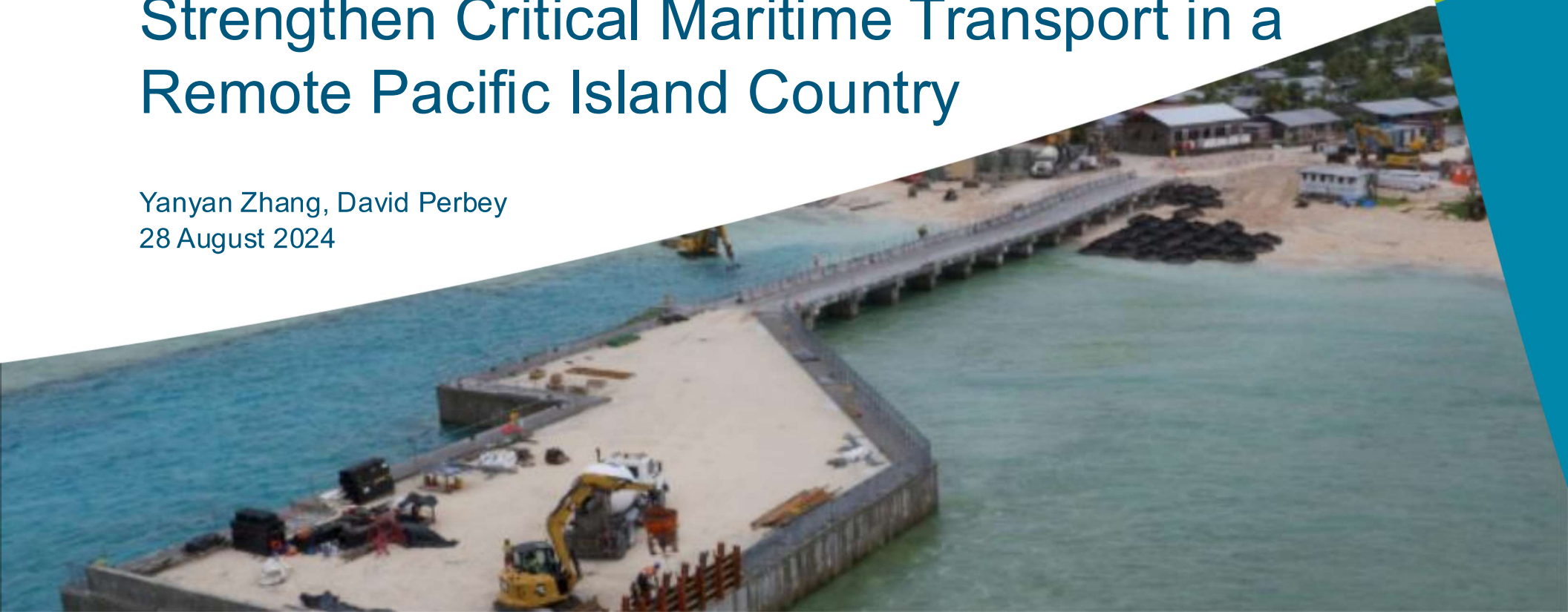


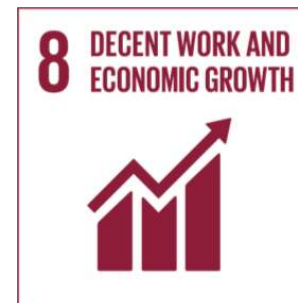
Strengthen Critical Maritime Transport in a Remote Pacific Island Country

Yanyan Zhang, David Perbey
28 August 2024

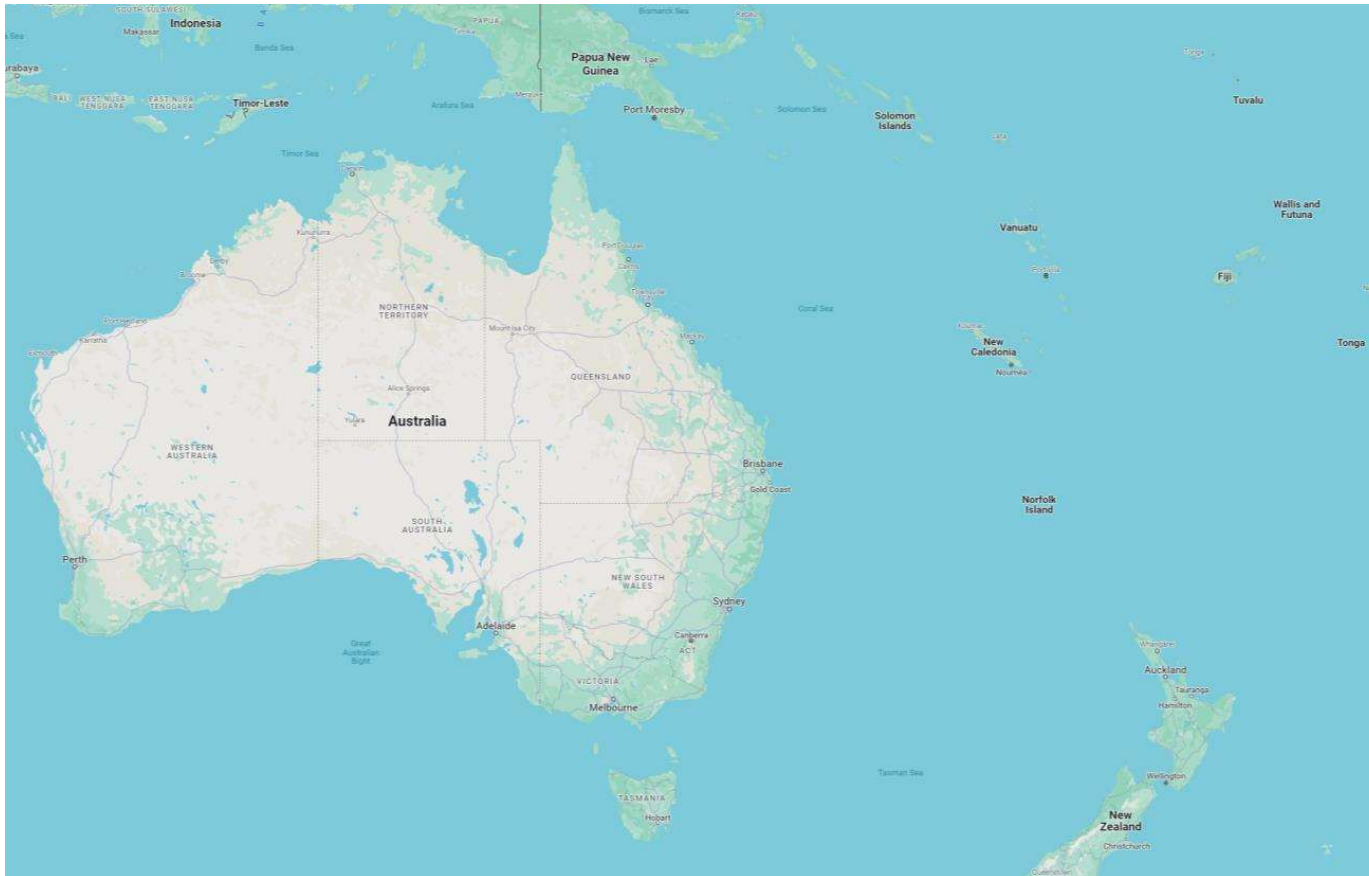


Connecting Asia Pacific Ports in a Changing World

- More about **people** than economy
- Increasing safety and efficiency of transportation between islands
- Providing better access to meet human needs
- Keeping communities connected
- Improving resilience to climate change on low-lying islands
- Enhancing the transition from traditional to modern lifestyle



Project Background



3 Strengthen Critical Maritime Transport in a Remote Pacific Island Country

Royal HaskoningDHV

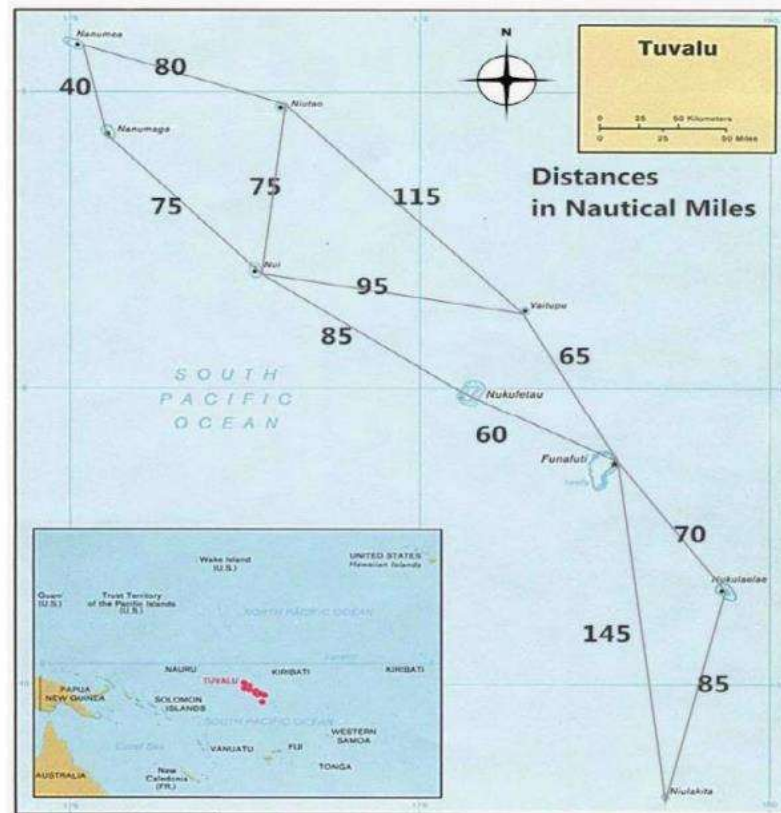
Project Background



4 Strengthen Critical Maritime Transport in a Remote Pacific Island Country

Royal HaskoningDHV

Project Background



Map depicting distances between islands

Shipping Condition - Operating Vessels

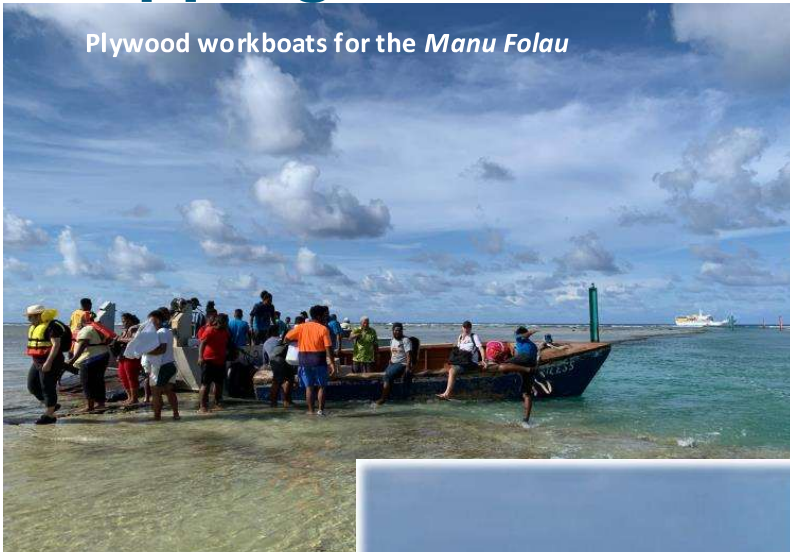
The 2002 Built Passenger-Cargo Vessel Manu Folau



The 2015 Built Passenger-Cargo Vessel Nivaga III



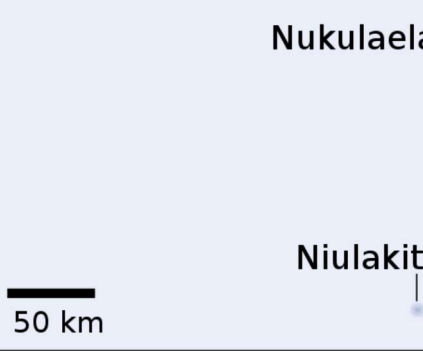
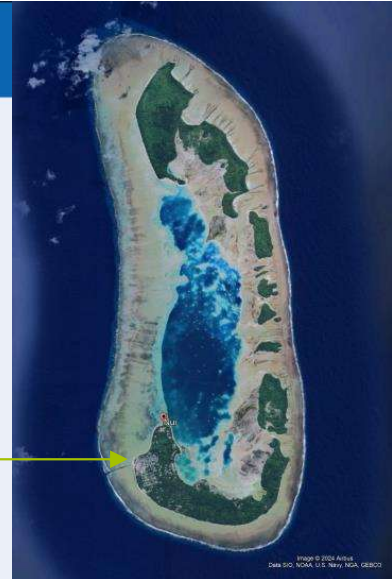
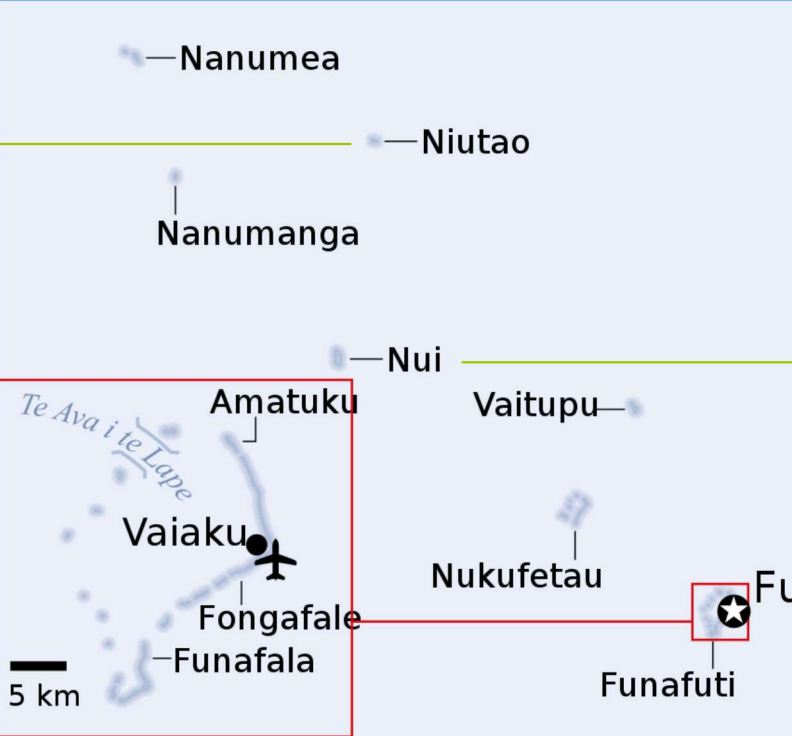
Shipping Condition - Workboats





TUVALU

<https://en.wikipedia.org/wiki/Tuvalu>



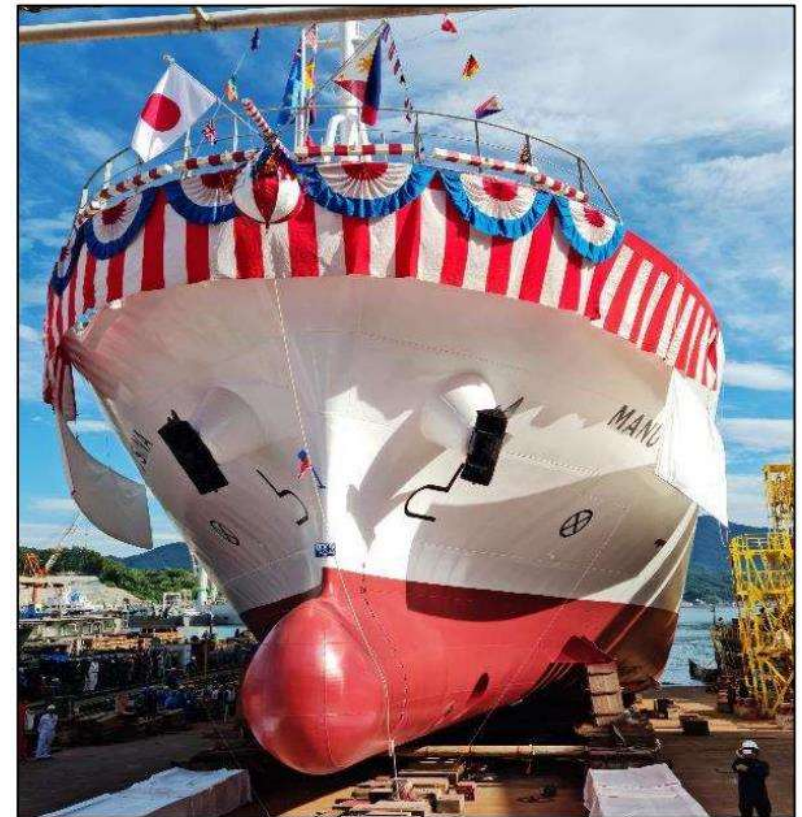
Projects

- Manu Folau Replacement Project
- Outer Island Maritime Infrastructure Project
 - Nui Workboat Harbour
 - Niutao Workboat Harbour
- **Outputs from these two project:**
 - Replace existing passenger and cargo ship
 - Rehabilitate port auxiliary infrastructure (fenders)
 - Strengthen operation and maintenance capacity
 - Increase the availability and reliability of transport for Nui and Niutao communities

New Ship - MV Manu Sina

MANU SINA was launched successfully in the morning of 9 July 2024

Characteristic	New Vessel vs Manu Folau
Length Overall (LOA)	20 m longer
Passenger Capacity	120 - 140 more passengers
Estimated GHG Emissions Reduction	<ul style="list-style-type: none"> - Meets Energy Efficiency Design Index (EEDI) Phase 3 Standard - 27.88 TPA of diesel - 8.68 tCO₂e/year
Speed	2 NM/hr faster
Operation	<ul style="list-style-type: none"> - Increases travel distances between refuelling - Less need for bunkering - safely anchor or berth - Equipped with stabilizers to reduce rolling
Maintenance	Simplified maintenance



New Workboat

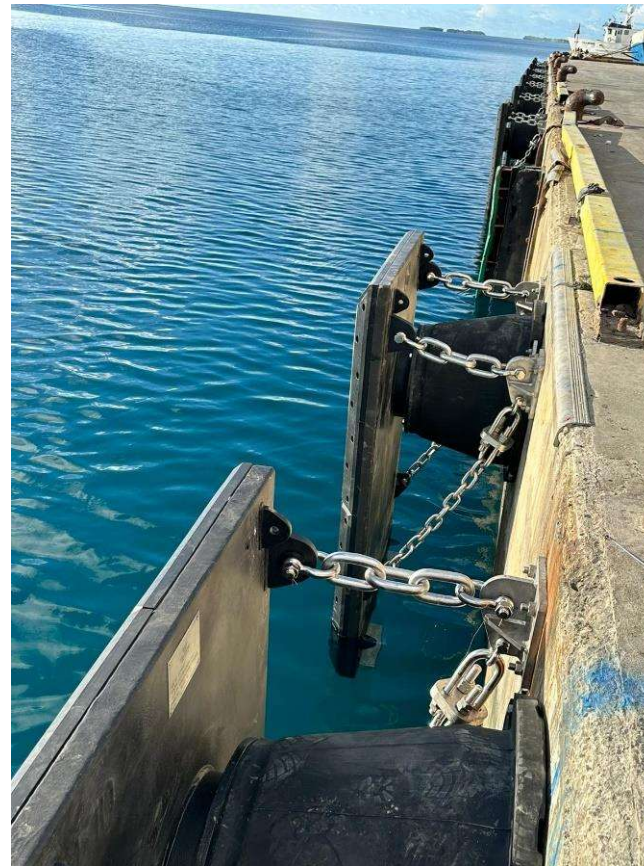


Previous Fenders



12 Strengthen Critical Maritime Transport in a Remote Pacific Island Country

New Cone Fenders

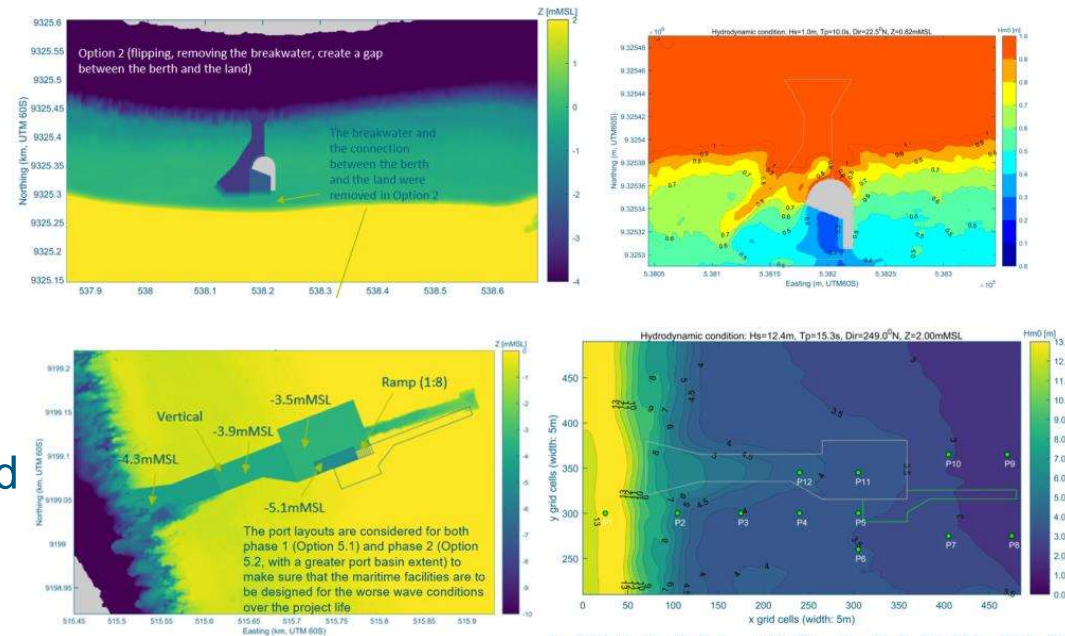


Royal HaskoningDHV

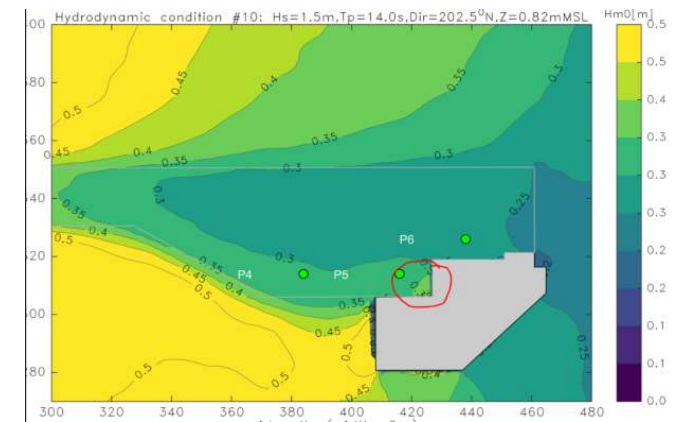
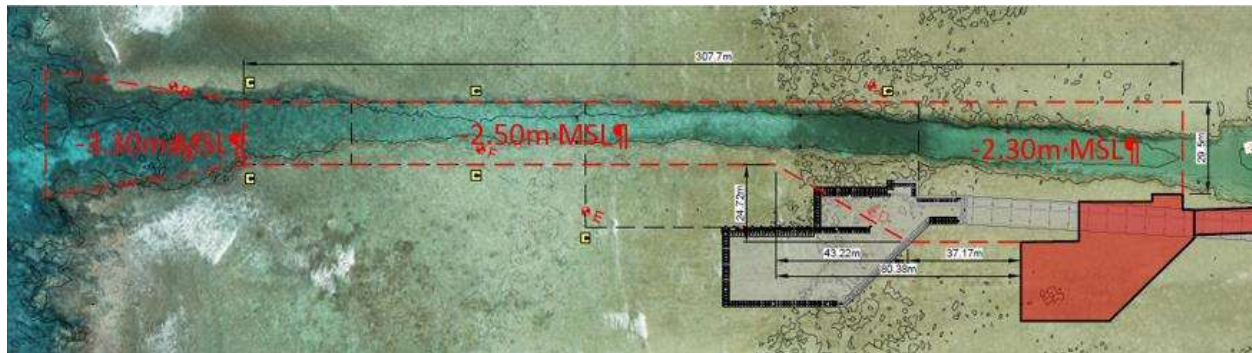
Coastal modelling study

- Wave penetration modelling
 - Optimise harbour layouts
 - Operational wave conditions
 - Design wave conditions

- Cyclone analysis and modelling
 - estimates wave height and wave period



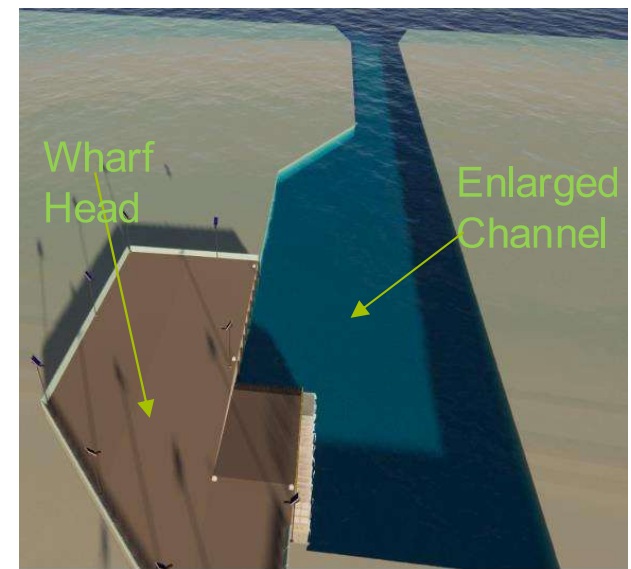
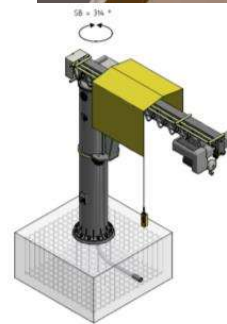
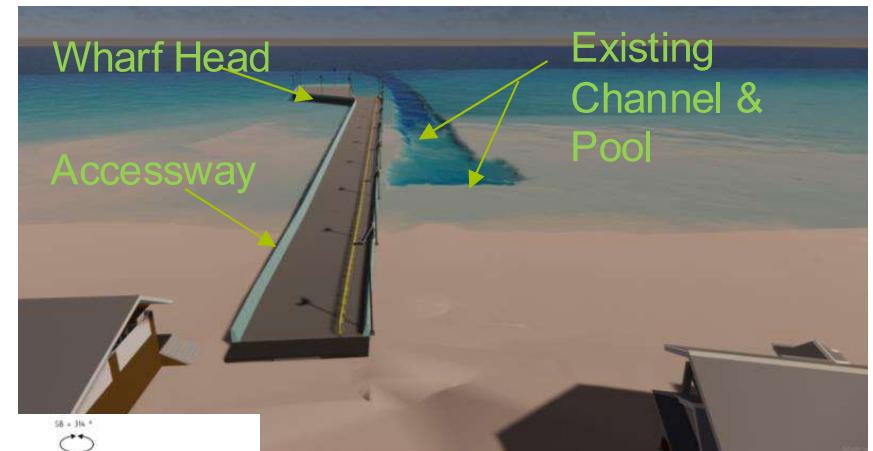
Nui Workboat Harbour



- Wharf brought closer to the shore, resulting in:
 - More dredging but less maritime structure.
 - Lower price overall and shorter construction time.
 - Better wave condition at wharf head (lower than previous design).
 - Better for sediment transportation

Marine Components

- Wharf level and accessway at +2.90m
- 30m long by 30m wide wharf head
- 20m long by 10m wide ramp
- 24m long landing & stairs for passengers
- 100m long by 9m wide accessway
- Suspended deck structure
- a crane on wharf for lifting of large goods



Material Recycling

- 8,000 m³ of dredged material was re-used as backfill for the wharf designed as blockwork structure to withstand cyclones estimated from computational analysis and sea level rise expected in the next 50 years.



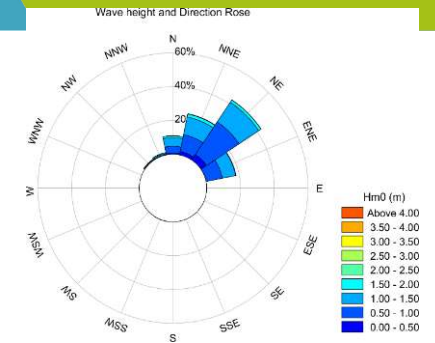
Harbour opening on 15 June 2024 (Source: AIFFP)

Earthwork on Foreshore

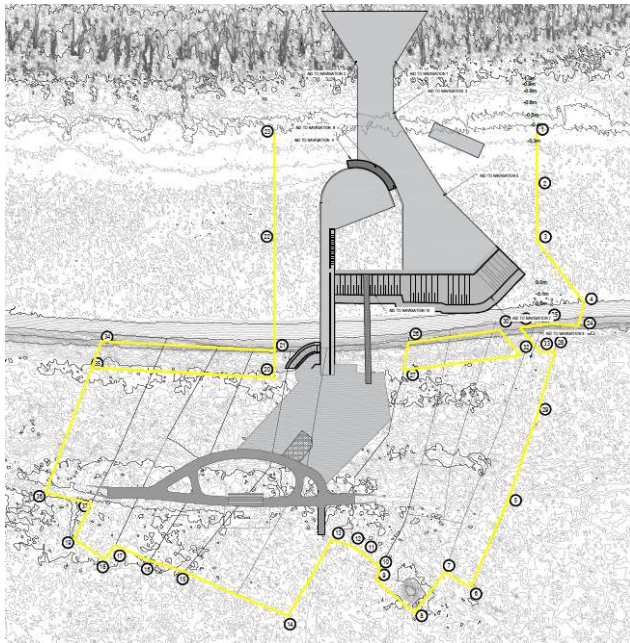
- Around 4,000m³ of Dredge Spoil material crushed and compacted along the shoreline.
- 100 No. Rock bags (8t units) filled with crushed material in front of buildings
- 150m of buried pipes (DN450) with Three outlets
- A new building used by the community was relocated and elevated to protect against coastal flooding and built to international standards for cyclone resistance.



Niutao Workboat Harbour - Marine Layout



Previous Design



Final



Added benefit from Final Design:

- No breakwater
- No rock revetment
- Reduced dredging quantities
- Reduced marine structures
- Reduced impact on sediment
- Reduced concrete pavement

Discussion and Conclusion

- Making marine transportation in Tuvalu more efficient, safer and sustainable supports the community and economic development of the country and helps reduce emigration from outer islands to the capital which currently face the challenges of overcrowding, pollution, and the spread of disease.
- Involvement in these projects provided a unique opportunity to understand how much the outer island communities depend on resilient domestic shipping.
- Connect people together, get basic human needs covered, and enhance development in outer islands
- Thanks you! Q&A?
- Contact: david.perbey@rhdhv.com or yanyan.zhang@rhdhv.com