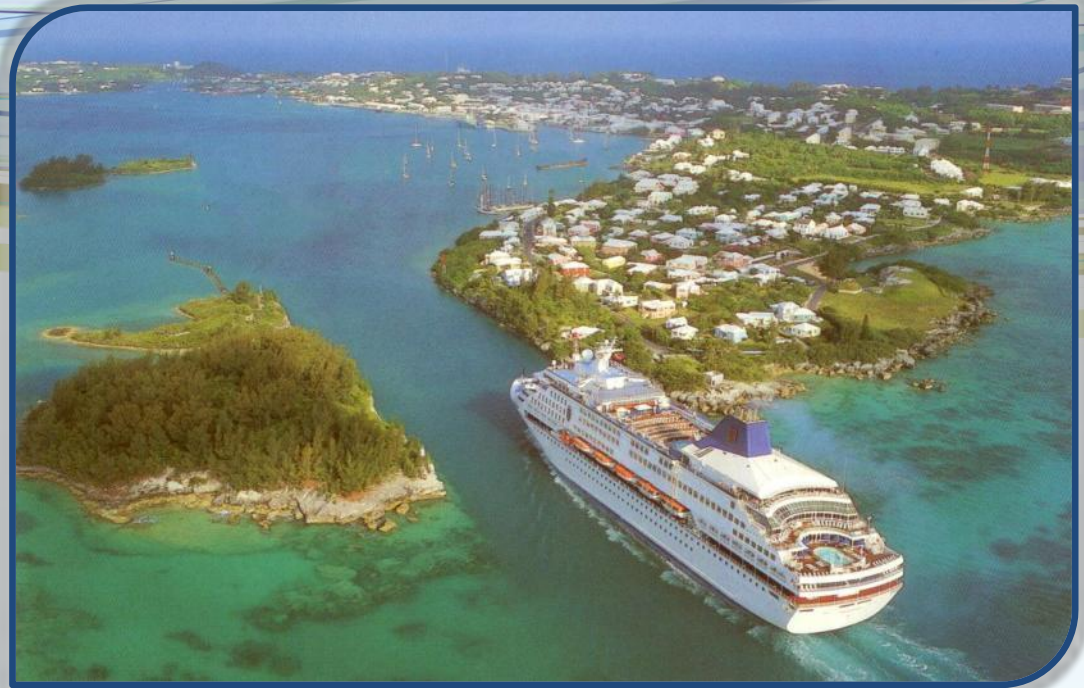


# **STUDY OF BERMUDA'S SHIPPING CHANNELS TO ACCOMMODATE LARGER CRUISE SHIPS**



**Ministry of Transport  
October, 2011**

# PART 1: PROJECT NEED



# Study Objectives

- Evaluate modifications required to accommodate larger cruise ships along Bermuda's shipping channels
- Analyze the economic and social benefits of the cruise ship product
- Analyze the benefits for St. George's and Hamilton by having better distribution of cruise ships (less reliance on Royal Naval Dockyard)
- Examine the impact on transportation services
- Provide a platform for development of other tourism amenities

# Study Methodology

- Trends and projected growth in the global and regional cruise ship industry
- Trends in cruise vessel characteristics and how these trends will impact the Bermuda market
- Assessment of the social, economic and environmental impacts of channel modifications
- Assessment of the potential impact of channel modifications on Bermuda's natural environment
- Dredging and material disposal
- Engineering feasibility and costs to construct improvements

**The study makes no recommendations, and Government has not made a decision whether to proceed with any of the options.**



# Trends in the Cruise Ship Industry

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165

Number of cruise ships currently in competitive service

136 (84%)

Ships too large to transit Town Cut, St. George's (longer than 680')

26 (16%)

Ships capable of transiting Town Cut, St. George's (less than 680')

# Ships Capable of Transiting Town Cut

26

Ships capable of transiting Town Cut,  
St. George's (less than 680')

Line	Ships	Market	Itinerary
Seabourn Cruises	6	Luxury	World-wide
Silverseas Cruises	6	Luxury	World-wide
Oceania Cruises	3	Premium	World-wide
Regent Seven Seas	2	Premium	World-wide
Princess Cruises	2	Premium	Tahiti/World-wide
Azamara	2	Luxury	Med/South America
Holland America	1	Premium	World-wide
Costa Cruises	2	Standard	Med/South America
Celebrity Xpeditions	1	Expedition	Galapagos
MSC	1	Standard	Med/South America

# Attract small, premium ships to Bermuda

**+/-16**

Small, premium brands visiting Bermuda 2010-2012

Line	Ships	Market	Itinerary
Seabourn Cruises	6	Luxury	World-wide
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MSC	1	Standard	Med/South America

# Ship Retirements and Cruise Orderbook

14 Years

Average age of the 26 ships able to transit Town Cut

(excluding the 2 Seabourn ships delivered in '10 and '11)

9 (33%)

Number of ships able to transit Town Cut to be retired in the next few years

19

Number of cruise ships currently on order for 2011-2014 delivery

1

Number of new cruise ships on order able to transit Town Cut



# Reduction in the Number of Cruise Calls

126,158

Number of cruise visitors docking in St. George's in 2007

1,023

Number of cruise visitors docking in St. George's in 2011, excluding Holland America 'Veendam'

108

Number of cruise ships docking in St. George's in 2007

2

Number of cruise ships docking in St. George's in 2011

# Impact of Fewer Ships in St. George's

29

Number of businesses closing in St. George's since 2009

5

Number of businesses opening in St. George's since 2009

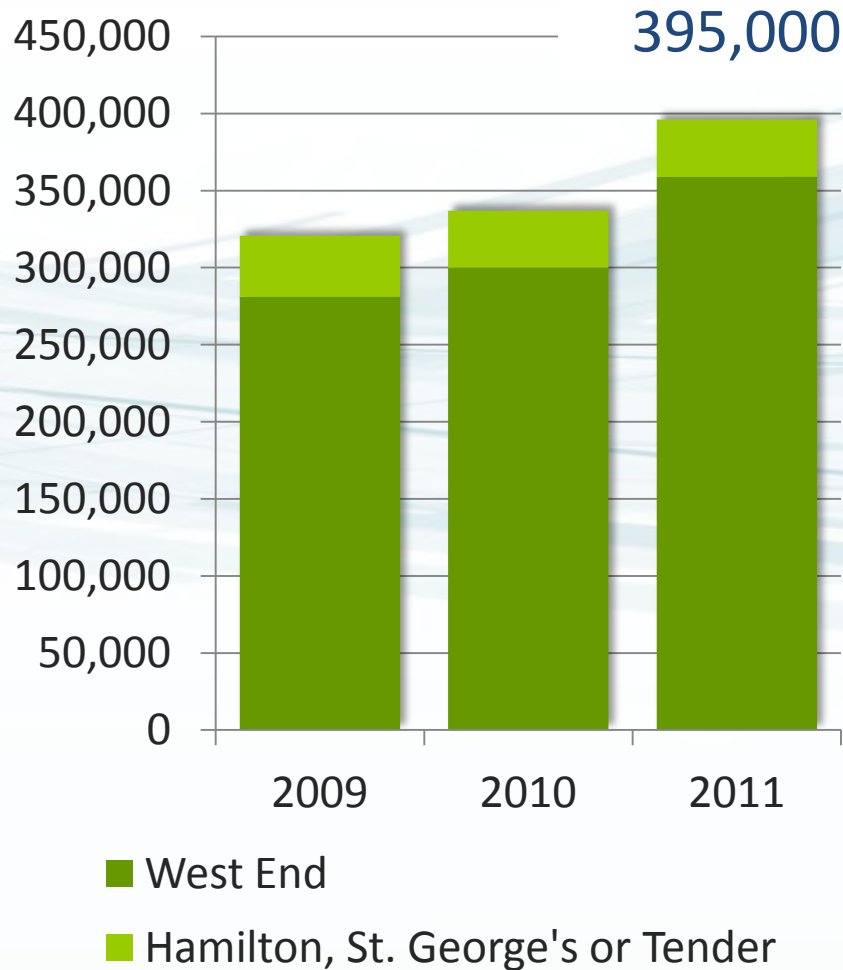
Two have since closed / More anticipated this winter

80-90%

Reduction in sales since 2007  
(for businesses dependent on tourists)

# Direct Benefits of Bermuda's Cruise Product

## Passenger Arrivals



## Estimated Direct Economic Impacts

Does not include port dues, tugs to other indirect revenues



# Direct Benefits of Bermuda's Cruise Product

355,000

Number of cruise visitors projected for Dockyard in 2011

The increase in the number of cruise visitors was made possible by the development of the Heritage Wharf cruise pier complex in 2009.

Since 2009, many new businesses have opened in the Dockyard area.





# Direct Benefits of Bermuda's Cruise Product

**\$75** Million

Direct economic contributions to Bermuda's economy from ships docking at Heritage Wharf since April 2009

Includes direct benefits such as Government Taxes, on-Island purchases made by cruise passengers and crew members and shore excursions purchased on-board the ships (net to local tour operators).

Does not include port dues, tugs, piloting revenues and other indirect revenues.





# Estimated Economic Benefits of a new cruise pier

- Depending on deployment decisions, an additional cruise pier in either St. George's or Hamilton could generate up to **\$25 million** per year in additional revenues\*

\*Based on 2,500 passenger ships docked for 5 nights for 23 weeks.

# Benefits of Bermuda's Cruise Product

- The Transportation sector relies heavily on the cruise product, including:
  - Public buses and ferries
  - Taxi owners and operators
  - Mini-bus services increasingly cater to cruise visitors
- Tour operators increasingly rely on the cruise industry, including:
  - Land-based tours (Bus/Taxi tours booked on the ships, walking tours, etc.
  - Water sport tours
- Retail
  - With fewer hotel rooms, shops increasingly rely on cruise ship visitors

# Indirect Benefits of Bermuda's Cruise Industry

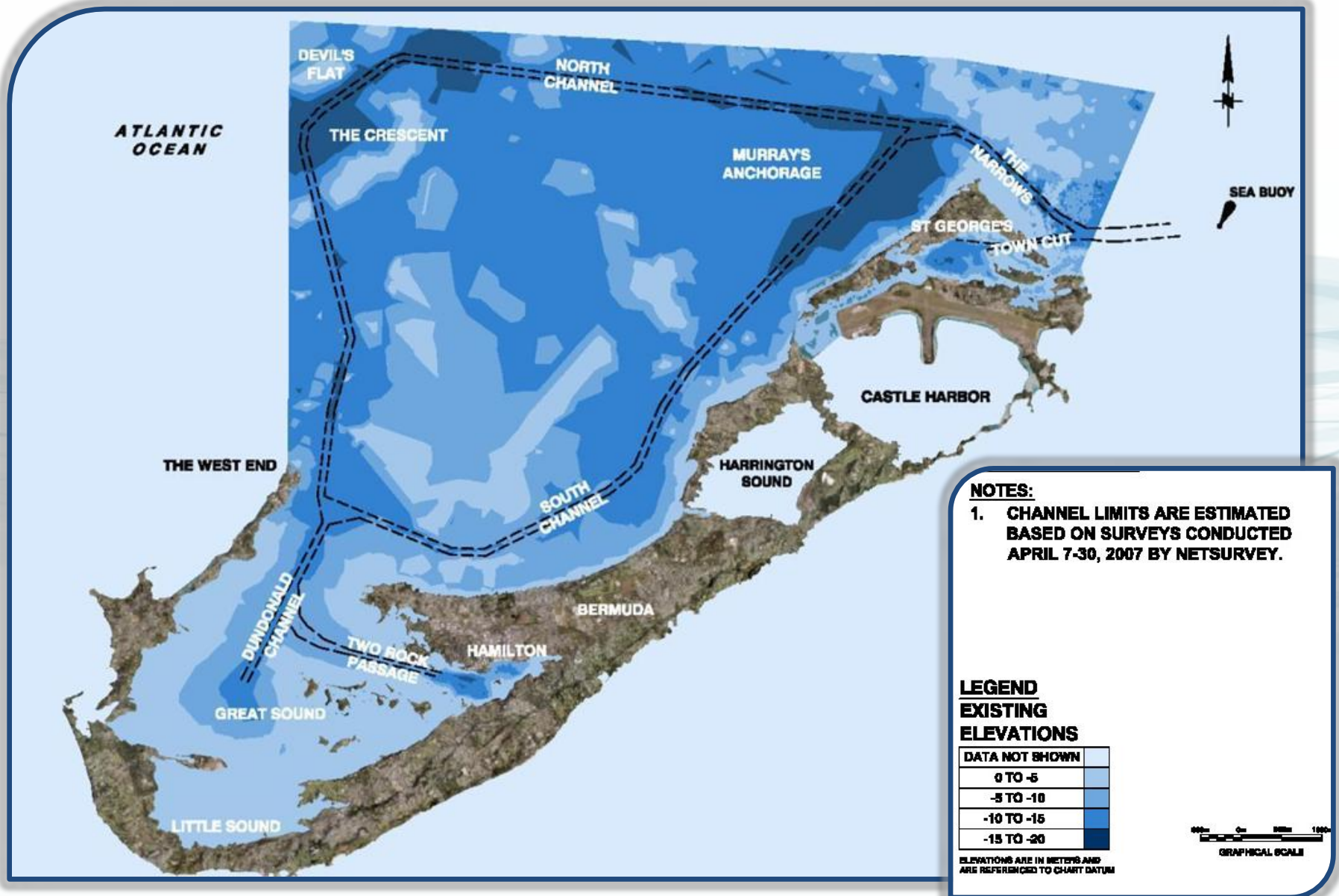
- Cruise visitors and crew bring life and activity to the ports where they dock
- Many crew members treat Bermuda as their summer home, while using local services (longer stay ships)
- Many retail, taxis and bus tours, walking tours, etc. cater exclusively to cruise ship visitors
- The majority of waterports operators cater primarily to cruise ship visitors

## PART 2: CHANNEL OPTIONS





# Bermuda's Channels





# Bermuda's Channels

Line	Length (Km)	Width (m)	Avg. Channel Depth (m)	Max Vessel Draft (MLW/MHW - m)
Town Cut	5.5 (3.4 mi)	70 (230')	10 (32.0')	7.9 / 8.5 (25.9' – 27.8')
The Narrows	4.3 (2.7 mi)	152.5 (500 ')	12.5 (41.0')	10.3 / 10.9 (33.8'/35.7')
North Channel	26.0 (16.0 mi)	152.5 (500 ')	12.5 (41.0')	10.1 / 10.9 (33.1'/35.7)
South Channel	16.0 (9 mi)	152.5 (500 ')	9.0 (29.5 ')	8.2 / 8.8 (26.9'/28.9')
Dundonald Channel	3.9 (2 mi)	152.5 (500 ')	11.1 (36.0 ')	10.1 / 10.6 (33.1'/34.8')
Two Rock Passage	3.5 (2.2 mi)	106.7 (350')	10.0 / 8.8 (32.8'/28.9') (Approach / Pass)	7.9 (25.9')

Note: 1m = 3.28 ft.

# Cruise Ship Design Tiers

Vessels	Vessel Characteristics	West End	Hamilton	St. George's
<b>Tier 1 – Panamax</b> Carnival's <i>Spirit</i> -class Holland America's <i>Vista</i> - and <i>R</i> -class	Length: ≤294m Beam: 32.3m Draft: 7.6 to 8.2m	Yes	Yes	Yes
<b>Tier 2 – Post Panamax 1</b> Carnival's <i>Conquest</i> -class Princess' <i>Grand</i> -Class	Length: ≤294 m Beam: 36m Draft: 8.2m	Yes	Yes	Yes
<b>Tier 3 – Post Panamax 2</b> Celebrity's <i>Solstice</i> -class	Length: 315m Beam: 37m Draft: 8.2m	Yes	?	?
<b>Tier 4 – Post Panamax 3</b> RCCL's <i>Freedom</i> -class	Length: 339m Beam: 38.6m Draft: 8.8m	Yes	No	No

Note: 1m = 3.28 ft.

# First Round of Options for Town Cut

- In considering options for Town Cut and all other Bermuda channels and harbours, four elements were considered essential
  - Meet international, cruise line and Bermuda Branch Pilot standards for safety and vessel operability
  - Ensure a high success rate—greater than 90%—for operating vessels in unfavorable wind, current and weather (e.g., avoid missed calls)
  - Reduce to the greatest extent possible environmental impacts as well as other impacts such as changes to storm surge and wave susceptibility, traffic, and socioeconomic issues
  - Reduce to the greatest extent possible anticipated project costs
- Fourteen options were reviewed against the above criteria and then the list was reduced to 8

# Simulated Round of Options for Town Cut

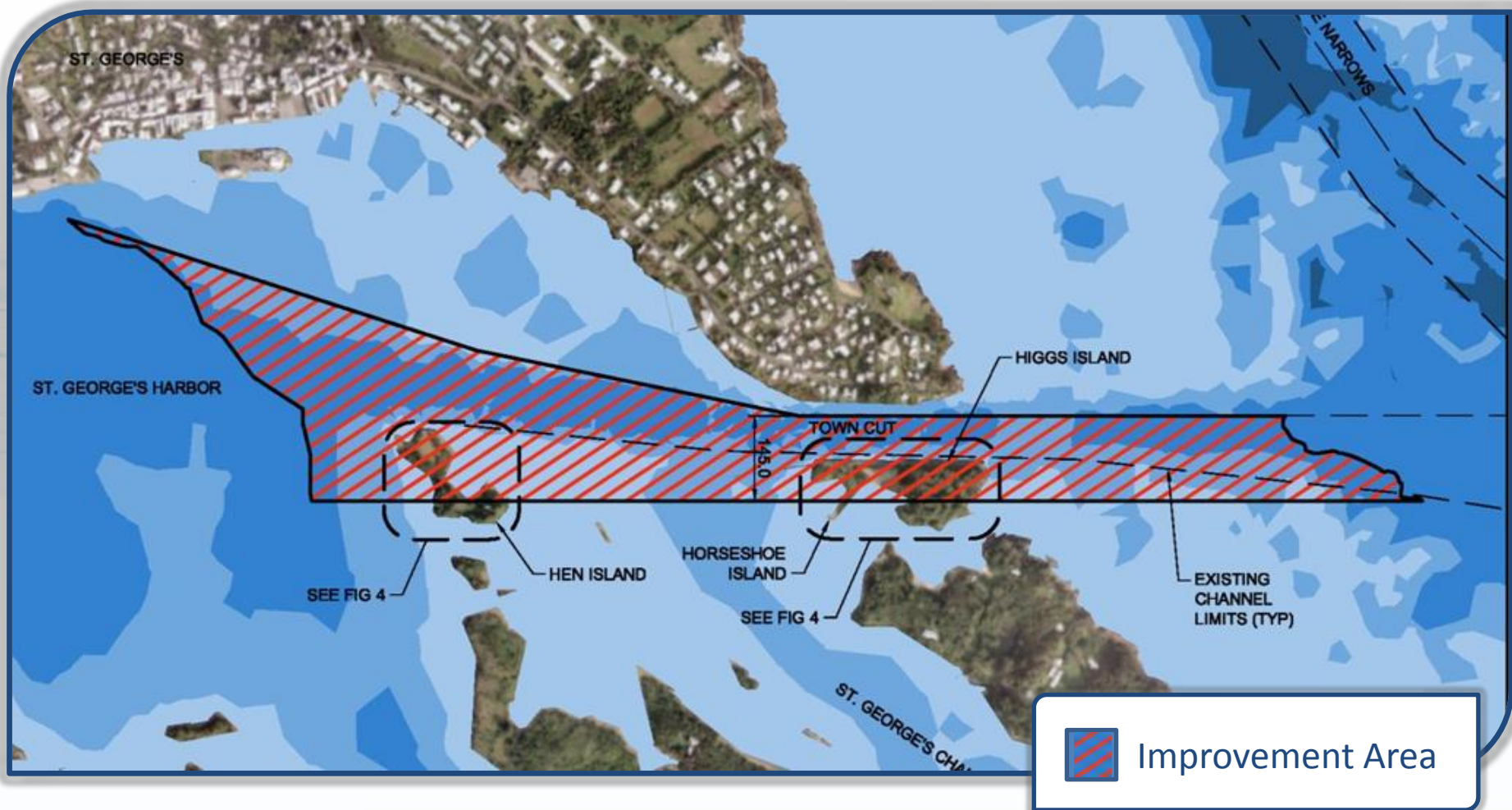
- Widen by 30m (100m total) – No Channel Realignment
- Widen by 30m (100m total) – Realignment to South
- Widen by 50m (120m total) – No Realignment
- Widen by 60m (130m total) – No Realignment
- Widen by 60m (130m total) – Realignment to South
- Widen by 60m (130m total) with tug assist –  
Realignment to South
- Widen by 85m (155m total) – Realignment to South
- Widen by 110m (180m total) – Realignment to South

Note: 1m = 3.28 ft.



# Town Cut Option – 145m Wide Channel at -11CD

## Capable of Supporting Tier 1 (Panamax) Vessels

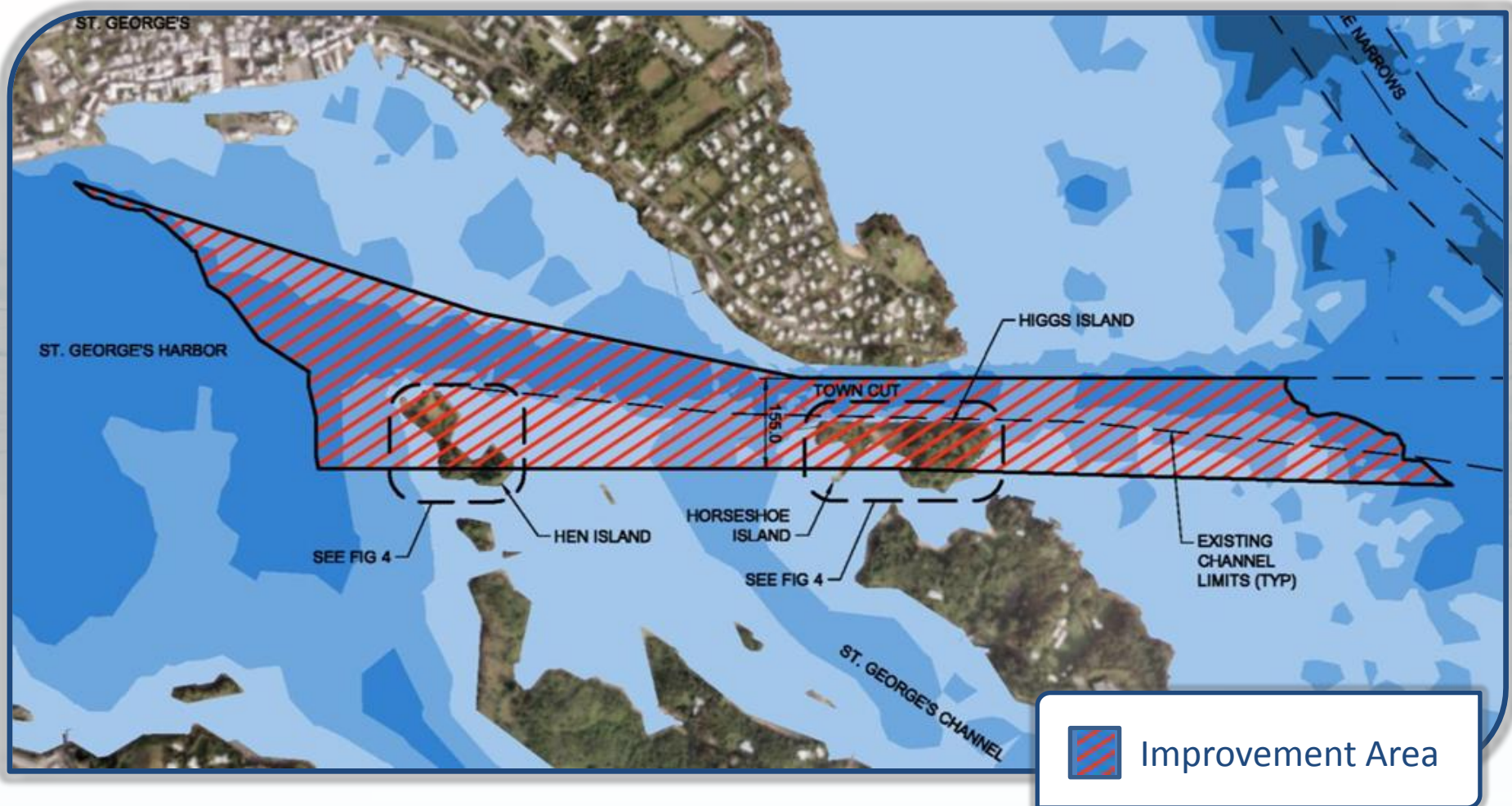


Note: 1m = 3.28 ft.



# Town Cut Option – 155m Wide Channel at -11CD

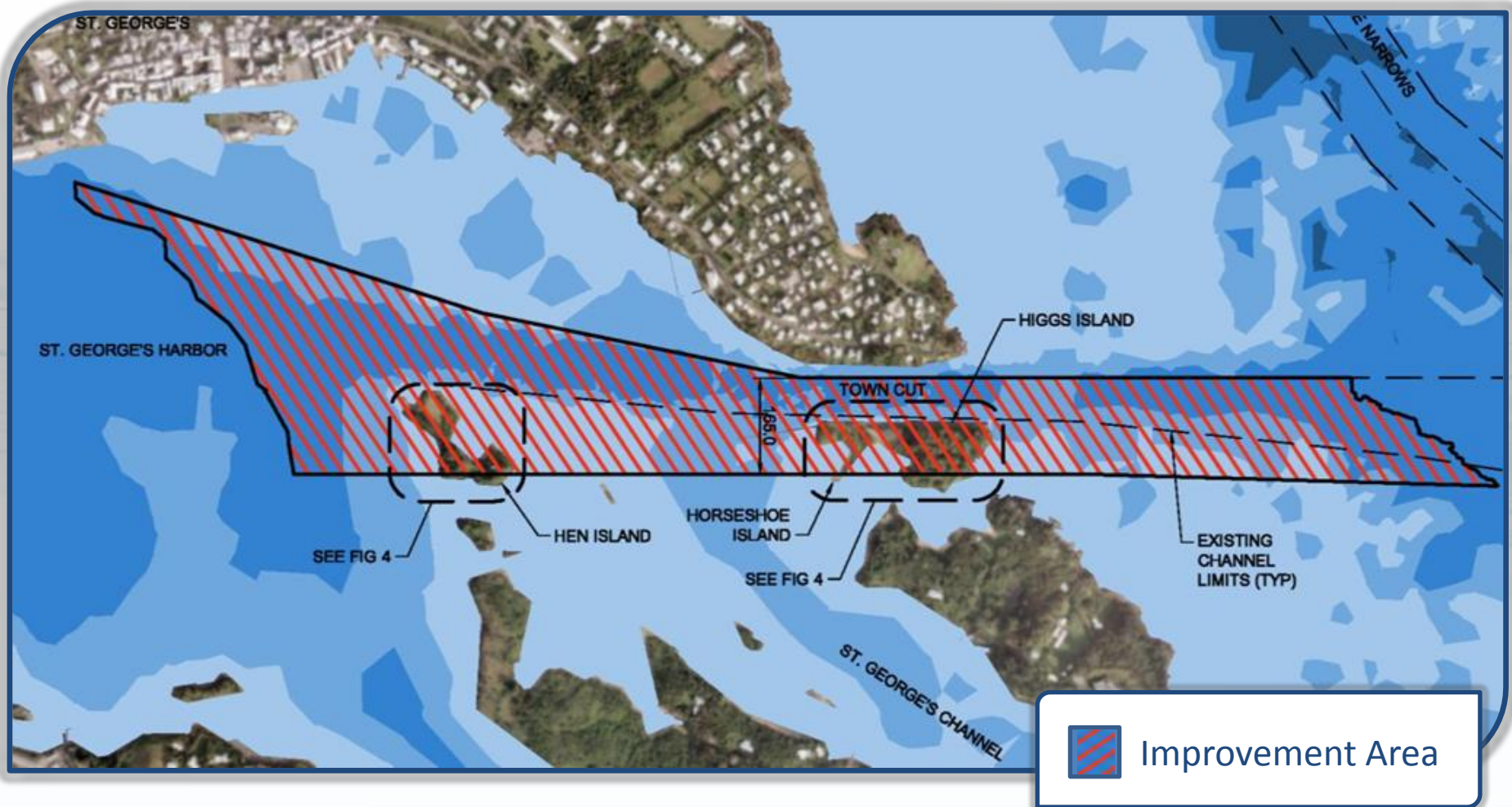
Capable of Supporting Tier 1 and 2 Vessels



Note: 1m = 3.28 ft.

# Town Cut Option – 165m Wide Channel at -12CD

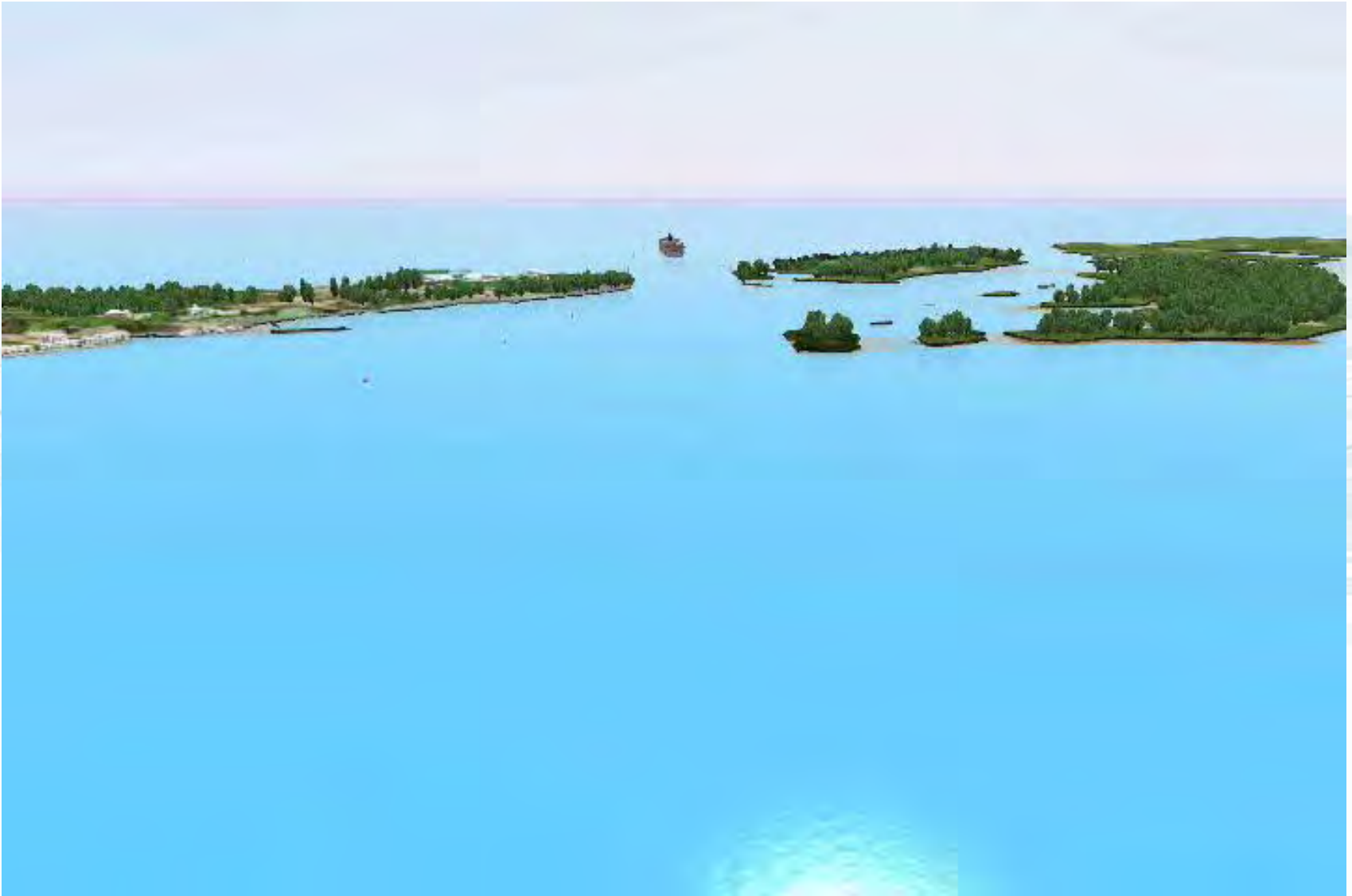
Capable of Supporting Tier 1, 2 and 3 Vessels



Note: 1m = 3.28 ft.

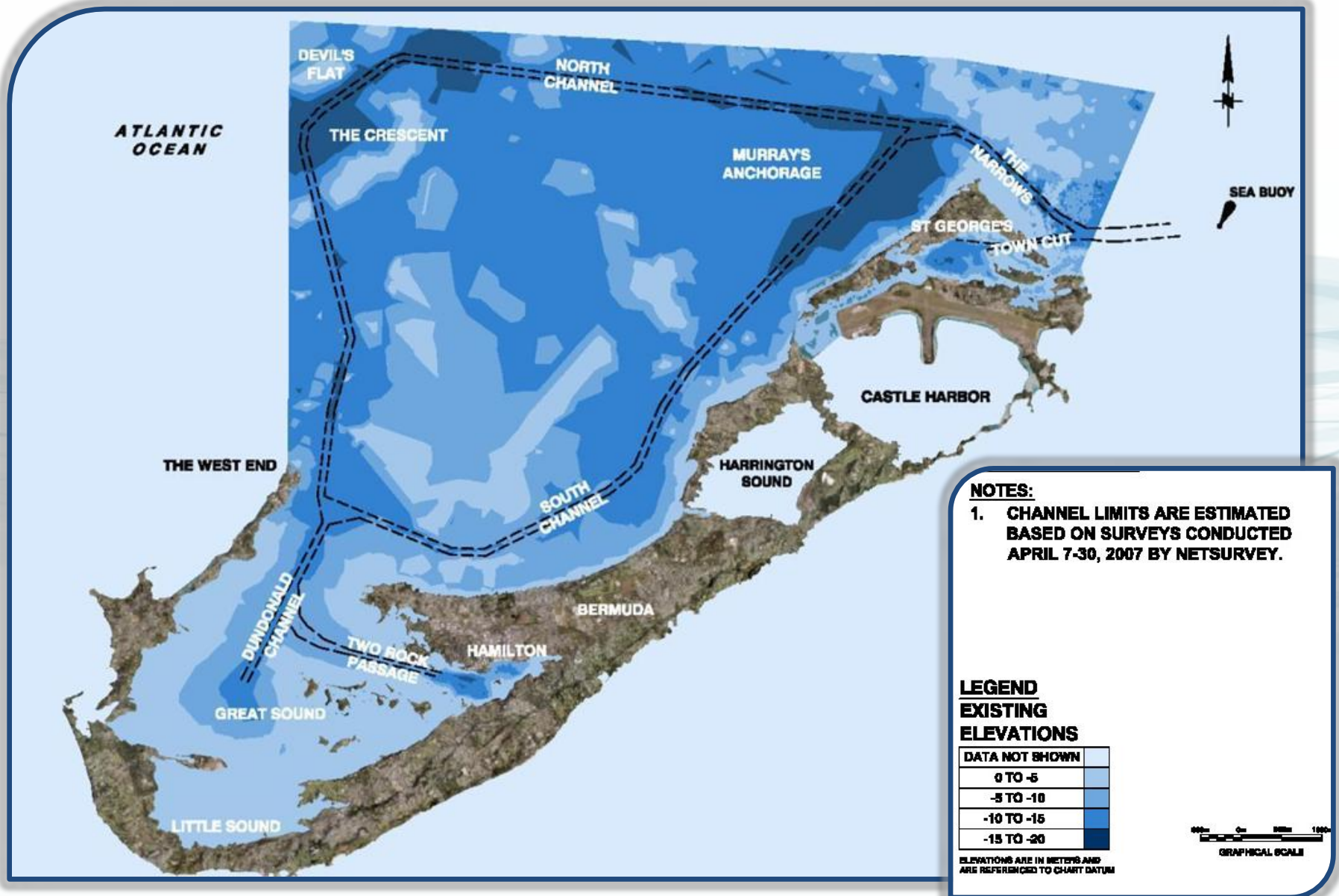
# Town Cut Option – 155m Wide Channel at -11CD

Capable of Supporting Tier 1 and 2 Vessels



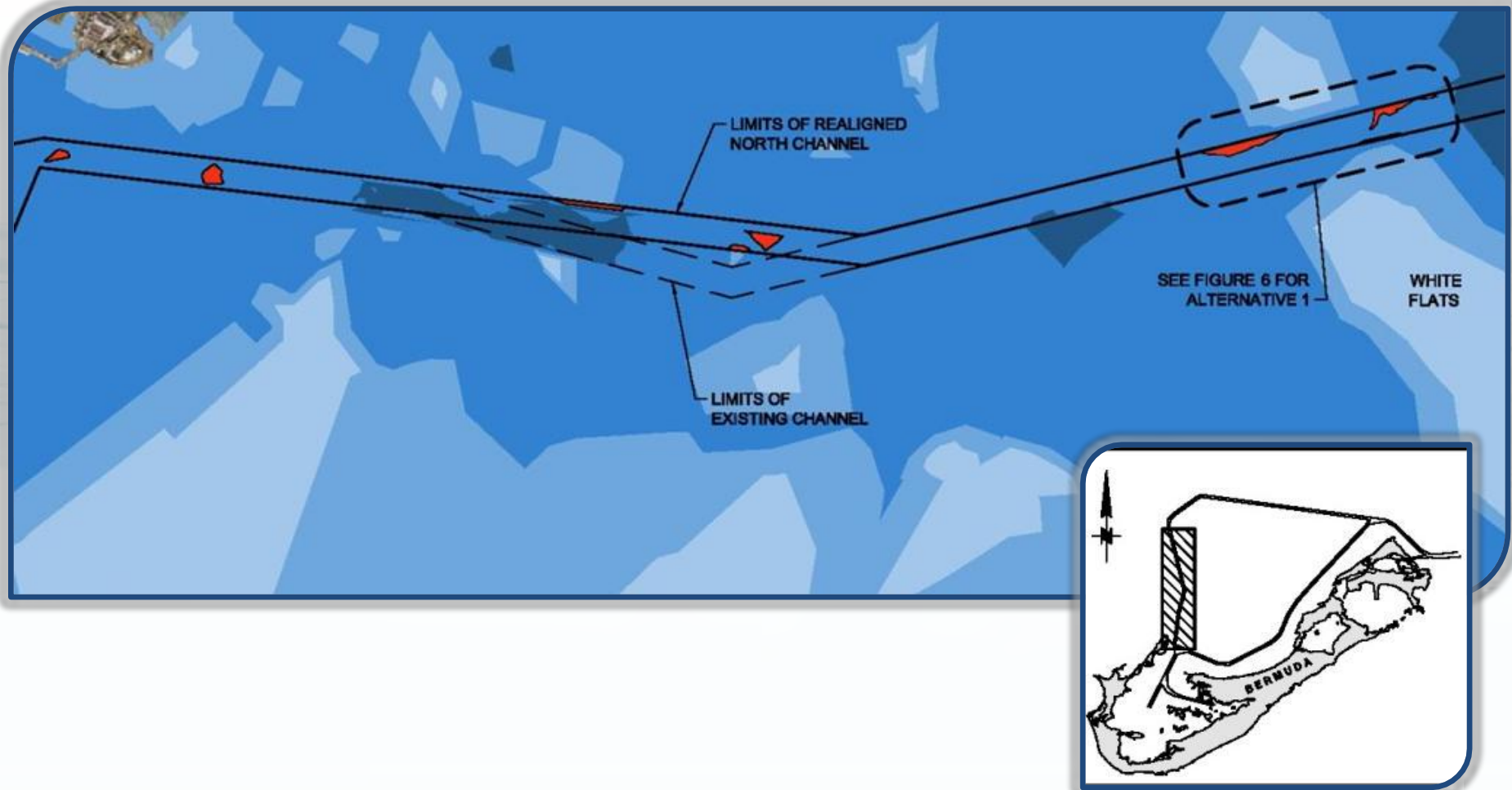


# Bermuda's Channels



# North Channel at 152.5m Wide and Realigned through Brackish Pond Flats

Capable of Supporting Tier 4 Vessels

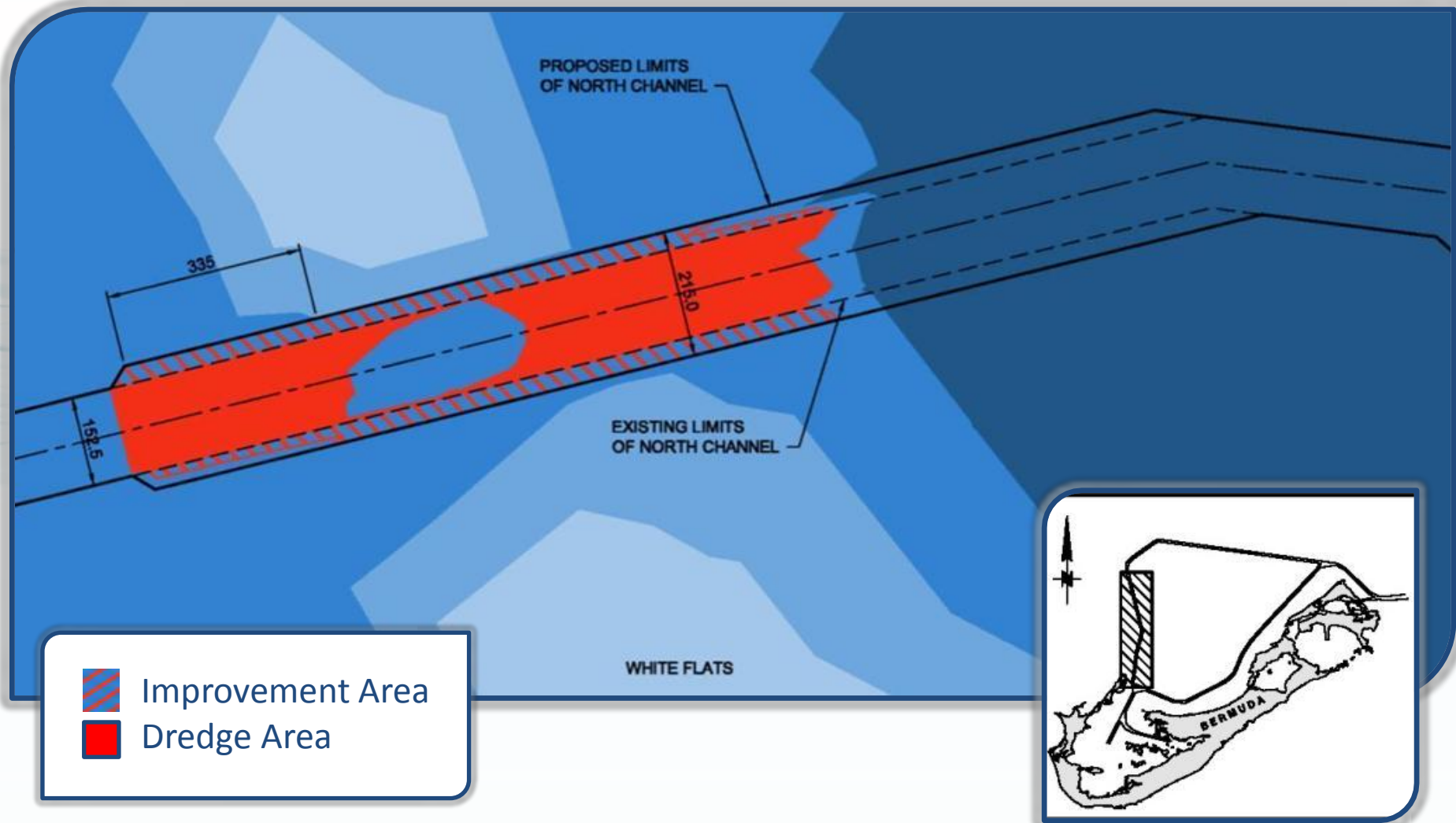


Note: 1m = 3.28 ft.



# North Channel with a 215m Wide Channel through White Flats at -13.5m CD

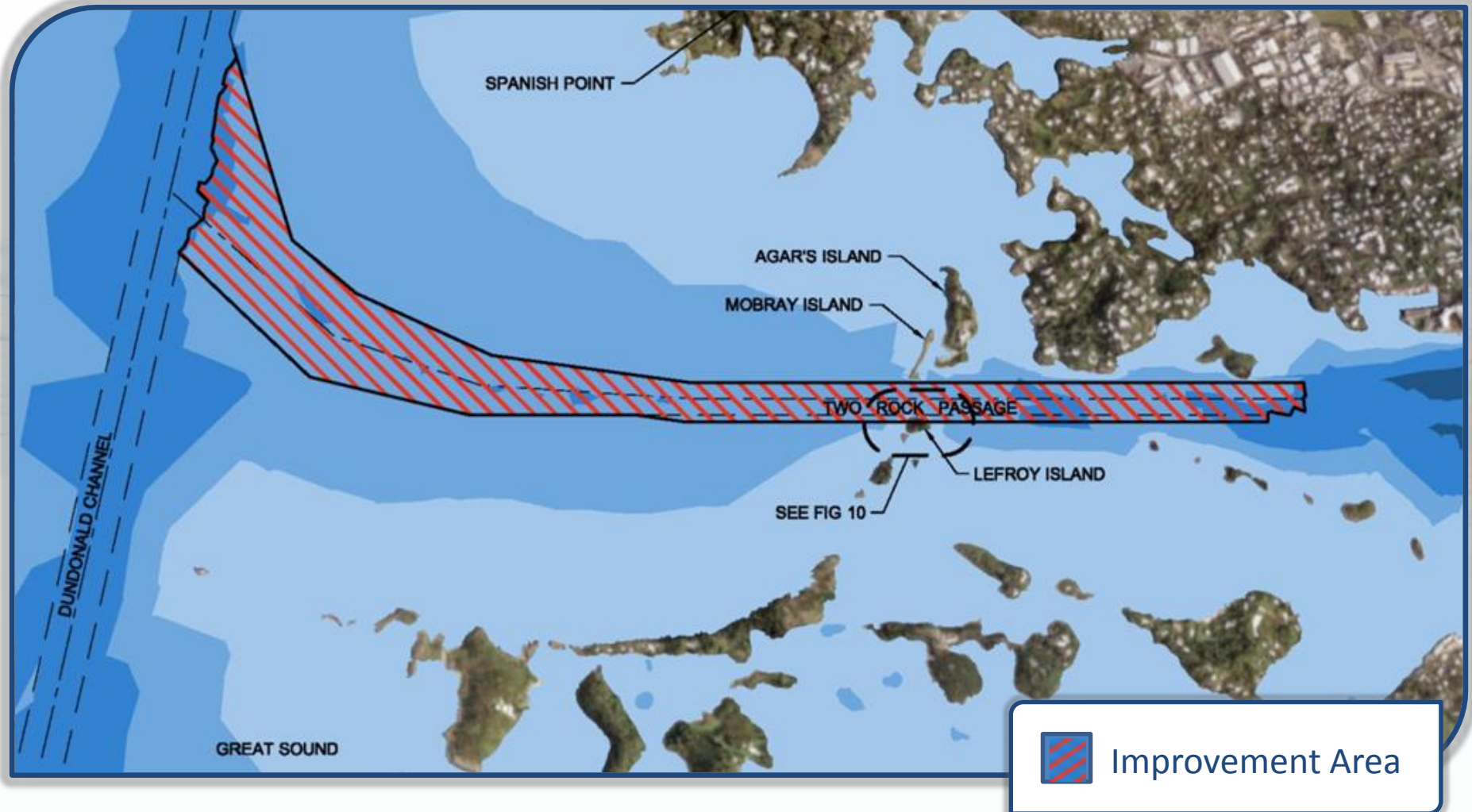
Capable of Supporting Tier 4 Vessels



Note: 1m = 3.28 ft.

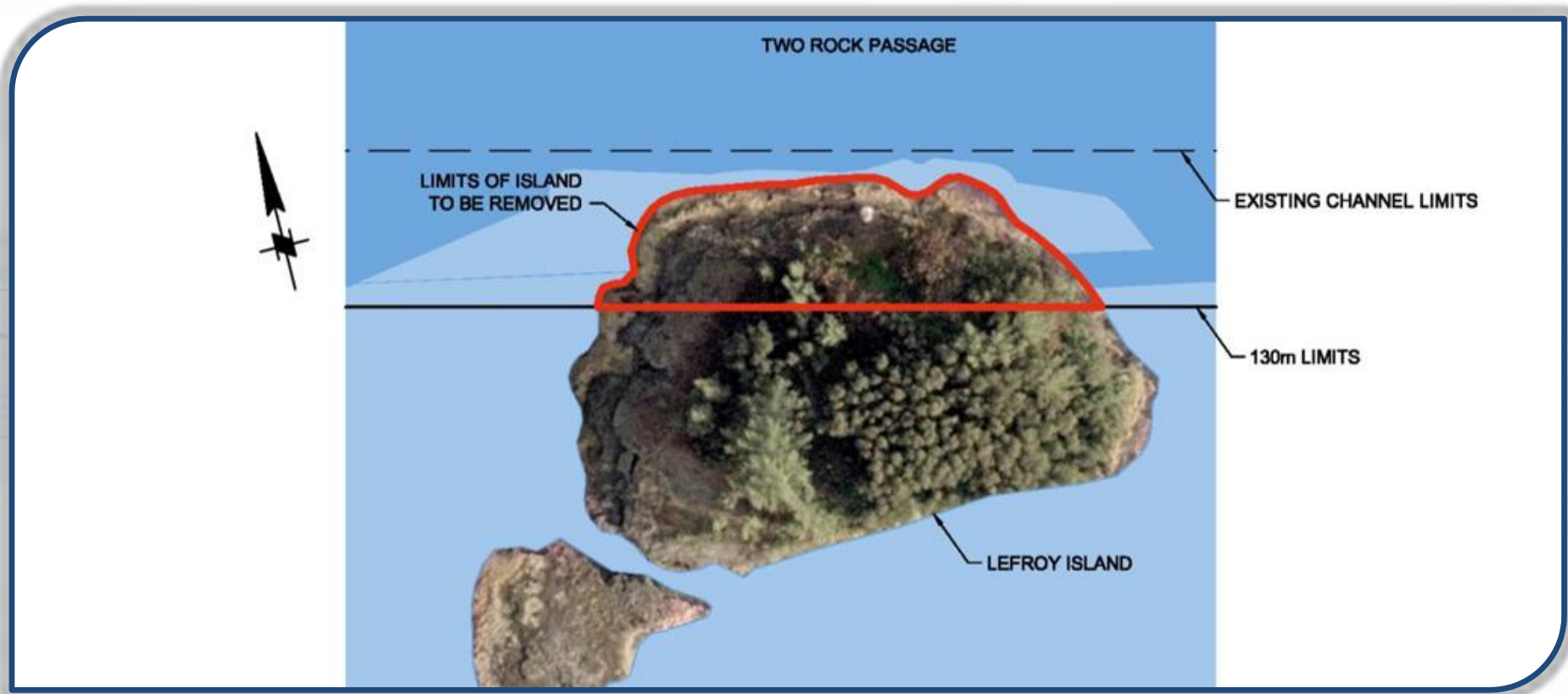
# Two Rock Passage Option – 130m Wide Channel at -11 and -11.5 CD

Capable of Supporting Tier 1 and 2 Vessels



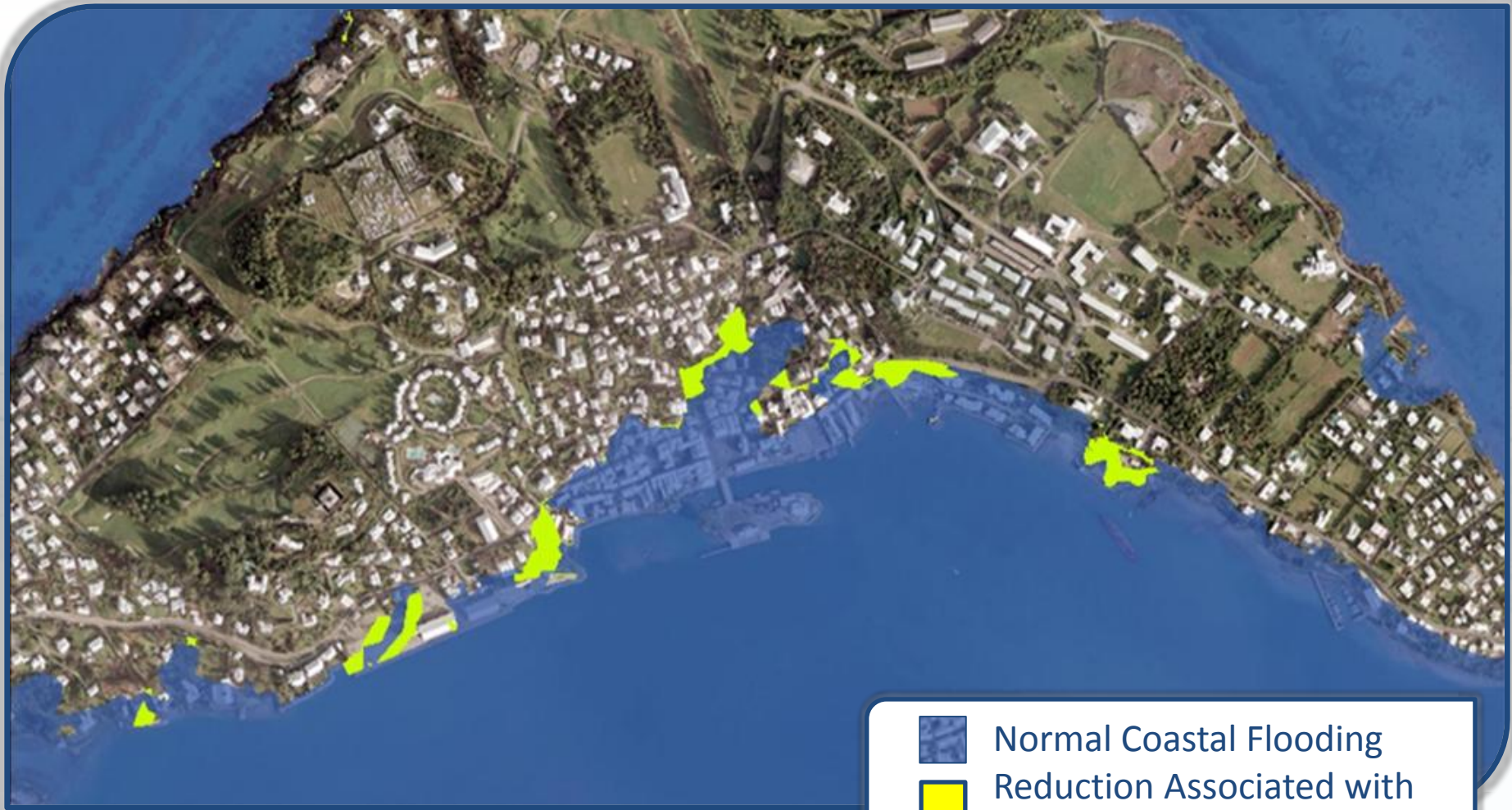
Note: 1m = 3.28 ft.

# Two Rock Passage Option – Lefroy Island Impacts





# Reduction in Coastal Flooding in St. George's for a Westerly Tracking Hurricane - 155m Channel Option



Note: 1m = 3.28 ft.



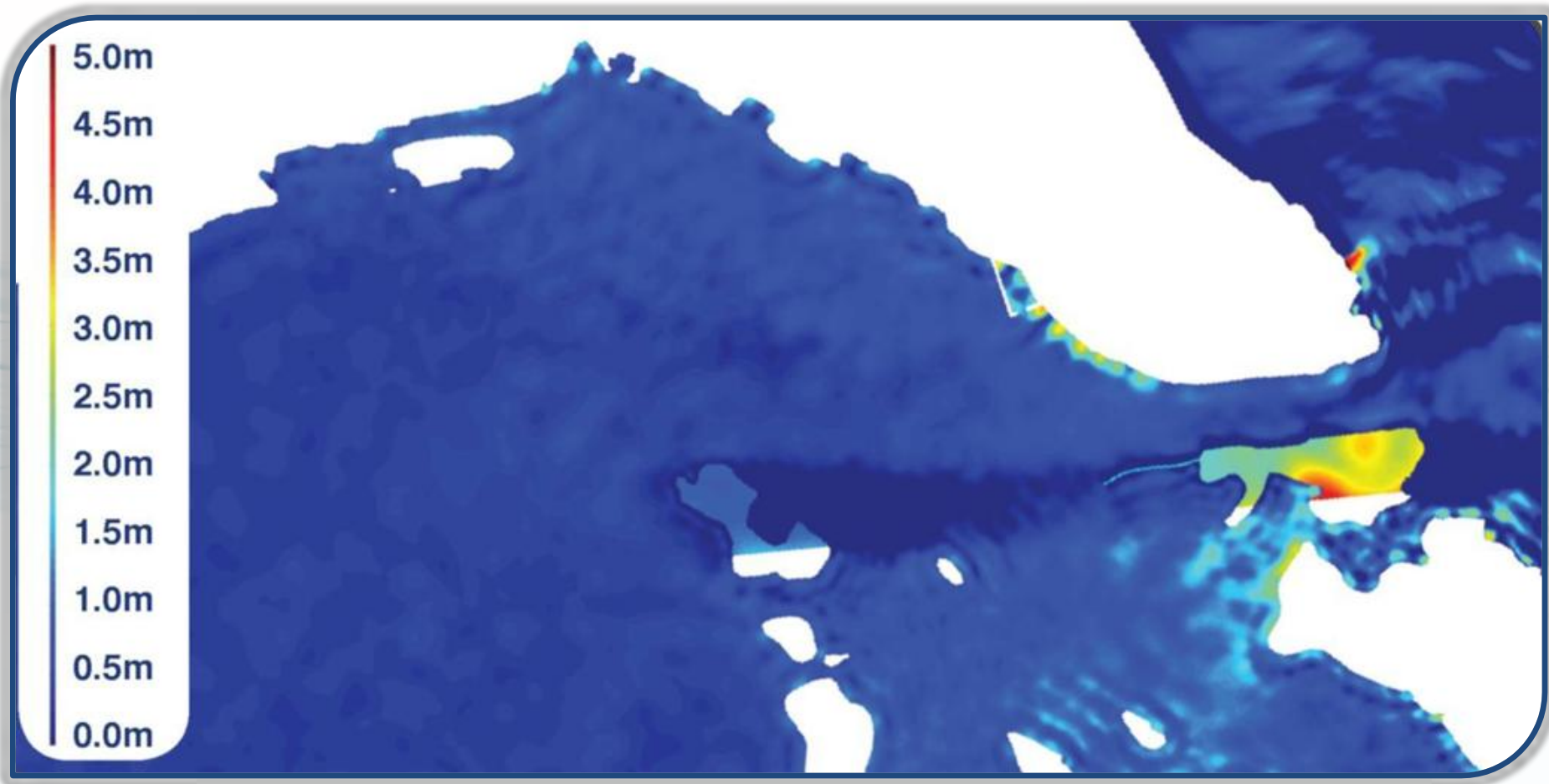
# Increase in Coastal Flooding in St. George's for an Easterly Tracking Hurricane - 155m Channel Option



-  Normal Coastal Flooding
-  Increase Associated with Channel Modification

Note: 1m = 3.28 ft.

# Wave Height Difference Plot for 50-Year Storm Event - 155m Channel Option



Note: 1m = 3.28 ft.

# Environmental Considerations

- Each of the possible Town Cut expansion options needed to accommodate a Tier 1, 2 or 3 vessel will have impacts on the surrounding natural environment
- Seagrass and coral reefs will be impacted as a result of channel improvements
  - Aquatic resource surveys will be required to accurately determine the amount of impact.
- The alternatives also involve the loss of more than 90% of the total area of Higgs, Horseshoe, and Hen Islands

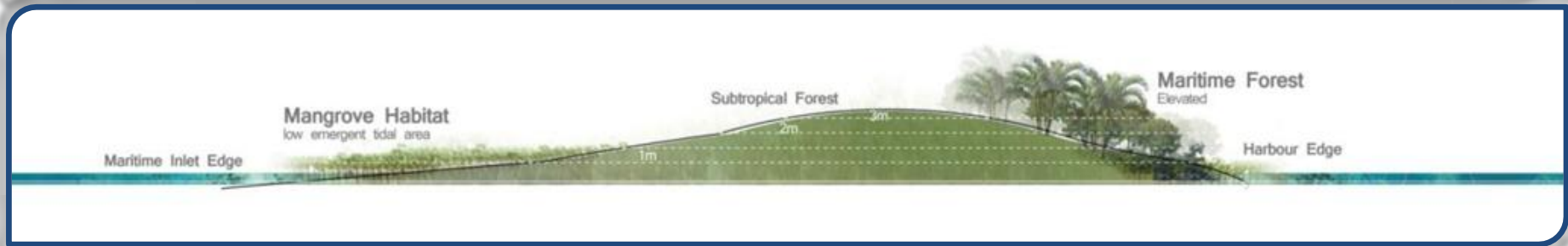


# Concepts to Mitigate Loss of Higgs, Horseshoe and Hen Islands





# Concepts to Mitigate Loss of Higgs, Horseshoe and Hen Islands



# Estimated Project Costs

Site	Dredging Cost (US\$ Millions)	Mob/Demob & Equipment Standby (US\$ Millions)			TOTAL COST (US\$ Millions)			Additional Contingency - 20% (US\$ Millions)		
Town Cut - St. George's (145-meter wide channel)	44.0	4.5	to	6.5	48.5	to	50.5	9.7	to	10.1
Town Cut - St. George's (155-meter wide channel)	55.0	4.5	to	6.5	59.5	to	61.5	11.9	to	12.3
Town Cut - St. George's (165-meter wide channel)	65.0	4.5	to	6.5	69.5	to	71.5	13.9	to	14.3
Two Rock Passage (130-meter wide channel)	52.0	4.5	to	6.5	56.5	to	58.5	11.3	to	11.7
South Channel	18.0	4.5	to	6.5	22.5	to	24.5	4.5	to	4.9
North Channel (All Alternatives)	4.0	4.5	to	6.5	8.5	to	10.5	1.7	to	2.1

# PART 3: FINDING BALANCE



# Balance and distribution – Carrying Capacity

10,000

Maximum number of cruise ship visitors on Island (Tuesday – Friday) in 2007

8,000

Maximum number of cruise ship visitors on Island (Tuesday – Friday) in 2011

**We have more challenges moving cruise passengers today than we did in 2007**



# Balance and Distribution – Carrying Capacity

2007

2 ships in St. George's  
2 ships in Hamilton  
1 ship at Dockyard

2011

0 ships in St. George's  
1 ship in Hamilton  
2 ships at Dockyard

Result

- Over-utilization of amenities and attractions at the West End
- Over-reliance on the public transport system to move people in and out of Dockyard to/from Horseshoe Bay, Hamilton and St. George's and other attractions
- Under-utilization of amenities in the East End and at other locations

# Balance and Distribution

- Transportation services are under considerable pressure to provide more services to move people to their destinations, such as:
  - Horseshoe Bay Beach (shuttle buses)
  - Hamilton - Ferry
  - St. George's – Ferry
  - Aquarium, Caves, etc. - Buses
- In the past, the cruise ships moved people from port-to-port, taking pressure off the public transport system
- The social impact of having almost all cruise calls at 1 port (Dockyard) has been considerable
- The current imbalance has made it difficult to develop tourism amenities in East End

# Balance and Distribution – Carrying Capacity 2006



**Cruise Ships in Port  
St. George's**



**Norwegian Majesty at  
Ordnance Island**



**Celebrity Zenith at  
Penno's Wharf**

**2 cruise ships docked in St. George's  
(Penno's Wharf and Ordnance Island)**

**Each ship had a carrying capacity of 1,600  
passengers for a total of 3,200 passengers**

# Balance and Distribution – Carrying Capacity 2006



*Two ships docked simultaneously –  
but are restricted in length*



*Two ships docked along Front Street*



*Horizon and Zenith – Now  
Pullmantur (Spanish line)*

**2 cruise ships docked in Hamilton**

**Each ship had a carrying capacity of 1,600  
passengers for a total of 3,200 passengers**



# Summary

- There are a limited number of small ships available that can dock in St. George's and Hamilton. Most are on world-wide itineraries, or sail to exotic destinations
- The economic benefit of the cruise segment is substantial, with many businesses relying on cruise passengers/crew for their livelihood
- Both St. George's and Hamilton have suffered economic loss from having fewer cruise ships
- The economic viability of many businesses in St. George's and Hamilton continues to be reduced
- The current imbalance places considerable stress on transportation services and visitor attractions, and has resulted in over-utilised amenities in the West End, and under-utilised amenities in the East End

# The 'glory' days of cruising to Bermuda

- *"The magic of cruising to Bermuda was having multiple ports where cruise passengers could have different experiences in St. George's, Hamilton and Dockyard"* - Giora Israel, VP, Strategic Planning, Carnival Corporation
- *"Although Bermuda is still a great destination, the over-emphasis on one port-of-call diminishes the cruise experience for our guests"* – Armando Da Silva – Hotel Director Norwegian Jade
- *"We love Bermuda, and in particular St. George's. When we came there on the Norwegian Majesty, we participated in community events and local restaurants and shops made us feel a part of the community"* – Staff waiter Norwegian Jade
- *"Docking in Hamilton on Front Street enabled our guests to experience everything the City had to offer."* Bartender Celebrity Summit
- *"Even though Bermuda does a great job of transporting people, until you get that balance back it won't be the same"* – Shore excursion Manager Royal Caribbean Cruise Lines

# Simulation results 2005 - Norwegian Sky

*Presented at a Town Hall meeting in St. George's in 2007*

The final comment made in the Star Center report was:

*“The participants (Star Center and NCL) mentioned that with cruise ships calling at St. George’s continuing to increase in size, without channel improvements to Town Cut, the future of cruise ships calling there is very limited.”*

# Next Steps

- Completion of this study effort is just the first of several steps necessary to evaluate a course forward.
- Anticipated next steps include
  - Gathering local input on the Study and its findings
  - Continued review of financing options
  - Feasibility and environmental impact study and others



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