Mettams & Watermans Coastal Adaptation Options

Workshop 2

m p rogers & associates pl

Welcome and Introductions

Outline / Agenda

- Workshop 1 Minutes and Actions
- Workshop 3 Planning
- Coastal Processes Review and Update
- Adaptation Options
- Coastal Values
- Benefit Distribution Analysis
- Next Steps

Workshop 3 – Community Engagement

- The selection and recruitment process for community members to participate in Workshops 3 and 4 in assessing and selecting the final concept plan for each location.
- Targeted Community Groups:
  - SNEC
  - Swimming User Group at Mettams
  - Surfing WA (Mettams Surfers Rep)
  - Coastal Whispers Facebook Group
  - Swimming and General User Group at Watermans
  - ANO TBA

Workshop 3 – Community Engagement

- Key selection criteria
  - Active member of the community group and a regular user at either or both Mettams Pool and Watermans Bay – a high level of interest in the project and its outcomes.
  - Available to attend:
    - Workshops 3 and 4 (need to confirm timing) and possibly a few additional meetings with the Project Working Team.
    - Coastal Conversation public event(s) that will be offered to users of both Mettams and Waterman's Bay to find out more about the project.
  - Share project information and concept option assessment process with other members of the community group during the workshop series.
  - Agree to the Project Reference Group's Terms of Reference

Workshop 3 – Community Engagement

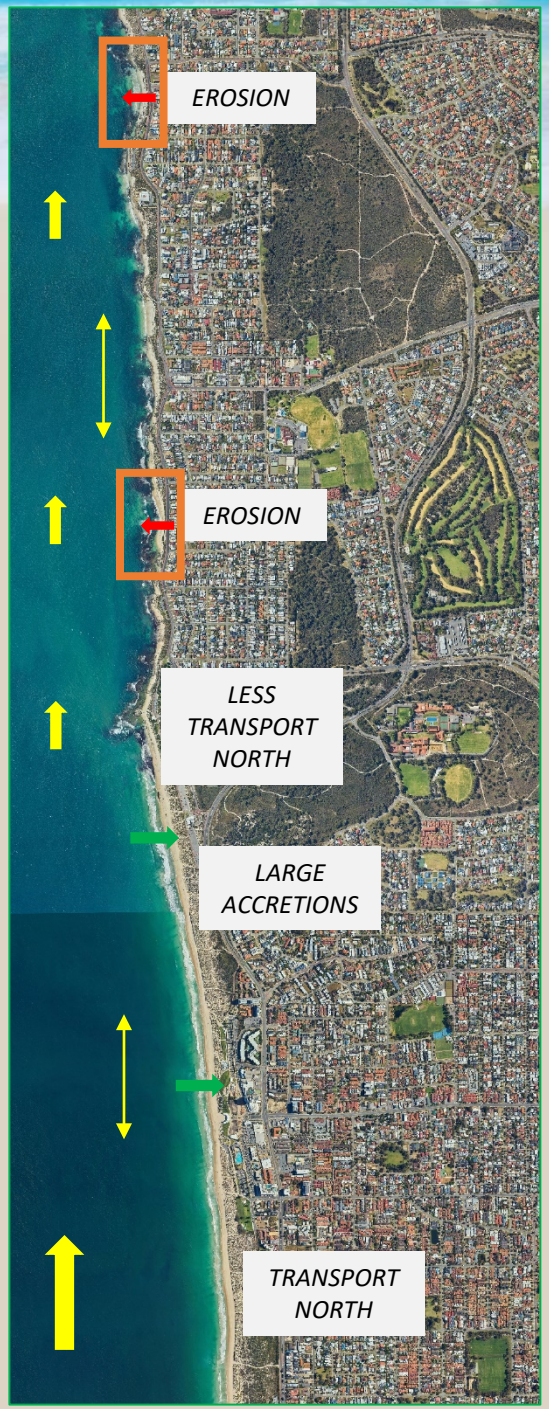
- Recruitment process
  - Workshop 2 - Reference Group confirm the key Community Groups for CoS to approach and any others – (seeking approx. 5-8 (max) community members)
  - CoS send introductory correspondence to each Group providing a project overview and request for representation
  - Once representative confirmed, 361 Degrees and MP Rogers (with City officer – tbc) to meet with representative, introduce project and provide a status update and overview of engagement process moving forwards
  - Community Representatives invited to attend one or both of the Coastal Conversations which will be scheduled at each location prior to Workshop 3.

Workshop 1 – Recap

- Mettams Pool & Watermans Bay site settings
- Assets at risk
- History of erosion over several decades
- Number of previous technical assessments and investigations
- Discussed project objectives
- Discussed coastal processes

Coastal Processes - Recap

- Based on previous assessments
- Seasonal transport and changes
  - Transport north in sea breezes
  - Transport south in storms
- Net northerly transport
- Erosion at Mettams & Watermans
- Required updating



Review & Update

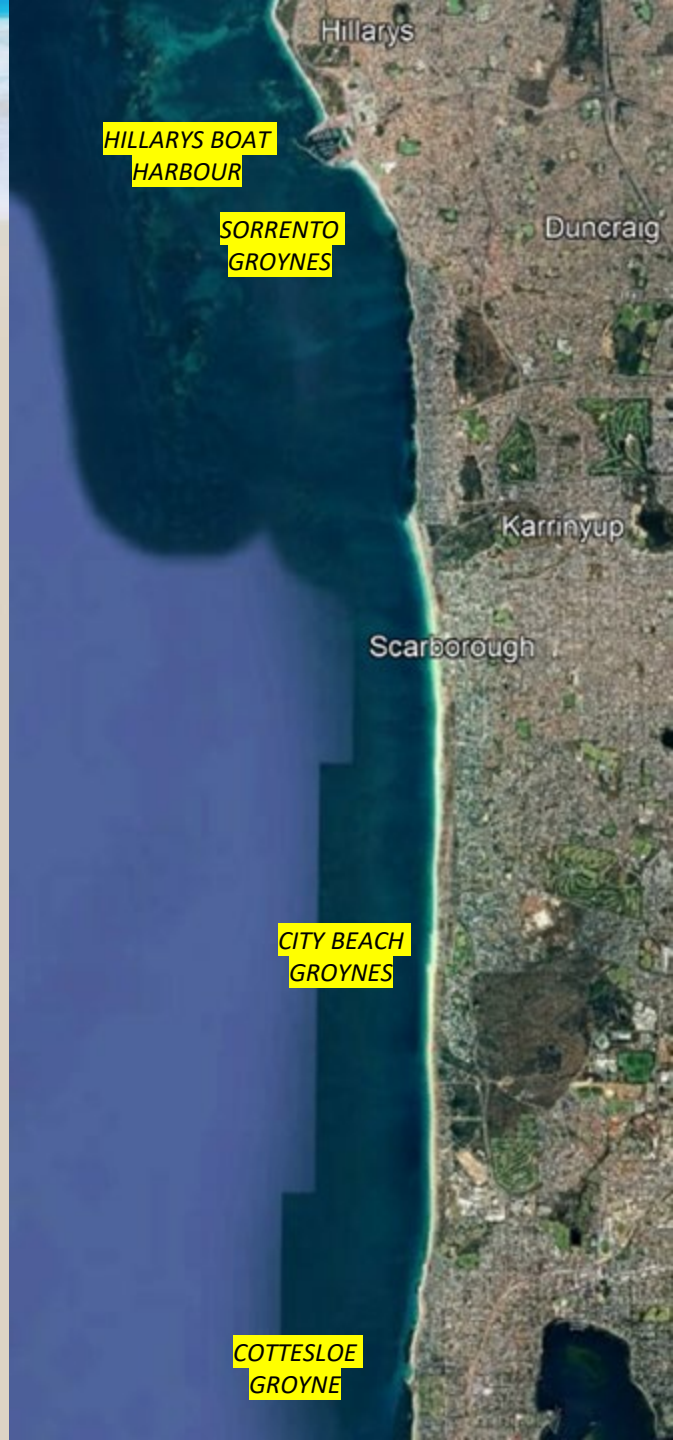
- Update sediment budget and model over sediment cell
- Consider:
  - Changes to processes
  - Works completed
  - Available recent information and data
- Prepare updated model of movement
- Sediment budget
- These will be used in later parts of study to assess options

Coastal Processes Update - Data

- Update to present picture of present-day processes
- Consider available information
  - Surveys – large scale, local and transects
  - Monitoring information and data
  - Shoreline movement information
- Each of these was collated and reviewed

Timeframe of Assessment

- Want to represent present-day conditions
- Considers coastal works which could change processes
- Assess following construction of:
  - Cottesloe groyne (1960)
  - City Beach groynes (1957)
  - Sorrento groynes (1980s)
  - Hillarys Boat Harbour (1985)
- Period from 1990 to 2022 selected for assessment



Coastal Works

- Other coastal works also have the potential to impact sediment movements
- Can include activities such as:
  - Construction of seawalls
  - Revegetation efforts
  - Beach scraping or management
  - Removal of wind-blown sand
  - SAND NOURISHMENT

Sand Nourishment

- Moves sand from one location to another
- May import, export or move sand from / in the system
- In the study area, completed at Trigg, Mettams, Watermans and Sorrento
- These works were reviewed and accounted for

Sand Nourishment

- Completed by the City of Stirling

Date	Approx. Volume (m^3)	Harvest / Deposit Locations
Circa 2010	2,500	Ocean Reef Marina / Watermans Bay
2012	500??	Terrestrial Source / Watermans Bay
2009	1,400	Scarborough Beach / Watermans Bay
Apr 2021	2,200	Sorrento Beach / Mettams Pool
Nov / Dec 2021	5,000	Trigg Beach / Mettams Pool
Nov / Dec 2022	5,000	Trigg Beach / Mettams Pool

Sand Nourishment

- Completed by the City of Joondalup

Date	Approx. Volume (m^3)	Harvest / Deposit Locations
Dec 2018	8,400	Sorrento Beach / North of Hillarys
Mar / Apr 2020	8,700	Sorrento Beach / North of Hillarys
Mar 2021	8,000	Sorrento Beach / North of Hillarys (5,800 m^3) & Mettams Pool (2,200 m^3)
Oct / Nov 2021	8,000	Sorrento Beach / North of Hillarys
Oct / Nov 2022	8,000	Sorrento Beach / North of Hillarys
Oct / Nov 2023	10,000	Sorrento Beach / North of Hillarys

Sand Nourishment

- Sand nourishment values were accounted for in the assessment
- Considered in the sediment budget

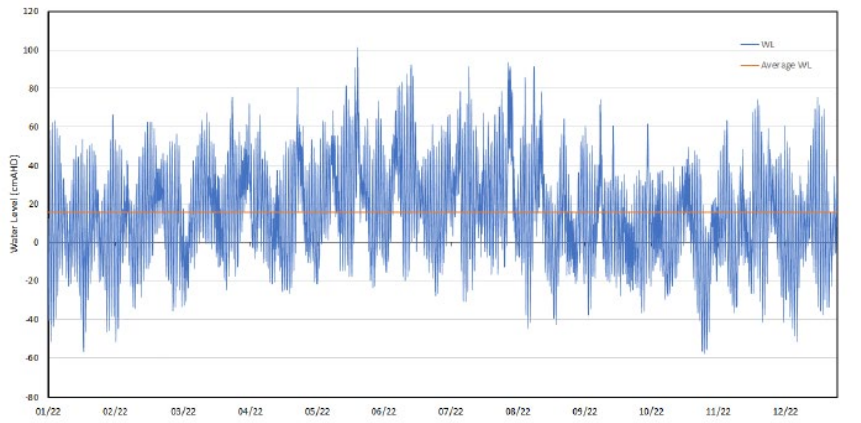
Coastal Monitoring

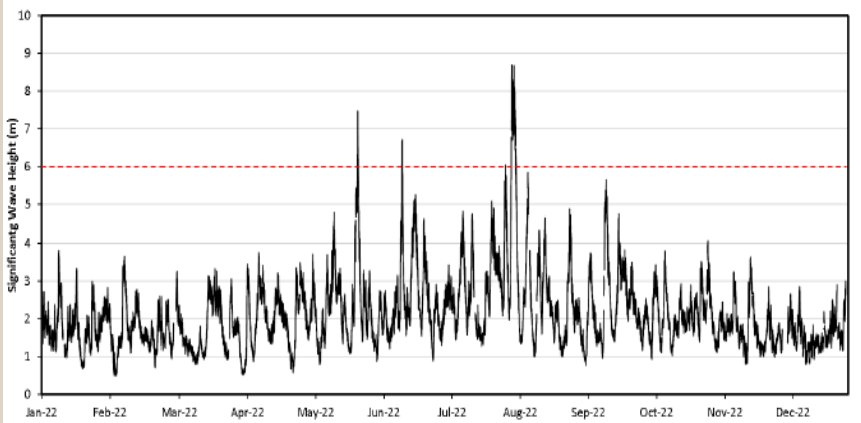
- Coastal monitoring completed in various forms since 1955
- Monitoring of beach widths at Scarborough and wide-scale monitoring
- In 2009, the monitoring was extended to include 19 coastal profiles
- Beach profiles captured between 2009 and 2015 and provided information on beach variation
- Monitoring showed generally:
  - Erosion over the Brighton to Trigg area
  - Varying accretion and erosion trends north of Trigg Point

Coastal Monitoring

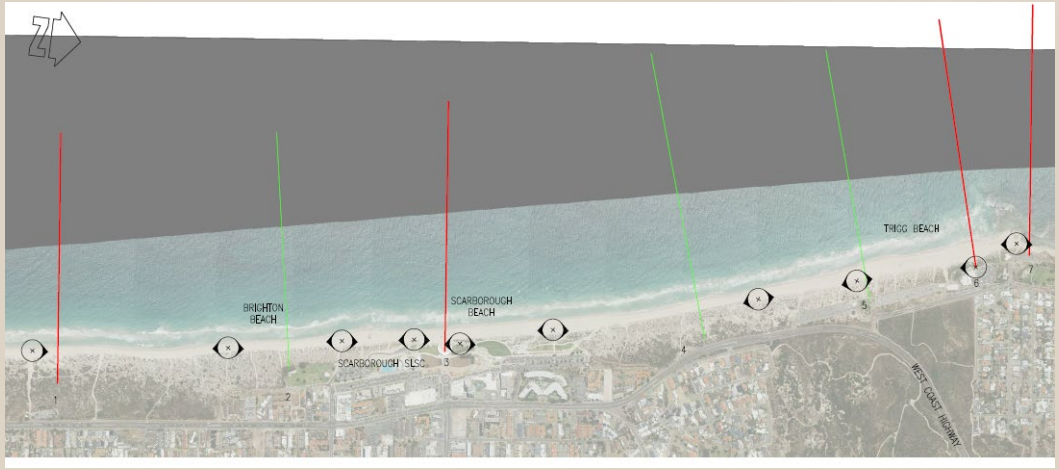
- City re-established coastal monitoring program in 2022
- Assesses changes to the shoreline and metocean conditions
- The monitoring includes:
  - 18 beach profiles
  - 28 photo monitoring locations
  - Shoreline mapping

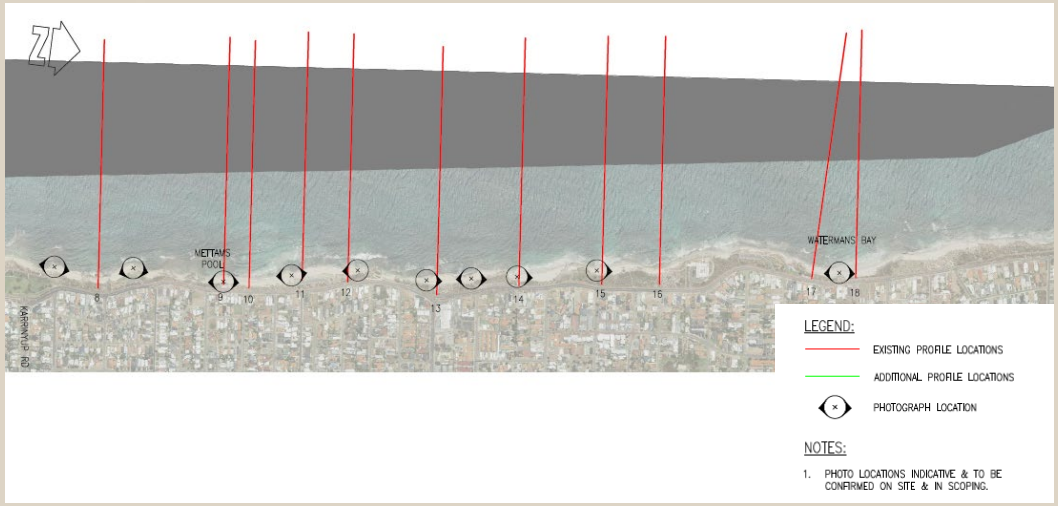
Activity	Frequency	2022		2023	
		March	October	March	
Beach Profile Surveys	6 monthly	✓	✓	✓	
Shoreline Mapping	Annual		✓		
Photographic Monitoring	6 Monthly	✓	✓	✓	

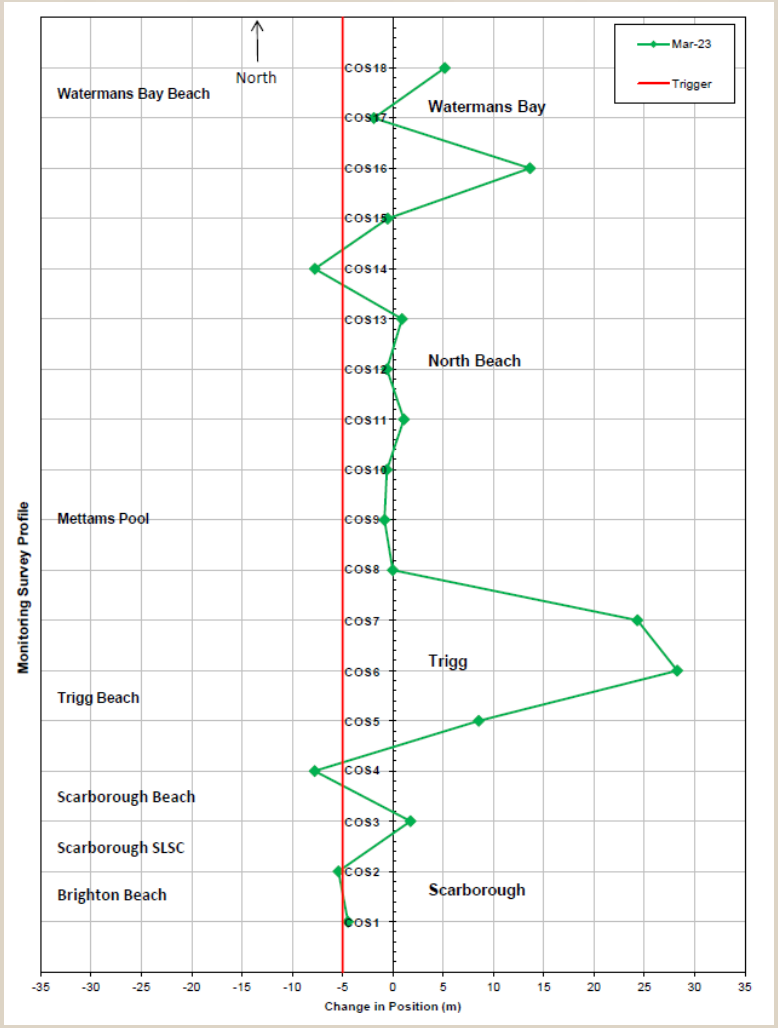




Coastal Monitoring

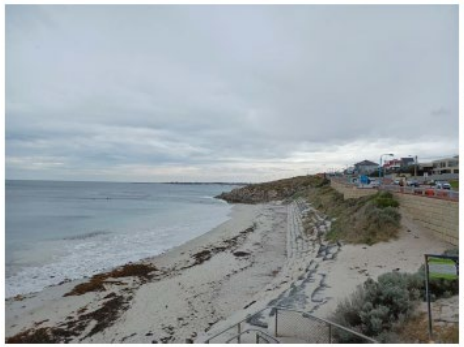




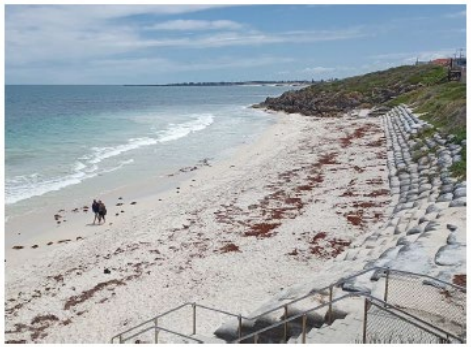


Coastal Monitoring

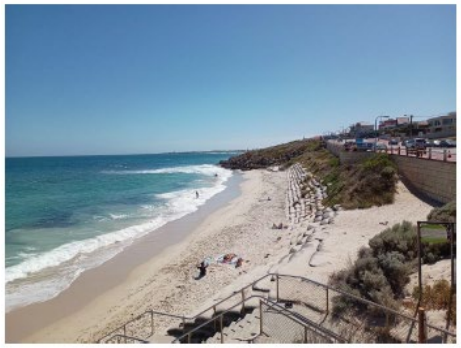
Watermans Bay



March 2022

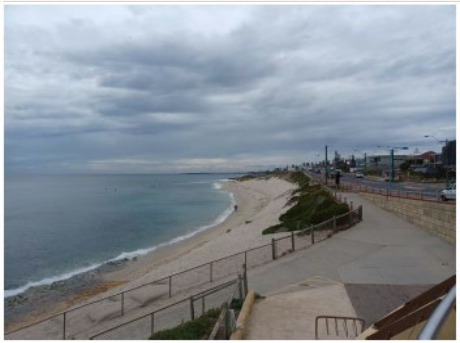


October 2022

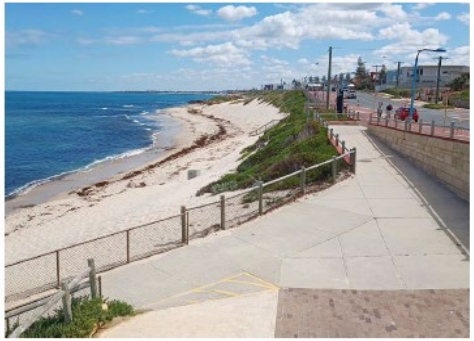


March 2023

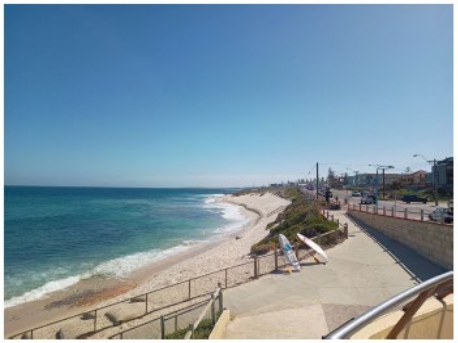
Mettams Pool



March 2022



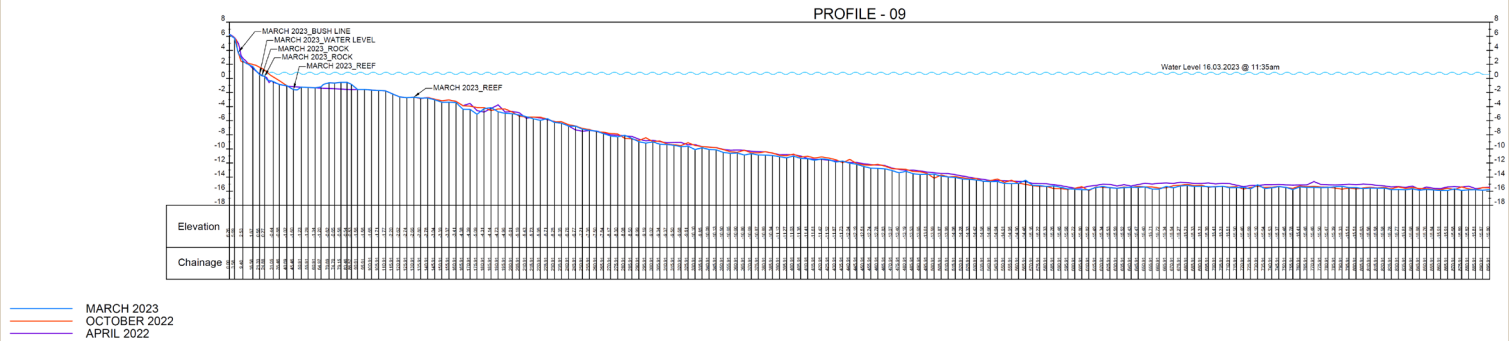
October 2022

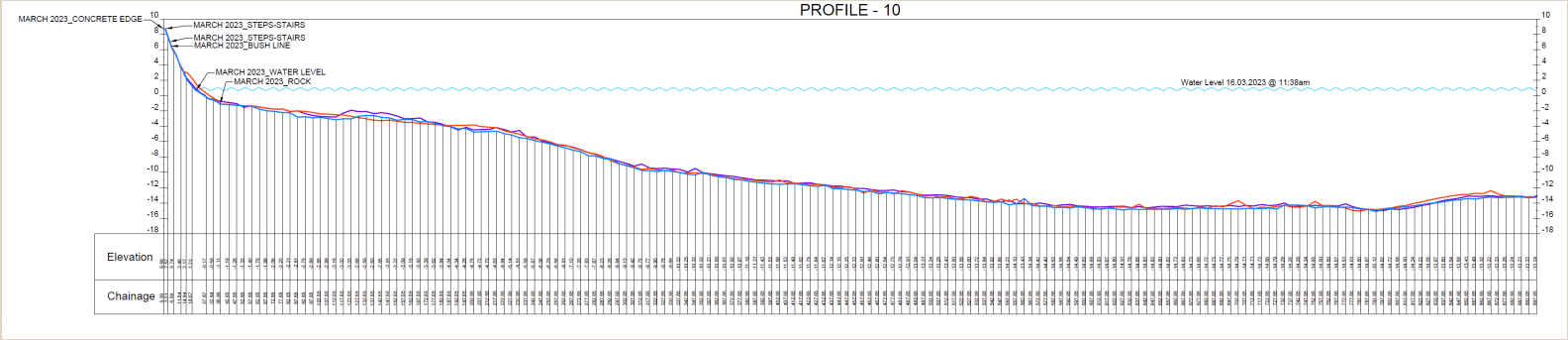


March 2023

Coastal Monitoring Profiles

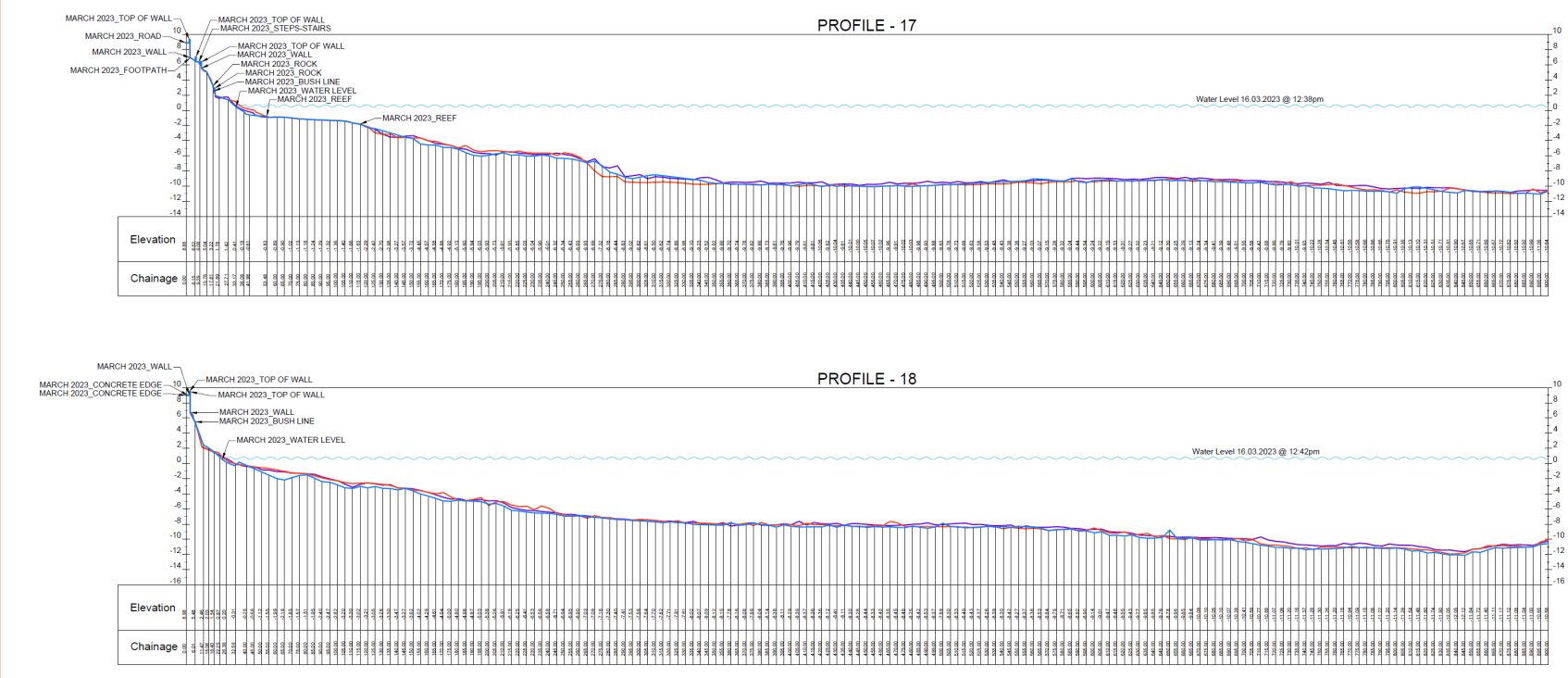
- Mettams





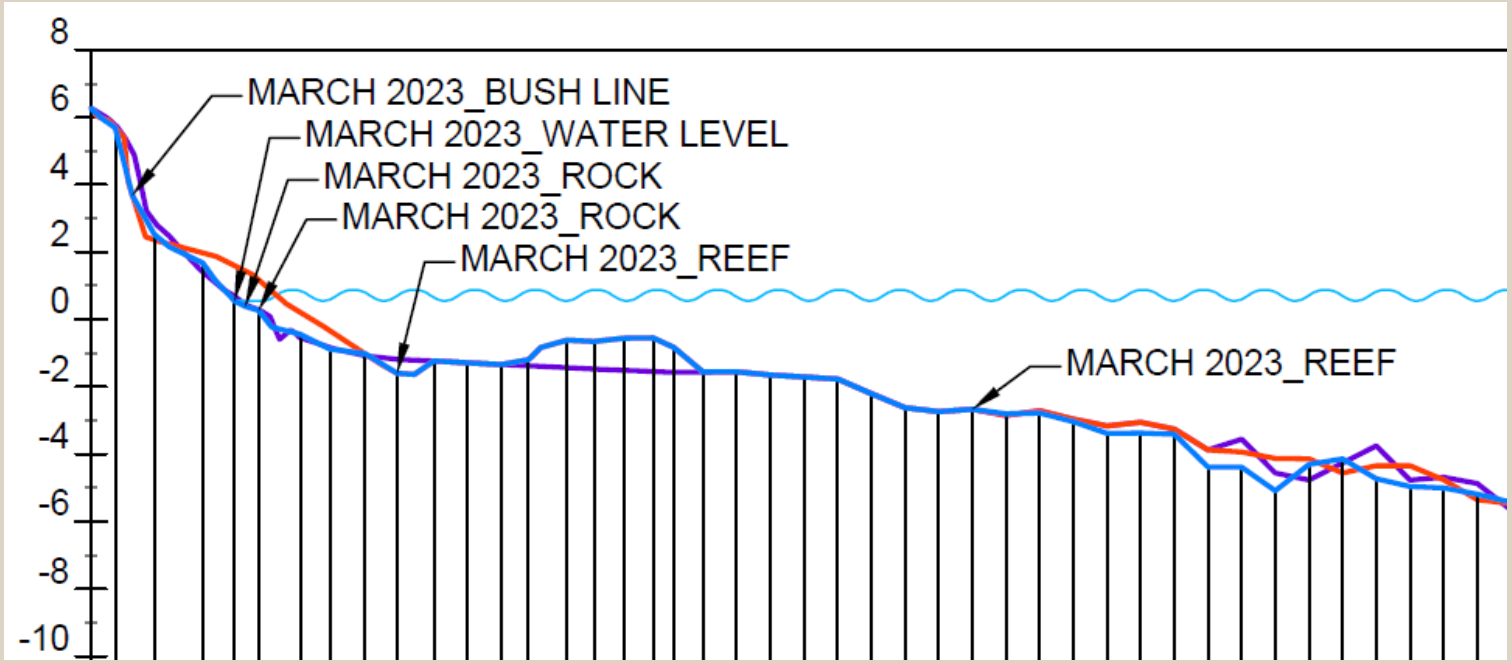
Coastal Monitoring Profiles

- Watermans Bay



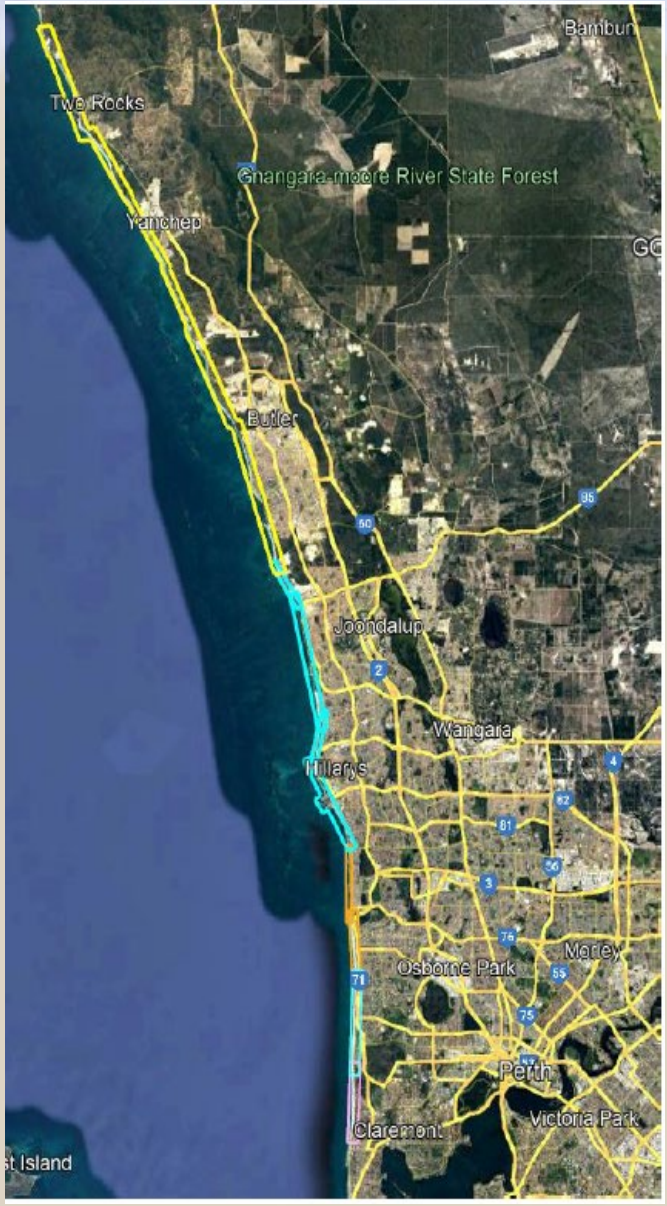
Coastal Monitoring Profiles

- Seasonal change



Coastal Monitoring

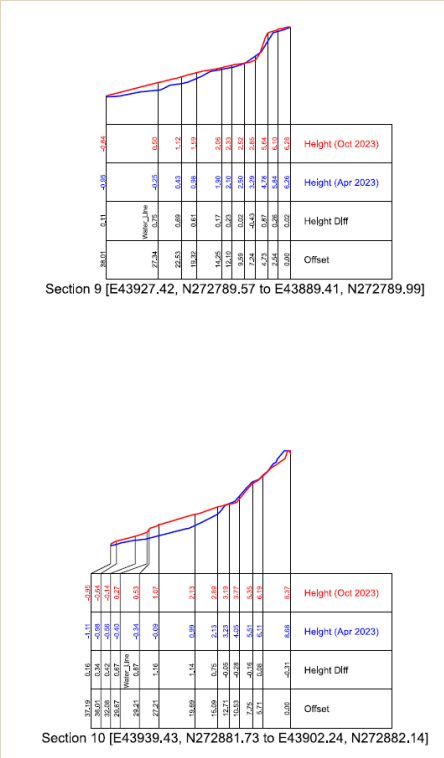
- Northern Beaches Alliance (NBA) coastal monitoring campaign
- Collection of Aerial Laser Scanning (ASL) and Ground surveys
- Monitoring is completed every 6 months and captures:
  - Volumes comparison
  - Cross-section profiles
- Commenced in 2023, only initial baseline data has been captured



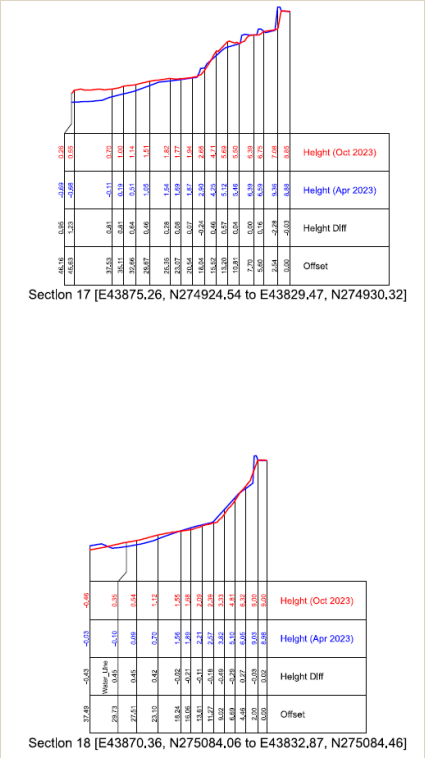
NBA Coastal Monitoring

- Will be useful information and allow more details updates to sediment budgets in future
- Not useful for study

METTAMS

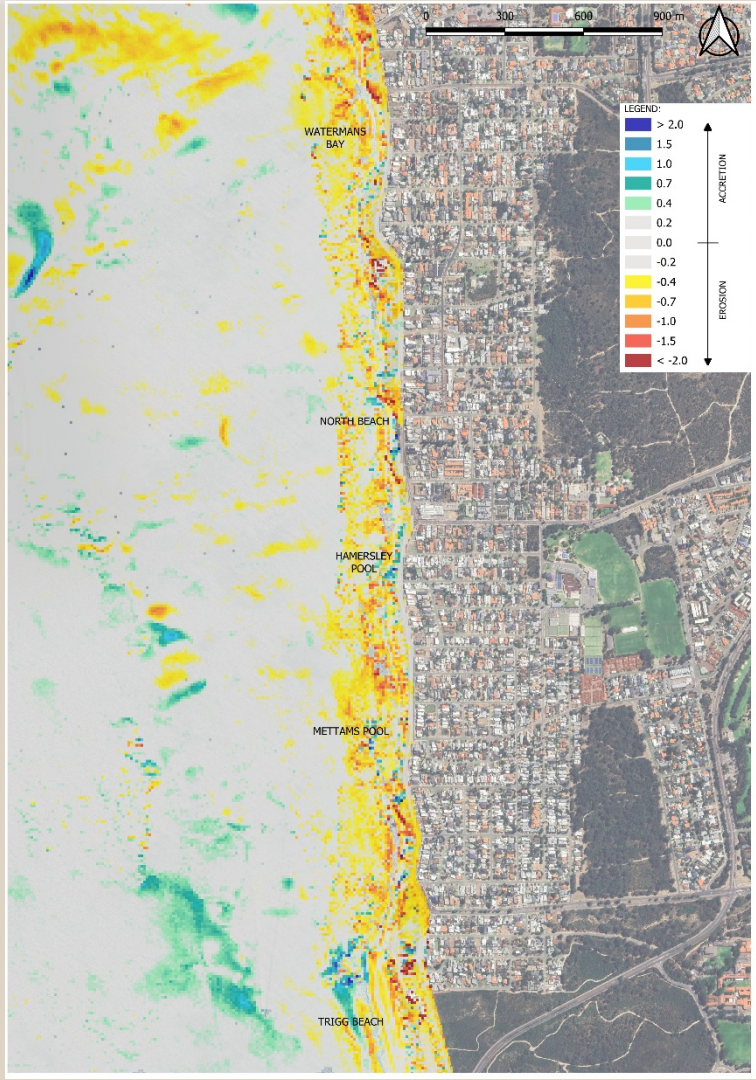


WATERMANS



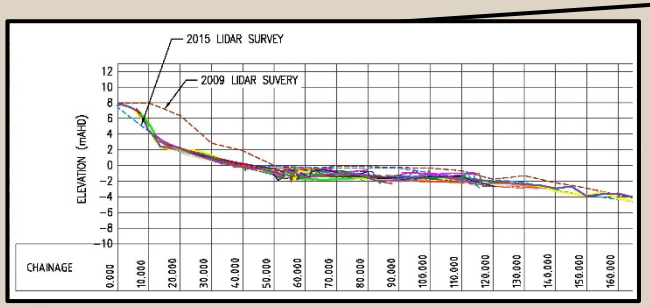
LiDAR Survey

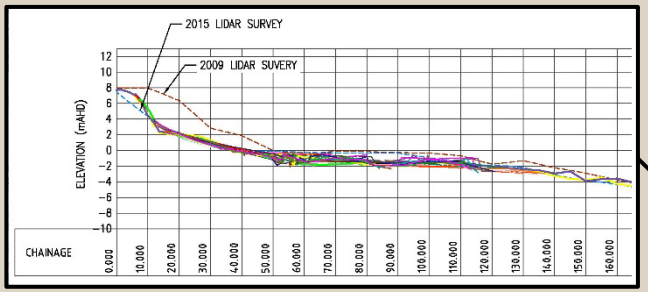
- Bathymetric data – LiDAR
- Surveys available from 2009 and 2015
- Extends from Hillarys to Cottesloe
- Assists with assessing bathymetric change in both nearshore and offshore regions
- Or can it??



LiDAR Survey

- Validating the LiDAR data against ground surveys shows:
  - The LiDAR varies in the locations of hard structures and rock
  - The LiDAR varies significantly from ground surveys (including onshore, nearshore and offshore areas)





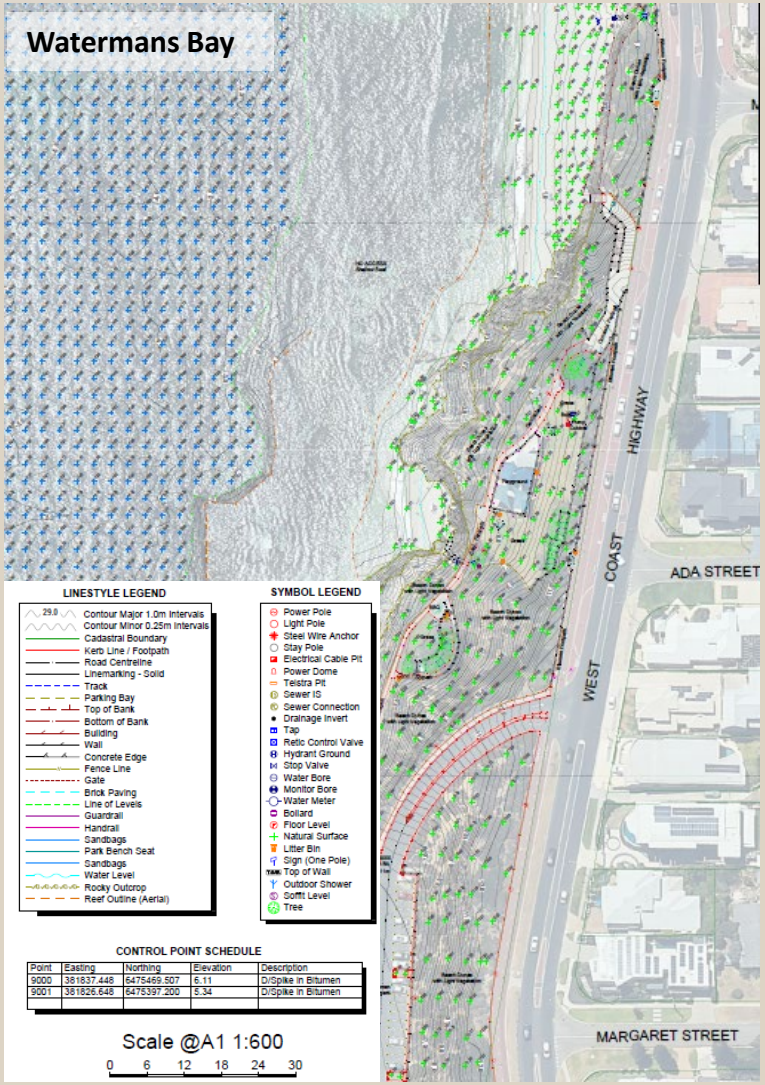
LiDAR Survey

- MRA has completed additional assessment of this survey in other areas
- Shows similar errors in potential transposing of data, anomalies or errors

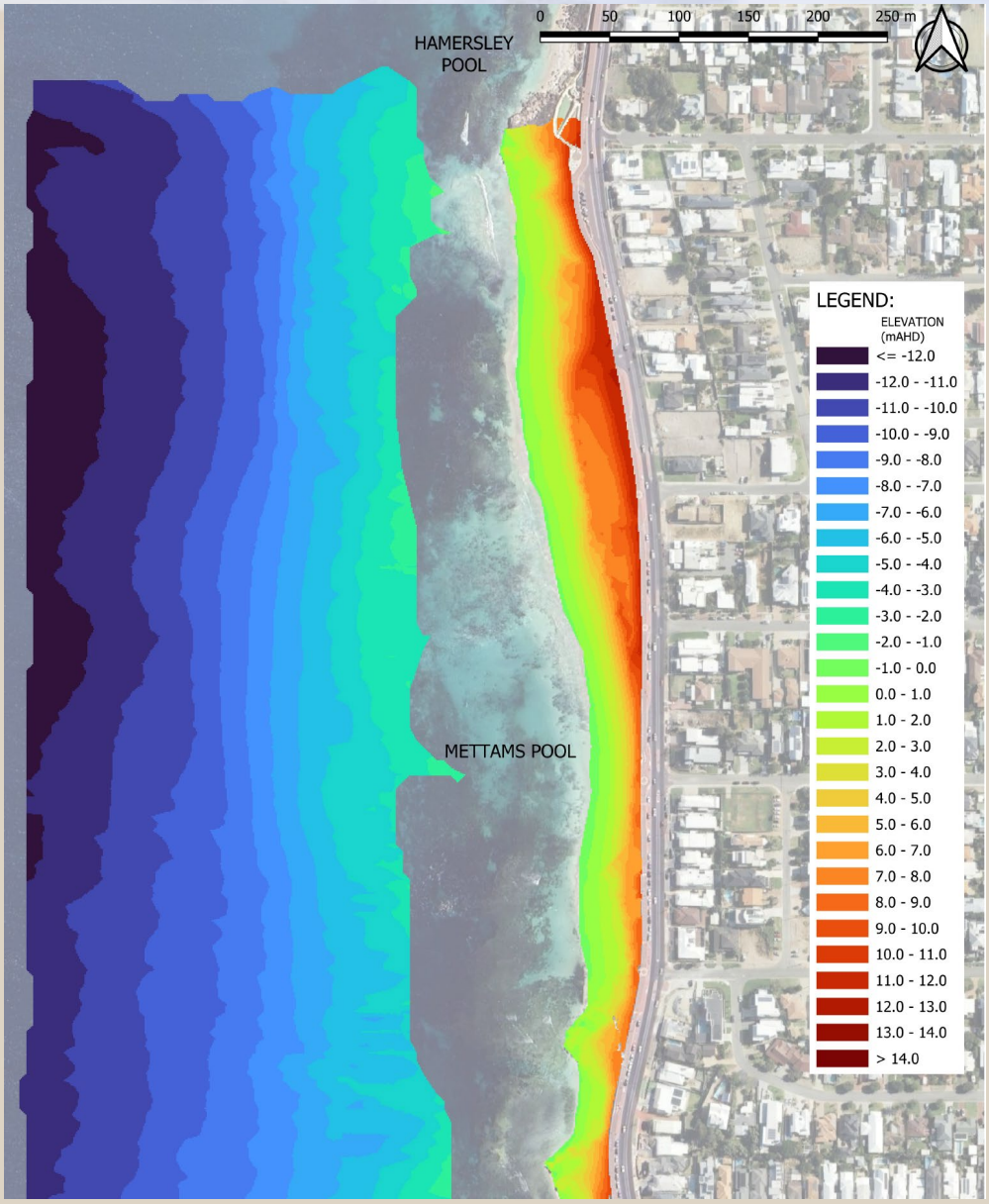
- Therefore – can't be relied upon
- LiDAR not used further in this assessment

Feature Surveys

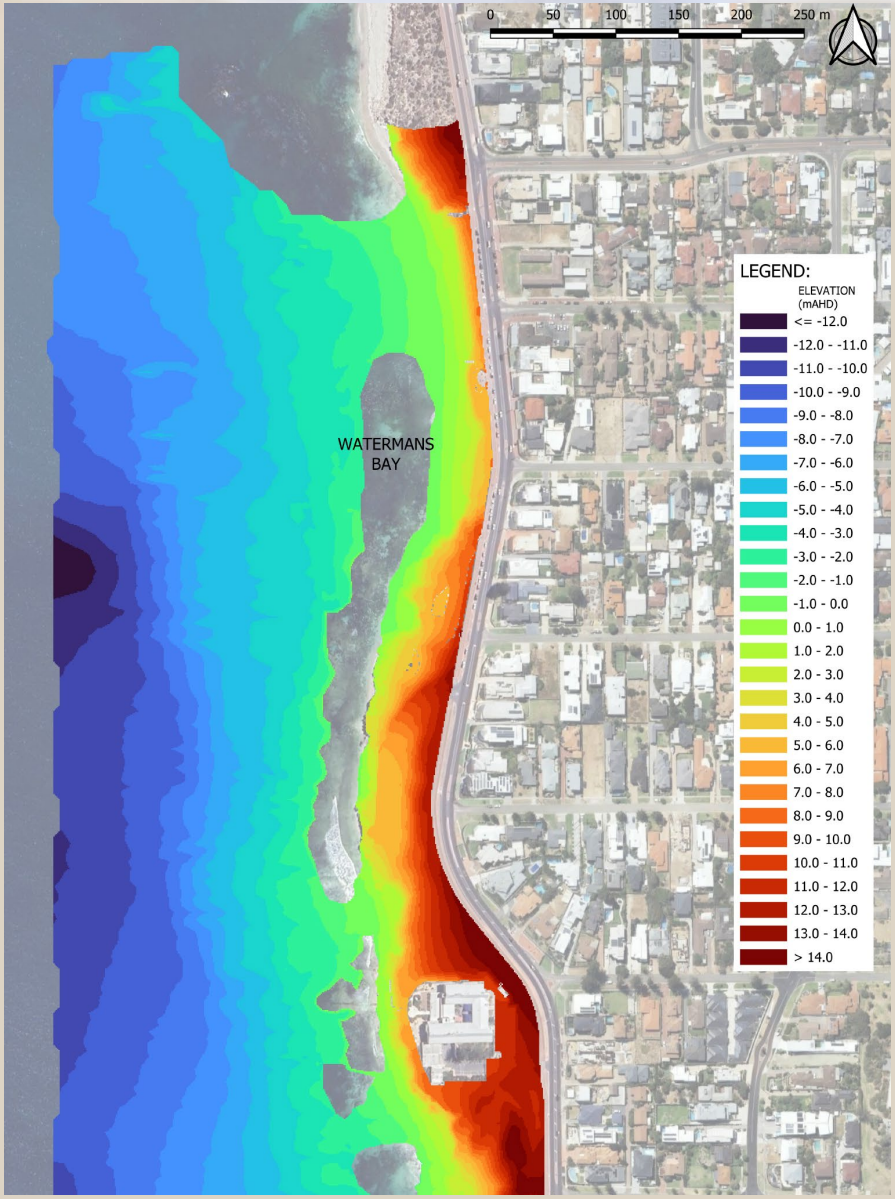
- Feature survey was captured at Watermans and Mettams in March 2024
- Survey includes vegetation, beach, nearshore/offshore reefs, amenities and infrastructure.
- Extends from the landward side of West Coast Drive to approx. 100 m offshore



Survey - Mettams



Survey - Watermans

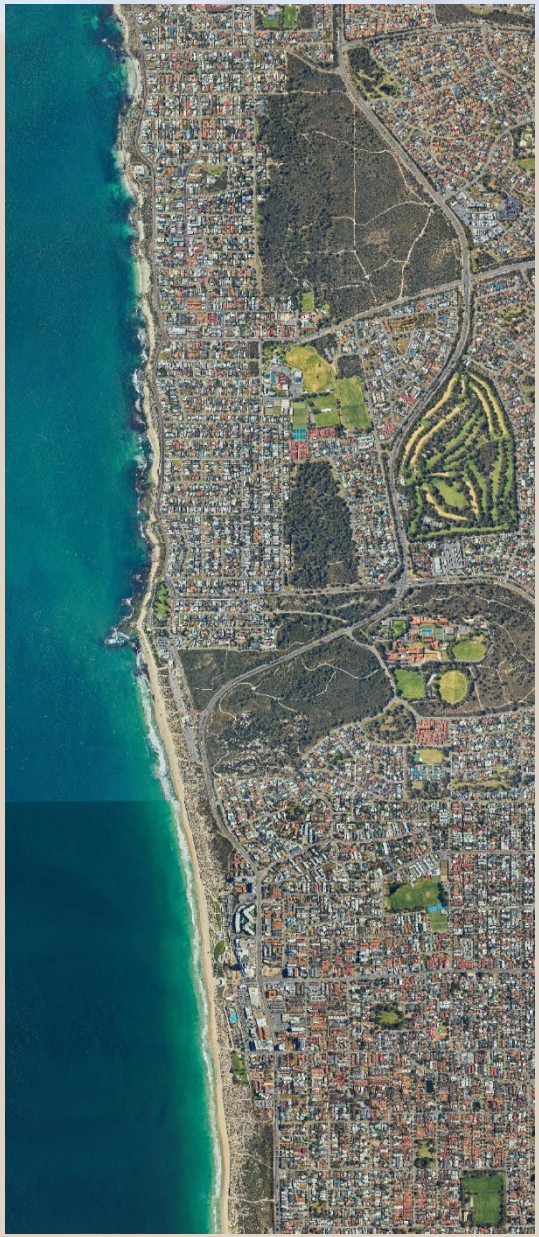


Vegetation Lines

- Collection of coastal lines captured from aerial imagery
- Data collected infrequently from 1940 to 2016
- A proxy to assess how shoreline changes
  - Accreting shoreline – the coastal vegetation moves seaward
  - Eroding shoreline – the coastal vegetation retreats landward
- Provides long term record

Mapping Coastal Vegetation Lines

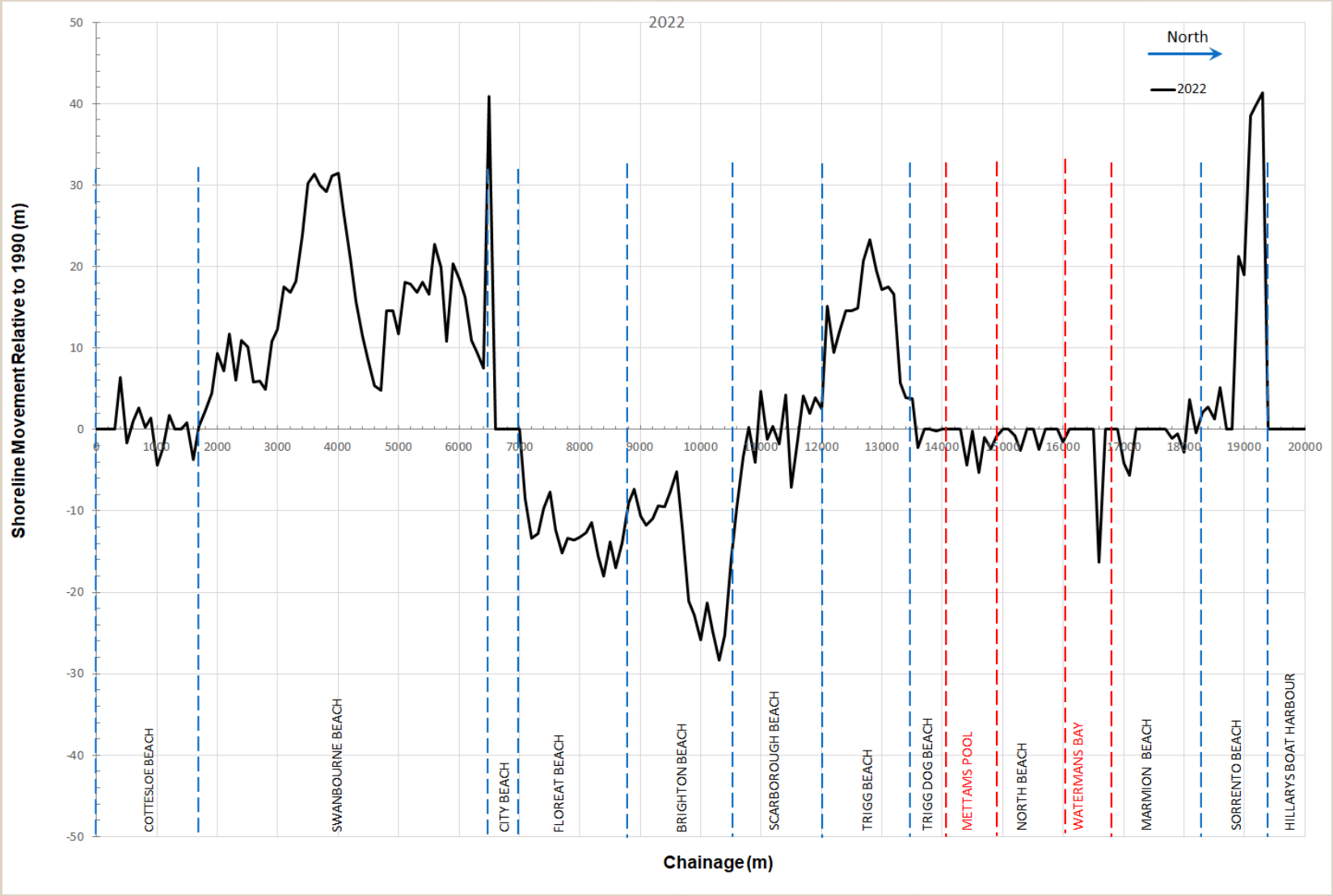
- Mapping of the coastal vegetation lines is undertaken using orthorectified aerial imagery
- The vegetation lines are mapped in accordance with DoT's methodology
- Provides a proxy to assess how a beach is evolving



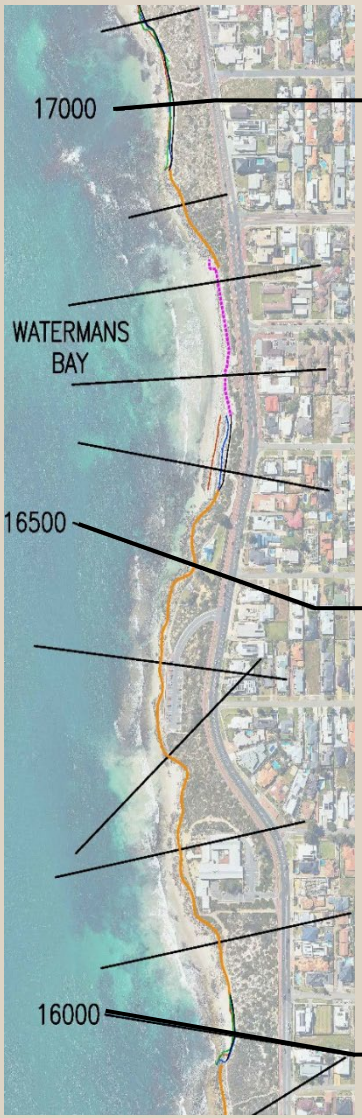
Mapping Coastal Vegetation Lines

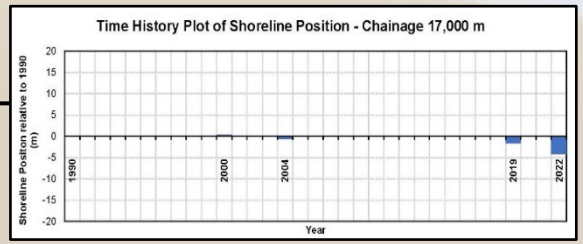
- For this assessment, MRA mapped recent aerial photograph
- Prepared shoreline movement plan for 1990 - 2022
- Movement of vegetation lines assessed

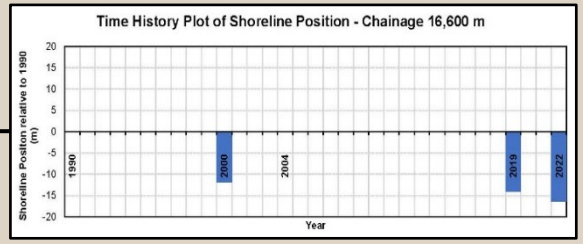
Shoreline Movement – Veg Lines

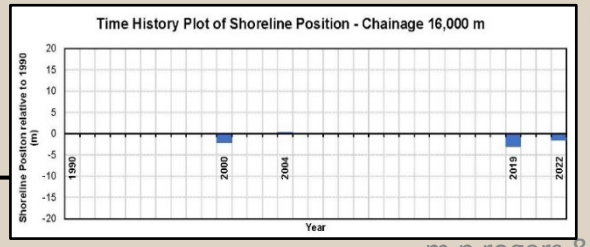


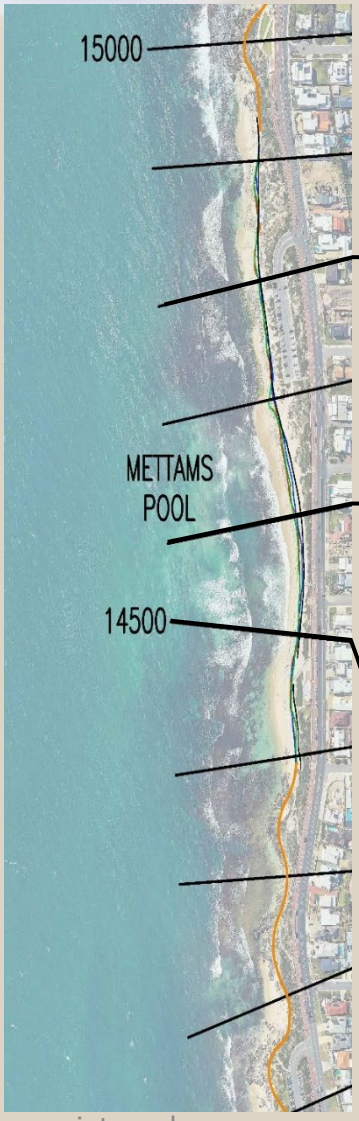
Time History of Shoreline Movement

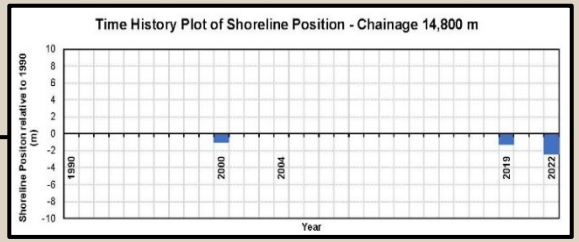


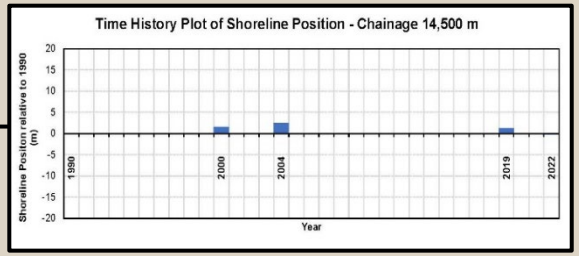


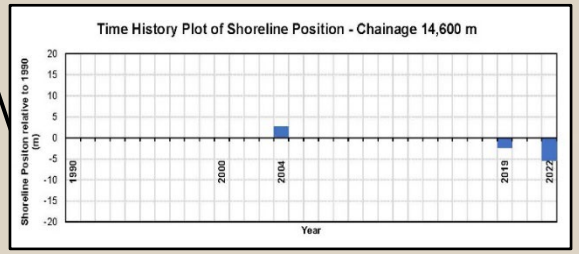






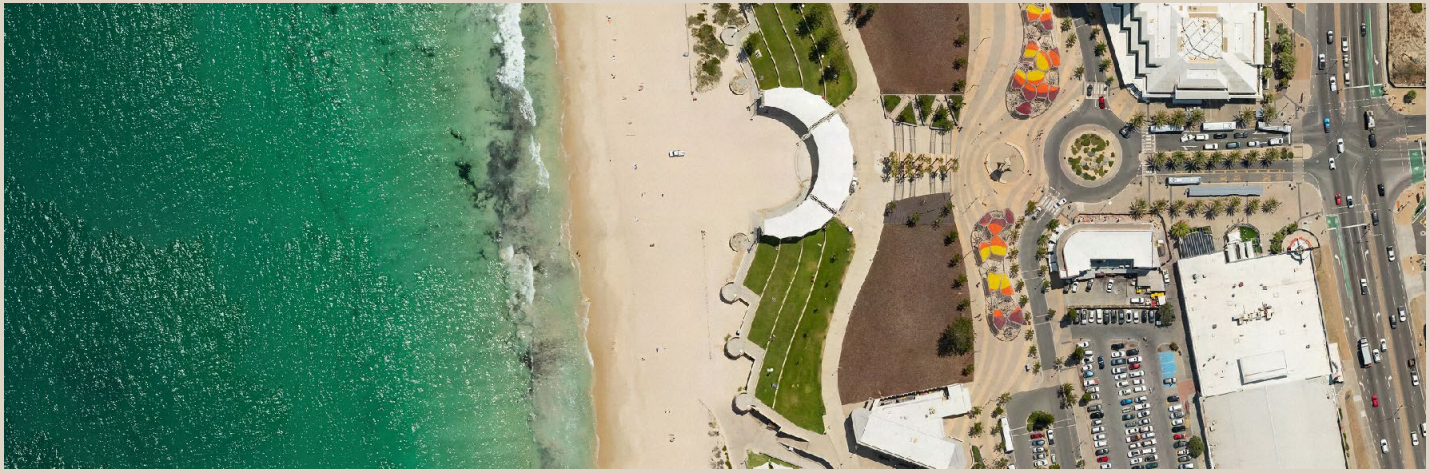






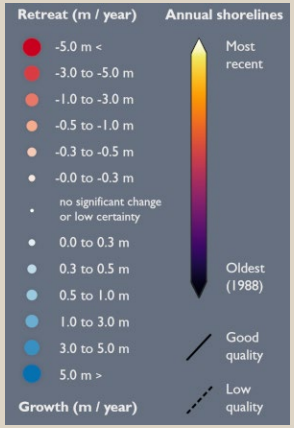
Veg Lines - Challenges

- Movement of vegetation line doesn't provide full picture
- Vegetation line can be affected by:
  - Fencing
  - Foot traffic
  - Vehicles (eg SLSC, beach patrols)
  - May not exist

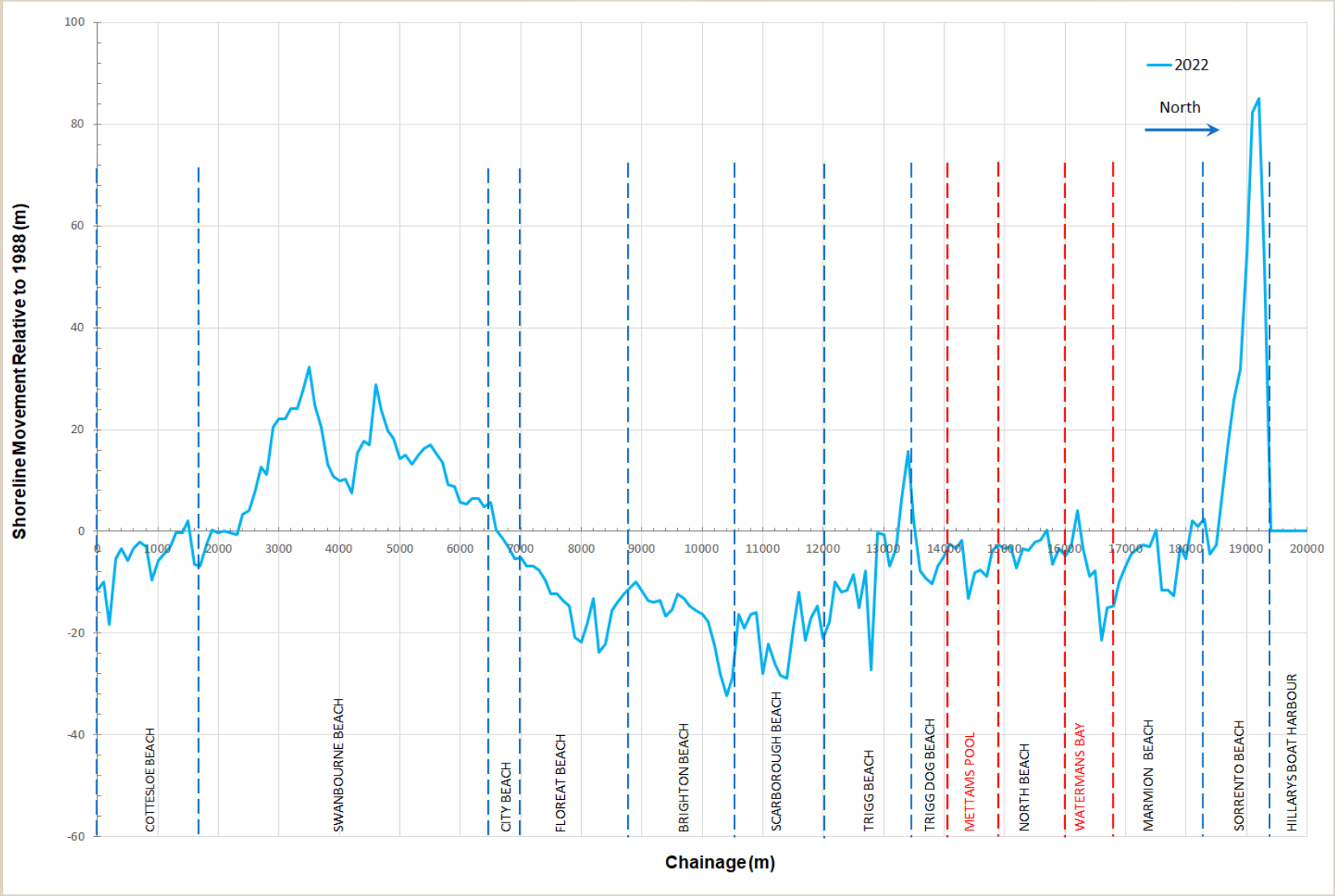


Digital Earth Australia (DEA) Coastlines

- Combine satellite data with tidal modelling to map the change in the shoreline
- Been collected since 1988.
- Provides information on shoreline position and rates of change

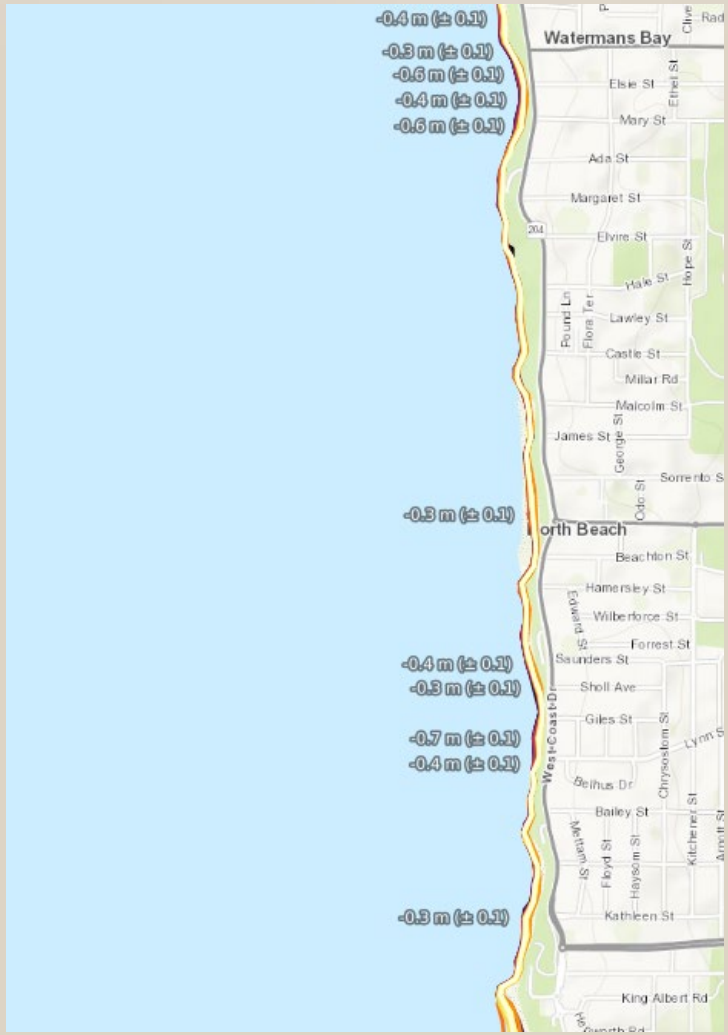


Shoreline Movement – Shorelines

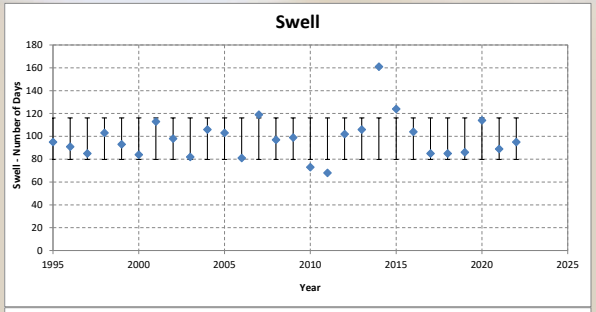


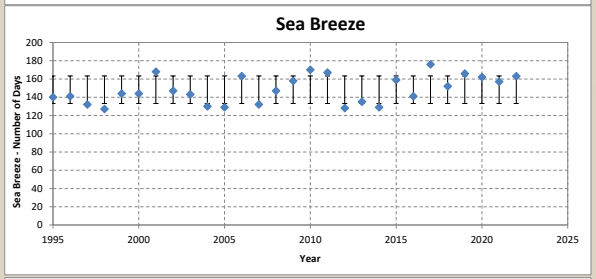
Shorelines - Challenges

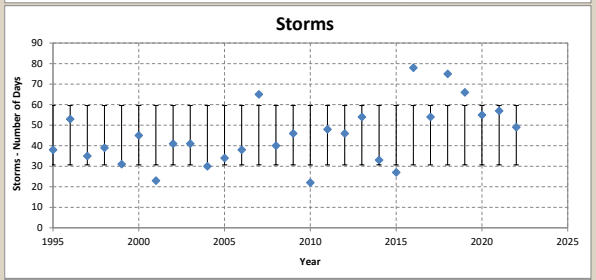
- More affected by short term changes
- Computer learning to differentiate pixels
- Consider alongside other methods

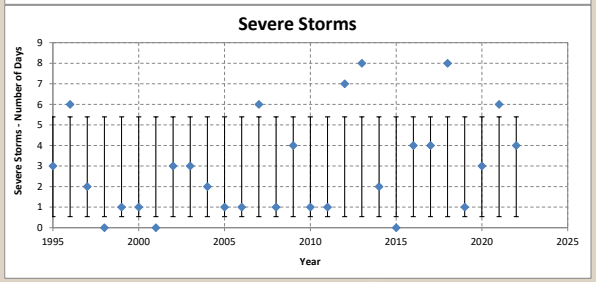


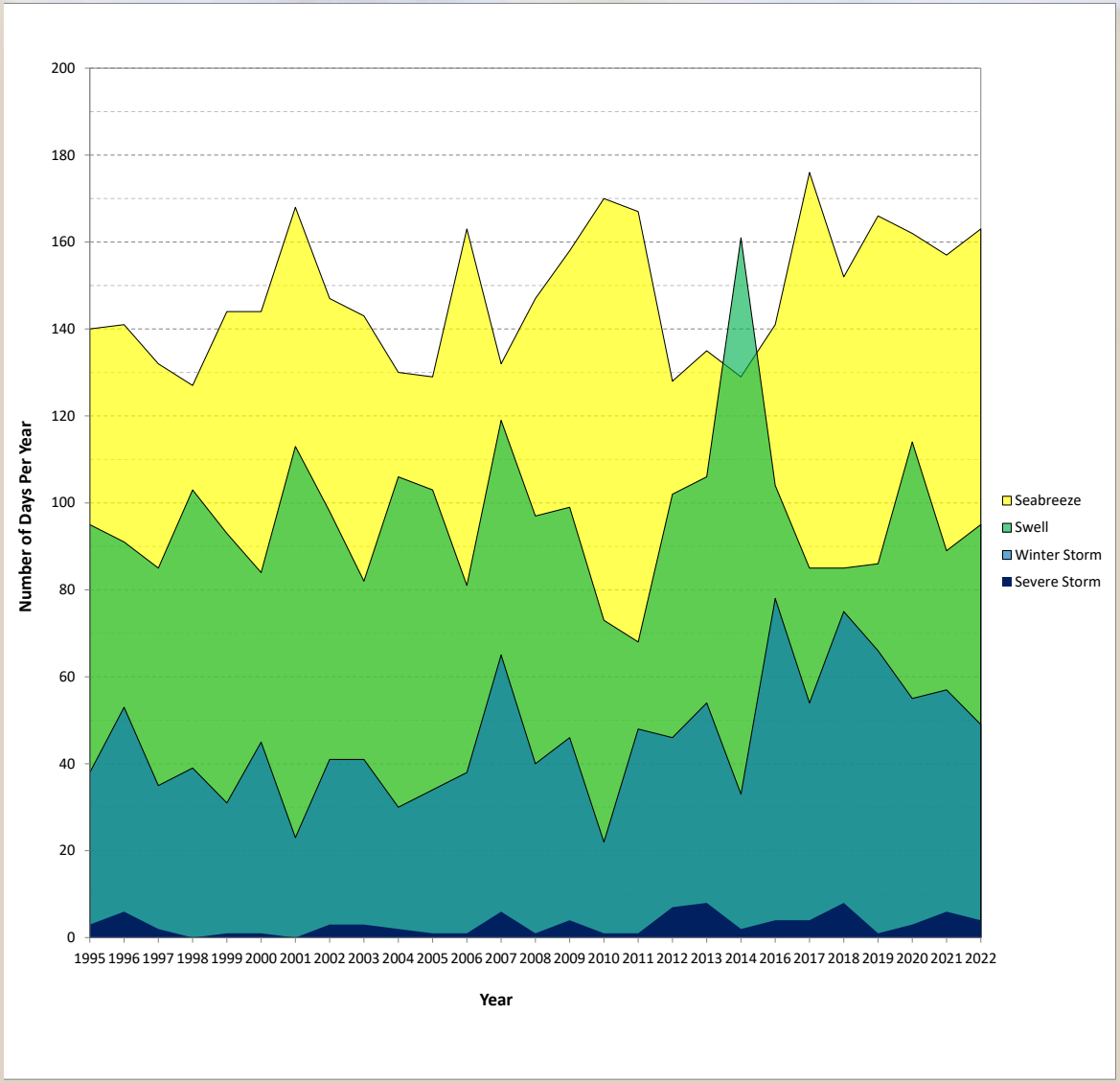
Frequency of Events –Rottnest











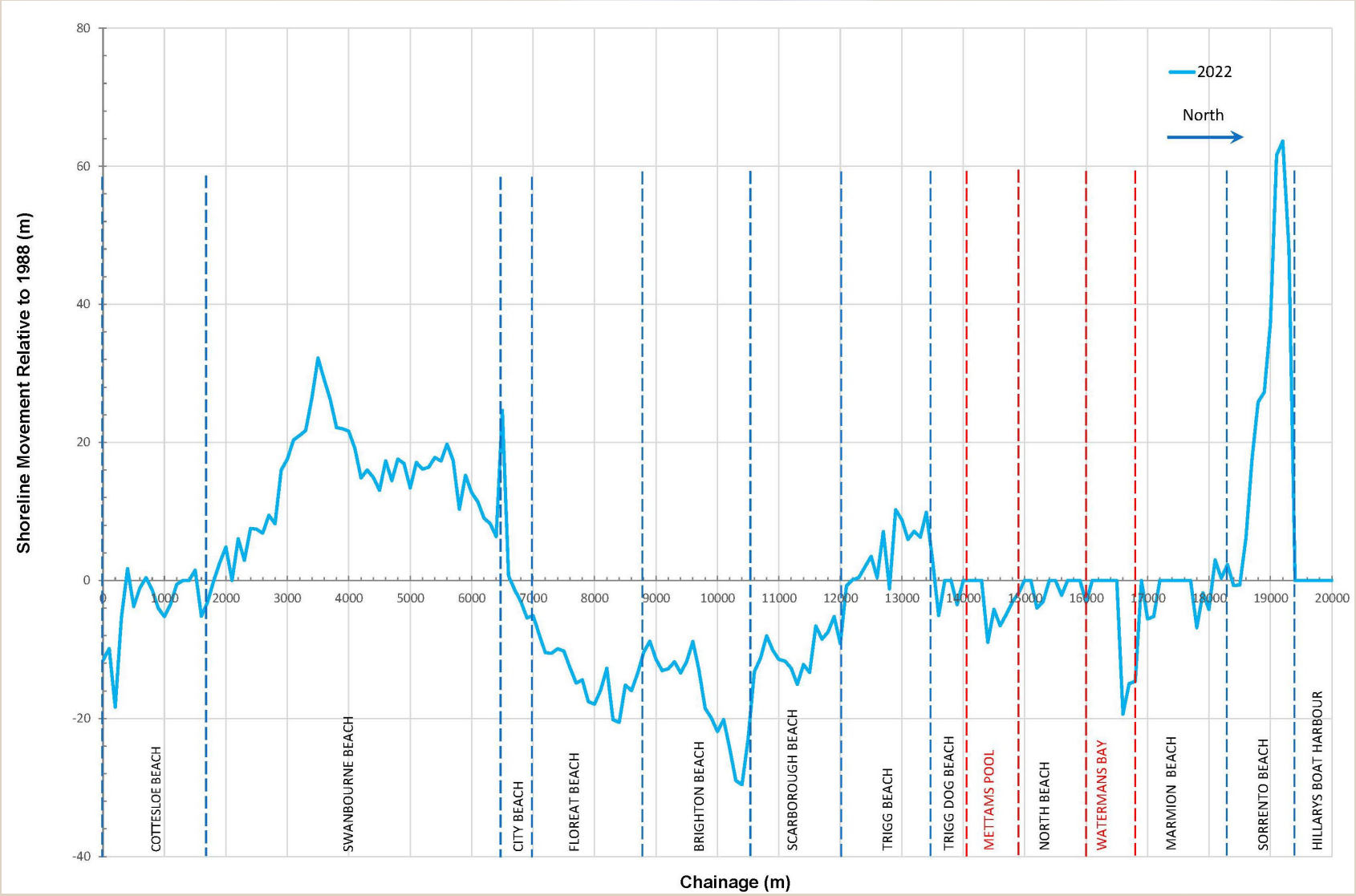
Shoreline Change – Summary

- The width of the beach has increased at Swanbourne, Trigg and Sorrento Beaches
- The rest of the coastline has receded at varying rates
- Watermans Bay:
  - Has experienced ongoing erosion since 1990
  - Veg line receded up to 16 m over 32 years
  - Shoreline receded up to 21 m over 34 years
- Mettams Pool:
  - Was accreting to 2004, receded since
  - Veg line receded up to 6 m over 18 years
  - Has receded up to 13 m over 34 years

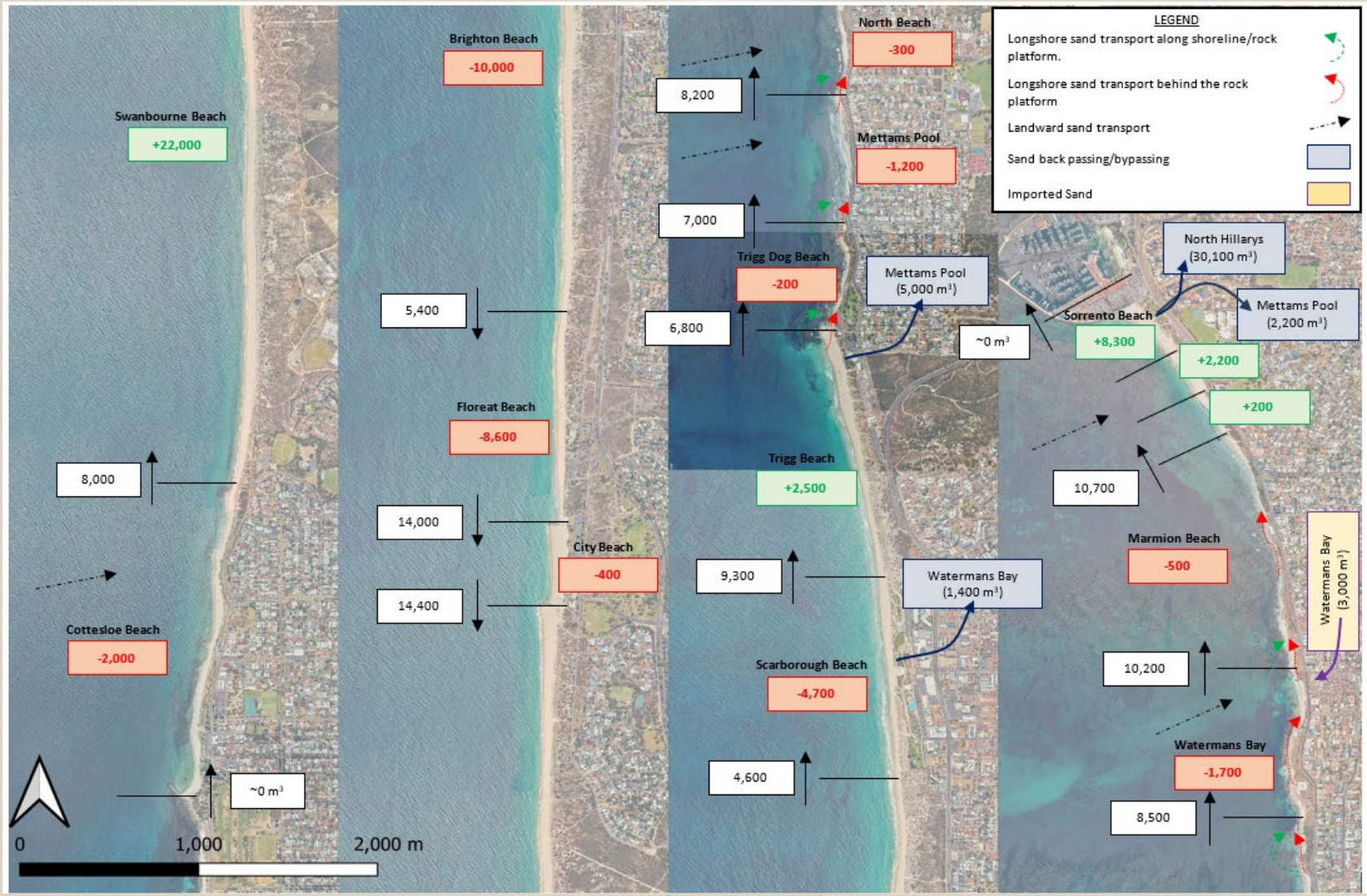
Shoreline Change – Summary

- Pull this information together to estimates volumes of change
- Where veg line assessment not valid, use shoreline
- Where shoreline and vegetation line change varied, average values

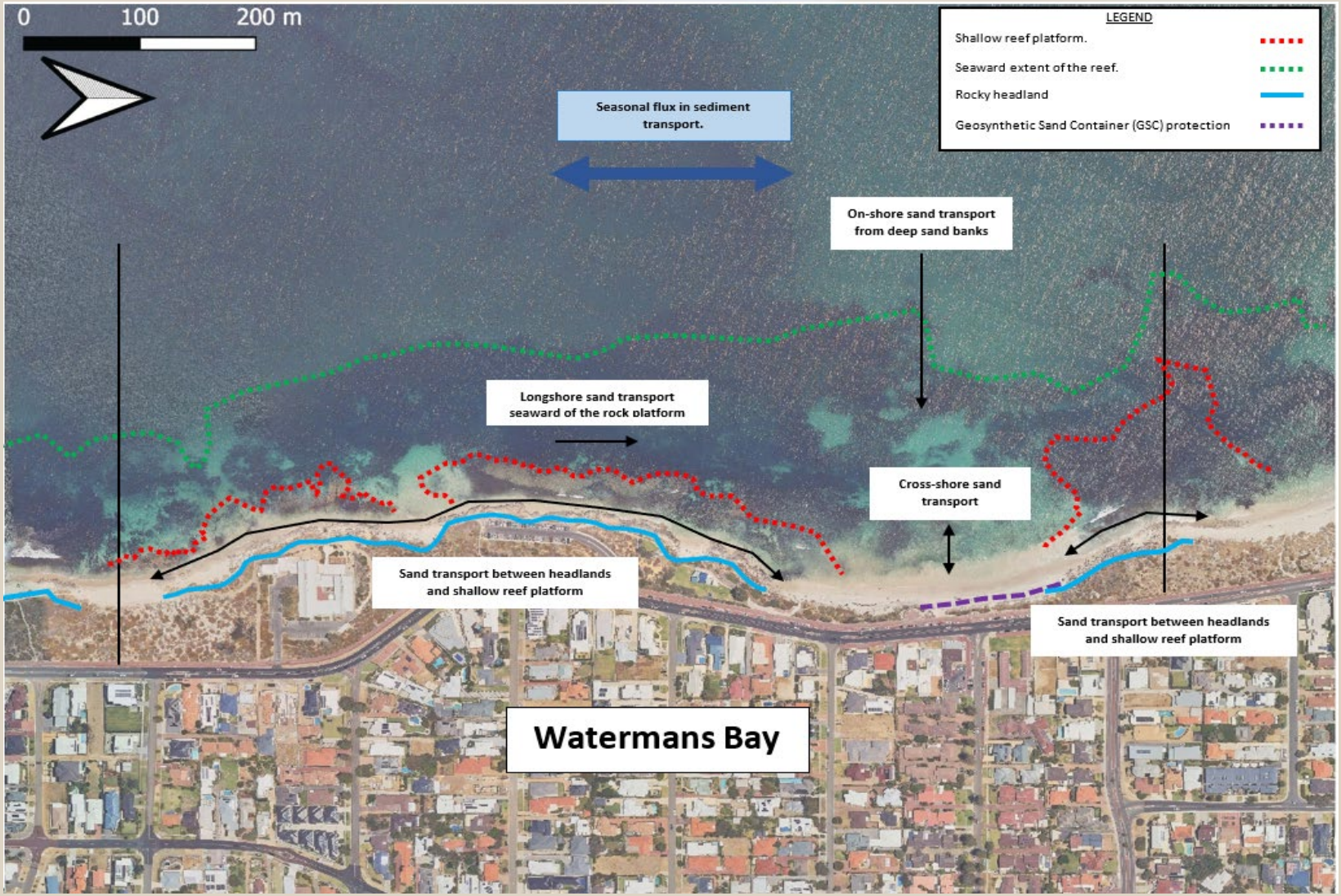
Average Shoreline Change



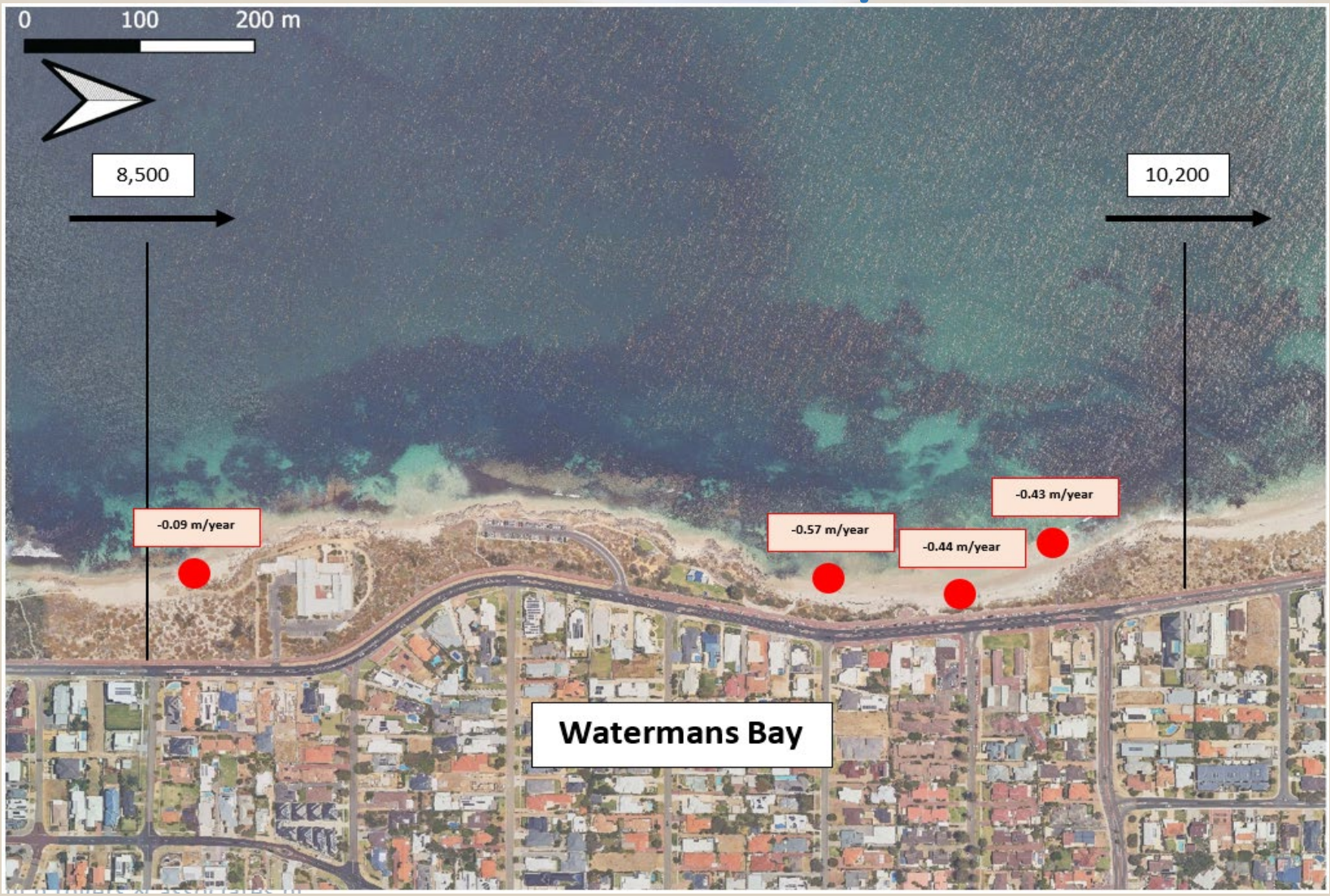
Conceptual Sediment Movement Models – Cottesloe to Hillarys



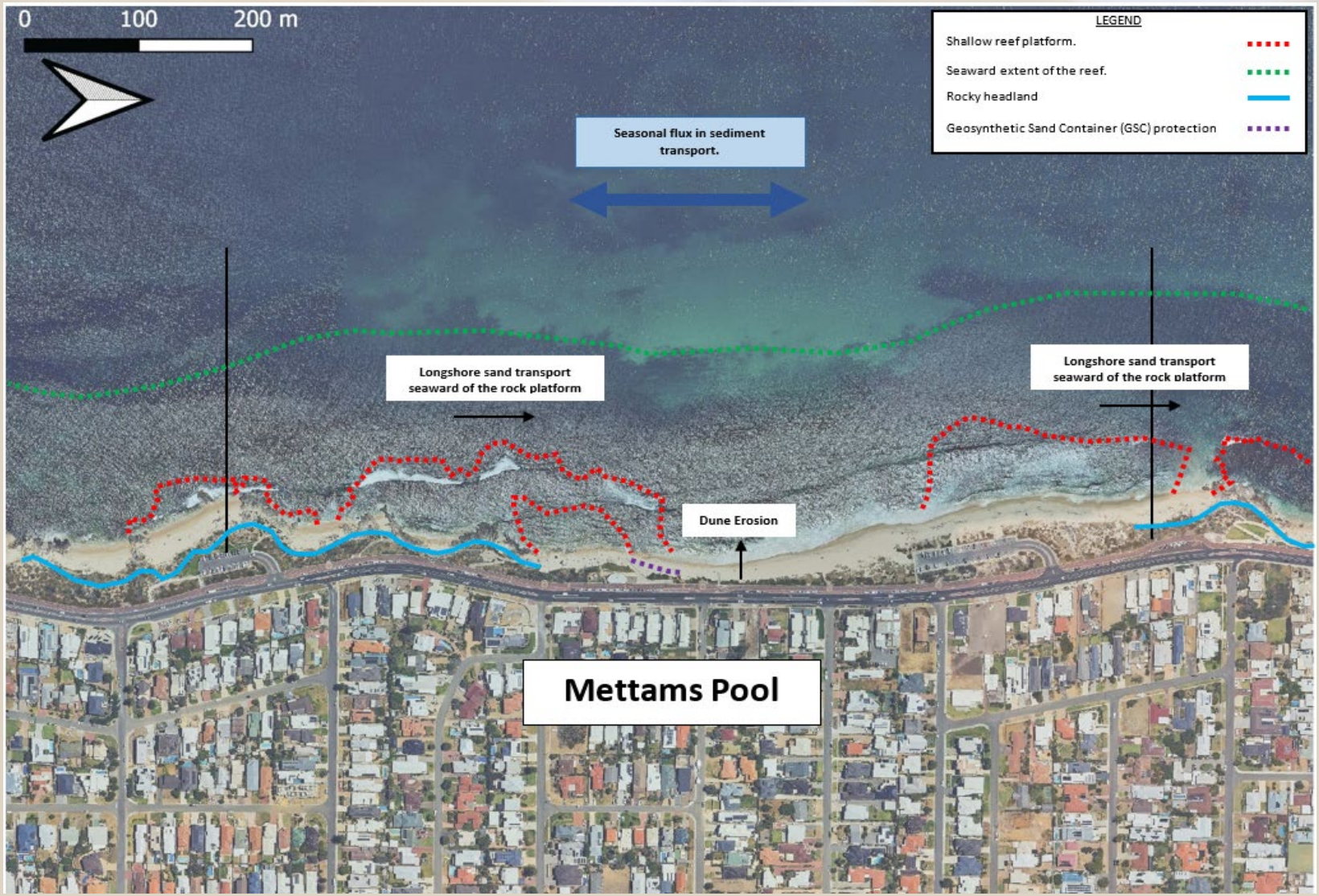
Conceptual Sediment Movement Models – Watermans Bay



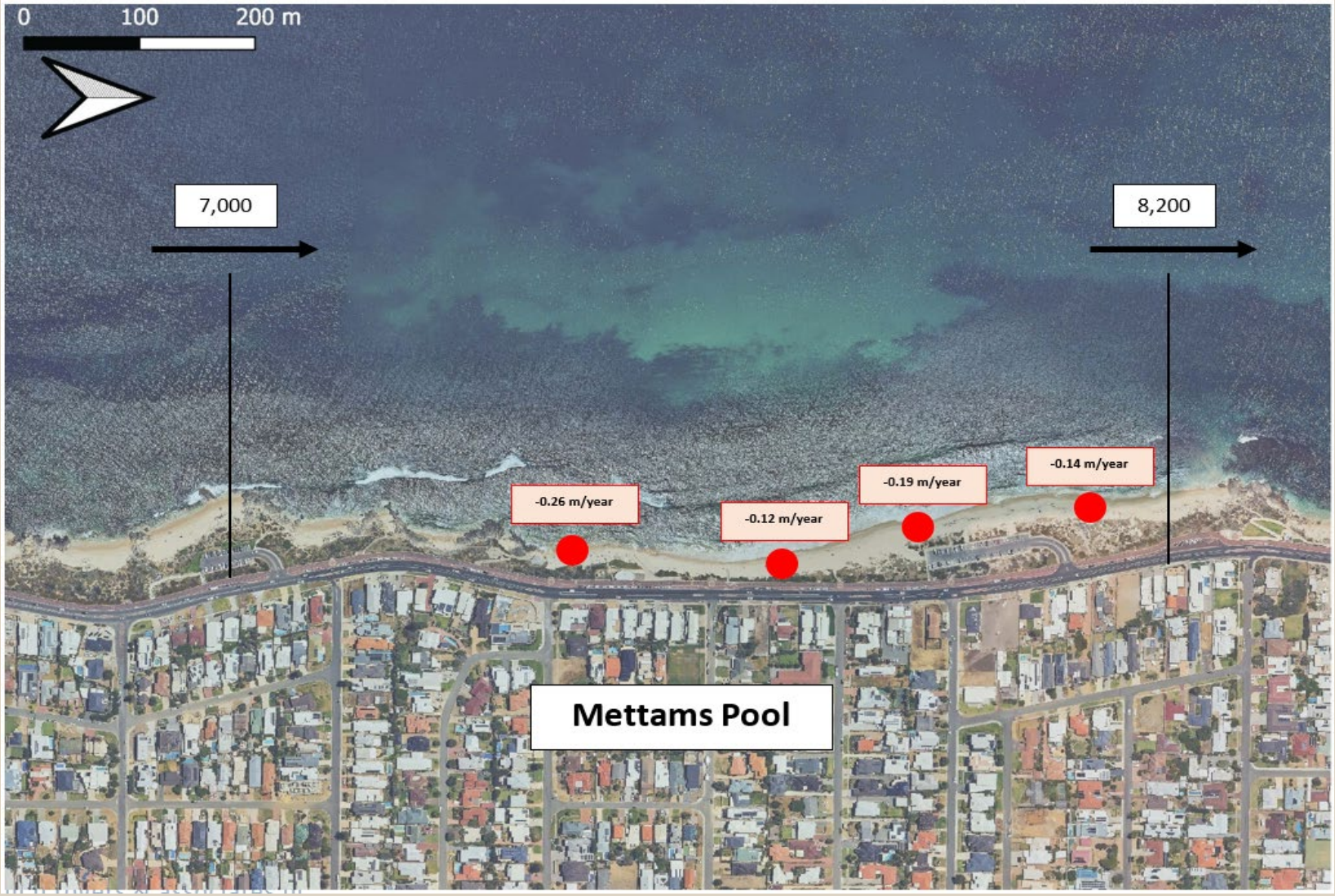
Conceptual Sediment Movement Models – Watermans Bay



Conceptual Sediment Movement Models – Mettams Pool



Conceptual Sediment Movement Models – Mettams Pool



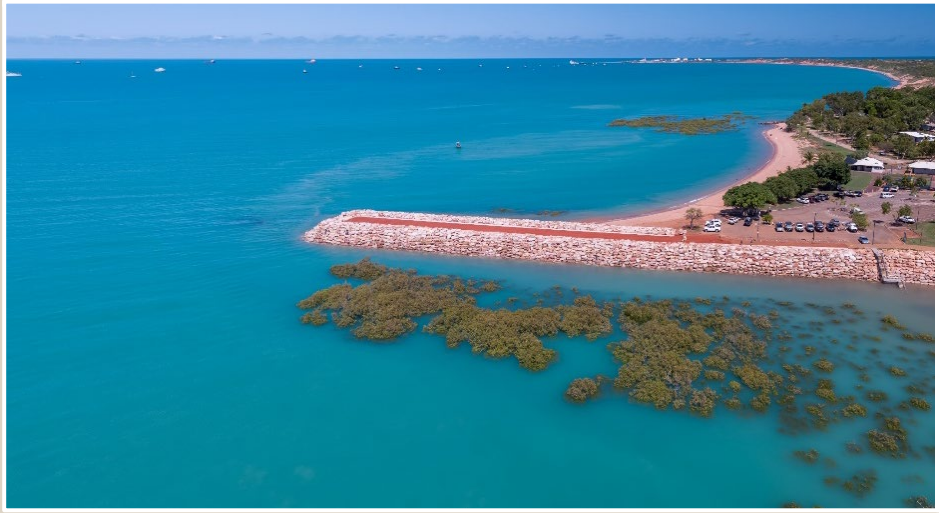
Sediment Movement – Summary

- Highlights the complex nature of beaches embayed by rocky headlands and subtidal reefs
- Sediment movement is multifaceted (ie onshore, nearshore and offshore) and controlled by metocean conditions
- Watermans Bay:
  - 1,700 m^3/yr sand being lost
  - Largest rate of change (-0.6 m/yr) at south
- Mettams Pool:
  - 1,200 m^3/yr sand being lost
  - Largest rate of change (-0.3 m/yr) at south

Initial Concept Options

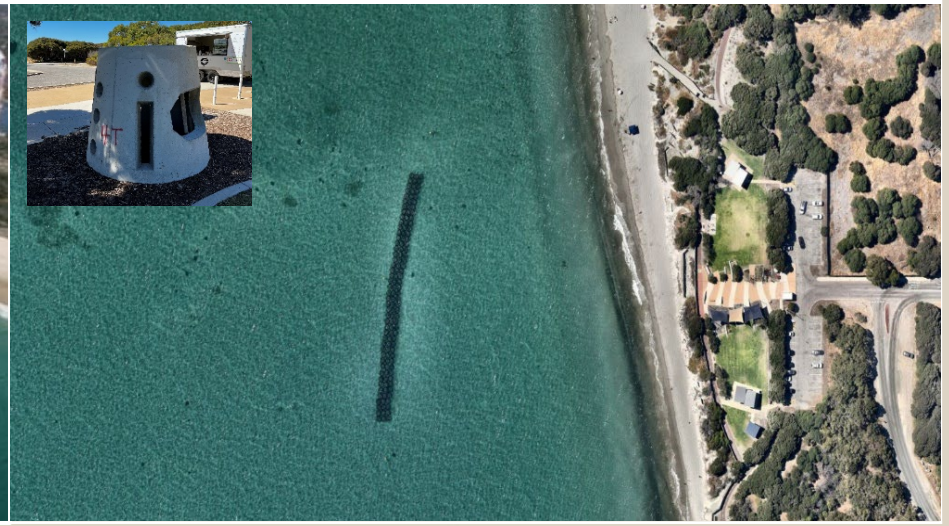
Sand Nourishment	Seawalls
	
	

Initial Concept Options

Groynes	Breakwaters
	
	

Initial Concept Options

Artificial Reefs



- Initial concepts still align with the City's CHRMAP recommendations
- 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

Multi-Criteria Analysis

- MCA will be used to assess options
- Considers a range of criteria

Table 3-2 Multi-Criteria Assessment criteria

Preliminary feasibility	Preliminary acceptability	Preliminary financial implication
Effectiveness	Environmental and social impact	Financial gain / avoidance of cost
Governance, legal implications and approval risk	Community acceptability	Capital cost
Reversibility / adaptability	-	Ongoing cost

Performance Criteria & Weightings

- General broad categories
- Can be weighted
- Future workshop will work through and assess MCA

Criteria	Technical	Social	Environmental	Economic
Weighting				

Technical Criteria

		Technical		
	Description	Effectiveness	Adaptability	Legal / approval requirements
		Weighting 60%	Weighting 30%	Weighting 10%
	Rating Description	Expected effectiveness of the scheme at achieving the key objectives without ongoing modifications or risks of failure/poor outsomes.	Ease with which option can be modified to account for changes in conditions, etc in the future	Extent of effort and time required to receive approval for option
Rating Scale	1	Not expected to be effective	Modification not possible	Extreme effort required - >12 month timeframe for approvals
	2	Slightly effective	Only slight modifications possible with large effort	Significant effort required to achieve approvals 6 to 12 month period
	3	Effective	Reasonable potential for modification with some effort	Some issues with approvals, but addressed over 3 to 6 month period
	4	Very effective	Modifications readily possible with moderate level of effort	Minor issues with approvals, but easily addressed
	5	Completely effective	Complete modification of option easily achieved	No issues with approvals

Social Criteria

		Social		
	Description	Provide beach and active recreation opportunities in pool	Provide coastal amenity and passive recreation opportunities	Provide recreational facilities including ablutions and changerooms, shade and shelter
		Weighting 40%	Weighting 40%	Weighting 20%
	Rating Description	Extent that the option provides useable beach area and active recreation opportunities	Extent that the option provides opportunities for passive recreation and amenity, such as provision of dual use path, areas to sit and view the water, etc.	Ranking based on provision and likely functionality of the ablutions, changerooms, shade and shelter.
Rating Scale	1	Significant loss in beach area and active recreation opportunities	Significant loss of amenity and passive recreation opportunities	Ablutions, changerooms, shade and shelter not provided
	2	Slight decrease in beach area and active recreation opportunities	Slight decrease in amenity and passive recreation opportunities	Ablutions, changerooms, shade and shelter provided but with potential loss of functionality due to change in beach or areas of beach usage
	3	No net change in beach area and active recreation opportunites	No net change to amenity and passive recreation opportunities	Ablutions, changerooms, shade and shelter provided within scheme with minimal potential for loss of functionality
	4	Slight increase in beach area and active recreation opportunities	Slight increase in amenity and passive recreation opportunities	Ablutions, changerooms, shade and shelter provided with improved functionality
	5	Significant increase in beach area and active recreation opportunities	Significant increase in amenity and passive recreation opportunities	Ablutions, changerooms, shade and shelter ideally situated

Environmental Criteria

		Environment	
	Description	Weighting 20%	
		Preservation of beach environment (dunes, etc)	Preservation of Marine Park
		Weighting 50%	Weighting 50%
	Rating Description	How well the option protects or provides for preservation of the beach environment, including dunes	How well the option protects or provides for preservation of the marine park environment
Rating Scale	1	Significant loss of beach environment	Significant loss of marine park environment
	2	Slight loss of beach environment	Slight loss of marine park environment
	3	No net change in beach environment	No net change in marine park environment
	4	Slight increase in beach environment	Slight increase in marine park environment
	5	Significant increase in beach environment	Significant increase in marine park environment

Economic Criteria

		Economic		
	Description	Weighting 40%		
		Capital cost	Operating/ maintenance cost	Economic return to the City
		Weighting 40%	Weighting 40%	Weighting 20%
	Rating Description	Capital cost to construct	Ongoing operating and maintenance costs to maintain	CBA
Rating Scale	1			
	2			
	3			
	4			
	5			

Multi Criteria Analysis

- Criteria and weightings to be reviewed and agreed on
- Options will be scored in later workshops against agreed criteria

Next Steps

- Complete wave modelling to obtain design conditions at Watermans and Mettams
- Develop coastal adaption concepts to manage impacts
- Estimate residual impacts of the coastal adaption concepts based on:
  - Conceptual sediment models
  - Wave modelling
  - Engineering experience
  - Background information

Any other business

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Coastal Values Project: community survey

City of Stirling Mettams & Watermans Reference Group Workshop 2
18th June, 2024

A/Prof Abbie Rogers
Premier's Early to Mid-Career Fellow
Co-Director, UWA Centre for Environmental Economics & Policy

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Two projects to deliver decision support for coastal hazard management:

1. Coastal values
2. Benefit-cost analysis

coastwa

Department of **Planning, Lands and Heritage**
Department of **Transport**

GOVERNMENT OF WESTERN AUSTRALIA

Government of **Western Australia**
Department of **Jobs, Tourism, Science and Innovation**

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy

University of Western Australia researchers are looking to engage with local governments to help build Western Australia's coastal resilience.

Dr Abbie Rogers, Co-Director of the UWA Centre for Environmental Economics and Policy, is leading two new research projects that aim to help local governments and coastal managers prioritize adaptation responses to coastal hazards. This information sheet provides an overview of the two projects, and details about opportunities to participate in this research.

Project 1: Coastal Values

Identifying and quantifying the values that the community holds for natural and public assets that might be impacted by coastal hazards.

Through collaboration with the Department of Planning, Lands and Heritage, this project will align with the Coastal Hazard Risk Management and Adaptation Planning (CHRMAP) guidelines to help coastal managers identify which community assets are most important to manage for coastal risks.

This research centres on estimating community values for changes in social or environmental outcomes associated with assets that could be impacted by coastal hazards or adaptation responses. Assets that will be valued include: beach areas, foreshore reserve areas, natural reserve areas, beach access, and publicly accessible facilities (e.g., retail, food, public service facilities).

Eight case studies will be implemented across metropolitan and regional areas (with some case studies including multiple coastal locations) to measure coastal values through community surveys. Values for coastal assets will be captured for residents and visitors of the areas, and also people who might not visit the case study sites but could still value the existence of particular assets.

We will also develop and test public communication materials for coastal managers to use in community engagement activities, explaining how community values are being measured and used to support decision making.

Outputs of this project will include:

- Case study reports documenting community values;
- A 'value repository' summarising the information from the case studies;
- Guidelines on how to use the repository to extrapolate values for other sites across the WA coastline;
- Demonstration of how the values can be used in decision-support tools, like benefit-cost analysis, to help with coastal hazard management decisions;
- Training workshops for coastal managers to learn how to use the repository;
- Valuation information templates for community engagement;
- A range of publicly-available guidance materials to assist coastal managers in utilising the project outputs.

www.uwaceep.org

Project 1: Coastal Values

Community values for public/natural coastal assets

Economic 'willingness to pay' (WTP) values

8 case studies to build a value repository

- 4 Perth metro hotspots
- 4 regional hotspots

Enable extrapolation to other sites through 'benefit transfer'

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Project 2: Decision Tool

Developing a decision-support tool to prioritise investments in adaptation responses to coastal hazards for long-term coastal sustainability.

Through the Premier's Science Fellowship Program, funded by the Department of Jobs, Tourism, Science and Innovation, this project will assist coastal managers in choosing the management approaches that are most likely to deliver the greatest net-benefits to communities.

This research centres on the development of a prioritisation tool that will assist coastal managers in choosing management options to help deal with the impacts of coastal hazards. The tool will integrate information on financial, environmental, social and cultural values.

This work is expected to enable more efficient investment in coastal protection measures that are resilient, and that benefit multiple stakeholders.

Outputs of this project will include:

- A spreadsheet-based computer program to help prioritise adaptation options;
- Linking of the value repository delivered in Project 1 with the computer program, to enable inclusion of community values for social and environmental outcomes relative to the financial benefits and costs of different coastal adaptation options;
- Training workshops for coastal managers to learn how to use the program;
- A range of publicly-available guidance materials for using the program.

Engagement opportunity: Local Government Area case studies

The project team will be engaging with local governments along the Western Australia coastline to participate in this research.

There will be a range of opportunities to participate, including through:

- The case studies selected for valuation surveys or development of community engagement materials in Project 1.
- Working groups to test and validate the prioritisation tool in Project 2.
- Training workshops for both projects.
- Regular project updates provided at WALGA meetings, coastal conferences or workshops, and dedicated sessions available on request.

This research depends on participation across a diverse range of local governments. While there are some efficiency and feasibility requirements that must be met in selecting case studies that will enable a representative collection of data for the value repository, the project team would like to be as inclusive as possible across the full list of participation opportunities above.

All coastal local governments, managers and other interested stakeholders are welcome to contact Dr Abbie Rogers for more information or to discuss participation: abbie.rogers@uwa.edu.au.

Department of **Planning, Lands and Heritage**

Government of **Western Australia**
Department of **Jobs, Tourism, Science and Innovation**

www.uwaceep.org

Project 2: coastal BCA tool

Prioritisation tool for coastal hazard management options

- Benefit-cost analysis tailored for CHRMAPs
- Inclusive of financial, social, and environmental benefits/costs
- Direct link to the value repository

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Community surveys

Case studies of the WA Coast

- Multiple coastal sites per case study
- Spanning Kimberley to South Coast
- Different populations sampled (1,000's)

Range of case studies will inform benefit transfer

2024:
City of Mandurah
Shire of Broome

2024/25:
4 Perth metropolitan case studies

2025:
2 regional case studies

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Non-market valuation

Templates developed in earlier work

- Original intention to improve feasibility of implementing valuation

Discrete choice experiment

- Respondents choose between different project options, that deliver different social and environmental outcomes.
- Each option has a cost → tradeoff with other outcomes = $WTP
- Hypothetical – predict values for future changes
- Inclusive of 'non-use' values
- Measure relative values of multiple attributes, incrementally

Non-market valuation instruments for measuring community values affected by coastal hazards: guidance and an application

Abbie A Rogers* and Michael P Burton

Centre for Environmental Economics & Policy

UWA School of Agriculture & Environment

UWA Oceans Institute

*abbie.rogers@uwa.edu.au

Report prepared for the Western Australian Department of Planning, Lands & Heritage

THE UNIVERSITY OF WESTERN AUSTRALIA

14th November 2019

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Discrete choice experiment - choice template

Survey sections include:

- *Coastal activities*
- *Travel costs*
- *Choice experiment*
- *Socio-demographics*

Management scenario 1: Assuming these three options are the only ones available to you, which one would you choose? Remember to be mindful of your budget constraint.

What you will get in 10 years time:		**Option 1**	**Option 2**	**Option 3** Situation in 10 years time with no management change	What you get at the moment:
	**Sandy beach**	50%	50%	50%	100%
	**Foreshore reserve**	25%	75%	50%	100%
	**Natural reserve**	50%	25%	25%	100%
	**Beach access**	Average	Good	Average	Good
	**Retail, dining & club facilities**	Absent	Absent	Absent	Present
Cost to you each year, for 10 years		$400	$50	$0	

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Define site assets, or "attributes"

Management scenario 1: Assuming these three options are the only ones available to you, which one would you choose? Remember to be mindful of your budget constraint.

What you will get in 10 years time:	Option 1	Option 2	Option 3 Situation in 10 years time with no management change	What you get at the moment:
 Sandy beach	50%	50%	50%	100%
 Foreshore reserve	25%	75%	50%	100%
 Natural reserve	50%	25%	25%	100%
 Beach access	Average	Good	Average	Good
 Retail, dining & club facilities	Absent	Absent	Absent	Present
Cost to you each year, for 10 years	$400	$50	$0	

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Define changes over time

Management scenario 1: Assuming these three options are the only ones available to you, which one would you choose? Remember to be mindful of your budget constraint.

What you will get in 10 years time:		**Option 1**	**Option 2**	**Option 3** Situation in 10 years time with no management change	What you get at the moment:
	**Sandy beach**	50%	50%	50%	100%
	**Foreshore reserve**	25%	75%	50%	100%
	**Natural reserve**	50%	25%	25%	100%
	**Beach access**	Average	Good	Average	Good
	**Retail, dining & club facilities**	Absent	Absent	Absent	Present
Cost to you each year, for 10 years		$400	$50	$0	

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Offer different options, with different costs

Management scenario 1: Assuming these three options are the only ones available to you, which one would you choose? Remember to be mindful of your budget constraint

What you will get in 10 years time:	Option 1	Option 2	Option 3 Situation in 10 years time with no management change	What you get at the moment:
 Sandy beach	50%	50%	50%	100%
 Foreshore reserve	25%	75%	50%	100%
 Natural reserve	50%	25%	25%	100%
 Beach access	Average	Good	Average	Good
 Retail, dining & club facilities	Absent	Absent	Absent	Present
Cost to you each year, for 10 years	$400	$50	$0	

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy

OCEANS INSTITUTE

Different options = different levels of attributes

Multiple questions with different options presented

Management scenario 1: Assuming these three options are the only ones available to you, which one would you choose? Remember to be mindful of your budget constraint.

What you will get in 10 years time:	Option 1	Option 2	Option 3 Situation in 10 years time with no management change	What you get at the moment:
 Sandy beach	50%	50%	50%	100%
 Foreshore reserve	25%	75%	50%	100%
 Natural reserve	50%	25%	25%	100%
 Beach access	Average	Good	Average	Good
 Retail, dining & club facilities	Absent	Absent	Absent	Present
Cost to you each year, for 10 years	$400	$50	$0	

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Statistically,
by having the cost included,
we can work out what people are willing to pay for X% change in attribute Y

Example:

- **$3 per % area of beach**
- **$253 to maintain the lagoon**

Management to protect lagoon and 65% beach = $448

Management scenario 1: Assuming these three options are the only ones available to you, which one would you choose? Remember to be mindful of your budget constraint.

What you will get in 10 years time:	Option 1	Option 2	Option 3 Situation in 10 years time with no management change	What you get at the moment:
 Sandy beach	50%	50%	50%	100%
 Foreshore reserve	25%	75%	50%	100%
 Natural reserve	50%	25%	25%	100%
 Beach access	Average	Good	Average	Good
 Retail, dining & club facilities	Absent	Absent	Absent	Present
Cost to you each year, for 10 years	$400	$50	$0	

THE UNIVERSITY OF WESTERN AUSTRALIA | Centre for Environmental Economics & Policy | OCEANS INSTITUTE

Next step: workshop to inform the survey instrument

- Scope of survey – location and boundaries
- Target population – whose values matter?
- For the location:
  - What assets are going to be impacted by hazards?
  - What is their current condition?
  - What condition will they be in X years into the future, if we do nothing?
  - What are the goal posts – how could condition of the assets change depending on different management actions?

Stirling community survey

Some things to keep in mind:

- We need to include at least one hotspot site
- Flexibility about how we 'define' the site(s) in the survey
  - Can include more than the specific hotspot site
- We will be sampling the broader Perth community
  - Primary sample via online panel; need to confirm the 'nice-to-have' or where to steer clear
- We're interested in outcomes for public/natural assets, not the intervention options directly:
  - E.g. protection of beach space could be achieved through multiple interventions – we're valuing the space available, not which method is used to deliver the space

abbie.rogers@uwa.edu.au
www.resilient-ways.com
www.uwaceep.org

Benefit Distribution Analysis

Timing and next steps

- Send out method paper – 21st June
- Workshop with project team to discuss and agree the conceptual approach – late June/early July
- Consultation with key stakeholders – July
- Detailed analysis – July/August

Next Steps