

Improving boating safety at Dungeness

Insights from morphological modelling

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29 August 2024 – PIANC APAC Conference



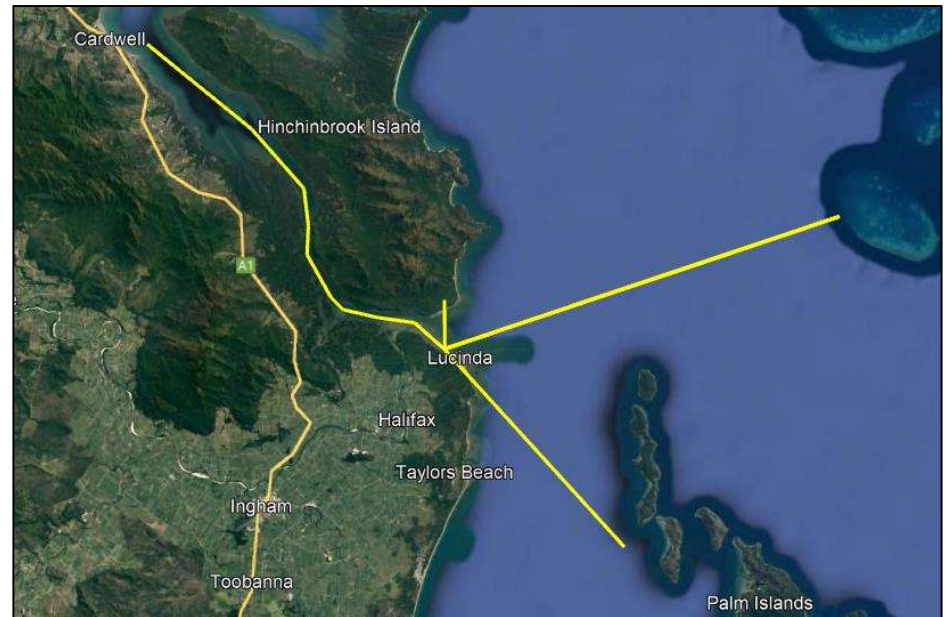
Site Introduction – Hinchinbrook Shire

- Preface – ongoing DA.
- Location
 - Tropical North QLD
 - Exposure to Cyclones, Floods
 - High reliance on sugar cane – 5m t/a
 - Pop. 11,000



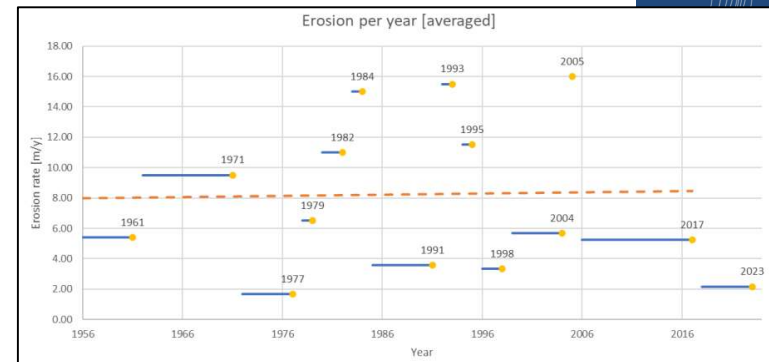
Site Introduction – Dungeness Boat Ramp

- Location
 - Key boating access point for Hinchinbrook Shire
 - Regional economic importance – tourism, fishing, boating



Site Introduction – Enterprise Channel

- Connects boat ramp and Hinchinbrook Channel
- Significant change to adjacent Spit in last 60 years - visible
- Negative impact on Enterprise Channel
- Inaccessible on low tide – 0m depth at LAT



The Challenge

- Issues
 - Channel siltation – unsafe navigation channels
 - No safe low-tide access
 - Navigation markers not in use



Photo credit: Ingham Coastguard



The Challenge

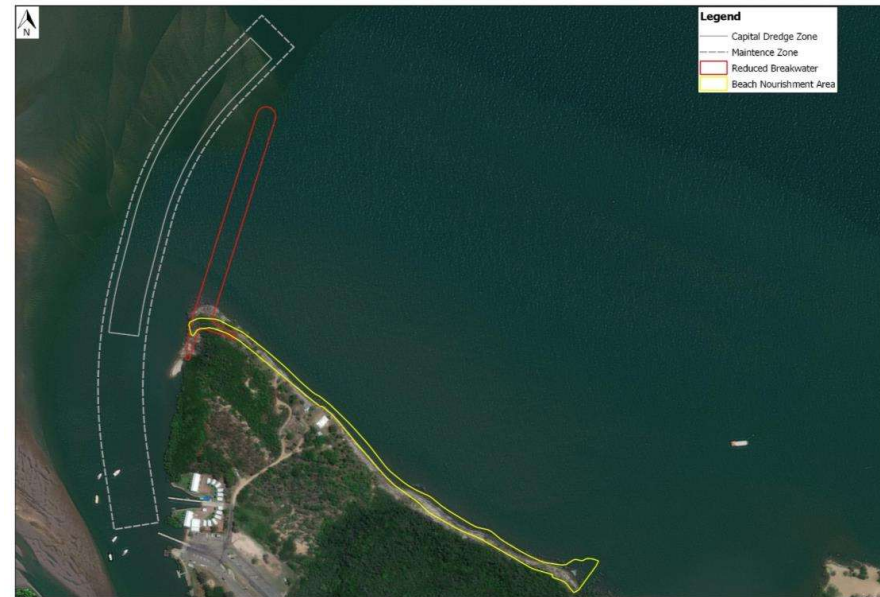
- Issues

- Erosion of Dungeness Beach and Spit
- Substantial loss of mangrove forest
- Solution requires balance of navigation safety and environmental considerations – GBRMP, seagrass, mangroves, natural coastal processes



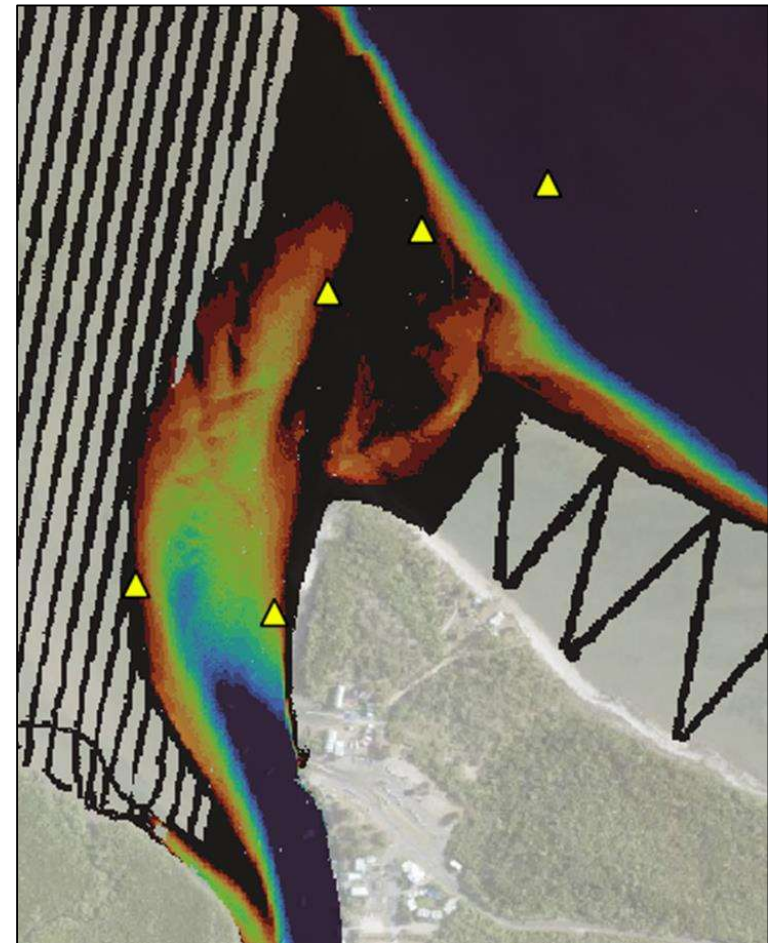
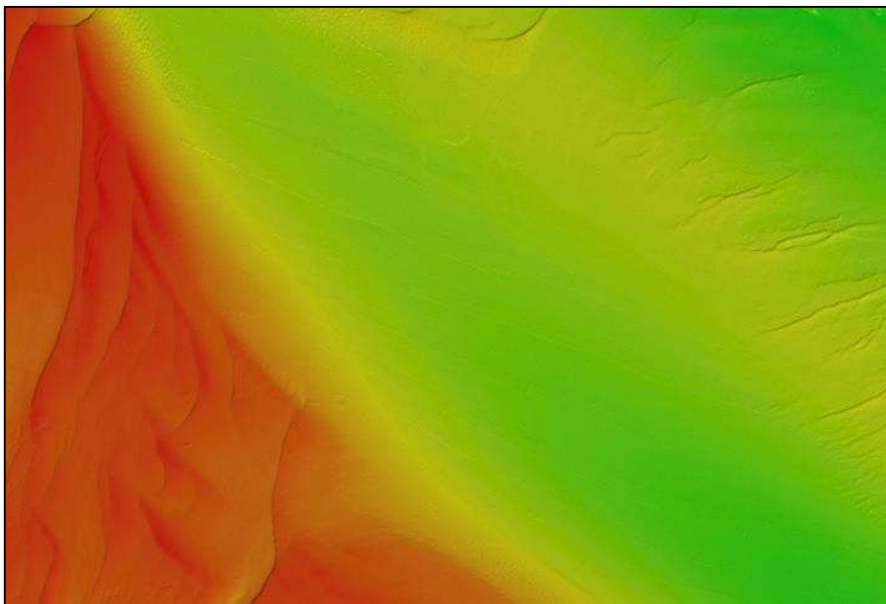
Sustainable Dredging Approach

- Original plan
 - Dredging of channel
 - Placement of dredged material on adjacent beach
 - Coastal structure to reduce sedimentation and retain material on beach
- Impact to coastal processes?
- Long-term & Large spatial extent



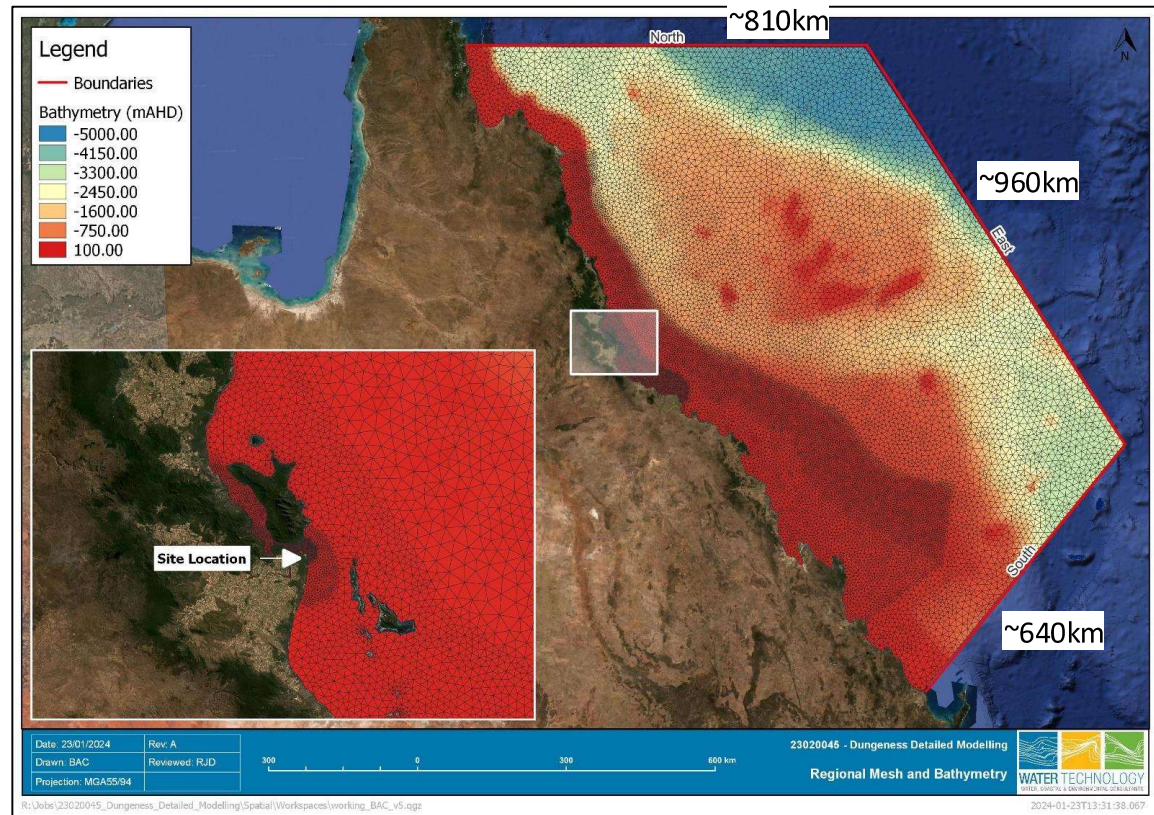
Methodology

- Stage 1 - Data Collection Program
- Stage 2 - Numerical Modelling (Hydrodynamic, Spectral Wave and Morphological)



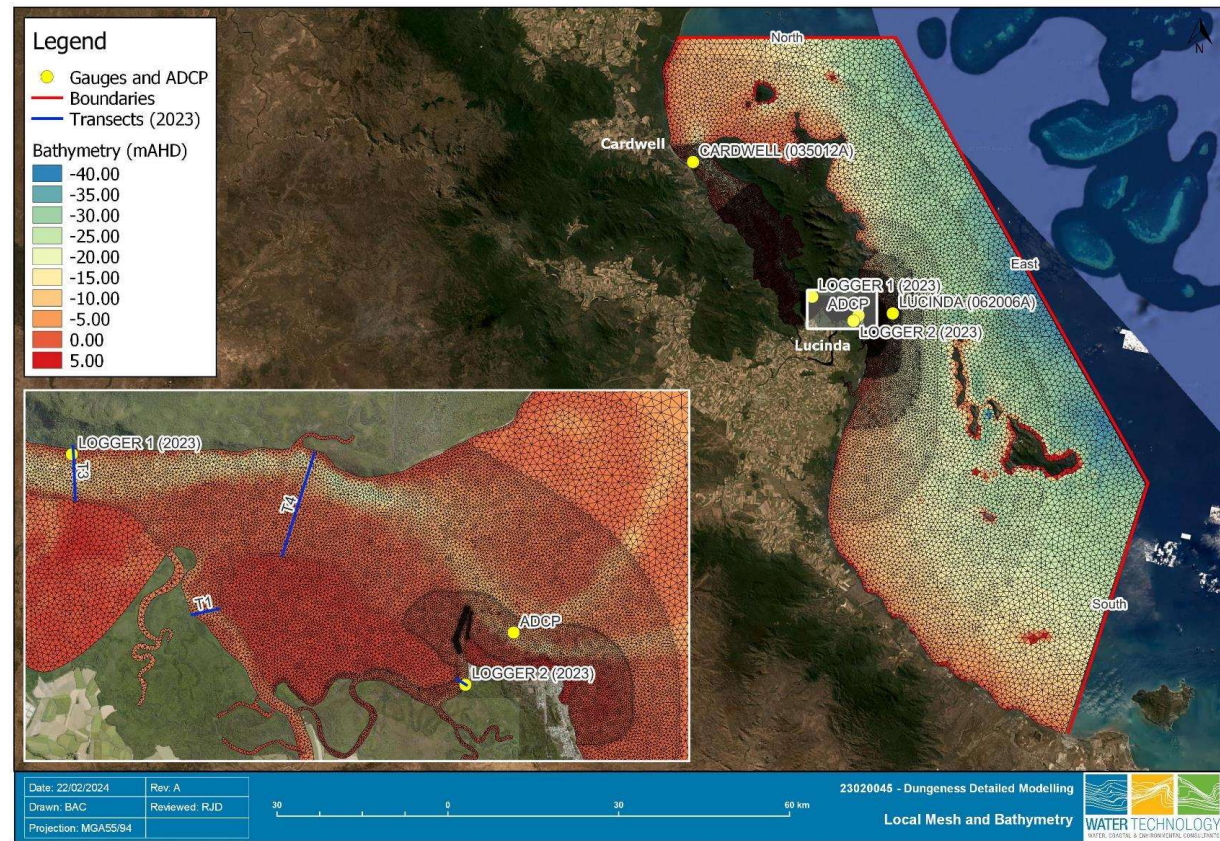
Regional Model – HD & Wave

- Mesh Resolution:
 - 200m (Channel)
 - 8500m (Offshore)
- Generation of local model HD boundary
- Generation of wave field

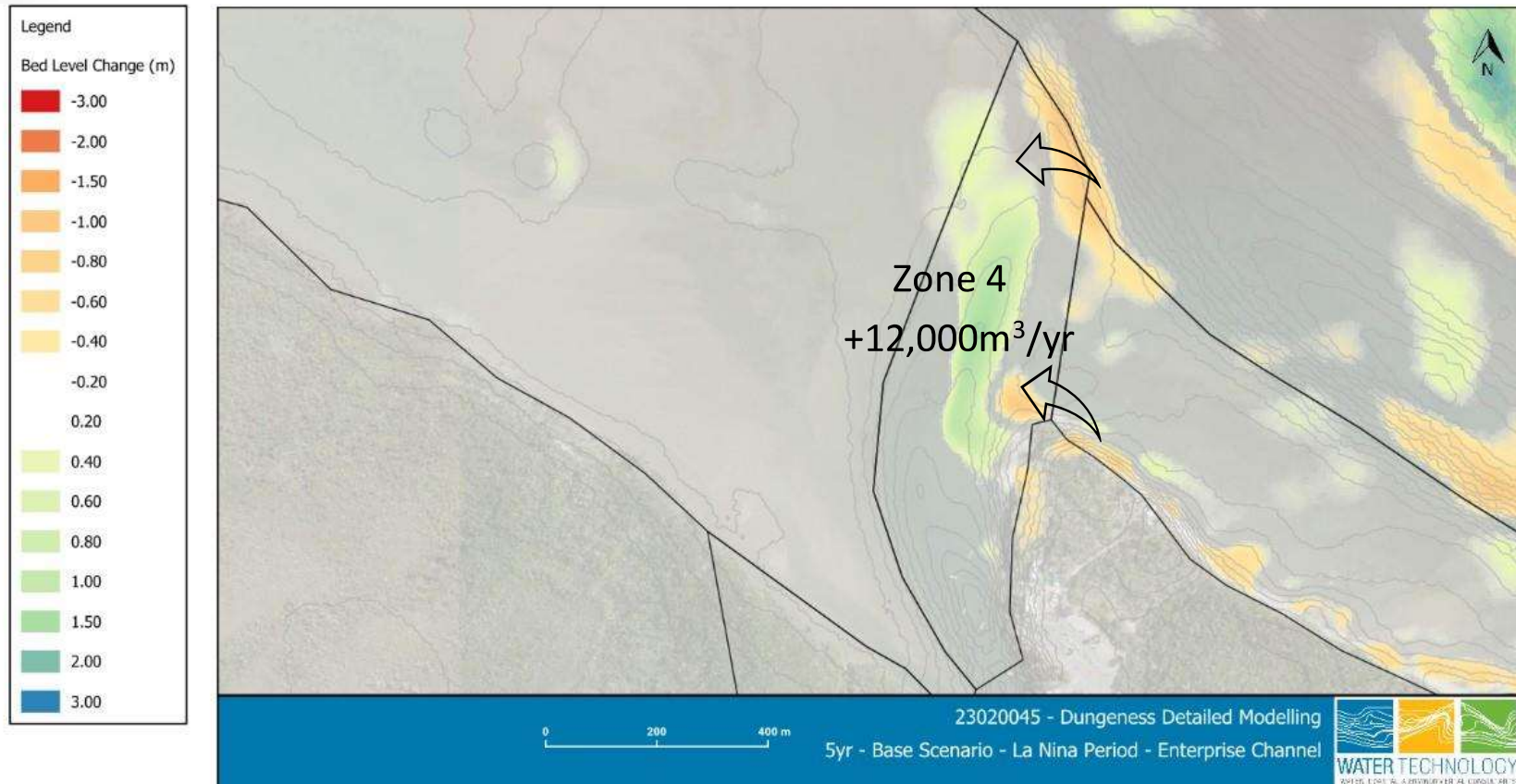


Local Model – HD & Sand Transport

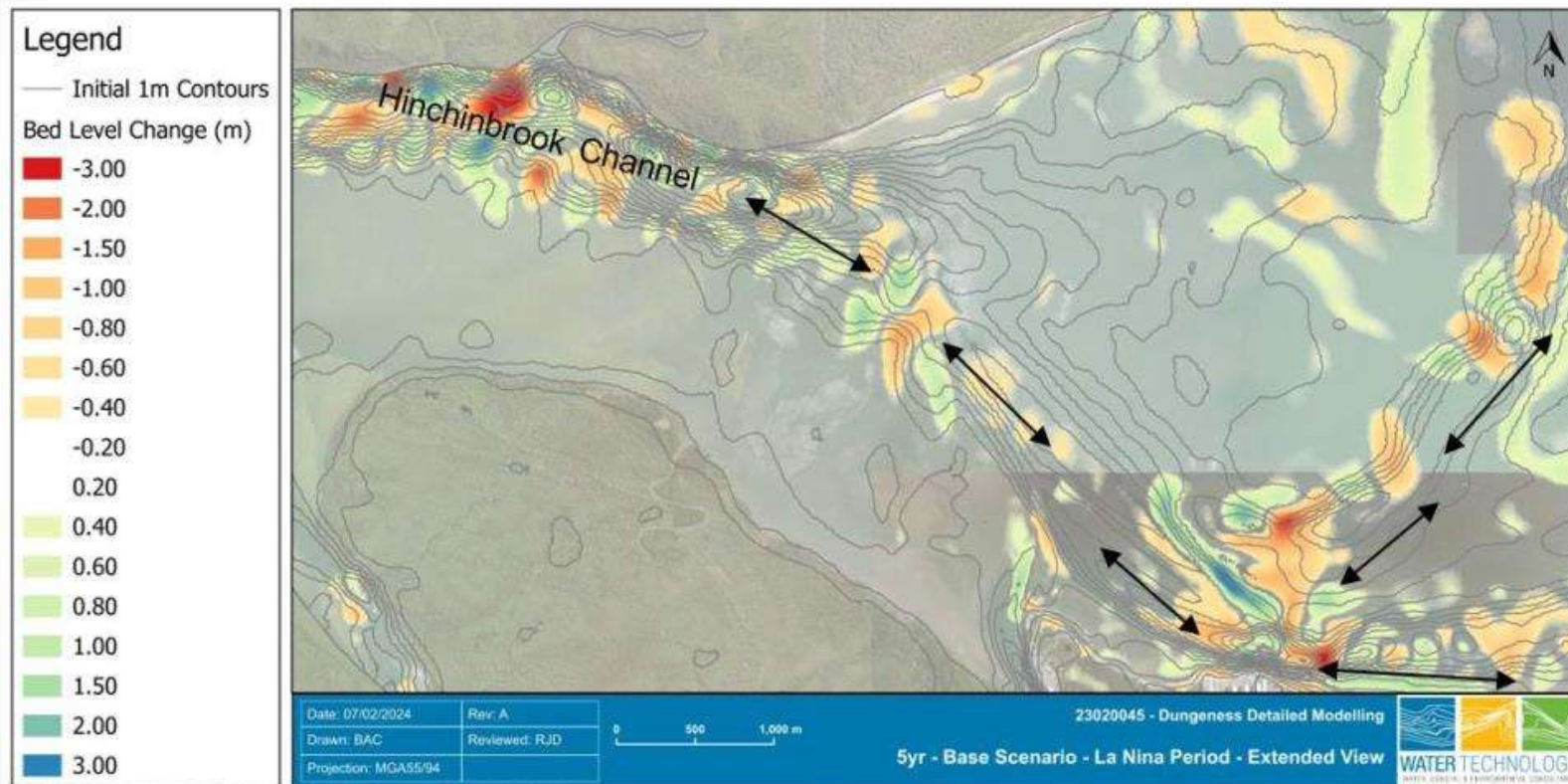
- Mesh Resolution:
 - 15m (Channel)
 - 1000m (Offshore)
- Hydrodynamic and Sand Transport models
- El Nino / La Nina
 - Base Case
 - Dredge only
 - Dredge with coastal structure



Baseline – Zone 4 (Enterprise Channel)



Baseline – Zone 4 (Hinchinbrook Channel)



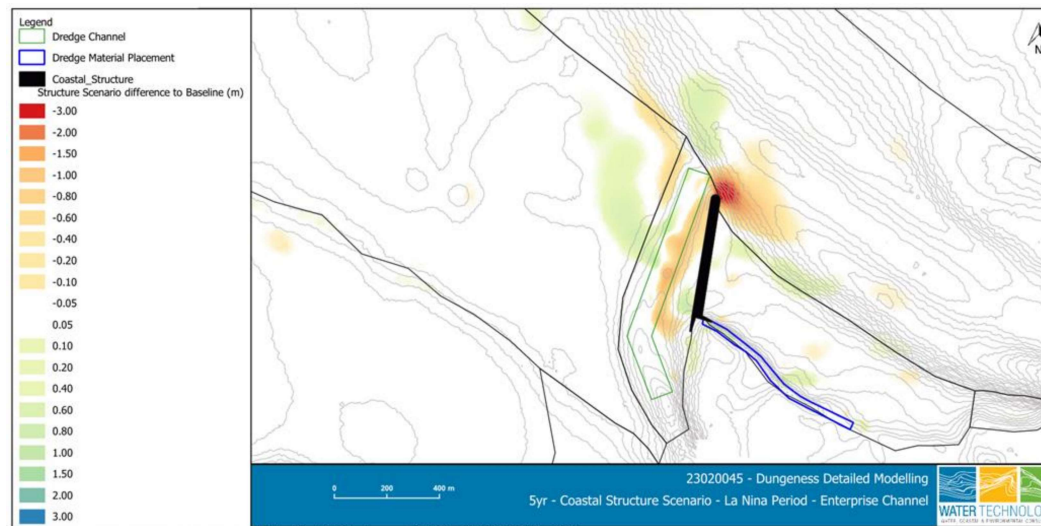
Works Option 1

- +20% infill rate
- Additional erosion



Works Option 2

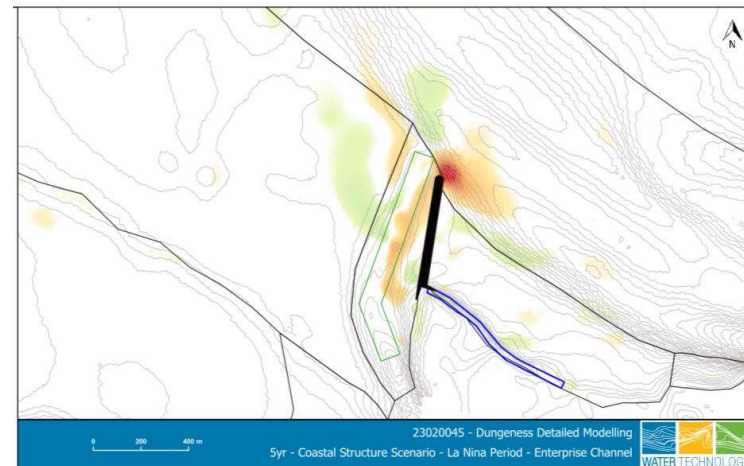
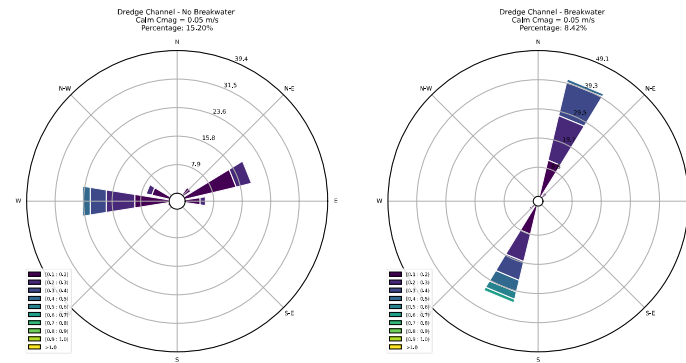
- -45% infill rate
- Scour at structure
- Stabilisation of Spit



Works Option 2 – Coastal Structure & Dredge Channel



Current Rose Plots for Dredge Channel



Conclusion & Recommendation

- Channel siltation – unsafe navigation channels
 - + Erosion of Dungeness Beach and Spit – loss of mangrove forest
- Morphological modelling was found to be a useful tool to assist answering key questions around impact to coastal processes
 - Minimal impact to western mangrove bank of coastal structure
 - Reduction to infill rate in channel (increased boating safety)
 - Spit / beach stabilisation
- Further use case – aid in design (ie utilise self-scouring for channel) + environmental assessments
- Repeat survey recommended - to allow for further model verification

Q&A

