

Presentation Outline

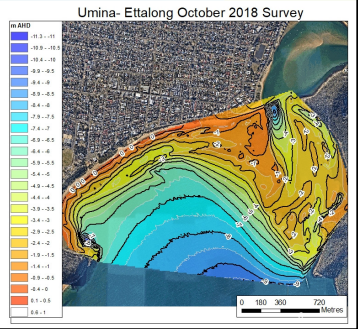
- Site Investigations
- Coastal Processes Understanding
- Terminal Protective Structure (TPS) Options Assessment
- Preferred TPS Strategy
- Beach Nourishment Strategy
- Ongoing work



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Site Investigations

- Surveys
- Geotechnical investigation
- Wave transformation modelling
- Marine ecology survey (channel)




Umina- Ettalong October 2018 Survey

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Coastal Processes Understanding

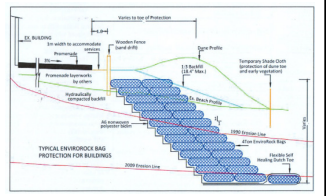

- conceptual model (WRL)
- linkage of ebb tide shoal with Ettalong Point found to be important for sediment supply to beach
- sand waves result in encroachment of shoal into navigation channel
- 'shoal blowout' event was disruptive to the natural system



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TPS Options

1. Rock revetment
2. Piled seawall
3. Concrete steps (bleachers)
4. Geotextile containers

Example TPS in Durban SA, constructed 6 yrs ago

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TPS Options : Rock Revetment

- buried under dune, eg. Collaroy Beach (2019)
- armour M_{50} 4.6T (basalt)
- 13.5m wide
- crest RL5.5, toe RL-1.0
- flexible structure
- simple construction and repairs
- wave runup reduced by high porosity
- adaptive under SLR
- beach amenity impacts would follow erosion in storms
- \$15K/m, excluding dune restoration works

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TPS Options Assessment: Piled Seawall

- secant piles eg. Cudgen Headland SLSC, South Curl Curl
- pile dia varies 600-900 depending on dune/crest height
- anchors 1.5-2.4m centres
- less excavation of dune
- adaptable under SLR
- minimal maintenance
- no absorption of wave energy
- high degree of construction expertise required
- \$19-26K/m depending on crest height

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TPS Options Assessment: Concrete Steps

- protection and amenity
- eg: Manly (c.1995), Dee Why (1999), Kingscliff (2018)
- minimal maintenance
- significant excavation of dune
- relatively high overtopping rate
- high degree of construction expertise required
- less adaptable to SLR
- higher cap cost \$40K/m

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TPS Options Assessment: Geotextile Containers

- eg. Umina Barrenjoey Rd (c.2016), Stockton SLSC (c.2002-2018)
- simple construction method
- less impact on beach amenity when exposed
- adaptable under SLR
- significant excavation of existing dune
- relatively high overtopping rate
- relative instability due to low bulk density
- long-term durability issue; low design life (5-15 yrs)
- relatively low cap cost \$7K/m

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Preferred TPS Strategy

- general: rock revetment, potentially constructed in stages
- trigger to call tenders – unsustainable dune maintenance 3yr
- trigger to commence construction – footpath threatened 3 months
- staged installation particularly would need to consider 'end effects'
- potentially > \$15M strategy



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Preferred TPS Strategy

- Ocean Beach SLSC - maintain natural dune profile as long as possible
- beach scraping to enhance beach recovery
- opportunistic beach nourishment
- stepped concrete seawall (40m) with rock revetment (110m) if progressive erosion results in complete loss of foredune
- \$3.5M strategy over 150m



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Preferred TPS Strategy


- clearly ongoing monitoring required to trigger the TPS schemes
- visual, photographic and structural inspections of beach condition and at risk infrastructure (quarterly and after major storms)
- beach surveys and analysis to monitor sand buffers and position of erosion scarps (biannually and after major storms, and with beach scraping or beach nourishment campaigns)



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Beach Nourishment Strategy

- to complement TPS, not replace
- sand sourced from navigation channel maintenance dredging from Little Box Head to Wagstaffe Shoal
- min. channel 30m wide to -2.5m ISLW
- ~80,000m³ removed over last 10 years



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Beach Nourishment Strategy

- investigated different plant and reuse options
- dredging with small Cutter Suction Dredge (CSD) preferred
- 1-2 booster stations to pump to Ocean-Umina Beach
- ...but more economical to pump to Ettalong Point and transport sand along beach by dump truck
- priority placement on vulnerable sections of Ocean-Umina Beach
- secondary placement option along Ettalong Beach



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Beach Nourishment Strategy

- ongoing monitoring required
- UAV photogrammetry surveys of beach
- periodic hydrographic surveys of navigation channel
- monitoring of tidal head loss indicators




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Beach Nourishment Strategy

- trial campaign completed Jul-Sep 2019
- 10,000 m³ dredged from southern edge of Wagstaffe Shoal
- ...pumped directly to the beach near Ocean Beach SLSC and placed over a length of 400m (25m²/m)
- small CSD, 2 x booster stations and combination of floating, sunken and land pipelines
- earthmoving equipment used to create bunds and final grade




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Ongoing Work

- ecological survey (imminent)
- stakeholder / community consultation
- Cost Benefit Analysis (CBA)
- Environmental Assessment (REF)
- detailed design documentation



Aerial drone photo of partially complete seawall at Collaroy Beach (Courtesy: Soil Conservation Service)

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Acknowledgements

Matt Potter (RHDHV)
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