



# Assessment of larger ships berthing at a salt export terminal

PIANC APAC 2022, Melbourne  
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- Design ships
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- Navigation assessment



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## Project overview

- Onslow Salt
- Export 2.7mtpa
- Operational since 2001
- Existing maximum ship – Supramax bulk carrier
- Proposed maximum ship – Ultramax bulk carrier



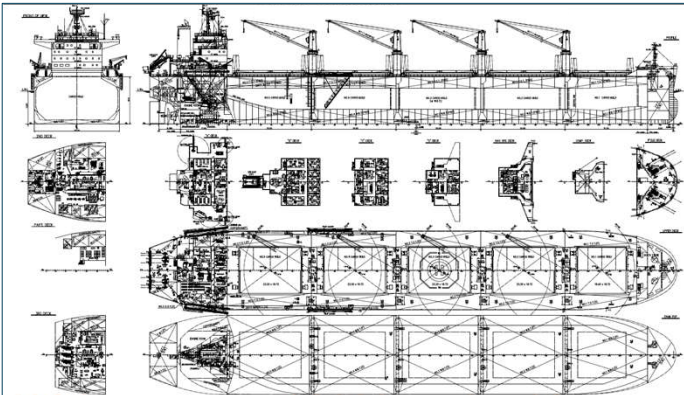
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## Design ships

- |                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Supramax           <ul style="list-style-type: none"> <li>• 190m x 32.26m</li> <li>• 56,557 DWT</li> <li>• 12.74m maximum draught</li> <li>• 11.8m loading draught</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Ultramax           <ul style="list-style-type: none"> <li>• 200m x 32.24m</li> <li>• 63,464 DWT</li> <li>• 13.42m maximum draught</li> <li>• 11.8m loading draught</li> </ul> </li> </ul> |
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## Engineering assessment

- Berth inspection and data collection
- Berthing and unberthing operation
- Splash zone inspection
  - Areas of corrosion
  - Steel thickness measurements



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## Engineering assessment

- Fender capacity calculations
- British Standard BS6349:4-2014
- PIANC guidelines Report WG33-2002
- Berthing against one fender and quarter-point berthing
- Fender capacity was sufficient
- Supramax – 0.15m/s Ultramax – 0.15m/s



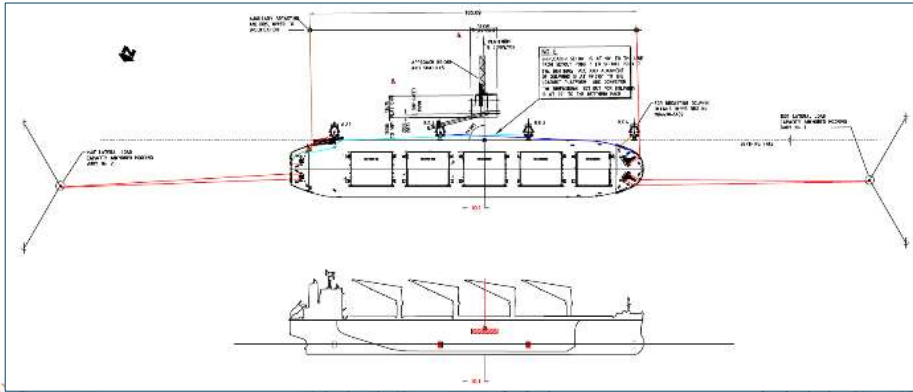
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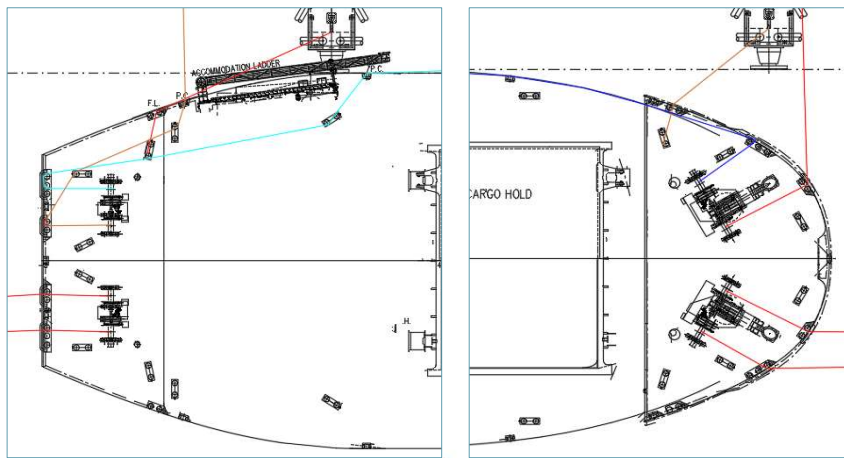
### Ship mooring assessment

- Static and dynamic mooring assessments
- Mooring layouts established
- Fender contact assessment
- Forward hold, centre hold, aft hold
- PIANC guidelines Report WG24-1995



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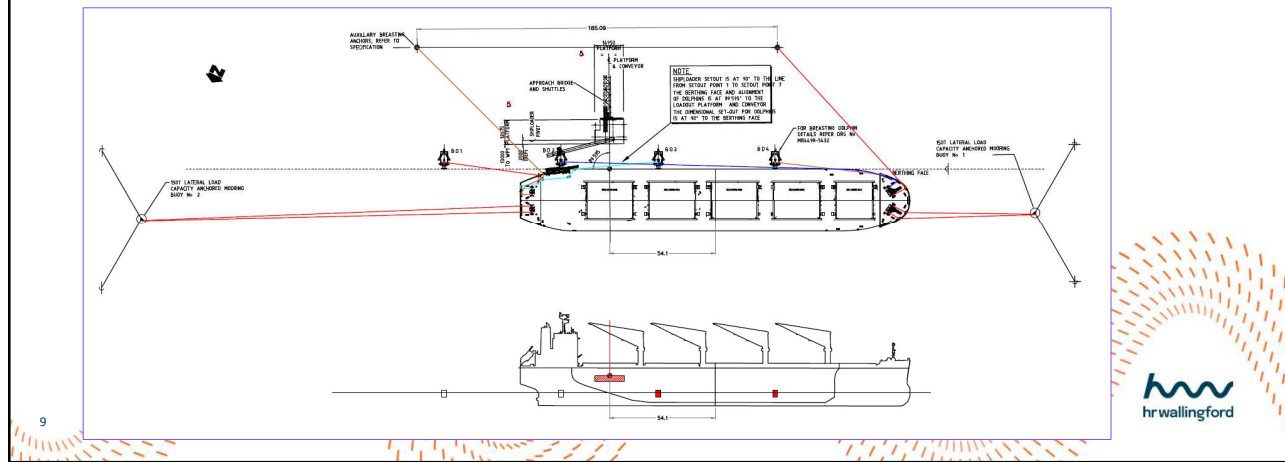
### Ship mooring assessment



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## Ship mooring assessment

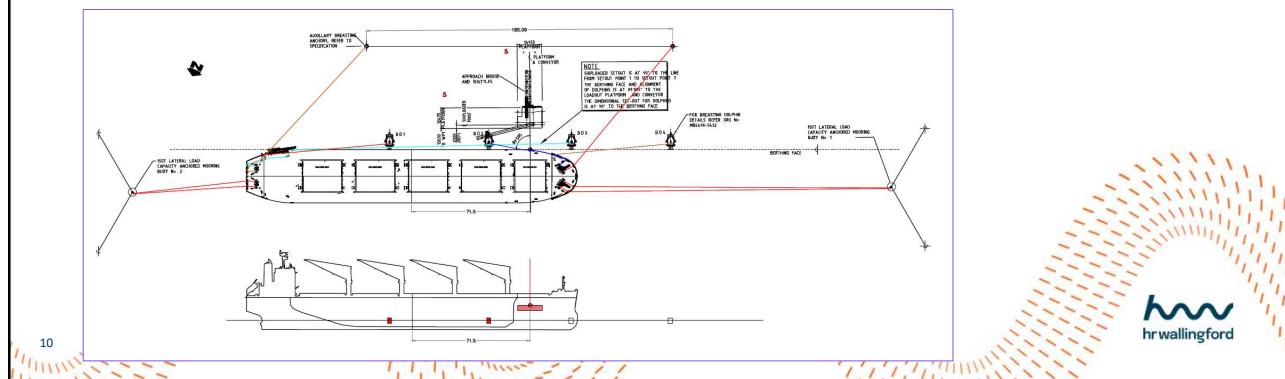
- Aft hold loading



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## Ship mooring assessment

- Static mooring assessment
  - Effects of wind
  - Wind sweep analysis
  - 5° increments
  - Worst case – forward hold
  - Ultramax – 20 knot limit
  - Supramax – 22 knot limit



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## Ship mooring assessment

- Dynamic mooring assessment
  - Effects of wind, waves, current
  - HR Wallingford's SHIPMOOR
  - Environmental loadings calculated from timeseries of conditions
  - ~28,000 scenarios examined
  - Examining ship motions at berth
  - Downtime analysis
    - 13.4% downtime



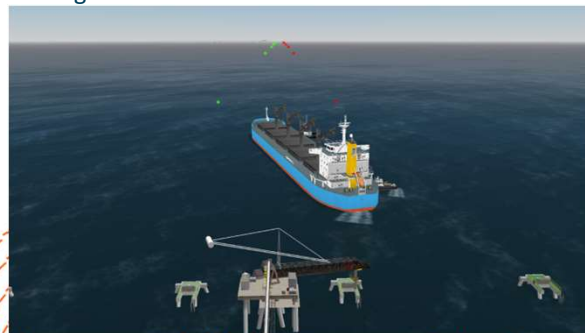
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## Navigation assessment

- Examined the navigational aspects of the larger ship
- Increased windage/displacement
- Arrival and departure scenarios
- Emergency scenarios
- Same towage arrangements



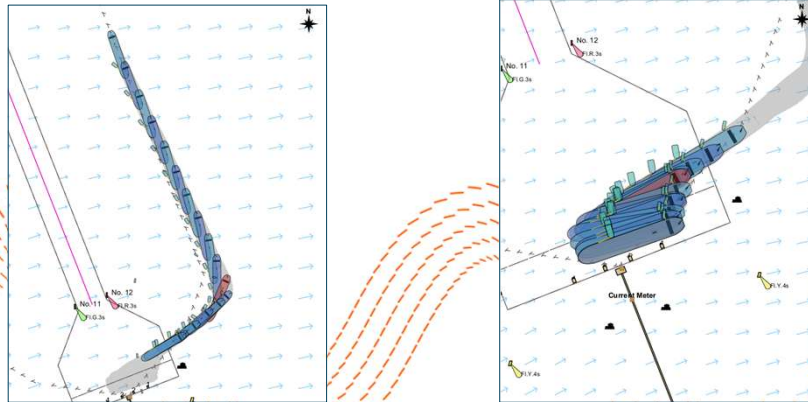
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## Navigation assessment

- 19 real-time navigation simulation runs
- Certain wind limits were lower than existing parameters
- Current limits were the same
- Limits for manoeuvring established for operation
- Greater amounts of tug power required



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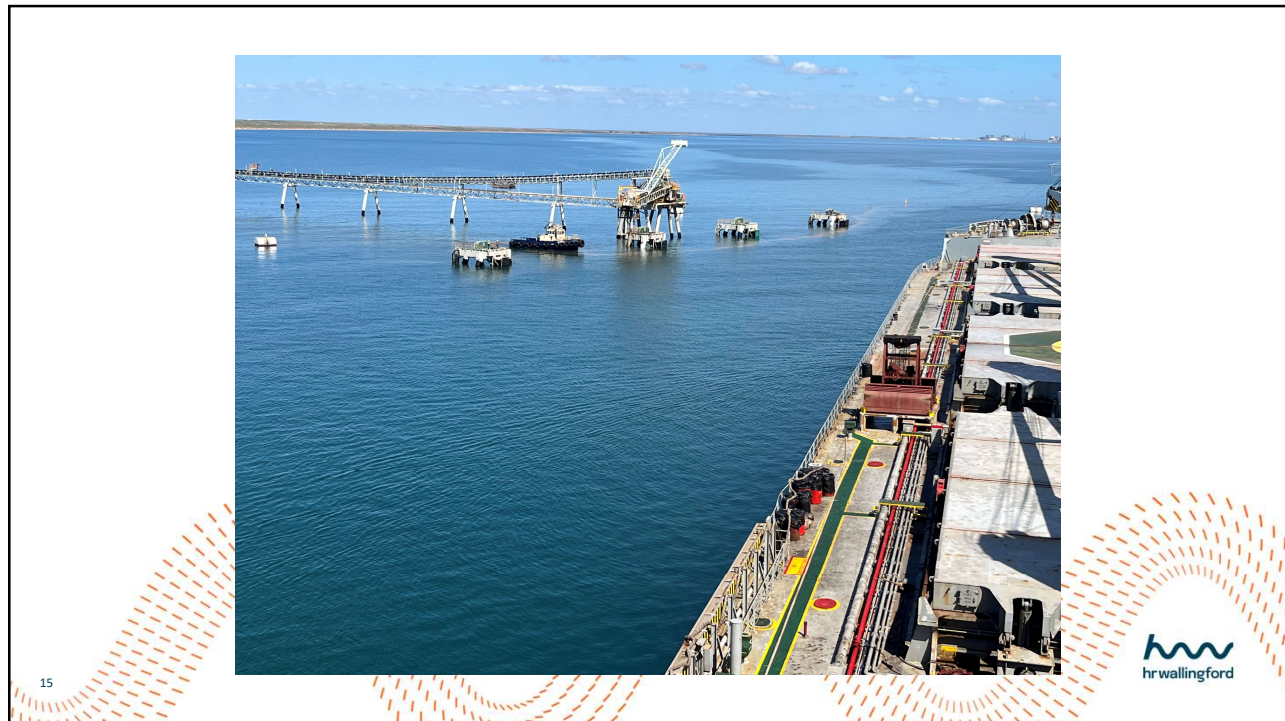
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## Conclusions

- Engineering, mooring and navigation assessments
- Operation found to be feasible
  - Limitations with
    - Berthing speeds
    - Mooring environmental limits
    - Navigation environmental limits
    - Operational procedures established
- Approvals granted for operation
- First ship arrived – 19 August 2022
- 2 tugs

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