CAROLINA BEACH RCCP

Resilience Strategy Public Meeting

Draft findings and 19 resilience concepts

Wednesday, September 16, 2026 | 6:00 p.m.
Carolina Beach Town Hall, Multipurpose Room



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

Tonight's focus

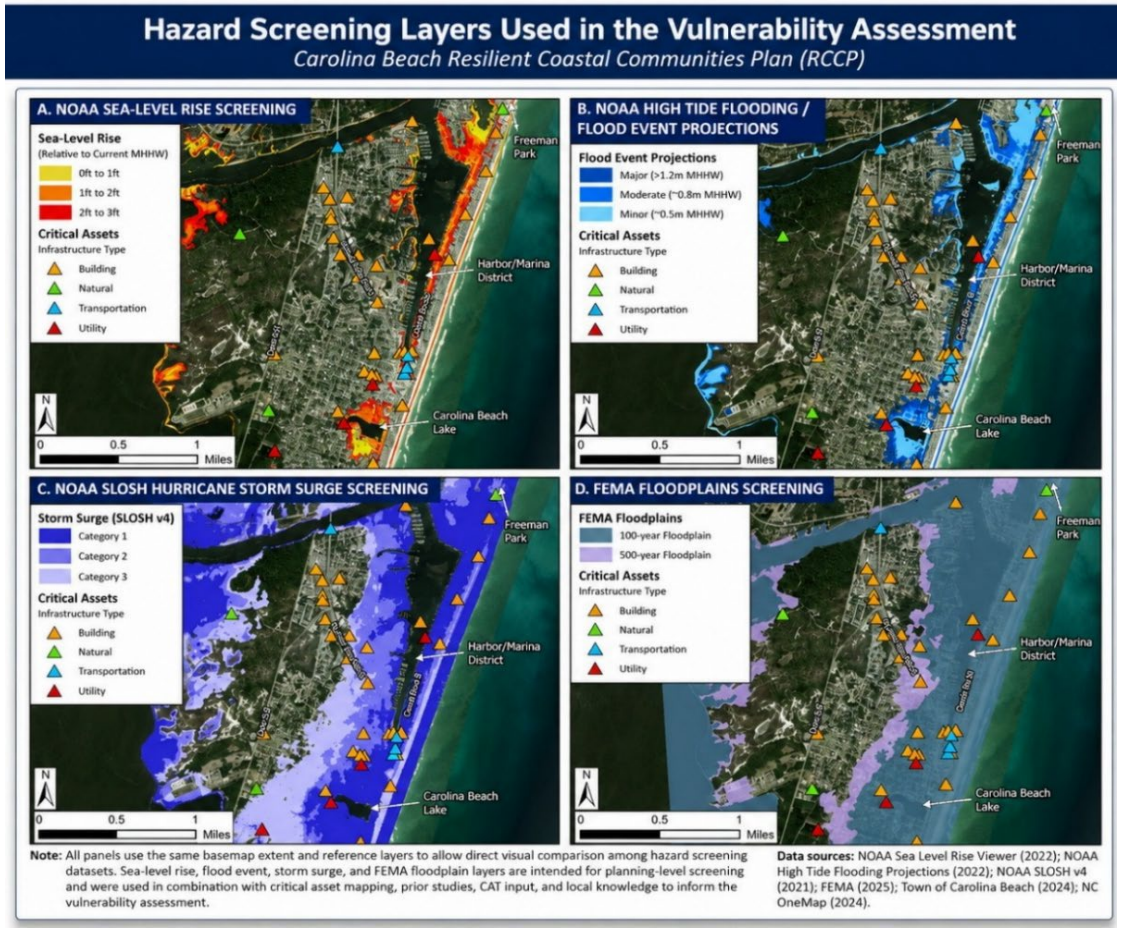
1. Briefly review what informed the draft strategy
2. Summarize the main vulnerability findings
3. Walk through the 19 resilience concepts
4. Gather feedback before the strategy is finalized



Public review materials

Project Portfolio, interactive map and prioritization survey

What informed the draft strategy



Existing work

Prior Town plans, drainage studies and hazard planning

Hazard data

Sea-level rise, high-tide flooding, storm surge and FEMA flood zones

Critical assets

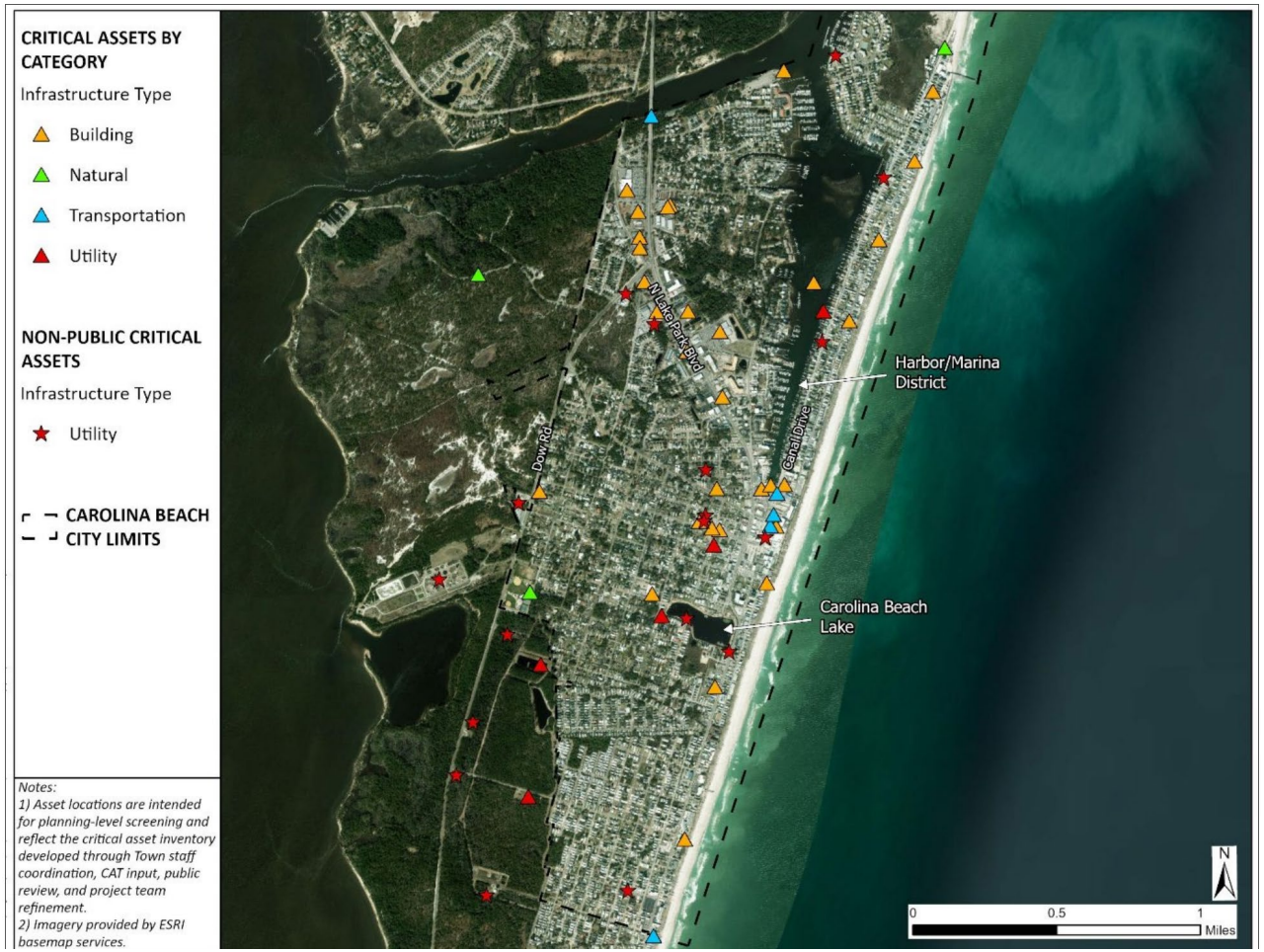
55 local assets and systems screened at a planning level

Local knowledge

Town staff, Community Action Team and public input

The assessment identifies relative concerns and priorities. It does not replace site-specific survey, engineering or design.

What we evaluated



Assessment at a glance

55 local assets and systems

6 major asset categories

- Built and natural assets
- Public and non-public assets affecting community function

Assets evaluated included:

- Transportation and access
- Stormwater and drainage
- Utilities and infrastructure
- Public safety and municipal facilities
- Community-support assets
- Natural and shoreline systems

The assessment focused on assets whose disruption could affect evacuation, drainage, utility continuity, public safety or everyday community access.

How vulnerability was evaluated

Exposure

How likely is the asset to be affected by flooding or another mapped hazard?

Sensitivity

How important is the asset, and what would happen if it were disrupted?

Adaptive Capacity

How easily could the Town work around, replace or recover from the disruption?

Vulnerability Score = Exposure + Sensitivity – Adaptive Capacity

Composite vulnerability score range

- **Low vulnerability: 0–2**
- **Medium vulnerability: 3–4**
- **High vulnerability: 5–6**

Source: Table 3, RCCP Report, p. 32

The scoring provides a consistent planning-level comparison. It is not a final engineering assessment.

What the scoring showed

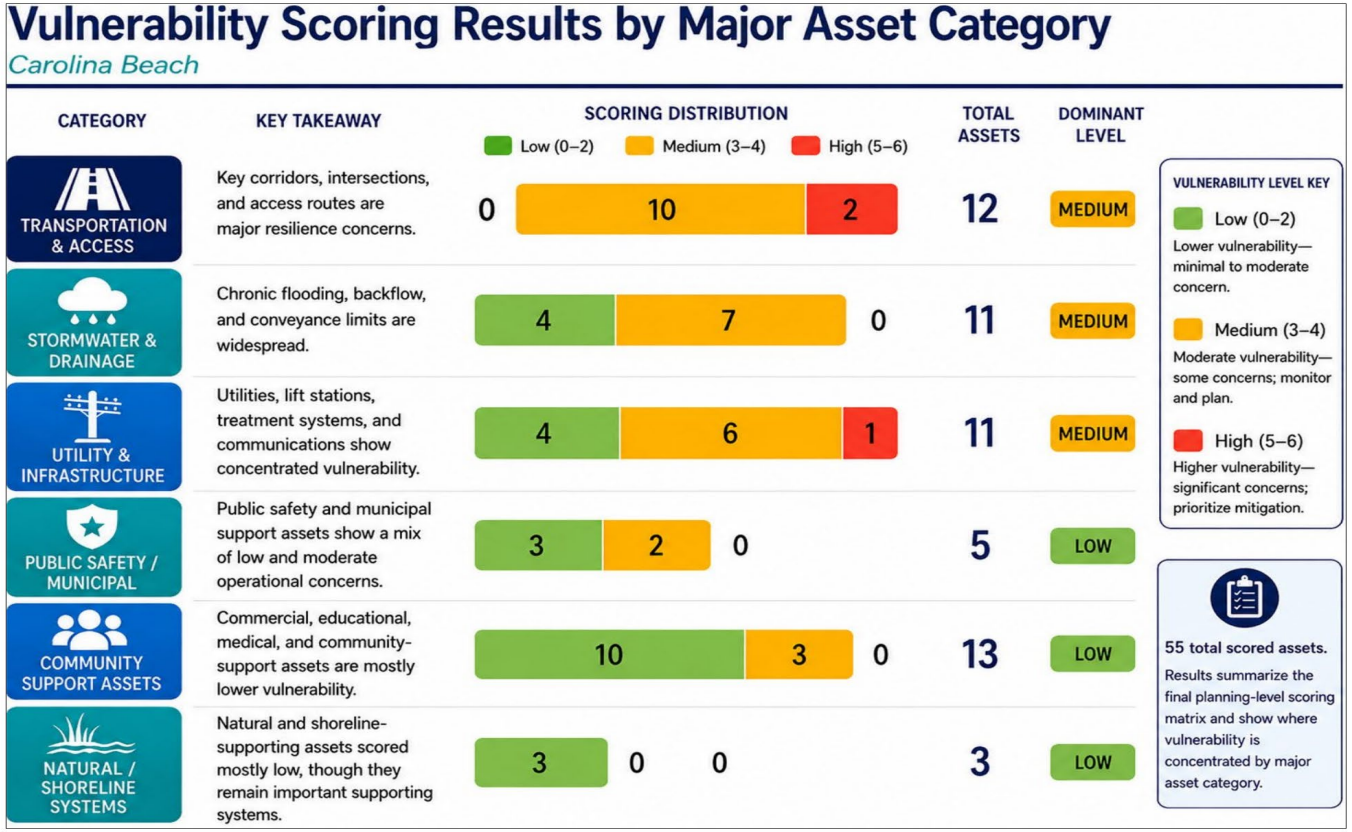


Figure 29. Vulnerability scoring results by major asset category, showing how high-, medium- and low-vulnerability assets are distributed across transportation and access, stormwater and drainage, utility and infrastructure, public safety and municipal, community support and natural shoreline systems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

- Transportation and access assets showed the strongest concentration of moderate and high vulnerability.
- Stormwater and drainage systems showed substantial moderate vulnerability, consistent with recurring flooding, backflow and limited conveyance capacity.
- Several utility and infrastructure assets also received moderate or high scores because of their importance to essential services.
- The results helped identify where hazard exposure, critical functions and limited alternatives overlap.

Lower scores do not mean that an asset is unimportant. Scores reflect the combined effects of exposure, sensitivity and adaptive capacity.

Five vulnerability themes emerged

The themes reflect repeated findings across the asset assessment, prior studies and community input.

01

Transportation and access

Key roadways, intersections and access routes affect evacuation, emergency response and everyday travel.

02

Stormwater and drainage

Chronic flooding hotspots and limited conveyance create recurring problems during rainfall and high water.

03

Critical utility and support infrastructure

Pump stations, lift stations, water systems and emergency services must continue operating during floods.

04

Natural and shoreline protective systems

Dunes, beaches, wetlands, marshes and shoreline buffers provide important protection.

05

Built-out community and aging infrastructure

Limited space and aging systems require targeted, phased and sometimes creative solutions.

Carolina Beach's vulnerability reflects the combined effects of its coastal setting, development pattern and infrastructure needs.

Priority vulnerability areas

These six areas were identified where mapped hazards, recurring flooding, critical assets and local resilience concerns overlap most strongly.

01 Canal Drive / North End

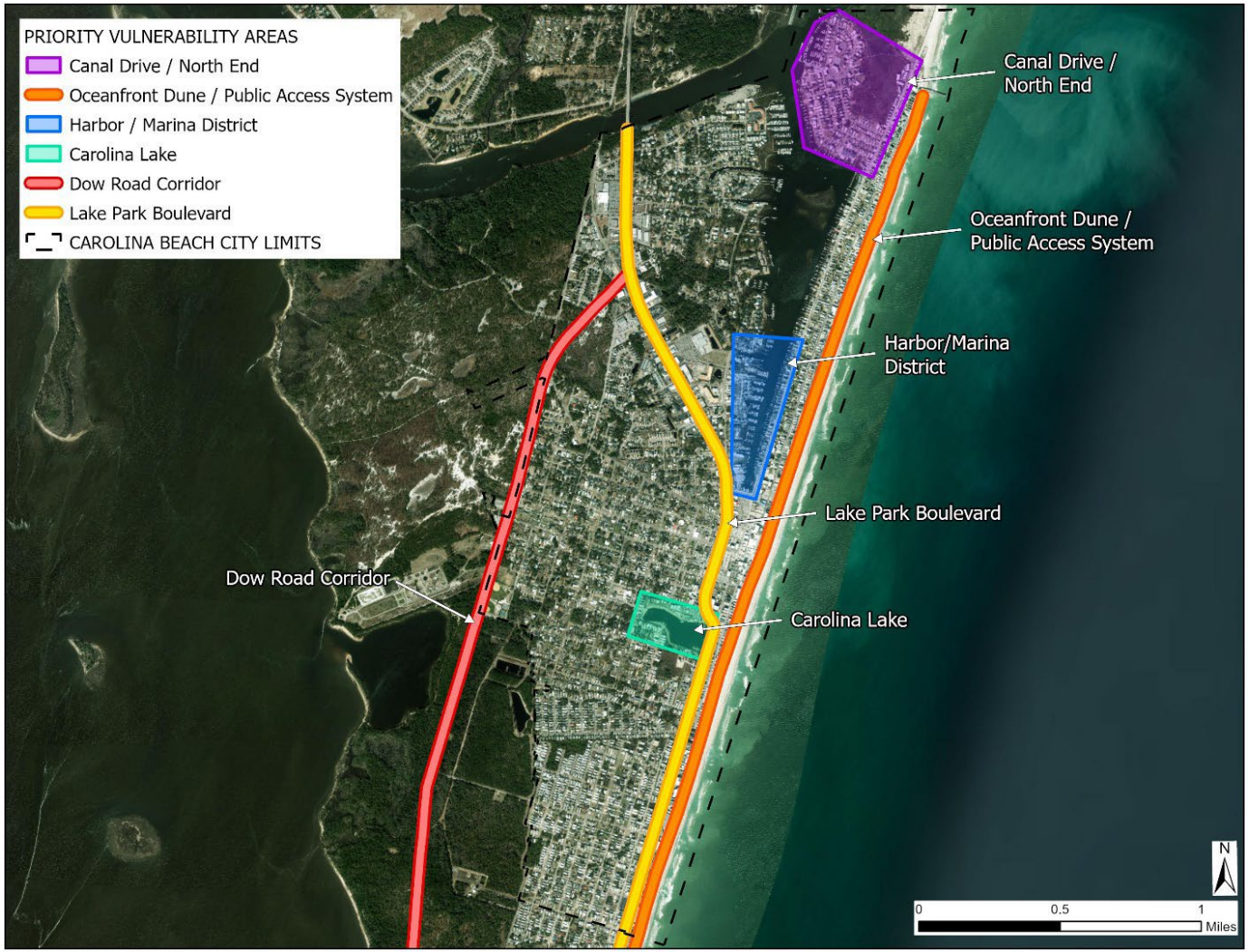
02 Oceanfront dune and public access system

03 Harbor / marina district

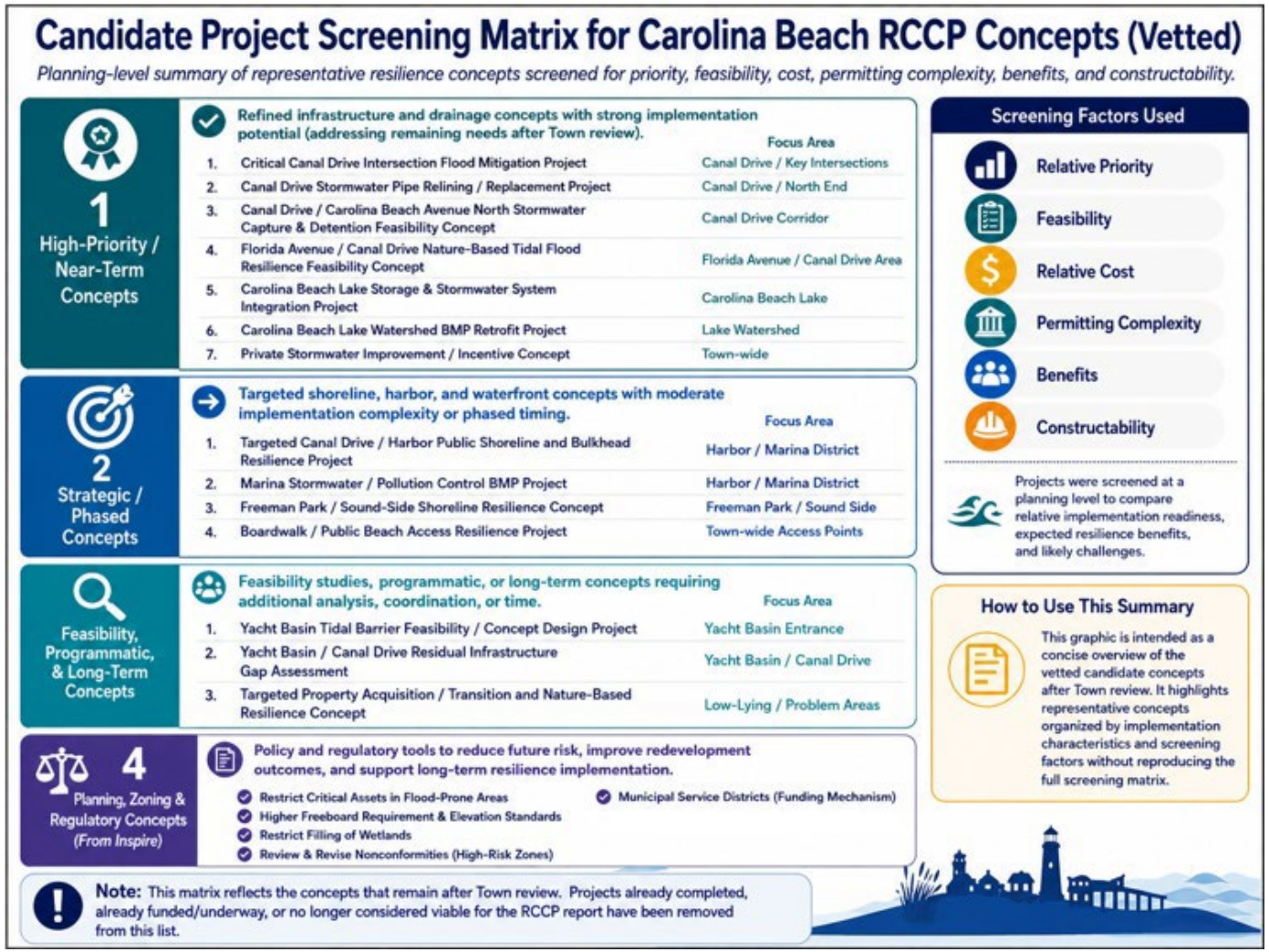
04 Carolina Beach Lake

05 Dow Road corridor

06 Lake Park Boulevard corridor



How the 19 concepts were organized



Candidate Project Screening Matrix for Carolina Beach RCCP Concepts (Vetted)

Planning-level summary of representative resilience concepts screened for priority, feasibility, cost, permitting complexity, benefits, and constructability.

1 High-Priority / Near-Term Concepts

Refined infrastructure and drainage concepts with strong implementation potential (addressing remaining needs after Town review).

		Focus Area
1.	Critical Canal Drive Intersection Flood Mitigation Project	Canal Drive / Key Intersections
2.	Canal Drive Stormwater Pipe Relining / Replacement Project	Canal Drive / North End
3.	Canal Drive / Carolina Beach Avenue North Stormwater Capture & Detention Feasibility Concept	Canal Drive Corridor
4.	Florida Avenue / Canal Drive Nature-Based Tidal Flood Resilience Feasibility Concept	Florida Avenue / Canal Drive Area
5.	Carolina Beach Lake Storage & Stormwater System Integration Project	Carolina Beach Lake
6.	Carolina Beach Lake Watershed BMP Retrofit Project	Lake Watershed
7.	Private Stormwater Improvement / Incentive Concept	Town-wide

2 Strategic / Phased Concepts

Targeted shoreline, harbor, and waterfront concepts with moderate implementation complexity or phased timing.

		Focus Area
1.	Targeted Canal Drive / Harbor Public Shoreline and Bulkhead Resilience Project	Harbor / Marina District
2.	Marina Stormwater / Pollution Control BMP Project	Harbor / Marina District
3.	Freeman Park / Sound-Side Shoreline Resilience Concept	Freeman Park / Sound Side
4.	Boardwalk / Public Beach Access Resilience Project	Town-wide Access Points

Feasibility, Programmatic, & Long-Term Concepts

Feasibility studies, programmatic, or long-term concepts requiring additional analysis, coordination, or time.

		Focus Area
1.	Yacht Basin Tidal Barrier Feasibility / Concept Design Project	Yacht Basin Entrance
2.	Yacht Basin / Canal Drive Residual Infrastructure Gap Assessment	Yacht Basin / Canal Drive
3.	Targeted Property Acquisition / Transition and Nature-Based Resilience Concept	Low-Lying / Problem Areas

4 Planning, Zoning & Regulatory Concepts *(From Inspire)*

Policy and regulatory tools to reduce future risk, improve redevelopment outcomes, and support long-term resilience implementation.

- Restrict Critical Assets in Flood-Prone Areas
- Higher Freeboard Requirement & Elevation Standards
- Restrict Filling of Wetlands
- Review & Revise Nonconformities (High-Risk Zones)
- Municipal Service Districts (Funding Mechanism)

Note: This matrix reflects the concepts that remain after Town review. Projects already completed, already funded/underway, or no longer considered viable for the RCCP report have been removed from this list.

Screening Factors Used

- Relative Priority
- Feasibility
- Relative Cost
- Permitting Complexity
- Benefits
- Constructability

Projects were screened at a planning level to compare relative implementation readiness, expected resilience benefits, and likely challenges.

How to Use This Summary

This graphic is intended as a concise overview of the vetted candidate concepts after Town review. It highlights representative concepts organized by implementation characteristics and screening factors without reproducing the full screening matrix.

Screening considered

- Relative priority
- Feasibility
- Relative cost
- Permitting complexity
- Expected benefits
- Constructability

Important

Project numbers identify the concepts. They do not represent a final ranking, funding commitment or approved design.

Funding and implementation context

The upcoming RCCP Phase 3 and Phase 4 funding cycle is expected to emphasize natural and nature-based solutions, including hybrid approaches.

ELIGIBILITY

The Phase 3 and Phase 4 Request for Applications will establish the final eligibility requirements and evaluation criteria.

THIS PORTFOLIO

The concepts have not been labeled eligible or ineligible for RCCP funding at this stage.

OTHER FUNDING

Concepts better suited to other programs remain important parts of the Town's broader resilience strategy.

PROJECT 1 | Critical Canal Drive Intersection Flood Mitigation Project



THE IDEA

Target drainage improvements at the Canal Drive intersections with Carolina Beach Avenue North, Carl Winner Drive and Harper Avenue. Possible measures include grading, inlets, pipe upgrades, spot elevation and underground storage where feasible.

In plain language: Fix the low/problem intersections so water has a better path out and access is less likely to be blocked.

WHY IT MATTERS

Reduce roadway ponding and closure risk while improving emergency access and circulation.

RECOMMENDED NEXT STEP

Complete targeted survey and drainage analysis, then select one or more pilot locations.

PROJECT 2 | Canal Drive Stormwater Pipe Relining / Replacement Project



THE IDEA

Rehabilitate or replace deteriorated stormwater pipes, inlets and related infrastructure. Canal Drive and Area F are the initial focus, but the same approach could be used elsewhere as needs are identified.

In plain language: Inspect the stormwater network and decide where old or failing pipes should be lined, repaired, replaced or disconnected.

WHY IT MATTERS

Improve drainage capacity, reduce leakage and failure, and direct capital funds to the most important segments.

RECOMMENDED NEXT STEP

Finish the Area F mapping and Town review, then prepare a prioritized rehabilitation plan.

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



THE IDEA

Evaluate whether runoff can be intercepted along Carolina Beach Avenue North and stored temporarily in underground chambers beneath Town-owned beach-side street ends before controlled release.

In plain language: Catch stormwater before it reaches Canal Drive, store it underground temporarily and release it more slowly after storms.

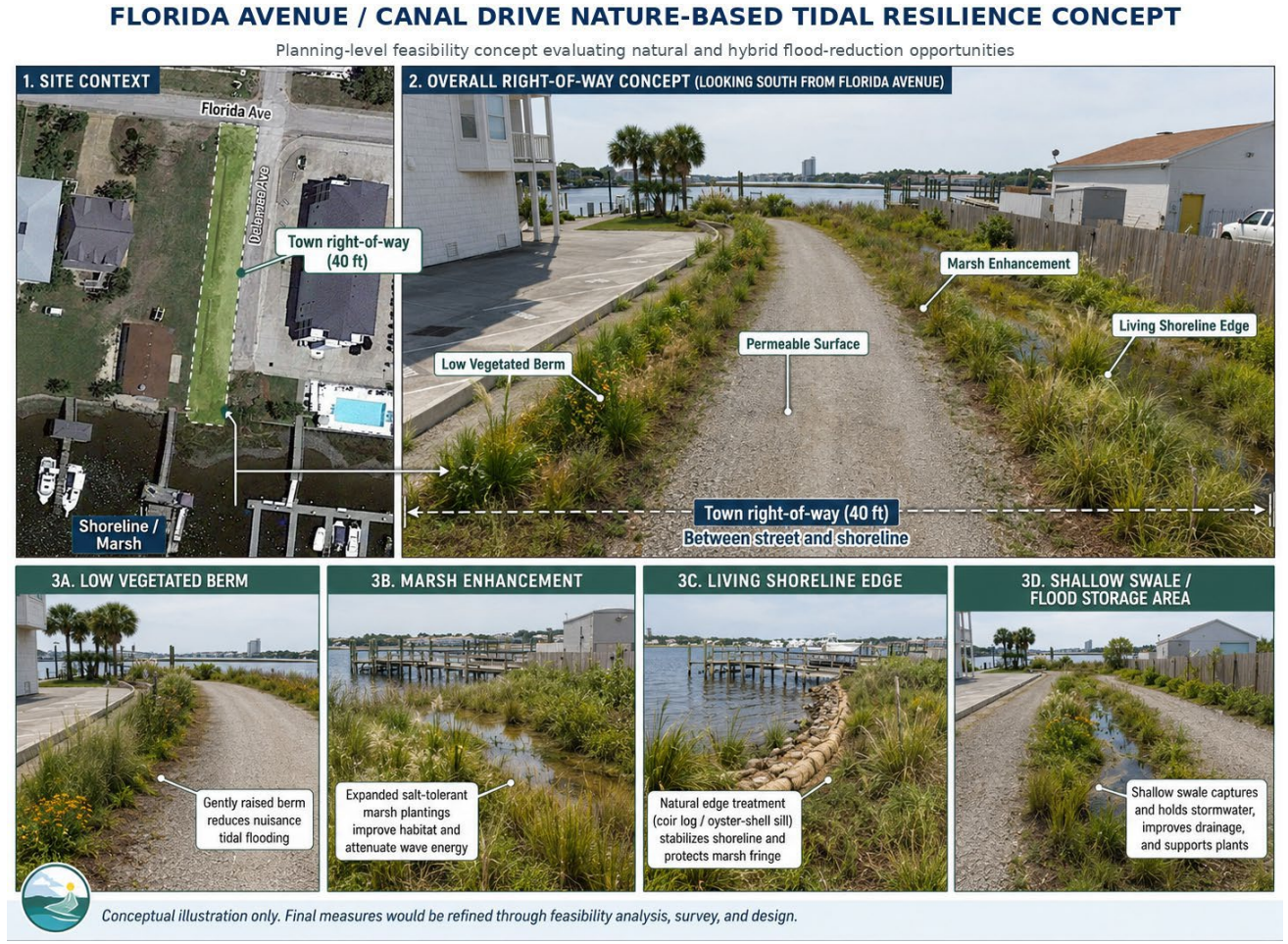
WHY IT MATTERS

Reduce the amount of rainfall runoff reaching the most flood-prone portions of Canal Drive.

RECOMMENDED NEXT STEP

Complete survey, drainage analysis, subsurface investigation and utility review for a pilot location.

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



THE IDEA

Evaluate marsh enhancement, living shoreline treatments, low vegetated berms or hybrid measures in the low-lying Florida Avenue / Canal Drive area. Public and willing-owner locations would be considered.

In plain language: Test whether marsh, living shoreline or low planted berm features could reduce tidal water without just relying on pipes or walls.

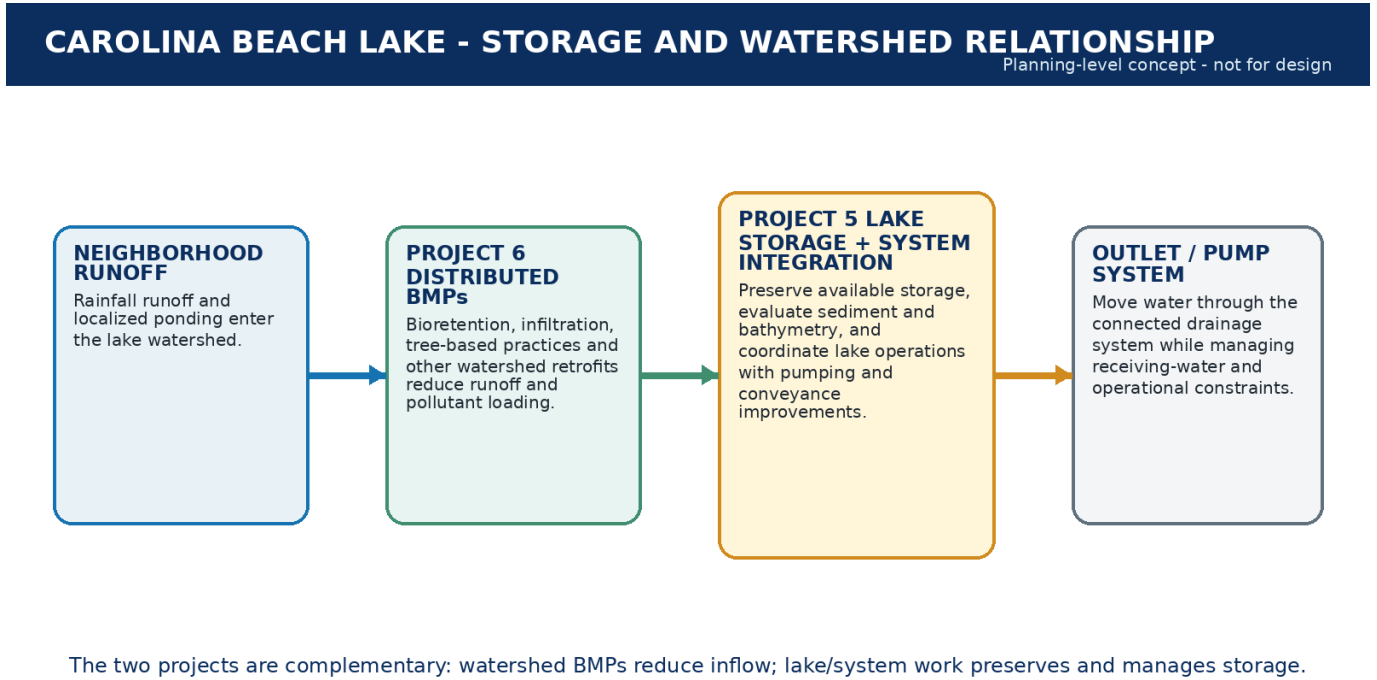
WHY IT MATTERS

Address recurring tidal flooding while supporting marsh, habitat and water-quality benefits.

RECOMMENDED NEXT STEP

Complete survey and hydraulic analysis, then compare sites, treatments, property needs and permitting constraints.

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



The two projects are complementary: watershed BMPs reduce inflow; lake/system work preserves and manages storage.

THE IDEA

Manage Carolina Beach Lake as part of an integrated drainage system by coordinating lake storage, dredging, pumps, the force main and connected conveyance infrastructure.

In plain language: Treat the lake, storage, dredging, pumps and connected pipes as one system that needs to work together.

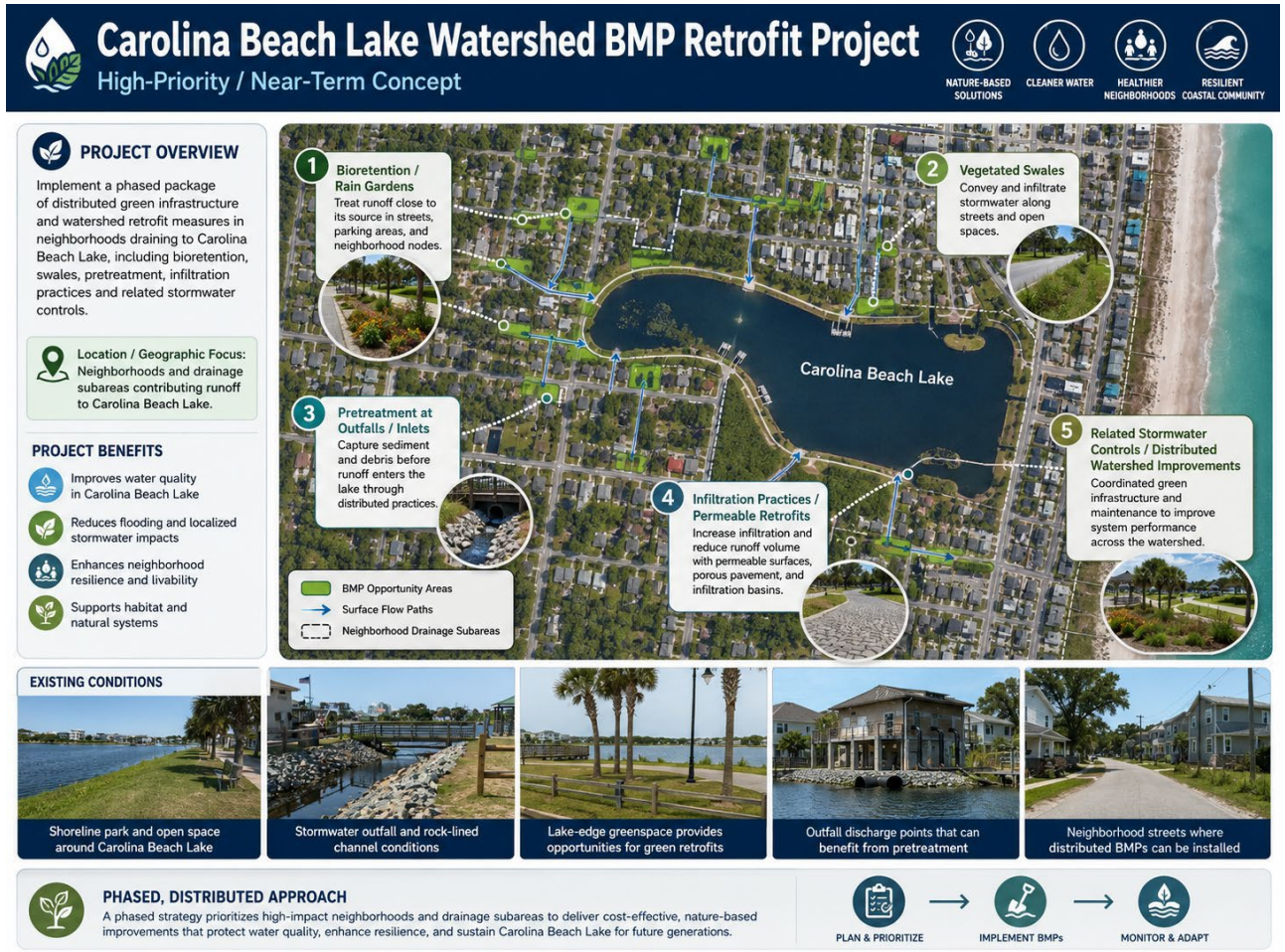
WHY IT MATTERS

Restore flood-storage capacity, improve pumping and reduce rainfall flooding around the lake.

RECOMMENDED NEXT STEP

Update bathymetry and sediment information, review prior plans and prepare an integrated lake-system plan.

PROJECT 6 | Carolina Beach Lake Watershed BMP Retrofit Project



THE IDEA

Install distributed green stormwater practices in neighborhoods draining to Carolina Beach Lake. Examples include bioretention, swales, pretreatment and infiltration measures.

In plain language: BMPs are small stormwater fixes. Bioretention is a planted rain-garden basin; swales are shallow vegetated channels; pretreatment catches sediment/trash first; infiltration lets water soak in where soils and groundwater allow.

WHY IT MATTERS

Reduce runoff and pollutant loading before it reaches the lake while creating visible neighborhood improvements.

RECOMMENDED NEXT STEP

Prepare a watershed retrofit priority map and advance one or more demonstration projects.

PROJECT 7 | Private Stormwater Improvement / Incentive Concept



THE IDEA

Create a voluntary incentive or rebate program for Town-approved improvements on private property, such as rain gardens, cisterns, permeable surfaces, swales and small-scale storage.

In plain language: Help property owners make small site changes—rain gardens, cisterns, permeable surfaces or storage—so less runoff enters public pipes.

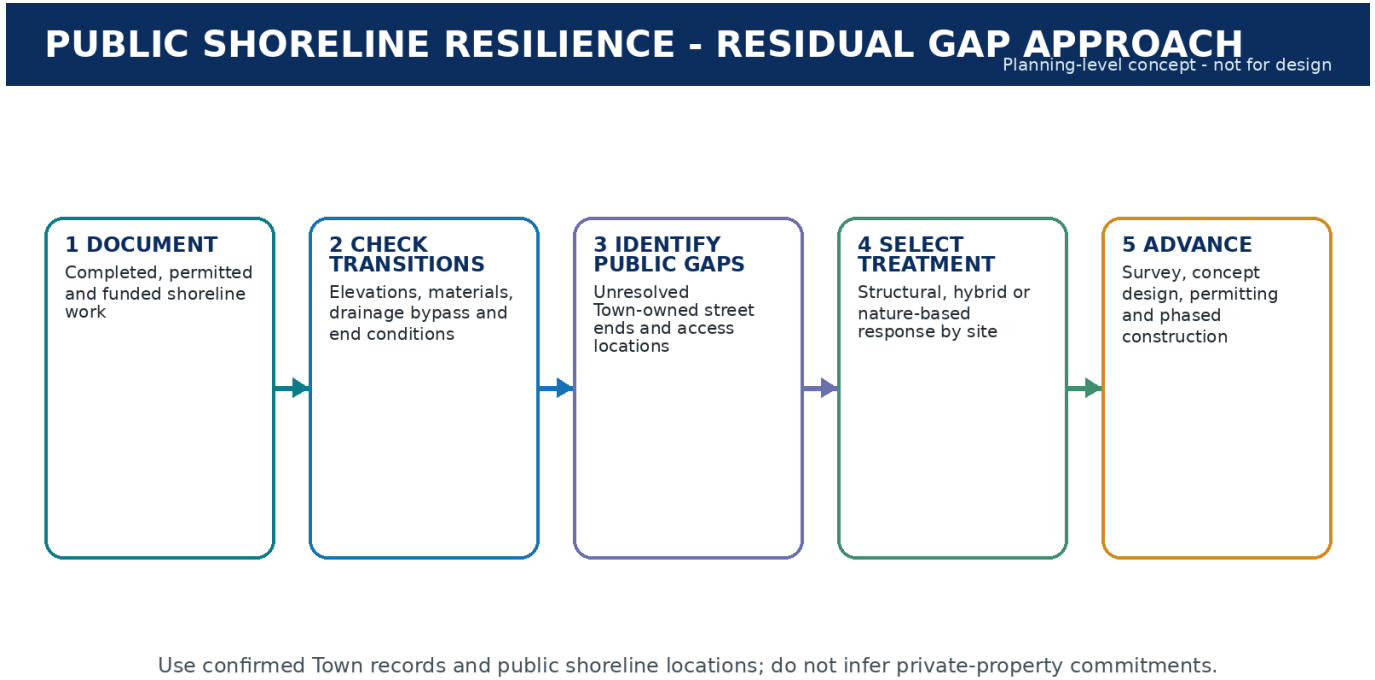
WHY IT MATTERS

Reduce runoff at its source and lessen demand on the public stormwater system.

RECOMMENDED NEXT STEP

Complete program feasibility and rate-policy review, then develop a pilot program.

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



THE IDEA

Address unresolved shoreline gaps and transitions at Town-owned street ends and public waterfront locations. The concept does not propose a corridor-wide bulkhead or improvements on private property.

In plain language: This is not a bulkhead everywhere; it identifies remaining public shoreline gaps and transitions that still let water overtop or bypass improvements.

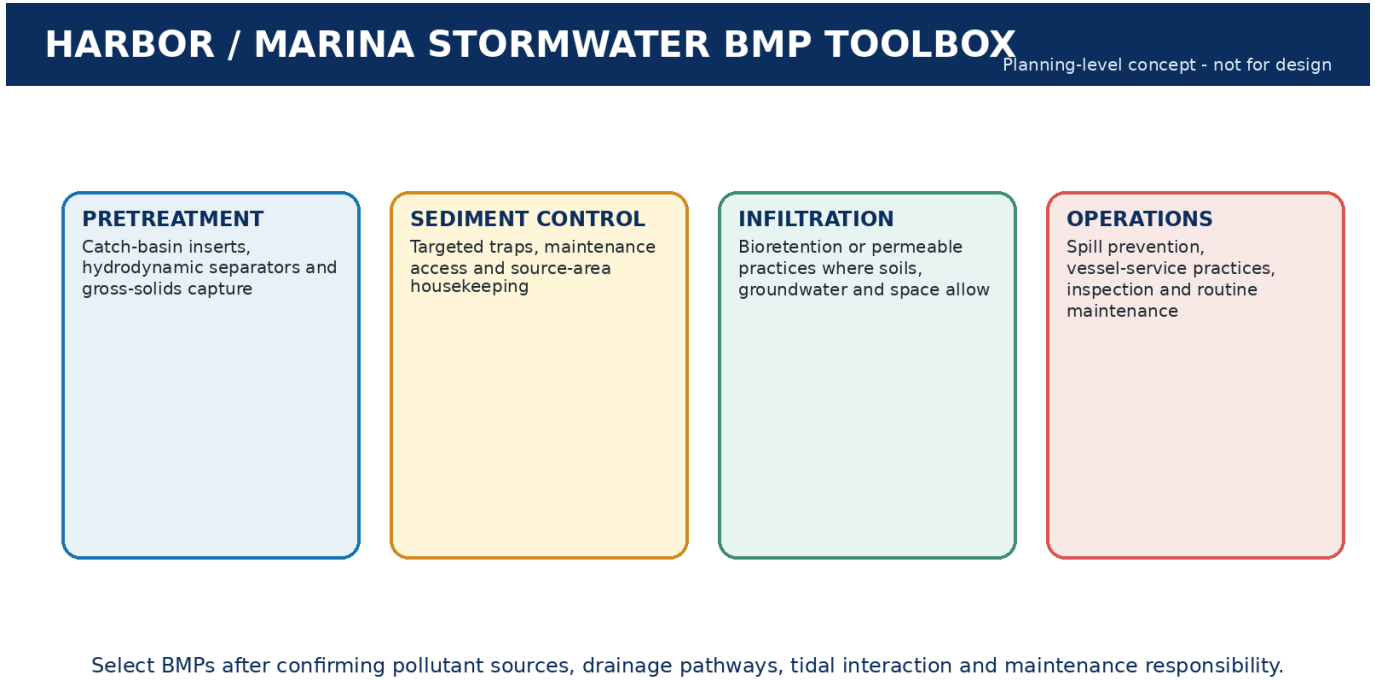
WHY IT MATTERS

Reduce overtopping, erosion and drainage bypass while protecting public access and infrastructure.

RECOMMENDED NEXT STEP

Inventory the remaining public shoreline gaps and prioritize a small number of locations for survey and concept design.

PROJECT 9 | Marina Stormwater / Pollution Control BMP Project



THE IDEA

Build on existing harbor improvements with added pretreatment, sediment capture, infiltration, spill prevention and operational best management practices.

In plain language: Catch sediment, trash, oil and other pollutants from streets, parking and marina operations before they reach the Yacht Basin.

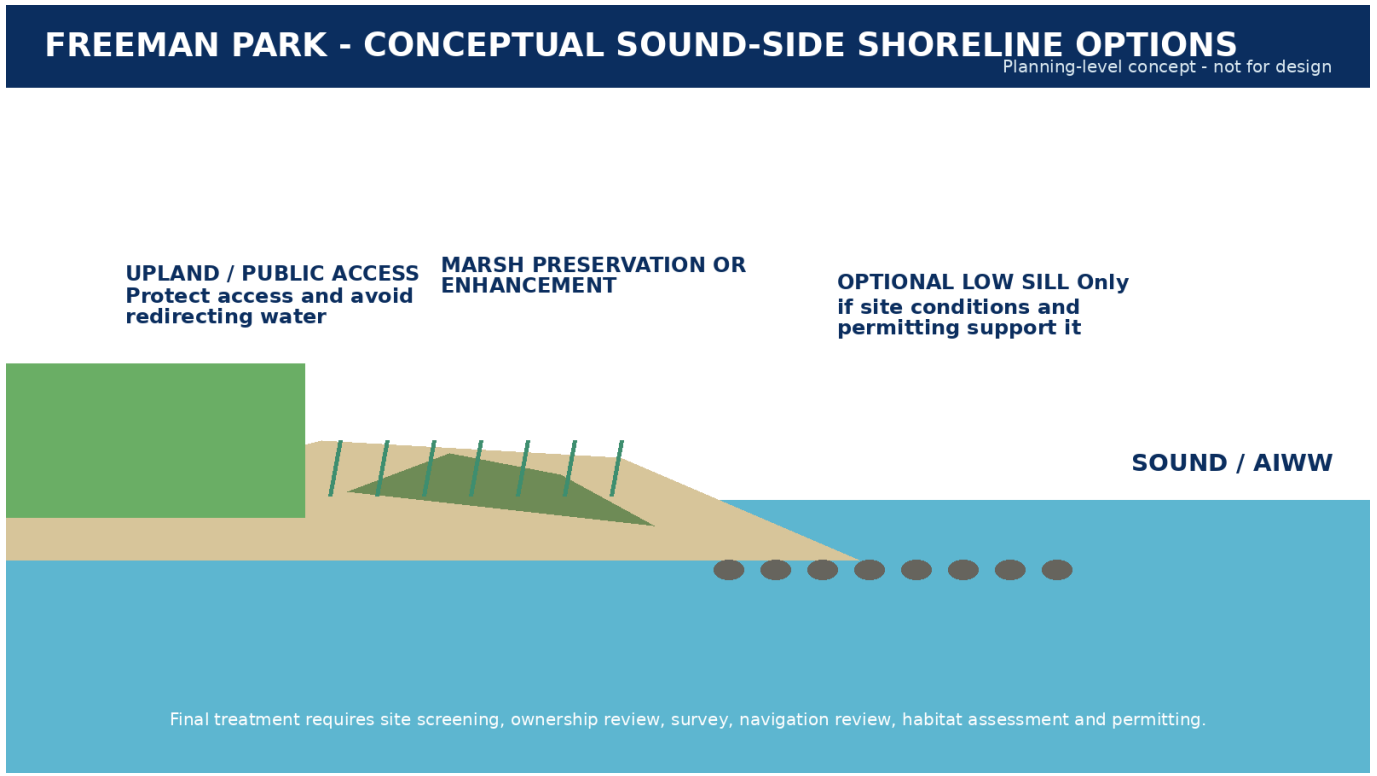
WHY IT MATTERS

Reduce sediment and pollutant discharges and improve water quality in the Yacht Basin and sound-side waters.

RECOMMENDED NEXT STEP

Complete a harbor stormwater audit and identify priority retrofits and operating practices.

PROJECT 10 | Freeman Park / Sound-Side Shoreline Resilience Concept



THE IDEA

Evaluate living shoreline, marsh enhancement, habitat restoration or other natural and hybrid shoreline measures along the sound side of Freeman Park or other suitable public locations.

In plain language: Look for a public sound-side location where marsh or living shoreline measures could reduce erosion from tides and boat wakes.

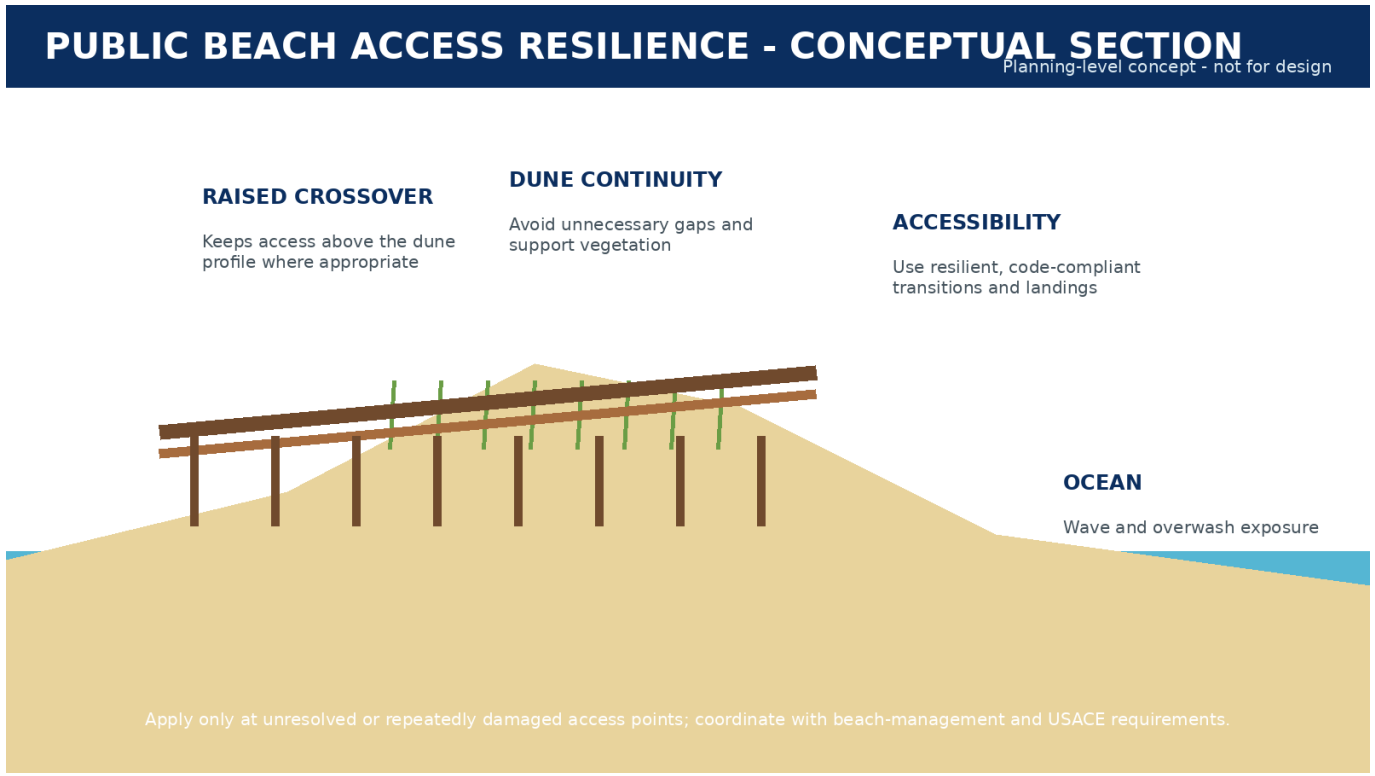
WHY IT MATTERS

Reduce erosion and wake impacts while improving habitat and building experience with nature-based approaches.

RECOMMENDED NEXT STEP

Coordinate with the Freeman Park planning effort and complete site-feasibility screening.

PROJECT 11 | Boardwalk / Public Beach Access Resilience Project



THE IDEA

Improve public beach access structures, dune crossovers and related facilities where storm surge, erosion, overwash or repeated maintenance problems remain after current Town improvements.

In plain language: Keep public beach access usable after storms while protecting the dune system and reducing repeated repair needs.

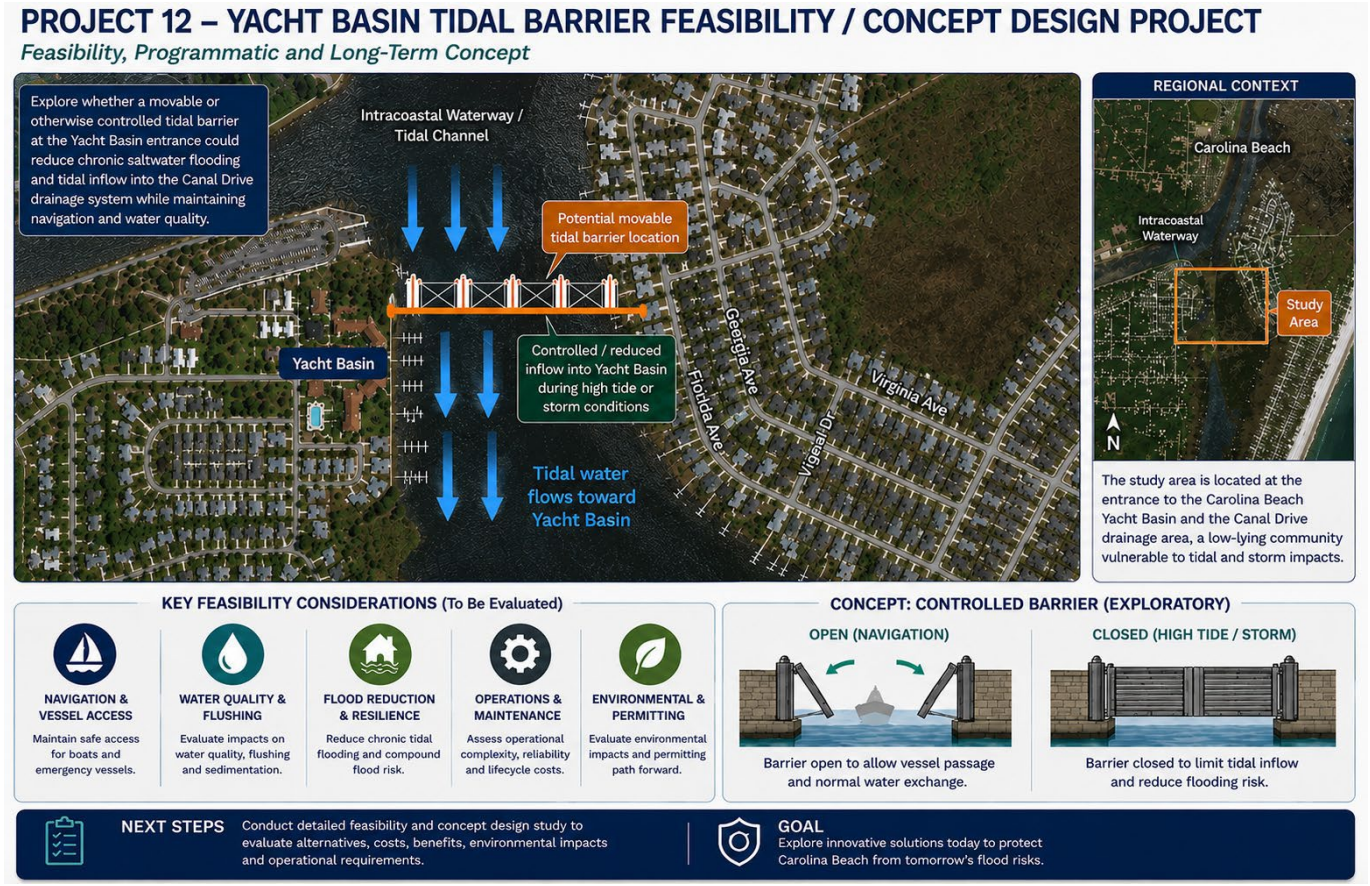
WHY IT MATTERS

Maintain safe access, reduce repair needs and support continuity of the protective dune system.

RECOMMENDED NEXT STEP

Prepare an access vulnerability inventory and incorporate priority retrofits into the Beach Management Plan and capital program.

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



THE IDEA

Evaluate whether a barrier or similar system at the Yacht Basin entrance could reduce tidal inflow into the Canal Drive drainage system. The concept would be operationally and environmentally complex.

In plain language: This is a long-shot screening step for a possible gate or barrier. Test fatal flaws before spending money on a full study.

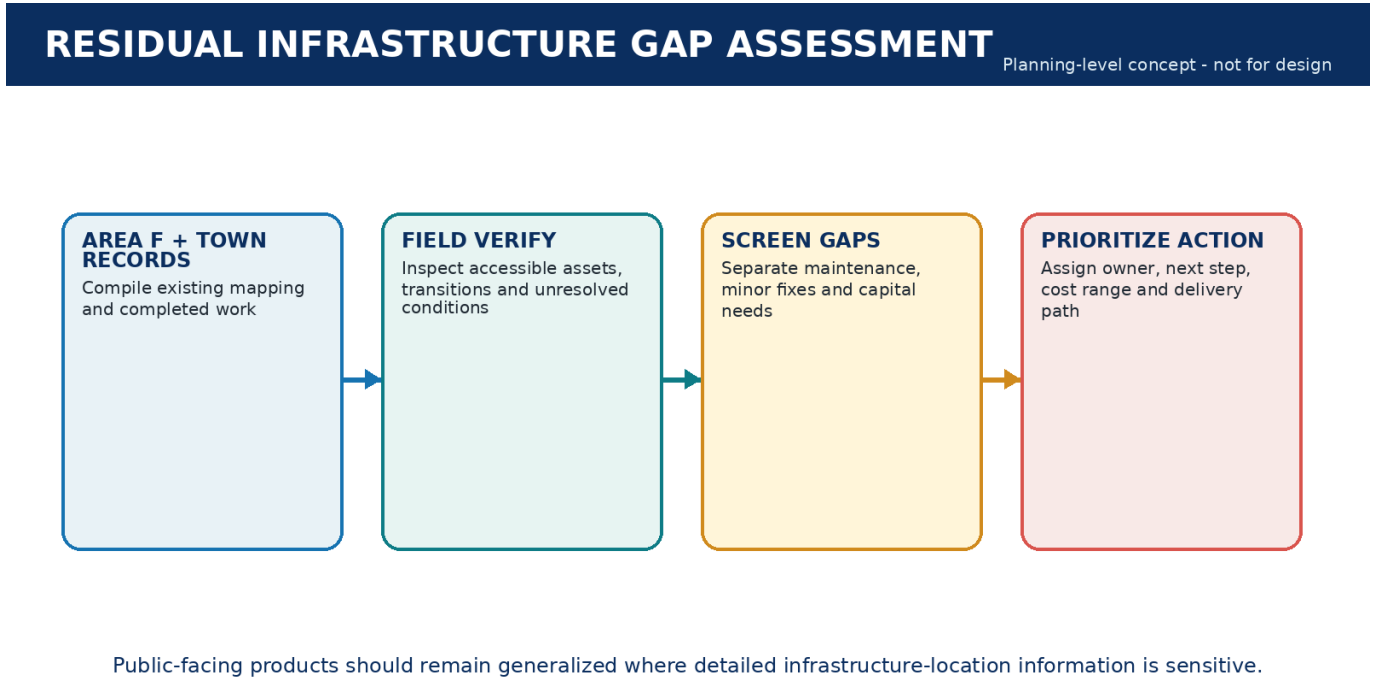
WHY IT MATTERS

A feasible system could reduce chronic tidal flooding, but cost, navigation, water quality and permitting could be major constraints.

RECOMMENDED NEXT STEP

Conduct only a high-level fatal-flaw and economic screening before considering a full feasibility study.

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



THE IDEA

Identify remaining pipe, outfall, bulkhead-transition and drainage gaps after ongoing Town improvements. Public-facing results would remain generalized where infrastructure details are sensitive.

In plain language: Make a punch list of what still leaks, overtops or connects in ways that cause flooding after completed drainage and shoreline work.

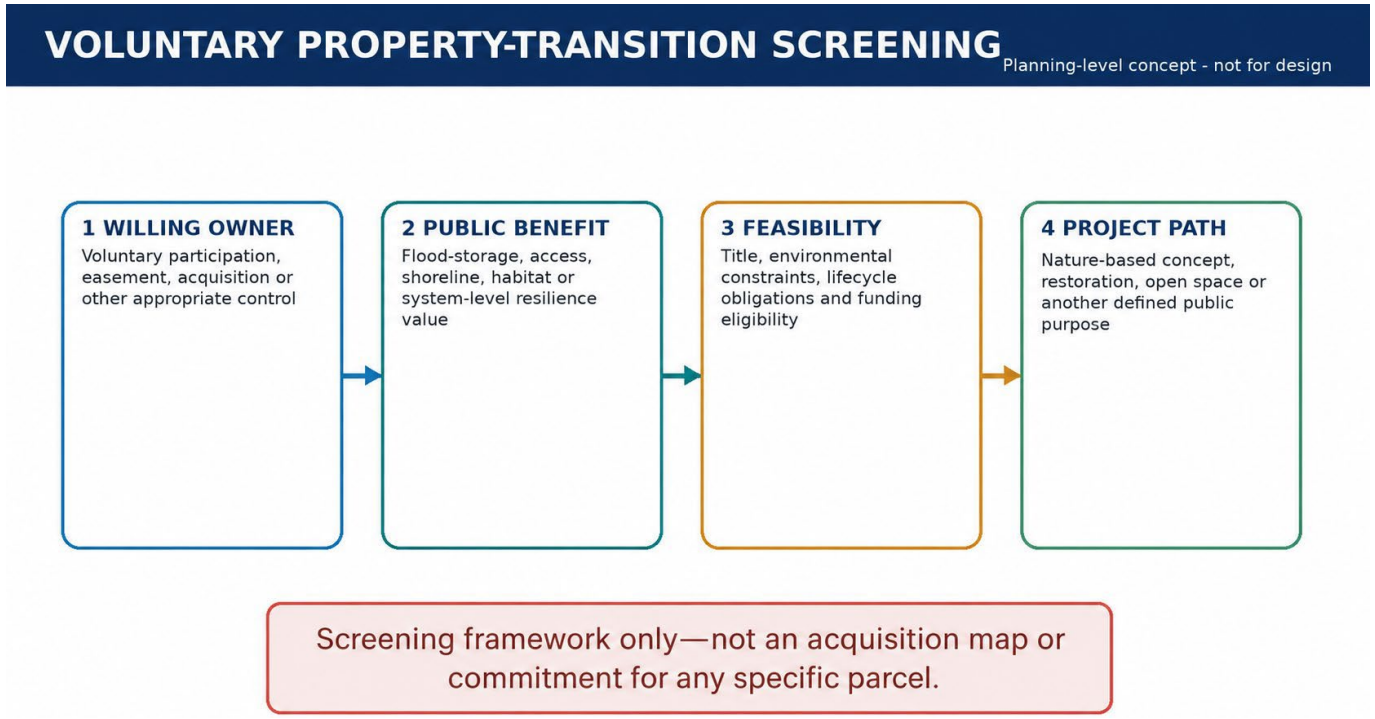
WHY IT MATTERS

Close remaining flood pathways and make the most of improvements the Town has already completed or programmed.

RECOMMENDED NEXT STEP

Combine the assessment with the Area F mapping review and prepare a concise residual-gap action list.

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



THE IDEA

Evaluate voluntary acquisition, conservation easements or property transitions at selected low-lying parcels where public control would support marsh, flood storage, shoreline restoration or another defined resilience use.

In plain language: Voluntary only. Look at whether select flood-prone parcels could become open space, wetland/flood storage or future nature-based project areas.

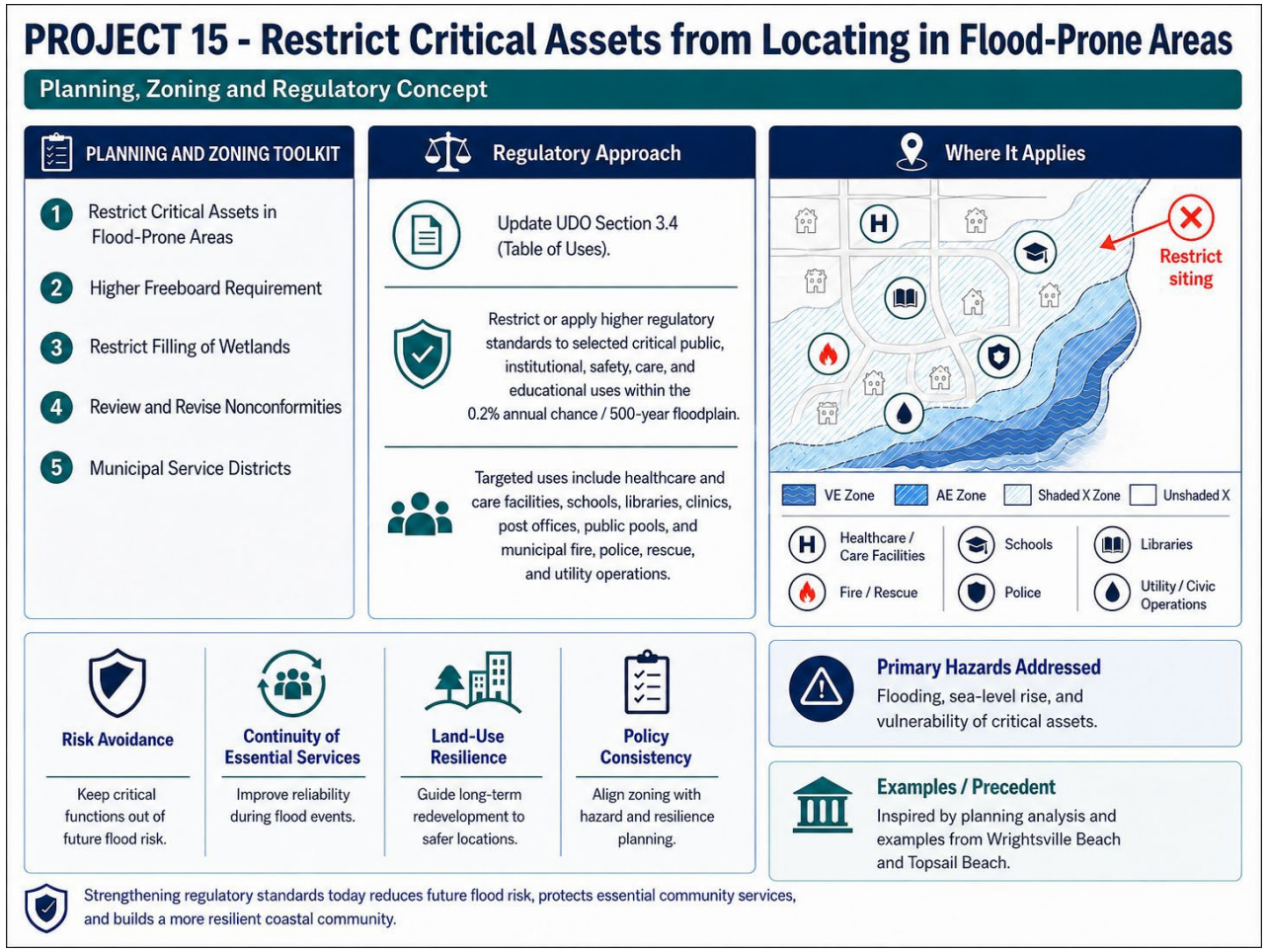
WHY IT MATTERS

Reduce long-term exposure and preserve space for natural flood-storage and nature-based projects.

RECOMMENDED NEXT STEP

Set screening criteria and evaluate candidate parcels. Contact owners only after Town policy direction and a viable funding source are established.

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



THE IDEA

Update the UDO to restrict selected healthcare, safety, educational and other critical uses in the Shaded X / 500-year floodplain or require higher standards for those uses.

In plain language: Avoid locating future critical services in flood-prone places where disruption would have serious community consequences.

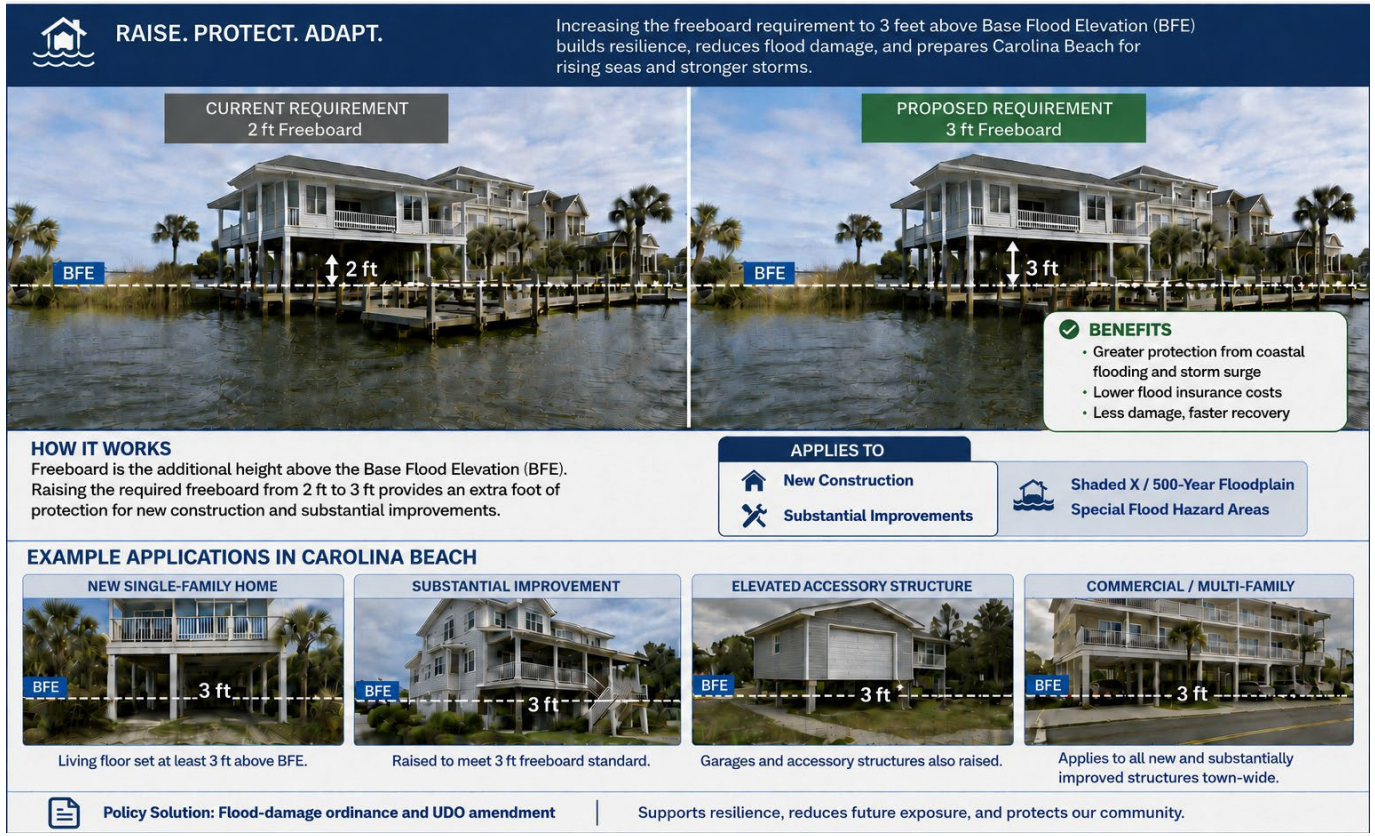
WHY IT MATTERS

Avoid creating new high-consequence vulnerabilities and protect continuity of essential public services.

RECOMMENDED NEXT STEP

Complete planning and legal review, prepare draft UDO amendments and conduct the required public process.

PROJECT 16 | Higher Freeboard Requirement



THE IDEA

Consider increasing required freeboard from 2 feet to 3 feet above Base Flood Elevation, updating height allowances and extending elevation standards into the Shaded X / 500-year floodplain.

In plain language: Freeboard is extra elevation above the mapped flood level. This considers building higher without creating an unintended height penalty.

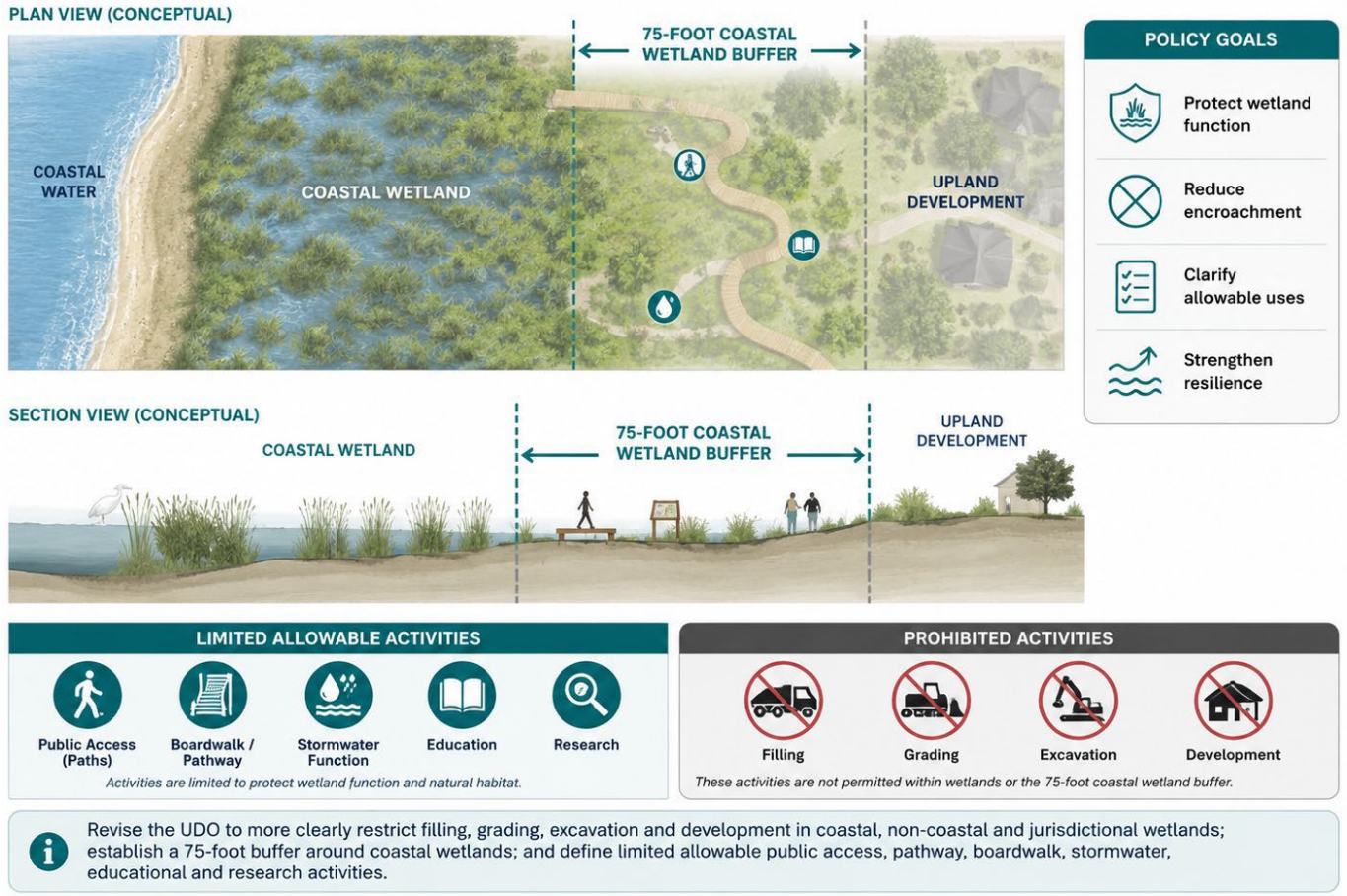
WHY IT MATTERS

Reduce future flood damage while allowing property owners to build higher without an unintended height penalty.

RECOMMENDED NEXT STEP

Prepare ordinance alternatives and conduct stakeholder and public review with the flood-map reassessment.

PROJECT 17 | Restrict the Filling of Wetlands



THE IDEA

Clarify restrictions on filling, grading, excavation and development in wetlands. Consider a 75-foot coastal wetland buffer and limited activities such as public access, stormwater work, education and research.

In plain language: Filling wetlands can remove natural flood storage and push water elsewhere. This protects wetland storage and water quality.

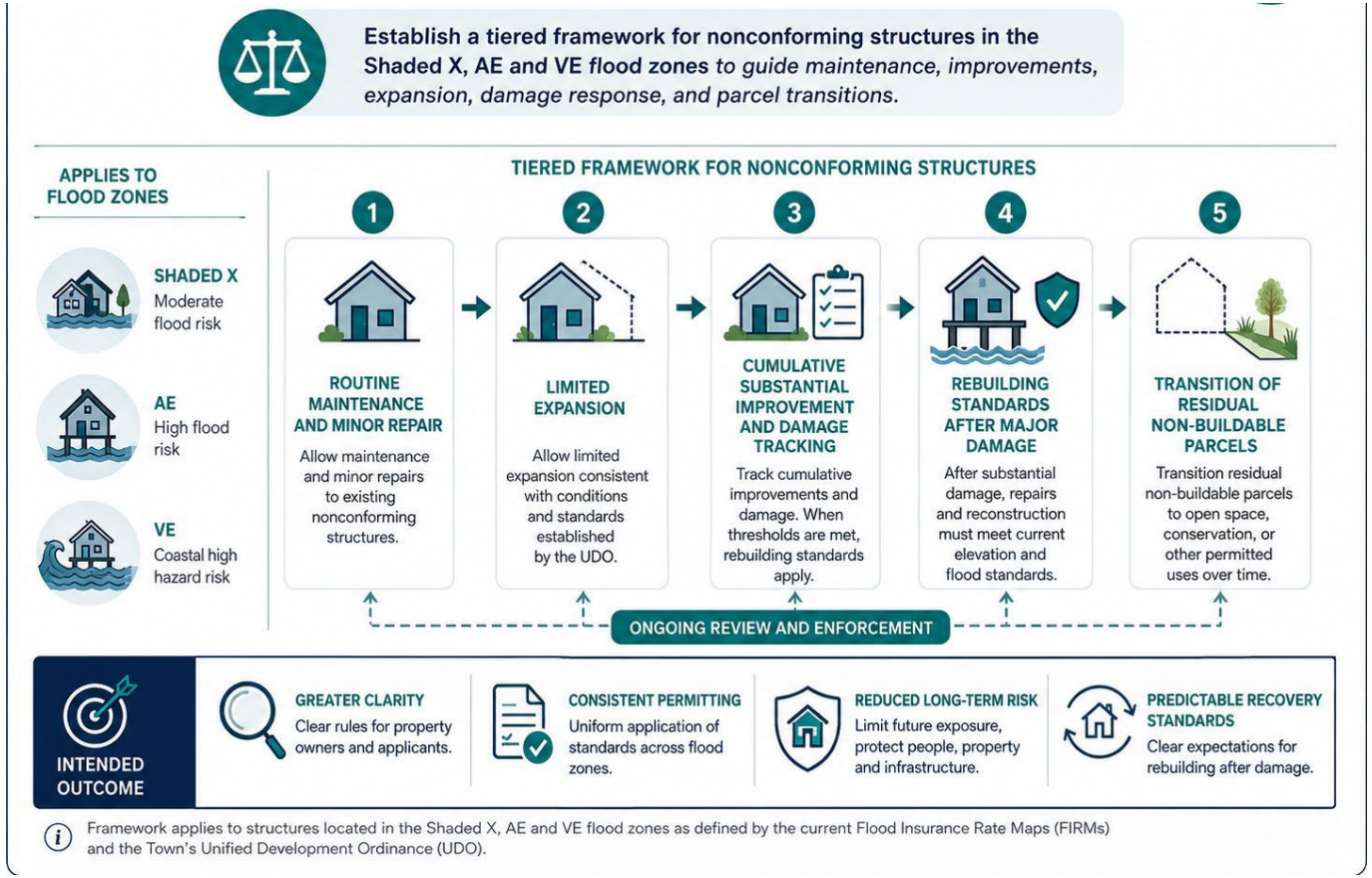
WHY IT MATTERS

Protect natural flood storage and water quality while reducing flood displacement caused by fill.

RECOMMENDED NEXT STEP

Complete legal and planning review, develop mapped and text alternatives and conduct the required public process.

PROJECT 18 | Review and Revise Nonconformities



THE IDEA

Develop tiered rules for nonconforming structures in the Shaded X, AE and VE flood zones, including cumulative improvement and damage, limited expansion and rebuilding standards.

In plain language: Clarify what older structures that do not meet today's rules can maintain, expand or rebuild after damage in flood-prone areas.

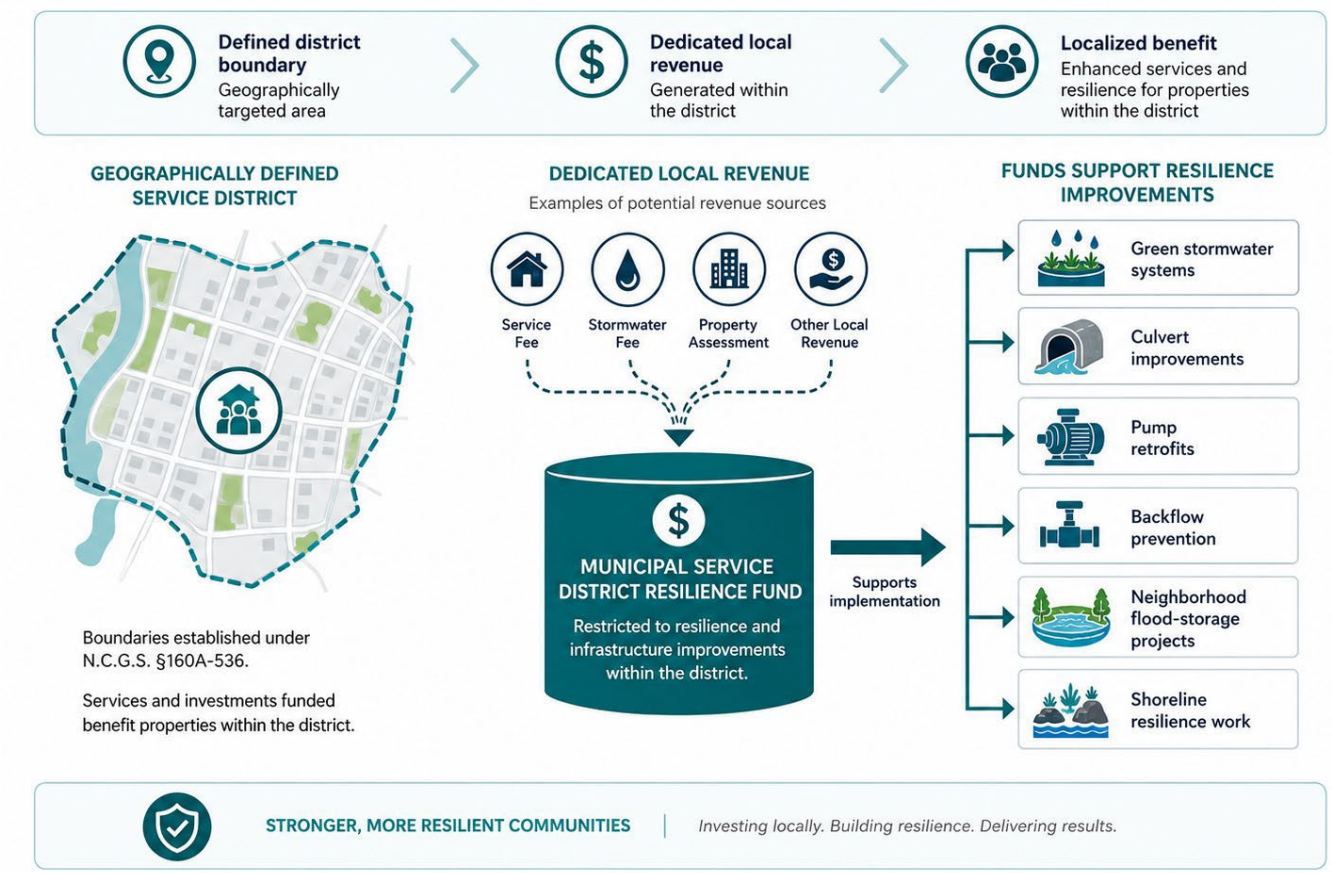
WHY IT MATTERS

Gradually reduce the most vulnerable conditions and improve resilience when properties rebuild after damage.

RECOMMENDED NEXT STEP

Conduct legal review and prepare tiered ordinance options and administrative procedures.

PROJECT 19 | Municipal Service Districts



THE IDEA

Explore geographically defined districts that could generate dedicated local revenue for enhanced stormwater, drainage, shoreline and flood-protection services within those areas.

In plain language: An MSD is a defined area that could raise dedicated local revenue for enhanced drainage, shoreline, flood-protection and maintenance services.

WHY IT MATTERS

Create a transparent funding stream for localized projects, ongoing maintenance and local grant match.

RECOMMENDED NEXT STEP

Complete municipal finance and legal feasibility review and test illustrative district scenarios.

What happens after tonight

1

Review public input

Combine comments from tonight with the online survey results.

2

Refine the strategy

Revise concepts or supporting text where the feedback or technical review warrants changes.

3

Complete the final report

Post the final Resilience Strategy after review and revisions are complete.

4

Advance selected concepts

Pursue funding, feasibility, design or policy review as opportunities become available.

The Project Portfolio will remain a living document and can be updated as concepts are funded, refined, completed or removed.

Questions and discussion

01 Which concepts should the Town focus on first?

02 Are there important locations or concerns that the portfolio does not capture?

03 What should the Town consider as these concepts are refined?



Thank you for helping shape Carolina Beach's final Resilience Strategy.

Appendix: Individual asset scoring matrix

Detailed Vulnerability Scoring Matrix for Individual Assets

Carolina Beach

EXPOSURE SCORE (0–3)		SENSITIVITY SCORE (0–3)		ADAPTIVE CAPACITY SCORE (0–3)		COMPOSITE VULNERABILITY SCORE (0–6)	
0–1	Low	0–1	Low	0–1	Low Capacity	0–2	Low
2	Moderate	2	Moderate	2	Moderate Capacity	3–4	Medium
3	High	3	High	3	High Capacity	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 provides the full planning-level exposure, sensitivity, adaptive capacity and composite vulnerability score matrix.

Appendix: Highest-priority asset map

vulnerability and provide a clear connection between the scoring results and the resilience strategies and candidate projects developed later in the RCCP process.

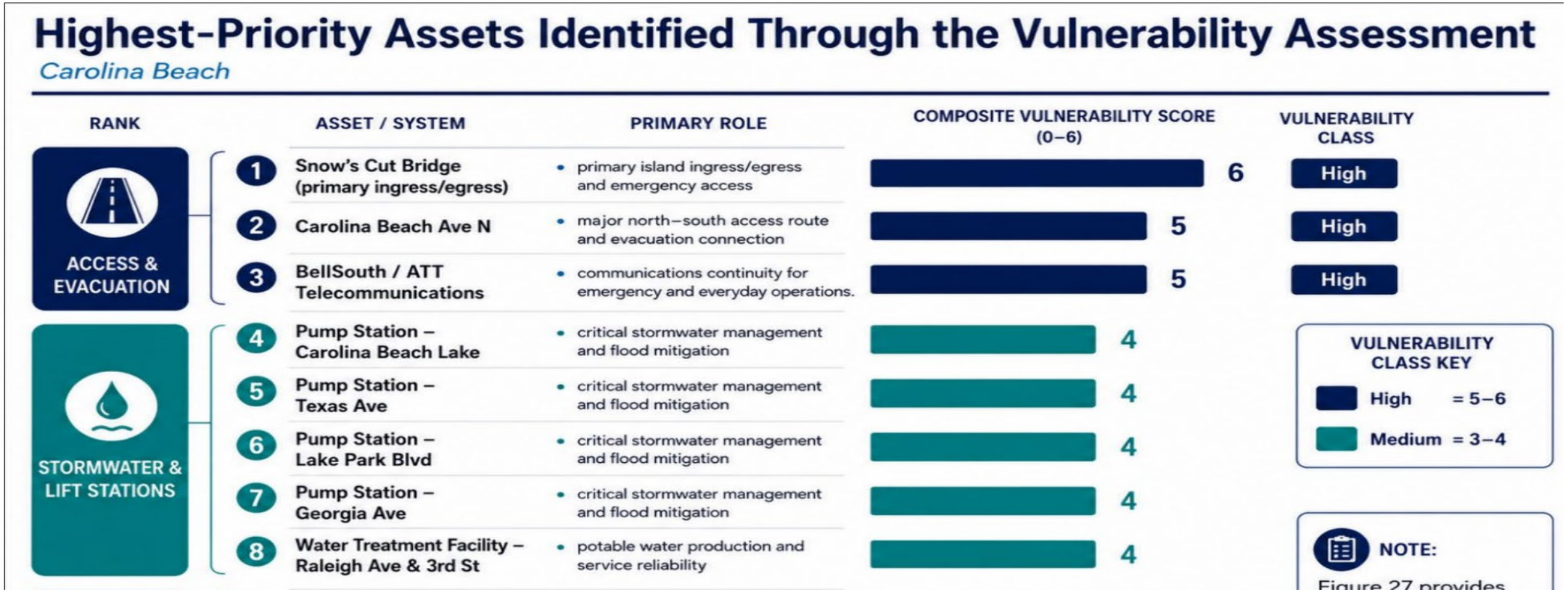


Figure 28 highlights the highest-scoring individual facilities, corridors and infrastructure identified through the vulnerability assessment.