

Risk Reduction & Resilience Benefit
- Reducing risk to high-priority areas, assets

Feasibility
- Technical, permitting, and maintenance feasibility

Cost & Funding Potential
- Costs and funding eligibility

Community Support & Equity
- CAT and public support, equity and social benefits

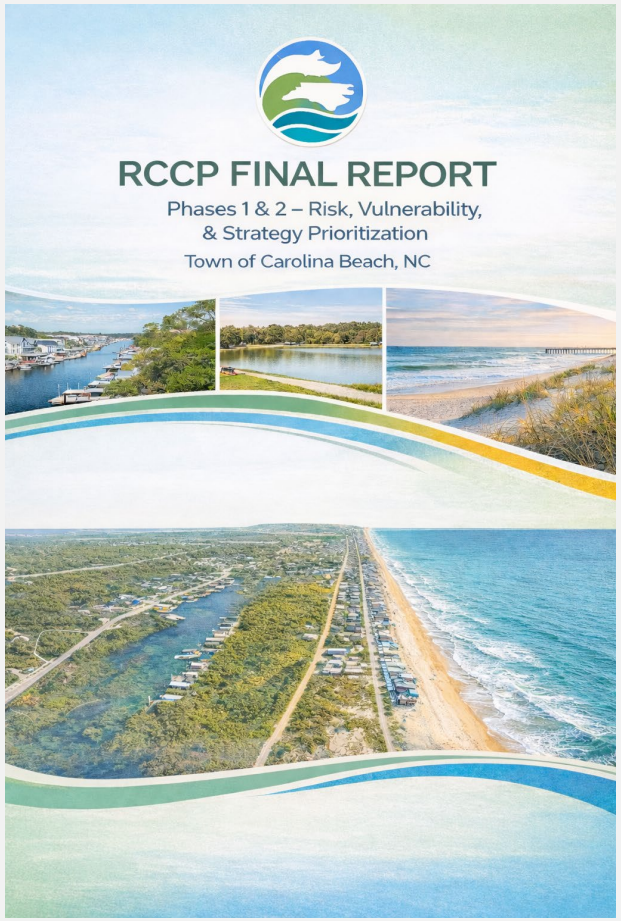
Environmental & Co-Benefits
- Nature-based, water quality, multiple benefits

Implementation Timeline
- Short- vs. long-term; planning vs. shov'el-ready

5 = High / Strong	Highly effective	Low impact	**Low cost**
5 = High feasible	Highly feasible	1 = Very difficult	Very difficult
5 = Cost-effective/egu'e	Cost-effective/digible	2 = High cost / few grants	High cost / few grants

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RCCP FINAL REPORT FOR CAROLINA BEACH



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PROJECT CONTACTS

Town of Carolina Beach

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State of North Carolina – RCCP Program

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- Robbie Addington, AICP – Planner

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- Addie Sherman – Senior Graphic Designer

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RELEVANT LINKS

https://app.climatecentral.org/coastal-risk-finder

https://www.nhcgov.com/222/Southeastern-North-Carolina-Regional-Haz

https://experience.arcgis.com/experience/203f772571cb48b1b8b50fdcc3272e2c/page/Category-1

https://sunnydayflooding.com/view-data/

https://www.climate.gov/maps-data/dataset/sea-level-rise-map-viewer

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