Coastal matters affecting Port siting

Richard Reinen-Hamill

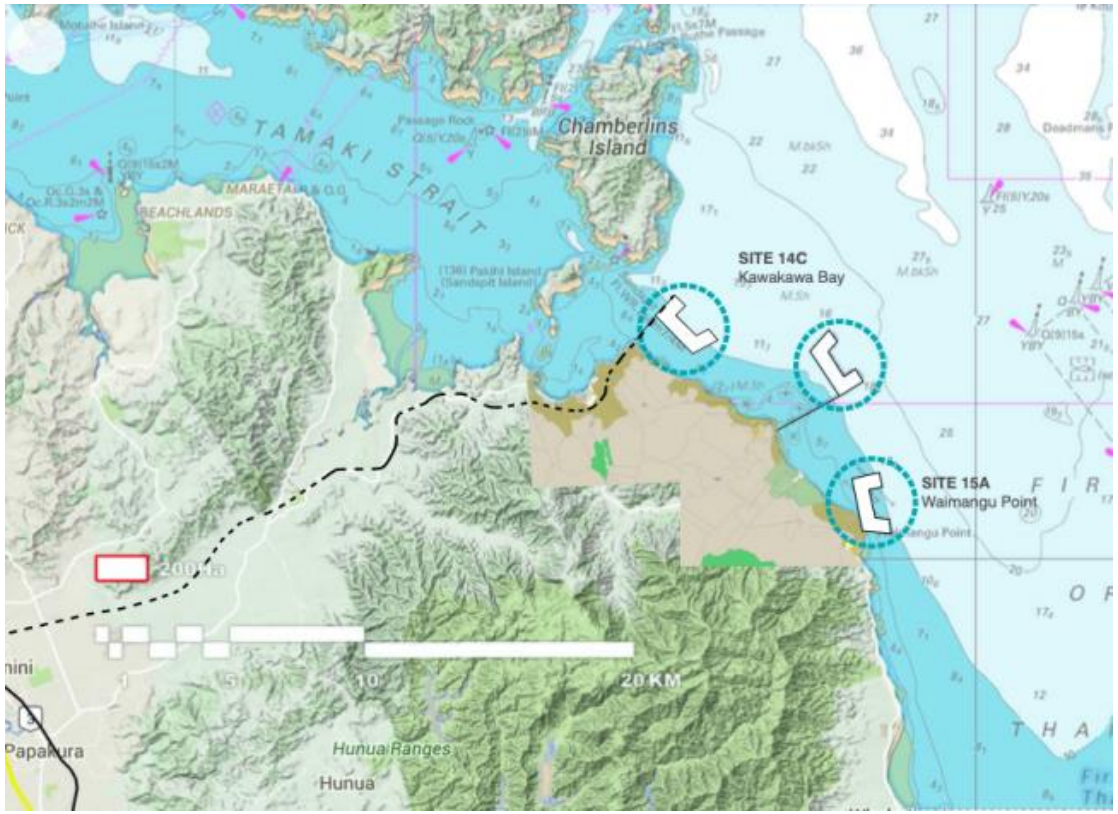
Technical Director: Coastal Engineering

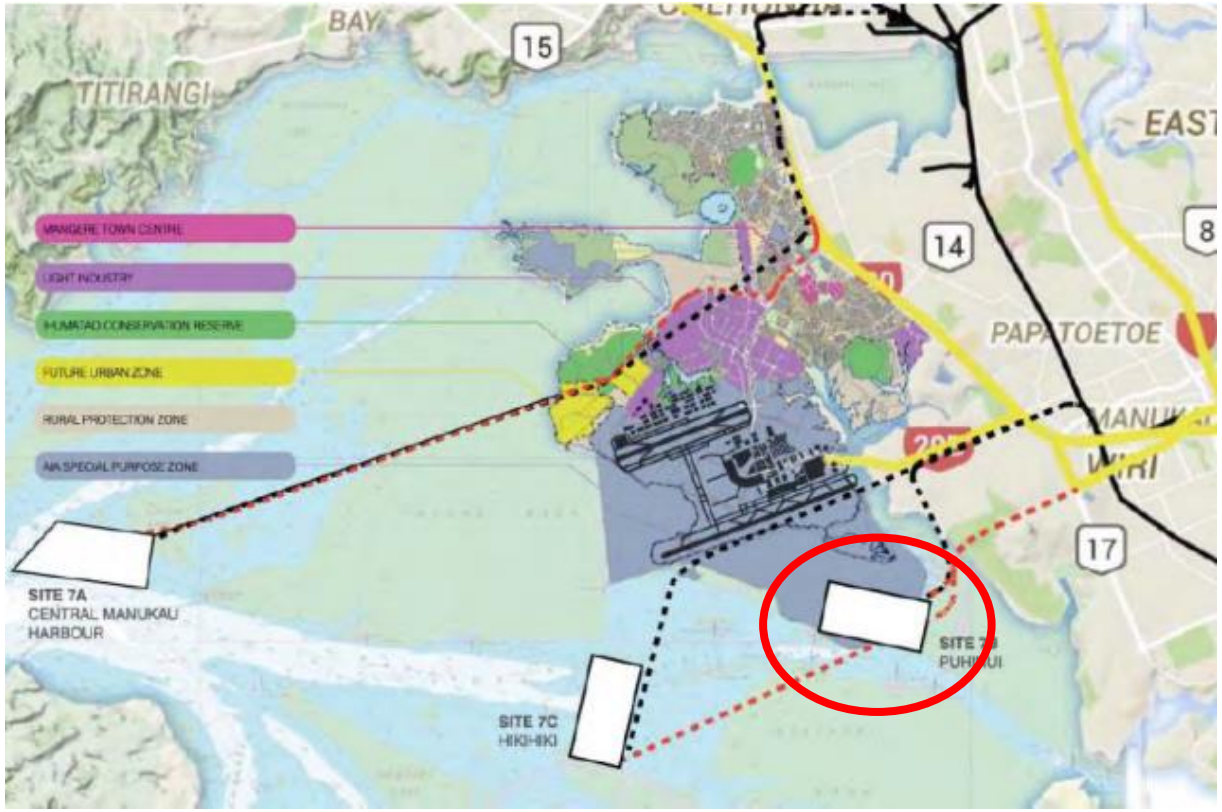
Five options considered in Sapere (2020) report assuming existing port location not viable after approx. 30 years without substantial (approx. 60 hectare) reclamation

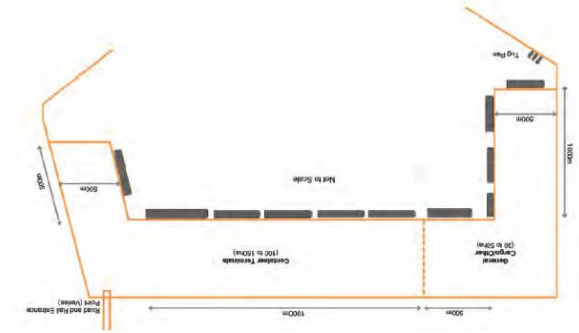
- Northport expansion
- Port of Tauranga expansion
- a shared increase in capacity at both Northport and Port of Tauranga
- a new port (greenfield site) on the Firth of Thames, and
- a new port (greenfield site) on the Manukau Harbour.

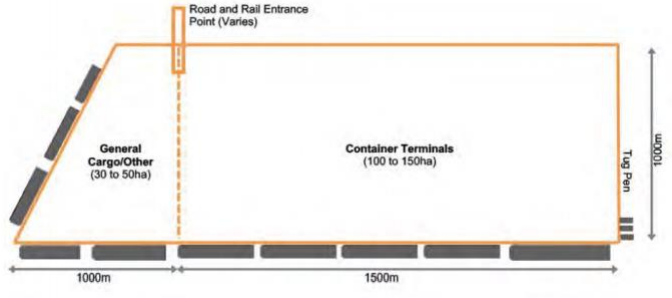
Northport and Tauranga proposals could provide capacity for next 30 to 60 years

Manukau Harbour and Firth of Thames the only two options that meet the gateway test

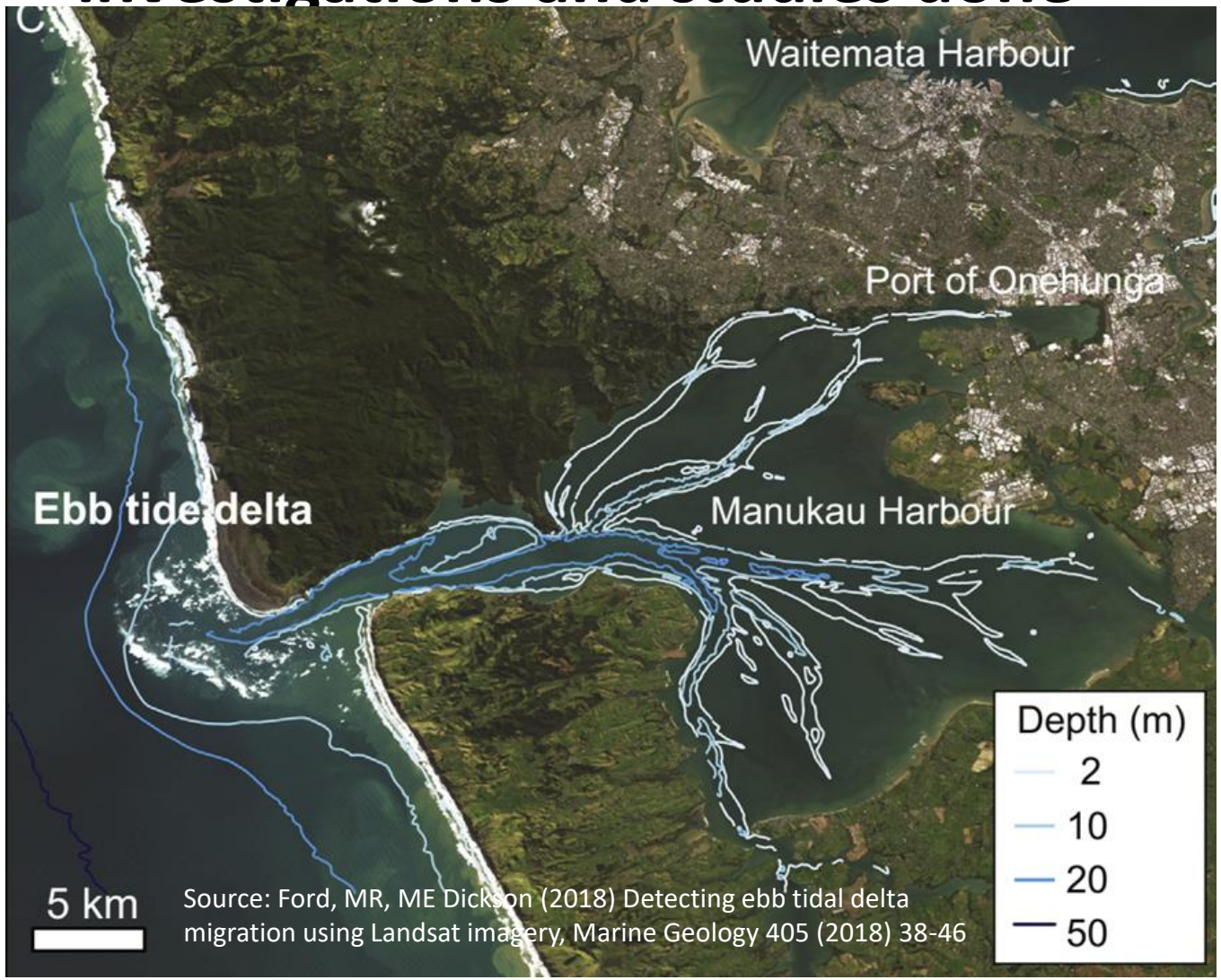




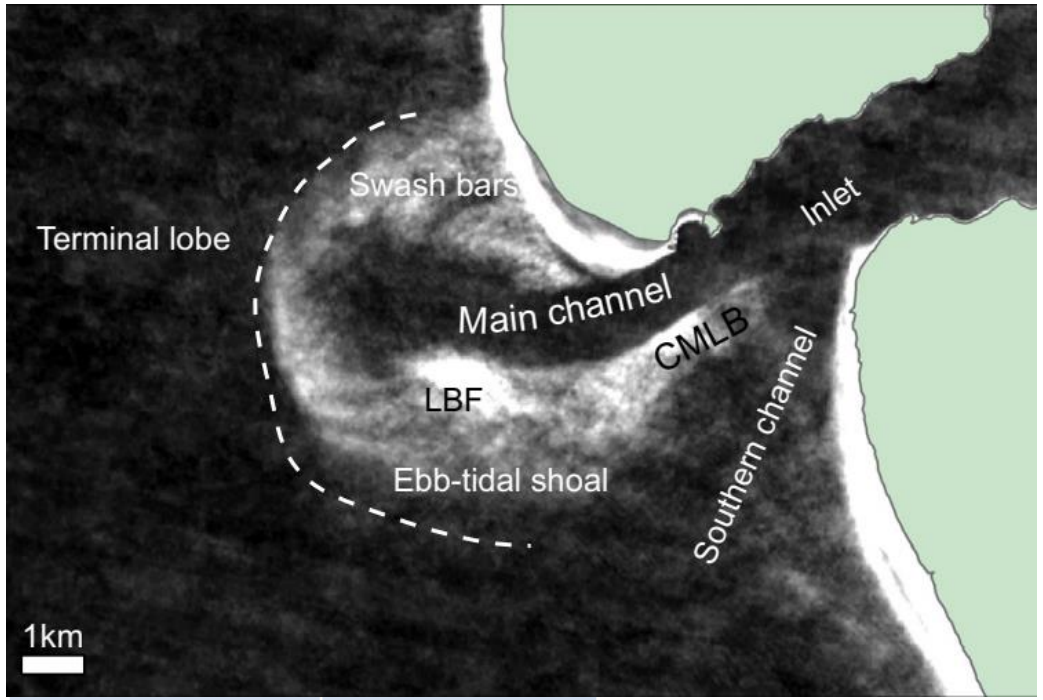




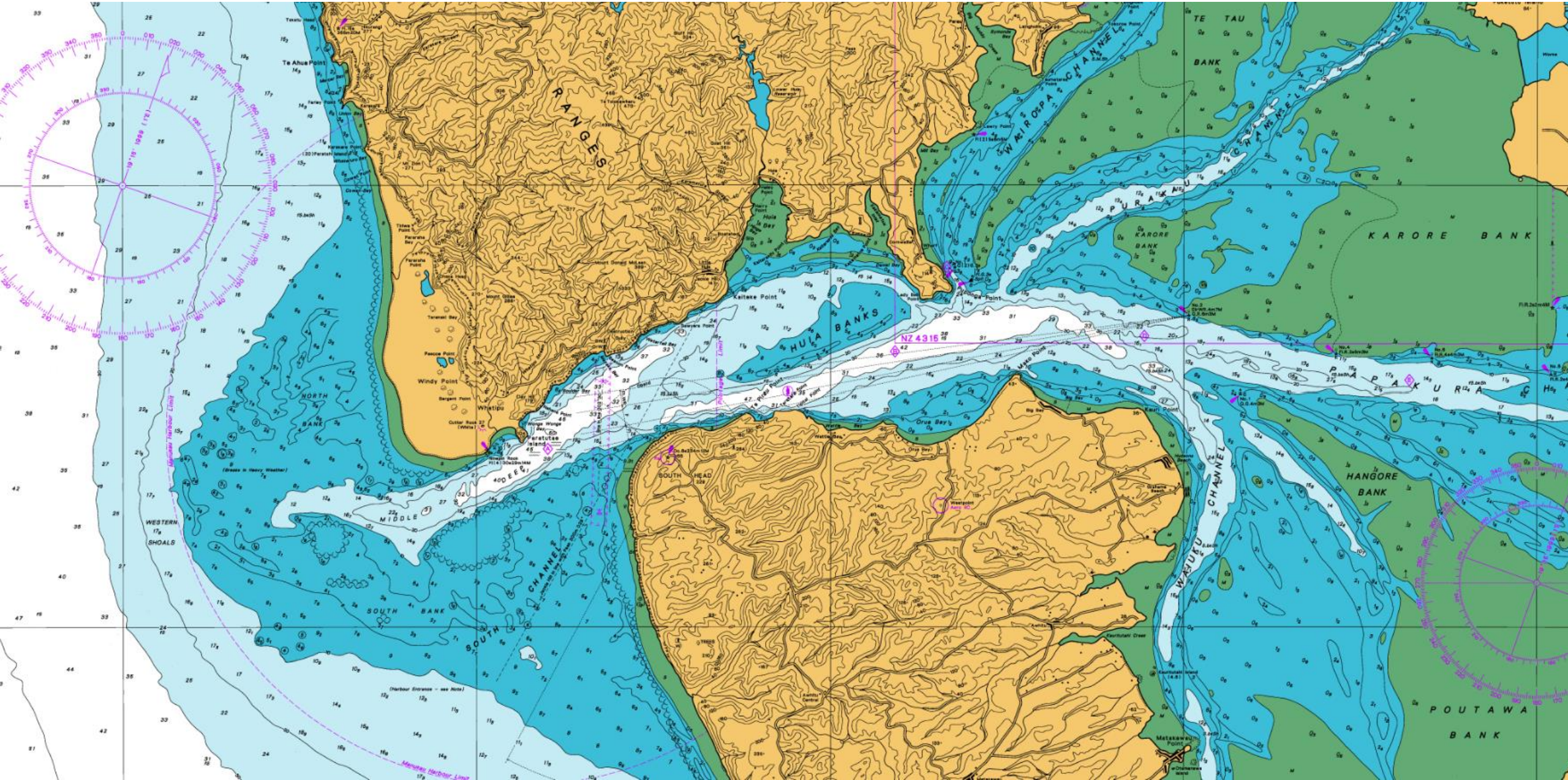
Manukau Harbour entrance is a significant challenge for this option that has had limited investigations and studies done



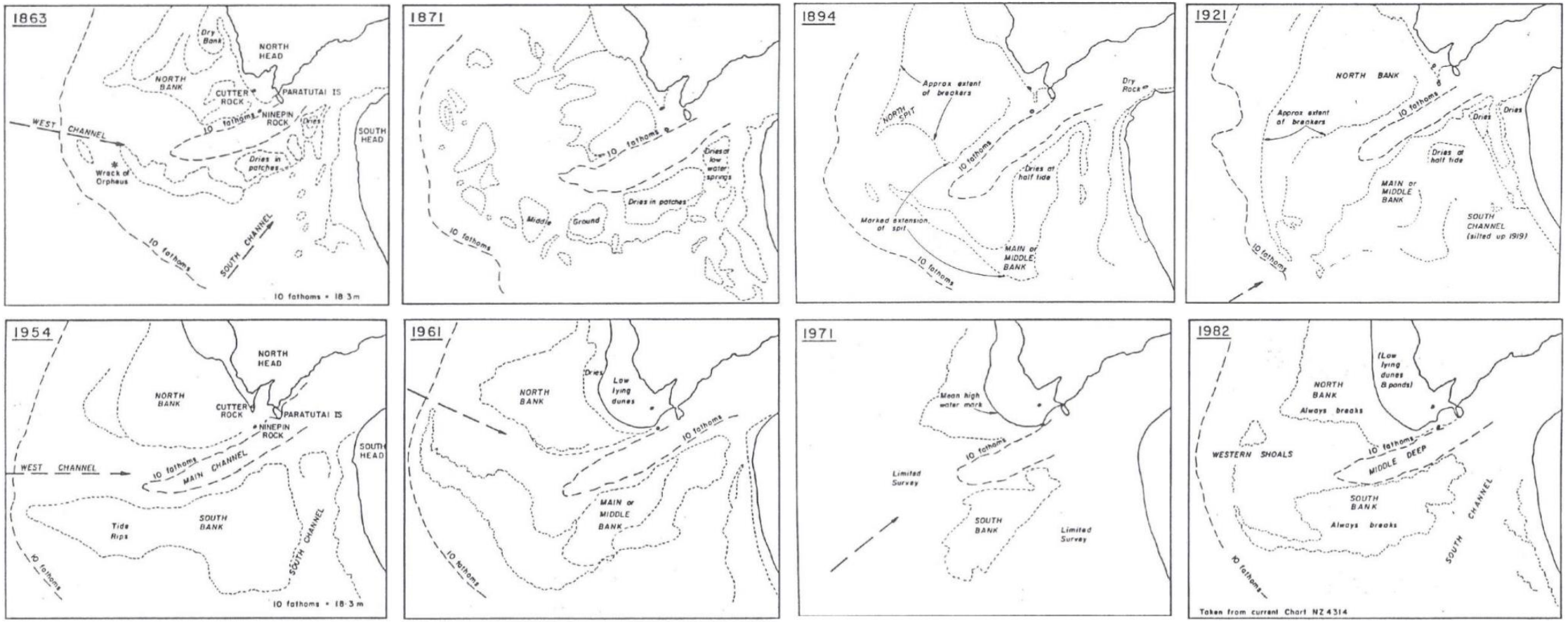
Source: Ford, MR, ME Dickson (2018) Detecting ebb tidal delta migration using Landsat imagery, Marine Geology 405 (2018) 38-46



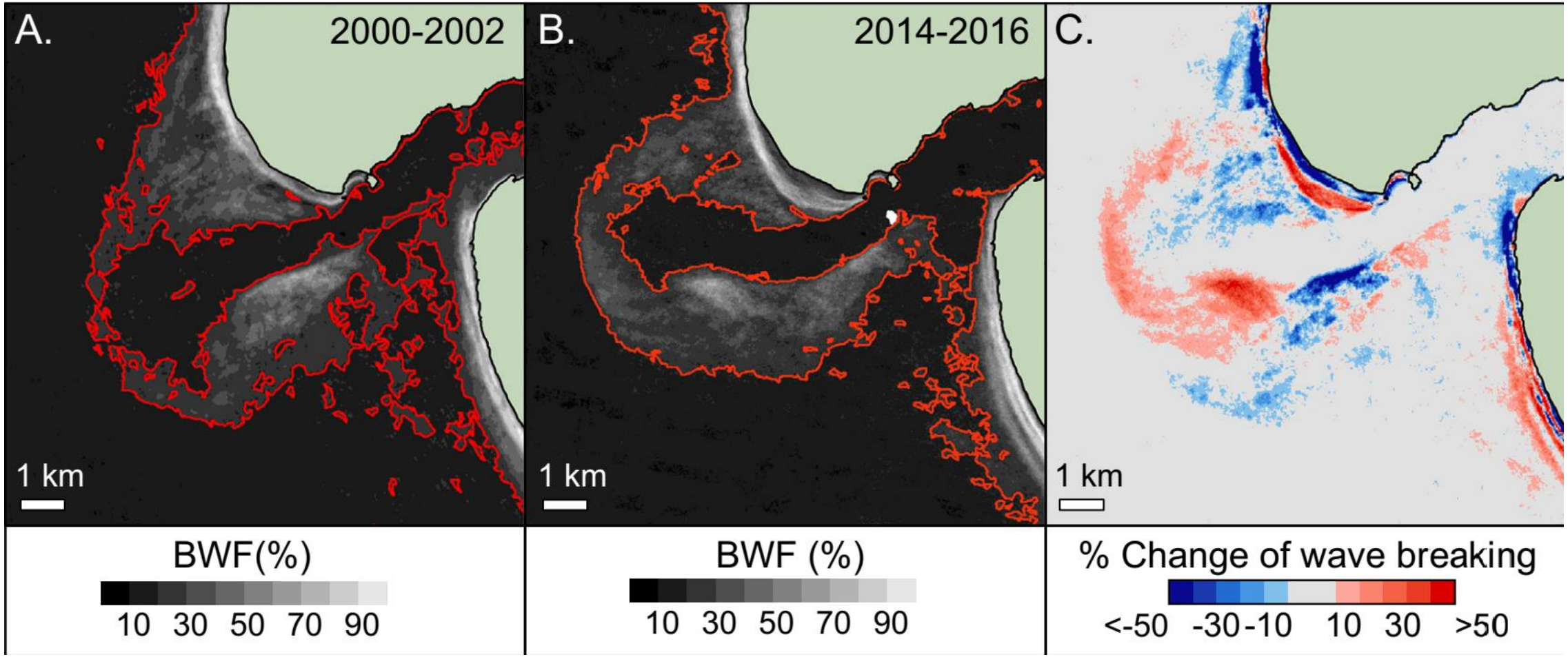
Mean spring tide range	3.4m
Mean inlet throat depth	24m
Tidal prism	918,000,000 m3
Ebb tide sand volume	1,250,000,000 m3
Annual littoral drift	300,000 to 400,000 m3/yr
Wave energy factor	159 m2sec2
Mean wave height and period	2.1 m and 11 – 13 sec


RANGES
TE TAU BANK
WAIROPA CHANNEL
KAROREKA CHANNEL
KARORE BANK
KARORE BANK
HUIA BANKS
NZ 4316
PAPAKURA CHANNEL
HANGORE BANK
POUTAWA BANK
WAIUKU CHANNEL
NORTH BANK
WESTERN SHOALS
MIDDLE
SOUTH BANK
SOUTH CHANNEL
SOUTH HEAD
Te Ahua Point
Windy Point
Whatipu
Kaitake Point
Manukau Harbour Limit

Historic changes from 1863

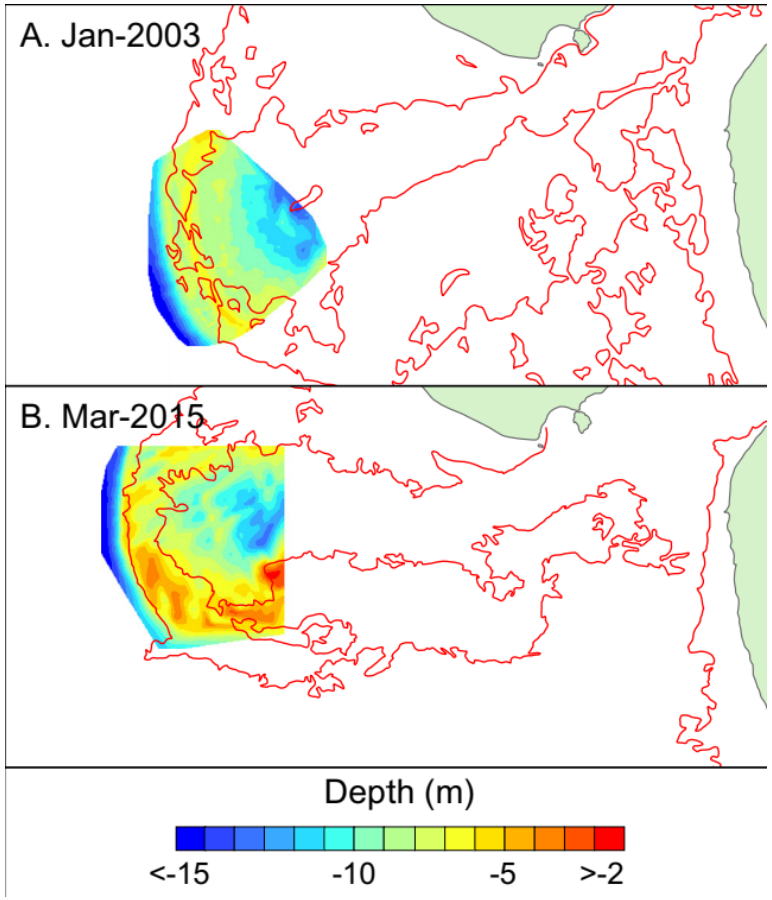


More recent changes 2000 - 2016



Source: Ford, MR, ME Dickson (2018) Detecting ebb tidal delta migration using Landsat imagery, Marine Geology 405 (2018) 38-46

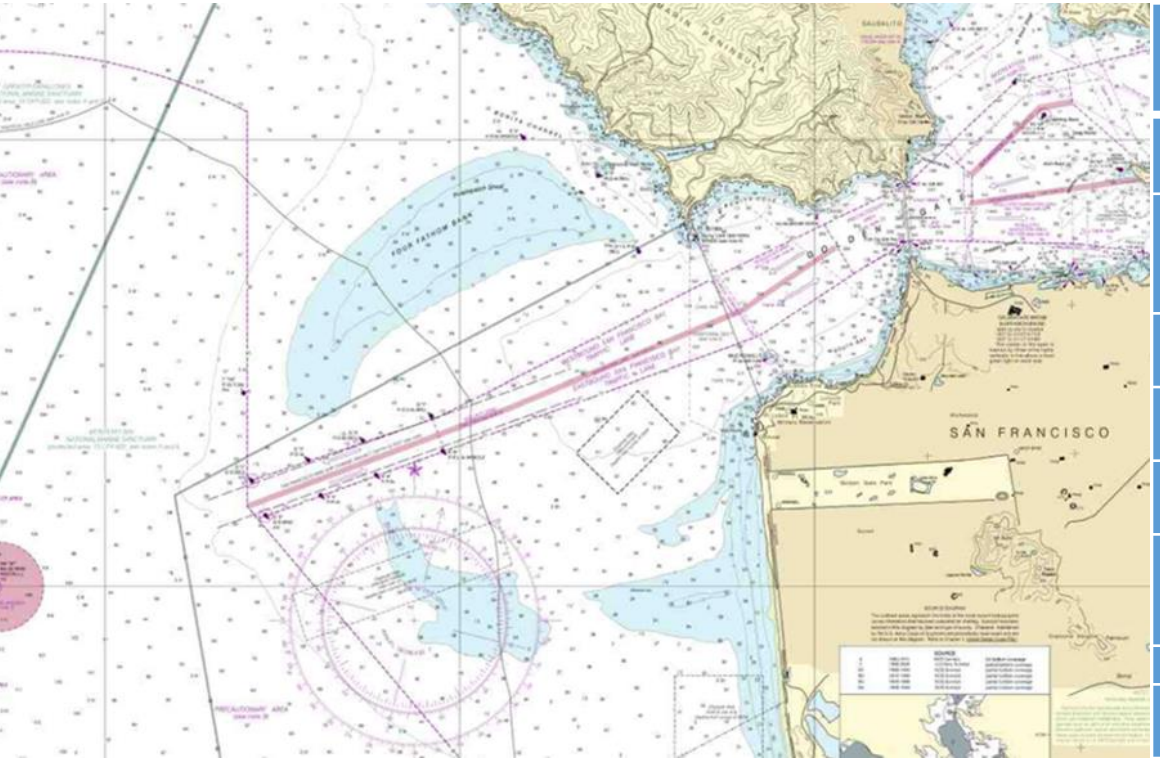
Manukau: Keeping the channel open would require large scale works and ongoing maintenance



Source: Ford, MR, ME Dickson (2018) Detecting ebb tidal delta migration using Landsat imagery, Marine Geology 405 (2018) 38-46

- PFS (2016) and subsequent studies (Black Quay 2020) have identified that more studies/research needed to explore how bar operates and effectiveness and effects of management options – only high level assessments done.
- Likely to need to be dredged down to 17 to 20m CD and may need tug support
- Length of dredged channel could be in the order of 7 to 10 km and need active management to keep open, i.e.
  - Training works
  - Maintenance dredging and sand bypassing
  - Fluidization or other innovative means

How does Manukau Entrance compare?



	Spring tidal prism (m3)	Spring tidal range (m)	Wave climate	Dredge volume (m3/year)	Alongshore drift volume (m3/year)
Manukau Harbour	918,000,000	3.4	Highly energetic		225,000 to 375,000
San Francisco	1,610,440,000	0.5	Moderately to highly energetic	300,000 (80,000 – 800,000)	80,000 to 200,000
Figueira da Foz (Portugal)	890,000	2.2	Highly energetic	>2,925,000	1,000,000
Port of Santos (Brazil)	55,100,000	1.2	Moderately energetic	1,644,000	355,000
Punta Umbria (Spain)	20,000,000	3.2	Weak to moderate	44,000	300,000
Currumbin Creek (Australia)	1610	1.5	Moderate to high	46,000	500,000 to 800,000
Port Otago	69,000,000	2.15	Moderate	250,000	500,000
Port of Tauranga	178,000,000	1.6	Moderate	62,000	73,000 to 210,000

Modified from eCoast, 2020

Once inside the harbour, more straightforward from coastal perspective, but many other issues:

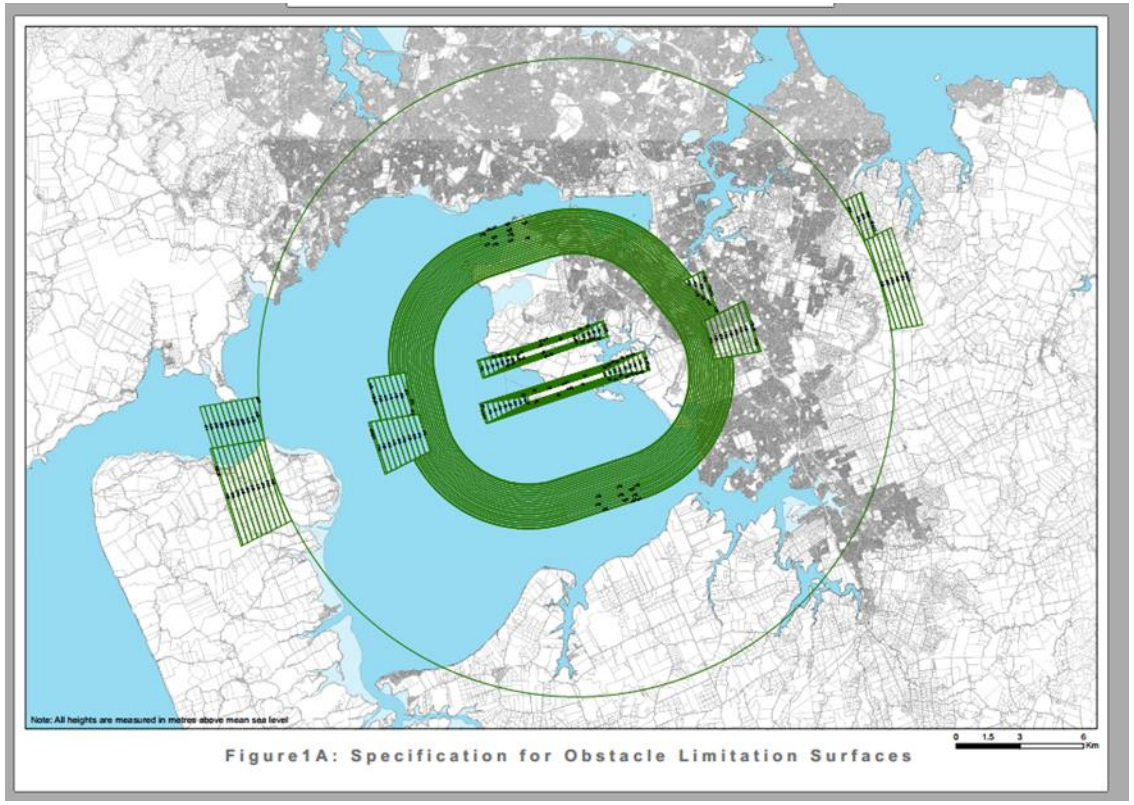
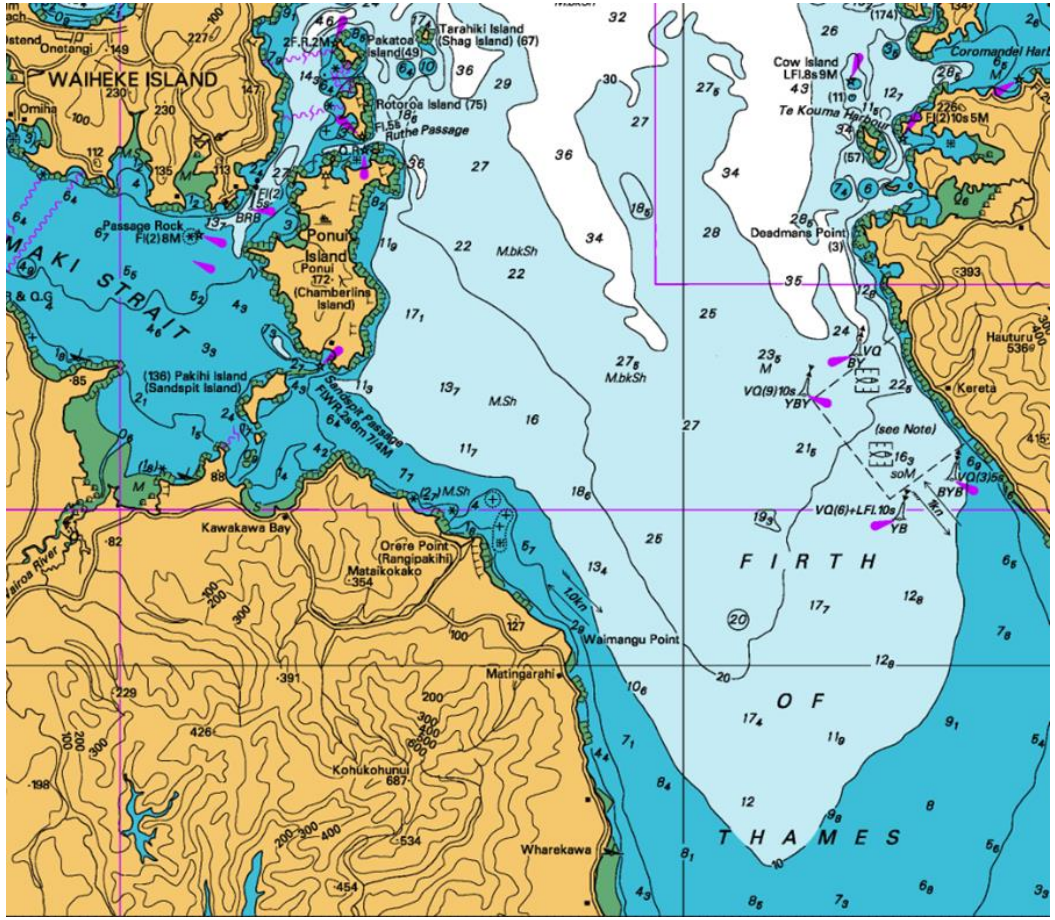


Figure1A: Specification for Obstacle Limitation Surfaces

- Dredged channels
- Avifauna
- Ecology
- Airport restrictions
- Unitary Plan designations
- Etc, etc

Firth of Thames Site



- Deeper water close to land
- Sheltered relatively low wave energy
- Rocky coast
- = Easier from marine side from coastal processes
- But complex land side and complex issues within CMA

Thank you