

CURRITUCK COUNTY

BEACH MANAGEMENT PLAN UPDATE:

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MAY 26, 2026



COASTAL
PROTECTION
ENGINEERING

LAYOUT OF THE BEACH MANAGEMENT PLAN

- **Section 1 – Introduction:** General information, project location, and goals
- **Section 2 – Coastal Hazards and Vulnerability:** Evaluated coastal storms, long-term erosion, shoreline change projections, and recreational beach width. Creation of vulnerability matrix.
- **Section 3 – Beach Management Concepts:** Relocation of vulnerable oceanfront structures, small-scale beach nourishment (truck haul), large-scale beach nourishment, use of coastal structures with beach nourishment, sand fencing and dune planting, beach bulldozing
- **Section 4 – Feasibility Analysis:** Evaluated four (4) separate reaches - Central Reserve/Refuge Reach, North Corolla Reach, Spindrift Reach, South Pine Island Reach
- **Section 5 – Proposed Beach Management Plan:** Current draft only includes considerations and requests for further input before finalizing the Plan



Meeting Agenda:

- Presentation (25 Minutes)
 - Review Goals
 - Summarize Vulnerability Matrix
 - Briefing on the Feasibility Analysis
 - Next Steps / Additional Considerations
- Question & Answers (25 Minutes)

COUNTY GOALS

Overall goal: preserve tax revenues (sales taxes, bed taxes, and ad valorem taxes) generated as a direct result of having a healthy beach.

To preserve these tax revenues both directly and indirectly, the County's Beach Management Plan focuses on maintaining the beaches in such a way as to:

- 1) Reduce risk to oceanfront properties from coastal storms
- 2) Reduce the risk of dune breaching which can cause considerable flooding of beachfront communities
- 3) Protect public roads/emergency evacuation corridors
- 4) Reduce risk to oceanfront properties from long-term erosion
- 5) Provide sufficient recreational beaches that promote and encourage tourism

HAZARDS & VULNERABILITY

- Extreme Storm Analysis (Section 2.1.2)
- D3D Storm Simulations (Section 2.1.3)
- XBeach 1D Storm Analysis (Section 2.1.4.1)
- XBeach 2D Storm Analysis – Dune Breaching/Overtopping (Section 2.1.4.2)
- Long-Term Shoreline Change Projections (Section 2.2.1)
- Volume Change Analysis (Section 2.2.2)
- Evaluation of Useable Beach Width (Section 2.3)

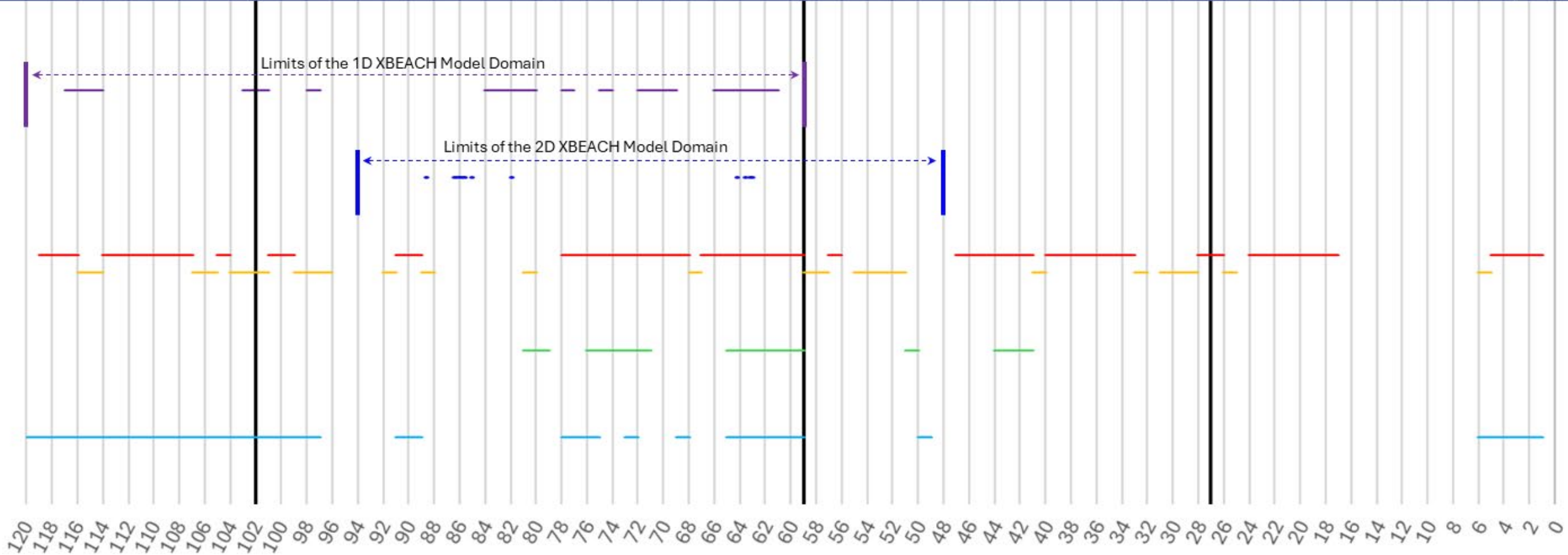


Pine Island Section

Corolla Section

Reserve/Refuge Section

Carova Section



Baseline Stations Along Currituck County Beaches

- Storm Vulnerability
- Breach/Overtop
- High Erosion
- Erosion
- Shoreline Change
- Narrow Recreational Beach Width

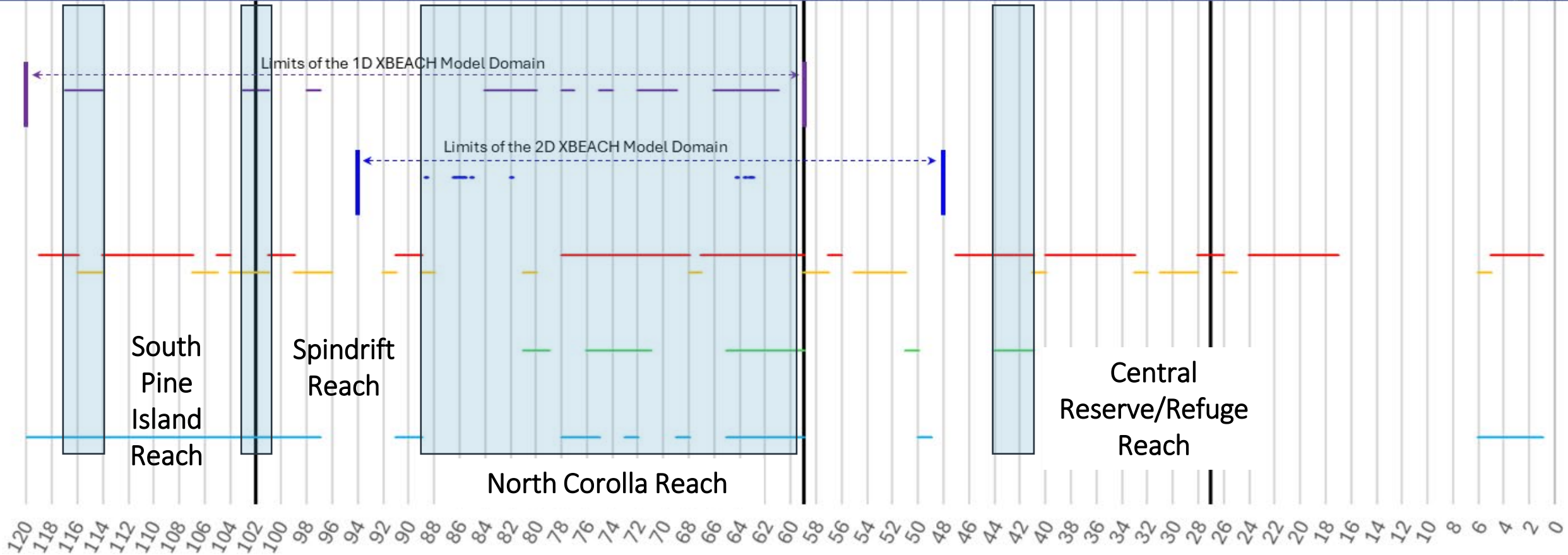


Pine Island Section

Corolla Section

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Baseline Stations Along Currituck County Beaches

- Storm Vulnerability
- Breach/Overtop
- High Erosion
- Erosion
- Shoreline Change
- Narrow Recreational Beach Width

FEASIBILITY ANALYSIS

- Problem Statement and Objectives
- Separated North of Horse Gate and South Of Horse Gate
- 1 Reach North of the Horse Gate
- 3 Reaches South of the Horse Gate
- Multiple alternative management concepts developed for each Reach
- Evaluated each alternative using 5 feasibility criteria (TELOS)

TELOS METHOD

- T (Technical): Performance, Reliability, Compatibility with Existing Protocols
- E (Economic/Financial): Initial and Life-Cycle Costs, Benefits
- L (Legal/Regulatory/Environmental): Legal Challenges, Environmental Permitting, Risk to Public or Ecosystem.
- O (Operational): Allows for Normal Operations, Requirement for Maintenance
- S (Schedule): Time to Implement

FEASIBILITY ANALYSIS (SECTION 4)

- 4.1 North of Horse Gate
 - 4.1.1 Problem Statement and Objectives
 - 4.1.2 Alternatives
 - 4.1.3 Feasibility Analysis
 - 4.1.4 Summary
- 4.2 South of Hose Gate
 - 4.2.1 – Problem Statement and Objectives
 - 4.2.2 – North Corolla Reach
 - Alternatives, Feasibility Analysis, Summary
 - 4.2.3 – Spindrift Reach
 - Alternatives, Feasibility Analysis, Summary
 - 4.2.4 – South Pine Island Reach
 - Alternatives, Feasibility Analysis, Summary

FEASIBILITY ANALYSIS






































CENTRAL RESERVE/REFUGE REACH



- Alternative 1: No Action Alternative
- Alternative 2: Buyouts and Removal of Threatened Structures
- Alternative 3: Beach Nourishment

FEASIBILITY ANALYSIS

CENTRAL RESERVE/REFUGE REACH

BEACH MANAGEMENT PLAN – ALTERNATIVE FEASIBILITY ANALYSIS (ALTERNATE)				
Evaluation Criteria	Alternative 1 No Action Alternative	Alternative 2 Buyouts and Removal of Threatened Structures	Alternative 3 Beach Nourishment	Description of Ranking Criteria
 T - Technical Performance, reliability, compatibility with existing protocols	 Low	 High	 Moderate	<ul style="list-style-type: none">  Does not satisfy any of the goals in the Problem Statement.  May satisfy some goals in the Problem Statement but does not satisfy all of the goals over a 30-year planning horizon.  Likely to address all goals in the Problem Statement for the 30-year planning horizon.
 E - Economic/Financial Initial and Life-Cycle Costs, benefits	 Low	 High	 Low	<ul style="list-style-type: none">  30-year life cycle cost anticipated to exceed the benefits.  30-year life cycle benefits anticipated to exceed the costs.
 L - Legal/Regulatory/Environmental Legal challenges, environmental permitting, risk to public or ecosystem	 Moderate	 Low	 Moderate	<ul style="list-style-type: none">  Likely to face permitting or legal challenges and/or may have long-term adverse environmental impacts.  Short-term environmental impacts but no long-term adverse environmental impacts anticipated. Not likely to face legal or permitting challenges.  Minimal environmental or legal objections anticipated.
 O - Operational Allows for normal operations, requirement for maintenance	 Low	 High	 Moderate	<ul style="list-style-type: none">  Likely to result in a loss of function of normal beach operations.  Allows for normal beach operations other than temporary construction efforts. Requires long-term maintenance.  Allows for normal beach operations other than temporary construction efforts. Does not require long-term maintenance.
 S - Schedule Time to implement	 High	 High	 Low	<ul style="list-style-type: none">  Initial implementation expected to require more than 1 year. Requires long-term maintenance.  Initial implementation expected to be completed in less than 1 year. Requires some long-term maintenance.  Initial implementation expected to be completed in less than 1 year. Does not require long-term maintenance.
RANKING LEGEND:	 High Favorable / Best	 Moderate Acceptable / Trade-offs	 Low Unfavorable / Significant Concerns	Note: Ratings are relative and based on qualitative assessment of anticipated performance over the 30-year planning horizon.

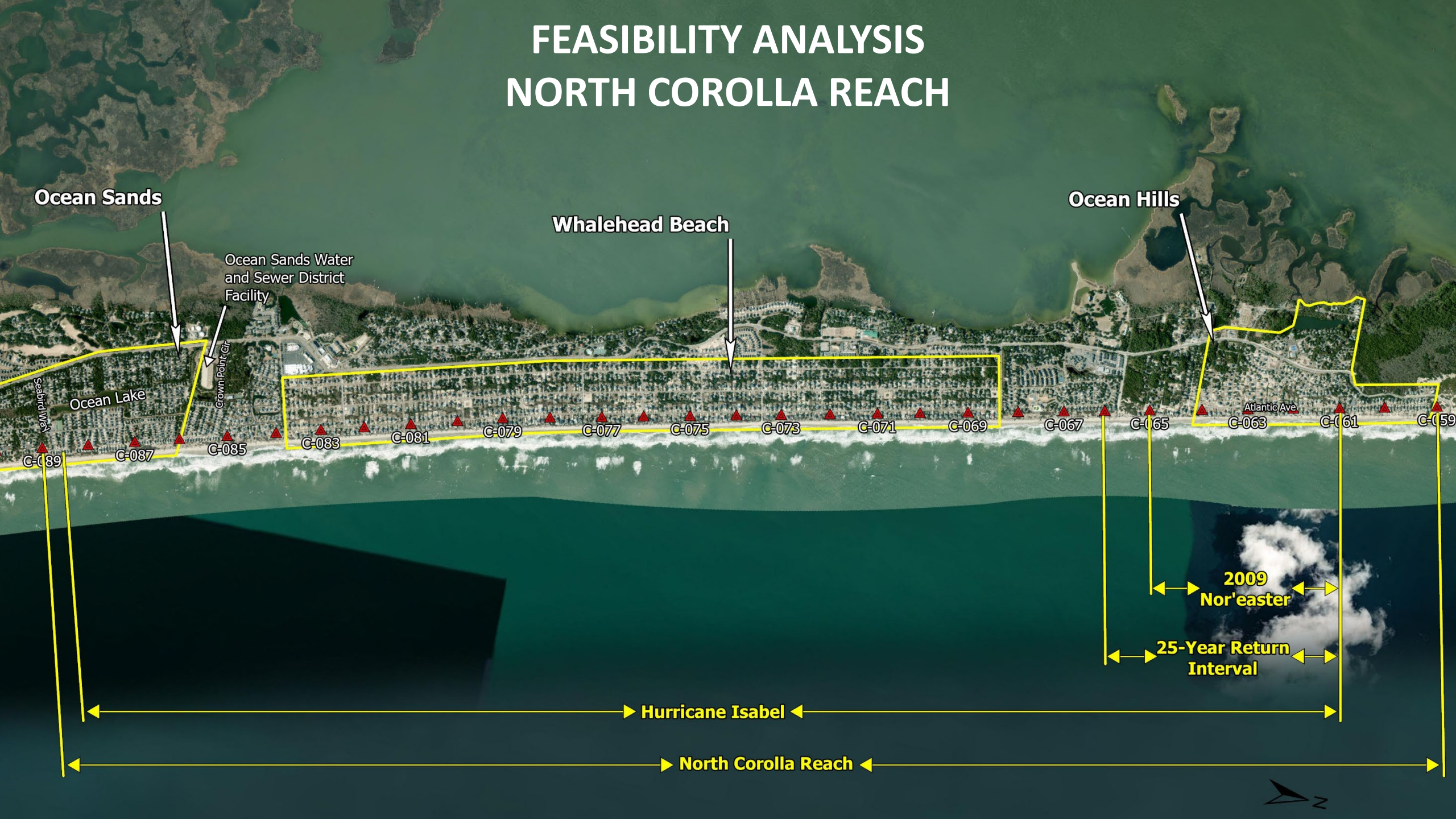
FEASIBILITY ANALYSIS

CENTRAL RESERVE/REFUGE REACH

Recommendation: The recommended alternative for beach management along the Central Reserve/Refuge Reach is Alternative 2 – Buyouts and Removal of Threatened Structures.

- Most likely to address all goals
- Allows for continuous operations without the need for maintenance
- Benefits of Alternative 2 anticipated to outweigh the costs
- Cost of Alternative 1 and 3 anticipated to outweigh the benefits

FEASIBILITY ANALYSIS NORTH COROLLA REACH























FEASIBILITY ANALYSIS NORTH COROLLA REACH

- Alternative 1: No Action Alternative
- Alternative 2: Sand Fencing and Dune Vegetation Program
- Alternative 3: Beach Nourishment



FEASIBILITY ANALYSIS

NORTH COROLLA REACH

BEACH MANAGEMENT PLAN – ALTERNATIVE FEASIBILITY ANALYSIS				
Evaluation Criteria	Alternative 1 No Action Alternative	Alternative 2 Sand Fencing and Dune Vegetation Program	Alternative 3 Beach Nourishment	Description of Ranking Criteria
 T - Technical Performance, reliability, compatibility with existing protocols	 Low	 Low	 High	<ul style="list-style-type: none"> ● Does not satisfy any of the goals in the Problem Statement. ● May satisfy some goals in the Problem Statement but does not satisfy all of the goals over a 30-year planning horizon. ● Likely to address all goals in the Problem Statement for the 30-year planning horizon.
 E - Economic/Financial Initial and Life-Cycle Costs, benefits	 Low	 Low	 High	<ul style="list-style-type: none"> ● 30-year life cycle cost anticipated to exceed the benefits. ● 30-year life cycle benefits anticipated to exceed the costs.
 L - Legal/Regulatory/ Environmental Legal challenges, environmental permitting, risk to public or ecosystem	 Moderate	 Moderate	 Moderate	<ul style="list-style-type: none"> ● Likely to face permitting or legal challenges and/or may have long-term adverse environmental impacts. ● Short-term environmental impacts but no long-term adverse environmental impacts anticipated. Not likely to face legal or permitting challenges. ● Minimal environmental or legal objections anticipated.
 O - Operational Allows for normal operations, requirement for maintenance	 Low	 Low	 Moderate	<ul style="list-style-type: none"> ● Likely to result in a loss of function of normal beach operations. ● Allows for normal beach operations other than temporary construction efforts. Requires long-term maintenance. ● Allows for normal beach operations other than temporary construction efforts. Does not require long-term maintenance.
 S - Schedule Time to implement	 High	 Moderate	 Low	<ul style="list-style-type: none"> ● Initial implementation expected to require more than 1 year. Requires long-term maintenance. ● Initial implementation expected to be completed in less than 1 year. Requires some long-term maintenance. ● Initial implementation expected to be completed in less than 1 year. Does not require long-term maintenance.

RANKING LEGEND:



High Favorable / Best



Moderate Acceptable / Trade-offs



Low Unfavorable / Significant Concerns

Note: Ratings are relative and based on qualitative assessment of anticipated performance over the 30-year planning horizon.

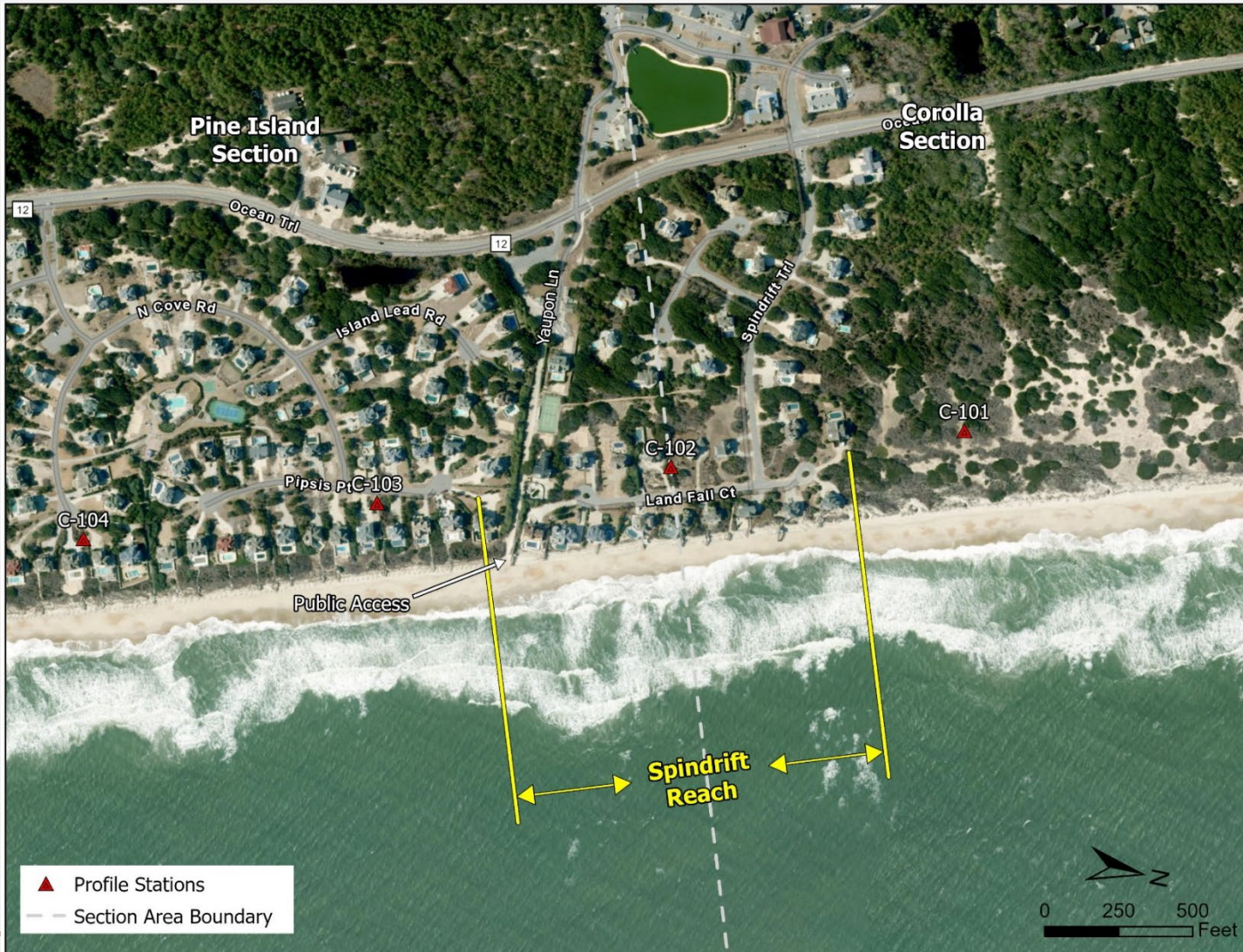
FEASIBILITY ANALYSIS

NORTH COROLLA REACH

Recommendation: The recommended alternative for beach management along the North Corolla Reach is Alternative 3 – Beach Nourishment.

- Only alternative that addresses all goals
- Benefits of Alternative 3 anticipated to outweigh the costs
- Cost of Alternative 1 and 2 anticipated to outweigh the benefits








































FEASIBILITY ANALYSIS SPINDRIFT REACH



- Alternative 1: No Action Alternative
- Alternative 2: Buyouts and Removal of Threatened Structures
- Alternative 3: Beach Nourishment
- Alternative 4: Beach Nourishment with Coastal Structures

FEASIBILITY ANALYSIS

SPINDRIFT REACH

BEACH MANAGEMENT PLAN – ALTERNATIVE FEASIBILITY ANALYSIS					
Evaluation Criteria	Alternative 1 No Action Alternative	Alternative 2 Buyouts and Removal of Threatened Oceanfront	Alternative 3 Beach Nourishment	Alternative 4 Beach Nourishment with Coastal Structures	Description of Ranking Criteria
 T - Technical Performance, reliability, compatibility with existing protocols	 Low	 High	 High	 High	<ul style="list-style-type: none">  Does not satisfy any of the goals in the Problem Statement.  May satisfy some goals in the Problem Statement but does not satisfy all of the goals over a 30-year planning horizon.  Likely to address all goals in the Problem Statement for the 30-year planning horizon.
 E - Economic/Financial Initial and Life-Cycle Costs, benefits	 Low	 Low	 Low	 Low	<ul style="list-style-type: none">  30-year life cycle cost anticipated to exceed the benefits.  30-year life cycle benefits anticipated to exceed the costs.
 L - Legal/Regulatory/Environmental Legal challenges, environmental permitting, risk to public or ecosystem	 Moderate	 Low	 Moderate	 Low	<ul style="list-style-type: none">  Likely to face permitting or legal challenges and/or may have long-term adverse environmental impacts.  Short-term environmental impacts but no long-term adverse environmental impacts anticipated. Not likely to face legal or permitting challenges.  Minimal environmental or legal objections anticipated.
 O - Operational Allows for normal operations, requirement for maintenance	 Low	 High	 Moderate	 Moderate	<ul style="list-style-type: none">  Likely to result in a loss of function of normal beach operations.  Allows for normal beach operations other than temporary construction efforts. Requires long-term maintenance.  Allows for normal beach operations other than temporary construction efforts. Does not require long-term maintenance.
 S - Schedule Time to implement	 High	 High	 Low	 Low	<ul style="list-style-type: none">  Initial implementation expected to require more than 1 year. Requires long-term maintenance.  Initial implementation expected to be completed in less than 1 year. Requires some long-term maintenance.  Initial implementation expected to be completed in less than 1 year. Does not require long-term maintenance.

RANKING LEGEND:



High Favorable / Best



Moderate Acceptable / Trade-offs



Low Unfavorable / Significant Concerns

Note: Ratings are relative and based on qualitative assessment of anticipated performance over the 30-year planning horizon.

FEASIBILITY ANALYSIS

SPINDRIFT REACH

Recommendation: The feasibility assessment of the four alternatives considered did not result in a clear recommended alternative.

- Alternatives 2, 3, and 4 anticipated to achieve the goals
- Costs of all 4 Alternatives anticipated to outweigh the benefits
- Alternatives 2 and 4 may face permitting and/or legal challenges
- Alternative 2 scored better than 3 and 4 in terms of Operational and Schedule
- May require additional analysis
- Continue monitoring small-scale truck haul projects conducted in 2023 to provide temporary shore protection.

FEASIBILITY ANALYSIS











































SOUTH PINE ISLAND REACH



- Alternative 1: No Action Alternative
- Alternative 2: Sand Fencing and Dune Vegetation Program
- Alternative 3: Beach Nourishment
- Alternative 4: Beach Nourishment with Coastal Structures

FEASIBILITY ANALYSIS

SOUTH PINE ISLAND REACH

BEACH MANAGEMENT PLAN – ALTERNATIVE FEASIBILITY ANALYSIS					
Evaluation Criteria	Alternative 1 No Action Alternative	Alternative 2 Sand Fencing and Dune Vegetation Program	Alternative 3 Beach Nourishment	Alternative 4 Beach Nourishment with Coastal Structures	Description of Ranking Criteria
 T - Technical Performance, reliability, compatibility with existing protocols	 Low	 Low	 High	 High	<ul style="list-style-type: none">  Does not satisfy any of the goals in the Problem Statement.  May satisfy some goals in the Problem Statement but does not satisfy all of the goals over a 30-year planning horizon.  Likely to address all goals in the Problem Statement for the 30-year planning horizon.
 E - Economic/Financial Initial and Life-Cycle Costs, benefits	 Low	 Low	 Low	 Low	<ul style="list-style-type: none">  30-year life cycle cost anticipated to exceed the benefits.  30-year life cycle benefits anticipated to exceed the costs.
 L - Legal/Regulatory/ Environmental Legal challenges, environmental permitting, risk to public or ecosystem	 Moderate	 Moderate	 Moderate	 Low	<ul style="list-style-type: none">  Likely to face permitting or legal challenges and/or may have long-term adverse environmental impacts.  Short-term environmental impacts but no long-term adverse environmental impacts anticipated. Not likely to face legal or permitting challenges.  Minimal environmental or legal objections anticipated.
 O - Operational Allows for normal operations, requirement for maintenance	 Low	 Low	 Moderate	 Moderate	<ul style="list-style-type: none">  Likely to result in a loss of function of normal beach operations.  Allows for normal beach operations other than temporary construction efforts. Requires long-term maintenance.  Allows for normal beach operations other than temporary construction efforts. Does not require long-term maintenance.
 S - Schedule Time to implement	 High	 Moderate	 Low	 Low	<ul style="list-style-type: none">  Initial implementation expected to require more than 1 year. Requires long-term maintenance.  Initial implementation expected to be completed in less than 1 year. Requires some long-term maintenance.  Initial implementation expected to be completed in less than 1 year. Does not require long-term maintenance.
RANKING LEGEND:	 High Favorable / Best	 Moderate Acceptable / Trade-offs	 Low Unfavorable / Significant Concerns	Note: Ratings are relative and based on qualitative assessment of anticipated performance over the 30-year planning horizon.	

FEASIBILITY ANALYSIS

SOUTH PINE ISLAND REACH

Recommendation: The feasibility assessment of the four alternatives considered did not result in a clear recommended alternative.

- Alternatives 3 and 4 anticipated to achieve the goals
- Costs of all 4 Alternatives anticipated to outweigh the benefits
- Alternative 4 may have lower 30-year cost than Alternative 3
- Alternative 4 likely to face permitting and legal challenges
- May require additional analysis
- Continue monitoring small-scale truck haul projects, sand fencing, and dune vegetation projects conducted along this Reach previously
- .

NEXT STEPS / ADDITIONAL CONSIDERATIONS

1. Update of the XBeach 2D model with 2026 conditions
2. Consideration of the Alternatives – Seeking feedback
3. Consideration of the assumptions made in the feasibility analysis – Seeking feedback
4. Additional analysis of Alternatives for Spindrifft: more accurately quantifying losses under No Action, further assessment of the 30-year life cycle cost of Alternative 2, 3, and 4, additional engineering analysis to quantify diffusion losses with and without structures
5. Additional analysis of Alternatives for South Pine Island: more accurately quantifying losses under No Action, further assessment of the 30-year life cycle cost of Alternative 2, 3, and 4, additional engineering analysis to quantify diffusion losses with and without structures
6. Thresholds: Vulnerability analyses suggest the 4 Reaches described have crossed the threshold and require action. Thresholds will be established for other areas to determine when active management is warranted
7. Detailed cost estimates to be developed for preferred alternatives.

Thank You

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