Mettams & Watermans Coastal Adaptation Options

Workshop 1

m p rogers & associates pl

Welcome and Introductions

Outline / Agenda

- Overview of Workshop Series
- Terms of Reference
- Community selection and engagement process
- Project Communications
- Background to Options Assessment
- Assessment Process
- Indicative Options
- Benefit Distribution Analysis
- Next Steps

Workshop Series - Overview

Purpose: To assist the City in assessing concept coastal adaption options for Mettams Pool and Watermans Bay

Workshop 1:

- Overview of the assessment process and key elements to prepare the risk management approach.

Workshop 2:

- Test and validate the evaluation performance criteria and weightings for the MCA.
- Introduce and present initial options (4 for each location

Workshop 3:

- Present concept options and evaluate these options by stepping through MCA.

Workshop 4:

- Present a recommended preferred concept option for each location
- Be clear about next steps

Mettams and Waters Reference Group Terms of Reference

- Purpose
- Aims and Objectives
- **Membership – Community, DBCA**
- Role of the group
- Facilitation of meetings
- Decision making
- Meeting frequency, minutes

Project Communications

- Enhance key stakeholder awareness, understanding and support for over-arching project goals.
- Ensure residents, businesses, landowners and other stakeholders are informed of the Project's objectives and role in the process

INFORM: One central source of info via the City's online engagement platform and existing Mettam's Pool Project Page

CONSULT: engaging with key stakeholders and community reps rather than broader community via the Reference Group

Project Overview

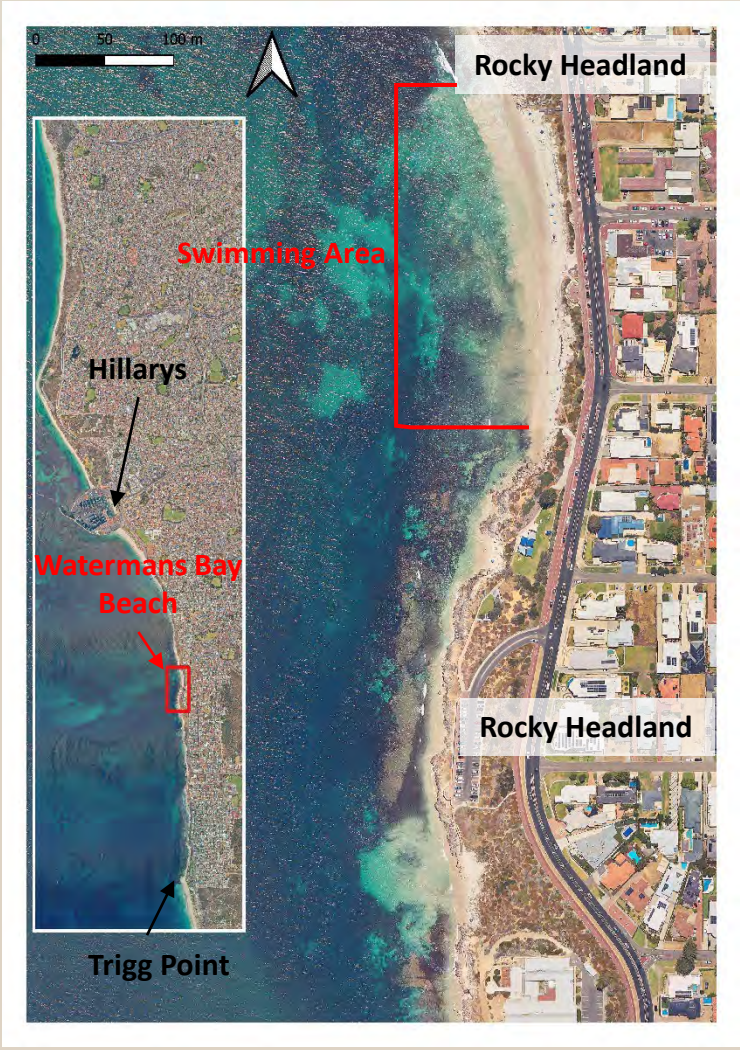
Summary Program - Watermans & Mettams Adaptation Options Assess

Tasks	Duration (Days)	Expect Completion Date
Data Gathering & Existing Conditions	77	22 March 2024
Workshop 1	**1**	**18 March 2024**
Coastal Processes Review & Update	35	10 May 2024
Workshop 2	1	13 May 2024
Detailed Concept Option Development	46	15 July 2024
Workshop 3	1	29 July 2024
Assessment of Options & Recommendation	46	17 September 2024
Workshop 4	16	9 October 2024
Final Report	44	10 December 2024

Knowledge Summary

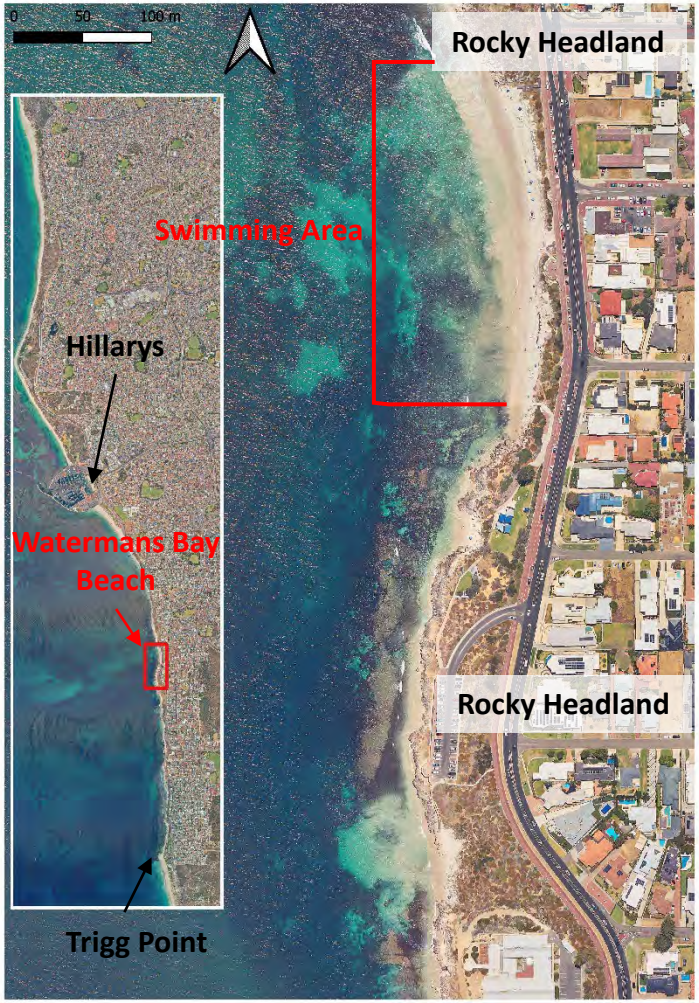
- Site setting
- Previous assessments & existing data
- CHRMAP Recommendations
- Key Values
- Adaptation Options

Watermans Bay



Watermans Bay – Site Setting

- Approx 500 m in length
- Backed by 20 m high rock cliffs
- Main swimming section adjacent to Elsie St and Mary St
- Very little buffer to infrastructure
- Popular recreational area and well used by local community
- Recreating activities include:
  - Walking/Running
  - Swimming
  - Surfing
  - Sunbaking

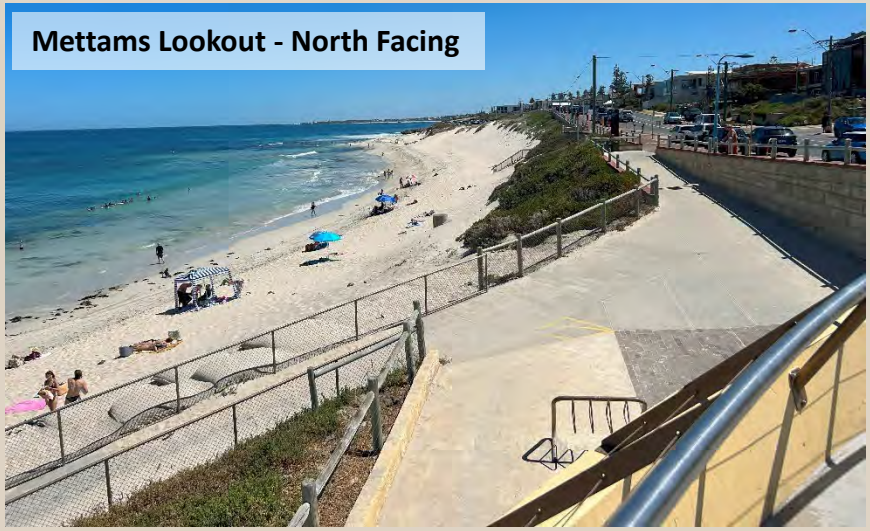


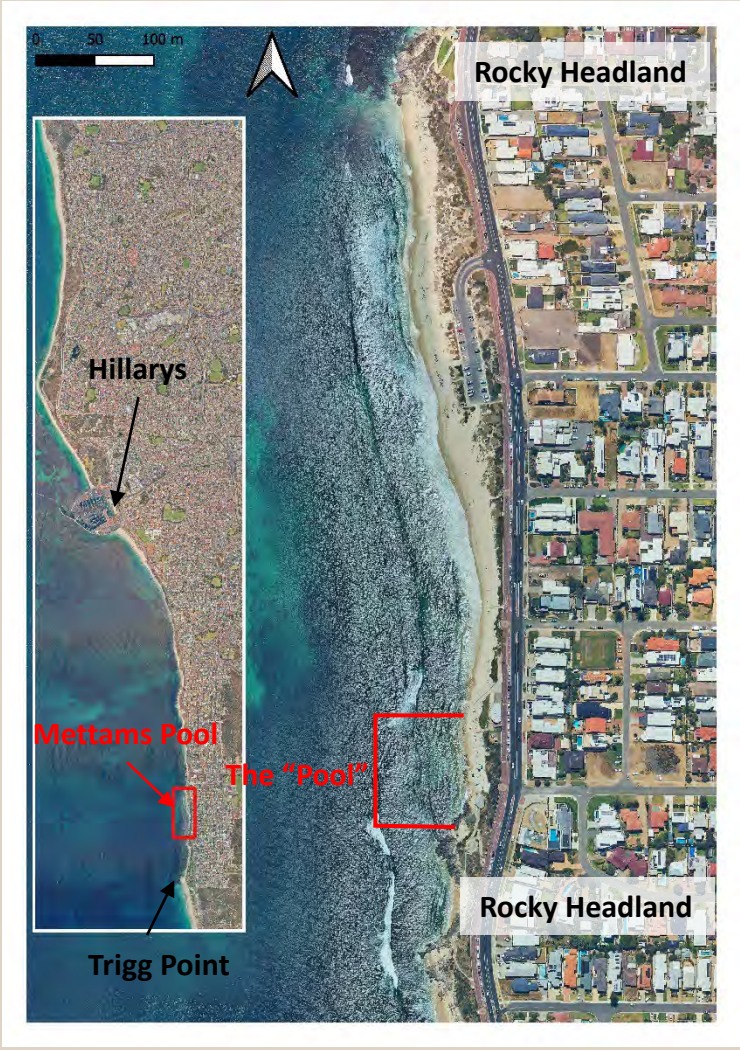
Watermans Bay – Assets & Infrastructure

- Built and natural assets
- Key built infrastructure:
  - West Coast Drive
  - Recreational Shared Path
  - Sewage Pump Station
  - GSC seawall
  - Retaining wall
  - Toilet Block
  - Viewing platform
- Natural assets:
  - Beach
  - Dunes

- GSC seawall constructed as “Emergency Protection Works” in 2009 following severe weather events

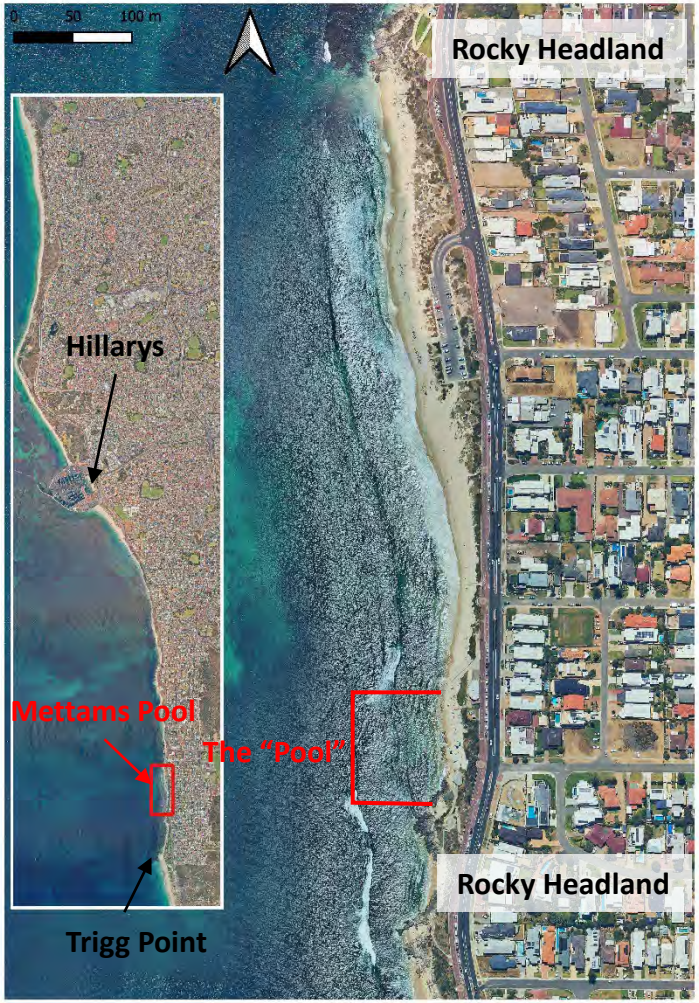
Mettams Pool





Mettams Pool – Site Setting

- Approx 600 m in length
- Embayed by limestone headlands
- The “Pool” at southern end
- Protected by nearshore reefs
- Irregularities in the shoreline generated by the reef platform
- Large visitor catchment area
- Popular recreational area and well used by the local community
- Recreating activities include:
  - Walking/Running
  - Swimming
  - Surfing/Wind Surfing
  - Sunbaking



Mettams Pool – Assets & Infrastructure

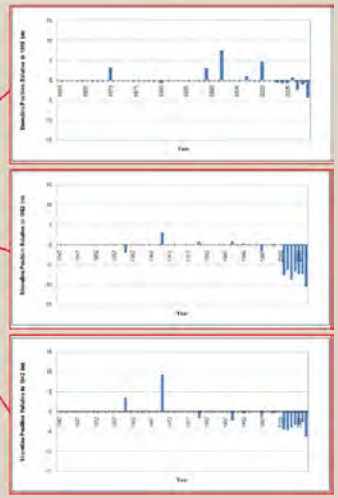
- Built and natural assets
- Key built infrastructure:
  - West Coast Drive
  - Recreational Shared Path
  - Gazebo and Water Access Ramp
  - Beach Access Ramp and GSC seawall
  - Toilet block
  - Viewing platform
- Natural assets:
  - Beach
  - Dunes

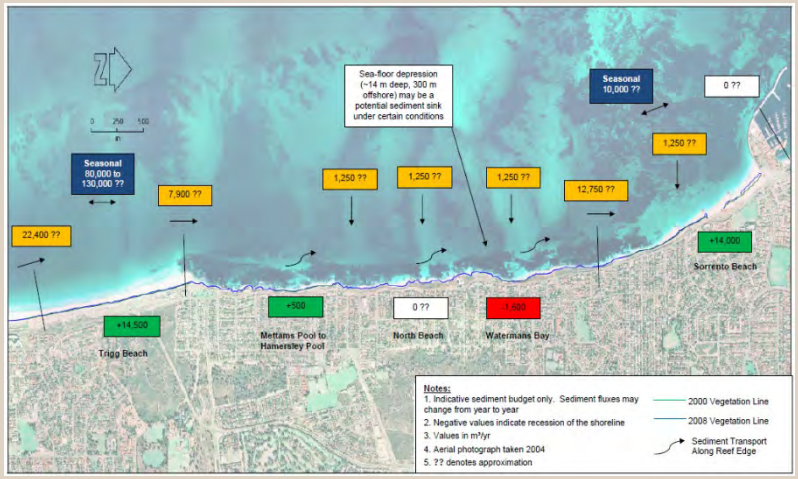
Previous Technical Assessments

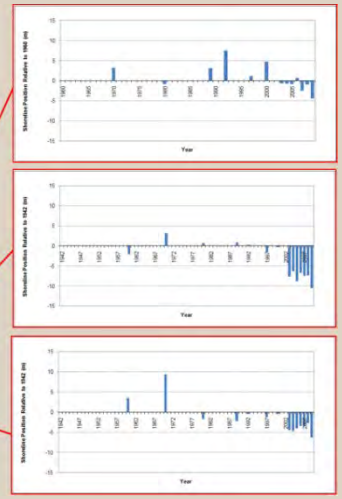
- Range of local assessments completed
  - Watermans Bay & Mettams Pool Coastal Investigations (MRA, 2010)
  - Strategic Coastal Processes Study (BMT JFA, 2016)
  - Mettams Pool Defensive Works – Concept Design Report (MRA, 2020)
  - Trigg to Sorrento Sand Sharing (MRA, 2021)
  - Geophysical Investigations (GBGMAPS, 2018)
  - Mettams DCP Investigation (DTE, 2019)
- Relevant and pre-cursor to this work

Watermans Bay & Mettams Pool Coastal Investigations (MRA 2010)

- Reviewed driving forces and shoreline movement trends
- Preparation of a sediment budget
- Identified possible causes of the recent shoreline erosion at the two beaches
- Investigation of options to minimise and/or manage the erosion experienced at the two beaches





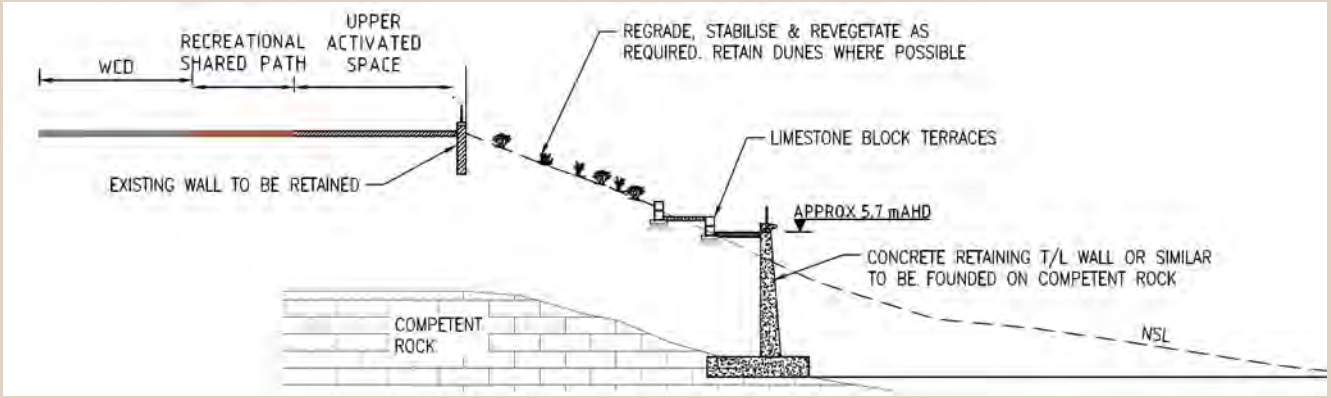


Strategic Coastal Processes (BMT JFA 2016)

- Scarborough to Watermans
- Coastal processes and metocean conditions
- Initial coastal hazard areas
- Identified Waterman Bay and Mettams Pool as high risk sites
- Recommended investigation of underlying rock

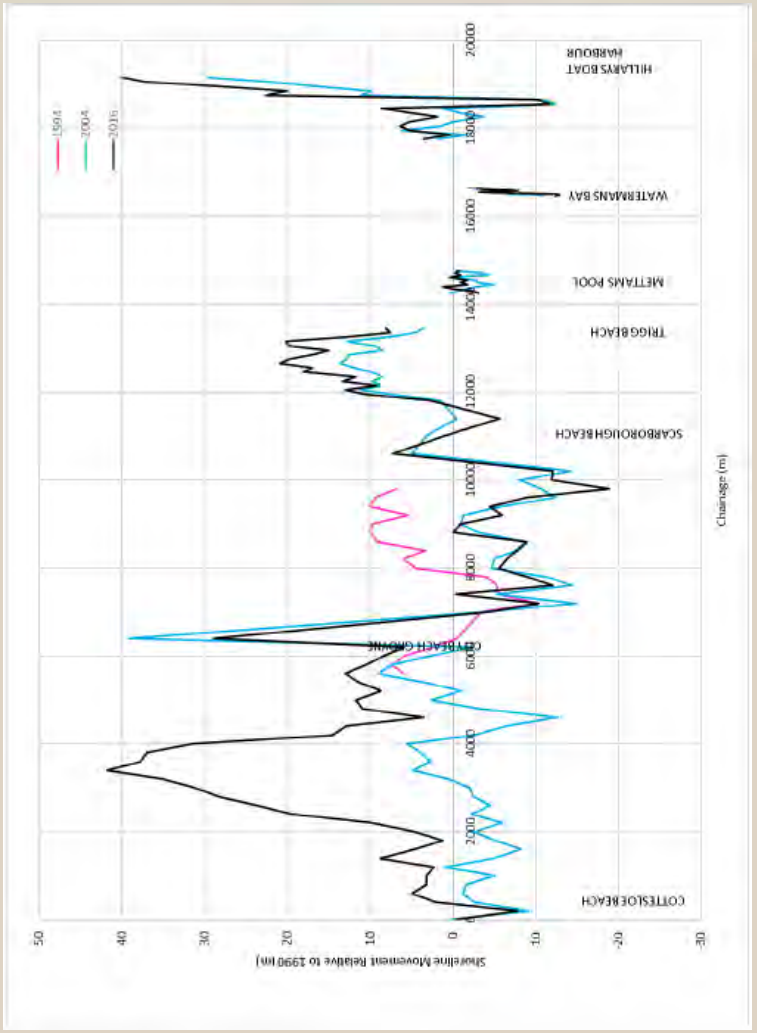
Mettams Pool Defensive Works (MRA 2020)

- 3 conceptual designs to protect key assets at Mettams Pool
- Additional geotechnical investigations
- The design included a lower level recreational space



Trigg to Sorrento Sand Sharing (MRA 2021)

- Updated the shoreline movement assessment
- Assessed a short term back passing/bypassing strategy for Whitfords Nodes, Watermans Bay and Mettams Pool
- 53,000 m3 of sand could be sustainably extracted from Sorrento

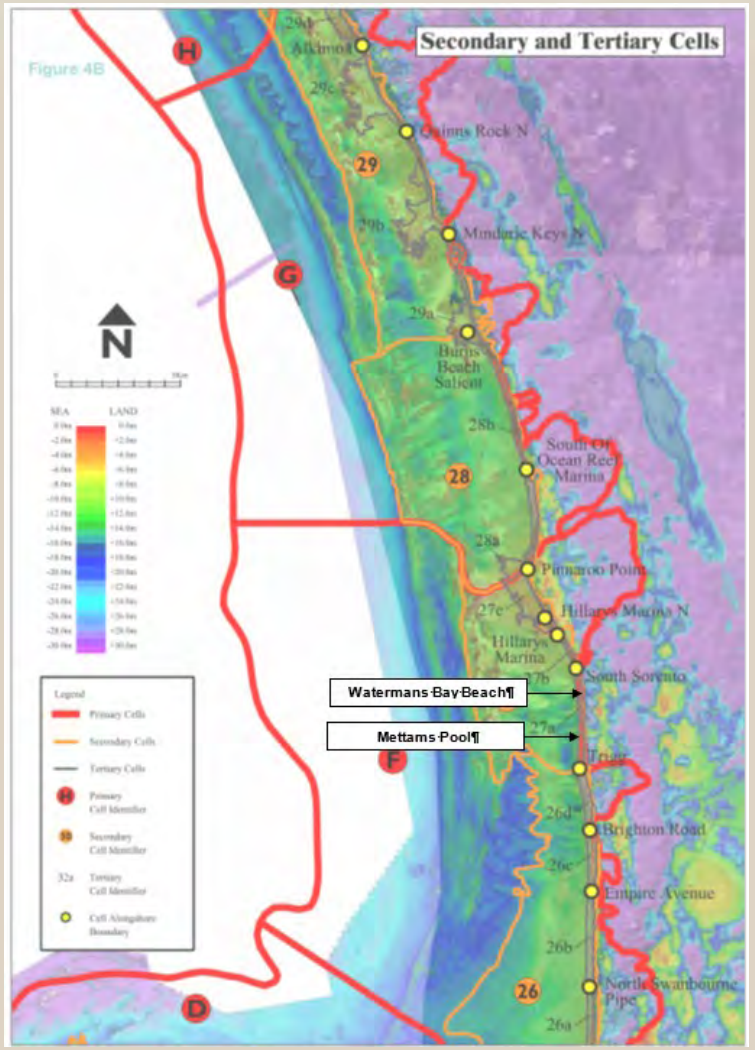


Sediment Transport

- Seasonal changes
- Northerly transport in summer (sea breeze) – typically wider beaches
- Southerly transport in winter (storms) – typically narrower beaches and nearshore banks at sandy beaches
- Seasonal transport may be in order of 100,000 m3
- Overall net transport to the north
- Resulted in historically large accretions at Scarborough and Trigg

Geomorphology & Geology

- Sediment Cells (Searle & Semeniuk (1985), Eliot et al (2005), Damara WA (2012) and Seashore (2015))
- Provide context for study area for coastal processes and sediment movement

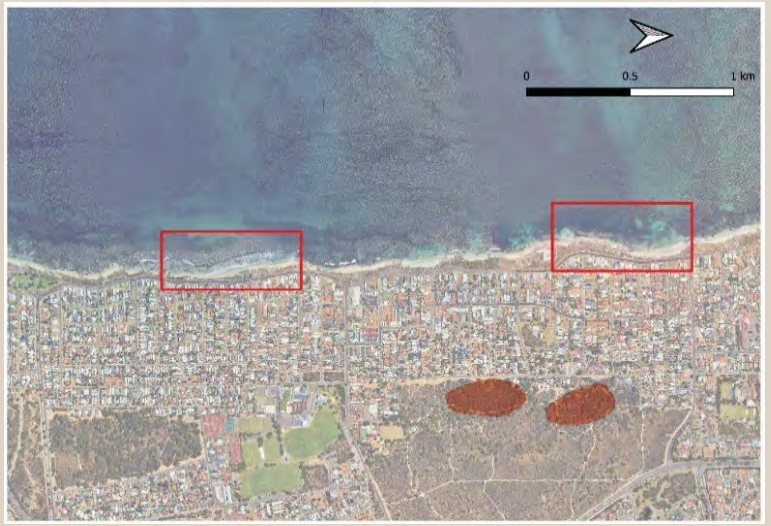


Geotechnical Investigations

- Geophysical Investigation (GBGMAPS, 2018)
- DCP Investigation (DTE, 2019)
- DCP investigation identified rock level at Mettams 0.5 to 1.5 m lower than geophys

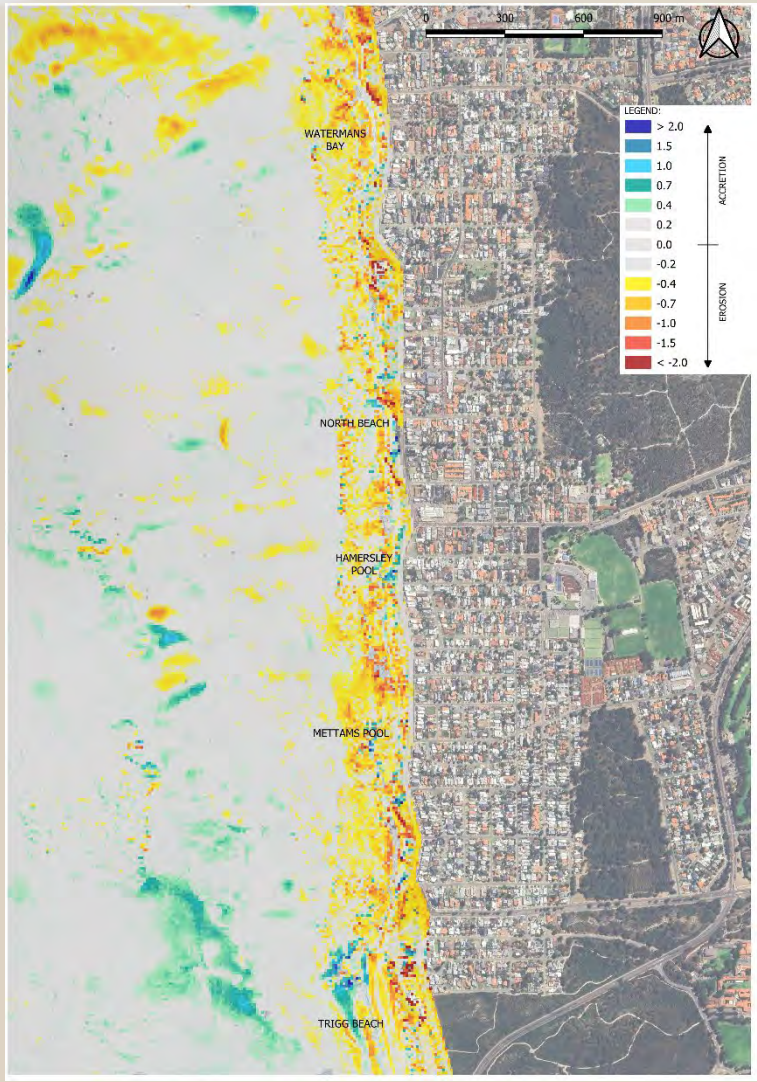
Environment & Heritage

- Acid Sulphate Soils (ASS) – None
- Contaminated Sites – None
- Registered Aboriginal Heritage Sites - None
- Marmion Marine Park – may affect investigations and approvals process in water

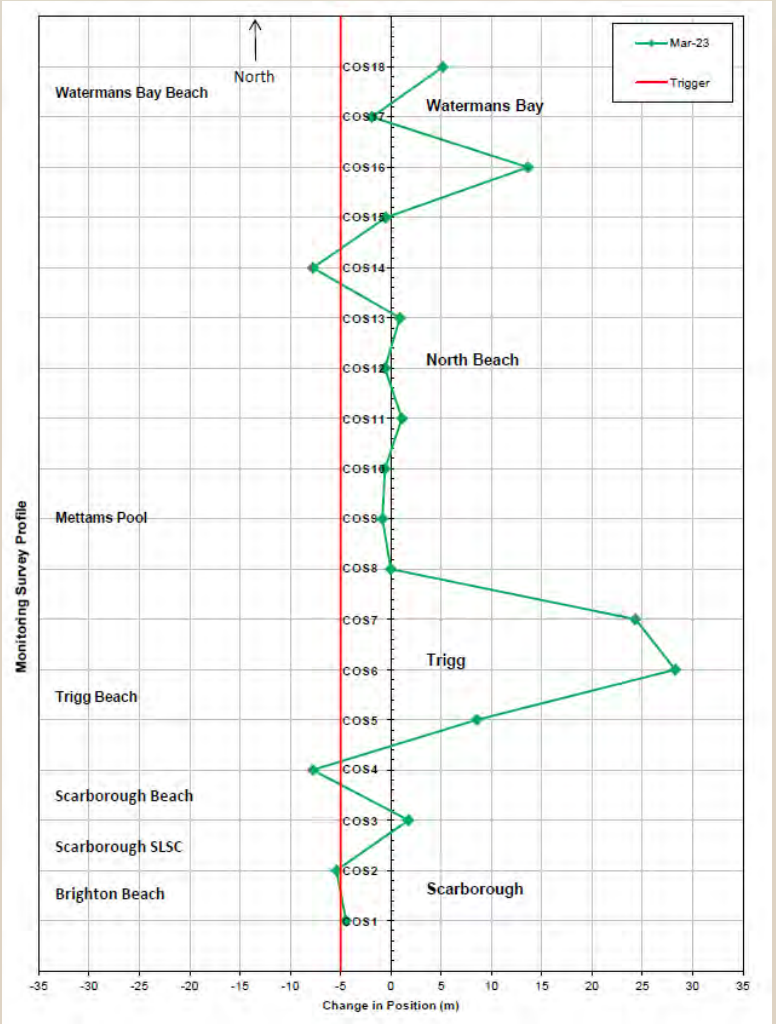


Existing Data - Survey

- Bathymetric data - LiDAR
- Detailed surveys have been completed sporadically
- Recent annual coastal monitoring surveys completed for the City's coastline
- Recent aerial surveys captured for coastline from Two Rocks to Cottesloe



Coastal Monitoring



Summary

- Background identifies issue and context
- Ongoing erosion over decades
- Worsening with SLR
- Affecting assets



- CHRMAP looks to future

CHRMAP (Cardno 2022)

- MU1 – Watermans Bay
  - Beach Rd to Hale St
  - Includes Watermans Bay and Dog Beach
- MU3 – Mettams Pool
  - Hamersley to Bailey St
  - Only includes Mettams Pool

CHRMAP – Values & Success Criteria

- Consultation undertaken with CHRMAP
- Community value 'recreation' and 'natural environment' most about their coastline

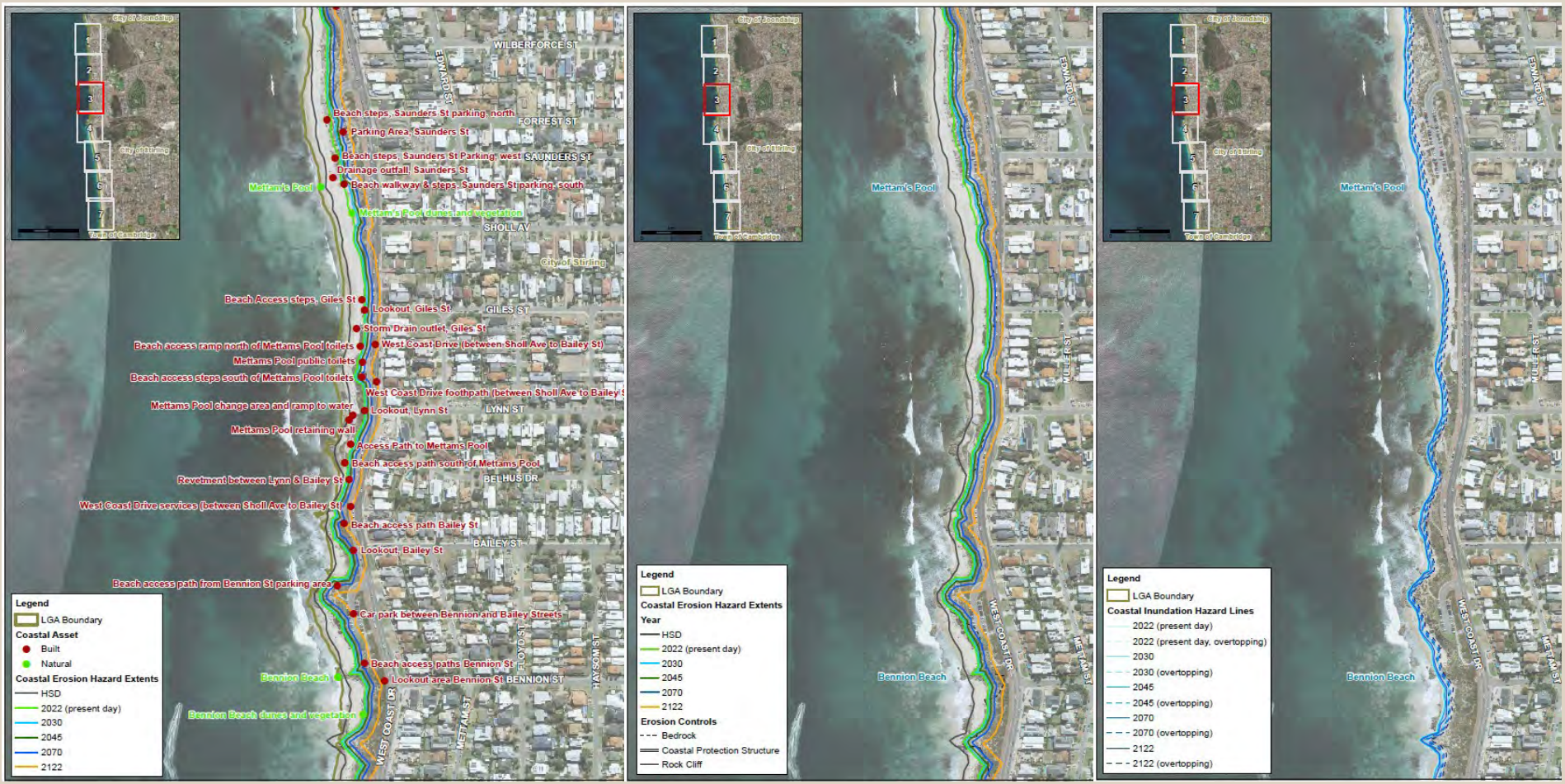
	Success Criteria for the City's CHRMAP
1	Preserve the function and opportunity for recreation activities along the coastline (such as walking/running, swimming and surfing).
2	Preserve the existing hospitality venues along the coastline and access to them.
3	Ensure the natural environment is protected and sustained in its current condition or an improved condition (concerning the dunes and flora and fauna).
4	Develop solutions to coastal processes that are sustainable (financially, socially and built form) and locally responsive.
5	Revisit regularly with community and key stakeholders their values in relation to development adjacent the coastline.
6	Maintain services that maximise community benefit for all.
7	Ensure the coastline is safe and accessible to all.
8	Achieve a balance between access needs and environmental sensitivities.

CHRMAP – MU1 Watermans Bay

CHRMAP – MU1 Watermans Bay

Option Category	Option Code	Option Name	Applicable Assets / Areas	Preliminary Feasibility			Preliminary Acceptability		Preliminary Financial Implication			Recommendation
				Effectiveness	Legal / Approval Risk	Reversibility / Adaptability	Environmental / Social Impact	Community Acceptability	Economic gain / Avoidance of Cost	Capital Cost	Ongoing Cost	
Avoid	AV	Avoid development	Presently undeveloped land within the coastal foreshore reserve.									Recommend
Planned / Managed Retreat	PMR1	Leave unprotected / repair	Minor public infrastructure - e.g. benches, paths, amenities.									Recommend
			Major public infrastructure - e.g. buildings, roads, carparks.									Do not recommend
			Residential and commercial property.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	PMR2	Remove / relocate	Minor public infrastructure - e.g. benches, paths, amenities.									Recommend
			Major public infrastructure - e.g. buildings, roads, carparks.									Further assessment
			Residential and commercial property.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	PMR3	Planning controls for managed retreat	Residential and commercial property.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Accommodate	AC1	Planning controls to identify/accommodate risk	Residential and commercial property.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	AC2	Emergency plans and controls	All areas.									Recommend
	AC3	Re-design to withstand impact	Built assets.									Do not recommend
Protect	PR1	Dune care / sand management	Beach and dunes - protective buffer to landward assets.									Recommend
	PR2	Beach Nourishment	Beach and dunes - protective buffer to landward assets.									Further assessment
	PR3	Groyne(s) / Headland enhancement	Beach and dunes - protective buffer to landward assets.									Further assessment
	PR4	Nearshore Reef(s) / Breakwater(s)	Beach and dunes - protective buffer to landward assets.									Further assessment
	PR5	Revetment(s) / Seawall(s)	Protective buffer to landward assets.									Further assessment
Do Nothing	DN	Do Nothing	All areas.									Do not recommend

CHRMAP – MU3 Mettams Pool



CHRMAP – MU3 Mettams Pool

Option Category	Option Code	Option Name	Applicable Assets / Areas	Preliminary Feasibility			Preliminary Acceptability		Preliminary Financial Implication			Recommendation
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Planned / Managed Retreat	PMR1	Leave unprotected / repair	Minor public infrastructure - e.g. benches, paths, amenities.									Recommend
			Major public infrastructure - e.g. buildings, roads, carparks.									Do not recommend
			Residential and commercial property.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	PMR2	Remove / relocate	Minor public infrastructure - e.g. benches, paths, amenities.									Recommend
			Major public infrastructure - e.g. buildings, roads, carparks.									Further assessment
			Residential and commercial property.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	PMR3	Planning controls for managed retreat	Residential and commercial property.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Accommodate	AC1	Planning controls to identify/accommodate risk	Residential and commercial property.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	AC2	Emergency plans and controls	All areas.									Recommend
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	PR5	Revetment(s) / Seawall(s)	Protective buffer to landward assets.									Further assessment
Do Nothing	DN	Do Nothing	All areas.									Do not recommend

CHRMAP – Adaptation Options

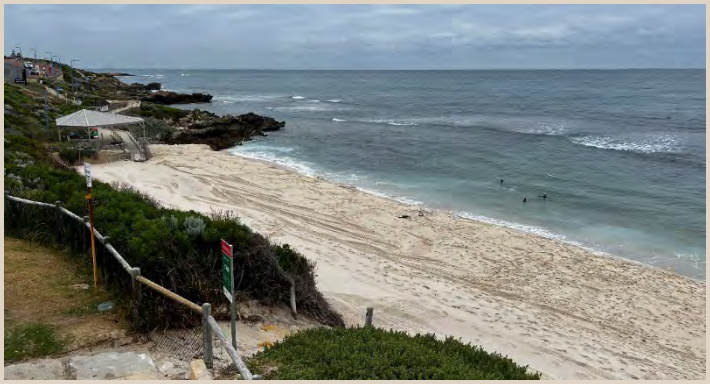
- Four options “likely to deliver a positive outcome” or “require further assessment”
- Both sites same options
- These included:
  - Beach Nourishment
  - Groynes / Headland Enhancement
  - Nearshore Reefs / Breakwaters
  - Revetments / Seawalls

Sand Nourishment

- Placing sand on the beach, nearshore or dunes to offset erosion risk
- Re-establish the beach or dunes, or provide sediment supply
- Can provide a direct buffer to coastal erosion
- Can be associated with hard structures, or require frequent or ongoing episodic placement
- Various sources (other coastal areas, terrestrial, offshore)
- Various methods of placement

Sand Nourishment

Advantages	Disadvantages
Provides a buffer to acute storm erosion, proportional to the amount of nourishment	Placed beach nourishment can be lost at quicker rates during storm events or under typical longshore transport conditions
Provides sediment feed to downdrift beaches	Doesn't provide guaranteed protection to any landward infrastructure
Generally maintains beach amenity	Requires maintenance in the form of additional and ongoing beach nourishment
Provides the greatest flexibility in terms of future adaptation	Very expensive – high ongoing cost
Typically viewed as soft, low impact option	



- Previously completed at both sites
- Some recent pushback

Seawalls

- Typically, linear
- Protect land and assets behind them
- Can protect from coastal erosion and inundation
- Wide range of forms:
  - Revetments
  - Vertical walls
- Wide range of materials

Advantages	Disadvantages
Effectively protects landward infrastructure and assets	Can be exposed during storm conditions or due to sustained erosion with increasing frequency/extent over the longer term
Impacts and design are well understood	Can lead to narrower or lost beaches from storm or sustained erosion with increasing frequency/extent over the longer term
Can be buried or vegetated (depending on location) to minimise visual impact	High capital cost
	Reduce access to the water

Groynes

- Shore perpendicular structures
- Stop or restrict sand movement
- Provide protection to assets behind the beach/foreshore
- Primarily effective where there is longshore sand supply
- Provide beaches, but can segment the coast
- Typically constructed from rock
- Often completed in conjunction with sand nourishment

Advantages	Disadvantages
Create beach compartments that maintain beach amenity adjacent to the groynes	Doesn't provide direct protection to the landward infrastructure along the entire extent
Can be strategically located to provide some protection to more critical infrastructure	Likely requires some level of maintenance in the form of beach nourishment
Impacts are generally well understood	Transfer erosive pressures to adjacent shorelines
Relatively lower maintenance costs	Segment and compartmentalise the shoreline
	Has the potential to trap seagrass wrack
	High capital cost

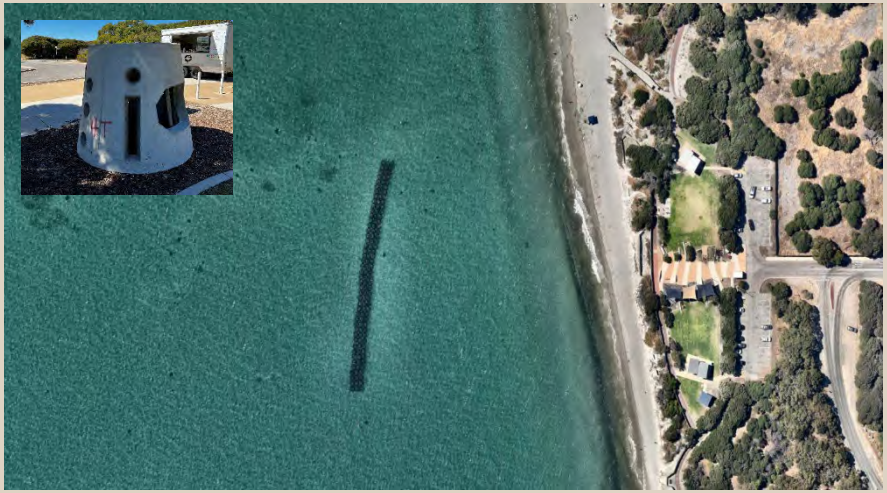
Breakwaters

- Offshore breakwaters are emergent barriers
- Create a lower wave energy section of beach behind
- Characterised by a salient where sand accretes
- Most suited to embayed coastlines where low or negligible net alongshore sediment transport reduces down drift impacts

Advantages	Disadvantages
Create beach compartments that maintain beach amenity adjacent to the groynes	Doesn't provide direct protection to the landward infrastructure along the entire extent
Can be strategically located to provide some protection to more critical infrastructure	Likely requires some level of maintenance in the form of beach nourishment
Can allow continuous beach access	Transfer erosive pressures to adjacent shorelines
Impacts are generally well understood	Compartmentalise the shoreline
	Has the potential to trap seagrass wrack
	High capital cost and relatively higher maintenance costs due to in water works

Artificial Reefs

- Reduce wave energy impacting the coast
- Do not block waves – no direct protection
- During storm events with high water levels, effectiveness is reduced
- Offer other opportunities such as creating marine habitat and surfing breaks
- Most suited to embayed coastlines where low longshore sediment transport reduces down drift impacts



Advantages	Disadvantages
Lower visual impact than other protection	No direct protection to the shoreline behind
Provides habitat	Lose effectiveness in storm conditions
May provide additional complementary benefits eg surfing, snorkelling	Lose effectiveness with sea level rise
	Likely requires some level of maintenance in the form of beach nourishment
	High capital cost
	Relatively higher maintenance costs
	Transfer erosive pressures to adjacent shorelines

Assessment of Options

- Driving processes and conditions confirmed
- Values reiterated
- Concepts of potential options developed for each site – considering processes and values
- Assessment completed against effectiveness, cost, impact and values
- BDA important component of the assessment

Benefits Distribution Analysis

- Ricardo

Next Steps?

- Knowledge Summary & Gap Analysis Report to be finalised
- Coastal processes update underway
- Update model of sediment movement
- Review provided surveys and data
- Consider updating City Communications
- Workshop 2 following coastal processes update

Any other business?