



Wave overtopping surveillance and early warning system:

Fairy Bower, Manly Australia



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## Site Location



- Protected from southerly waves
- Vulnerable to easterly waves + longer period SE waves

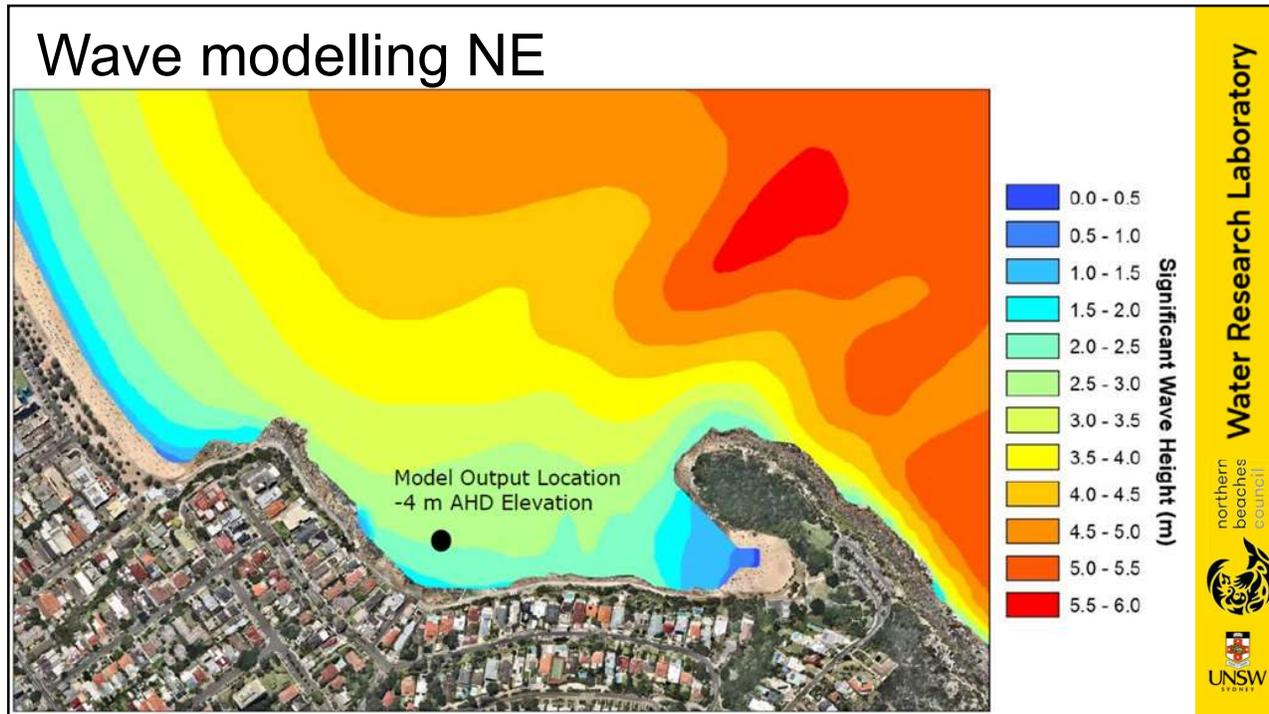
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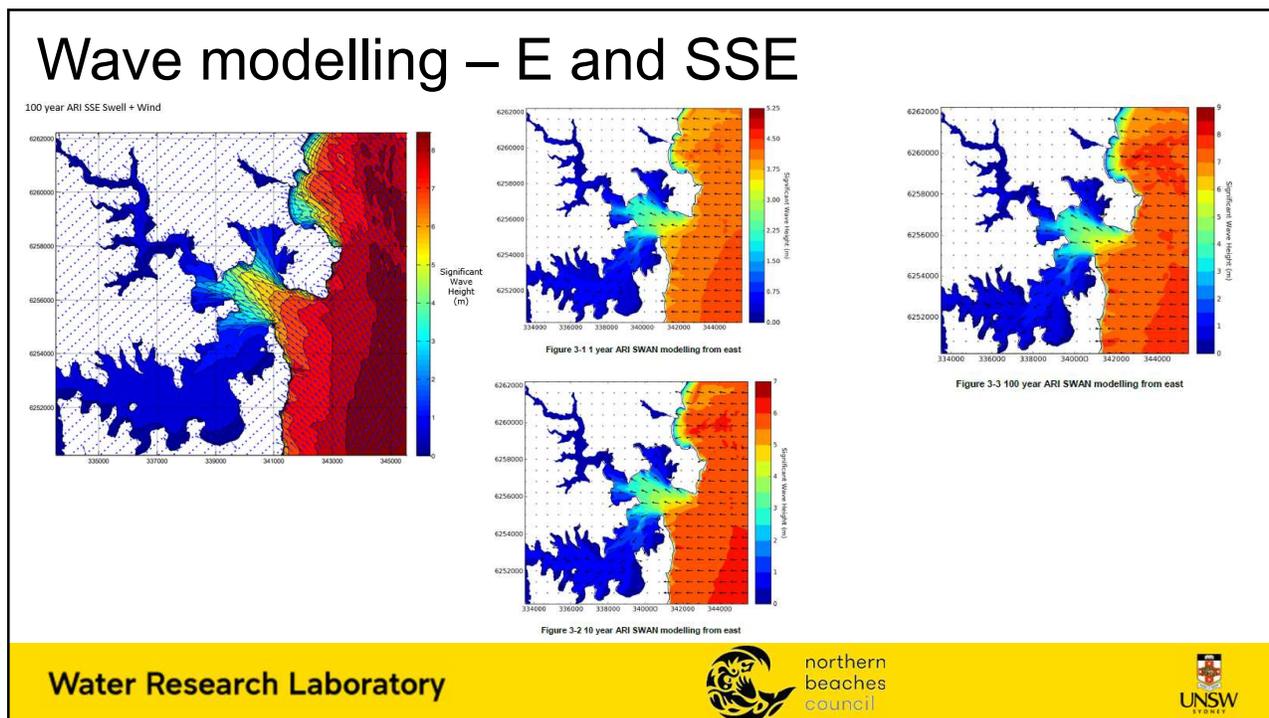


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# Fairy Bower Seawall Manly 20:30 5th June 2016

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## Camera System

- Security camera
- Solar panel (power) + battery
- Transfer by mobile SIM card
- Image every 2 seconds
- Live web view + archive



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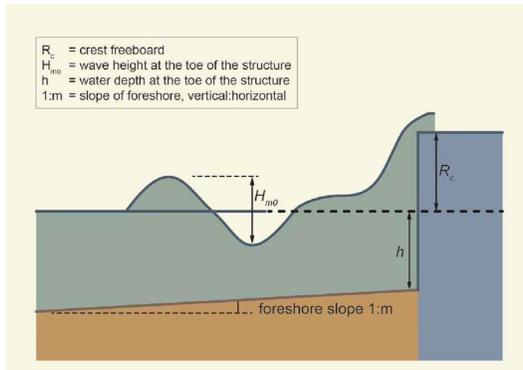
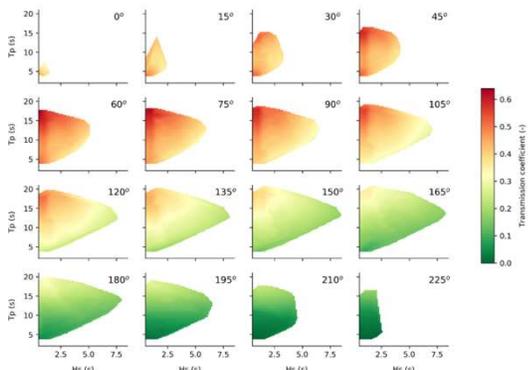
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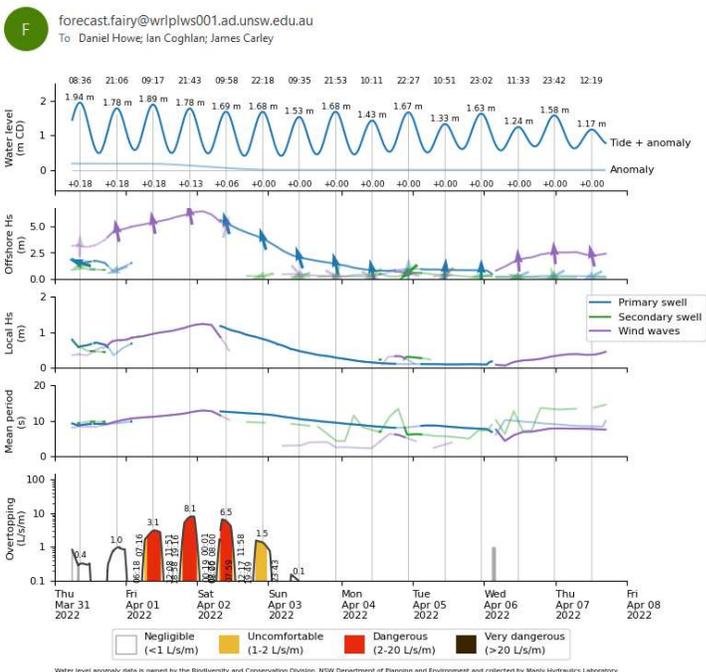
# Early Warning System

- Input water Level: BoM tide tables
- Input offshore waves: US NOAA WaveWatch III forecasts
- Local wave conditions: height-period-direction lookup tables
- Mean wave overtopping rate: EurOtop "Overtopping Manual"



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◆◆ Fairy Bower overtopping warning [code red: dangerous, enhanced monitoring, restrict pedestrian access]



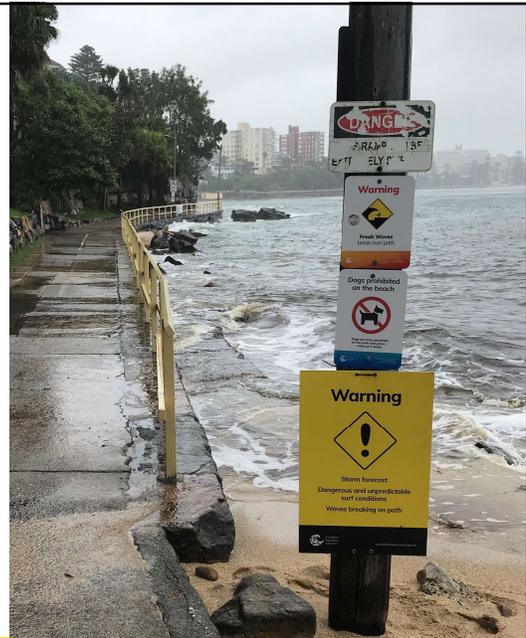
Daily e-mail at 6 AM when overtopping is forecast within the next 7 days.

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## Reducing pedestrian risk

### Signage

- Permanent signs along pathway
- Temporary signs in leadup to events, larger and more noticeable
- Alt route signs on temp fencing during events



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## Reducing pedestrian risk

### Closures

- “Soft” close – access discouraged with temp fencing, extra warning signs installed
- “Hard” close – access prevented with heavy gates, security guards
- Notify business owners
- Staff monitor on ground and remotely using camera
- Open when safe to do so following high tide
- Difficult due to popularity of walkway



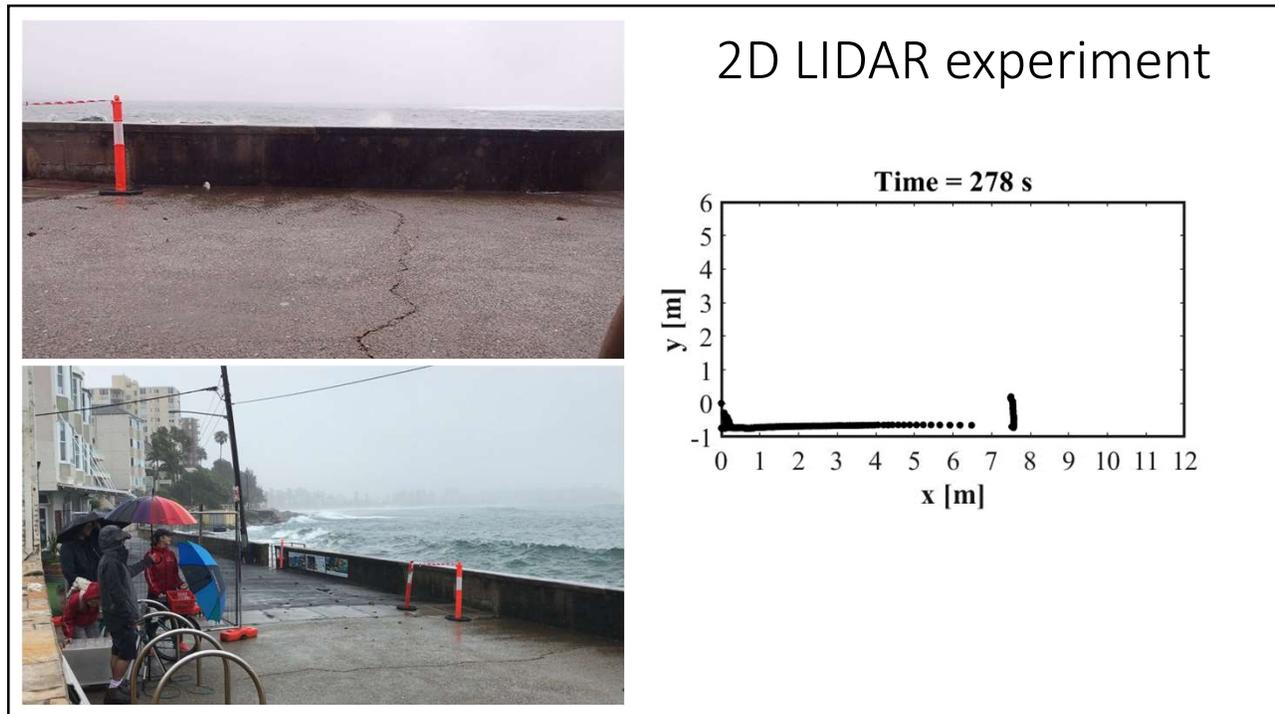
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## Recent Improvements

- Add storm surge (tidal anomaly) to forecast water level
- Consideration of secondary swells
- Nearshore wave gauge to verify wave model
- Measurement of wave overtopping

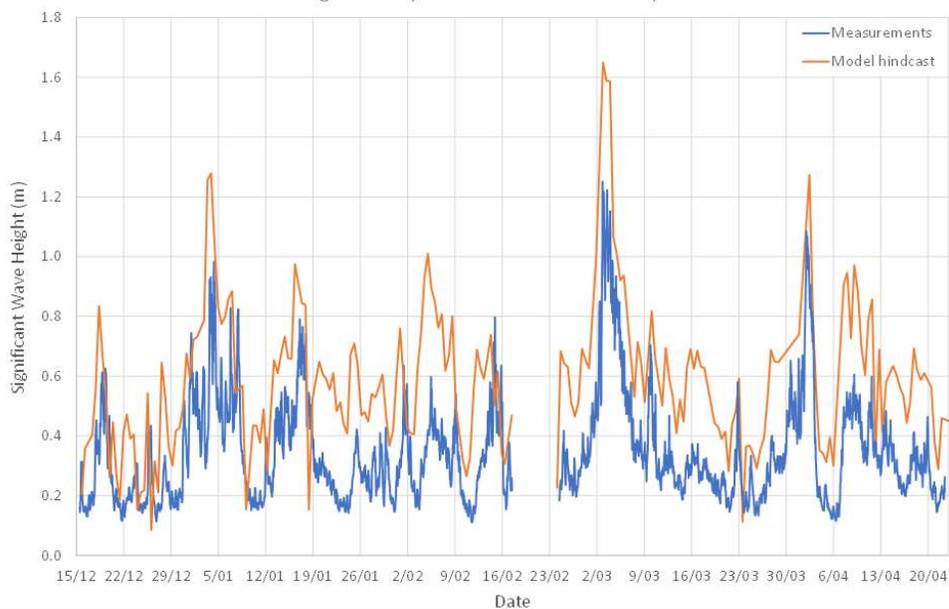


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## Field station data – wave height

Cabbage Tree Bay - Hs - 15 Dec 2021 to 22 Apr 2022

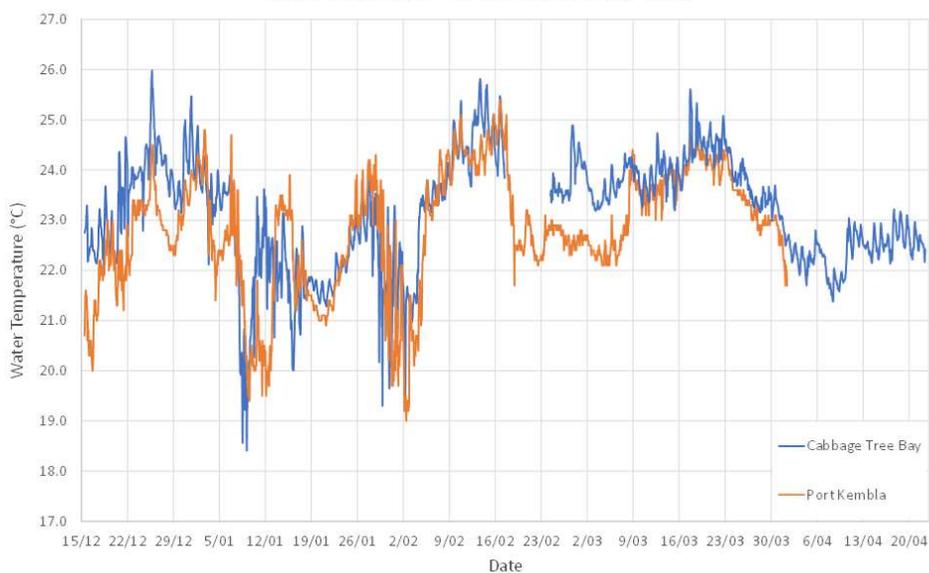


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## Field station data - temperature

Water temperature measurements – Cabbage Tree Bay compared to Port Kembla (closest permanent, inshore temperature station):

Water Temperature - 15 Dec 2021 to 22 Apr 2022



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Thank you



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