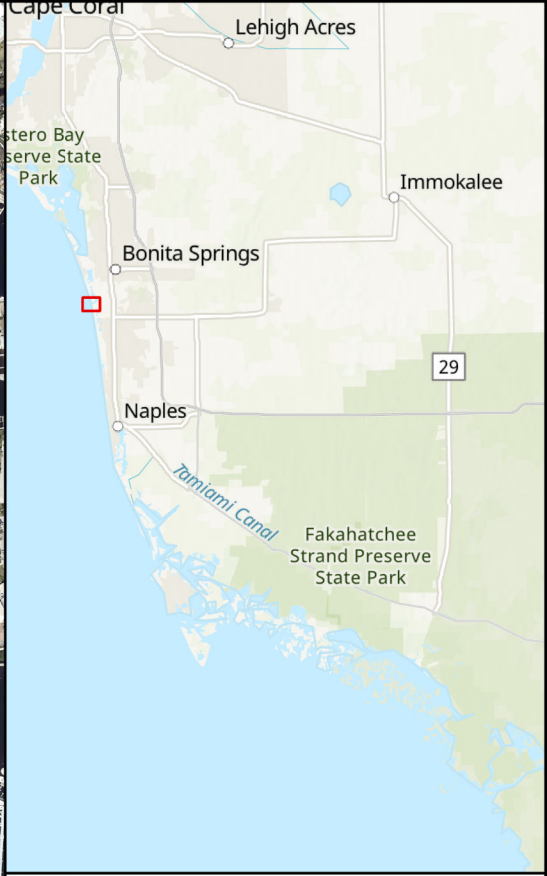


**Objective:**

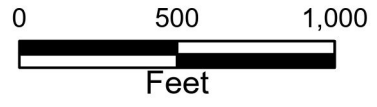
Providing added NNBS for stabilization of Wiggins Pass by:

- Protecting the mouth of Wiggins Pass with a pair of reinforced dune systems.
- Protecting the complex of marinas located on the Cocohatchee River by restoring, reinforcing, and enhancing the western island buffers area.


- Elements / Benefits:**
- Dunes:
    - Installing artificial reef-type energy attenuation structural toe at the base of the dune. The main reef structure includes periodic, short, perpendicular extensions to reduce parallel scouring and promote Gulf-side accretion near base of toe.
    - Creating long gentle-sloped, vegetated dunes to help dampen storm energy while providing high ecological function and maintaining aesthetics.
    - Installing a dune spine which would serve as a wave dampening structure should the dune be eroded during a major storm event.
  - Buffering Islands:
    - Installing wrack trap-type toe protection at the base of the impacted and vulnerable shoreline at and near the fragmented mangrove islands.
    - Nourishing the protected areas to provide for the proper mangrove platform elevation for plantings.
    - Revegetating the unvegetated areas within project footprint.
  - The proposed features will help reduce storm energy impacting Wiggins Pass without inhibiting post- flood event drainage.
  - Structural components provide for long-term stabilization and resilience.



- Legend**
- Wrack Trap
  - Artificial Reef - Wave Attenuation Structure (e.g., WADs and Eco-WADs)
  - Spine Structure
  - Anticipated Shadow Zone (i.e. Accretion Footprint)
  - Nourishment Zone and Mangrove Plantings
  - Nourishment Zone with Dune Slope Planting
  - Nourishment Zone with High Marsh Planting



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			 SOVEREIGN CONSULTING INC. 1000 Dobbs Lane, Suite 212 Cherry Hill, New Jersey 08034 (856) 325-2099	
			Final Concept Wiggins Pass	FIGURE: 1
6/19/23	DJS	All	Created By: DJS	
			Date: 06/09/23	

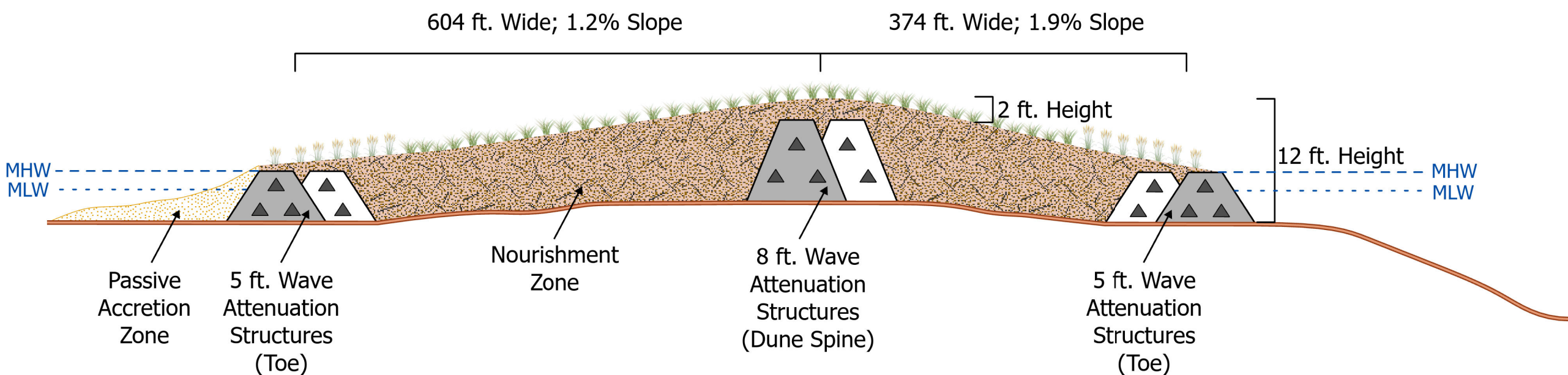


A

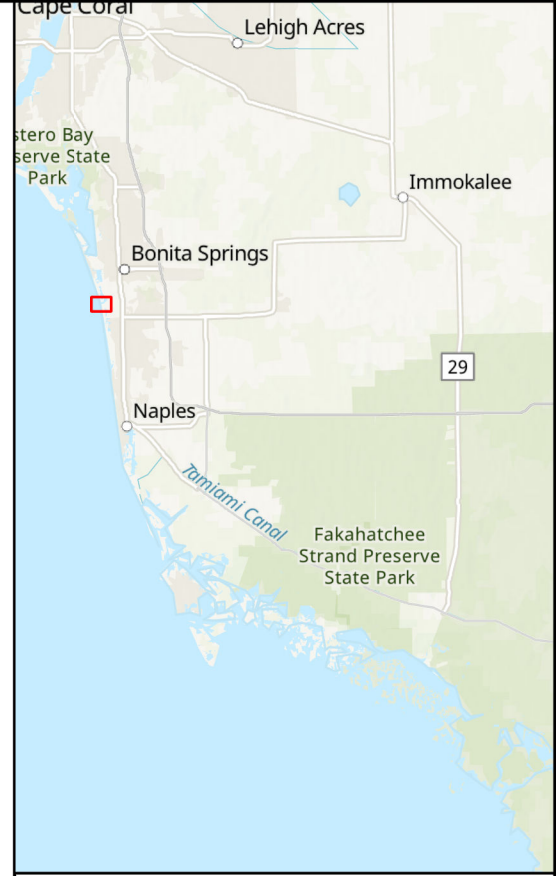
A<sup>1</sup>

Gulf of Mexico

Wiggins Pass




Profile View (nts)



- Legend
- Conceptual Existing Substrate
  - Nourishment Zone
  - Passive Accretion Zone

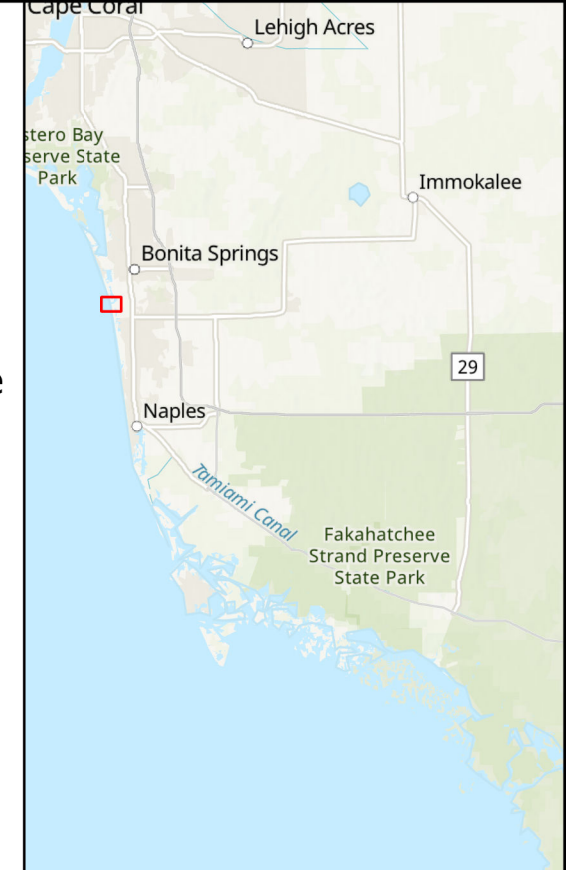
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CSRM Review With NNBF Options Collier County, Florida		
 SOVEREIGN CONSULTING INC.		
1000 Dobbs Lane, Suite 212 Cherry Hill, New Jersey 08034 (856) 325-2099		
Final Concept Wiggins Pass Spine Detail		FIGURE: 1a
Created By: DJS		Date: 06/09/23



B

B<sup>1</sup>



- Legend
- Conceptual Existing Substrate
  - Proposed Mangroves Platform
  - Nourishment Zone
  - Passive Accretion Zone
  - Pilings

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CSRMR Review With NNBF Options  
Collier County, Florida



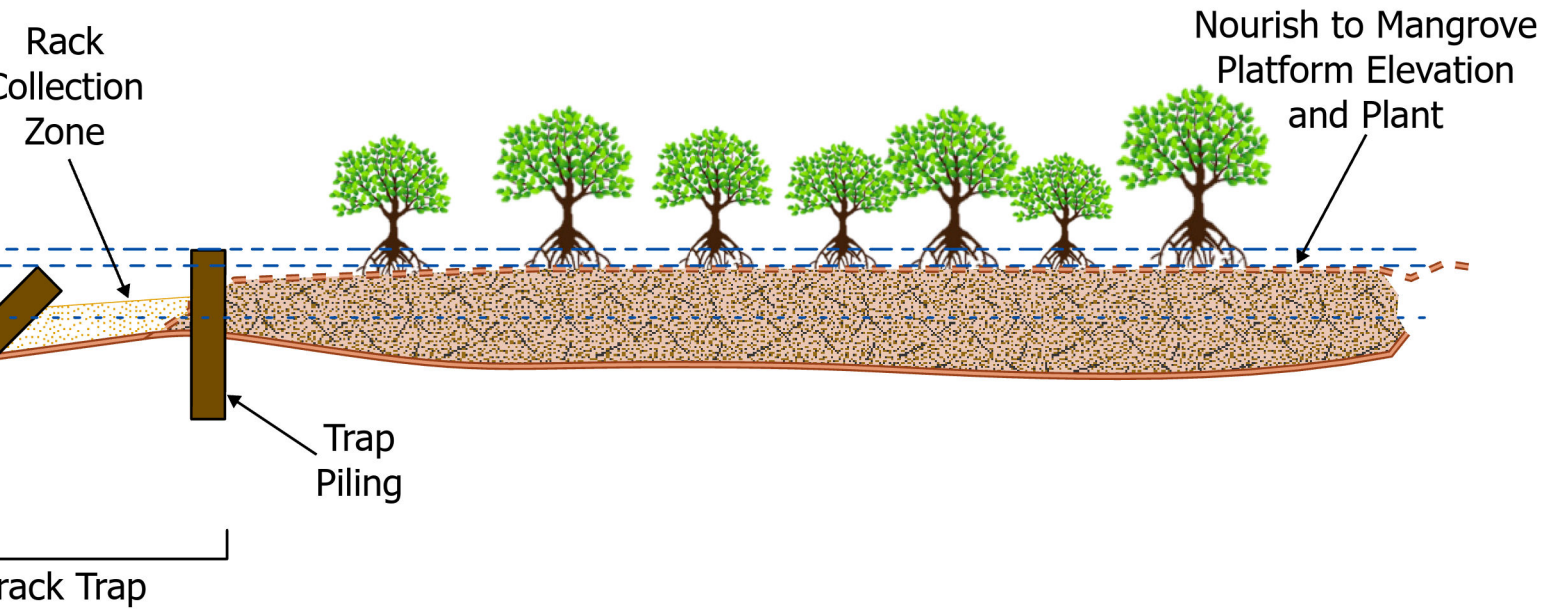
1000 Dobbs Lane, Suite 212  
Cherry Hill, New Jersey 08034  
(856) 325-2099

Final Concept  
Wiggins Pass  
Wrack Trap Detail

FIGURE:  
1b

Created By: DJS Date: 06/09/23

## Profile View (nts)



Toe / Base of Nourishment

Top of Slope of Nourishment

Predominant Wave Energy Vector

Channelward Side

3 ft. O.C.

Ramp Piling

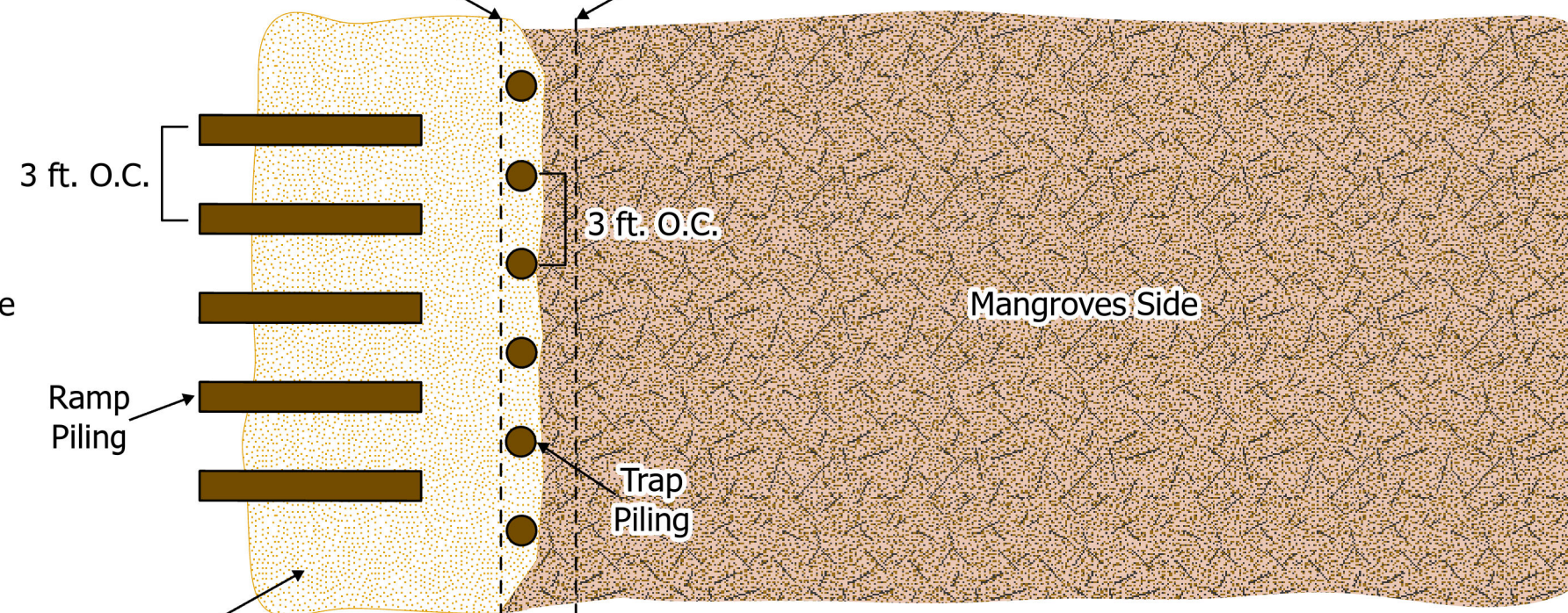
3 ft. O.C.

Trap Piling

Mangroves Side

Zone of Rack Material Entrapment

## Plan View (nts)

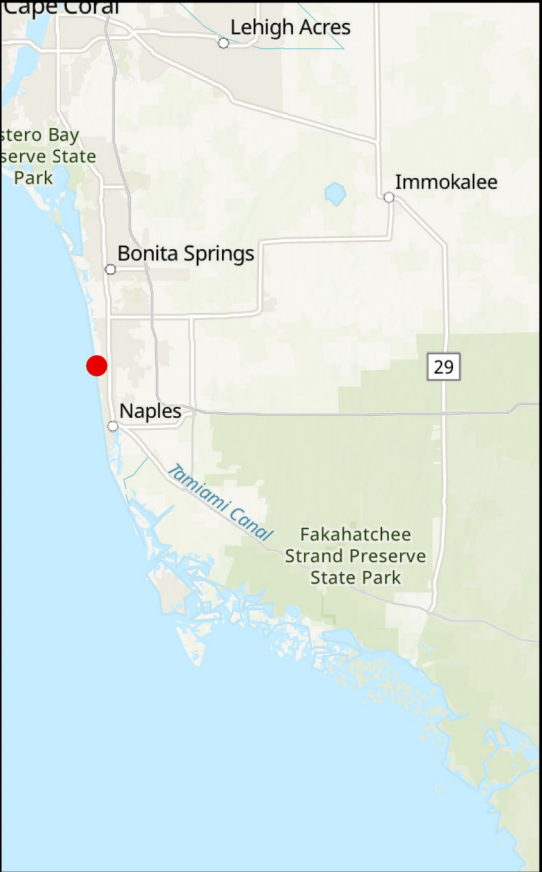




**Objective:**

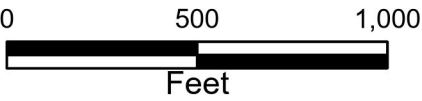
Widening of the natural coastal storm buffer. The widening of the buffer reduces the chance of a shoreline breach during severe storm event, which could put residents near Clam Bay at elevated risk.

- Elements / Benefits:**
- Nourishing the existing landside mangrove stand to 12 inches above existing mangrove platform (to allow for settlement).
  - Planting with mangroves and marsh grasses.
  - Providing greater resilience to coastal buffer.
  - Strategically providing additional mangrove habitat.




**Legend**

 Nourishment Zone and Planting Area



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			 SOVEREIGN CONSULTING INC. 1000 Dobbs Lane, Suite 212 Cherry Hill, New Jersey 08034 (856) 325-2099	
6/19/23	DJS	All	<b>Final Concept Clam Pass - South</b>	FIGURE: <b>2</b>
Created By: DJS			Date: 06/09/23	



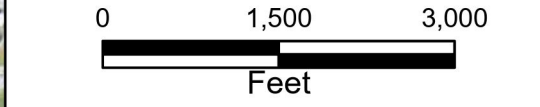
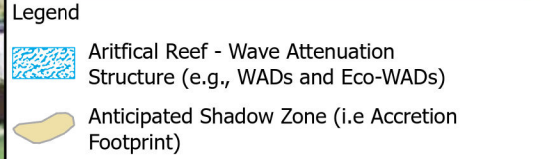
**Objective:**

Improving retention of beach nourishment by installing artificial reef structures, for:


- Attenuating parallel “shoreline drift” energies.
- Greatly reducing downdrift scouring,
- Providing for a more resilient and wider beaches.

**Elements / Benefits:**

- Retrofitting breakwater structures located immediately south of Doctors Pass with artificial reef structures to provide a more resilient and even beachfront and increase coastal habitat.
  - Installing (non-stone) artificial reef structures at selected jetties/storm water (SW) outfalls
  - Starting 10 ft. landward of jetty/SW outfall (waterward end).
  - Tying in on the south- side of existing structures.
  - Artificial reefs extending from jetties and SW outfalls will extend out at a 45° angle with the top of structure elevations not exceeding the MHW.
- Designated lengths of artificial reefs are estimated but will be designed proportional to the length of beach being protected.
- The height and position of artificial reefs will be designed to minimize any aesthetic impacts.
- Creating stable and wider beaches.
- Reducing wave energy during storm events.
- Maximizing natural low or high dune development potential.



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							SOVEREIGN CONSULTING INC.
							1000 Dobbs Lane, Suite 212 Cherry Hill, New Jersey 08034 (856) 325-2099
Final Concept Doctors Pass - South				FIGURE: 3			
Created By: DJS						Date: 06/09/23	



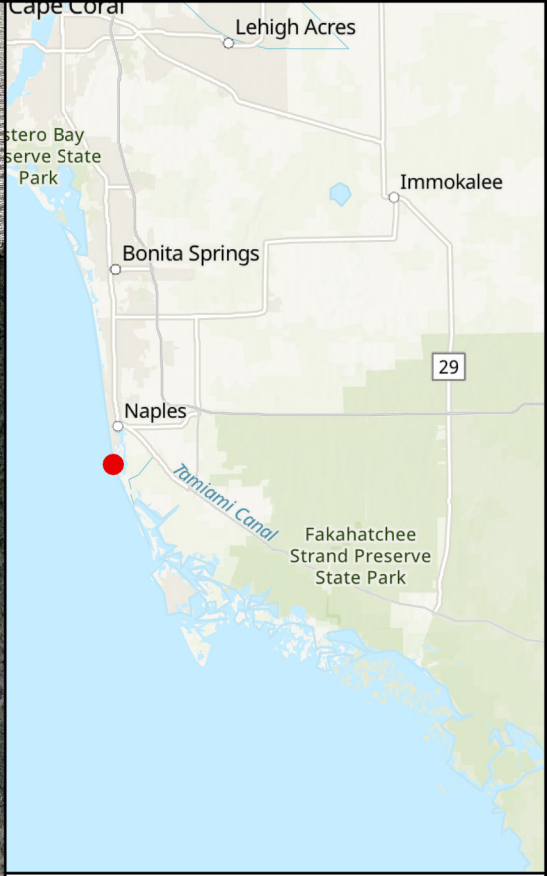
**Objective:**

Providing added NNBS for the stabilization of Gordon Pass by:

- Placing a pair of low reefs (top of reef at MHW) north and south of the pass opening.
- Placing a structural energy dampening structure at the first bend of the pass to reduce storm energy and scour.

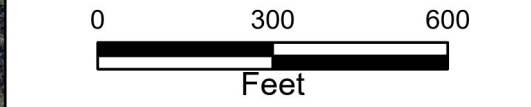
**Elements / Benefits:**

- Reef Toe Structures:
  - Two long, linear reef toe structures with periodic, short, perpendicular extensions for reducing parallel scouring and promoting Gulf-side accretion near base of toe.
  - Allowing for the landward cells to be nourished.
  - Providing for retention of nourishment.
- Interior channel reef/scour protection for:
  - Navigating energy around bend.
  - Zone of accretion is identified, however, this area may be nourished or used as a dredged material reuse site.
- Large flat areas of accretion can develop resulting in:
  - Depth-limited wave heights.
  - Development of a large wave break zone.
  - Reduction of the energy contacting uplands.
  - Reduced maintenance of pass channel.
  - More stable channel shoreline habitat.




**Legend**

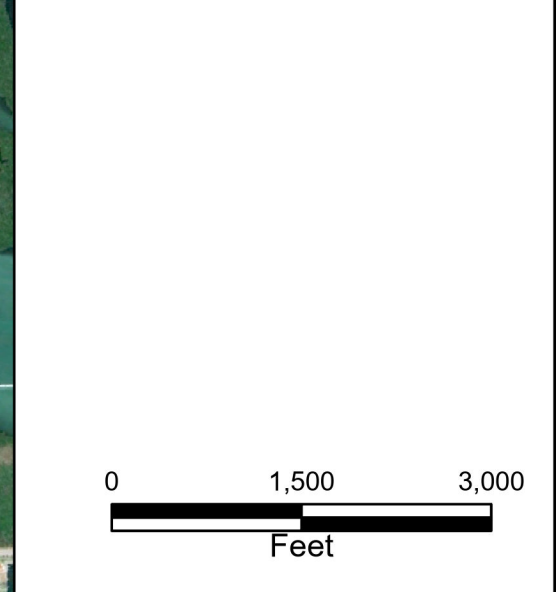
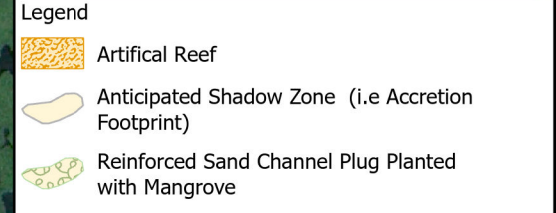
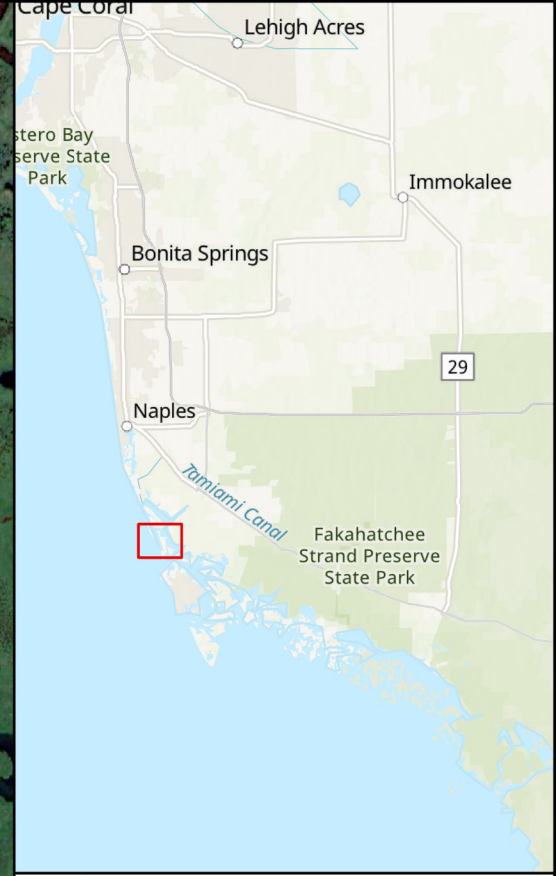
- Artificial Reef - Wave Attenuation Structure (e.g., WADs and Eco-WADs)
- Anticipated Shadow Zone (i.e. Accretion Footprint)




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	By	DJS	 SOVEREIGN CONSULTING INC. 1000 Dobbs Lane, Suite 212 Cherry Hill, New Jersey 08034 (856) 325-2099	
Revision Date			6/19/23	Final Concept Gordon Pass
			Created By: DJS Date: 06/09/23	





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By	DJS	 <b>SOVEREIGN CONSULTING INC.</b> 1000 Dobbs Lane, Suite 212 Cherry Hill, New Jersey 08034 (856) 325-2099	
Revision Date	6/19/23	<b>Final Concept</b> Little Marco Island, Cannon Island, Umbrella Island, and Johnson Island Complex (North of Marco Island)	FIGURE: <b>5</b>
Created By: DJS		Date: 06/09/23	



**Objective:**

- Providing NNBS for resilient stabilization and protection of Big Marco Pass, Isle of Capri, Coconut Island, North Point, and Hurricane Pass.
- Features helping with the stabilizing of the size of the passes and providing for NNBS storm surge protection.

**Elements / Benefits:**

- Installing artificial reef toe and reinforced dune system to protect and increase the footprint of barrier islands and exposed linear land masses.
- The nourishment area design may incorporate future dredged material re-use during pass maintenance.
- The reef toe structure and dune spine would be buried, minimizing aesthetic issues.
- The main reef structure includes periodic, short, perpendicular extensions for reducing parallel scouring and promoting Gulf-side accretion near the base of the toe.

Hurricane Pass

C C<sup>1</sup>

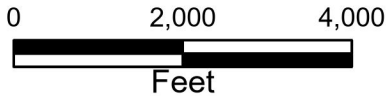
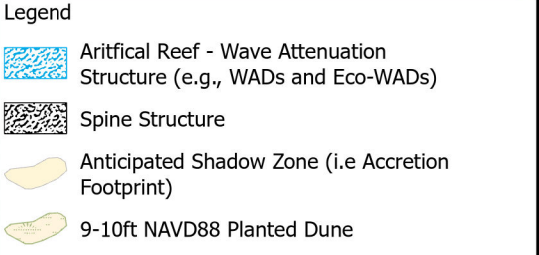
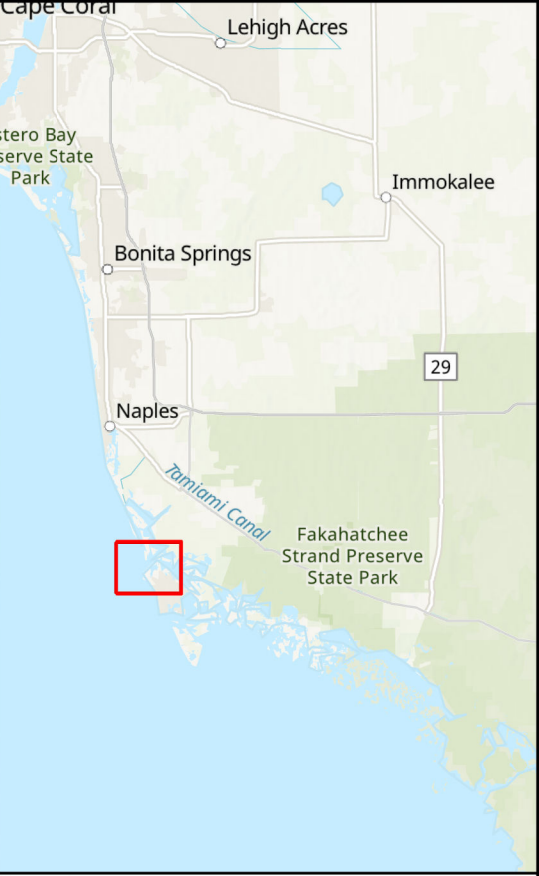
Big Marco Pass

Sand Dollar Island

North Point

Isle of Capri

Marco Island



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By	DJS	
Revision Date	6/19/23	
CSRM Review With NNBF Options Collier County, Florida		
1000 Dobbs Lane, Suite 212 Cherry Hill, New Jersey 08034 (856) 325-2099		
Final Concept Marco Island - North		FIGURE: 6
Created By: DJS		Date: 06/09/23

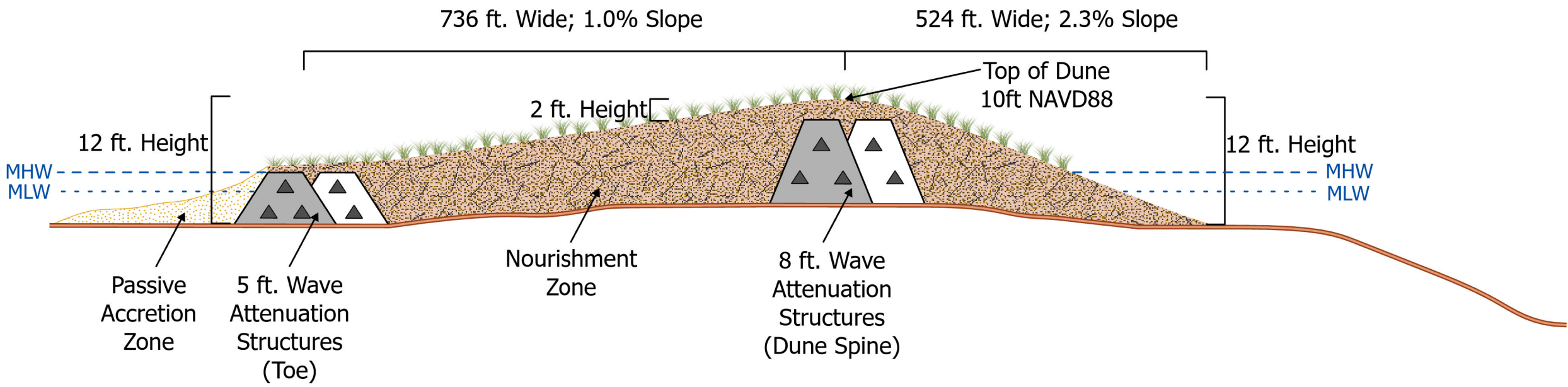


C

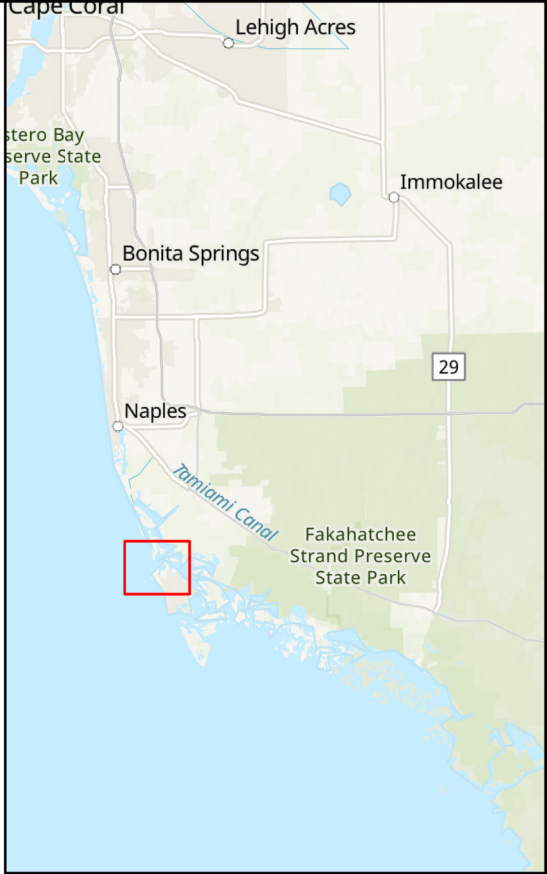
C<sup>1</sup>

Gulf of Mexico

Hurricane Pass




Profile View (nts)



- Legend
- Conceptual Existing Substrate
  - Nourishment Zone
  - Passive Accretion Zone

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By	DJS	<b>Final Concept</b> <b>Marco Island - North</b> <b>Spine Detail</b>	
Revision Date	6/19/23	FIGURE: <b>6a</b>	
Created By: DJS		Date: 06/09/23	



**Objective:**

- Providing NNBS for the resilient stabilization and protection of Caxambas Pass, Cape Marco, Henry Key, Dickmans Island, and Northern Ten Thousand Island.
- These features are “anchor” landmasses which protect the southern face of Marco Island and Highland Point.

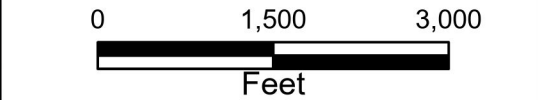
**Elements / Benefits:**

- Installing artificial reef system will dampen wave energy and rejuvenate sand bar/beach complex along Dickmans Island and northern Ten Thousand Island by natural accretion or nourishment.
- The existing breakwater configuration at Cape Marco splits shoreline drift and northern storm vector, increasing scour. Installing an artificial reef toe and point nourishment will form high beach/low dune, resulting in:
  - Enlarged beach area.
  - Elimination of nearshore scour.
  - Improved aesthetics.
- Gap Reef:
  - Protecting Henry Key.
  - Reducing excessive width of pass.
  - Providing a more stabilized bar.
  - Configuration providing for:
    - Directed accretion.
    - More stable navigation channels.
    - Anticipated reduction of silting-in of channels (i.e., reduced long-term maintenance).




**Legend**

- Artificial Reef - Wave Attenuation Structure (e.g., WADs and Eco-WADs)
- Anticipated Shadow Zone (i.e. Accretion Footprint)
- Nourishment Zone



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			 SOVEREIGN CONSULTING INC. 1000 Dobbs Lane, Suite 212 Cherry Hill, New Jersey 08034 (856) 325-2099	
6/19/23	DJS		Final Concept Marco Island - South	FIGURE: 7
			Created By: DJS	Date: 06/09/23

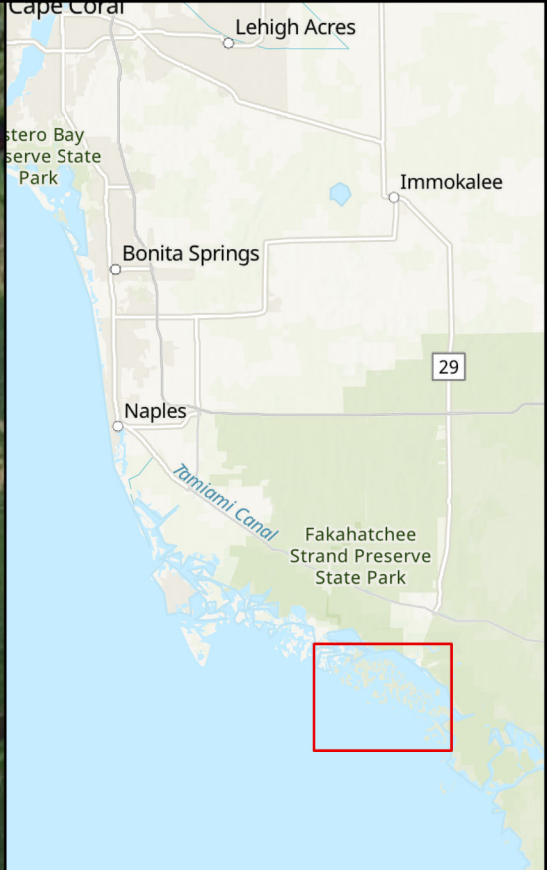




**Objective:**

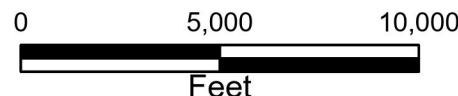
- Existing mangrove island complex provides for an excellent natural buffer for Everglades City and Chokoloskee from storm events.
- The Island Complex is degrading.
- Providing a series of artificial reefs to hold the toe of the island complex and offer additional NNBS protection, without impacting the existing navigation.

**Elements / Benefits:**

- Providing for passive accretion from the artificial reefs and providing for additional habitat and wave dampening.
- Work staging and barging from Everglade City and Chokoloskee, infusing money into the community.
- Note: Reef would need to extend into the south beyond County limits.



- Legend**
-  Artificial Reef - Wave Attenuation Structure (e.g., WADs and Eco-WADs)
  -  Anticipated Shadow Zone (i.e Accretion Footprint)



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6/19/23	DJS		Final Concept Everglades City & Chokoloskee (Rabbit Key Pass north to West Pass)	FIGURE: 8
			Created By: DJS	Date: 06/09/23