

A DIT perspective on managing coastal assets within a changing climate

SA Coastal Councils Alliance
2022 Coastal Forum
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Adelaide Sailing Club

Spiros Dimas, Manager Marine Assets



Topics

- DIT Coastal Assets
- Asset Management Plan
- Climate Change Parameters
- Storm Damage Impacts
- Specific Projects
 - Wardang Island Boat Landing Facility
 - West Lakes tidal flushing system
 - Dredging
- A solution to sea level rise

City of Cockburn, Perth WA - to fight beach erosion, March 2022.

135 precast concrete modules placed 100m offshore to form an artificial reef to reduce the energy and intensity of incoming waves, and thereby reducing erosion.

Source Council Magazine

John Thompson
September 15,
2022
Asset Management,
Environment and
Sustainability,
Features



For those living in the suburbs of Perth, going to the beach is an essential reprieve to the seemingly everlasting heat. This is why the City of Cockburn undertook an innovative trial to remedy a rapidly eroding beach, installing an artificial reef to barrier the coastline against wind and wave, preserving both the natural and built environment, and contributing to valuable erosion-beating research.



Twenty years of erosion has reduced Cockburn's beachfront by 50m, threatening the surrounding natural and built environment. Image: City of

What coastal assets do DIT manage ?

Jetties (about 70+), harbours, marinas, boat ramps, slipways, boatyards, West Lakes tidal flushing system, Port Bonython, Kangaroo Island ferry ports, aids to navigation (about 800+), breakwaters, revetments, navigation channels and various other marine structures and buildings.



Marine Asset Management plan

OFFICIAL

Marine Assets Section

ROAD and MARINE SERVICES DIVISION



MARINE ASSETS ASSET MANAGEMENT PLAN

Marine assets that activate coastal environs and contribute to the economic prosperity, quality of life and enjoyment for all South Australians.

Marine assets that provide a service acceptable to user needs and delivered in partnership with the community, commercial fishing industry, commercial operators and local government.

**First published
On
18 October
2021.**

Stages	Components
Direction	Vision
	Objective
	Description
	Accountability
Planning	Inventory
	Levels of Service
	Risk Management
	Future Demand
Delivery	Asset Management Systems
	Financial Management
	Maintenance, Renewal and Disposal
Review	Asset Performance
	Monitor, <u>Review</u> and Improve Plan

Table 1 Asset Management Components

Marine AMP – climate change

10.4.7 Design for Sea Level Rise.

Maritime structure shall be designed to ensure it can adapt to climate change; specifically for anticipated sea level rise over its design life.

Flooding and erosion protection requirements are set based on an allowance for sea-level rise⁴ due to global climate change of **0.3 m between 1991 and 2050.**

Development should also be capable of being protected against a further sea-level rise, and associated erosion, of **1.0 m between 2050 and 2100.**

Allow 300mm to reach 2050 and then add another 700mm to reach 2100

Storm Damage events



Kingston 7 July 2016



Henley 9 May 2016



Elliston 29 September 2016



Pt Germein 9 May 2016



Pt Victoria 26 September 2016

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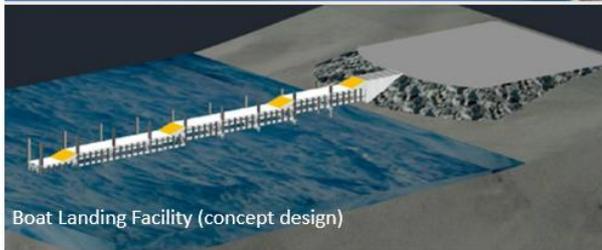
**In 2016 storm
damage cost
the state
\$2.8m**



Wardang Island Boat Landing Facility

WARDANG ISLAND / WARALDI
INFRASTRUCTURE REVITALISATION
PROJECT

PROGRAM STATUS



Boat Landing Facility (concept design)

Version dated: 05/09/2019 Kineti # 14454084

Drawn: 3 of 3



16/06/2022

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Government of South Australia
Department for Infrastructure
and Transport

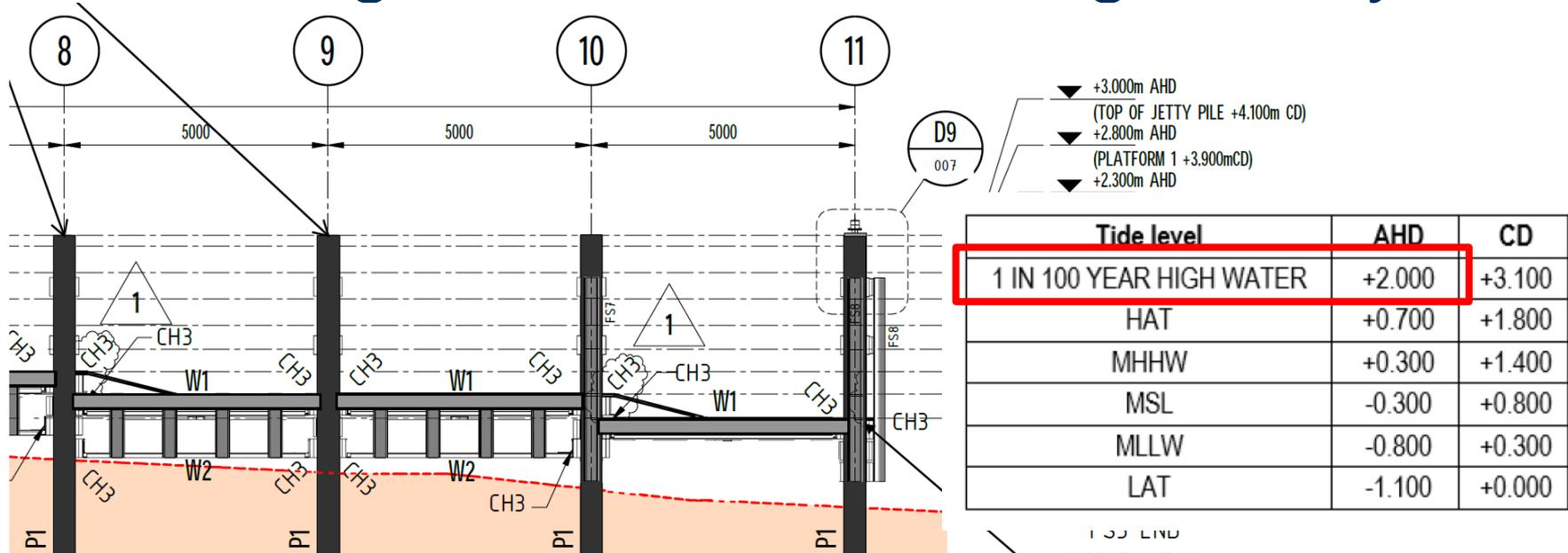
Wardang Island Boat Landing Facility



+3.10m (1in100yr HW)		+2.00m
+1.80m (HAT)		+0.70m
+1.40m (MHHW)		+0.30m
+1.00m (MLHW)		-0.10m
+0.80m (MSL)		-0.30m
+0.60m (MHLW)		-0.50m
+0.30m (MLLW)		-0.80m (APPROXIMATE LEVEL)
±0.00m (LAT)		-1.10m
CD		AHD

50-year design life

Wardang Island Boat Landing Facility



We set the highest platform at RL 2.3m AHD = 1 in 100-year HW RL 2.0m + 0.3m (50yr)
 We “chased” sea level rise up the beach until we were satisfied/compromised

Wardang Island Boat Landing Facility



All built from composite fibre reinforced plastic members – only bolts were s/s 316 marine grade

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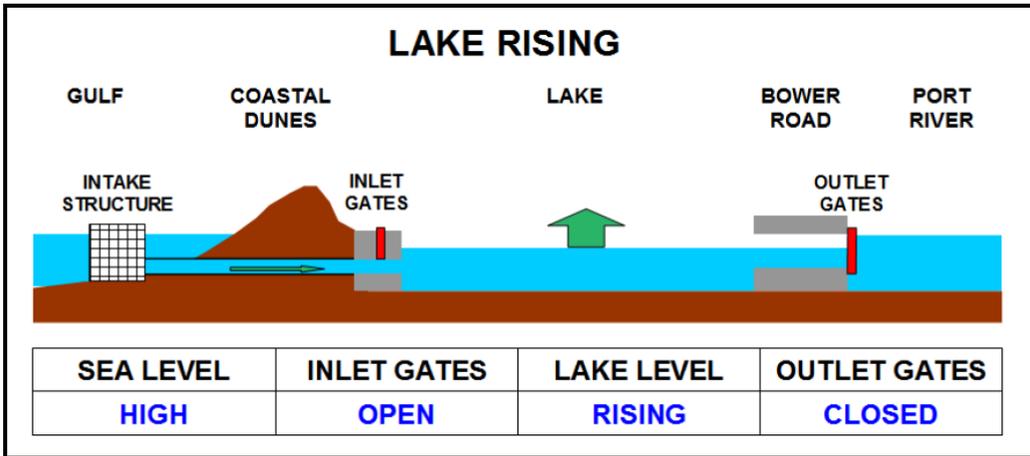
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West Lakes tidal flushing system



Figure 7 - Intake Structure

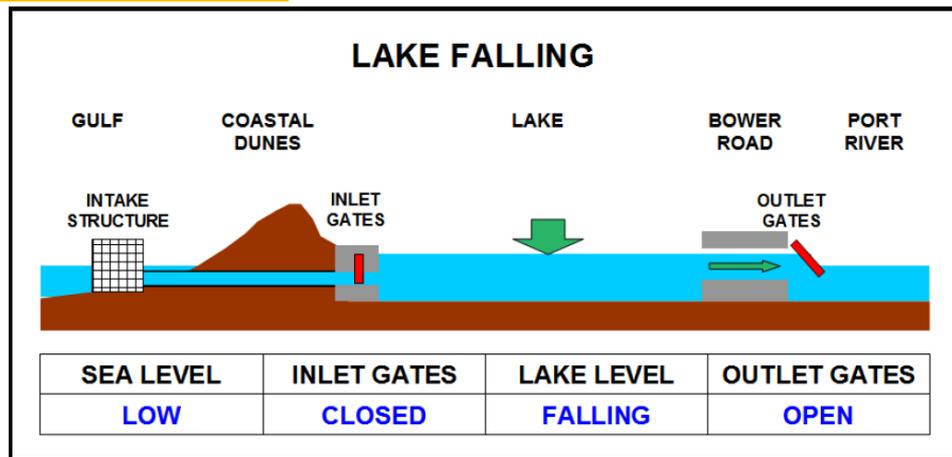




10mm of rainfall can raise lake level by up to 100mm

Lake Statistics

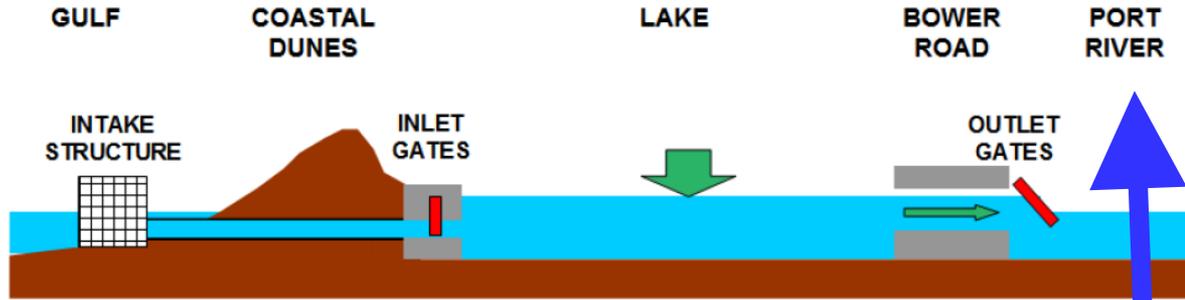
Approximate volume at target operating height (1.2 m)	4 Gigalitres
Approximate area	1.1 km ²
Approximate length	5.2 km
Approximate length of rowing course	2.5 km
Approximate period to turn over the volume of water	10 days
Catchment area (See Figure 25)	27 km ²
Approximate depth range of rowing course	4.5 – 5.5 m
Depth of some deeper areas in the lake	6 m +



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LAKE FALLING



SEA LEVEL	INLET GATES	LAKE LEVEL	OUTLET GATES
LOW	CLOSED	FALLING	OPEN

With 1 m sea level rise by 2100:

Does the lake need to be pumped out to manage lake levels ?

Does lake flushing get compromised ?

Lake Low level = **RL 0.8m OHTD**
 Target Lake level = RL 1.20m OHTD
 Revetments Level = 1.65m OHTD
 Building levels (around lake) = RL 3.0m OHTD

West Beach LAT = RL 0.0m OHTD
 plus 1m Sea Level rise = **RL 1.0m OHTD**
 At what point in the rising tide from LAT is the lake unable to empty?

Dredging



North Haven (May 22) – every 18 months
Penneshaw (Aug 21) – every 4 years
Cape Jervis - unknown
O’Sullivans Beach (Sept 19) – every 4 years
Port MacDonnell (Aug 22) - unknown

West Beach and Holdfast Shores dredged continuously by DEW.

Investigating new sites:
Barker Inlet (Swan Alley), St Kilda,
Wirrina marina

Dredging – sea grass wrack



More noticeable in the last 5 years

Dredging – sea grass wrack



A solution to sea level rise

1m sea level rise due to melting polar ice caps on land.

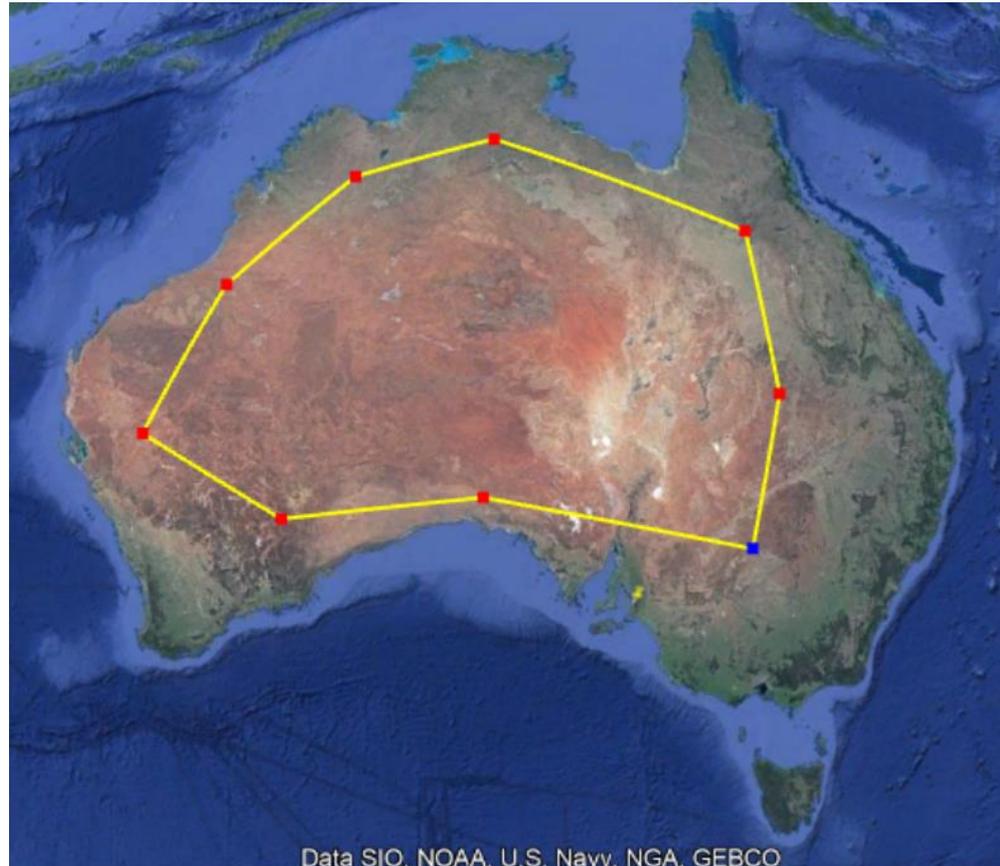
Surface area of water on Earth is
= 361 million km²

Hence volume of water =
361 million x 1000 x 1000 x 1m sea level rise
= 36.1×10^{13} m³ of water

Let's put this water somewhere – in a 100m deep hole?



A solution to sea level rise...



Area of Australia = 7,617,930 km²

We need an area of 3.6×10^{12} sq.m
to be dug 100m deep!

or

3.6 million square km

or

46% of the area of Australia!

Thankyou for listening

