CITY OF MANDURAH

NOTICE OF MEETING

ORDINARY COUNCIL

Members of Council are advised that a meeting will be held in the Council Chambers, 83 Mandurah Terrace, Mandurah and the meeting will be live streamed on:

Tuesday 28 April 2026 at 5:30 pm

MATTHEW HALL
Acting Chief Executive Officer
17 April 2026

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1 OPENING OF MEETING AND ANNOUNCEMENT OF VISITORS

Members of the public are advised that the Council Meeting is being livestreamed in accordance with the City's Council Meetings – Live Streaming, Recording and Electronic Attendance Policy. By being present at this meeting, members of the public consent to the City live streaming and publishing their voice on the City's website. Members of the public are not subject to video livestreaming and only their voice will be captured. For further information on the Live streaming of Council Meetings please click here Live Streaming of Council Meetings

2 ACKNOWLEDGEMENT OF COUNTRY

George Walley kindly prepared this statement for me.

People have been here for a long time. I want to acknowledge the presence of people over that long time with firstly the Bindjareb Noongar people who continue to have an ongoing connection to this land. They have been here for over 50,000 years. This place Mandjoogoordap or Mandurah, acknowledges a beautiful name, full of intent of people living here and others visiting here. That intent gives us an idea of their ancestral land usage over that long period. Mandurah, the gathering place is unique because even today we still gather here in the most beautiful place for many important reasons. Let us embrace the notion of people being in this space as we move forward as one community.

3 APOLOGIES

Leave of Absence
Nil

Apologies
Nil

4 DISCLAIMER

Members of the public are advised that any decisions made at the meeting tonight, can be revoked, pursuant to the *Local Government Act 1995*. Therefore, members of the public should not rely on any decisions until formal notification in writing by Council has been received.

5 ANSWERS TO QUESTIONS TAKEN ON NOTICE

5.1 Trevor Hall

Question 1: Fence Replacement

I live at Nutbush Avenue, Falcon and a large tree fell over into my property from Harold Bassett Scarfe Park. The tree was cut up three weeks later and removed, however, I am still waiting for the fence to be repaired. I want to know why it has not been repaired as it was 2 months ago?

City of Mandurah Response

Regarding the fence repair, City officers have advised Mr Hall by email and a telephone conversation that his claim, as with all financial claims against the City, needs to be lodged through a letter of demand process and that the City's insurer would then assess the claim and contact him directly.

6 AMENDMENT TO STANDING ORDERS

Modification to *Standing Orders Local Law 2016* – electronic attendance at meeting.

7 PUBLIC QUESTION TIME

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Public Question time provides an opportunity for members of the public to ask a question of Council. For more information regarding Public Question Time, please visit the City's website About Council Meetings or telephone 9550 3787.

8 PUBLIC STATEMENT TIME

Any person or group wishing to make a Public Statement to Council regarding a matter concerning local government must complete an application form. For more information regarding Public Statement Time, please visit the City's website About Council Meetings or telephone 9550 3787.

9 LEAVE OF ABSENCE REQUESTS

Nil

10 PETITIONS

Nil

11 PRESENTATIONS

Nil

12 DEPUTATIONS

Any person or group wishing to make a Deputation to Council regarding a matter listed on this agenda for consideration must complete an application form. For more information regarding making a deputation, please visit the City's website About Council Meetings or telephone 9550 3787.

13 CONFIRMATION OF MINUTES

13.1 Ordinary Council Meeting held on 24 March 2026

RECOMMENDATION

That the Minutes of the Ordinary Council Meeting held on 24 March 2026 be confirmed.

Minutes are available on the City's website Agendas and Minutes

14 ANNOUNCEMENTS BY THE PRESIDING MEMBER (WITHOUT DISCUSSION)

15 DECLARATIONS OF FINANCIAL, PROXIMITY AND IMPARTIALITY INTERESTS

16 QUESTIONS FROM ELECTED MEMBERS

16.1 Questions of which due notice has been given

16.2 Questions of which notice has not been given

17 BUSINESS LEFT OVER FROM PREVIOUS MEETING

Nil

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18 RECOMMENDATIONS OF COMMITTEES

Nil

19 REPORTS

Subject: 19.1 Draft Mandurah Southern Beaches Coastal Hazard Risk Management Adaptation Plan: Endorsement

Summary

The draft Mandurah Southern Beaches Coastal Hazard Risk Management and Adaptation Plan (Southern Beaches CHRMAP), is a strategic, evidence-based document developed in accordance with State Planning Policy 2.6, Coastal Planning (SPP2.6). SPP2.6 requires that coastal management authorities appropriately plan for coastal hazard risk management and adaptation. The development of the Southern Beaches CHRMAP addresses this requirement through an assessment of the vulnerability of assets and options for appropriate risk management, with the objective to protect, conserve and enhance coastal zone values.

The Southern Beaches CHRMAP focuses on Mandurah's ocean-facing coastline from Roberts Point in Halls Head to the City's southern boundary in Clifton. It complements the Mandurah Northern Beaches Coastal Hazard Risk Management and Adaptation Plan adopted in 2022 and provides a 100-year planning framework (to 2125) to guide the City's approach to managing current and future coastal hazard risks.

The Southern Beaches CHRMAP presents a range of immediate, short, medium, and long-term adaptation pathways tailored to local conditions and community values. These include planning policy responses, coastal monitoring, nature-based solutions, and infrastructure adaptation options. While the Southern Beaches CHRMAP provides high-level strategic direction, it is not an operational plan and does not include funding allocations. Further detailed planning, consultation, and budgeting will be required to implement future actions.

Council agreed to seek public comment on the Southern Beaches CHRMAP, in accordance with the engagement plan, at its meeting in August 2025. The subsequent public consultation on the Southern Beaches CHRMAP indicated no changes were required to the report, refer to Attachment 1. Council is now requested to endorse the Southern Beaches CHRMAP, refer to Attachment 2.

Disclosure of Interest

Nil

Location

Mandurah's ocean-facing coastline from Roberts Point in Halls Head to the City's southern boundary in Clifton.

Previous Relevant Documentation

G.9/8/25	26 August 2025	Council agreed to seek public comment on the draft Mandurah Southern Beaches CHRMAP.
G.9/8/23	22 August 2023	Council appointed Crs Bob Pond and Ryan Burns as the Elected Member representatives to the Mandurah Southern Beaches Coastal Hazard Risk Management Adaptation Plan Steering Committee as the community representatives.

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G.13/7/23	25 July 2023	Council approved the Mandurah Northern Beaches CHRMAP Action Plan.
G.7/11/22	22 November 2022	Council endorsed the Mandurah Northern Beaches Coastal Hazard Risk Management Adaptation Plan.

Background

In accordance with the State Planning Policy 2.6 – State Coastal Planning Policy (SPP 2.6), areas at risk of being affected by coastal hazards require that coastal hazard risk management and adaptation is appropriately planned and this is achieved through the preparation of a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) to assess the vulnerability of assets and options for appropriate risk management, with the objective to protect, conserve and enhance coastal zone values.

A CHRMAP is a strategic planning document that identifies the coastal values along a given coastline, assesses the threats to those values across a planning horizon of 100 years presented by coastal erosion and inundation, and then articulates a coastal adaptation pathway designed to protect coastal values from anticipated impacts. The CHRMAP process involves a thorough community engagement process throughout its development to try and ensure planned coastal adaptation along a given coastline has broad community support. The CHRMAP process provides a mechanism for coastal managers to make informed decisions on short, medium and long term management actions.

During 2019 to 2023, City officers undertook a CHRMAP process for Mandurah's Northern Beaches defined as the section of open coastline extending from the City's northern boundary in Madora Bay through to Roberts Point, Halls Head. Council adopted the Mandurah Northern Beaches CHRMAP at its meeting in November 2022, with a recommendation for City officers to develop and present a short-term Action Plan in 2023. In July 2023, Council adopted the Action Plan that lists all the actions required to mitigate short-term intolerable risks identified within the Mandurah Northern Beaches CHRMAP, as well as actions that will assist with mitigating medium to long-term intolerable risks.

In July 2023, City officers commenced preparations to develop a CHRMAP for Mandurah's southern beaches, defined as the section of open coastline from Roberts Point through to the southern border of the City of Mandurah in Clifton. The development of the Southern Beaches CHRMAP has been supported through grant funding via the Department of Planning, Lands and Heritage (DPLH) CoastWA Coastal Management Plan Assistance Program (CMPAP).

Comment

The Southern Beaches CHRMAP is the City's guide to managing coastal hazards including flooding, erosion, storm surges and sea level rise along the southern coastline from Roberts Point (Halls Head) to Clifton (Mandurah's southern border), and to ensure long-term coastal sustainability. The primary objective is to protect, conserve, and enhance coastal values, while proactively addressing the long-term risks associated with coastal erosion and inundation. Developed in accordance with State Planning Policy 2.6, the Southern Beaches CHRMAP will guide the City investment in the location and maintenance of coastal infrastructure and provide guidance on developing future statutory planning controls.

The Southern Beaches CHRMAP is underpinned by detailed technical studies, risk assessments, and community and stakeholder engagement, including the input of a Coastal Community Reference Group and Project Steering Committee. It emphasises the importance of adaptive and flexible planning, noting that long-term responses such as managed retreat, structural protection (e.g., seawalls or groynes), or land use change will require further investigation, design, community engagement, and funding.

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Given the dynamic nature of coastal processes and climate change, the Southern Beaches CHRMAP requires ongoing monitoring and a formal review every ten years, or earlier if significant coastal changes occur, such as extreme storm events, shifts in erosion patterns, or new climate data becoming available. The Southern Beaches CHRMAP provides a proactive decision-making framework to manage coastal risk.

Through the implementation of an Engagement Plan, public comment was sought on the Southern Beaches CHRMAP through multiple media and over an extended duration. The engagement included a range of proposed activities to facilitate the provision of feedback from the community. The consultation prioritised clear, accessible communication by converting complex technical information into easy-to-understand formats, with a range of engagement activities tailored to reach diverse stakeholder groups.

During a two month period concluding on 31 January 2026, the final engagement stage provided an opportunity to test the Southern Beaches CHRMAP with the wider community, gather input on proposed adaptation pathways, and confirm community values and priorities before the plan is finalised. The findings of the engagement are presented in Attachment 1 indicated that no change was required to the Southern Beaches CHRMAP.

MEAG Comment

This item was considered by the Mandurah Environmental Advisory Group at its meeting on 27 March 2026 and the following comment was made:

The Southern Beaches CHRMAP uses a comprehensive and sound methodology to identify suitable adaptation options of the coastline over the 100-year planning timeframe. The actions identified appear to be realistic in terms of the City's ability to deliver. MEAG are in support of the City officer's recommendation to Council to endorse the plan.

City Officer Comment:
Noted

Youth Advisory Group Comment

The Youth Advisory Group welcomed the opportunity to be consulted on the Southern Coastal Hazard Risk Management and Adaptation Plan and recognises the coastline as a vital part of Mandurah's community and identity. The consultation process was comprehensive, outlining both the technical and social considerations involved, and supported the group's understanding of the plan and its broader implications.

The YAG supports the Southern Beaches CHRMAP and its importance in protecting Mandurah's coastline and associated coastal infrastructure into the future. The group noted that young people appeared to be underrepresented within the consultation groups. While the YAG acknowledges that the engagement of youth can present challenges, the necessity of consulting young people must be regarded as a critical consideration in future processes. The YAG is willing to support this work, including identifying practical strategies such as partnering with local schools to broaden participation. Members also indicated that earlier engagement with the YAG would have been beneficial, allowing for youth perspectives to be more effectively incorporated throughout the development of the plan.

City Officer Comment:
Given the variety of forms of engagement and awareness that has been undertaken, especially online formats and drop-in sessions on the subject, there has been significant opportunity for all members of the community to contribute. Future CHRMAP consultation processes will however consider further opportunities to engage with YAG.

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Consultation

The development of the Southern Beaches CHRMAP has followed a comprehensive consultation process to ensure the plan reflects community values, local knowledge, and expert input.

Key elements of the consultation process include:

- Project Steering Committee (PSC): A cross-disciplinary Project Steering Committee comprising City officers and representatives from relevant State agencies oversaw the development of the CHRMAP. The PSC provided technical and strategic oversight, reviewed draft outputs, guided consultant deliverables, and ensured alignment with State Planning Policy 2.6 and the City's broader planning and environmental frameworks.
- Coastal Community Reference Group (CCRG): The CCRG, made up of local community representatives, provided valuable on-the-ground knowledge and community perspectives. The group participated in key workshops and reviewed draft recommendations to ensure local values were well captured.
- Stakeholder Workshops and Briefings: Government agencies, land managers, and infrastructure providers were engaged in targeted workshops to provide input on coastal risks, management responsibilities, and planning implications.
- Coastal Values Mapping: Community members participated in mapping activities to identify areas of environmental, social, cultural, and recreational importance. These values helped guide the development of adaptation options.
- Online Engagement Tools: Broader community input was sought through online surveys, information sessions, and digital mapping tools to ensure accessibility and reach
- Awareness Promotion: Broader community input was sought through increased awareness via media release, newspaper advertisements and online e-news articles.

Statutory Environment

Creation of the Southern Beaches CHRMAP is aligned with the statutory requirements for local governments related to coastal management as described within State Planning Policy 2.6 – Coastal Planning.

Policy Implications

Nil

Financial Implications

The Southern Beaches CHRMAP outlines a funding approach that acknowledges the significant long-term investment required to implement coastal adaptation actions. The strategy recognises that a combination of local, state, and potentially federal funding will be necessary to support the implementation of short, medium, and long-term risk management options.

Key funding considerations include:

- Local Government Investment: The City of Mandurah will play a key role in funding some priority actions, particularly monitoring, planning controls, and small-scale adaptation measures. Budget allocations will need to be staged over time and aligned with trigger points and decision pathways.

- State Government Support: State funding will be sought for small and larger-scale adaptation actions, especially those with regional significance or involving public infrastructure. Through programs such as the Department of Transport's Coastal Adaptation and Protection (CAP) grants.

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- Federal Government Support: Federal funding will be sought for larger-scale adaptation actions where they align with national programs and priorities, such as the Australian Government's Disaster Ready Fund.

- Cost-Benefit Assessment: The Mandurah Southern Beaches CHRMAP encourages the City to consider cost-benefit analysis and lifecycle costs when prioritising adaptation actions, and to factor in the long-term economic, social, and environmental benefits of proactive adaptation.

- Funding Flexibility: The implementation plan allows for a flexible funding model, responsive to changing risk levels, community priorities, and evolving policies or grant opportunities.

Economic Implications

The Southern Beaches CHRMAP has identified economic values associated with the southern beaches coastline. These values have been taken into consideration through the identification of coastal adaptation options to ensure they continue into the future as much as reasonably possible.

Environmental Implications

The Southern Beaches CHRMAP has identified environmental values associated with the southern beaches coastline. These values have been taken into consideration through the identification of coastal adaptation options to ensure they continue into the future as much as reasonably possible.

Risk Implications

The Southern Beaches CHRMAP has modelled present and future coastal parameters to assess the risk presented to coastal assets. These risks have been evaluated and treatment options identified as part of the CHRMAP process.

Strategic Implications

The following strategies from the City of Mandurah Strategic Community Plan 2024-2044 are relevant to this report:

<u>Economy</u>
- Well-planned, sustainable urban development

<u>Community</u>
- Inclusive and welcoming places, spaces and neighbourhoods

<u>Environment</u>
- Our natural environment is celebrated, protected and restored for generations to come
- Our coast and waterways are healthy and celebrated

<u>Leadership</u>
- A clear and shared vision for Mandurah's future
- Sound decisions based on evidence and meaningful engagement
- Well-maintained assets and facilities that meet the needs of our community

Conclusion

The Southern Beaches CHRMAP provides the overarching framework for managing coastal hazards and future adaptation along the southern coastline and has been developed through extensive consultation with both internal and external stakeholders.

Officer Recommendation

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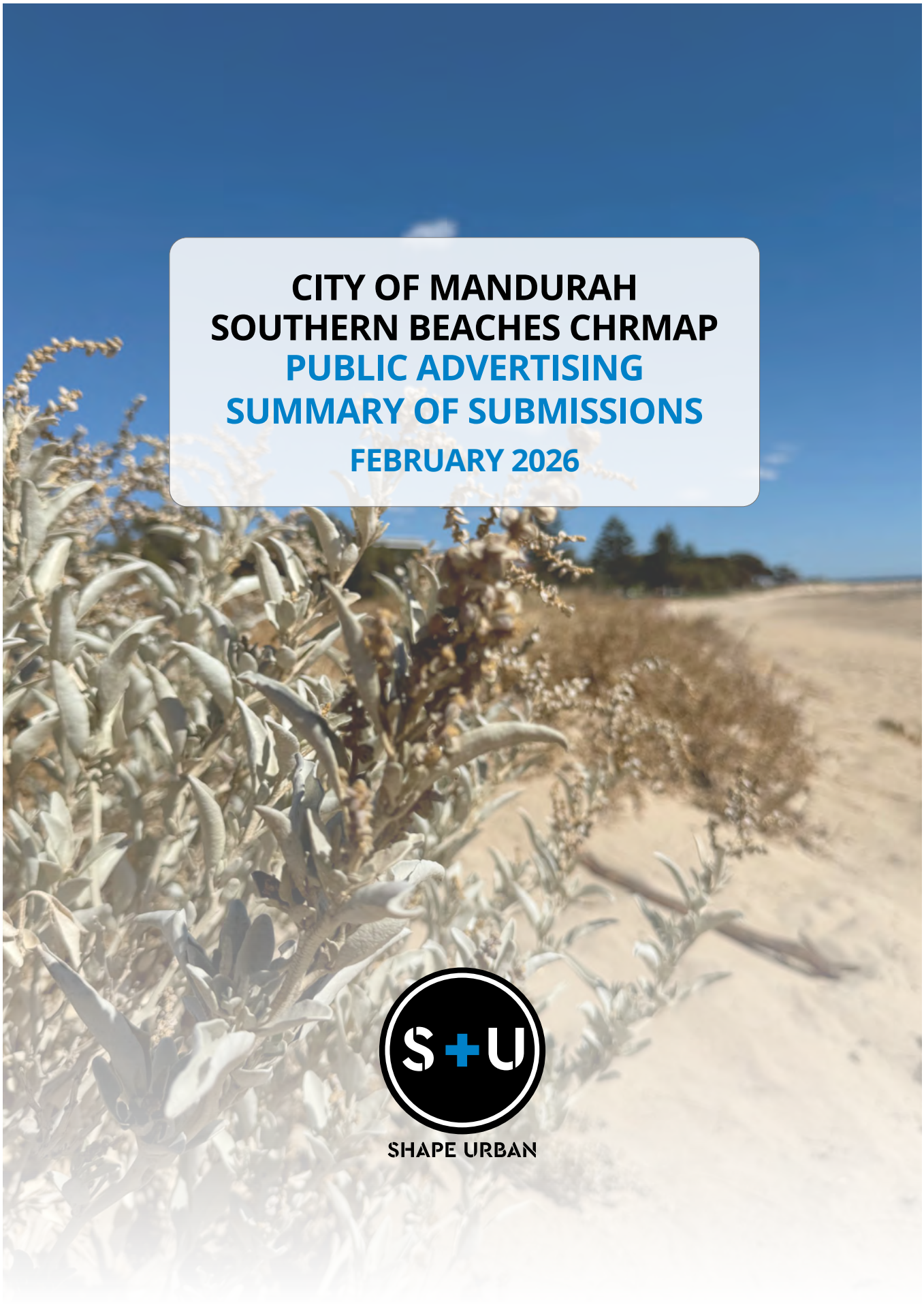
That Council:

1. **Notes the summary of submissions from the public consultation process as presented in Attachment 1.**
2. **Endorses the draft Mandurah Southern Beaches CHRMAP as presented in Attachment 2.**
3. **Notes that a ten year action plan for the draft Mandurah Southern Beaches CHRMAP will be presented to Council for consideration in early 2027.**

Attachments

1. Mandurah Southern Beaches CHRMAP Public Advertising Summary of Submissions [**19.1.1** - 41 pages]
2. Mandurah Southern Beaches CHRMAP [**19.1.2** - 277 pages]
3. Appendix A CSEP v 3 Final [**19.1.3** - 48 pages]
4. Appendix B Technical Report [**19.1.4** - 16 pages]
5. Appendix C Technical Report [**19.1.5** - 11 pages]
6. Appendix D Technical Report Risk Maps [**19.1.6** - 8 pages]
7. Appendix E Mandurah Southern Beaches CHRMAP Engagement Outcome Report v 0.3 v 0.3 [**19.1.7** - 235 pages]
8. Appendix F Vulnerability Tables [**19.1.8** - 7 pages]
9. Appendix H Final Southern Beaches CHRMAP CBA and BDA v 4.0 [**19.1.9** - 44 pages]

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ACKNOWLEDGEMENT

Shape Urban acknowledge the Bindjareb people as traditional custodians of the land on which we have worked for this project. We recognise their cultural heritage, beliefs and relationship to the land, which continue to be important to the Bindjareb people today.

We pay our respects to Elders past and present, and to the land which they have cared for.

This document has been prepared with the support of many people from the City of Mandurah community. We wish to acknowledge the City of Mandurah community for your contribution.

PROJECT PARTNERS

CITY OF MANDURAH

SHAPE URBAN

WATER TECHNOLOGY

DISCLAIMER

This report has been prepared by Shape Urban Pty Ltd for the City of Mandurah and may only be used and relied on by the City of Mandurah for the purpose agreed between Shape Urban Pty Ltd and the City of Mandurah and in accordance with the Terms of Engagement for the commission.

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The services undertaken by Shape Urban Pty Ltd in connection with preparing this report were limited to those specifically detailed in the report and are subject to the limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report and should be considered accurate for the period up to and including the latest date in the Document Control panel below. Shape Urban Pty Ltd has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

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DOCUMENT CONTROL

City of Mandurah Southern Beaches CHRMAP
Public Advertising Summary of Submissions - February 2026

No.	Author	Reviewed By	Date	Purpose
1	O Chetkovich	A Kelderman	16/02/2026	Draft for review
2				
3				
4				

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EXECUTIVE SUMMARY

Located in the southwest of Western Australia, Mandurah is a metropolitan hub known for its coastal lifestyle and the natural beauty of its estuaries, lakes and local beaches. Mandurah's southern suburbs support a thriving population of residential hamlets, community and social services, and coastal foreshore infrastructure.

The City is obliged, through *State Planning Policy 2.6* (SPP2.6) and by way of proper governance, to properly and efficiently plan and manage its communities and assets. This includes making suitable decisions in response to coastal hazards.

It is internationally recognised that increasing sea levels and fiercer storms will intensify coastal hazards such as coastal inundation (temporary coastal flooding), storm erosion and long-term shoreline recession.

Consistent with SPP2.6, the City has developed the draft *Mandurah Southern Beaches Coastal Hazard Risk Management and Adaptation Plan* (Southern Beaches CHRMAP). The City engaged local communities in all stages of preparing the CHRMAP to understand the community's coastal values and preferred adaptation options.

Public consultation for the draft Southern Beaches CHRMAP ran from 1 December 2025 to 31 January 2026. This phase of engagement represents the culmination of three phases of community engagement undertaken over 18 months since the project was launched on 1 August 2024 on the City's Mandurah Matters engagement platform.

During the public consultation period, the draft Southern Beaches CHRMAP and supporting documentation, including a fact sheet, were published on the project webpage and community members were invited to provide feedback via an online survey. Written submissions were also accepted.

The City advertised the engagement period, which included four community information drop-in sessions, through direct communication with project stakeholders and through its regular news and updates channels.

During the engagement period, there were a total of 4,092 visits to the project webpage, 1,131 document downloads, 44 online survey submissions, one written submission and approximately 76 attendees at the drop-in sessions.

The main thematic concerns that emerged from the feedback are:

+ Requesting clear communication of recommended actions, including who will be affected
+ Ensuring technical veracity and community engagement
+ Ensuring implementation, and addressing immediate needs
+ Comments implying mistrust in government and climate science
+ Querying the suitability of the Falcon Coastal Shared Path.
+ Concern about beach access restrictions, in particular for four wheel driving (4WD).

Feedback received during the public engagement period reflects a need for clear and consistent communication and ongoing community engagement.

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A significant amount of the oppositional or concerned feedback received appears to be influenced by other concurrent coastal projects. The most commented issue was concern that beach access, in particular for 4WD, would be restricted as a protection measure at Tim's Thicket and Whitehills Beaches (MU11 - Yalgorup).

Recommended actions in the Southern Beaches CHRMAP for this Management Unit do not include restricting beach access. The CHRMAP defers to the Yalgorup National Park Concept Master Plan (Department of Biodiversity, Conservation and Attractions, 2024) as the primary control of activities for this area, which makes several recommendations regarding managing visitor use and beach access, although no documentation explicitly changes current 4WD access.

Recommendations

No material changes to the draft Southern Beaches CHRMAP are recommended.

The following actions are recommended to ensure accurate and up-to-date information is easy to find:

- Update the Southern Beaches CHRMAP project page on the Mandurah Matters engagement platform to remove out-of-date information
- Create a dedicated coastal planning webpage on the City of Mandurah website to ensure the community can easily find all CHRMAP information (including other projects)
- Prepare a CHRMAP Summary and Fact Sheet (Southern Beaches CHRMAP *Strategy 2: Coastal Hazard Summary and Fact Sheet*)
- Ensure project communication is clear and consistent.

Consistent with Southern Beaches CHRMAP *Strategy 1: Engagement,* the following actions are recommended to ensure the community remains engaged with this project, and other CHRMAP developments and reviews into the future:

- Actively engage with the community by sending regular updates to community members who have registered for project updates
- Publish eNews updates on the City's website to update the community about the progress of recommended actions
- Leverage groups like the CCRG for information sharing
- Consider reconvening stakeholder groups, including CCRG members, to create MU-specific groups
- Directly contact property owners in the 2050 coastal hazard zone to inform them about potential vulnerabilities, along with providing FAQs and simple fact sheets on coastal hazard management
- Provide information about potential vulnerabilities, FAQs and simple fact sheets on coastal hazard management to local real estate and settlement agents.

The Southern Beaches CHRMAP will now be finalised and presented to Council for endorsement, after which funding can be sourced to action recommendations, including ongoing monitoring which will be vital in determining future actions.

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1 INTRODUCTION

1.1 Project background

The City of Mandurah (the City) has prepared the draft *Mandurah Southern Beaches Coastal Hazard Risk Management and Adaptation Plan* (Southern Beaches CHRMAP) for the 36 kilometres of ocean-facing coastline from Robert Point, Halls Head to the southern most border of the City in the Clifton locality (Figure 1).

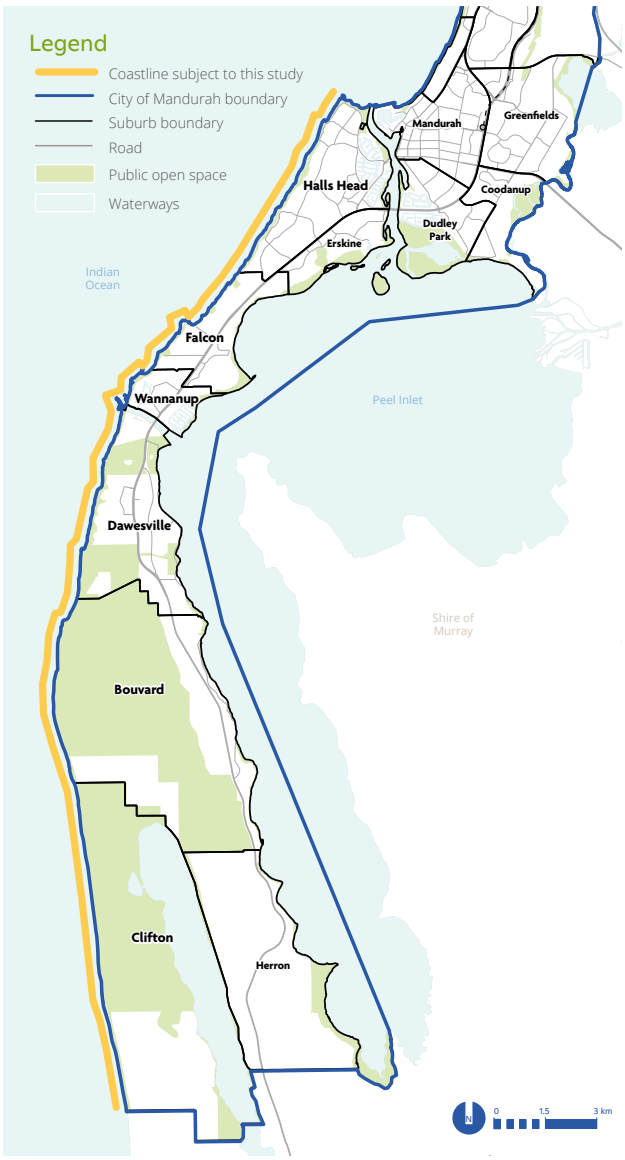


Figure 1 Southern Beaches CHRMAP study area

The CHRMAP process establishes long-term predictive models of potential shoreline movement (erosion) and coastal flooding (inundation) to give decision makers and landowners a framework for sustainable coastal development into the future.

Recommendations of the Southern Beaches CHRMAP will be used to guide practical coastal management and planning decisions in the short term (0-10 years).

Ongoing coastal monitoring and review of the CHRMAP and its inputs will progressively improve the information used to inform future decisions.

Community and stakeholder engagement has been critical in the development of the draft Southern Beaches CHRMAP, and has been undertaken consistent with the requirements of *State Planning Policy 2.6* (SPP2.6) and *SPP2.6 Coastal Hazard Risk Management and Adaptation Planning Guidelines*.

An overview of the engagement approach in each of the CHRMAP stages is depicted in Figure 2.

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1.2 Engagement purpose

To understand local coastal values and preferred adaptation options, the City has engaged local communities throughout the CHRMAP process stages (refer Figure 2).

Public engagement on the draft Southern Beaches CHRMAP was open from 1 December 2025 to 31 January 2026.

The purpose of this engagement was to:

- Ensure continued information sharing and knowledge building
- Provide the community opportunities to understand the technical investigations
- Share an understanding of how the coastline may be impacted in the future
- Share how the City can plan for and manage coastal changes into the future.

As such, public advertising was undertaken to consider public support and concerns about the findings and recommendations of the draft Southern Beaches CHRMAP.

The feedback received will enable the City to make decisions on the adoption of the final document.

1.3 Purpose of the report

This Summary of Submissions collates all the formal submissions received during the public advertising period of 1 December 2025 to 31 January 2026. It includes the information presented, the engagement activities and the public and community feedback.

This report also makes recommendations based on the feedback provided,to ensure the Southern Beaches CHRMAP meets the expectation of the public, stakeholders and community.

All individual submissions can be found unedited in Appendix A of this report, with identifying details removed for privacy and confidentiality purposes.

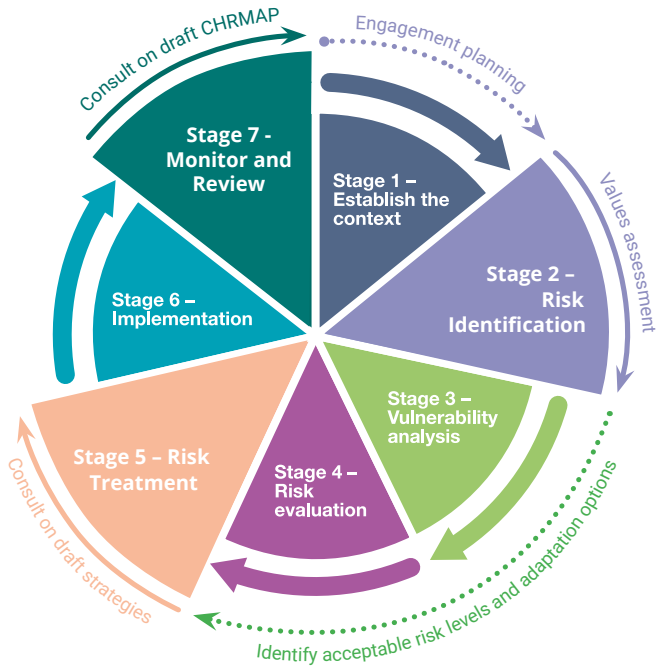


Figure 2 Engagement approaches in CHRMAP stages (adopted from CHRMAP Guidelines 2019)

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2 COMMUNICATION METHODS

2.1 Project webpage

The City's project webpage was updated with information on this stage of public engagement, including dates for community drop-in sessions and the link to complete a feedback survey.

The following draft Southern Beaches CHRMAP documents were published and made available for download:

- Mandurah Southern Beaches CHRMAP Summary
- Mandurah Southern Beaches CHRMAP Technical Report
- Appendices A-H
- Fact Sheet - Southern Beaches CHRMAP.

During the public engagement period, there were a total of 4,092 visits to the project webpage, of which 3,433 included visiting at least one page ("Aware Participants").

1,289 actions were performed ("Informed Participants"), such as downloading a document, of which 44 involved completing the feedback survey ("Engaged Participants").

In total, there were 1,131 document downloads. The most downloaded documents were the *Fact Sheet - southern Beaches CHRMAP* (230), *Mandurah Southern Beaches CHRMAP Summary* (229) and *Mandurah Southern Beaches CHRMAP Technical Report* (160).

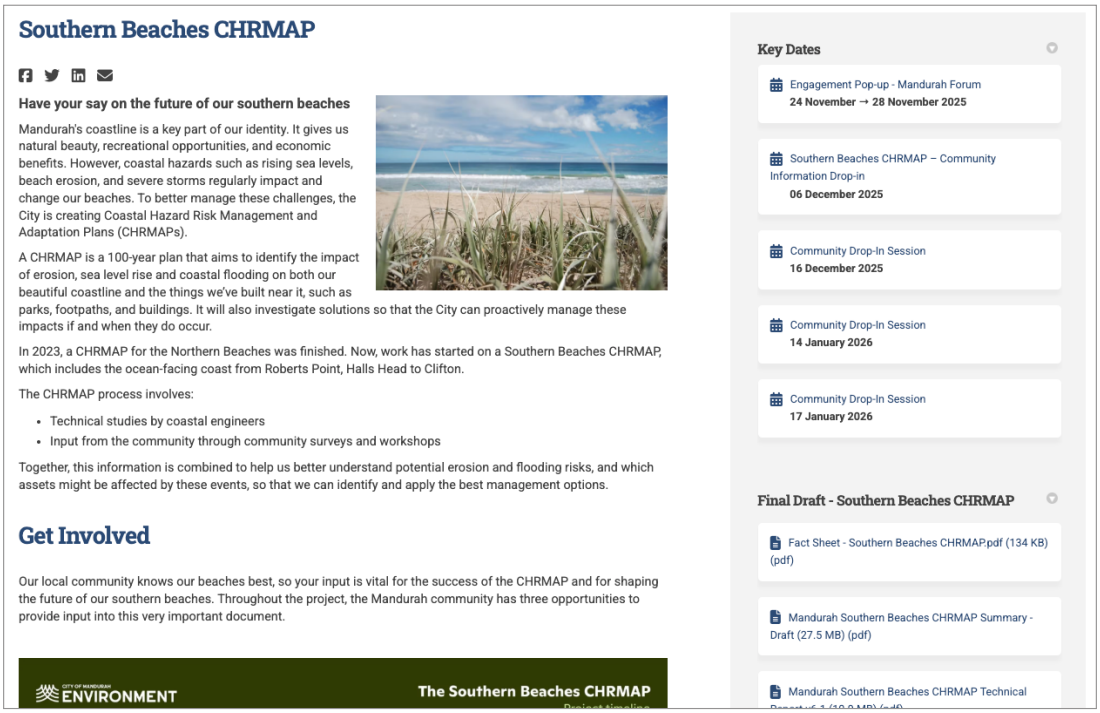


Figure 3 Project webpage

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2.2 Direct communication

The project team communicated directly with the community and stakeholders to provide an update on the project and to advise of engagement opportunities for the draft Southern Beaches CHRMAP in the following ways:

+ A letter providing information about the public consultation period was distributed with the 2025 rates mail distribution (hard copy).
+ Coastal Community Reference Group (CCRG) members and City of Mandurah Elected Members were emailed directly about the public consultation
+ A targeted e-newsletter was distributed to community members who had participated in engagement activities or who had registered for project updates
+ The public consultation period was featured in two issues of the City's *Mandurah News and Events* newsletter and *Environmental News, Events and Updates* newsletter.

2.3 Other communications

Combined communications with information about concurrent public consultation for the City's Falcon Coastal Shared Path project were communicated via the following:

- Media Release
- Social Media
- Newspaper Advertisement
- Email Newsletters
- Signage.

The City also hosted a City-wide engagement pop-up from 24 to 30 November 2025 at the Mandurah Forum. Total footfall recorded was 75,565.

2.4 Social media

Social media, specifically the City's Facebook account, was used to inform the public about the consultation period, sources of information and ways to be involved.

Table 1 Facebook posts

Publication date	Number of views	Number of interactions
21/11/2025	7,571	27
02/12/2025	3,003	39
05/12/2025	4,172	19
08/12/2025	5,358	14
02/01/2026	22,961	110
07/01/2026	3,932	9
28/01/2026	2,009	20
Total	49,006	227

2.5 Drop-in sessions

Four community drop-in sessions provided attendees the opportunity to learn about the draft Southern Beaches CHRMAP, ask questions of the project team and find out how to provide feedback:

+ **Saturday 6 December 2025**, 1-3pm, City of Mandurah Civic Centre, 83 Mandurah Terrace, Mandurah - **13 sign-ins**
+ **Tuesday 16 December 2025**, 4-6pm, Falcon Bay Foreshore Reserve, Spinaway Parade, Falcon (combined with Falcon Coastal Shared Path public consultation) - **approximately 30 attendees**
+ **Wednesday 14 January 2026**, 5-7pm, City of Mandurah Civic Centre, 83 Mandurah Terrace, Mandurah - **17 sign-ins**
+ **Saturday 17 January 2026**, 10am-12pm, Halls Head Parade Community and Sports Facility, 1 Halls Head Parade, Halls Head - **16 sign-ins**.

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3 SUMMARY OF SUBMISSIONS

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3 SUMMARY OF SUBMISSIONS

3.1 Submissions overview

Feedback on the draft Southern Beaches CHRMAP was invited through an online survey hosted on the project webpage. The City also accepted written submissions.

During the public engagement period, feedback was received in the following ways:

- 44 online survey submissions
- One handwritten submission (using the City's *Customer Comments Form*).

In addition, three post-it notes were left at the community drop-in sessions.

Informal comments, such as those posted on social media, are not included in this report as it is unclear if the commenters are actively engaged in the CHRMAP project or expressing views on other City projects. The project team did, however, monitor these channels.

3.2 Submissions analysis

The overview of the submissions includes feedback received in the online survey, the written submission and notes from the drop-in sessions. All verbatim submissions are provided in Appendix A.

In the survey, respondents were asked if they support the draft Southern Beaches CHRMAP (*yes/no*), with no prevalence of support for or opposition to the CHRMAP in the responses:

- *yes* response: 17 (one respondent indicated they had not read the document)
- *no* response: 16
- did not answer the question: 11 (four indicated they had not read the document).

Respondents were also invited to provide additional comments in response to the question: "Are there any parts of the CHRMAP you think need to be changed or improved, or is there anything we have missed?"

A thematic analysis of the feedback received, grouping issues of concern to understand trends, is presented in Table 2 and explored further in the following section.

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Table 2 Thematic overview of concerns

Theme	Number of mentions
Comments pertaining to the Southern Beaches CHRMAP	
Document to be clearer; needs more detail on affected assets and recommended actions	6
Process needed more engagement (e.g. Indigenous, 4WD community)	3
Detailed proposals for more technical veracity	2
Continue sand replenishment	2
Suggest limestone reefs	1
Need to ensure implementation of recommended actions	1
Need more short-term actions to address immediate needs	1
Need to consider estuarine waterways	1
Comments relating to concurrent coastal projects	
Do not support 4WD beach access closure (Management Unit 11)	13
Do not support beach access closure (general)	5
Proposed Falcon Coastal Path should not disturb dunes, should not be constructed where 'avoid' is recommended (Management Units 5, 6 and 7)	3
Comments relating to City of Mandurah's management of beach facilities and activities	
Safety concerns at swimming beaches (boats, crayfish pots), dog beaches	4
Comments expressing a lack of trust	
Climate science scepticism, no need for action	4
General mistrust of local governance	3
Previously protected coastal areas have since been developed on	2

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3.3 Submitter demography

Submitters who responded via the online survey were asked a series of questions about their demographic details, presented in the following graphs.

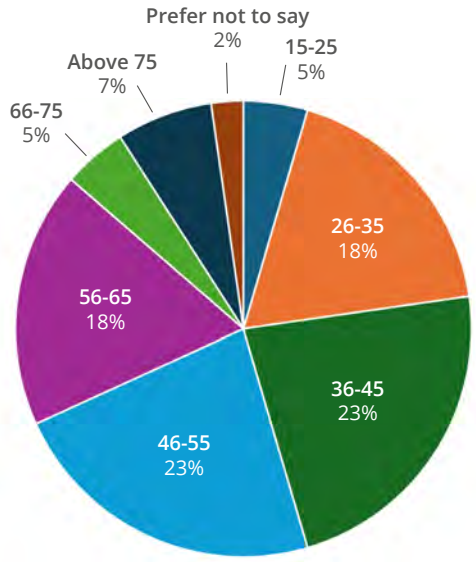


Figure 4 Survey responses: Age Data

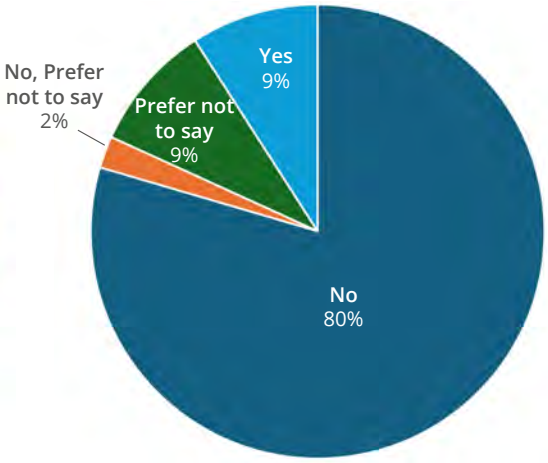


Figure 6 Survey responses: Person with disability, or condition that makes it harder to take part in everyday activities

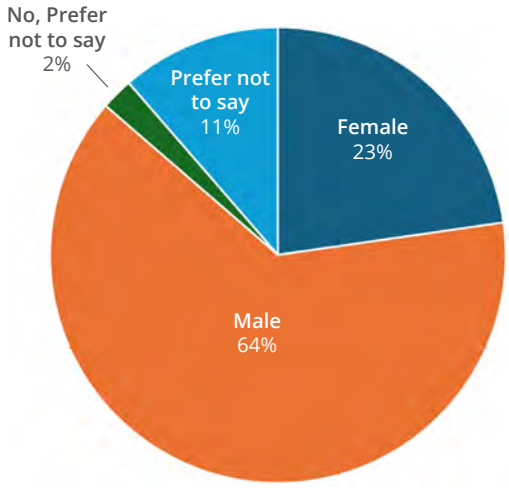


Figure 5 Survey responses: Gender Data

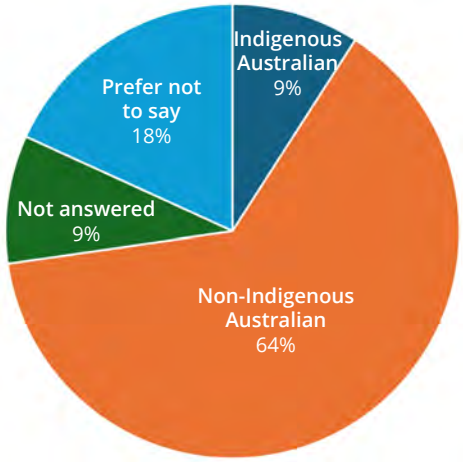


Figure 7 Survey responses: Cultural background

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3.4 Trends

Survey respondents tended to be either generally supportive of the CHRMAP, somewhat satisfied with the CHRMAP but had some reservations, or opposed to the CHRMAP entirely.

Several generally supportive comments were received and made note of the following:

- The importance of the CHRMAP for protecting Mandurah's coastline
- The comprehensiveness of the CHRMAP
- The level of detail and clarity of the document
- The community engagement undertaken.

Concerns expressed by respondents who were somewhat satisfied with the CHRMAP but had some reservations related to:

- General clarity of the document and the need for more detail about actions (including beach access)
- The technical veracity of the document
- Engagement with key stakeholder groups.

Of the respondents who were opposed to the CHRMAP entirely, the comments reflected three main sentiments:

- General belief there is no need for coastal hazard planning or any adaptation options; no climate threat
- General mistrust of local governance, of previous coastal protection plans
- Opposition to restrictions on beach access (four wheel driving).

A significant amount of the oppositional or concerned feedback received appears to be influenced by other concurrent coastal projects.

Several comments relate to the City's general management of beach facilities and permitted activities and will be referred directly to the City for consideration.

The main thematic concerns that emerged from the feedback are:

- Concern about beach access restrictions, in particular for 4WD at Tim's Thicket.
- Desire for clear communication of recommended actions, including who will be affected
- Need for technical veracity and community engagement
- Ensuring implementation and addressing immediate needs
- General mistrust in government, climate science
- Concern about Falcon Coastal Shared Path.

The following section discusses each of these thematic concerns in detail.

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4 KEY ISSUES

4.1 Beach access restrictions (MU11)

The most consistently raised matter was concern that beach access, in particular for 4WD, would be restricted as a protection measure at Tim's Thicket and Whitehills Beaches (MU11 - Yalgorup).

Recommended actions in the Southern Beaches CHRMAP for this Management Unit do not include restricting beach access. The CHRMAP does note that beach access should be carefully managed to avoid over-use of tracks and damage to the dunes, and defers to the Yalgorup National Park Concept Master Plan (Department of Biodiversity, Conservation and Attractions, 2024) as the primary control of activities for this area.

The Yalgorup National Park Concept Master Plan makes several recommendations regarding managing visitor use and beach access, protecting environmental and cultural heritage assets, and maintaining access infrastructure.

The stretch of beach from the North Rocks car park to Whitehills Beach car park (White Hills Road) is suggested as vehicle-free, with north-south movement via unsealed access tracks in the dunes.

Concern about beach access restrictions was noted in 40% of the public submissions for the Southern Beaches CHRMAP.

Of the submissions that noted 4WD access specifically, 42% responded 'no' to the question of whether they support the draft CHRMAP, making this cohort a large proportion of the respondents who do not support the CHRMAP.

33% responded 'yes' and 25% did not provide a response to that question.

100% of the submissions that expressed concern about beach access restrictions but did not mention 4WD access specifically responded 'no' to whether they support the draft CHRMAP. This cohort supplements the large proportion of the respondents who do not support the CHRMAP, with the inferred reason being beach access restrictions.

Collectively, the respondents who answered 'no' to support for the CHRMAP were largely linked to 4WD and beach access matters not the subject of the CHRMAP.

The key messages from submissions relating to beach access restrictions are as follows:

+ Overall objection to closing beaches (over 70% of these objections mention 4WD access specifically)
+ Visiting and fishing at beaches that are only accessible by 4WD being a "local way of life", family activity, connection to the land and tourism asset for the area
+ 4WD access enables disability access to beaches (can drive directly onto the sand)
+ Objecting to restricting 4WD access, whilst acknowledging that unsuitable (dangerous, environmentally damaging) 4WD behaviour needs to be managed
+ Nearly 25% of all submissions suggested strategies to manage 4WD behaviour, including signage, speed limits, infringements, enforcement presence during peak times, licence plate recognition, dune access barriers, education and more bins
+ Need for clarity of communication regarding any restrictions on beach access.

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4.2 Communication of actions

The overall clarity of the document and level of detail was noted as an issue in six submissions. Of these, one responded 'yes' to the question of whether they support the draft CHRMAP, one responded 'no' and four did not provide a response to that question.

In particular, these respondents noted a need for clarity on:

- What specific assets are planned to be removed and/or relocated, and when
- What properties are impacted, and how
- How community values are supported by each recommendation
- Any changes to beach access.

4.3 Technical veracity and community engagement

Three submissions noted aspects of engagement they felt were missing from the preparation of the CHRMAP. None of these respondents provided a response to the question of whether they support the draft CHRMAP.

Two of these submissions featured detailed feedback relating to the technical veracity of some aspects of the CHRMAP, reflecting a desire for clear and transparent processes, communication and implementation.

In particular, the suggestions related to:

- Need for more Indigenous engagement and input
- Financing and cost transparency
- Expanded inclusions in the Cost Benefit and Benefit Distribution Analyses
- Ecological impact assessment for structural interventions
- Inclusion of nature-based and hybrid solutions
- More comprehensive climate modelling.

The third submission only noted a need for input from a 4WD association.

Another respondent, who indicated they do not support the draft CHRMAP, noted the need to consider all Mandurah waterways together, including the estuarine environment.

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4.4 Taking action

Two submissions raised concern about implementation of recommendations of the draft CHRMAP to address coastal hazards.

One of the submissions indicated support for the draft CHRMAP and expressed urgency for implementing the recommended actions.

The other submission indicated a lack of support for the draft CHRMAP, noting several concerns, including beach access. This submission called for more short-term actions to address current needs.

The need for sand replenishment as an ongoing action to address erosion was mentioned twice in the feedback received, and one other respondent suggested the use of limestone reefs.

4.5 General mistrust

Six submissions reflected sentiments of mistrust. Of these, three responded 'no' to the question of whether they support the draft CHRMAP and four did not provide a response to that question, one of whom responded that they had not read the document.

The sentiments of mistrust focussed on:

- Governance at the City of Mandurah - three mentions, plus two claims that coastal areas that had previously had restricted access for environmental protection have since been developed on
- Climate science and/or no need to take any actions - two mentions each.

Four of these six submissions noted beach access as another concern (see 4.1) and one submission also included concerns about clarity of the document and ensuring community values are met (see 4.2).

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4.6 Falcon Coastal Shared Path (MU5, MU6, MU7)

Three submissions noted concerns about the City's concurrent project of a new shared path running four kilometres from Gretel Drive to Cesia Lane (MU5 - Rakoa, MU6 - Falcon Bay, MU7 - Gearys-Avalon). One submitter responded 'yes' to the question of whether they support the draft CHRMAP, one responded 'no' and one did not provide a response to that question.

Discussion regarding vulnerability in the draft Southern Beaches CHRMAP for MU5 and MU6 note the proposal of the new coastal path in this area. The draft recognises this existing funded project, noting that detailed design requires consideration of long term coastal effects.

The City's project page for the new path states that it is designed to follow existing footpaths and utilise existing road reserves, and notes its location considers future risks from coastal changes based on the Southern Beaches CHRMAP. Public consultation for the final design of the coastal path was open in December 2025 and early 2026.

The submissions relating to the new coastal path focussed on the need to protect primary dunes where the path is proposed.

One submission felt the new coastal path project contradicts the Southern Beaches CHRMAP recommendations for the avoidance of development in the immediate term (0-2 years) and demolition/removal/ relocation of minor assets in the short term (0-10 years) in these management units.

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5 RECOMMENDATIONS

No material changes to the draft Southern Beaches CHRMAP are recommended.

Feedback received during the public engagement period did not identify any element of the draft CHRMAP that would require material changes.

A minor update is required in the final CHRMAP to include a brief summary of this public engagement phase (page 61, Section 1.10.2.3, which refers to this phase and previoulsy included only placeholder text).

A summary of this report is also required to be included in Appendix E to the CHRMAP; the overall engagement summary.

The minor amendments noted above are proposed amendments to the CHRMAP.

Notwithstanding the limited changes proposed to the CHRMAP technical reporting, the public engagement period reflects a need for ongoing clear and consistent communication and engagement. This is essential to ensure the community can easily access accurate information.

The following sections outline the recommended actions to meet this need.

5.1 Clear Communication

The Southern Beaches CHRMAP project is hosted on the Mandurah Matters website; the City of Mandurah's engagement portal. There is currently a lot of project information on the project webpage, reflecting the progression of the project through the stages of engagement, and as such, much of it is now outdated.

The following actions are recommended to ensure accurate and up-to-date information is easy to find.

5.1.1 Mandurah Matters Southern Beaches CHRMAP webpage

While the Southern Beaches CHRMAP remains a draft document and is hosted on the Mandurah Matters engagement portal:

- Remove links that are no longer current, such as signing up for drop-in sessions ('Key Dates' section), joining the CCRG ('Important Links' section)
- Remove documents from the 'Useful Information' section that are now covered in the draft Southern Beaches CHRMAP suite of documents, such as Glossary, Fact Sheet and Frequently Asked Questions
- Update the project timeline graphic to reflect current delivery dates
- Upload a new Frequently Asked Questions document that addresses interdepedencies of the Southern Beaches CHRMAP with other coastal projects, such as the Yalgorup National Park Concept Master Plan and any 4WD recommendations and the Falcon Coastal Shared Path
- Upload the Coastal Hazard Summary and Fact Sheet (5.1.3)
- Clarify the purpose of the summary document outlining pertinent information per MU, such as what assets will be impacted and how, which properties are affected, proposed actions and timeframes for each (the existing summary document).

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5.1.2 Dedicated coastal planning webpage on the City of Mandurah website

Currently, all information about the City's CHRMAP projects (Southern Beaches and Northern Beaches) is hosted on the Mandurah Matters engagement portal.

This means that community members searching for information about CHRMAPs on the City's website may find it challenging to access documents or any information about the projects.

The following is recommended to ensure information about coastal planning is easy to find:

- Create a dedicated coastal planning webpage on the City of Mandurah website
- Host the Northern Beaches CHRMAP documents and project information on this page, ensuring all content is relevant and up to date
- Once the Southern Beaches CHRMAP is finalised, host it on this new webpage, ensuring all documents are up to date
- Host information about the planned Estuarine CHRMAP on the new webpage
- Provide links to the Mandurah Matters project webpages when necessary, or remove the project from Mandurah Matters if no longer in engagement phases.
- Ensure implementation plans are easy to find and kept current
- Host all general CHRMAP and useful information on the new coastal planning webpage.

5.1.3 Southern Beaches CHRMAP Strategy 2: Coastal Hazard Summary and Fact Sheet

The Southern Beaches CHRMAP sets out the key strategic planning, statutory planning and policy or governance strategies the City will need to implement regardless of proposed adaptation options. *Strategy 2: Coastal Hazard Summary and Fact Sheet* recommends:

- The City prepare a short, simple fact sheet for developing in the City. This should be published with CHRMAP information.

5.1.4 Clear and consistent messaging

To ensure the community is receiving accurate information about the Southern Beaches CHRMAP process:

- Emphasise in messaging that a CHRMAP is not a 'decision made', but provides information and guidance for future coastal planning decisions
- Ensure communications clearly reiterate the CHRMAP undergoes continuous review based on monitoring and best practice, with opportunities for ongoing community engagement
- Ensure communications clearly reiterate the CHRMAP suggests recommended additional studies to confirm and/ or enhance the basis of longer term recommendations
- Emphasise transparency of the CHRMAP process and required community consultation as per SPP2.6
- Monitor community sentiment through social media channels and ensure consistent and accurate messaging regarding CHRMAP processes and management actions.

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5.2 Ongoing engagement

Community engagement was critical to the development of the Southern Beaches CHRMAP and should be continued to ensure community members remain informed about the project.

The following actions are recommended to ensure the community remains engaged with this project, and other CHRMAP developments and reviews into the future.

5.2.1 Southern Beaches CHRMAP Strategy 1: Engagement

The following recommendations are consistent with *Strategy 1: Engagement* of the key strategic planning, statutory planning and policy or governance strategies set out in the Southern Beaches CHRMAP:

- Actively engage with the community by sending regular updates to community members who have registered for project updates
- Publish eNews updates on the City's website to update the community about the progress of recommended actions
- Leverage groups like the CCRG for information sharing
- Consider reconvening stakeholder groups, including CCRG members, to create MU-specific groups
- Directly contact property owners in the 2050 coastal hazard zone to inform them about potential vulnerabilities, along with providing FAQs and simple fact sheets on coastal hazard management
- Provide information about potential vulnerabilities, FAQs and simple fact sheets on coastal hazard management to local real estate and settlement agents.

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APPENDICES

Appendix A: Schedule of Submissions

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APPENDIX A

Appendix A: Schedule of Submissions

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ONLINE COMMUNITY SURVEY SUBMISSIONS

In general, do you support the draft Southern Beaches CHRMAP? (Other (please specify))
Its impossible to download
I'm generally supportive of the plan's overall goal of protecting Mandurah's southern coastline, but I have a few reservations that I think should be addressed before giving a full endorsement: Funding and cost-effectiveness – Some of the proposed hard-engineering measures (e.g., permanent seawalls, large-scale sand-bypass systems) could be costly for ratepayers. It would be helpful to see a clearer breakdown of financing options, including any state or federal grants, and an analysis of long-term maintenance expenses versus softer, nature-based solutions. Environmental impacts – While the draft mentions ecological considerations, the potential effects of structural interventions on dune ecosystems, native vegetation and marine habitats deserve more detailed assessment. Incorporating additional habitat-restoration components (e.g., native dune planting, living shorelines) could mitigate these concerns. Community-driven flexibility – The plan outlines a solid framework, but the ability for local residents and businesses to adapt the management zones over time isn't explicit. Adding a formal review mechanism every 5–10 years, with clear pathways for community-initiated amendments, would improve responsiveness to changing conditions and stakeholder needs. Equity of access – Some proposed protection zones may restrict public access to certain beach sections. Ensuring that any access limitations are minimal and accompanied by alternative recreational spaces would help balance safety with the community's enjoyment of the coast. Bottom line: I support the overarching aim of the CHRMAP - building a resilient, sustainable coastline - but I would like to see the above points clarified or refined before giving an unequivocal "yes." Addressing funding transparency, ecological safeguards, adaptive governance, and equitable beach access would strengthen the plan and broaden community backing.
The draft Southern Beaches CHRMAP demonstrates a commendable effort to integrate scientific modelling, community engagement, and economic appraisal. Nevertheless, the plan would benefit from a more rigorous treatment of climate uncertainty, quantitative vulnerability assessment, comprehensive valuation of non-market benefits, stronger Indigenous consultation, and clearer, equity-oriented funding mechanisms. By addressing the points outlined below, the City can deliver a CHRMAP that is both scientifically defensible and socially acceptable, safeguarding Mandurah's coastal assets and cultural values for generations to come.
NO DOG BEACHES
Doesnt matter the answer council will make up bullshit to do what they want (ban 4wding on tims thicket), better of putting pressure on council members with FOI's and watching their personal lives for descrepancys.

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ONLINE COMMUNITY SURVEY SUBMISSIONS (con't)

In general, do you support the draft Southern Beaches CHRMAP? (Other (please specify))
While I know that assessments of this type are quite subjective many of the recommendations and vauge and do not provide the reader with any certainty of the actual outcome. An example is on one of the recommendations (summary Pg 55) of the go-forward position of the Yalgorup location. The recommendation is to "Do Nothing" which is the preferred optio for this region. However the text in the Vulnerability sections states "Beach access should be carefully managed to avoid overuse of tracks and damage to dunes" This is government/council code for "we will do anything we see fit" and also I would assume this would be without consultation.
I'm concerned for the sake of myself and my kids that there will be a closure of access to Tim's Thicket and Whitehills. Granted there are massive issues with intellectually challenged 4WD owners who think the fragile dunes are fine for them to play in. And I realise that enforcement is expensive. Some of the costs could be offset by creating an access pass for the beach users. A simple number plate recognition system could be done remotely for general enforcement thus allowing Rangers to provide enforcement of the issues with the dunes. City of Wanneroo rangers have long employed drones and other methods to enforce regulations there.
I'm all for protecting our beautiful coastline, but wish for myself and future generations to continue being able to use it, would hate to see what's happened elsewhere specifically northern beaches where access to the beach, specifically 4wd access has been stopped in the name of dune rehabilitation only for in a matter of years the dunes to be destroyed for housing development
I feel not all beaches need to be reached by humans by car south of Dawesville, as natural untouched areas need to be protected, from 4 wheeldrives, motor bikes and development, this is a must.
The coastal At Risk concerns remain for a number of areas specifically Falcon Bay between Falcon Bay and Rokoa St. The proposed shared used path SHOULD NOT REMOVE ANY Primary dunes in this area.
Dependant on reading.

Are there any parts of the CHRMAP you think need to be changed or improved, or is there anything we have missed?
Who knows
I'm pleased to see the detail that has been taken in the review. Whilst also still recognising how much of an important asset these beaches are to the community and part of the natural environment.
Maybe a bit more on beach walking with dogs but I realise that this is currently well catered for which is great.
Not necessarily

ONLINE COMMUNITY SURVEY SUBMISSIONS (con't)

Are there any parts of the CHRMAP you think need to be changed or improved, or is there anything we have missed?
1. Funding & Cost Transparency What's missing: A detailed, itemised budget that shows the projected capital outlay, ongoing maintenance costs, and the exact sources of financing (local rates, state/federal grants, private-sector contributions). Why it matters: Residents need confidence that the plan is financially sustainable and that any new levies or rate increases are justified. Clear cost-benefit analyses also help compare hard-engineering options with softer, nature-based alternatives. Suggested improvement: Include a "Financial Summary" table and a "Funding Sources" appendix that breaks down each major intervention (e.g., seawall construction, sand-bypass system, dune restoration) and outlines the expected pay-back period or lifecycle cost. 2. Ecological Impact Assessment What's missing: In-depth assessments of how proposed structures (seawalls, groynes, offshore breakwaters) could affect native dune flora, intertidal habitats, and marine biodiversity. Why it matters: Hard engineering can disrupt sediment transport, degrade habitats, and reduce the natural resilience of the coast. Suggested improvement: Add a dedicated "Environmental Impact" chapter that cites baseline ecological surveys, predicts potential impacts, and proposes mitigation measures (e.g., living-shoreline designs, native vegetation planting, habitat corridors). Including an independent peer-reviewed ecological audit would increase credibility. 3. Nature-Based Solutions & Hybrid Approaches What's missing: A systematic comparison of soft-engineering options (dune nourishment, vegetated berms, oyster reef or mangrove pilot projects) alongside the hard-engineering proposals. Why it matters: Soft solutions often prove cheaper over the long term, enhance biodiversity, and can be adjusted as conditions evolve. Suggested improvement: Create a "Solution Matrix" that rates each option on cost, effectiveness, environmental impact, and community acceptance. Highlight hybrid designs (e.g., a low-profile seawall combined with dune reinforcement) where appropriate. 4. Adaptive Management & Review Cycle What's missing: An explicit schedule for periodic review (e.g., every 5 years) that incorporates new scientific data, climate projections, and community feedback. Why it matters: Coastal processes accelerate under climate change, and a static plan can quickly become outdated. Suggested improvement: Insert a "Monitoring & Review" section that defines key performance indicators (erosion rates, flood frequency, habitat health) and outlines a transparent process for updating the plan, including public workshops and an online dashboard. 5. Community Access & Equity What's missing: Clear guidelines on how protective works will affect public beach access, especially for families, Indigenous groups, and people with disabilities. Why it matters: Restricting access can generate opposition and undermine the social value

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ONLINE COMMUNITY SURVEY SUBMISSIONS (con't)

Are there any parts of the CHRMAP you think need to be changed or improved, or is there anything we have missed?
of the coastline. Suggested improvement: Map out "Access Zones" that preserve or enhance pathways, boardwalks, and amenities. Where access must be limited for safety, propose alternative recreational sites or temporary shuttle services. 6. Indigenous Knowledge Integration What's missing: Formal mechanisms for incorporating Traditional Owner insights on coastal stewardship, cultural sites, and historical sea-level changes. Why it matters: Indigenous knowledge can reveal long-term patterns and culturally significant areas that standard scientific surveys might overlook. Suggested improvement: Establish an Indigenous Advisory Panel, embed cultural heritage assessments throughout the plan, and co-design monitoring protocols with Traditional Owners. 7. Communication & Public Engagement Toolkit What's missing: A consolidated, user-friendly "What-you-need-to-know" package (infographics, FAQs, short videos) that explains the plan's key elements in plain language. Why it matters: Effective communication drives participation, reduces misinformation, and builds trust. Suggested improvement: Produce a downloadable one-page summary and host live Q&A webinars. Provide a feedback portal that logs comments and shows how they are incorporated into revisions. 8. Risk Scenarios & Sensitivity Analyses What's missing: Quantitative modelling of "worst-case" sea-level rise and extreme storm scenarios, plus sensitivity tests showing how uncertainties affect outcomes. Why it matters: Decision-makers need to understand the range of possible futures to allocate resources prudently. Suggested improvement: Append scenario tables (e.g., RCP 4.5 vs. RCP 8.5) with projected shoreline retreat distances and associated adaptation costs.
Probabilistic Climate Scenarios – publish a matrix of SLR and storm-event envelopes and integrate them into the hazard maps. Quantitative Vulnerability Scoring – replace categorical likelihood/adaptive-capacity assignments with calibrated probability and index values. Expanded Sensitivity Analyses – include discount-rate, sand-price, maintenance-frequency, and climate-scenario sensitivities in the CBA. Full Valuation of Non-Market Benefits – incorporate ecosystem-service and cultural-heritage valuations into the BDA. Formal Indigenous Consultation Record – document FPIC outcomes and integrate cultural-heritage risk assessments into option screening. Life-Cycle Costing of Hard Structures – require a detailed cost-benefit and interference analysis before green-lighting groynes or seawalls. Monitoring Framework with Defined Triggers – set quantitative thresholds, data-release schedules, and a trigger-activation protocol. Equity-Focused Funding Model – develop a progressive special-area rate, assess affordability, and align with state grant matching. Implementing these enhancements will increase the scientific robustness, transparency, and social licence of the CHRMAP, ensuring that the City of Mandurah can make informed, flexible, and equitable decisions over the next 100 years.
We look forward to the estuarine review which is more important to our club

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I believe there are people involved in reviewing the data and drafting the strategies that they think is best for the environment. Hoping any change to public recreation assets is dealt with in a separate consultation. Definitely noticing the coastal changes on my walks and beach visits.
No
The plan is comprehensive and clear. Now it needs to be implemented in full. Please do not let this strategy collect dust in an archive only to be looked at again when another strategy is proposed in future. CEO, Directors and senior managers need to be held accountable with measurable KPI's and deadlines.
The entire plan, there is a perfectly good footpath on the east side of this proposed footpath, I do not understand why one would be drawn up on the west side, this will remove vegetation, and create an erosion problem, the car parks are shown to shrink. We need more car parks if anything. Gearies when the swell is running forces cars to park up & down panamuna drive, it's only a matter of time before there's a car vs pedestrian accident there.
URGENT IF THE MELROS BEACH AND SURF BEACH HAS A DOG BEACH THIS NEEDS TO STOP. I WENT THERE ON 20 DEC AND I WAS HARRASSED BY DOGS FROM THE SURF BEACH TO MELROS CARPARK BEACH..LETS FACE IT PEOPLE NEVER DO THE RIGHT THING..... THE DOG BEACH USED TO BE TO THE RIGHT OF MELROS BEACH BECAUSE THIS IS NOT A SWIMMING AREA. BUT PERFECT FOR DOGS....- WHY DID THIS CHANGE BECAUSE IS WORKED WELL.? THERE ALSO NEEDS TO BE MORE SIGNAGE. SWIMMERS BEACHES SHOULD NOT HAVE DOGS
All of it
The fact we as families have already lost our right to fish off boats and enjoy the summer days on the water now you all decide to take another family outing away by closing our camping and fishing spots on the only beaches you can actually take your 4x4 and have the whole family and enjoy our bbq and shade without being surrounded by thousands of people and also the fact sone of us just love that its peaceful and not overcrowded and we teach our children the life of being outdoor instead of being stuck in a house on social media. I think the problem that is going to become the fact we wont have anything for our children to enjoy in the future because by the time they grow up the council and government will ban so much that the boredom is going to cause alot of crime rate and nuisannce behaviour to rise. Life is meant to be able to live on our land and enjoy all that we have but really its now becoming so bad that all our control in what we enjoy the most is now being controlled by the government and council and fisheries. Maybe monitor the land more and close some areas off in the dunes so it cant be accessed and keep everyone on tracks that arent ruining it for the families to still enjoy our days on our only coastal beaches that we can access without walking so far to get to. Have a ranger ir coastal driver to monitor and fine anyone that is not doing the right things on the beach and just like when you go to some coastal beaches down south they always have someone checking on the beaches and making sure no fire are kut and take the rubbish when they leave. Take rego and thus will also help if someone is in one spot that you can ensure they cleaned up the area before leaving. Please understand some of us dont ruin our right to go on the beach but you do have sone who just dont care and think its not going to affect all but it does at the end of day. I def võte against the idea that they want to close tims thicket and whitehills its just sad to keep people from enjoying the good life of our ocean and beaches.

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ONLINE COMMUNITY SURVEY SUBMISSIONS (con't)

Are there any parts of the CHRMAP you think need to be changed or improved, or is there anything we have missed?
Stop locking us out of the remaining spots we can live our life.
The A class reserve on the foreshore. I dont think that enbankment should be changed if tims thicket needs to be protected.
Better input from 4WD association
The idea that the shire would ever consider restriction Australian people onto their beaches for leisure, play and hobbies is despicable, and its becoming increasing evident the Mandurah shire is being led by unelected corporations and it is disgraceful, stop with the fake "climate change" and "erosion" excuses to keep Australians off our country.
I have been taking my family down the beaches for day trips or night fishing for yrs and it is 1 of the last spot I can drive my car down We can't close these beaches off to the 4x4 access
I am against all changes to the beach access.
You dont need to do anything
I honestly think this is a joke. These beaches should not be closed. People should be allowed to access them at their own risk. Tims Thicket and White Hills are part of our local way of life, whether it's fishing, 4WD driving or just enjoying the coast. If there are safety or environmental concerns, they should be managed sensibly, not by banning everyone. Closing off public beaches punishes responsible locals and takes away access to places that have always belonged to the community.
We need to control hoons along the beaches between Tims and Preston. Speed limit signage and dune access restrictions need to be installed in more places. Police infringements for speeding via handheld speed guns especially during busy periods would help make idiots think twice.
I've done enough of these Risk assessment in Projects to know that the devil is in the detail. I do not believe that Joe Average will be able to decipher the detail of this assessment. Even the Summary document is vague at best in some areas. You need to be binary on what will remain the same and what changes are being recommended against each of the community values. In the summary you list the Community Values (directly from the public submissions). Your summary should cover off (very Clearly) the impact on each of the listed community values, as mentioned above, to include very clearly any positive/negative impacts on asset users. Yalgorup MU11 is the area of my most concern. Having recently retired, after living in mandarah since the early 80's, that last thing I need is to have my beach fishing/4wd beach access removed (as this government has just killed my boat fishing hobby). I believe that Yalgorup just needs to be left alone as it is. By all means have rangers patrol to see ppl doing the wring thing in dunes however don't penalize honest locals for the sins of idiots. You may think I'm over reacting in my lack of trust in your intentions - however I remember not being able to ride dirtbikes in the golden bay and Dawesville areas due to the ecology - then when a developer steps in, those areas are flattened and suburbs now exist as far as the eye can see. Protect Yalgorup by: Doing nothing. Do not make it easier to get in there - that's half the problem.

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ONLINE COMMUNITY SURVEY SUBMISSIONS (con't)

Are there any parts of the CHRMAP you think need to be changed or improved, or is there anything we have missed?
No, it is very pleasing to have had the opportunity to provide input into the community consultation process and that the community values have been given prominent standing. As a Mandurah resident of old Halls Head (Roberts Point and Doddies Beach) I can only state that I wish as much care and community consultation had been applied to the Northern Beaches CHRMAP as their proposed hard solution of rock groynes on Doddies Beach from the Roberts Point Car Park to Doddies Beach toilet block will significantly and directly impact the communities enjoyment of that section of beach, just like the values identified for the MU1 Roberts Point/Blue Bay Southern Beaches area. If there is any way you can bring attention to the anomaly of CHRMAP treatment responses for this stretch of coastline with a view to having the decision to proceed with rock groynes abandoned that would be a great outcome.
As per the above.
Closing them down and preventing access but 4x4 doesn't fix the solution. Bigger fines as well as regular patrols of the areas are much better suited than just closing the areas and cutting families off from experiencing just a great family day out to the beach (with beach access the full length so on busy time periods not everyone is cramped together)
I like helping safeguarding the beaches which has been a priority for many many years but the only thing I, family and friends are totally against is White Hills and Tim's Thicket beach closures. Also we have people with disabilities that rely on a vehicle for a release and to be able to enjoy our very unique lifestyle and follow their passion. We can manage any and all problems and still keep the beach open. Being able to use those beaches has been a right of passage for nearly every Mandurah citizen since the birth of Mandurah. Those beaches have during the yearly cycles moved and then rejuvenated my whole long life and even longer. So to cap I agree we need to have a level headed approach that suits everybody in our community. Thank you for your time. Regards, [name redacted]
Whilst I agree with a plan to ensure our coastlines are looked after, I don't agree with a permanent closure to the public. Access and maintenance can be a duel cohesive activity.
Make it clear what the intentions are for Tim's thicket and white hills are. I believe Tim's thicket and White hills beaches should remain open to off-road driving as they are a much loved destination for many locals including myself and my family, and I would love to take my young ones there when they grow up a bit more. I agree the dunes need to be protected and the hard barriers ie. large limestone boulders appear to be helping when done right, but the beaches should remain open to public. The beaches do wash away from time to time and when this happens we wait a few weeks and it's back , as long as people stick to the beaches. Please keep them open to the public
Some specific clarification on 4wd access to the currently accessible parts of the coastline
Access to these beaches for recreational use and fishing should not be restricted. Education is key, not locking us out of more of our backyard. These beaches are unbelievably important to Perth locals who have fewer and fewer options for areas to enjoy the coastal outdoors.
Why put on changes that may be affected by climate change over the next 100 years No one knows what climate change will do so let's just wait and see what happens. If we didn't build so close to the coast most of these issues wouldn't really affect us.

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Are there any parts of the CHRMAP you think need to be changed or improved, or is there anything we have missed?
As I stated above, the non built up areas , need to be left natural , bush land and beach. No 4wheeldrives, no roads no toilets. Nature needs to be left alone not developed in those further south of Dawesville. Don't become an urban sprawl. Please allow nature to have its own space. If people want to hike to these areas so be, but have rules about taking out your own rubbish. Like national parks. If it can be come a large coastal natural park that would be great.
Potentially more protections against 4wd at Tim's thicket. Often the barrier of rocks at Whitehill will be covered in sand, allowing vehicles to traverse areas not permitted
'- Having a plan for property owners now and letting them know the risks and hazards associated when the CHRMAP is created so they can make informed decisions on the future of their properties. I think this needs to be made clear for those especially living on the coastline - I believe that closing popular driving beaches doesn't fix the problem. There is evidence that this causes erosion etc, that is an important issue to address. I do believe that even with this fact, these beaches are important for not only tourism but are a part of liveability in Mandurah. Fishing, swimming, being active is important in a lot of this community, if this is an avoidable approach it should be. More implementation into having actual strategies to prevent erosion and rubbish and habitat protection especially in the Tims thicket and White hills areas is essential. Have more informative talks, for adults and kids about erosion. More bins and signage for rubbish related issues. Newer clearer signs for habitat protection (some of these are older signs that aren't eye catching at all, easily missed when considering the age of these). There are so many things that can be done to make the city sustain future issues. - looking into waterway management especially when looking at the beaches local to the dawesville cut cannot be done separately. They have been created to be interlinked systems, so should be treated as such. Needs to look beach by beach as well as the whole picture. How will possible issues in the inner waterways effect the beach environments vice versa. - 100 year strategy is good in theory but shorter period planning should be considered more of a priority as things can change in the environment substantially quick. For example, you can look into the state governments water management policy that was for 30 years and a lot of the applications of it aren't actually viable in this end of the plan. Having a long term goal is important nonetheless, but there should be more of a timeframe of a short term solution to each issue at hand. - the CHRMAP is an important step. I do believe it's needed. I think it needs to be addressed further before implementing it.
Yes. Floating Boating markers need to be placed in Falcon Bay to prevent the ever increasing number of boats from encroaching into the swimming area. Also , please consider restricting Cray Pots in these swimming areas as the bait attracts sharks..
Must include remodeling of existing reefs, to make several right hand breaks, using limestone. Therefore the epa will approve this style of remodeling. Albany has used limestone and the epa approved.
Overall it seams good the only worry I have is if this is somthing that will be used to close 4wd acces to tims thicket and white hills Because if that did close that would be a major loss to the whole south Perth region and a huge attraction that is know AUS wide amongst travellers and fulltime caravans, Mandurah is know to have those beaches and I know it does create attraction to the area
Same as last answer

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Are there any parts of the CHRMAP you think need to be changed or improved, or is there anything we have missed?
The Shire of Waroona notes that the Southern Beaches CHRMAP does not recommend closing 4WD beach access at Tims Thicket or White Hills beaches. The Shire would appreciate acknowledgement that the beach from White Hills to Preston Beach remain a popular 4x4 access route and that a collaborative approach between the Shire and the City, to managing this access in a sustainable and safe manner into the future is important. The Shire is working up options to achieve these objectives while continuing to allow beach access and seeks ongoing cooperation with the City to achieve these aims.
Real issue is crackheads living in tents destroying the beaches and surroundings
We support the view that the natural coastal environment is highly valued and natural responses are strongly supported. However sand replenishment of beaches north of the Cut needs attention, with greater sand pumping from south to north of the Cut to ensure less erosion of beaches and dunes. Managing vehicle access to protect beaches and dunes is also a priority. The City now has 3 months of CCTV footage to show that, contrary to what is stated in the CHRMAP, launching watercraft is not the predominant use of the Avalon Rd beach boat launching facility. Nor is it "frequently used by the surf life saving club for boat training." The most frequent use, day and night, is by 4WD vehicles. Hence the City incurs an ongoing cost to have an excavator lift and relocate rocks to prevent vehicles driving on the beaches north and south of the boat ramp and into the dunes, and having a bobcat smooth the beach and access road after it has been ripped up by vehicles. This contradicts the feedback that lower cost responses to the ratepayers would be preferred. Nevertheless, despite this ongoing cost, the dunes either side of the beach access road continue to be eroded by vehicle use, threatening existing dune vegetation and causing sand to blow into the intersection of Avalon Pde and Yeedong Rd. Boat launching is in fact discouraged by vehicles churning up the beach and parking along the foreshore. The presence of these vehicles also discourages other low impact beach users. As the Draft Report states: overall, the community is deeply concerned about the impact of erosion and the loss of beach. They are also concerned about . . . managing vehicle access, and improving access to the beach. There is no management of vehicle access to this facility with users ignoring existing signage and little or no enforcement by the City. As a result, the beach access should be closed. It should also be noted that among the recommendations for MU5 Rakoa, MU6 Falcon Bay, and MU7 Gearies-Avalon, is the avoidance of further development in the immediate term, and demolition/removal/relocation of minor assets in the short term. If the Falcon Coastal Shared Path is constructed as proposed in the immediate/short term, contrary to these recommendations, then protection of the narrow strip of dunes is imperative. Allowing continued vehicle access to the beach boat launching facility, day and night, with continued beach and dune erosion, would be contradictory to these plans. It will also be a major safety issue for the City if the Coastal Shared Path is constructed, as planned, across the beach access road. The City is now in possession of vision that shows the manner in which vehicles enter and exit this facility, creating a major safety hazard for pedestrians, cyclists and other road users. The cheapest, most environmentally responsible, and safest option is to permanently close the beach to all vehicles.

ONLINE COMMUNITY SURVEY SUBMISSIONS (con't)

Let us know if you have any access needs you would like us to consider for engagement activities.
They are currently good for me.
You cant help people who have spinal chord injuries or sensory issues to access our beaches better than we can when we can just get out of car and we on beach but also the fact people with breathing problems or respiratory issues to also access it any easier than like i said just getting out ya 4wd and just sit and chill. My mental health isnt the best I rather be on the beach chilling where its not crowded and have my own space rather than all sitting on top of each other like the beaches ya can't access with a 4wd
Nil
None that I can think of

Tell us about your cultural background. Select all that apply (Other (please specify))
Im Australian, and as an Australian, living in Australia, im offended to be described as anything else. My ability, or my disabilty status is irrelivent. And what genitals i have are none of anyones business and also irrelivent t9 the coastline of this town. This weak, woke the city insists on focusing on, while the town is over run with unwashed vagrants living in shanties of trash on any vacant block they choose, crime is rife, people poop in the streets, but the burning question is what is my gender
Australian
Australian.
Spanic

CUSTOMER COMMENTS FORM (City of Mandurah proforma)

Comments
> Maintain some select dune tracks > Police speed limits on beach > Maintain hard access on 4WD access tracks - reduces speed & use overall > Monitor beach conditions & close once certain (washed out) conditions met > What consultation will be carried out prior to changes? > Increase rubbish collection - currently entire stretch requires more active rubbish collection & bins > Stretch of beach around Seal Rocks which is proposed to be closed needs to be reduced to more closely reflect cultural area

DROP-IN SESSIONS POST-IT NOTES

Pump more sand that will stop dune erosion
Concrete barriers instead of timber or sandstone -> Square! Not round
Unsafe as cray pots are very close to shore i.e. encouraging sharks (back beach)



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Mandurah Southern Beaches

Coastal Hazard Risk Management and Adaptation Plan

Technical Report v6.2 | February 2026

CITY OF MANDURAH
ENVIRONMENT

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Acknowledgements

Shape Urban acknowledge the Bindjareb People as traditional custodians of the land on which we have worked for this project. We recognise their cultural heritage, beliefs and relationship to the land, which continue to be important to the Bindjareb People today.

We pay our respects to Elders past and present, and to the land which they have cared for.

"IF YOU LOOK AFTER THE LAND, THE LAND WILL LOOK AFTER YOU"

This document has been prepared with the support of many people from the City of Mandurah community. We wish to acknowledge the community for your contributions.

Disclaimer

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Document Control

Coastal Hazard Risk Management and Adaptation Plan for the City of Mandurah's Southern Beaches

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1	K Yang, A Kelderman, N Dugan, K Illich	A Kelderman, N Dugan	24 May 2024	Stage 1 - Establish the Context - Draft
2	K Yang, A Kelderman, K Illich	A Kelderman, N Dugan	25 November 2024	Stage 1 - Establish the Context - FINAL, Stage 2 - Risk Identification, Stage 3 - Vulnerability, and Stage 4 - Risk Evaluation - Draft
3	O Chetkovich, A Kelderman, K Illich	A Kelderman, N Dugan	19 March 2025	Stage 2 - Risk Identification, Stage 3 - Vulnerability, and Stage 4 - Risk Evaluation - FINAL Stage 1 - Establish the Context updated Section 1.10.2.2 - Draft Stage 5 - Risk Treatment, Stage 6 - Implementation, Stage 7 - Monitor and Review - Draft
4	O Chetkovich, A Kelderman, K Illich	A Kelderman, N Dugan	28 May 2025	Draft CHRMAP - Combined, all stages
5	A Kelderman, K Illich	A Kelderman	25 July 2025	Final Draft CHRMAP - Combined, all stages For internal discussion only
5.1	A Kelderman	A Kelderman	5 August 2025	Final Draft CHRMAP - Combined, all stages For Elected Member Briefing
5.2	A Kelderman	A Kelderman	28 August 2025	Final Draft CHRMAP - Combined, all stages
6	A Kelderman	A Kelderman	9 October 2025	Final Draft CHRMAP - For Public Release
6.1	A Kelderman	A Kelderman	19 November 2025	Final Draft CHRMAP - For Public Release
6.2	O Chetkovich	A Kelderman	24 February 2026	Final Draft CHRMAP - For Public Release

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Abbreviation List

AHD	Australian Height Datum
ARI	Annual Recurrence Interval
AS	Australian Standard
BDA	Benefit Distribution Analysis
CBA	Cost Benefit Analysis
CHRMAP	Coastal Hazard Risk Management and Adaptation Plan
CMS	Coastal Management Strategy
CoM or the City	City of Mandurah
CSEP	Community and Stakeholder Engagement Plan
DBCA	Department of Biodiversity Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPLH	Department of Planning, Lands and Heritage
DoT	Department of Transport
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
FAQs	Frequently Asked Questions
GSC	Geotextile sand container
HSD	Horizontal Shoreline Datum
IPCC	International Panel on Climate Change
LPS12	Local Planning Scheme No. 12
MCA	Multi-criteria analysis
MSL	Mean Sea Level
MU	Management Unit
MWL	Mean Water Level
PHCC	Peel-Harvey Catchment Council
PSC	Project Steering Committee
SoM	Shire of Murray
SLR	Sea Level Rise
SPP 2.6	State Planning Policy 2.6 – State Coastal Planning Policy
TECs	Threatened Ecological Communities
WAPC	Western Australian Planning Commission

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Executive Summary

The Southern Beaches Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) is a strategic initiative by the City of Mandurah to proactively address coastal hazards such as erosion, storm surges, and rising sea levels. This plan aims to preserve the coastal values of the Southern Beaches, ensuring their sustainability for future generations. The CHRMAP has been prepared in accordance with *State Planning Policy 2.6 - State Coastal Planning Policy*, and follows the required structure and pathways required by that policy.

In principle, a CHRMAP is intended to identify pathways that may be suitable – attempting to highlight and avoid pathways that remove flexibility for different decisions in the future. The CHRMAP is not the end of the decision making pathway, but a point in time where the best available and most contemporary data is compiled and made public so that all members of an affected community can be fully informed and active participants in their own decision making.

It is a document that required continuous review and updating, as scientific predictions are confirmed or amended, as more data is obtained, or as the community's needs and expectations change over time.

The CHRMAP preparation tests future uncertainty and identifies potential adaptation measures to respond. This allows decision makers to ensure potential risks from coastal hazards are factored into decision-making.

Coastal hazards pose significant risks to our natural environment, infrastructure, and community well-being. The CHRMAP helps us understand these risks and develop practical strategies to mitigate them, to protect community safety, enjoyment of our beaches, and proper financial management of City resources.

This CHRMAP recommends a number of studies and investigations, including monitoring of the actual changes to the coastline over the coming decade. In the immediate term, these planning, monitoring and investigations focus on areas identified as most at risk, so that improved data and engagement with the community properly informs decision making.

Along the study area, the beach, foreshore and properties are most at risk in the immediate term in the Blue Bay area, near Rakoa Beach and in the Gearies and Avalon stretch of the coast. Options for necessary sand nourishment are included in this CHRMAP, so that short term action can occur if necessary, before medium and longer term adaptation options are confirmed.

When reading this document, it is important to understand that the CHRMAP recommends pathways based on the most contemporary understanding of the existing context. Recommended pathways are not committed to by the City at this time, and substantial work is still required to determine the economic, environmental and sociological viability of retreat, accommodate or protect pathways.

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SECTION 1
ESTABLISHING THE CONTEXT

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1 Establishing the Context

1.1 Introduction

Located in the southwest of Western Australia, Mandurah is a metropolitan hub known for its coastal lifestyle and the natural beauty of its estuaries, lakes and local beaches. The Mandurah region has long been home to the Mandjoogoordap Bindjareb Noongar Traditional indigenous owners who were the first people to inhabit the area (Mandurah City Museum, n.d.). European settlement began in 1829 (City of Mandurah, 2020).

The settlement grew from a small economic centre to the major southern hub of the Perth and Peel metropolitan area, becoming a town in 1987 and subsequently reached City status in 1990.

The southern stretches of the City of Mandurah were originally synonymous with fishing and coastal tourism and holiday-making, due to its proximity to the Metropolitan area and the natural beauty, amenity and recreation offered by its beaches and the Peel Harvey Estuary.

Mandurah's southern suburbs support a thriving population of residential hamlets, community and social services and coastal foreshore infrastructure that is accessed from as far east as the foothills.

The area is strongly valued by the community and tourists for:

- Recreational opportunities
- its character, sense of place and scenic landscape
- Community facilities and services
- Entertainment and social opportunities
- Mental health benefits
- Lifestyle and living amenity
- Employment and economic benefits

The subject area for this study is located within the City of Mandurah, stretching from approximately 65 kilometres to nearly 100km south of the Perth central business district. The subject area is referred to as the Mandurah Southern Beaches for the purposes of this report (***Figure 1***).

It adjoins the existing Mandurah Northern Beaches study area, which has already been considered by a study under the same policy framework. The City has recently completed the Mandurah Northern Beaches CHRMAP (Northern Beaches CHRMAP) for the beaches from Madora Bay to Doddies Beach, Halls Head, adopted by Council in November 2022, with a 10 Year CHRMAP Action plan adopted by Council in July 2023 to implement the immediate short term CHRMAP recommendations.

There are six main coastal suburbs for the Southern Beaches:

- Halls Head (not including Doddies Beach)
- Falcon
- Wannanup
- Dawesville
- Bouvard
- Clifton

Bouvard and Clifton are almost entirely comprised of conservation and recreation reserves within the study area.

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Figure 1: Mandurah Southern Beaches CHRMAP Study Area

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1.2 Why we need this study

It is internationally recognised that increasing sea levels and fiercer storms will intensify coastal hazards such as coastal inundation (temporary coastal flooding), storm erosion and long-term shoreline recession. The Intergovernmental Panel on Climate Change (IPCC) provides ongoing and regular updates to modelling and predictions.

As our coastline changes, our planning system needs to respond to both visible and predicted changes. Consequently, State governments across Australia have introduced obligations that require local governments to consider and plan for the effects of these hazards over various planning timeframes.

In Western Australia, the governing policy is the Western Australian Planning Commission's *State Coastal Planning Policy 2.6*, herein referred to as SPP 2.6. SPP 2.6 was originally gazetted in 2003 and has been reviewed twice in 2006 and 2013 (WAPC, 2013).

SPP 2.6 recommends management authorities develop a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP). SPP 2.6 sets out the required structure and pathways required by that policy. Guidance is provided for decision-making within the coastal zone including managing development and land use changes.

The objectives of SPP 2.6 are to:

1. ensure that development and the location of coastal facilities takes into account coastal processes, landform stability, coastal hazards, climate change and biophysical criteria;
2. ensure the identification of appropriate areas for the sustainable use of the coast for housing, tourism, recreation, ocean access, maritime industry, commercial and other activities;
3. provide for public coastal foreshore reserves and access to them on the coast; and
4. protect, conserve and enhance coastal zone values, particularly in areas of landscape,biodiversity and ecosystem integrity, indigenous and cultural significance.

The Southern Beaches CHRMAP aims to respond to each of these objectives by first understanding the potential coastal hazards that may be present, and then following the specific guidance of SPP 2.6 to identify possible adaptation responses. This CHRMAP recognises that these objectives can be challenging and sometimes conflicting to achieve, and provides a balanced response where possible.

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The City has an estimated 43 kilometres (km) of coastal foreshore, of which about 36 km is subject to this study. The adjacent land, the coastal zone, supports a variety of recreation, conservation, residential and commercial land uses. The coastal zone underpins the community's identity and lifestyle.

An assessment of Coastal Erosion Hotspots in Western Australia (Seashore Engineering Pty Ltd, 2019) identified that Falcon Bay to Rakoa Street is at moderate risk of coastal erosion within the study area, with an adjoining hotspot at the northern end of the study at Roberts Point/Doddies Beach. It is important to note the Falcon Bay seawall, discussed later in this report, was installed after the Hotspots report was released.

Other sections of this study area coastline may also face coastal hazards over the 100-year timeframe, which will be considered by this study.

Large sections of the coast have been developed for residential land as well as tourism and commercial use and the broader area is also exposed to the pressures associated with recreational uses.

The CHRMAP process establishes long term predictive models of potential shoreline movement (erosion) and coastal flooding (inundation) to provide a clearer understanding of allowances that may be required for protecting, conserving, and enhancing coastal values across the state.

Despite the uncertainty, early consideration of coastal hazards and planning responses can provide benefits. A risk management approach can be utilised to identify intolerable risks to the community and other stakeholders, such as local governments, Aboriginal and other cultural stakeholders, and other public and private investment.

This allows decision makers to address the uncertainty of coastal hazard impacts and their timeframes and ensure risks from coastal hazards are factored into decision-making.

CHRMAP preparation provides a method for testing uncertain risks from coastal hazards, and the treatment of these risks, to help capitalise on any opportunities.

As per SPP 2.6, potential adaptation measures fit into a preferential hierarchy of avoid, managed retreat, accommodate and protect. It is extremely important that the appropriate stakeholders and community are made aware of the issues and can contribute to selection of the adaptation measures.

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For the Southern Beaches CHRMAP, a Project Steering Committee (PSC) has been formed with representatives from the City, including two Councillors, the Peron Naturaliste Partnership (PNP), the Department of Planning, Lands and Heritage (DPLH), and the Department of Transport (DoT) (***Table 1***).

Consultants Shape Urban and Water Technology are supporting development of the CHRMAP.

Table 1: Project Steering Committee Members and Their Roles

Agency	Role in the Study
City of Mandurah	Project manager, technical advisor, engagement advisor, administration support
City of Mandurah Elected Members	Representing the community
Department of Planning, Lands and Heritage	State coastal and strategic planning representative
Department of Transport	State coastal engineering technical representative
Peron Naturaliste Partnership	Regional coastal management advisor

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1.3 Purpose

This report presents the Establish the Context Chapter Report, which outlines the key management and adaptation issues that must be considered in the CHRMAP. The flow chart displayed in ***Figure 2*** indicates where this report sits within a broader study. The coastal assets and community values will be identified during Stages 1-4, defining the success criteria.

The overall study aims to investigate and plan for coastal hazards likely to affect the extent of the Mandurah Southern Beaches study area, and provide strategic guidance for coordinated, integrated, and sustainable decision-making for future coastal land use planning, including management of and adaptation to coastal hazard risks.

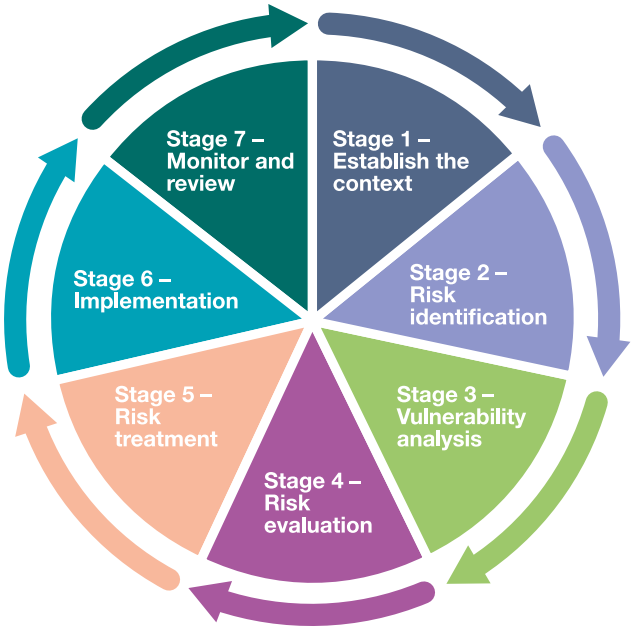


Figure 2: CHRMAP Stages (WAPC 2019)

Management of risks to the study area's land adjacent to the ocean coast, estuaries and rivers is very important for the local communities' social, environmental, infrastructure and economic assets and values. Although some work on coastal hazards has been undertaken across the study area in the past, including investigations and studies by DoT (further information can be found in Section ***2)***, a coordinated approach that identifies areas likely to be affected by erosion and/or inundation and requires management and adaptation to mitigate the risks will provide increased resilience to these communities.

The project will identify the strategic direction for coastal adaptation scenarios from the present to 2125 (100-year management time frame) and detail an implementation plan describing risk management action to achieve preferred risk treatments. Overall, this CHRMAP will develop a flexible adaptation pathway for the region and serve as a key reference for management, planning, and policy making in the immediate term (current day), short term (0-10 years), medium term (10-50 years), and long term (100 years).

A CHRMAP will be updated periodically – every 10 years or so, typically.

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1.4 Objectives

The overall objectives of this CHRMAP are to:

- Improve understanding of existing coastal processes, features, and hazards within the Mandurah's Southern Beaches.
- Identify coastal assets (natural and man made) and their services, functions and values situated in the coastal zone through stakeholder and community engagement.
- Identify coastal hazard risks in terms of both coastal erosion and inundation, as well as potential vulnerability trigger points.
- Improve understanding of asset risk and vulnerability to coastal hazards.
- Determine the consequence, likelihood, and tolerance of assets to the identified risks.
- Identify effective risk management measures through Multi Criteria Analysis and Cost Benefit Analysis.
- Identify short, medium, and long-term risk management actions.
- Engage with stakeholders and the community to inform local values, adaptation pathway selection, and the implementation plan.

There are additional objectives and outcomes specific to this CHRMAP, including:

- To determine suitable groupings of assets and areas through a combination of asset locations and physical process boundaries.
- To better understand the extensive engineering works undertaken through the annual sand bypassing projects, shoreline protection structures, Dawesville Channel and associated training walls, and marina infrastructure.
- To take into consideration access to Mandurah's extensive waterways including the Peel Harvey Estuary.
- To develop a plan that considers coastal processes, landform stability, coastal hazards and climate change.
- To summarise environmental values, community values for foreshore reserves, protection of valued land, and commercial/residential/public assets and providing guidance for the development of statutory planning controls to allow for sustainable provision of these elements.
- To identify the likely profile of who will need to contribute to coastal hazard management (Government and private interests through Benefit Distribution Analysis).

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1.5 Scope

This CHRMAP intends to identify values and assets with intolerable risk associated with coastal erosion and inundation hazards within the study area.

For the purpose of this CHRMAP, assets are defined as;

- Aboriginal cultural heritage sites;
- Natural features such as beaches, natural vegetation and reef systems – linking to social/recreational values, e.g., surfing, wind/kitesurfing, fishing, diving, snorkelling etc.;
- Recreational structures (benches, barbecues, shade structures, playgrounds, sporting equipment, golf course, Mandurah Giants);
- Buildings and other structures - houses, land, commercial buildings and community structures;
- Servicing infrastructure relating to drainage, water, sewerage and power;
- Roads, paths and walkways;
- Coastal structures such as jetties, boat ramps, seawalls and other coastal protection structures

As defined in the Australian Standard for Climate change adaptation for settlements and infrastructure – A risk-based approach (AS 5334-2013), an asset's value can be tangible or intangible, financial or non-financial. Examples of non-tangible assets include ecological function, coastal views and use of the beach for swimming, diving, surfing and fishing.

The value of an asset also includes consideration of risks and liabilities and can be positive or negative at different stages of the asset's life. Established community and stakeholder feedback further encompass the economic, social (including heritage) and environmental values of the coastal zone.

Risk management measures will be considered that reduce risk to values and assets to tolerable levels. Tasks to implement the measures will be summarised to provide strategic guidance on medium—and longer-term risk management, but more focus will be placed on short-term (less than 10 years) management measures. The CHRMAP will focus on preserving assets and values that provide public benefit, although private at-risk assets will also be identified.

The CHRMAP will consider what the risks are, who is responsible or obliged to manage the risks and how the risks will be managed.

This CHRMAP project is expected to increase knowledge and understanding of coastal hazard risks and identify risk management and adaptation measures for implementation.

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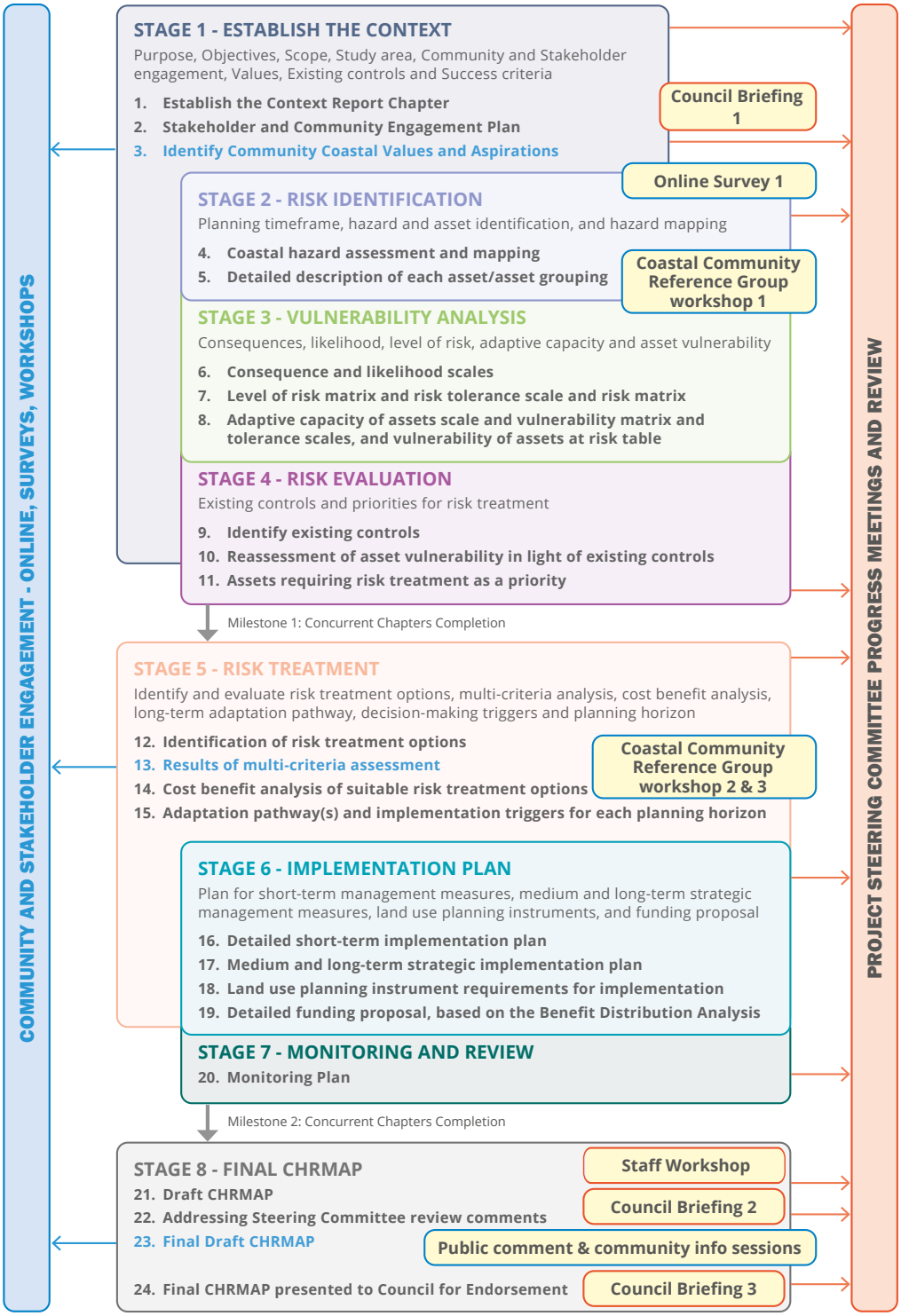


Figure 3: Mandurah Southern Beaches CHRMAP Project Stages

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The outcomes will inform local government policies, strategies and plans, including (but not limited to);

- Local planning strategies and Schemes;
- Strategic Community Plans;
- Structure plans and local planning policies;
- Drainage strategies;
- Asset management plans;
- Emergency management plans;
- Foreshore management plans; and
- Corporate business planning and budgets.

Recommended management measures will consider a number of criteria including financial, social, environmental, effectiveness and capacity to deliver.

Delivery of this project will occur over eight stages (as summarised in ***Figure 3***), where some stages are grouped together for concurrent chapter reporting to increase the efficiency and coherence of the project's progress for optimum outcomes. The staged approach is developed according to the City of Mandurah's scope and is in line with the SPP 2.6 objectives and CHRMAP Guidelines (WAPC, 2019).

1.6 Study Area

The Southern Beaches CHRMAP study area covers the ocean-facing coastline continuing on from the Northern Beaches CHRMAP from Roberts Point, Halls Head to the southern most border of the City in the Clifton locality.

The nearby Peel-Harvey Estuary to the east of the Mandurah Southern Beaches coastlines is excluded from this study, with a CHRMAP for the estuarine environment planned after the completion of this project. The study area is indicated in ***Figure 4***, showing its relationship with other nearby CHRMAPs.

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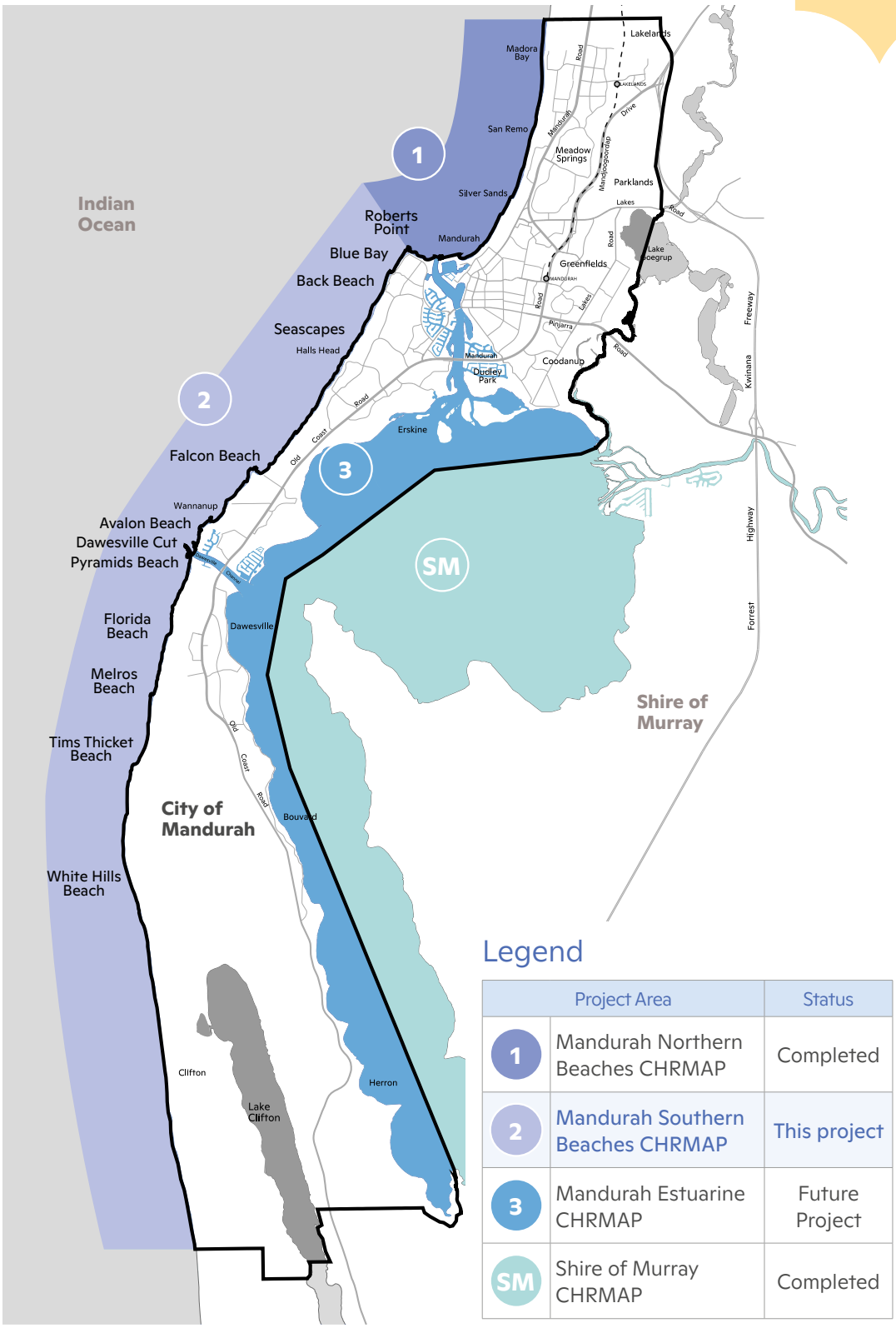


Figure 4: Mandurah Southern Beaches CHRMAP study area in relation to other CHRMAP study areas in the vicinity.

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1.7 Coastal Managers

1.7.1 City of Mandurah

The City of Mandurah (CoM) has led the development of this CHRMAP. The CoM has vested management on behalf of the State over the majority of the 43 km of coastal foreshores, 38 km of estuary waterways and foreshores, and 8 km of riverine waterways and foreshores.

As previously indicated, a significant proportion of this is populated and highly accessible, meaning that there are extensive assets and values associated with the coastline. This also means that the City has substantial social, environmental and economic responsibility for a number of areas that may be competing for consideration.

1.7.2 Department of Transport

The Department of Transport (DoT) is responsible for a number of assets within the CoM local government area. The primary asset of interest for this CHRMAP is the Dawesville Channel (see ***Section 1.7.3: Management of the Dawesville Channel***).

DoT pumps sand across the Dawesville Channel (also known as the Cut) each year to ensure safe navigation while allowing the natural flow of sediment to continue northwards along the coast. This sand bypassing typically begins towards the end of each summer. In the 2023 sand bypassing program, 130,000m^3 of sand was pumped from Pyramids Beach to north of the Cut.

The sediment supply volume passing through the Cut plays a crucial role for the erosion hotspot at Falcon Bay to Rakoa Street, which also contributes to maintaining the natural flow of sand to the north of the study area, e.g., Doddies Beach and the Northern Beaches. (Seashore Engineering 2019). A Permanent Sand Bypassing Feasibility Investigation has recently been completed between both CoM and DoT for the Mandurah Ocean Entrance channel but also extended to the Dawesville operation.

DoT is also responsible for ensuring safe navigation in both inland and coastal waters. Whilst the primary responsibility for maintaining beach access points and beach boat launching remains with the City, DoT is a key stakeholder in the long term oversight of the safety of these access points and facilities.

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1.7.3 Management of the Dawesville Channel

The Dawesville Channel (or the Dawesville 'Cut') is an artificial channel between the Peel-Harvey Estuary and the Indian Ocean.

Its primary purpose was to alleviate significant concerns with the health of the Peel Inlet, which had become seriously degraded, with algae becoming odorous, fish and crab stocks reducing and recreational functions affected.

The cause of the degradation stemmed from farming and agricultural practices associated with use of fertilisers and with animal farming (pigs and poultry) in the drainage catchment of the inlet. Nutrients from these activities entered the system via flows from the Murray, Serpentine and Harvey Rivers. The Cut was designed to allow for natural flushing of the inlet system from the coast.

Whilst DoT manages the structural components of the Cut, and is responsible for the safe navigation of craft in and through the Cut, it is acknowledged that the Cut functions with shared oversight from a number of stakeholders, including the:

- City of Mandurah (CoM).
- Department of Biodiversity, Conservation and Attractions (DBCA).
- Environmental Protection Authority (EPA).
- Department of Water and Environmental Regulation (DWER).
- Peel Harvey Catchment Council (PHCC).
- Shire of Murray (SoM).

This CHRMAP will potentially identify management tasks or actions at the ocean facing edges of the Cut which will require shared alignment and/or shared delivery responsibility of these stakeholders.

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1.7.4 Department of Biodiversity, Conservation and Attractions

The Department of Biodiversity Conservation and Attractions (DBCA) is responsible for the Yalgorup National Park. Yalgorup National Park is a significant park on the Swan Coastal Plain vested for the protection and management of internationally important environmental, cultural, and landscape values specific to the coastal setting and the lakes system. These values are put under pressure from visitor and recreational use in the Park given its close proximity to the ever-expanding southern fringe of the Perth and Peel metropolitan areas.

Visitor planning for Yalgorup has been ongoing since the park was created in the 1970's to manage existing recreation and visitor use and plan for future opportunities.

The park interfaces with the Clifton locality at the southern end of the CHRMAP study area (***Figure 5***). DBCA will have a strong interest in the outcomes for planning along this area.

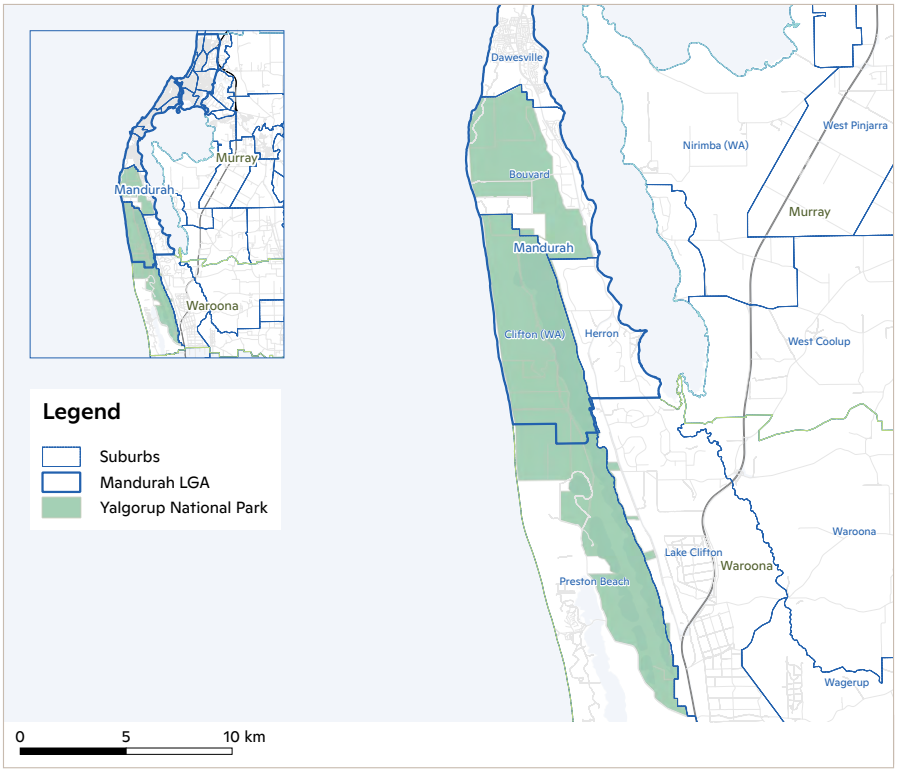


Figure 5: Yalgorup National Park area

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1.8 Coastal Context

1.8.1 Coastal Geology and Geomorphology

The study area has a mixed sandy and rocky coastline, consisting of limestone platforms overlain by a mix of calcium carbonate sands and eroded limestone. The stable component of the geomorphology is Tamala Limestone which underlies and backs the beaches and forms headlands and offshore reefs. The coastal foreshore is dominated by sand dunes of varying heights and limestone rock outcrop and underlying bedrock, with some nearshore lakes to the southern end (Searle and Semenuik, 1985).

The nearshore coastal zone is characterised by offshore rocky limestone reefs supporting macroalgae (seaweed communities) and nearshore areas of shallow sand-based benthic habitats dominated by seagrass communities. Offshore bathymetry is relatively simple beyond approximately 30m depth. In shallower waters limestone reef chains provide significant, but inconsistent, wave sheltering to the coastline. Seasonal weather patterns drive changes to beach width, generally being wider in summer and narrowing in winter due to storm erosion (some areas being narrower in summer and widening in winter).

The study area's coastline is predominantly classified as a "mixed sandy" or "mixed sandy and rocky" coastline according to the coastal classifications defined in SPP 2.6 Schedule One (WAPC, 2013). Much of the coastline comprises rock platforms overlain by a sandy beach backed by remnant sand dunes. Nearshore reefs are present along much of the coastline and exposed rock is present above Mean Sea Level (MSL) in sections, particularly during the winter months.

In 2023, DoT commissioned GBG Maps to undertake geotechnical surveys to better understand the local geology at Falcon Bay. Based on testing of a longshore and cross shore sections using multiple methods a 600m section of coast was investigated (GBG Maps, 2023). The estimated level of limestone bedrock ranged between approximately -3.0mAHD and 4.5mAHD.

The study area is typified by fringing limestone reef structures scattered adjacent and parallel to the coastline.

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Picture 1: (Right) Limestone outcrop (typical) near Back Beach, Halls Head

Picture 2: (Below) Limestone outcrops in dune system near Acerosa Boulevard, Seascapes





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Picture 3: Typical sandy shore with fringing limestone outcrops

1.8.2 Water Levels

Climate change will cause variations in many environmental variables including mean sea level, ocean currents and temperature, wind climate, wave climate, rainfall/run-off, and air temperature (WAPC, 2013). Whilst consideration of changes in other variables may be suitable as knowledge improves, the key variable to consider when determining coastal processes is mean sea level rise, which is addressed further below.

The study area experiences a low tidal range from mixed but mainly diurnal tides. The small tidal movement allows wind and waves to be the major drivers of currents, particularly within the nearshore zone. Longshore currents correspond to seasonal wind and wave conditions, predominantly propagating northward during summer and to the south during winter. The interaction of these currents with shoreline features can form local eddy and rip currents, particularly when swell is present, driving substantial water movement perpendicular to the shore. Astronomical tidal planes at Cape Bouvard have been included in ***Table 2***. The full tidal range between Lowest Astronomic Tide and Highest Astronomic Tide is quite small at 1.04m.

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Table 2: Cape Bouvard tide levels (DoT, 2007)

Tidal Water Levels	m AHD	m CD (3.495m below Tidal Benchmark DMH 102)
Highest Astronomical Tide (HAT)	0.653	1.23
Mean High Higher Water (MHHW)	0.23	0.88
Mean Sea Level (MSL)	0.04	0.69
Mean Low Lower Water (MLLW)	-0.15	0.5
Lowest Astronomical Tide (LAT)	-0.46	0.19

Globally, Mean Sea Level (MSL) has risen since the nineteenth century and is predicted to continue to rise, at an increasing rate, through the twenty first century (Intergovernmental Panel on Climate Change [IPCC], 2021). Changes to MSL over the past century have been observed along the WA coastline and are predicted to continue, including for the study area (CSIRO and BoM, 2015). Sea Level Change in Western Australia – Application to Coastal Planning (Department of Transport [DoT], 2010) reviewed information relating to SLR at a local scale and recommended an allowance for SLR be adopted for planning purposes.

Recommendations were based on the upper bound of the global average SLR projections from IPCC's Fourth Assessment Report [AR4] (IPCC, 2007). In the intervening years, following release of the DoT document, advances in climate change science have been reflected in revisions to SLR projections, such as those documented in IPCC's Sixth Assessment Report [AR6] (IPCC, 2021).

Current guidance on global SLR projections is derived from Shared Socioeconomic Pathways (SSP), characterising the trajectory of global society, demographics and economics over the coming century. Analogous to that used in DoT's (2010) recommendation is SSP5, which forecasts a SLR of 0.94m between 2024 and 2124.

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1.8.3 Wind Climate

The study area experiences two distinct seasonal weather patterns. The summer months are characterised by moderate to strong south-westerly sea breezes which develop in the afternoon. The winter months are characterised by intermittent storms attributed to mid latitude low pressure systems, shifting the dominant wind direction to north-westerly. A summary plot of available local wind recorded by the Bureau of Meteorology is provided below in ***Figure 6***.

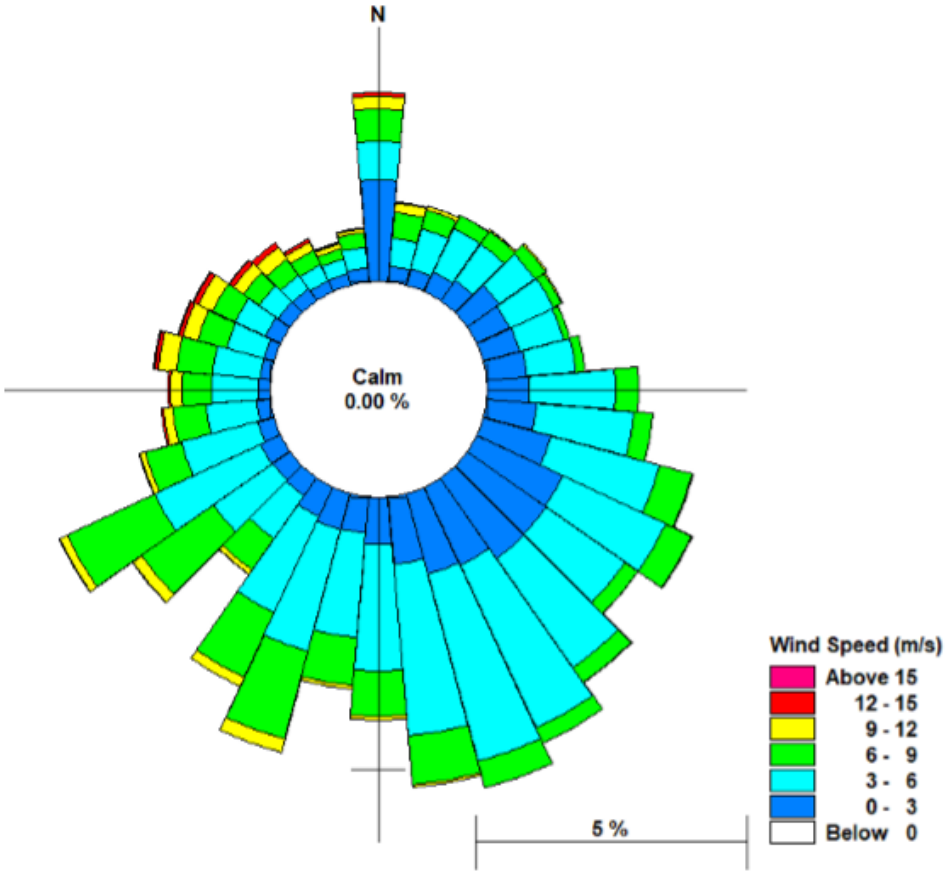


Figure 6: Mandurah wind data 2001 to 2021 in entirety

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1.8.4 Wave Climate

Analysis of local waverider buoy data from 30m depth due west of Madora Beach indicates the wave climate in the study area is seasonal, with on average, higher wave energy and more northerly wave direction during the winter months. The two seasonal weather modes dominate the local wave climate with locally generated seas from the south, south-west interrupting generally calm conditions during summer. Storms during winter lead to higher energy wave conditions and a greater presence of offshore derived swell, which generally propagates from the southwest, but can also approach from the north west.

Figure 7, Figure 8 and ***Figure 9*** summarise wave data from 2014 to 2022 inclusive in entirety, and in the summer and winter season.

Tropical cyclones that develop during the summer months off WA's north-west coast rarely track down to the study area's latitude, however, have been recorded in the area and can cause significant damage to coastal infrastructure.

Further details and relevance of the metocean conditions in the study area are presented in ***Section 2: Risk Identification***.

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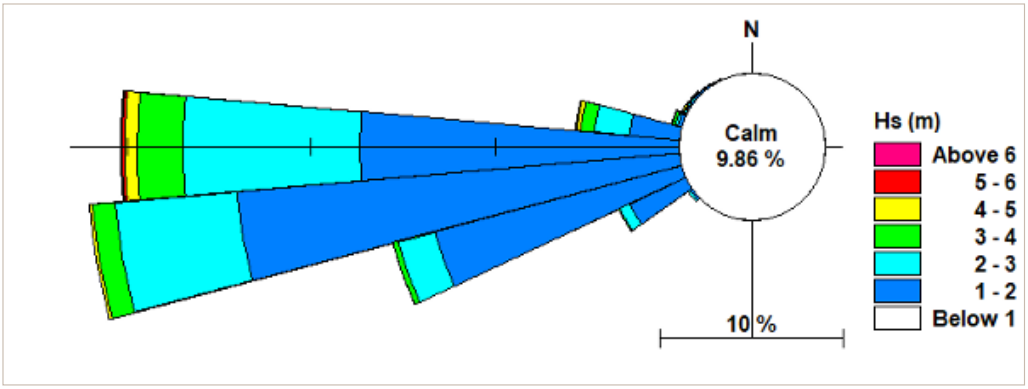


Figure 7: Mandurah waverider buoy data from 30m depth – significant wave height 2014 to 2022 in entirety

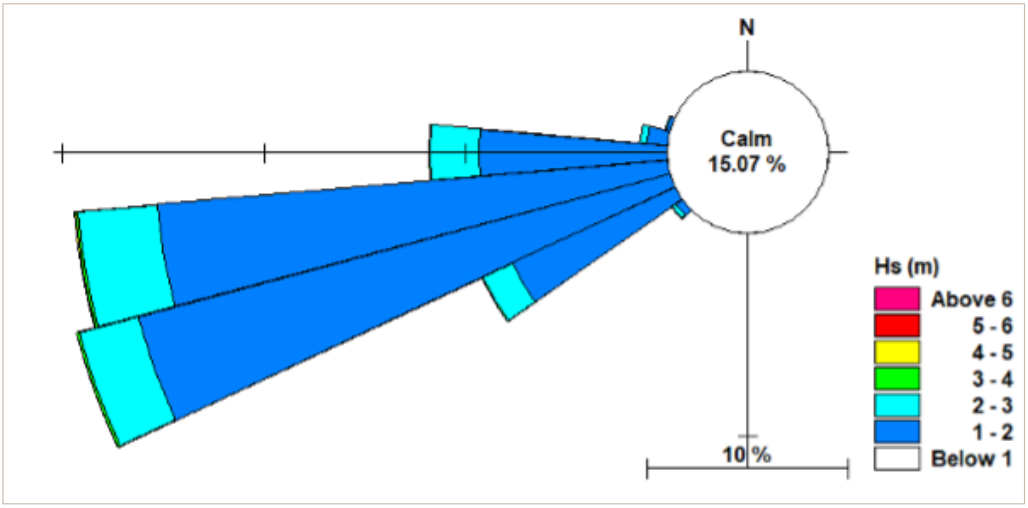


Figure 8: Mandurah waverider buoy data from 30m depth – significant wave height 2014 to 2022 in the summer months

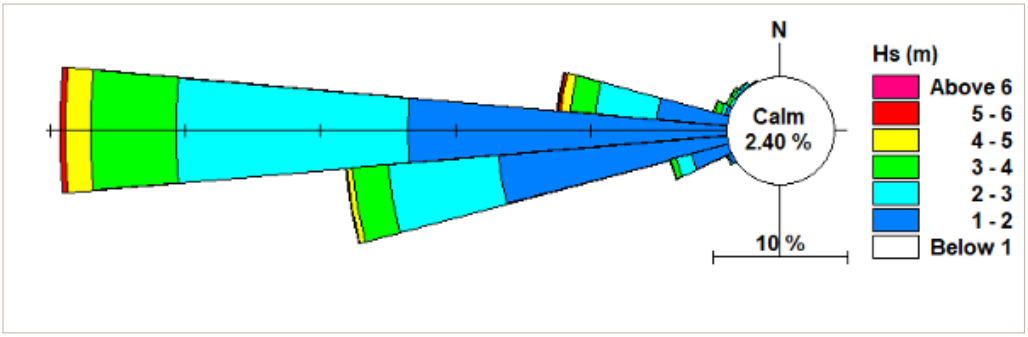


Figure 9: Mandurah waverider buoy data from 30m depth – significant wave height 2014 to 2022 in the winter months

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1.8.5 Sediment Transport

Sediment cells are areas along the coastline which are likely to be connected through processes of sediment exchange. Stul et al. (2015) mapped sediment cell boundaries at three spatiotemporal scales along the Western Australian coastline between Cape Naturaliste and Moore River. The three scales are listed below and depicted for the study area in ***Figure 10***.

- Primary cells are related to large landforms or land systems over longer coastal management timescales of more than 50 years.
- Secondary cells incorporate contemporary sediment movement on the shoreface and potential landform responses to inter-decadal changes in coastal processes. The study area is spread across cells 8 and 9. Cell 8 spans from Preston Beach North to Cape Bouvard, cell 9 from Cape Bouvard to Robert Point; and
- Tertiary cells are defined by the reworking and movement of sediment in the nearshore and are the most relevant for seasonal to inter-annual changes to the beach face. The study area is spread across cells 8b, 9a and 9b. Cell 8b spans from Lake Clifton North to Cape Bouvard; cell 9a from Cape Bouvard to Dawesville and cell 9b from Dawesville to Robert Point.

Longshore sediment transport within the study area has been shown to be a net northward movement of material annually, with some minor reversals depending on metocean conditions in winter (BMT 2023). Nearshore structures can obstruct this sediment movement. The most notable example of this is the breakwaters associated with the Dawesville Channel, and the sand trap for mechanical sand bypassing across the channel.

Cross-shore sediment movement is also seasonal, with sporadic periods of swell pushing sediment onto the shore, steepening the beach profile. Mid-year, the beach is reformed by the energy of winter storms eroding the beach face and redepositing sediment to form sandbars just offshore. These formations become stable towards the end of winter and act as a buffer, preventing wave breaking at the shore and the substantial shifting of sediment that can cause long-shore transportation and further erosion towards the spring and summer.

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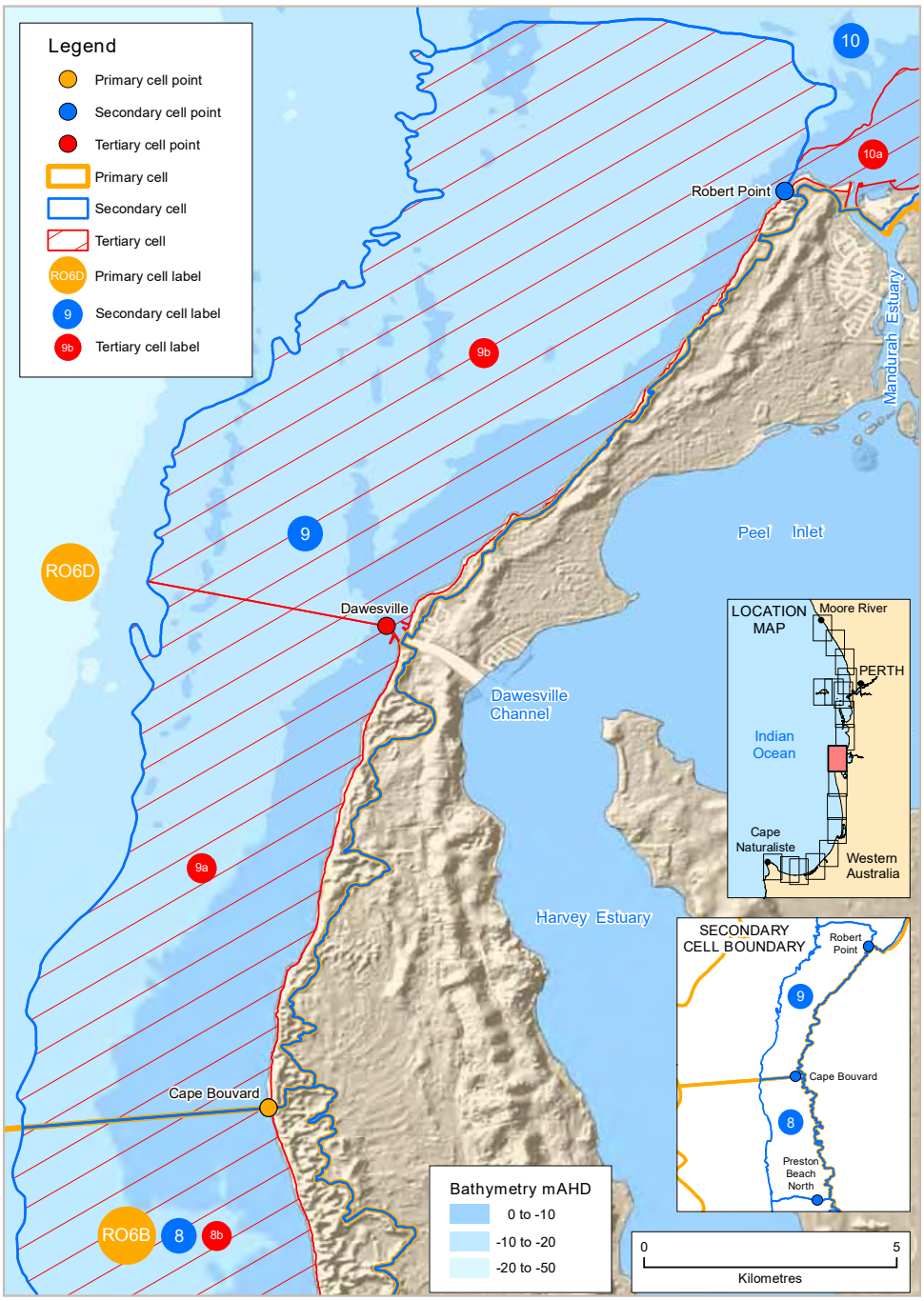


Figure 10: Sediment cells relevant to the study area (Stul et al. 2015)

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1.8.6 Other Coastal Context

Coastal processes and hazards as described in SPP 2.6 are exclusively natural forces (tides, waves, wind, sediment movement). These are the primary assessment tools for understanding likely future scenarios. However, there are other forces (activities) that can impact on the coastline.

These activities are important to understand, as they can often be managed in such a way as to reduce their impact.

Natural vegetation and paths

Natural vegetation is an important natural defence against natural forces. Although often considered unreliable as a last line of defence, a dunal system covered with healthy, established vegetation can help to slow the impact of some coastal events.

Walking, pulling buggies and driving tractors through the dunes, although providing local ease of access, can destabilise the vegetation and lower resistance to coastal events. Due to the height of the foredune in most locations, there are few tracks through the dunes along the coastal edge, however, tracks proliferate where dunes are more passable. These could be better managed to reduce risk.

Vehicle access points to the beach also result in less natural vegetation and thus protection in those locations, but with lower levels of immediate risk.

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Four wheel driving

Four wheel driving on beaches has been the subject of a significant amount of research. It has been studied in Australia and WA, including through a 30 year study of the Mid-West coastline, with different although comparable properties as the Mandurah Southern Beaches area (Priskin 2004).

Research consistently shows that beach driving impacts both the ecological and geomorphological systems of the coast, creating both compaction and displacement impacts, localised stripping of vegetation and damage to fauna. Access to the beach through the dunes also impacts dune vegetation resulting in blow outs; large areas of unvegetated dune that has limited defence against erosion.

Compaction of sand in wheel tracks limits the natural movement of sediment (sand) for those areas compacted and creates a harder surface for wave run-up. Faster wave run-up exposes the primary dune system to faster and more vigorous wave action (Dune Restoration Trust of New Zealand, 2014).

Impacts are not only to the dune system, but also the beach. Unauthorised recreational and vehicle activity can destabilise vegetation; wheel tracks can break underground root systems, decrease root production, and greatly reduce presence of sand adapted species that would normally provide defence.

The majority of the study area extent is protected from four wheel driving by the placement of substantial rocks and some wooden sculptures on the beach and in the dunes (see examples in ***Picture 4*** and ***Picture 5***).

Notwithstanding, there are areas in the south which have uncontrolled four wheel driving on both the beach and dunal system, which will need to be considered in this CHRMAP.

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Picture 4: Rocks Placed to stop four-wheel driving outside of designated launching zones (Yeedong Road Boat Launching Facility, Avalon)



Picture 5: Wooden sculptures placed in the dunes to stop four-wheel driving outside of designated launching zones. (Yeedong Road Boat Launching Facility, Avalon)

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1.9 Cultural, Economic and Social Context

The City of Mandurah local government area is surrounded by various water bodies, including the ocean, rivers, estuaries and lakes, which extend to the beaches, foreshores coastal heath, wetlands and bushlands, forming the unique environment that is highly valued by the community, evidenced by the extensive water-based activities observed in the study area.

1.9.1 Cultural Context – Aboriginal Heritage

The first people known to have inhabited the area were the Bindjareb people of the Noongar Nation. These people lived well off the land, which abounded in fish, game, berries and fruits. The locality then was known as Mandjoogoordap, which translates as 'meeting place of the heart'. After European settlement the name was adapted to Mandurah (City of Mandurah, accessed 2024).

The history from before colonisation is vast and there are many signs and places of significance that survive today. The meaning of Mandjoogoordap remains true today; it continues to be a meeting place where many paths cross. The waterways play an important role in the Aboriginal creation story of the Wagyl, with the estuary formed from the Wagyl coming from the sea and then its young travelling across the land to form the Murray, Harvey and Serpentine Rivers (www.ourknowledgeourland.com.au).

The Bindjareb people are part of the larger Gnaala Karla Booja region of the Noongar Nation, which also includes the Wilman and Ganeang people.

The Gnaala Karla Booja region encompasses the towns of Bunbury, Capel, Donnybrook, Balingup, Wickepin, Narrogin, Williams, Mundijong, Kwinana, Brookton, Pingelly, Wagin, Harvey, Collie, Pinjarra, Mandurah and Boddington (https://gkb.org.au).

1.9.1.1 Native Title and Indigenous Land Use Agreements

The study area is fully located within the 195,128.35 km² South-West Settlement area which encompasses the land of the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC). This Native Title Determination (Determination WCD2021/010) was preceded by the execution of an Indigenous Land Use Agreement (ILUA) for each of the above groups in June 2015 (see ***Figure 11***).

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In the context of the CHRMAP, the South West Settlement and the ILUA oblige the City and other stakeholders to consider how any activity may 'impact' (i.e. by excavating, damaging, destroying or altering in any way) any Aboriginal Heritage site or place of value.

This is relevant to the CHRMAP, as many strategies may result in activities that may impact a site, of which there are already many known in the area, described under the following sections.

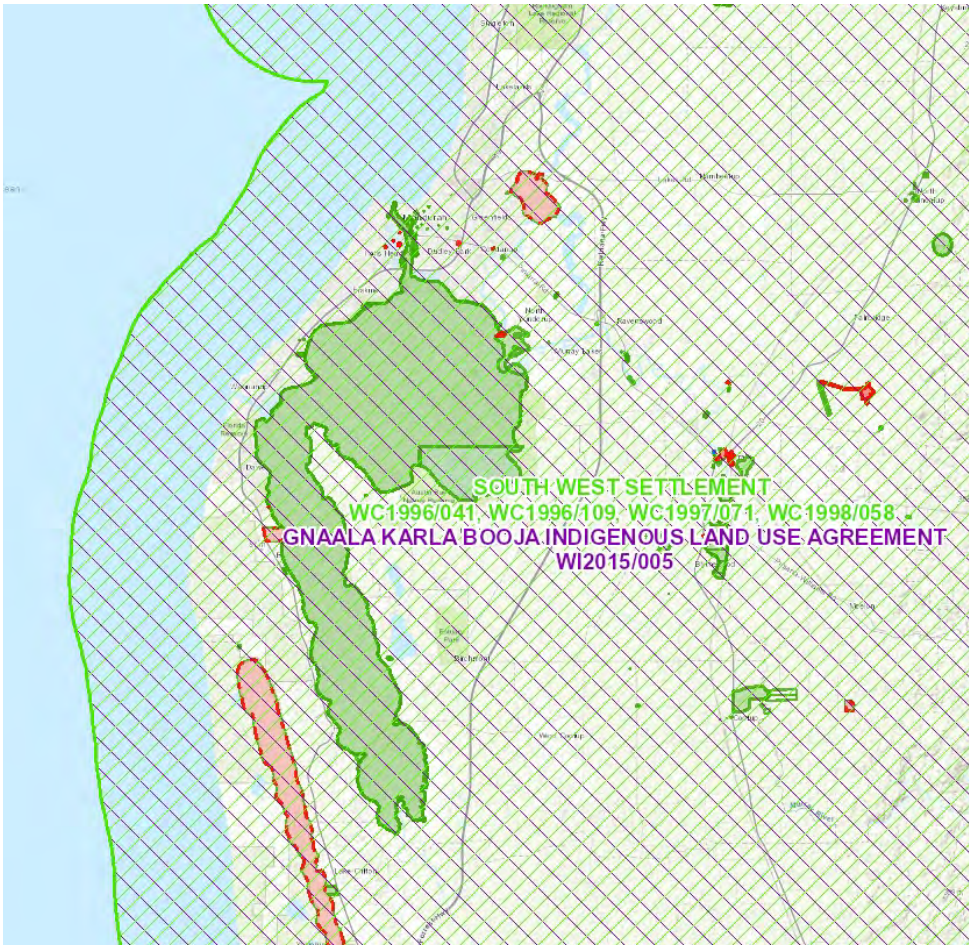


Figure 11: South West Settlement Native Title Claim Overlay

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1.9.1.2 Winjan's Camp

Winjan's Camp is known as Aboriginal Cultural Heritage (ACH) Register Place 3724, last updated 02 April 2003.

George Winjan (also known as Yaburgurt) was a key local Bindjareb Elder and likely lived through the Pinjarra massacre in 1834 as a child. It is likely that he lost many family members in the massacre, including his mother and brothers. He is believed to have lived in the Mandurah and Pinjarra area until his death in 1915 at approximately 86 years of age.

Winjan's Camp is at the northern most part of the study area. It is unlikely to be impacted by the study directly but has close proximity to the study area (see ***Figure 12***). It is a culturally sensitive site but is not listed as being gender or initiation restricted.

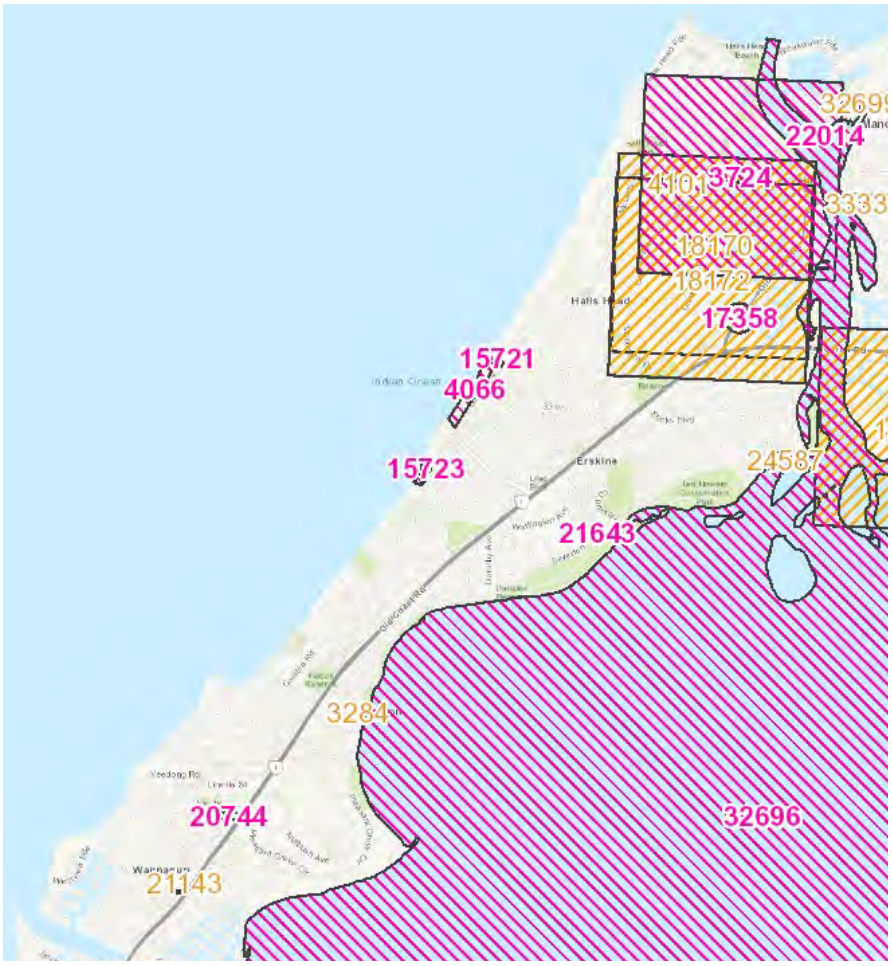


Figure 12: Halls Head to Wannanup Aboriginal Cultural Heritage

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1.9.1.3 Scarred Tree No. 1

Scarred Tree No. 1 is known as Aboriginal Cultural Heritage (ACH) Register Place 18172, last updated 18 April 2001 (***Figure 12***). It is a Burial; Ritual / Ceremonial; Modified Tree; Repository / Storage Place. It is a culturally sensitive site but is not listed as being gender or initiation restricted. It is unlikely to be impacted by the study directly but has proximity to the study area.

1.9.1.4 Scarred Tree No. 2

Scarred Tree No. 2 is known as Aboriginal Cultural Heritage (ACH) Register Place 18170, last updated 24 April 2001 (***Figure 12***). It is a Burial; Ritual / Ceremonial; Modified Tree. It is a culturally sensitive site but is not listed as being gender or initiation restricted. It is unlikely to be impacted by the study directly but has proximity to the study area.

1.9.1.5 Seascapes 01

Seascapes 01 is known as Aboriginal Cultural Heritage (ACH) Register Place 15721, last updated 16 January 1999 (see ***Figure 13***). It is a site of artefact scatter. It is not a culturally sensitive site[1] or listed as being gender or initiation restricted.

The site is immediately along the coastline on Boardwalk Boulevard in Halls Head and may be directly impacted by coastal hazards. The CHRMAP should consider this in its decision making and engagement has commenced directly with the Bindjareb people through the Gnaala Karla Booja Aboriginal Corporation Cultural Advice Committee (the CAC).

1.9.1.6 Halls Head

Halls Head is known as Aboriginal Cultural Heritage (ACH) Register Place 4066, last updated 20 March 2017 (see ***Figure 13***). It is a burial site. It is not a culturally sensitive site or not listed as being gender or initiation restricted.

The site is a long contiguous site immediately along the coastline in Halls Head and may be directly impacted by coastal hazards. The CHRMAP should consider this in its decision making and engagement has been commenced directly with the Bindjareb people through the CAC.

1 In the ACH Register, culturally sensitive information means information that, in accordance with Aboriginal tradition, is information that is not to be shared with people who are not the knowledge holders for the Aboriginal cultural heritage to which the information relates.

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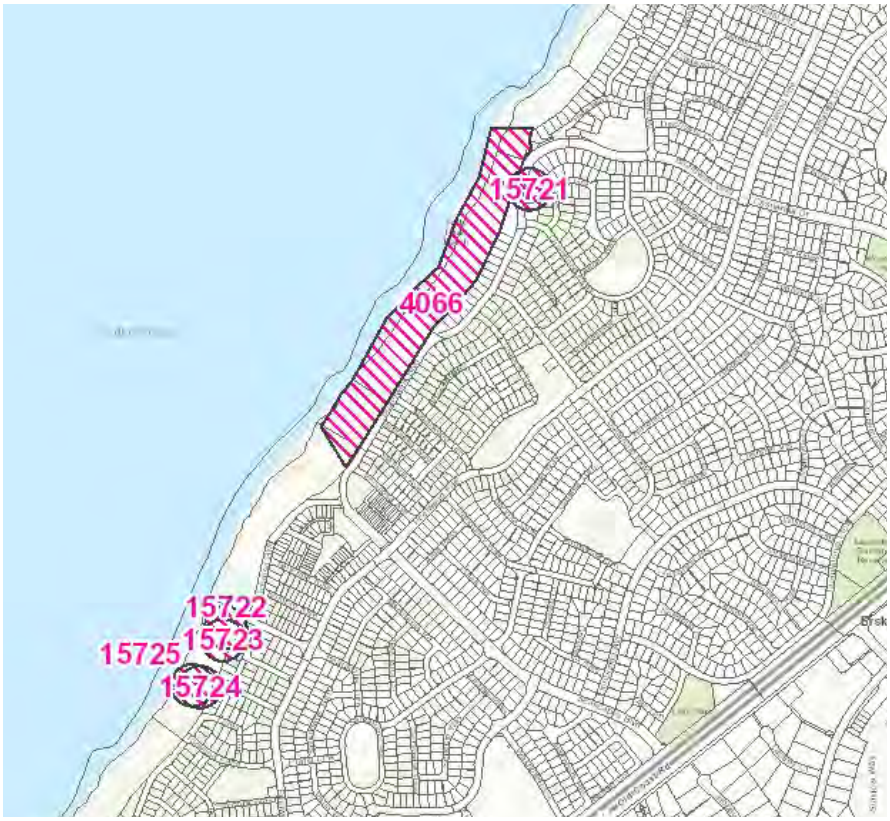


Figure 13: Seascapes Sites Aboriginal Cultural Heritage

1.9.1.7 Seascapes 02

Seascapes 02 is known as Aboriginal Cultural Heritage (ACH) Register Place 15722, last updated 20 January 1999 (see ***Figure 13***). It is a site of artefact scatter. It is not a culturally sensitive site or not listed as being gender or initiation restricted.

The site is immediately along the coastline on the seaward side of residential properties on Cuprea View in Halls Head and may be directly impacted by coastal hazards. The CHRMAP should consider this in its decision making and engagement has been commenced directly with the Bindjareb people through the CAC.

1.9.1.8 Seascapes 03

Seascapes 03 is known as Aboriginal Cultural Heritage (ACH) Register Place 15723, last updated 16 January 1999 (see ***Figure 13***) and immediate adjacent to site 15722. It is a site of artefact scatter. It is not a culturally sensitive site or not listed as being gender or initiation restricted.

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The site is immediately along the coastline on the seaward side of residential properties on Cuprea View in Halls Head and may be directly impacted by coastal hazards. The CHRMAP should consider this in its decision making and engagement has been commenced directly with the Bindjareb people through the CAC.

1.9.1.9 Seascapes 04

Seascapes 04 is known as Aboriginal Cultural Heritage (ACH) Register Place 15724, last updated 20 January 1999 (see ***Figure 13***). It is a site of artefact scatter. It is not a culturally sensitive site or not listed as being gender or initiation restricted.

The site is immediately along the coastline on the seaward side of residential properties on Cuprea View in Halls Head and may be directly impacted by coastal hazards. The CHRMAP should consider this in its decision making and engagement has been commenced directly with the Bindjareb people through the CAC.

1.9.1.10 Seascapes 05

Seascapes 05 is known as Aboriginal Cultural Heritage (ACH) Register Place 15725, last updated 16 January 1999 (see ***Figure 13***) and immediate adjacent to site 15724. It is a site of artefact scatter. It is not a culturally sensitive site or not listed as being gender or initiation restricted.

The site is immediately along the coastline on the seaward side of residential properties on Cuprea View in Halls Head and may be directly impacted by coastal hazards. The CHRMAP should consider this in its decision making and engagement has been commenced directly with the Bindjareb people through the CAC.

1.9.1.11 Harvey Estuary, Seaview 2

Harvey Estuary, Seaview 2 is known as Aboriginal Cultural Heritage (ACH) Register Place 3288, last updated 02 December 1998 (see ***Figure 14***). It is an Artefacts / Scatter, Camp; Other. It is not a culturally sensitive site or not listed as being gender or initiation restricted.

It is unlikely to be impacted by the study directly but has proximity to the study area.

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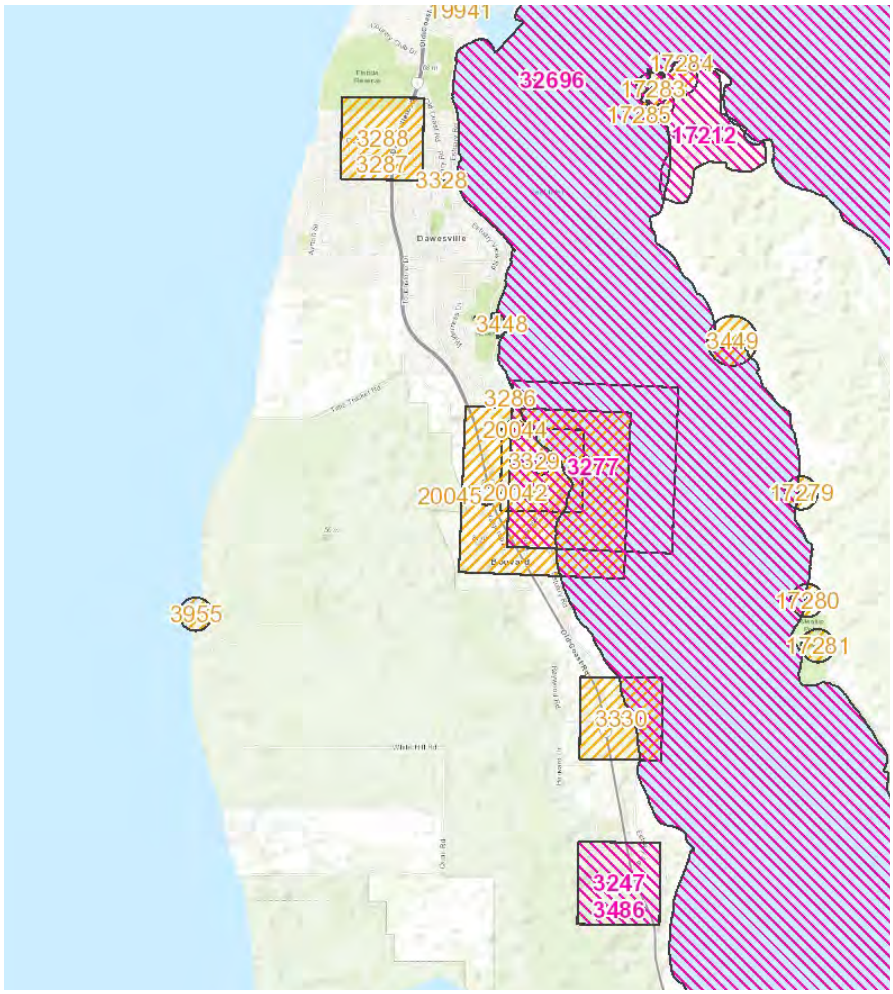


Figure 14: Dawesville to Clifton Aboriginal Cultural Heritage Map

1.9.1.12 Tim's Thicket

Tim's Thicket is known as Aboriginal Cultural Heritage (ACH) Register Place 3955, last updated 08 September 1999 (see ***Figure 14***). It is a site of Burial, artefact scatter. It is not a culturally sensitive site or not listed as being gender or initiation restricted.

The site is immediately along the coastline in the locality of Bouvard and may be directly impacted by coastal hazards. Although there is no direct road access within the heritage Place boundary, it is clear from aerial photography that numerous vehicles traverse through the dunes in proximity.

The CHRMAP should consider this in its decision making and engagement has been commenced directly with the Bindjareb people through the CAC.

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1.9.2 Cultural Context – Colonial Settlement History and European Heritage

European heritage in the study area can be traced back to 1828 when Sir Thomas Peel brought a large number of colonist settlers to the region. Mandurah remained very isolated from other populations and services due to the existence of its many waterways. Mandurah was a day's journey by sea or more than two days by horse and cart travelling on old Aboriginal trails. Rail to Pinjarra initially meant that Pinjarra advanced more quickly. However, this did result in the Mandurah area becoming known for its tourism values.

A road was built from Fremantle in 1920 which increased access. By the middle of 1949 Mandurah's Roads Board was established for the area 'between the sea and the estuary and Mandurah itself' (City of Mandurah, accessed 2024), making Mandurah a separate Local Government entity for the first time.

The Mandurah Shire Council was gazetted in 1961, became a Town in 1987 and reached City status quickly thereafter by 1990. There is just one heritage place recognised either on the State Heritage List or Municipal Heritage Inventory that may be relevant to this CHRMAP.

1.9.2.1 Hall's Cottage

Hall's Cottage is registered on the State Register of Heritage Places as Place number 01485, 27 May 2014. It is located at 7 Leighton Road in Halls Head and was constructed from 1833. It is unlikely to be impacted by the study directly but has proximity to the study area.

1.9.3 Economic Context

Historically the area was known for fishing and fruit growing, canning factories to store produce, timber and then tourism. In 1925 it was reported that some 2,000 people visited Mandurah during holiday season to stay at boarding houses or for camping (from a typical resident population less than 150 residents). The first hotel (Brighton) was built in 1895, a boarding house by 1900 and the Peninsular Hotel by 1903.

By the 1970's with Mandurah's permanent population at 4,000, tourism lifted the population to some 10,000 on an average summer weekend. In more recent history, Mandurah has seen substantial population growth, growing some 20,000 residents between 2013 -2023 – a 25% growth rate in just 10 years (current population approximately 100,000). Mandurah is predicted to grow another 16,000 persons in the next 20 years.

Based on the National Economics (NIEIR) Modelled series (source: economy.id.com.au), Mandurah's largest current industry (by employment) is Health Care and Social Assistance. This is followed by Retail, Education and Training, Accommodation and Food Services and Construction. While Tourism is not an

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industry category in the model, Retail and Accommodation and Food Services are considered to have significant direct tourism component.

Whilst the financial value of the study area's tourism economy is well understood quantitatively, the perceived value of tourism to the community in the Mandurah Southern Beaches study area is tested through the CHRMAP.

Community and stakeholder engagement has not indicated a substantial financial value placed on the tourism economy in the area (e.g. shops and restaurants, surfing classes etc), but engagement has strongly suggested value is placed on the natural and rugged beauty of the coastline that attracts people to visit. This 'nature-based' tourism visitor economy is important to the local community, and is recognised in this CHRMAP.

Impact on the natural experience may negatively affect the economic context of the area.

1.9.4 Social Context

The Mandurah community has identified its values through its Strategic Community Plan. Its updated vision for 2024-2044 is:

> ***Woven by waterways; a city that is thriving and connected to its people and nature.***

Within the community, there is a strong connection to all things water – protection, recreation, appreciation, enjoyment. It is very clear that the community of Mandurah is deeply connected to the water. (Strategic Community Plan, 2024).

The social context of Mandurah is indelibly linked to the water. This section details a number of much loved coastal assets relevant to the study area.

This section describes the coastline of the Southern Beaches study area from north to south, with direct feedback from the community on the social values associated with each of the locations (see ***Figure 15***).

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Figure 15: Roberts Point to Yalgorup location names



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1.9.4.1 Blue Bay, Halls Head

Blue Bay is the first bay in the study area when running north to south. Immediately south of Roberts Point, where there is a viewing platform, the area is known for snorkelling off shore, to be clean and quiet, and has some rock pools when the tide is out. A small section of the beach is closed to motorised vessels. This section of the coast is also known for surfing in the right conditions.

Shower and toilet facilities are available, as is plenty of parking. The recent dual use path upgrade along the coast in this location may increase access from cyclists or e-rideables.

When invited to share their coastal values, the community identified Blue Bay as the third most visited beach in the southern beaches study area with walking, relaxing, bicycling, socialising and watching the sunset and watching bird life some of the most common activities, year around. Surfing was also recognised at Roberts Point.

1.9.4.2 Back beach

Back Beach is a stretch of coastline with relatively low use compared to the nearby beaches, predominantly because of its low levels of direct access by road and steep steps. Walking, swimming and snorkelling were the most common uses.

1.9.4.3 Calypso (including the Giants of Mandurah)

The area south of Back Beach comprises mostly reserve land containing a waste water treatment plant. For the purposes of this CHRMAP it has been called Calypso, and the coastal path is the most valued asset noted in the area, with the exception of the Giant.

The Giants of Mandurah is a major tourism driver to Mandurah. One of the wooden sculpture art installations 'Santi Ikto' is installed on the coastal ridge in the regional open space abutting the Halls Head Waste Water Treatment Plant to the east.

The sculpture trail is set on the north-south coastal path from Calypso Road in the north to Daydream Plaza in the south. There are carparks, toilets, showers and playground amenities in the northern extent of the location, and a carpark in the southern extent of the location.

1.9.4.4 Seascapes Beach, including Bakyrey Bay and Pringles Beach

Seascapes Beach includes a number of rocky pools and has outcrops of rock up into the dune. This area is known for its rich Aboriginal cultural heritage history, (see previous sections) and is adjacent to a relatively new area of urban development. Facilities are well used with a large number of people from the community noting their enjoyment of barbecues, play facilities, picnic areas and places to socialise.

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The rocky coastline may be delicate, and walking across the rocky outcrops is currently discouraged. Community interact with this section of coastline via dedicated coastal shared path frequented by walkers, runners, dog walkers, cyclists, with walking, swimming, riding and watching the sunset and bird life being the most regular uses of the foreshore area. Seascape beach is the sixth most visited section of coastline, according to survey of the community.

In this section of the coasts, there are fourteen interpretative signs (***Picture 6***) installed along the coastal walkway to support community learning about native species and Aboriginal use of plants and animals. It extends along 3km of footpath from Daydream Plaza to Gretel Drive. It is a collaborative project by local school students, traditional owners, Seascapes Coastcare Group, and an environmental artist, with the support of the City of Mandurah.



Picture 6: A Seascapes Interpretative Walkway signage at Seascapes Beach

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1.9.4.5 Rakoa Beach

The area known as Rakoa for the purpose of this CHRMAP comprises an open facing coastline including Josephine Te-Puni Reserve in the north and Rakoa Reserve closer to the southern end of the area.

There is a wide path to the beach near Rakoa Reserve and the presence of showers, shelters, barbecues and a playground make the parkland a desirable destination for gathering.

There are some protected swimming spots, a surf break and the beach is considered relatively uncrowded compared to the nearby Falcon Bay. The natural coastline is appreciated in this area.

1.9.4.6 Falcon Bay

The most visited beach in the study area according to surveys, Falcon Bay comprises a northern facing and protected beach with shady grassed areas, picnic tables, BBQs, a playground and toilet/shower facilities and the popular Falcon Bay Beach Cafe. With most services accessible to diverse users, this beach represents a multi-user destination unique to the study area.

It has calm waters, and is a favourite of local paddlers, has a reef for snorkellers and a pontoon offshore in summertime.



Picture 7: The Falcon Bay Foreshore Area

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When invited to share their coastal values, the community indicated heavy use of the area for walking, swimming, surfing, paddling, fishing, relaxing and spending time with family. Picnicking, watching sunsets and enjoying the facilities were also strongly valued.

As one of the few destinations in the study area with food and beverage options, dining was also recognised as a valued activity.

This location will need to be considered carefully in the development of the CHRMAP, as one of the few easy access beaches for a diverse audience, appreciated for its disability access qualities. It already comprises coastal protection structures within the foreshore parklands.

A coastal shared path project is currently underway, to continue the coastal path network from Halls Head through the Falcon area to the recently completed Halls Head shared path. The implications of the hazard modelling on the shared path alignment should be carefully considered, as the delivery of the project may contradict agreed outcomes of the CHRMAP, or may oblige the City to direct increased funding in this location when it might not otherwise have been required.

1.9.4.7 Gearies-Avalon

Gearies-Avalon is the second most visited beach in the study area, very close behind Falcon Bay. The area comprises a beach launching boat ramp (Yeedong Road), with boulders on the beach in a north and south direction designed to stop four-wheel driving outside of the beach launching area, as well as some wooden logs placed by the City to achieve the same restriction over the dunes (***Picture 5***).

Avalon Beach, the Yeedong Road boat ramp, and the surf break known as Gearies are much used for water based sports with swimming, snorkelling, surfing, paddle boarding, kayaking and fishing some of the primary uses.

Other uses include walking, running, riding, dog-walking and watching sunsets and birds, as well as socialising with family and friends.

In many discussions with the community, sand bypassing operations from the Dawesville Cut were queried, with the community noting the sizeable influence of bypassing operations on the beach environment, including the surf breaks and foreshore area. Notwithstanding, users noted the relative quiet and natural environment of the area, in contrast to the developed Falcon Bay.

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1.9.4.8 Dawesville Cut

The Dawesville Cut (The Cut) is a man-made channel connecting the Peel-Harvey Estuary System with the Indian Ocean. it was established first in 1994 to improve water quality in the estuary system after many decades of nutrients and run-off from farming activity had begin to impact the water quality, flora and fauna of the system.

Monitoring of the water quality is ongoing, and The Cut is considered an essential environmental control.

The channel is defined by rock training walls to maintain the entrance and a number of groynes. The training walls and groynes impact the south to north movement of sand along the coastline (intentionally to ensure the channel does not close over). To maintain the pre-development natural movement, sand bypassing is undertaken to mechanically move sand from the south side of the Cut to the north.

Either side of the Dawesville Cut is the infrastructure required for the sand bypassing program of DoT, which includes some heavy machinery, areas for excavation and areas for disposal. This results in areas on both the Wannanup and Dawesville side of The Cut being periodically closed to public access during seasonal campaigns, in the relevant excavation and disposal areas (see ***Figure 16***).

The entirety of area referred to as the Dawesville Cut in this CHRMAP is managed by DoT. The impacts of sand bypassing are important for the coastlines north and are noted by the community to affect beach usage north and south at various times.

The beaches immediately north and south are, regardless, well loved. Access is managed on the north side, and the beach is popular for fishing and surfing (at Egg Farms surf break).

The Cut is further analysed in Section 2 of this CHRMAP.

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Figure 16: Dawesville Cut Bypass Operations - General Layout and Areas

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1.9.4.9 Pyramids Beach-Golf Course, Dawesville

This beach immediately south of The Cut and part of the area referred to as the Pyramids Beach-Golf Course in this CHRMAP is known for surfing and other beach activities all year round. The Port Bouvard Surf Life Saving Club patrols the area and is the only surf club in the study area.

The beach is the fourth most visited beach in the study area, is attractive and well used by surfers, swimmers and snorkellers, and comprises a significant area of parking, including public toilets/showers and shelters as well as a path through the dunes, supporting the most popular value of walking.

The sand bypassing equipment for the Dawesville Cut is located here either contributing an aesthetic loss or interesting gain to the vista (depending on the audiences level of interest in coastal engineering).

The golf course is located within an area of high natural dunes overlooking the ocean. It is no surprise that sunset and wildlife watching are also popular past times.

1.9.4.10 Florida-Melros Beach

The Florida and Melros Beach area is quieter and more relaxed than its northern counterparts. The area is relatively enclosed by The Cut, the Peel-Harvey Estuary and the Yalgorup National Park. Despite this, it is a well visited location and much used for walking, swimming, relaxing and watching sunsets and bird life.

There is some good quality snorkelling valued by the community in the Melros area and the local Coast Care group has a strong presence with planting areas, lookout and a memorial.

Melros Beach comprises a beach launching boat ramp, with boulders on the beach in a north and south direction designed to stop four-wheel driving outside of the beach launching area. This vicinity is also a known surfing spot.

1.9.4.11 Yalgorup

These beaches, and in fact the entire beach front of the Clifton locality, present as virtually pristine, natural environments. Notwithstanding, it is clear that four-wheel driving and off-road vehicles frequent the area due to obvious signs off vehicle paths through vegetated areas. Fishing and surfing are also popular in this area.

When invited to share values, the community highlighted their enjoyment of four wheel driving on the beach to spend time swimming, relaxing and socialising, and the area was identified as the fifth most used beach in the area. Feedback suggests that the rugged natural environment here is highly valued.

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Shore based fishing, wildlife and sunset watching are the other most common uses in the area. Further engagement with the community indicated some concern about the behaviours of some four wheel driving enthusiasts, especially as it impacts the natural environment. There is some concern that poorly behaved four wheel drivers will result in closure of beach areas, which would greatly impact the communities stated values for the area.

These areas interface with and through the Yalgorup National Park area, which will need to be considered through the CHRMAP.

1.9.5 Environmental Context

The City has endorsed the Environment Strategy and Implementation Plan 2023-2033, which has a Strategic Goal:

> ***A healthy and diverse natural environment where we walk softly on our Mandjoogoordap.***

...with the following Guiding Principles:

- Built in nature, not on nature
- Woven by waterways
- Lead and serve in equal measures
- Stewards of the environment, custodians of culture

The City also has a Biodiversity Strategy (2013) which recognises vast areas of regionally significant natural areas in the southern parts of the study area (mostly in the Yalgorup National Park).

The majority of the coastal strip is identified as either containing the Quindalup or Yoongarillup vegetation complex and the area is home to the Western Ringtail Possum, Carnaby's Cockatoos, Quenda and an abundance of migratory and resident shorebirds (predominantly found within the Peel Inlet area).

A threatened fairy tern bird species is known to nest and raise chicks in the region. The DoT works closely with the CoM and Murdoch University to protect an Australian Fairy Tern colony nesting at Pyramids Beach.

Coastal hazards occur over many decades and will have an impact on the natural environment. Pressure from both urbanisation and coastal hazards may impact some environmental values, especially where the community is seeking to retain the natural coastal experience but also wishing to retain the coastal living lifestyle.

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The environmental values of the community will play a key part in the CHRMAP process.

As also noted, The Cut is a man-made channel designed entirely to manage water quality in the Peel-Harvey estuary system. Changes to the channel operations are the purview of DoT, however, it is expected that The Cut will remain in operation over the planning horizon of the CHRMAP.



Picture 8: The mixed urban-natural environment south of Dawesville



Picture 9: Management of access at Yalgorup

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1.10 Community and Stakeholder Engagement

1.10.1 Community and Stakeholder Engagement Plan

It is imperative to complete coastal hazard planning alongside the community and stakeholders affected by the decision-making process. Key to the success of the CHRMAP project will be to ensure that the plan is underpinned by their values and knowledge.

To this end, a Community and Stakeholder Engagement Plan (CSEP) was developed to identify relevant stakeholders and determine the structure and pathways for their engagement throughout the CHRMAP process. The plan was fit-for-purpose, and commensurate with the size and scope of the CHRMAP – to avoid consultation fatigue within the community, but ensure meaningful engagement in developing options for coastal hazard management.

The following describes the engagement phases for this CHRMAP. The full CSEP can be found in ***Appendix A***.

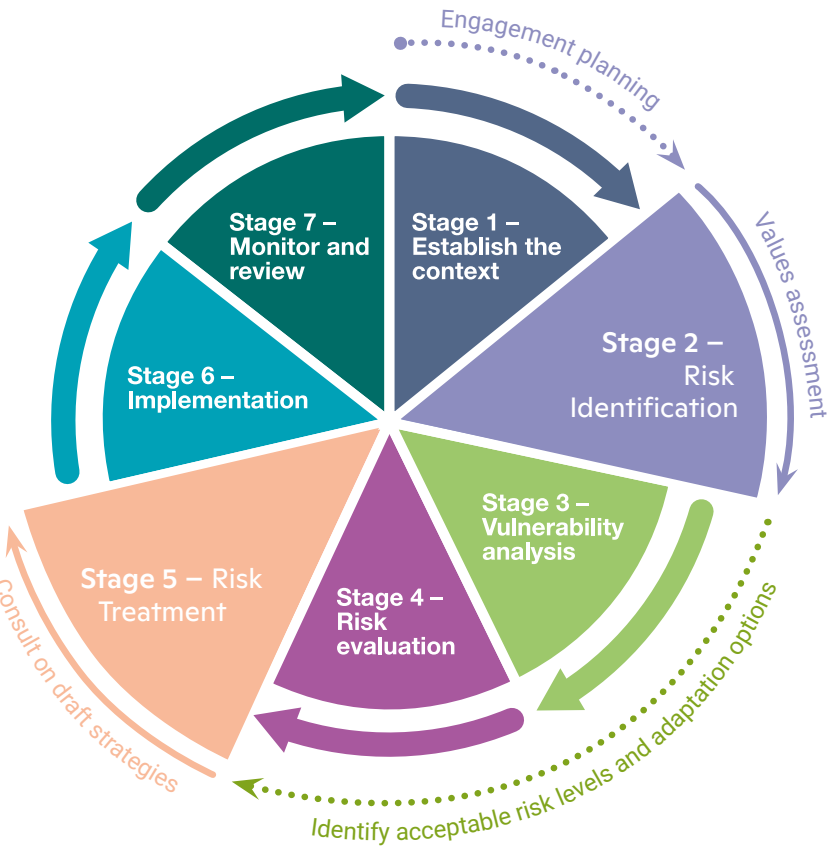


Figure 17: CHRMAP Engagement approach in relation to the CHRMAP process (adapted from CHRMAP Guidelines, 2019)

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1.10.2 Proposed Engagement

The engagement methods have been designed to provide the community and stakeholders with opportunities to test and confirm the City's understanding of current coastal values and identify new and emerging values reflective of predicted coastal hazards, investigate qualitative criteria used in the multi-criteria analysis process, and to examine trade-offs of management options.

For this CHRMAP, there will be three engagement phases:

1.10.2.1 Values Engagement

At the launch of the project, community values are sought to support good quality robust decision making, and the community will be introduced to the CHRMAP purpose, objectives and potential adaptation options.

Information was shared via letters, posters, a website and social media. Community members were invited to participate in both surveys and workshop options. More than 150 individuals were involved in the Values engagement, sharing rich data about beach and foreshore use and activities. A 40 person Coastal Community Reference Group (CCRG) was convened during this stage, representing the broader community of the study area (see ***Picture 10***).

Through their involvement and discussion, the CCRG were able to provide more detailed information about valued locations and both physical and intangible assets.

1.10.2.2 Adaptation Options Engagement

After technical work by the project team involving the assessment of erosion and inundation risks and the identification of suitable adaptation options, a second phase of engagement was convened involving targeted and deliberate engagement with the CCRG and affected agency and local stakeholder about management options. Information was shared via letters, website updates and social media.

The engagement focussed on providing local people with the opportunity to hear about options in more detail, enquire about benefits and challenges of each option, and deliberate over the trade-offs or balance between options. The process had the added value of building coastal hazard literacy amongst a cross-section of coastal users.

CCRG members assessed options for each location within the study area against an agreed set of values-driven criteria, to support the overall assessment of options for each location. It is notable that the CCRG values-driven scores have had a significant influence over the final options assessment, and directly influenced changes in project team assessment.

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In general it was observed through the scores that the CCRG valued a walkable sandy beach higher than assumed based on the Values Engagement phase, and impacts to ocean visual landscape/vista lower than previously assumed. Some of the options prioritised also reflect a love of surfing in the area, and may have exaggerated support for improving surf, rather than for reducing coastal risk.

1.10.2.3 Draft CHRMAP Engagement

Public consultation for the draft CHRMAP provided the community the opportunity to review the CHRMAP and ensure it reflects local values and priorities.

The City advertised the engagement period through direct communication with project stakeholders and through its regular news and updates channels. The draft CHRMAP and supporting documentation were published on the project webpage and four drop-in sessions provided attendees the opportunity to learn about the draft CHRMAP, ask questions of the project team and find out how to provide feedback. Community members were invited to provide feedback via an online survey - 44 were submitted. One written submission was also received.

The feedback received did not identify any element of the draft CHRMAP that would require material changes. Notwithstanding, this engagement period reflects a need for ongoing clear and consistent communication and engagement about the CHRMAP, implementation of recommended actions and future reviews.



Picture 10: The Coastal Community Reference Group in Action

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1.11 Existing Planning Controls

Planning in Western Australia is guided and regulated by the State Planning Framework, which ranges from overarching strategic planning strategies to specific planning policies and supportive guidelines. ***Figure 18*** explains the framework, which includes planning at the state, regional, and local levels and demonstrates how strategic planning is implemented through statutory planning controls (e.g., local planning schemes) and local planning policies. This Framework sits within the Planning and Development Act 2005.

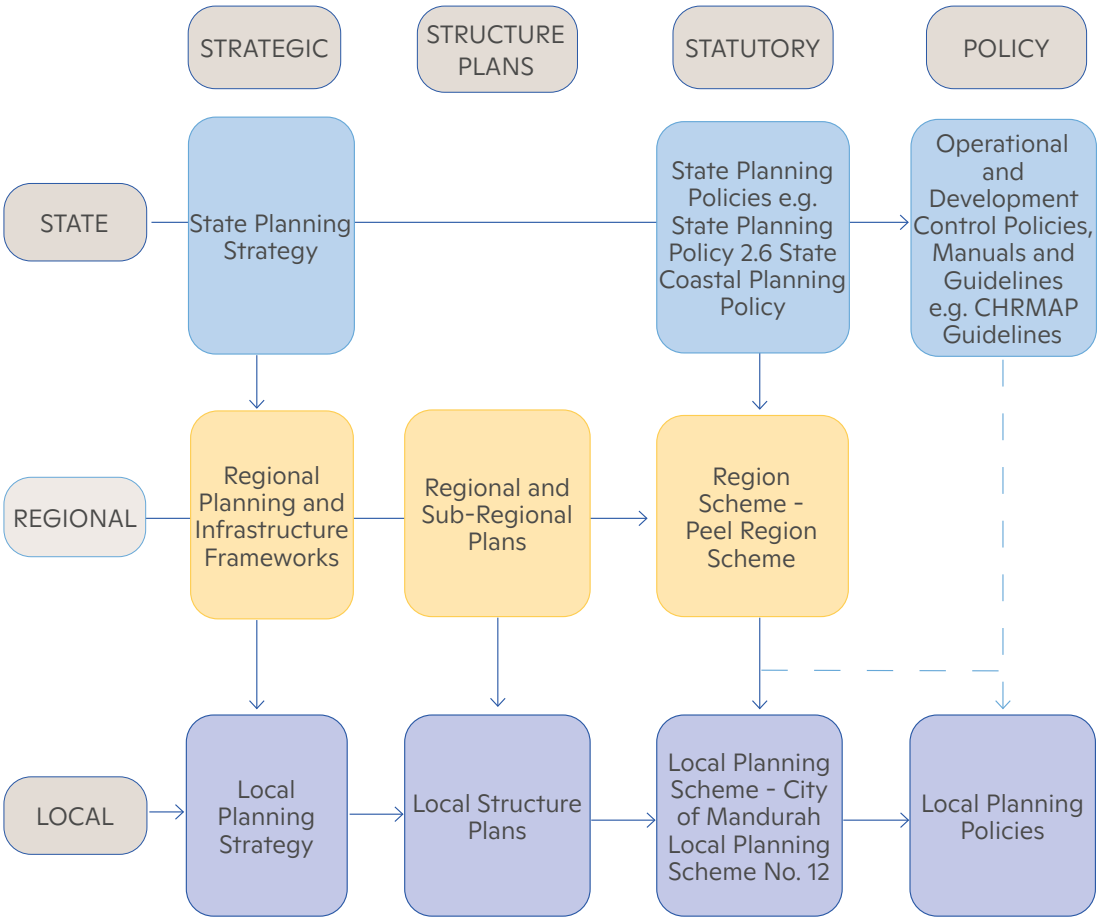


Figure 18: Overview of the WA State Planning Framework

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1.11.1 State Planning Policies and Strategies

1.11.1.1 State Planning Strategy 2050

The State Planning Strategy serves as a comprehensive framework for making decisions about land use and development throughout the state. It is designed to tackle the challenges and opportunities associated with future development, including the impact of climate change and rising sea levels.

The strategy sets out a vision for planning, with a focus on collaboration to address land availability, infrastructure, the environment, and economic development.

The approach to climate change seeks to achieve development and adoption of risk management strategies for natural hazards in the context of climate change patterns and trends. Aspirations listed for mitigation and adaptation planning for areas at risk of coastal landform change include:

- Special controls continue to be in place for vulnerable species and areas most affected by climate change.
- Climate change adaptation and mitigation strategies continue to be developed and implemented to minimise impacts on the State's key assets.
- Vulnerable areas continue to be secured and managed to foster ecosystem resilience.
- Risk management strategies continue to be developed and adopted for natural hazards in the context of climate change patterns and trends.

The Implementation Plan for the CHRMAP is intended to ensure that management actions strike the appropriate balance to ensure sustainable adaptation measures for assets most valued by the community.

For Mandurah Southern Beaches, this means making development decisions that align with the broader state vision and assess risks while managing coastal assets. The strategy also supports coordination in planning for physical and community infrastructure.

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1.11.1.2 WA Coastal Zone Strategy

The WA Coastal Zone Strategy plays a pivotal role in shaping coastal management decisions, ensuring a resilient and sustainable future for Mandurah's southern beaches. It establishes a long-term vision for a sustainable coast, benefiting both the local community and visitors to the state, which recognises the value of Western Australia's coastal zone as a natural asset and a major attraction.

The WA Coastal Strategy provides a whole-of-government integrated framework for collective action to manage and adapt to threats and pressures along the coast, complimenting existing State legislation, strategies and policies, including SPP 2.6.

The document identifies all relevant legislation and policies related to coastal management and defines stakeholder roles and responsibilities for coastal stewardship. It provides that all levels of government, as well as individuals, businesses, and the community, each have important and complementary roles in adapting to coastal hazards. The WA Coastal Zone Strategy introduces the concept of the beneficiary pays principal.

In particular, it outlines the following principles which have relevance to this CHRMAP:

- Private parties are responsible for managing risks to their private assets; and
- Governments (i.e.: the City), on behalf of the community, are primarily responsible for managing risks and impacts to public goods and public assets which they own and manage; they should also seek to:

    1. Develop local policies and regulations consistent with state adaptation approaches.
    2. Facilitate building resilience and adaptive capacity within the local community.
    3. Work in partnership with community to identify and manage risks/ impacts.

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1.11.1.3 State Planning Policy 2.6: State Coastal Planning Policy (SPP 2.6)

SPP 2.6 provides guidance for land use and development decision-making within the coastal zone along the WA coast. It requires that coastal hazard risk management and adaptation is appropriately planned for, encouraging innovative approaches to managing coastal hazard risk, and providing for public ownership of coastal foreshore reserves.

SPP 2.6 provides detailed information to evaluate the risk of coastal inundation and erosion and specifies the storm events to be considered for these analyses. SPP 2.6 is supported by the CHRMAP Guidelines (WAPC, 2019).

SPP 2.6 aims to avoid future development within areas identified to be at risk within the planning timeframe, generally 100-years. For areas at risk, all potential adaptation options will be identified under the risk management categories of avoid, managed retreat, accommodate and protect to manage the unacceptable risks. The ultimate aims of the policy are to ensure all future development considers coastal hazards, climate change, and landform stability.

The State's coastal planning policy adaptation preferences in order of priority, as outlined in SPP 2.6, are:

Avoid > Planned and Managed Retreat > Accommodate > Protect

The State's strong preference towards adaptation options that minimise coastal process interference and away from those that may leave legacy issues and management strategies that preserve the natural coastline and move development away from the active coastal zone is noted. The strategy steers planners away from protection options and provides strict rules for the consideration of protection works.

Of particular relevance to the CHRMAP process is the user pays principle, whereby those who benefit most from protection must provide the greatest financial contribution. This arrangement applies to any area of the coast and can include incidences where the coastal foreshore reserve is being protected as a buffer to private assets.

The CHRMAP follows the recommended adaptation hierarchy approach to risk management. It also accords with the principle and objectives around building resilience and working in partnership with the community to identify and manage risks and impacts.

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1.11.1.4 Coastal Hazard Risk Management and Adaptation Planning Guidelines

The CHRMAP Guidelines (WAPC, 2019) provide guidance on the development of CHRMAPs, their documentation and the required stakeholder engagement. The guidelines detail the processes and function and form of CHRMAPs, as well as standard approaches to undertake the hazard assessment, adaptation option development and implementation.

This CHRMAP has been developed in accordance with the CHRMAP Guidelines. The engagement approach in the CHRMAP Guidelines has been used to inform and guide the community and stakeholder engagement approach for this CHRMAP.

Planned and Managed Retreat Framework (CHRMAP Guidelines - Appendix 4)

Appendix 4 of the CHRMAP Guidelines provides guidance on how to implement a policy of Planned and Managed Retreat for 'brownfield' or 'greenfield' locations that are currently, and increasingly in the future, vulnerable to coastal hazards with limited opportunities to introduce less vulnerable forms of use or development through planning control.

The policy adheres to the principles for sustainable land use and development on the coast and adaptive risk management as required by the Planning and Development Act 2005 (P&D Act) and SPP 2.6, namely;

- To ensure the ongoing responsible and sustainable management of the coastline for the benefit of the whole community. It ensures ongoing protection and provision of a coastal foreshore reserve and beach amenity.

The document details the following principles:

- To ensure land in the coastal zone is provided for coastal foreshore management, public access, recreation and conservation.
- To ensure public safety and reduce risk associated with coastal erosion and inundation.
- To avoid inappropriate land use and development of land at risk from coastal erosion and inundation.
- To ensure land use and development does not accelerate coastal erosion or inundation risks; or have a detrimental impact on the functions of public reserves.

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The guidelines provide that a comprehensive CHRMAP process be undertaken to inform and enable the adoption of a Planned and Managed Retreat policy to guide implementation. The planning mechanisms outlined to enact Planned and Managed Retreat are:

- Structure planning – where comprehensive redevelopment of land remains an option structure planning considers risks identified in the CHRMAP process to feed into subdivision conditions which may, for example, address land requirements to accommodate coastal risks.
- Local planning scheme (LPS) amendment – to inform the classification of vulnerable areas as Special Control Areas (SCAs), to rezone land or to provide other built form planning controls as applicable.
- Special control areas (SCAs) – that SCAs can be incorporated into local planning schemes to identify areas which are significant for a particular reason and where special provisions in the Scheme may need to apply.
    - The purpose of establishing a SCA would be to enable at-risk land use and development to be identified within the SPP 2.6 100- year planning time-frame; establish the intended coastal hazard adaptation response(s) in this area; and provide a statutory planning instrument to implement the approach.
    - An SCA classification would be included in a scheme to facilitate land use changes and development control within that area.
- Taking of land – where triggers for initiating this process would be included in any policy arising from the CHRMAP process to support implementation of the Planned and Managed Retreat. The cost of taking land needs to be in agreement with the requirements under section 168 of the Land Administration Act 1997.
- Special circumstances for state government control – this would be enacted through mechanisms set out in the P&D Act and the relevant Region Scheme and would include a Planning Control Area (PCA) declaration and/or an Improvement Plan and Scheme over/for the relevant area
- Improvement Plan and Scheme –special circumstances for state government control, enacted through mechanisms set out in the P&D Act, over/for the relevant area, so that unique planning provision and controls can be applied to affected land. Improvement plans are strategic instruments used to facilitate the development of land in areas identified by the WAPC as requiring special planning. The WAPC can recommend to the Minister for Planning that an improvement plan is made. An improvement plan can authorise the making of an improvement scheme (the rule component of the plan).

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1.11.2 Region Planning Schemes and Regional Planning Strategies

1.11.2.1 Peel Region Scheme

The Peel Region Scheme (PRS) guides land use and provides the legal basis for planning in the Peel Region. The area includes the local government boundaries of the City of Mandurah and the shires of Murray and Waroona (see ***Figure 19***).

The PRS Identifies broad areas in the following Zones and Reserves:

Zones

- Urban
- Urban deferred
- Regional centre
- Industrial
- Rural
- Private recreation

Reserves

- Regional open space
- Railways
- State forests
- Waterways
- Primary regional roads
- Other regional roads
- Public purposes

The Study Area does not include any of the Special Control Areas from the PRS.

One of the purposes of the PRS is to 'provide for the reservation and protection of land for regional transport, conservation, recreation, cultural and other public uses' (Section 5). It includes as its aims (Section 6), to;

- 'promote the sustainable development of land taking into account relevant environmental, social and economic factors' (Section 6 (a)).
- protect as regional open space the region's coastal foreshores, the foreshores of the Serpentine, Murray and Harvey Rivers and the Peel Inlet and Harvey Estuary, as well as other areas of regional conservation significance and areas for regional recreational facilities (Section 6 (c)).

These clauses are relevant to the preparation of the CHRMAP, as the CHRMAP does need to consider the protection of the coastal foreshore for the use of the community.

The Local Planning Scheme is also required to be consistent with the PRS (Clause 7). Strategies will need to consider both LPS12 and the PRS.

For this reason, LPS12 will reflect the Reservations of the PRS, whilst more detailed local Reserves and Zones can be found within the PRS Zones.

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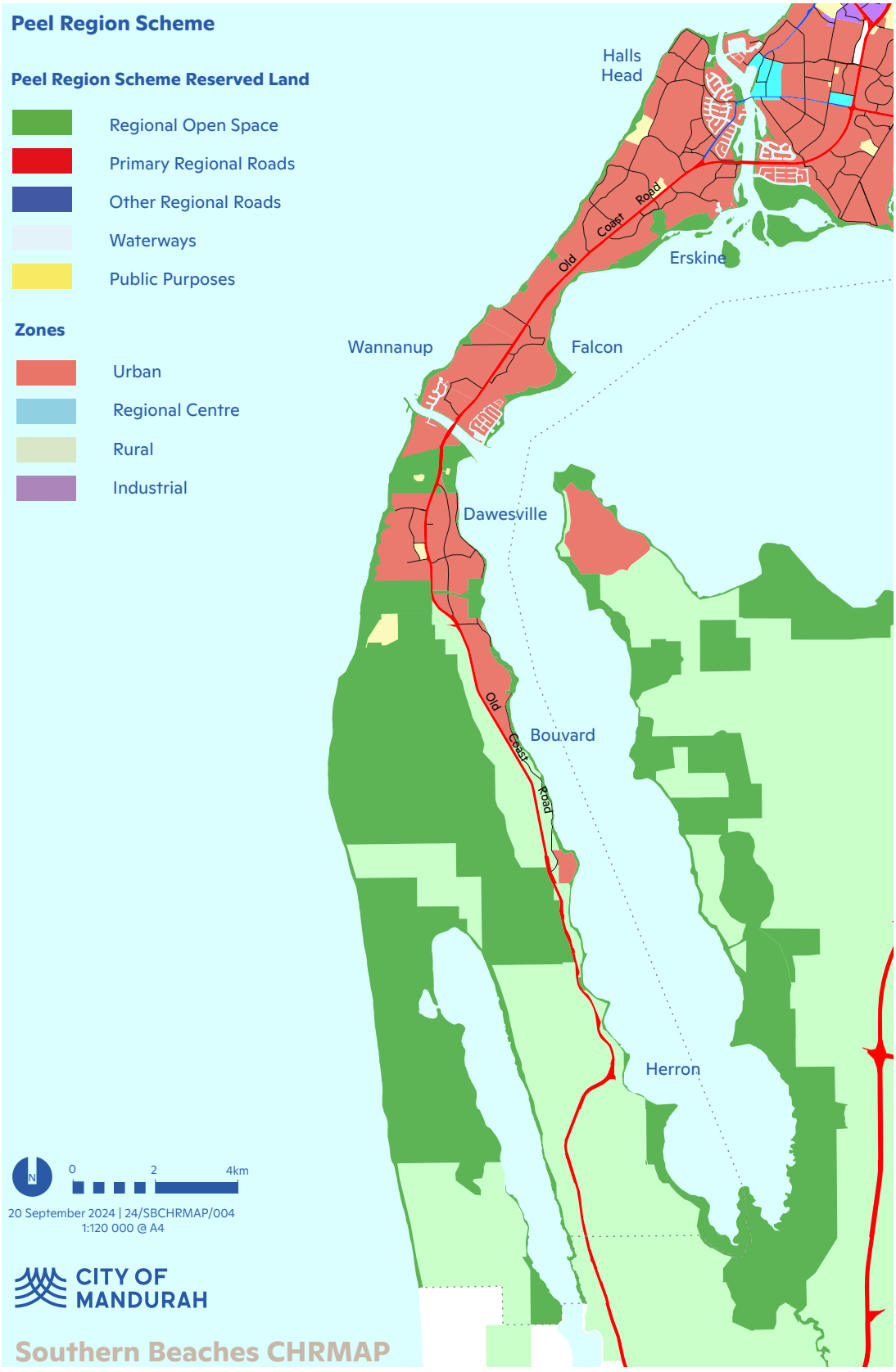


Figure 19: Peel Region Scheme in the Study Area

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1.11.2.2 Priority Agricultural and Rural Land Use Policy (2017)

The Peel Region Scheme: Priority Agricultural and Rural Land Use Policy identifies priority agricultural land areas in the region. It is unlikely to be impacted by the CHRMAP.

1.11.2.3 Peel Region Scheme Strategic Minerals and Basic Raw Materials Resource Policy (2002)

The PRS Strategic Minerals and Basic Raw Materials Policy seeks to ensure that the basic raw materials available for the Western Australian economy are protected. There is a small site located within the Dawesville area, although its proximity is unlikly to be impacted by the CHRMAP.

1.11.2.4 Peel Region Scheme Floodplain Management Policy (2002)

The PRS Floodplain Management Policy provides guidance on appropriate land use and development within floodplains to minimise flood damage during major flooding. Overland flooding is often considered separate to, but potentially exacerbated by, coastal inundation. The CHRMAP will need to consider if coastal inundation and floodplain issues coincide in the study area.

1.11.2.5 Boating Facility Policy (2014)

The Boating Facility Policy requires consideration of landscape and environmental values of the Peel region's waterways and their foreshores and the use of these areas.

Any new or modified boating facility that may be considered as part of this CHRMAP will need to respond to this policy.

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1.11.3 Local Planning Strategies, Schemes and plans

1.11.3.1 City of Mandurah Local Planning Scheme No. 12 (LPS12)

LPS12 was adopted on the 11 April 2022. LPS12 provides the statutory framework for land use in the City of Mandurah and will be a key tool to deliver land use and development that responds to the recommended short-term actions and long-term strategies.

LPS12 includes Peel Region Scheme Reserved Land, Local Reserved Land and Local Zones as described below and shown in ***Figure 20***.

Zones

- Residential
- Urban Development
- Strategic Centre
- Local Centre
- Special Use
- Service Commercial
- General Industry

Peel Region Reserved Land

- Regional Open Space
- Primary Regional Roads
- Other Regional Roads
- Waterways
- Railways
- Public Purposes

Local Reserved Land

- Public Open Space
- Environmental Conservation
- Public Purposes
- Local Distributor Road

The local planning scheme guides development of Mandurah's Southern Beaches, with the dominant land use at the interface of the coastal zone being residential single dwellings and a long contiguous area of coastal reserve of varying widths, although typically quite narrow. There are small pockets of commercial development and community uses including at Falcon Bay which interfaces directly onto the foreshore; however, the land use is predominantly residential serviced by local roads.

Planning and Development (Local Planning Schemes) Regulations 2015, Schedule 2 Deemed provisions for local planning schemes requires the City to consider the suitability of the land for the development taking into account the possible risk of flooding, tidal inundation, subsidence, landslip, bushfire, soil erosion, land degradation or any other risk.

A large area of land south of the Dawesville Cut is comprised of the Caddadup Reserve adjacent to The Cut Golf Course, which breaks the direct residential interface to the coast and is Reserved for Regional Open Space. The locality of Clifton at the southern end of the study area is largely undeveloped and comprises the Yalgorup National Park, also in Regional Open Space Reserve.

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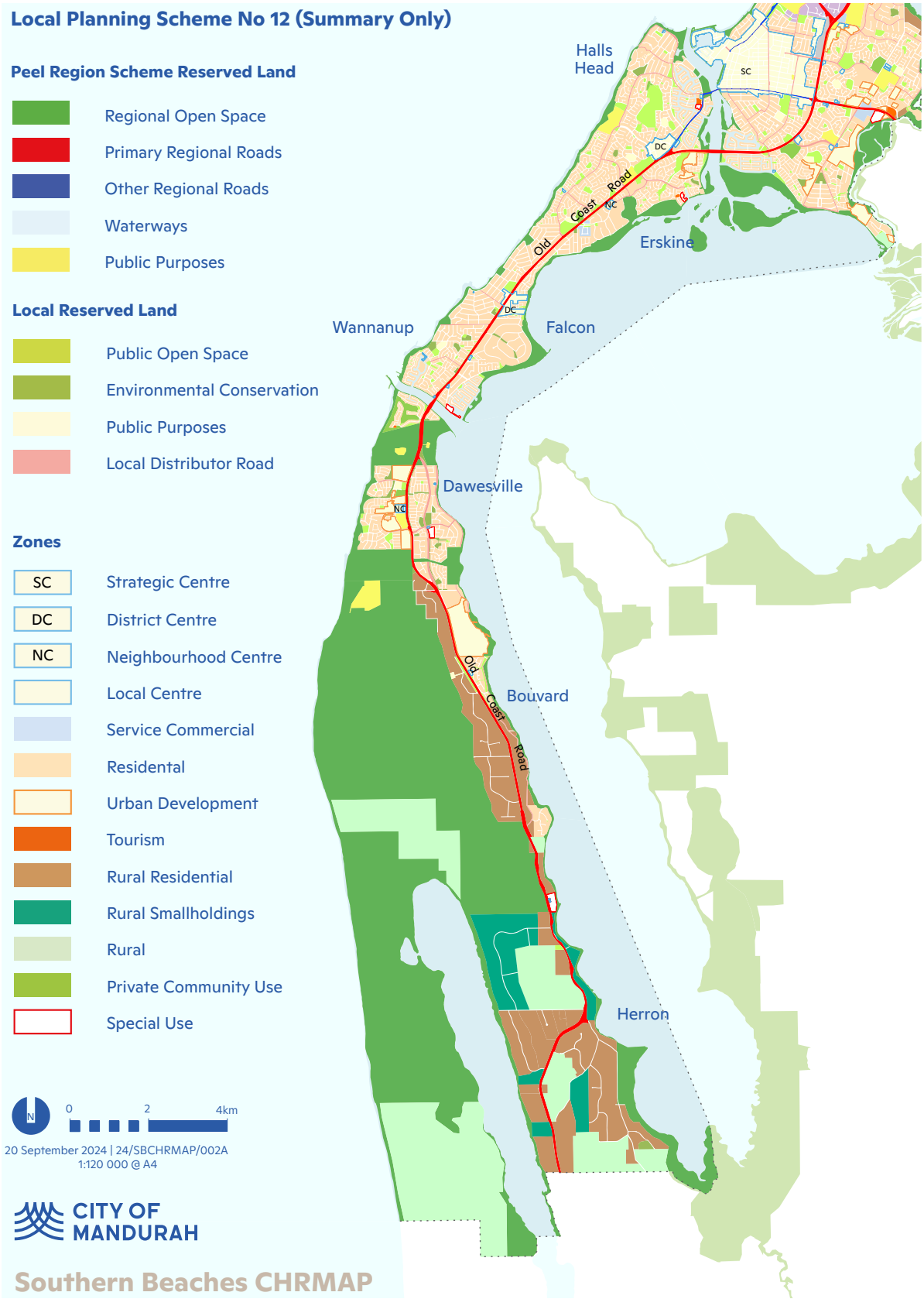


Figure 20: City of Mandurah Local Planning Scheme No. 12

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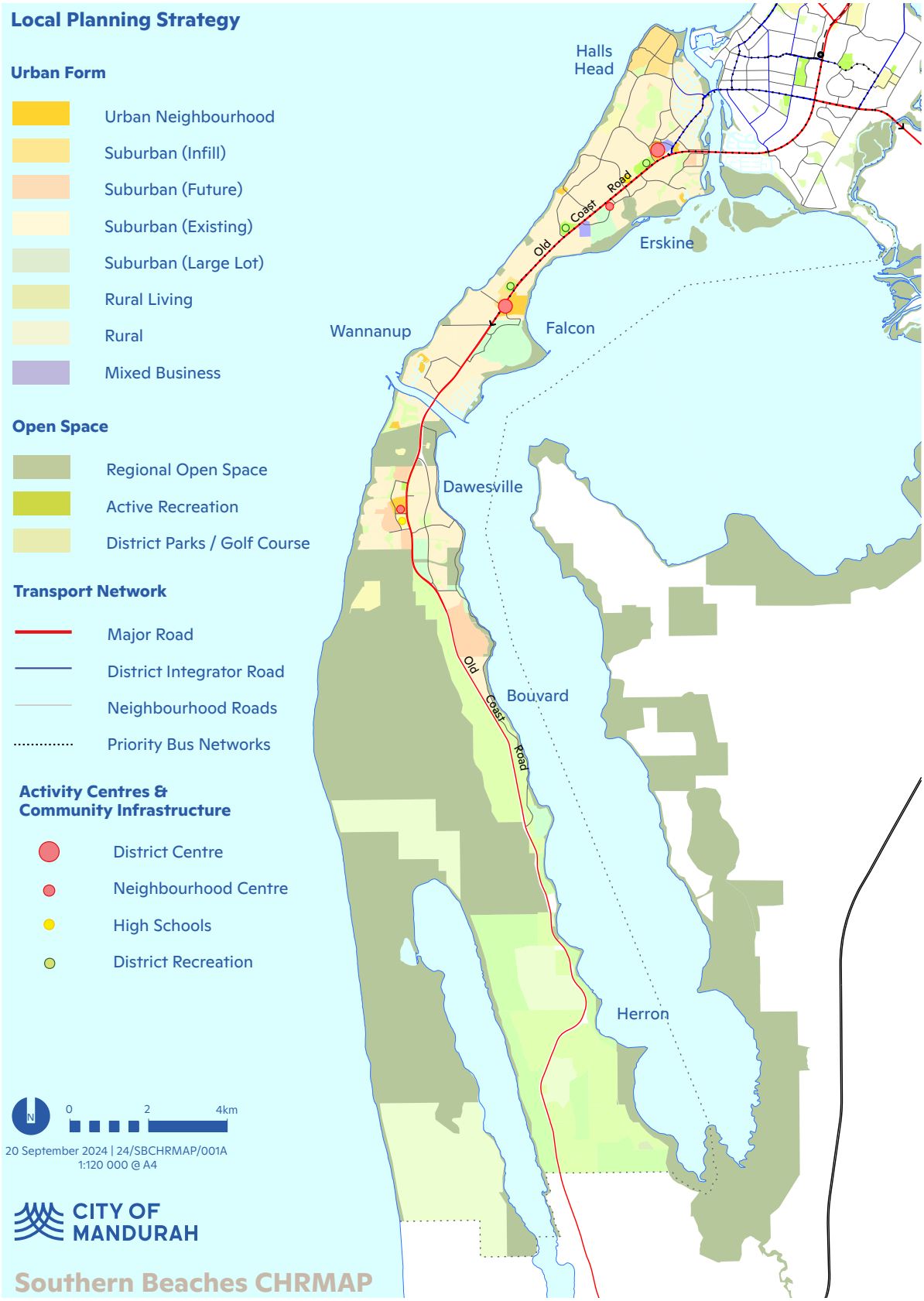


Figure 21: City of Mandurah Local Planning Strategy

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1.11.3.2 City of Mandurah Local Planning Strategy (2022)

The Local Planning Strategy (***Figure 21***) establishes the spatial planning vision for the City, and provides guidance and direction for growth and development in the future.

The Strategy includes a recommendation that all structure plans and proposals rezone land adjacent to the waterways (coast, rivers and estuary) for appropriate public access and foreshore reserve. Climate Change assessments are also foreshadowed, as are the preparation of CHRMAPs.

The current strategy does not indicate any significant change to the study area within the expected coastal hazard zone, with some minor infill possible in some locations, but generally further from the coastline.

Any key recommendations of the CHRMAP will be future modification to the Strategy.

1.11.3.3 Structure Plans

A structure plan sets out a local government's desired outcome for a specified area. They will typically include their own site specific CHRMAP if they abut a coastal area. There are no existing structure plans affected by this CHRMAP.

The Florida Local Structure Plan is within the CHRMAP area, however, it looks to be fully implemented.

1.11.3.4 Climate Change Adaptation Plans

A Coastal Zone Climate Change Risk Assessment and Adaptation Report (CZM Pty Ltd) was prepared for the City of Mandurah in 2010. The assessment identified climate change impacts that the coastal zone of the City of Mandurah may be susceptible to.

This CHRMAP will provide a greater level of detail regarding the immediate impacts to the southern beaches coastline and is consistent with the recommendations of the report.

1.11.3.5 Coastal Management Plan

The City of Mandurah Coastal Management Plan (2004) provides an overarching framework for planning and management of multiple-use reserves along the coastline. In addition, the City requires Foreshore Management Plans for new development areas. Whilst there are no specific foreshore management plans for the study area, it is likely that these tools may be updated or created anew as a result of the CHRMAP.

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1.11.4 Other Relevant Planning Documents

1.11.4.1 Yalgorup National Park Concept Master Plan (2024)

The Yalgorup National Park Concept Master Plan has been established to identify, plan and deliver infrastructure for the sustainable development of eco-tourism opportunities on landholdings within and immediately adjacent to Yalgorup National Park.

It will allow sustainable growth of local tourism, leading to improved economic and employment outcomes and recreational opportunities.

A key part of the plan is beach access management, reflecting the recognised concerns about damage to the dunes from recreational use (see ***Section 1.8.6: Other Coastal Context***), whilst seeking to provide a foreshore with access for the community to enjoy.

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1.11.5 Planning Controls Summary

Potential options for future planning controls as a result of this CHRMAP are shown in ***Table 3***.

Table 3: Available Planning Controls

Planning Mechanism	Content
Peel Region Scheme (PRS) amendment	To allow for the reservation of any additional land for conservation or recreation or other public uses, than is currently reserved, as required and deemed appropriate, if increased oversight is required within the planning system.
Structure planning	Where there is potential for comprehensive redevelopment of land, structure planning can take into account risks identified in the CHRMAP process to feed into subdivision conditions which may, for example, address land requirements to accommodate coastal risks.
Special Control Area (SCA)	Establishing an SCA enables land use and development at risk to be identified in the SPP 2.6 100-year planning timeframe, establish intention to retreat from the area and provide the special planning instrument required to implement the approach. An SCA classification can be included in an LPS. Part 5, Schedule 1 of the *Planning and Development (Local Planning Schemes) Regulations 2015* provides the template for local governments to follow when amending their LPS to include an SCA.
Local Planning Scheme (LPS) amendment	To inform the classification of vulnerable areas as SCAs, to rezone land or to provide other built form planning controls; as required and deemed appropriate.
Taking of land	The power to compulsorily acquire land is provided for under the Land Administration Act 1997. In accordance with the CHRMAP Guidelines, triggers for initiating this process should be included in any policy arising from the CHRMAP process to support implementation of the Planned and Managed Retreat. The cost of taking land needs to be in agreement with the requirements under section 168 of the Land Administration Act 1997.

1.12 Existing Physical Controls

1.12.1 Formal Controls

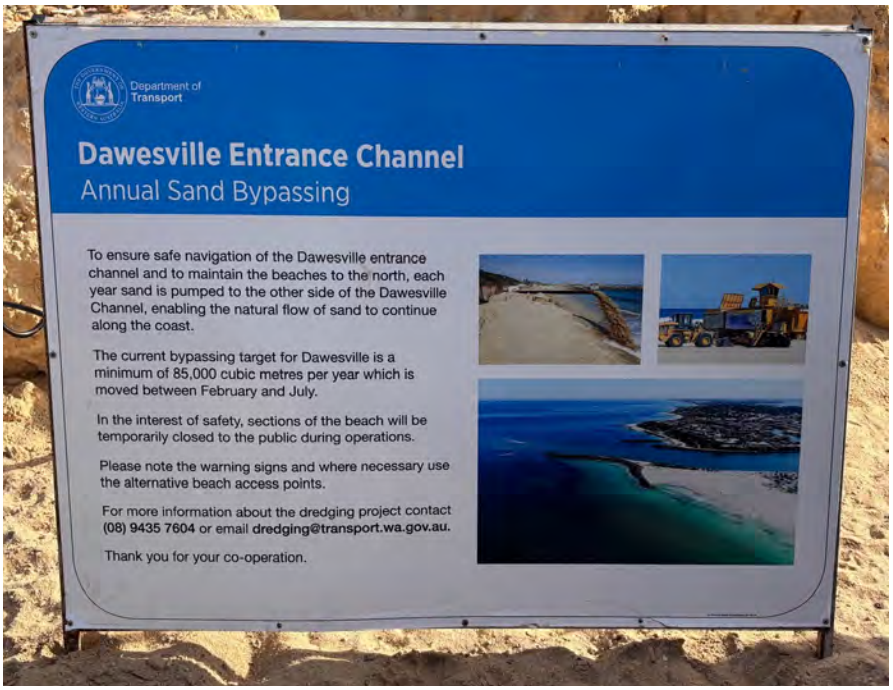
The study area's coastal extent is largely 'natural' but includes the Dawesville Entrance Channel breakwaters, spur groyne and revetment which impart a permanent interruption to the coastal processes, most notably longshore sediment transportation. Compensation for which is provided by the ongoing mechanical sand bypassing operation form south to north. A seawall at Falcon Beach is the only other formal coastal protection structure which is well understood, however, there is a suggestion that a buried seawall structure is located adjacent to the Port Bouvard SLSC. A summary of existing controls is provided in ***Table 4***.

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Table 4: Existing Physical Controls

Control	Location	Purpose	Year Implemented	Assumed design life / management timeframe
'Soft' Management Controls				
Annual Sand Bypassing	Dawesville Entrance Channel (DEC)	Seasonally provide for continuity of longshore sediment movement northwards across the DEC which interrupts the natural coastal process (***Picture 11***) .	1994	Ongoing
Adhoc Sand Nourishment	Falcon Bay	Several small campaigns of sacrificial sand nourishment were undertaken to increase beach amenity and provide a buffer to coastal erosion between with an approximate total of 23,000m^3	2004 and 2007	Several months
'Hard' Engineering Controls				
Rock breakwaters (and associated spur groyne and revetment)	Dawesville Entrance Channel (DEC)	The breakwaters form the outlet and assist in maintaining navigability of an artificial channel constructed between the Peel-Harvey Estuary and the ocean. The channel acts to permit flows to improve water quality in the estuary. Some available documentation suggests the revetment at Pyramids Beach may extend south towards the Port Bouvard SLSC. The extent and characteristics of the wall are unclear; further investigations will be recommended to understand the presence and design of the revetment in more detail.	1994	50 to 100 Years
Rock Protection	Egg Farms Surf Break Car Park	DoT owned/managed as part of The Dawesville Channel operations.	1995	50 to 100 Years
Seawall	Falcon Bay	To provide erosion protection to the Falcon Beach amenities (***Picture 12***).	2019	50 Years
Seawall	Port Bouvard SLSC	Documentation has been discovered that suggests a revetment seawall was built in front of the SLSC in 2009 to protect it from coastal erosion. The documentation does not represent as-constructed information so the extent and characteristics of the wall are not confirmed. Further investigations will be recommended to understand the presence and design of the seawall in more detail.	2009 (to be confirmed)	Estimated - 25-50 years

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Picture 11: Temporary Signage at the Dawesville Channel for Sand Bypassing Activities



Picture 12: Seawall at Falcon

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1.12.2 Informal Structures

Within the study area there are several locations where the presence of informal structures including large rocks or logs have been placed with intent to maintain beach access, reduce erosion, promote accretion or provide some amenity, including at:

- Yeedong Road Boat Launching Facility, Avalon (MH195) - large logs (***Picture 5***).
- Beach access at Rakoa Street – rock protection.
- Rocky Pool Bay, Seascapes (adjacent Boardwalk Boulevard) - informal rock structure (***Picture 13***).

While locally and in the short-term these may continue to provide some function in relation to their intended purpose, in the context of the CHRMAP, long-term planning timeframes and extents of the study area, these are considered unlikely to provide any significant protection from coastal hazards. For this reason, they are not presented as an Existing Control in the ***Table 4***.

Dune revegetation works are also know to be undertaken in the study area. While the resolution and method of analysis for this project does not identify specific healthy parameters of vegetation it is important to promote dune vegetation to improve the natural resilience of the beach and dune system and reduce the effects of nuisance wind-blown sand. Revegation of dunes can help to support resilient coastlines.



Picture 13: Rocky Pool Bay - informal rock structure

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1.13 Success Criteria

The desired outcome of the CHRMAP process is for the City's Council to support and adopt the recommended specific planning controls and actions for short term risk (0 - 10 years) and for specific planning and implementation pathways for longer-term risks.

These recommendations will be based on community and stakeholder consultation and engagement, plus economic, environmental and cultural considerations.

The key success criteria are:

- The community and stakeholders are well informed and educated about the coastal features, processes and hazards that are present in the study area.
- The community and stakeholders have an emerging understanding of the long term potential impacts of coastal hazards, and can understand the complex decision making that will be required to respond.
- The community and stakeholders are involved in the development of adaptation actions and strategies, and understand the actions and strategies that are selected.
- The CHRMAP balances protection of the environmental and cultural values of the coastline with the community and stakeholder values for recreation and enjoyment.
- The coastline remains accessible to the community where possible and in line with the options selected through engagement.
- The CHRMAP will include clear recommended actions for the short term and a series of possible adaptation responses for the future, along with triggers for when decisions are required.
- The City has a clear pathway of action, including an understanding of costs and funding needs over the forward 10 year budget cycles and Long Term Financial Planning.

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SECTION 2
RISK IDENTIFICATION

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2 Risk Identification

This chapter identifies the coastal hazards in the study area and the corresponding at-risk assets. Hazard maps have been produced that define the erosion and inundation extents for present day, 2035, 2050, 2075, 2125.

Responding to the objectives of SPP2.6 (***Section 1.2***), risk assessment processes are then utilised to identify risks that are intolerable to the community, and other stakeholders such as local governments, indigenous and cultural interests, and private enterprise. Adaptation measures are then developed according to the preferential adaptation hierarchy outlined in SPP2.6.

A portion of Mandurah's southern beaches between Falcon Bay and the corner of Rakoa Street have been identified in Western Australia as a projected erosion hotspot within a 25 years' timeframe (Seashore, 2019), and is considered a priority for coastal hazard assessment and management planning. The study area (refer ***Figure 1***) is located between the Mandurah CBD and City of Mandurah's (the City) southern boundary. It comprises a stretch of mixed sandy and rocky coast from Robert Point to Dawesville Channel backed by predominantly suburban land. The section of coast south of Dawesville Channel becomes increasingly sandy and is backed by a combination of land uses such as a golf course, suburban land, Yalgorup National Park and other publicly reserved land.

This erosion risk is a key trigger for the requirement of this CHRMAP. The aim of the present study is therefore to investigate and plan for coastal hazards which are likely to affect the study area. Primary landforms of the location consist of mixed sandy and rocky coast, and coastal infrastructure and is considered a priority for coastal hazard risk management and adaptation planning.

This CHRMAP project is expected to increase knowledge and understanding of coastal hazard risks and identify risk management and adaptation measures for implementation. The outcomes will be used to inform local government policies, strategies, and plans, including (but not limited to), planning strategies, community strategic plans, drainage strategies, asset management plans, emergency management plans, and foreshore management plans.

The project will adhere to the WAPC (2019) guidelines with scope and deliverables to be consistent with the objectives identified by these guidelines and SPP2.6. The project will identify the strategic direction for coastal adaptation scenarios from the present to 2125 (100-year management time frame) and identify an implementation plan to achieve this direction. Overall, this CHRMAP will develop a flexible adaptation pathway for the City and serve as a key reference for management, planning and policy making for the short-term (0-25 years), medium-term (25-50 years), and long-term (50-100 years).

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2.1 Planning Timeframe and Sea Level Rise

To provide context for this coastal hazard assessment, key documents, and datasets have been reviewed regarding metocean processes, coastal processes, and existing coastal hazard information. Relevant information from key documents was presented in ***Section 1: Establishing the Context*** and summarised data about coastal geology and geomorphology, water levels, wind climate, wave climate, and sediment transport.

Any sources of information identified as directly relevant to inform this CHRMAP have been utilised, referenced, and reported in previous reporting or in the relevant sections of this report below.

2.1.1 Projected Mean Sea Level Rise

The Sea Level Change in Western Australia – Application to Coastal Planning (Department of Transport [DoT], 2010) recommended allowances for sea level rise (SLR) application in coastal planning in Western Australia as presented in ***Table 5*** and ***Figure 22***. In 2010 the recommended SLR for 2110 was +0.9 m above 2010 levels - with 0.01 m/year to be added for every year beyond 2110. It is noted that this SLR scenario is consistent with the latest projections provided in the Intergovernmental Panel on Climate Change (IPCC 2021) Sixth Assessment Report (AR6) of a 1-metre rise by 2110 and has formed the basis of mean sea level rise projections for use in this study.

Table 5: Summary of projected mean sea level rise allowances.

Planning Time Frame (year)	Present Day	2035	2050	2075	2125
Projected mean sea level rise (m)	0	0.10	0.23	0.44	1.00

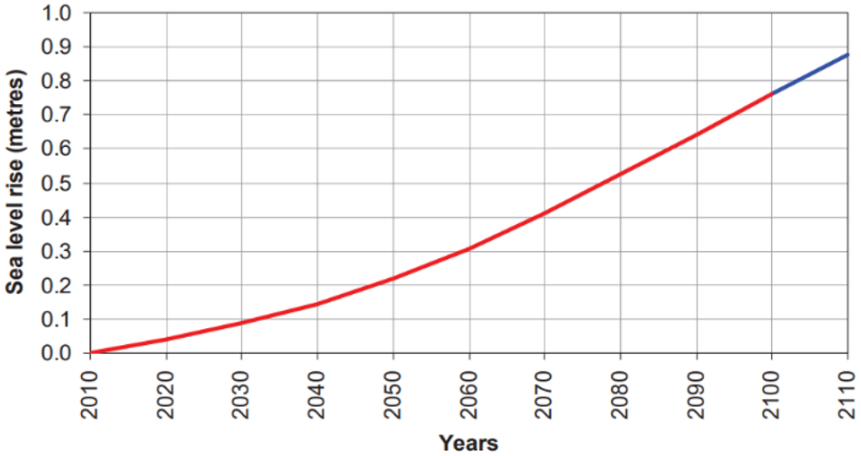


Figure 22: Mean sea level rise projections for coastal planning in WA (DoT, 2010).

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2.2 Coastal Geomorphology

2.2.1 Coastal Erosion

Sandy coastlines are generally very responsive to the climate and any changes that occur. As discussed previously, part of the study (Falcon Bay to the corner of Rakoa Street) is considered a hotspot for coastal erosion (Seashore, 2019) and has historically been affected by storm erosion. Affected assets are the beach, dunes and the beach access stairways. The presence of discontinuous rock features and reefs at/off the coast affects the coastal morphology, impacting nearshore wave propagation and may protect the beach from storm erosion at some locations.

Damara (2012) prepared regional erosion hazard lines to 2110 under contract to the Peron Naturaliste Partnership to consider the potential economic impact of coastal hazard risk. The lines for this study were not prepared in accordance with SPP2.6; instead, they were compiled from a geological regional recession study that focused on sediment transport between the coast and continental shelf. As such, these hazard lines are not directly comparable to the hazard lines for the CHRMAP, which is based on discrete storm erosion modelling. However, they provide helpful background information and represent the possible erosion over the next 100 years. The two approaches for determining erosion hazard lines also highlight the complexities associated with these types of projections.

GHD (2022) undertook a similar CHRMAP project for the section of coastline immediately northeast of the study area – comprising the remainder of the City's ocean coastline.

No other local hazard assessments have been undertaken for the study area.

2.2.2 Coastal Inundation

In 2012, Damara prepared inundation hazard mapping depicting the potential extent of coastal inundation for the Peron Naturaliste Partnership with a view to estimate the potential economic impact of coastal hazard risk. The inundation determinations were broadly aligned on the SPP2.6 and have been assimilated in the extreme water levels used in the Inundation Hazard Assessment.

More recently, the DoT has released it's statewide assessment of coastal inundation (Seashore 2024). The assessment "aims to evaluate potential scale and extent of coastal inundation in WA over the short to medium term at present and into the next 25 years".

The assessment considered a number of existing datasets and projected sea level rise, to determine at-risk sites.

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Seashore (2024) lists Mandurah as a potential area with 'Moderate' inundation concern, however this refers to areas in the City's northern beaches (Ormsby Terrace and Cooper Street) which are outside of the study area. The estuary coast is also impacted but not currently slated for targeted assessment.

There are small areas at Falcon Bay and Dawesville Cut within the study area that have inundation identfied on the Coastal Seawater Inundation Web Map (DoT, accessed 2025). Whilst not identified for targeted assessment, they are considered in this CHRMAP's inundation assessment.

There is an area immediately outside of the study area for this CHRMAP at Halls Head which is also identified on the Coastal Seawater Inundation Web Map (DoT, accessed 2025). This area should be considered in the more detail in the Doddies Beach study area. This CHRMAP makes reference to the Doddies Beach area and the complex interface between the Southern Beaches CHRMAP and the Northern Beaches CHRMAP. Inundation at this location will be acknowledged and discussion included where relevant.

2.2.3 Resistant Coastal Rock

2.2.3.1 Geotechnical Survey

In 2023, DoT commissioned GBG Maps to undertake geotechnical surveys to understand the local geology at Falcon Bay better. A 600m section of the coast was investigated, including testing longshore and cross-shore surveys using multiple methods (GBG Maps, 2023). The estimated level of limestone bedrock ranged between approximately -3.0mAHD and 4.5mAHD.

Interpretation of the geotechnical survey results finds that the physical features are generally consistent with that of a sandy coast for the erosion calculation as per SPP 2.6.

2.2.3.2 Desktop Review

For the rest of the study area a desktop review of available aerial photography and vegetation line movement was undertaken to identify sections of coast with rock that may have the potential to resist erosion. Although much of the coastline comprises rock platforms overlain by a sandy beach and exposed rock present above mean sea level, available desktop information was not enough to determine if they would be considered resistant to erosion. As such, several sections of coast were identified as requiring further analysis via a subsequent site visit, presented below.

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2.3 Coastal Erosion Hazard Assessment

2.3.1 Coastal Engineering Site Visit

A coastal engineering site visit was undertaken in May 2024 to:

- Collect sediment samples for laboratory analysis of grain size to inform storm erosion modelling, and
- Confirm the nature and extent of coastal rock in the study area.

Sediment samples were collected at eight locations representing the study area. This information is presented in the storm erosion modelling section. It is noted sediment size gradually increases from the north end of the study area towards the south, with a D50 of 0.31mm in the north and 0.57mm in the south.

Following the site visit, two small sections of coast were confirmed to have resistant rock at an appropriate height, length and durability to be considered in the erosion hazard assessment:

- An approximately 362m long section of rock is present adjacent to Pavetta Approach (***Picture 14***).
- An approximately 348m long section of rock is present in the vicinity of Gretel Drive (***Picture 15***).

It is acknowledged that there might be other rocky sections of coast along the study area. Future geotechnical data collection may be able to identify additional areas of resistant rock beneath the foreshore reserve.



Picture 14: Resistant coastal rock near Pavetta Approach, Halls Head 31/5/2024.

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Picture 15: Resistant coastal rock near Gretel Drive, Halls Head 31/5/2024.

2.3.2 Erosion Hazard Assessment Methodology

The coastal hazard identification approach has been undertaken in accordance with SPP2.6 (WAPC, 2013) and the CHRMAP Guidelines (WAPC, 2019).

2.3.2.1 Coastline Classification

The SPP 2.6 identifies the following coastal geomorphic types based on geology physical and biological features:

- Sandy
- Mixed sandy and rocky
- Rocky
- Coastal lowlands
- Tidal reaches of inland waters
- Islands

The study area's coastline is predominantly classified as a "sandy" or "mixed sandy and rocky" coastline according to the coastal classifications defined in SPP2.6 Schedule One (WAPC, 2013). Much of the coastline comprises rock platforms overlain by a sandy beach backed by remnant sand dunes. Nearshore reefs are present along much of the coastline and exposed rock is present above mean sea level in sections, particularly during the winter months.

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To determine allowances for coastal processes, based on site visit observations, desktop review and following SPP 2.6 definitions, the following classifications have been considered applicable for the study are:

- **Sandy** – the southern end of the study area south of Dawesville Channel and smaller portions of the coast north of the Dawesville Channel. The erosion hazard allowance method for sandy coasts from SPP2.6 applies to these sections.
- **Mixed sandy and rocky** – a majority of the coast north of the Dawesville Channel. In accordance with SPP2.6 the erosion hazard allowance method for sandy coasts also applies to these sections.
- **Rocky** – two small sections of coast: An approximately 362m long section of rock is present adjacent to Pavetta Approach. An approximately 348m long section of rock is present in the vicinity of Gretel Drive. In accordance with SPP2.6 the erosion hazard allowance method for rocky coasts has been assessed with regard to the local site conditions.SPP2.6 defines rocky coasts as comprising a continuous rocky substrate which extends to an elevation above the active limit of the shoreline. In most instances this elevation should be defined at least one metre above the HSD. Portions of the study area are considered to be weakly lithified sedimentary rock coast (i.e., limestone).

Portions of the study area are considered to be weakly lithified sedimentary rock coast (i.e., limestone). These coasts comprise poorly cemented or semi-lithified, discontinuous, relatively soft, or highly weathered, weak rock. They typically feature low and steep cliffs that are easily undercut, often forming wave-cut platforms. Shoreline retreat is comparatively rapid compared to other types of rocky coasts and generally occurs by slumping, rock-falls, or slab collapse.

In the absence of better datasets, the existing 2009 Department of Water and Environment Regulation (DWER) LiDAR topography was utilised for mapping.

A conservative 100-year ARI Peak Steady Water Level of 2.5m AHD was combined with a 1.0m allowance as per policy instructions, and the resulting 3.5m AHD contour was mapped (***Figure 23*** and ***Figure 24***). The rocky extent of this was confirmed by comparison to available aerial photography and field photos and observations.

2.3.2.2 Horizontal Shoreline Datum

The Horizontal Shoreline Datum (HSD) is defined as the active limit of the shoreline under storm activity. It is the line from which the erosion hazard

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Figure 23: Pavetta Approach Rocky Coast extent with 3.5mAHD contour displayed

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Figure 24: Gretel Drive Rocky Coast extent with 3.5mAHD contour displayed

allowance will be applied from. In this assessment HSD has been determined by:

- Using the 2019 DoT vegetation line, which characterises the upper limit of seasonal storm impacts. This vegetation line is appropriate because it was prepared from a detailed photogrammetry study covering the whole study area. It is considered an accurate method since any alternative approach would need to use the available topography data from 2009. Section ***2.3.3.2*** provides further details related to vegetation line mapping.
- Consideration of the elevation of the 100-year ARI Peak Steady Water Level. This water level was estimated from the SBEACH model as the maximum water level over the existing beach profile during a 100-year ARI storm event.

The HSD line is included in the erosion hazard maps.

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2.3.2.3 SPP2.6 Erosion Allowances

The objectives of SPP2.6 (***Section 1.2***) guide decision-making within the coastal zone. The natural coastline is subject to erosion through both short-term processes, such as storm surge, and long-term processes, such as rising sea levels and changes to longshore sediment transport.

The allowance for erosion on a sandy coast should be measured from the HSD and calculated as the sum of the following factors:

- **S1 Erosion** - Allowance for the current risk of storm erosion.
- **S2 Erosion** - Allowance for historic shoreline movement trends.
- **S3 Erosion** - Allowance for erosion caused by future sea level rise.
- 0.2 metres per year allowance for uncertainty.

Detailed methodology and results for the erosion hazard assessment are provided below and in ***Appendix B*** and ***Appendix C***.

2.3.2.4 Rocky Coast

The erosion hazard allowance for the sections of rocky coast has used an interim assessment method similar to the 2015 Augusta Margaret River CHRMAP (Shore Coastal, 2015) until detailed local investigations can be undertaken.

It is assumed the S1 erosion distance is a simple slope assessment of visible rock crest height, S2 is interpreted from aerial photography as for sandy coast and for S3 the coastline is also treated as sandy coast to allow for the possibility that the visible rock is not well-founded or continuous landward. This is considered a conservative approach, suitable for this CHRMAP focussed on land use planning. It is not an assessment of geological stability for general public safety.

Shore Coastal (2015) used a bespoke S1 method which set a slope angle (1V:2H aka 26.5 degrees) and calculated horizontal distance based on that slope from the toe of the rock cliff.

A similar approach has been used for this study area with the rock cliff toe approximated conservatively as 1.0mAHD for the Gretel Drive reach and 1.5m AHD for the Pavetta Approach reach (both conservatively low) from analysis of the 2009 DWER LiDAR topography.

A maximum height analysis of the adjacent rock crest of each reach identified heights of 16.0mAHD for the Gretel Drive reach and 12.0m AHD for the Pavetta Approach (both conservatively high). Golder Associates (2017) noted a slope angle of 1V:2H (aka 26.5 degrees) in Shore Coastal (2015) was too conservative. As such a slope angle of 1V:1.5H (aka 33.7 degrees) has been used.

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This resulted in S1 allowances of 22m and 16m for the Gretel Drive reach and Pavetta Approach reaches respectively. The allowance is added from the HSD (rather than the cliff toe line), to be slightly more conservative. It is noted this is more than some S1 distances for sections of Sandy Coast – this is because it is an assessment of cliff stability and not an assessment of the ocean's ability to carry away material as for Sandy Coasts.

Further geotechnical/geophysical investigation is required, such as was undertaken by Golder Associates (2017) in their Limestone Cliff Stability Assessment for the Shire of Augusta Margaret River. Appropriate monitoring and data collection to improve classification of the coast and erosion allowances in future projects will be detailed in future sections.

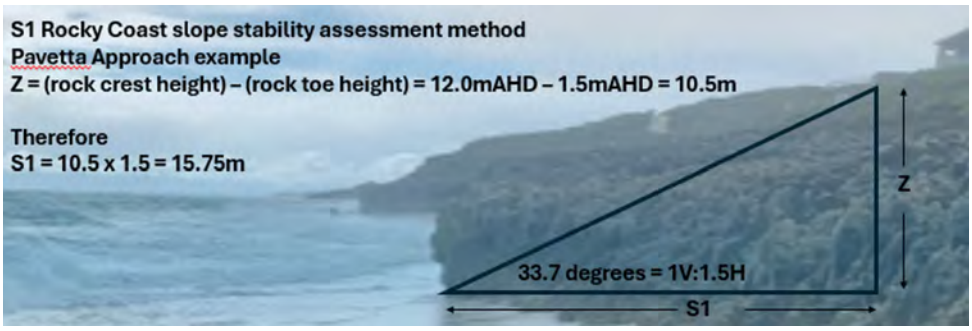


Figure 25: Example calculation method for the S1 storm erosion allowance interim method for Rocky Coast at Pavetta Approach

2.3.2.5 Falcon Bay Seawall

The Falcon Bay seawall extends approximately 170m along the developed foreshore (City of Mandurah, 2019). It was constructed between 2017 and 2019 and consists of a steel sheet pile wall with a 4.0m AHD concrete crest, as pictured in ***Picture 16***. The design information suggests that the structure's useful life is between 30 and 50 years. As such, two coastal erosion scenarios have been mapped:

- the wall is considered to resist erosion to 2050 and then assumed to be removed.
- the wall is ignored, and erosion is mapped as uncontrolled.

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Picture 16: Falcon Bay seawall, 31/5/2024.

2.3.3 Erosion Hazard Assessment Results

2.3.3.1 S1 – Allowance for the current risk of storm erosion

The potential for storm-induced erosion was assessed using the SBEACH numerical model by applying the MPRA (2018) design storm. It was assumed that the subsurface of the shoreline within the study site is of a uniform sandy consistency. Complex geological features are beyond the capability of the SBEACH model, and relevant impacts are factored into the risk assessment component of the CHRMAP.

Refer to ***Appendix B*** and ***Appendix C*** for a detailed description of the wave modelling and simulation of storm erosion. The estimated S1 allowance is presented in ***Table 6***.

2.3.3.2 S2 – Allowance for historic shoreline movement trends

The historic shoreline movement trend was estimated by reviewing available historical shoreline changes. The approach is to analyse historical vegetation lines extracted by DoT (since 1942) from aerial imagery to determine trends as an indicator for potential future shoreline change. It is applicable on natural coastlines where vegetation is free to recede in response to erosion.

Analysis of historical vegetation line movements was undertaken with USGS Digital Shoreline Analysis System (DSAS 5.0) in ArcGIS. It can generate beach transects and calculate shoreline movement trends based on transect crossings through historic shorelines to generate a meaningful shoreline movement rate considering statistical insignificance. Transects for analysis were established at 250 m intervals for the section of the study area south of Dawesville Channel, and 100 m intervals for the section of the study area north of Dawesville Channel. DSAS was used to analyse vegetation line positions at 202 transects (see ***Figure 26*** and ***Figure 27***).

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Figure 26: DSAS transect lines north of Dawesville Channel

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Figure 27: DSAS transect lines south of Dawesville Channel

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This methodology meant that vegetation line information for the entire study area was used rather than other approaches that could have undertaken analysis at only the SBEACH profile locations. This method was used because the vegetation lines represent the longest duration and most detailed dataset for the study area relating to coastal dynamics.

The DSAS analysis was undertaken conservatively by removing some vegetation lines, which returned uncertain results, but on each occasion, it was confirmed that the results were more conservative rather than less. Between 5 and 18 vegetation lines were available for each chainage. A minimum of 3 lines were used as recommended by the DSAS guidelines.

DSAS does not utilise a long-term average of the positions of the oldest and most recent shorelines; instead, it uses a linear regression analysis (refer ***Figure 28***) using a data point from each vegetation line for each transect. Then, for each transect, a statistically representative shoreline movement rate is provided (Woods Hole Coastal and Marine Science Center, 2021).

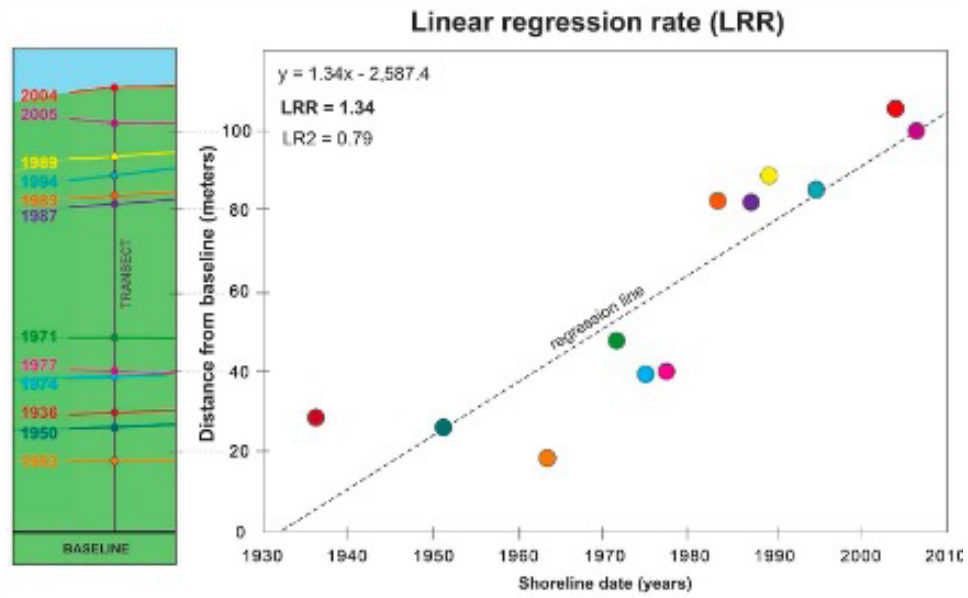


Figure 28: Depiction of DSAS analysis method (Woods Hole Coastal and Marine Science Center, 2021)

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Several locations in the study were found to be accreting. In accordance with SPP2.6:

- If the accretion rate was between 0.0m/yr and 0.2m/yr (inclusive), then it was assumed to be zero.
- If the accretion rate was greater than 0.2m/yr, it was assumed to continue for 50 years only, and this allowance was included in the erosion hazard assessment. This only occurred at one transect north of Dawesville Channel and 14 transects south of Dawesville Channel.

For the erosion hazard allowance from historic shoreline movement trends, a total of 202 transects were analysed along the study area. The SBEACH model was carried out over twenty-one profiles as shown in ***Appendix C***.

The relevant S1 component was selected for each of the 202 transects, based on adjacency to the storm erosion modelling profile location. The erosion distance allowance for each timeframe for each transect is summarised in ***Table 7***.

2.3.3.3 S3 – Allowance for erosion caused by future sea level rise

Rising sea levels retreat the shoreline position along the beach slope. According to SPP 2.6 for sandy beaches, the shoreline recession due to future sea level rise can be estimated as equivalent to 100 times the adapted sea level rise value over the defined planning periods for sandy/mixed coasts. The allowance for coastal erosion due to sea level rise for each project timeframe is presented in ***Table 8***.

2.3.3.4 Summary

Total erosion hazard allowances were calculated for all 202 transects (***Figure 26*** and ***Figure 27***), and a summary for each time frame and each transect is presented in ***Table 6*** and ***Table 7***.

Coastal erosion hazard mapping outputs are included in ***Appendix D***. The year 2125 total erosion hazard allowance distances vary between 95m and 214m across the study area.

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Table 6: Erosion Hazard Allowance summary – North of Dawesville Channel. Note transects classified as rocky coast are identified in the transect number column; HSD used for all transects is the 2019 DoT vegetation line

Transect Number - North of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
1	P14	9	-0.1	10	23	44	100	0.2	9	21	37	63	129
2		9	0.0						9	21	37	63	129
3		9	0.0						9	21	37	64	130
4		9	-0.1						9	21	37	63	129
5		9	0.1						9	22	40	70	142
6		9	0.1						9	22	40	70	142
7		9	0.2						9	23	41	71	145
8		9	0.5						9	26	49	87	176
9		9	0.5						9	26	49	88	178
10		9	0.4						9	25	48	84	171
11		9	0.4						9	25	46	82	166
12		9	0.4						9	25	48	84	171
13		9	0.6						9	27	53	94	191
14		9	0.5						9	26	49	87	177
15		9	0.1						9	22	41	70	143
16		9	0.2						9	23	42	72	147
17		9	0.4						9	25	46	81	164
18	P13	25	0.1						25	38	56	85	158
19		25	0.1						25	38	56	84	156
20		25	0.1						25	38	56	85	158

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Table 6: Continued: Erosion Hazard Allowance summary – North of Dawesville Channel. Note transects classified as rocky coast are identified in the transect number column; HSD used for all transects is the 2019 DoT vegetation line

Transect Number - North of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
21	P12	0	0.2	10	23	44	100	0.2	0	14	32	62	135
22		0	0.0						0	12	28	55	121
23		0	0.0						0	12	28	55	121
24		0	0.0						0	12	29	56	123
25		0	0.1						0	13	31	61	133
26		0	0.0						0	12	29	56	124
27		0	0.0						0	12	28	54	120
28		0	-0.1						0	12	28	54	120
29		0	0.0						0	12	28	54	120
30		0	0.1						0	13	30	59	129
31		0	0.2						0	14	32	62	136
32	P11	7	0.1						7	20	37	65	134
33		7	0.0						7	19	36	62	129
34	P10	18	0.3						18	33	53	86	166
35		18	0.3						18	33	54	88	170
36		18	0.3						18	33	54	89	171
37		18	0.4						18	34	56	92	178

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Table 6: Continued: Erosion Hazard Allowance summary – North of Dawesville Channel. Note transects classified as rocky coast are identified in the transect number column; HSD used for all transects is the 2019 DoT vegetation line

Transect Number - North of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
38	P9	16	0.4	10	23	44	100		16	32	54	89	174
39		16	0.3						16	32	52	86	168
40		16	0.2						16	31	50	81	158
41		16	0.3						16	32	52	86	167
42		16	0.3						16	31	51	83	161
43		16	0.3						16	31	51	84	164
44		16	0.1						16	30	47	76	148
45		16	0.0						16	28	44	70	136
46	P8	13	0.0						13	26	42	69	137
47		13	0.0						13	25	42	68	134
48		13	0.1						13	26	43	70	138
49		13	0.0						13	25	42	68	134
50		13	0.1						13	26	43	70	138
51		13	0.0						13	25	41	67	133
52		13	-0.1						13	25	41	67	133
53 – Rock	N/A	22	0.0						22	34	50	76	142
54 – Rock	N/A	22	0.1						22	35	53	84	152
55 - Rock	N/A	22	0.0						22	34	50	76	142

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Table 6: Continued: Erosion Hazard Allowance summary – North of Dawesville Channel. Note transects classified as rocky coast are identified in the transect number column; HSD used for all transects is the 2019 DoT vegetation line

Transect Number - North of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
56	P7	18	0.2	10	23	44	100	0.2	18	32	51	81	155
57		18	0.1						18	31	48	75	143
58		18	0.1						18	31	48	76	146
59		18	0.1						18	31	49	77	147
60		18	0.0						18	31	47	74	142
61		18	0.1						18	31	48	76	145
62	P6	23	0.0						23	35	51	78	145
63		23	0.0						23	35	51	78	146
64 - Rock	N/A	16	0.0						16	28	44	70	136
65 - Rock	N/A	16	0.0						16	28	44	70	136
66 - Rock	N/A	16	0.0						16	28	44	70	136
67 - Rock	N/A	16	0.0						16	28	44	70	136
68	P6	23	0.1						23	35	52	80	149
69		23	0.1						23	36	53	81	151
70		23	0.0						23	35	52	79	147
71		23	0.1						23	36	53	81	151

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Table 6: Continued: Erosion Hazard Allowance summary – North of Dawesville Channel. Note transects classified as rocky coast are identified in the transect number column; HSD used for all transects is the 2019 DoT vegetation line

Transect Number - North of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
72	P5	21	0.1	10	23	44	100	0.2	21	33	50	78	147
73		21	0.0						21	33	49	76	144
74		21	0.1						21	34	51	80	151
75		21	0.1						21	34	51	80	152
76		21	0.1						21	33	51	79	150
77		21	0.1						21	33	50	77	146
78		21	0.1						21	33	50	78	148
79		21	0.0						21	33	50	77	145
80		21	0.1						21	34	51	80	152
81		21	0.1						21	33	50	77	146
82		21	0.0						21	33	49	76	144
83		21	0.1						21	33	50	77	146

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Table 6: Continued: Erosion Hazard Allowance summary – North of Dawesville Channel. Note transects classified as rocky coast are identified in the transect number column; HSD used for all transects is the 2019 DoT vegetation line

Transect Number - North of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
84	P4	10	0.0	10	23	44	100	0.2	10	22	38	64	130
85		10	0.0						10	22	38	64	130
86		10	0.0						10	23	39	66	134
87		10	0.0						10	23	39	66	134
88		10	0.1						10	23	40	67	136
89		10	0.0						10	23	39	65	132
90		10	0.0						10	23	39	65	132
91		10	0.0						10	22	38	64	130
92		10	0.1						10	23	40	68	138
93	P3	12	0.1						12	25	43	71	141
94		12	0.0						12	24	40	66	132
95		12	0.0						12	24	40	66	132
96		12	0.0						12	24	40	66	132
97		12	-0.1						12	24	40	66	132
98		12	-0.1						12	24	40	66	132
99		12	-0.1						12	24	40	66	132

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Table 6: Continued: Erosion Hazard Allowance summary – North of Dawesville Channel. Note transects classified as rocky coast are identified in the transect number column; HSD used for all transects is the 2019 DoT vegetation line

Transect Number - North of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
100	P2	41	-0.1	10	23	44	100	0.2	41	53	69	95	161
101		41	-0.1						41	53	69	95	161
102		41	0.0						41	53	69	95	161
103		41	-0.1						41	53	69	95	161
104		41	-0.2						41	53	69	95	161
105		41	-0.3						41	50	63	82	148
106		41	-0.2						41	53	69	95	161
107		41	-0.1						41	53	69	95	161
108		41	0.1						41	53	70	98	167
109	P1	31	-0.1						31	43	59	85	151
110		31	-0.1						31	43	59	85	151
111		31	-0.1						31	43	59	85	151
112		31	-0.1						31	43	59	85	151
113		31	-0.1						31	43	59	85	151
114		31	-0.1						31	43	59	85	151
115		31	-0.2						31	43	59	85	151
116		31	-0.1						31	43	59	85	151

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Table 7: Erosion Hazard Allowance summary – South of Dawesville Channel. HSD used for all transects is the 2019 DoT vegetation line

Transect Number - South of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
4	P21	37	0.1	10	23	44	100	0.2	37	50	68	98	171
5		37	0.2						37	51	69	100	175
6		37	0.1						37	50	68	98	171
7		37	0.0						37	49	65	91	157
8		37	0.0						37	49	66	92	160
9		37	0.1						37	50	67	95	165
10		37	0.0						37	49	66	92	160
11		37	0.3						37	52	72	105	186
12		37	0.2						37	51	70	101	177
13		37	0.6						37	55	79	119	214
14		37	0.3						37	52	73	106	188
15		37	0.2						37	51	71	102	180
16		37	0.1						37	50	68	97	169
17		37	0.3						37	52	72	105	185
18		37	-0.2						37	49	65	91	157
19		37	-0.6						37	43	49	60	126
20		37	-0.6						37	43	50	61	127
21		37	-0.6						37	43	49	60	126
22		37	-0.5						37	44	52	65	131
23		37	-0.4						37	45	55	72	138
24		37	-0.5						37	44	52	65	131

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Table 7: Continued: Erosion Hazard Allowance summary – South of Dawesville Channel. HSD used for all transects is the 2019 DoT vegetation line

Transect Number - South of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
25	P21 (cont)	37	-0.3	10	23	44	100	0.2	9	21	37	63	129
26		37	0.0						9	21	37	63	129
27		37	0.1						9	21	37	64	130
28		37	0.2						9	21	37	63	129
29		37	0.2						9	22	40	70	142
30		37	0.1						9	22	40	70	142
31		37	0.1						9	23	41	71	145
32		37	0.3						9	26	49	87	176
33		37	0.2						9	26	49	88	178

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Table 7: Continued: Erosion Hazard Allowance summary – South of Dawesville Channel. HSD used for all transects is the 2019 DoT vegetation line

Transect Number - South of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
34	P20	31	0.1	10	23	44	100	0.2	31	45	63	92	165
35		31	0.1						31	44	61	90	160
36		31	0.1						31	44	62	90	161
37		31	0.1						31	44	62	91	163
38		31	0.2						31	45	65	96	173
39		31	0.1						31	45	63	92	165
40		31	0.0						31	43	60	87	154
41		31	0.1						31	44	61	88	157
42		31	-0.1						31	43	59	85	151
43		31	0.0						31	43	60	87	154
44		31	0.0						31	43	60	86	153
45		31	-0.1						31	43	59	85	151
46		31	0.1						31	44	61	89	158
47		31	0.2						31	45	65	96	173
48		31	0.2						31	46	65	97	175
49		31	0.3						31	46	67	101	183
50		31	0.2						31	45	64	96	172
51		31	0.3						31	46	66	99	179

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Table 7: Continued: Erosion Hazard Allowance summary – South of Dawesville Channel. HSD used for all transects is the 2019 DoT vegetation line

Transect Number - South of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
52	P19	37	0.3	10	23	44	100	0.2	37	51	71	104	183
53		37	0.4						37	52	74	110	196
54		37	0.1						37	50	68	97	170
55		37	0.2						37	50	68	98	172
56		37	0.2						37	50	69	100	175
57		37	0.1						37	50	67	96	167
58		37	0.2						37	50	69	99	173
59		37	0.1						37	49	67	95	165
60		37	0.1						37	50	67	96	167
61		37	0.1						37	49	66	94	164
62		37	0.1						37	50	67	96	168
63		37	0.1						37	49	67	95	165
64		37	0.0						37	49	66	93	161
65		37	0.0						37	49	65	92	160
66		37	0.0						37	49	65	92	160
67		37	0.1						37	50	67	96	167
68		37	0.0						37	49	65	91	157
69		37	0.2						37	50	69	99	174
70		37	0.1						37	49	67	95	166

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Table 7: Continued: Erosion Hazard Allowance summary – South of Dawesville Channel. HSD used for all transects is the 2019 DoT vegetation line

Transect Number - South of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
71	P18	13	0.2	10	23	44	100	0.2	13	27	45	75	149
72		13	0.1						13	26	42	70	138
73		13	-0.2						13	25	41	67	133
74		13	-0.2						13	25	41	67	133
75		13	-0.2						13	25	41	67	133
76		13	-0.3						13	22	33	51	117
77		13	-0.6						13	19	26	37	103
78		13	-0.1						13	25	41	67	133
79		13	-0.1						13	25	41	67	133
80		13	-0.2						13	25	41	67	133
81		13	-0.3						13	22	34	53	119
82	P17								13	22	34	54	120
83									13	25	41	67	133
84									13	25	41	67	133
85									13	25	41	67	133
86									13	25	41	67	133
87	P16								13	23	35	55	121
88									13	22	33	52	118
89									13	25	41	67	133
90									13	25	41	67	133
91									13	25	41	67	133

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Table 7: Continued: Erosion Hazard Allowance summary – South of Dawesville Channel. HSD used for all transects is the 2019 DoT vegetation line

Transect Number - South of Dawesville Channel	Profile NO	S1 (m)	S2 (m/year)	S3 (m)				Allowance for uncertainty (m/year)	Erosion Allowance (m from HSD)				
				2035	2050	2075	2125		Present Day	2035	2050	2075	2125
92	P15	18	-0.4	10	23	44	100	0.2	18	27	37	55	121
93		18	-0.9						18	21	24	29	95
94		18	-0.4						18	26	36	52	118

Table 8: Summary of coastal erosion allowances for corresponding projected mean sea level rise values.

Planning Time Frame (year)	Present Day	2035	2050	2075	2125
Predicted Sea Level Rise (m)	0	0.10	0.23	0.44	1.00
Allowance for coastal erosion due to sea level rise S3 (m)	0	10	23	44	100

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2.3.3.5 Falcon Bay

Figure 29 presents the alternative Falcon Bay seawall erosion hazard projections for a scenario that assumes the wall is resistant to erosion until 2050 and is removed at the end of its design life



Figure 29: Falcon Bay seawall erosion hazard projections for a scenario which assumes the wall is resistant to erosion until 2050 and is removed at the end of its design life

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2.4 Coastal Inundation Hazard Assessment

Coastal land may be affected by storm and tropical cyclones events or rising water levels due to climate change. WAPC (2013) defines coastal inundation as:

"the flow of water onto previously dry land. It may either be permanent (for example due to sea level rise) or a temporary occurrence during a storm event."

Water Technology have increasingly seen the need in recent years to differentiate between coastal flooding and coastal inundation:

- Episodic coastal flooding due to storm tides and wave actions from storms and tropical cyclones events
- Permanent coastal inundation due to rising sea water levels due to climate change

We note for the purposes of this report, to align with SPP2.6, the term coastal inundation has been used throughout and is considered to include the flow of water onto land from both temporary storm events and projected permanent climate change scenarios.

2.4.1 Inundation Hazard Assessment Methodology

In this study, the coastal inundation hazard assessment has been undertaken in accordance with SPP2.6 (WAPC, 2013) and the CHRMAP Guidelines (WAPC, 2019). SPP2.6 requires the allowance for storm surge inundation to be the maximum extent of inundation calculated as the sum of S4 Inundation plus the predicted extent of sea level rise.

The S4 inundation component is defined as the peak steady water level plus wave run-up. SPP2.6 requires the study area's peak steady water level component to be based on a tropical cyclone storm event with ocean forces and coastal process that have a one in five hundred probability of being equalled or exceeded in any given year.

This component has been determined through a review of extreme water level data and modelling information for the study area and surrounding subregions.

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2.4.1.1 Extreme peak steady water levels review

A desktop review of extreme water levels for the study area was undertaken and is presented in ***Table 9***.

Table 9: Extreme peak steady water levels (metres AHD) for the Peel Region coast – desktop review

ARI	50 year (mAHD)	100 year (mAHD)	500 year (mAHD)
GHD (2022) from GEMS (2011)	N/A	N/A	3.6
Seashore (2018)	2.0	2.3	3.0
MPRA (2018)	1.21	1.25	1.35

GHD utilised information from GEMS (2022) for the Mandurah Northern Beaches CHRMAP inundation assessment but noted that "*The 500 (year) ARI inundation levels were adopted from GEMS (2012) report, for which ARI was not explicitly provided. The inundation levels were simulated under a worst track scenario (shifting the track of TC Alby) modelled at a spring tide, which would theoretically result in a higher return period than that of TC Alby. It is assumed that the inundation levels produced in GEMS (2012) report are representative of 500 ARI inundation level at Mandurah.*" It is assumed that the levels are at peak steady water levels, but with the uncertainty of equivalent ARI, these results are considered potentially over conservative.

Baird (2024) used bespoke analysis via numerical modelling of the design storm water level in the ocean outside of the Peel-Harvey Estuary. The design cyclone tracks for the Peel study area are based on the TC Ned track and the TC Alby Track to approximate 500 (year) ARI peak steady water levels with model outputs at the ocean entrances to Mandurah and Dawesville Channels.

Baird (2024) noted that their outer grid resolution was not appropriate to estimate wave setup accurately. This model limitation has been taken into consideration when assessing the model results.

Table 10: Extreme water Levels (mAHD) for the Peel Region coast driven by tropical cyclones (TC) which include an estimated wave setup component (Baird, 2024)

Design cyclone / Location	Mandurah ocean entrance	Dawesville ocean entrance
TC Alby	2.4	2.7
TC Ned	2.2	2.5

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In 2010, Geoscience Australia, the then Western Australian Department of Planning and the WAPC collaborated to develop a storm surge modelling methodology for Bunbury, approximately 70km south of the study area (Fountain et al. 2010). A storm surge level of over 2.3 m AHD was predicted for a worst-case synthetic cyclone event (modified from TC Alby track).

Damara (2011) estimated the extreme water levels at Bunbury using over 20 years of water level data from the Bunbury tide gauge. Damara (2020) provided an update of this estimate. MPRA (2015) undertook an extreme value analysis using 23 years of DoT data and 48 years of the former Public Works Department data (in total 71 years). Review results are summarised in ***Table 11***.

Table 11: Extreme peak steady water Levels for Bunbury – desktop review

ARI	50 year	100 year	500 year
Damara 2011 (m AHD)	1.44	1.49	N/A
MPRA 2015 (m AHD)	1.6	1.7	2.0
Seashore 2018(m AHD)	N/A	N/A	2.9
Damara 2020 (m AHD)	N/A	1.55	2.6

GHD (2017) estimated a 500yr ARI water level for Port Beach near Fremantle, approximately 50km north of the study area, of 3.2mAHD and including sea level rise, storm surge and wave setup. Cardno (2022) estimated a 500yr ARI water level for the town of Cambridge coast in Perth of 3.5mAHD and including sea level rise, storm surge and wave setup.

As Baird (2024) scoped their work to determine appropriate regional peak steady water levels from tropical cyclone storm events for use in CHRMAP, 2.4mAHD (an average of their four results) has been selected as an appropriate value to use to inform the preparation of the current CHRMAP study. It is understood to include tide, storm surge and wave setup components.

2.4.1.2 Wave setup

Wave setup is a localised increase in ocean waters level due to wave breaking. It is a contributing factor to coastal inundation on top of peak steady water level. It can be particularly important during storm events with high wave energy and is therefore important to include in the inundation hazard assessment. The wave setup component included within results from Baird (2024) has been compared to an analysis using relationships determined by Stockdon (2006) with inputs from the MPRA (2018) 100yr ARI design storm (b) (see ***Table 12***).

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Table 12: Wave setup for the Peel Region coast

Design Source	Mandurah ocean entrance	Dawesville ocean entrance
Included within TC Alby modelling by Baird (2024)	0.7m	0.8m
Included within TC Ned modelling by Baird (Baird, 2024)	0.6m	0.8m
Stockdon (2006) Using offshore wave height of 8.0m and peak wave period of 16.0s	0.9m	N/A The Mandurah ocean entrance result applies to the whole study area.

The wave setup components included within the modelling by Baird (2024) are slightly less than the results from analysis using Stockdon (2006) so an additional allowance of 0.1m has been added.

2.4.1.3 Allowance for the risk of storm surge inundation

The inundation water level components for storm surge inundation adopted for this project include extreme peak steady water level, local nearshore wave setup and projected mean sea level rise, presented in ***Table 13*** for the different project timeframes.

A wave run-up component, which may need to be considered for local impacts on assets has not been included. Wave run-up is defined in SPP2.6 as the rush of water up a shoreline or structure on the breaking of a wave. It is only considered relevant on the beach face, or structures, where waves break and as such varies greatly along the shoreline. Wave run-up is therefore not appropriate to include in regional studies such as this but will need to be included when assessing local assets in greater detail.

For comparison purposes it is noted that GHD (2022) estimated a total inundation allowance of 4.8mAHD for 2120 for the Mandurah Northern Beaches CHRMAP. The difference between the projects' results is likely due to the recent work by Baird (2024) now being available.

Table 13: Summary of inundation components.

Planning Time Frame (year)	Present Day	2035	2050	2075	2125
Projected mean sea level rise (m)	0	0.10	0.23	0.44	1.00
Peak Steady Water Level (mAHD)	2.4	2.4	2.4	2.4	2.4
Wave Setup (m)	0.1	0.1	0.1	0.1	0.1
Total inundation allowance (mAHD)	2.5	2.6	2.7	2.9	3.5

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2.4.2 Inundation Hazard Assessment Results

Inundation extent is mapped through a "bathtub" model, which is a simplified approach to evaluate coastal inundation based on the storm tide level. The mapped inundation extents were reviewed to exclude any low-lying inland area not connected to the ocean. The study area is less affected by inundation than erosion. This is in line with the information gathered during the desktop review and site visit.

The approach is considered conservative because it depicts low-lying land with limited ocean access for water to travel at risk of inundation. It is considered appropriate because the topography of the study area means that for everywhere except Falcon Bay, the projected erosion hazards far exceed the extent of the projected inundation hazard. As the hazards are considered separately, the dynamic nature of the study area's evolution means that the long-term relationship of projections (50-100 years) cannot currently be considered – the impact of the design inundation event following significant erosion in the future requires further consideration.

Coastal inundation hazard mapping is included in ***Appendix D***.

2.5 Management Units

Following the site visit, desktop review, engagement with the project steering committee and assessment of the coastal erosion hazards, the study area shoreline has been divided into 11 segments for subsequent analysis during the project, referred to as Management Units and presented in ***Figure 30*** and presented in ***Table 14.***

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Figure 30: Management Units

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Table 14: Management Unit numbers, names, extents and summary information for asset at risk from erosion and inundation

Management Unit Extents	Summary of assets at risk from erosion	Summary of assets at risk from inundation
MU1 Blue Bay Robert Point to Janis Street	Vegetated and developed foreshore, road and residential property at risk from present day.	Limited primarily to the sandy beach with a small section of vegetated foreshore also impacted.
MU2 Back Beach Janis Street to Calypso Road	Vegetated foreshore at risk from present day. Residential property at risk by 2050.	Limited to the sandy beach.
MU3 Calypso Calypso Road to Daydream Plaza	Vegetated foreshore at risk from present day. Dual use path at risk by 2050. Developed foreshore at risk by 2075.	Limited to the sandy beach.
MU4 Seascapes Daydream Plaza to Gretel Drive	Vegetated foreshore at risk from present day. Dual use path and developed foreshore at risk by 2035. Residential property at risk by 2075. An approximately 362m long section of rock is present adjacent to Pavetta Approach. An approximately 348m long section of rock is present in the vicinity of Gretel Drive.	Limited to the sandy beach and very small areas of vegetated and developed foreshore – however these are also at risk of erosion much sooner.
MU5 Rakoa Gretel Drive to Mercedes Avenue	Vegetated foreshore and roads at risk from present day. Dual use path developed foreshore and residential property at risk by 2035.	Limited to the sandy beach and very small areas of vegetated and developed foreshore – however these are also at risk of erosion much sooner.
MU6 Falcon Bay Mercedes Avenue to Cosies Surf Break	Vegetated foreshore at risk from present day. Developed foreshore at risk by 2035. Road at risk by 2050. Residential property at risk by 2075. A seawall is present along approximately 170m of the developed foreshore area.	Potential inundation impacts from the present day on vegetated foreshore. developed foreshore, roads, residential property projected to be at risk from 2125.
MU7 Gearies-Avalon Cosies Surf Break to Westview Parade	Vegetated foreshore at risk from present day. Developed foreshore at risk by 2035. Roads and residential property at risk by 2050.	Limited to the sandy beach and very small areas of vegetated and developed foreshore – however these are also at risk of erosion much sooner.
MU8 Dawesville Cut Westview Parade to Pyramids Beach	Protected by structures associated with the Dawesville Channel and sand bypassing operations.	Access areas behind Dawesville Channel structures at risk from present day with area at risk increasing slowly to 2125.

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Table 14: Continued: Management Unit numbers, names, extents and summary information for asset at risk from erosion and inundation

Management Unit Extents	Summary of assets at risk from erosion	Summary of assets at risk from inundation
MU9 Pyramids Beach-Golf Course Pyramids Beach to Dongara Vista	Vegetated foreshore, dual use path, Port Bouvard SLSC building and associated developed foreshore at risk from present day. Golf greens at risk from 2050.	Primarily limited to the sandy beach. Small areas of vegetated foreshore, developed foreshore, roads, dual use path, Pyramids Beach, SLSC and car park at risk from 2050
MU10 Florida-Melros Dongara Vista to William Street	Vegetated and developed foreshore at risk from present day. Dual use path at risk by 2035. Roads and residential property at risk by 2075.	Primarily limited to the sandy beach. Small areas of vegetated foreshore, developed foreshore and dual use path are also at risk by 2125, but are at risk of erosion much sooner.
MU11 Yalgorup William Street to Southern Boundary	Vegetated foreshore at risk from present day. Dual use path at risk by 2075. One rural property at risk by 2125.	Primarily limited to the sandy beach. Small areas of vegetated foreshore, are at risk by 2125, but are at risk of erosion much sooner.

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2.6 Asset Identification

Identification of coastal assets and their values is a crucial step toward the development of adaptation options. Coastal assets along the Mandurah southern beaches foreshore have been identified through review of available information – predominantly Local Planning Scheme No. 12, cadastral maps and the community engagement survey. This includes key coastal assets and values that reflect the opinions from local communities and stakeholders. More specifically, coastal assets (both natural and built) were identified in the following ways:

1. Asset information was provided for use in this study by the City and included in a GIS database.
2. Data WA was accessed to identify assets, including roads.
3. The coastal values survey(s) and other engagement activities identified additional assets of importance and value to the community.
4. Site visits investigated locations where information required greater detail or clarity.
5. Further assets were identified manually from aerial photography (e.g., developed areas of foreshore reserve).

2.6.1 Asset categories

Assets sharing similar values are grouped as per the recommendation of WAPC (2019). Categories are listed below, describing typical assets within each group.

1. **Aboriginal Heritage** e.g., Registered sites and other heritage places.
2. **Environmental Assets**
   - Matters of National Environmental Significance (such as the Australian Fairy Tern colony).
   - Threatened and Priority Ecological Communities/known locations of threatened flora.
3. **Regional Open Space Reserve**
   - Vegetated (undeveloped) foreshore areas, including beaches, dunes, and bushlands in the foreshore areas.
   - Developed foreshore areas containing public assets, e.g., car parks, public ablutions, playgrounds, walkways, and access structures.

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4. **Residential Land**
   - Occupied and vacant land directly abutting the coast.
   - Occupied and vacant land landward of a coastal road.
5. **Commercial Land and Assets**, e.g., cafés, shops etc.
6. **Rural Lots**
7. **Roads** - which are also typically co-located with service infrastructure (power, telecommunications, gas and water and waste water pipes etc) and footpaths and/or bike paths.

The Wastewater Treatment Plant at Halls Head is a significant individual asset that does not fit easily into the categories – it has been considered separately during the vulnerability analysis.

These groupings typically include tangible physical assets or identified sites and places that can be mapped and located. It is recognised that some assets are intangible, such as Aboriginal cultural values that are not solely associated with formalised locations. These are identified through engagement.

2.6.2 Confirming Values

As noted, one of the ways that assets are identified is through engagement with the community. Engaging the community can help to identify intangible assets that are not physically present but still hold importance to the community. It also helps to identify which physical assets are of importance (or not).

The first phase of project engagement occurred between August and October 2024. Feedback was sought through:

+ Online mapping
+ Surveys
+ A Coastal Community Reference Group
+ Stakeholder meetings including Winjan Aboriginal Corporation
+ The City's advisory groups
+ An invitation for written feedback

The following pages (and ***Figure 31*** to ***Figure 36***) show key feedback received during engagement - shown spatially.

More detail on Engagement Outcomes can be found in ***Appendix E***. A full report on all of the engagement undertaken as part of this CHRMAP, including verbatim reporting on individual responses, can be found on the project website.

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2.6.3 Assets and Values Mapping

2.6.3.1 Blue Bay to Seascapes

Key Physical Assets

1. Halls Head Shared Path
2. Blue Bay Beach car park
3. Back Beach car park
4. Calypso car park and reserve
5. Halls Head Waste Water Treatment Plant
6. Giants of Mandurah

Places I love

1. Doddies Beach – North facing beach protected from prevailing wind and big swells.
2. Roberts Point – Views north and towards Mandurah centre. Watching dolphins, seabird life, watching storms in winter
3. Halls Head Beach – Swimming beach and dog beach. Sunset views.
4. Blue Bay Beach – Place for people to gather and enjoy a beautiful beach, with easy access to parking and amenities (outdoor shower, grassed area). Protected beach and good swimming spot.

Water based activities

1. Swimming, fishing, pontoon - protected
2. Surfing, kayaking, stand-up paddle-boarding
3. Protected swimming spot, good length to swim some laps

Beach based activities

1. Running, playing with dogs
2. Beautiful beach location and semi protected from summer breezes. Beach walks, walking dogs.
3. Walking, relaxing

Nature based activities

1. Watching dolphins surfing off the reef, watching wildlife
2. Coastal path surrounded by nature & ocean.
3. Natural environment

Great views

1. Watching the sunset

Strongly Valued Assets

1. Robert Point - Blue Bay: sandy beach and dune revegetation for increased natural protection of the area.
2. Blue Bay: Sandy beach. Erosion. Vulnerable area. Toilets and public assets. Meeting place. Social community gathering. Ablution facilities
3. Back Beach - sandy beach and the natural environment. Access to swimming, walking, fishing, snorkelling

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Figure 31: Beach profile area values mapping - Mandurah island north

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2.6.3.2 Seascapes to Rakoa

Key Physical Assets

1. Seascapes Beach *Aboriginal Cultural Heritage (ACH) Register Place*
2. Seascapes Boardwalk
3. Josephine Te-Puni Reserve
4. Rakoa Reserve

Places I love

1. Polley's Hole – Swimming, dog walking, abalone fishing area

Water based activities

1. Quiet beach for a long walk with the dog and a swim
2. Protected swimming spot inside the reef. Great that you can take your dog. Fun for the kids at low tide
3. Low crowd beach walks and swimming spot
4. Quiet surf spot, friendly locals

Foreshore based activities

1. Great bicycling pathway
2. Seascapes Boardwalk – Coastal shared path popular for walking and cycling
3. Good fishing access, without a boat

Beach based activities

1. Local dog beach, dog walking
2. Local dog walking and socialising
3. Quiet corner for sunbathing, reading, listening to music
4. Winter beach combing, photography

Nature based activities

1. Reef protection for biodiversity, supporting marine ecosystems

Great views

1. Great spot to watch the sunset from the wooden platform.
2. Great sunset views, storm watching, and fireworks

Strongly Valued Assets

1. Cliffs and reef from Gretel Drive to Seascapes Boulevard show a different geological/ecological feature; more"rugged", and different visitor experience
2. Seascapes: Sand consistent. Protect reef system. Fishing and management of environment
3. Rakoa to Falcon Bay: Sandy beach. Community assets/pontoon/ playground. Sand for surf break/ great for learners. Meeting place. Social/community gathering. Accessible. Maintain access, swimming beach, cafe

Different views on maintaining the physical assets or allowing the ocean room to change

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Figure 32: Beach profile area values mapping - Seascapes to Falcon Bay

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2.6.3.3 Falcon Bay to Dawesville Cut

Key Physical Assets

1. Yeedong Road Boat Launch
2. Avalon Foreshore Reserve
3. Eggs Farm car park
4. DoT ongoing maintenance sand bypassing operations
5. Falcon Bay Foreshore Reserve

Places I love

1. Falcon Bay – Protected from a lot of the sea breezes. Toilets and lovely grassed area for picnic. Great meeting place
2. Cosies Surf Break
3. Gearies Surf Break. Area history.
4. Kid friendly location.
5. Yeedong Road boat launching beach with 4wd access. Great place to launch watercraft
6. Avalon Beach –Good swimming spot – quiet natural beach. Not too many man made structures
7. Eggs Farm Surf Break. Great spot for surfing. Coffee van, sitting and watching the surfers

Water based activities

1. Family swimming area with pontoon and is patrolled during summer months by the surf life saving club
2. Surfing
3. Boat ramp and launching area is frequently used by the surf life saving club for boat training
4. Great for surfing and protected area for swimming. Provides a great recreational playground for everyone. Training for nippers
5. All year round surfing and summer swimming location. influenced by the sand bypassing operations
6. Winter Surfing location – influenced by the sand bypassing operations.

Foreshore based activities

1. Coastal path – running and cycling through the dunes and around to watch the dolphins in the cut.

Beach based activities

1. Dog friendly beach access for swimming and surfing, with lovely sunsets
2. Dog friendly beach access for swimming and surfing. Sunsets too
3. Dog Friendly Beach activities. Easy access to the beach with and without dogs.
4. Avalon Beach – Calm waters. Swimming, surfing, relaxing
5. Dawesville Cut training wall groynes – popular for fishing.

Great views

1. A great meeting point for community. Enjoying sunsets, checking the surf, watching wildlife

Strongly Valued Assets

1. Gearies Avalon: culturally important. Requires sustainable development and some protection
2. Grass open space. Accessibility (all abilities access and community spaces). Paths and shade shelters and lookouts. Sand nourishment to support beaches further north. Safe protected swimming - good for kids and elderly
3. Avalon Bay: Natural dunes/ vegetation, sandy beach for swimmers, surf breaks/sand for surf breaks. Community meeting place
4. Sand bypassing maintained - keep beached nourished and safe

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Figure 33: Beach profile area values mapping - Mandurah island south

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2.6.3.4 Dawesville/Pyramids-Golf Course to Florida-Melros

Key Physical Assets

1. DoT ongoing maintenance sand bypassing operations
2. Port Bouvard SLSC
3. The Cut Golf Course
4. Florida Beach carpark
5. Melros Beach carpark

Places I love

1. Port Bouvard SLSC
2. Florida Beach – Good access for homes close by.
3. Melros Beach – Main beach access for Melros with car parks and toilets. Access for surfing, beach walks and other beach activities.
4. Coastcare picnic bench, fabulous views over the ocean.
5. Coastal path - beautiful scenic access path for all users including wheel chair access.
6. Snorkelling with the kids and walking the dogs

Water based activities

1. Mandurah surfers and life saver training ground and Sporting event space for Mandurah board riders club junior and senior competitions all year round. Patrolled beach with surfable conditions.
2. Quiet place for relaxing on the beach.
3. Surf spot
4. Snorkelling around the reef, where it is protected from the waves.

Foreshore based activities

1. Walking and bicycling

Beach based activities

1. Vehicle Access. Important for fishing at the Cut.
2. Walking along the beach
3. Beach for kids to play. It's a nice quiet space for locals.
4. Exercising the dog, swimming, relaxing

Nature based activities

1. Great for watching dolphins along The Cut foreshore

   An important unique habitat for flora and fauna, to be protected
2. Hooded Plover and occasional Fairy Tern nesting area
3. Bushwalking
4. Coastcare planting area
5. Home to native fauna to be protected

Great views

1. Enjoy watching the Sunset over the ocean from the Lookout.
2. Views from Coastcare lookout with seat.
3. Views from Coastcare Memorial lookout with seat.

Strongly Valued Assets

1. Social and recreational uses that help us connect - surf clubs, pathways, amenities

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Figure 34: Beach profile area values mapping - Dawesville

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2.6.3.5 Yalgorup - Tim's Thicket

Key Physical Assets

1. Tims Thicket Inert Disposal
2. Tims Thicket Beach car park
3. Tims Thicket *Aboriginal Cultural Heritage (ACH) Register Place*

Places I love

1. Tim Thicket Beach – 4wd access beach. Popular and important for the 4WD community and fishers
2. Popular for beach goers with 4WD

Water based activities

1. Fishing access point off the shore or going cray diving or spear fishing at the inshore reefs
2. Swimming, fishing, snorkelling, paddle boarding, diving. Inshore reef provides protection for families and kids
3. Has reef, surf, and protected places to park and picnic. It is the best part of the coastline, close to the Perth metro area

Beach based activities

1. Beach combing and wildlife observations with cycle access to coastal path.
2. Bouvard Coastcare's annual Tims Thicket 4WD cleanup – attended by residents and 4WD enthusiasts.
3. Multi purpose beach – iconic Mandurah beach, 4WD, family and friends gathering, relaxing
4. 4WD along the stretch from Tims Thicket to White Hills - safe spaces to picnic, fish, surf, snorkel and spearfish

Nature based activities

1. Coastcare planting area
2. Coastcare planting area, to rejuvenate the dune system.

Strongly Valued Assets

1. Tim's Thicket: Recreational activities (4WD). Yalgorup: environmental protections. Restrict development to allow for protection of fauna/ flora/habitats/ecosystem
2. 4WD, fishing, surfing, snorkelling and diving. Bird watching. Natural area. Lifestyle
3. Limiting access tracks or access to tracks for protection.

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Figure 35: Beach profile area values mapping - Tims Thicket

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2.6.3.6 Yalgorup - White Hills

Key Physical Assets

1. White Hills Road

Places I love

1. White Hills Beach – Fishing, swimming and snorkelling

Water based activities

1. White Hills to Preston – extremely valuable area for the fishing and 4wd community.
2. Great fishing

Beach based activities

1. Beautiful long uncrowded beach and nearby reefs. Snorkelling, swimming, fishing, beach days, relaxing getaway
2. Beach fishing, swimming and 4WD
3. Access by vehicle for 4WDing, fishing, swimming, relaxing on the beach

Nature based activities

1. Fishing, safe swim spot for more adventure swimming, walking in bush that surrounds beach is good for bird watching and coastal plant exploring

Strongly Valued Assets

1. Needs protection. Benefits - For ecology for future survival of biodiversity; for many visitors for leisure and nature
2. Escaping to nature

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Figure 36: Beach profile area values mapping - White Hills

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In addition to this spatial feedback, the community also provided feedback on some of their preferences for the types of adaptation responses that might be considered by the CHRMAP.

One question sought values related to use and enjoyment of the beach and foreshore area. The most agreeable uses included;

+ Preserving the natural environment and ecological systems (98.9% Strongly Agree or Agree)
+ Opportunities to use beaches for unstructured recreation activities (96.7% Strongly Agree or Agree)
+ Retention of natural landscapes, not interrupted by human-made structures (95.6% Strongly Agree or Agree)

The feedback suggests that the community values the natural, low key, family friendly nature of the coastline above other more intense uses.

The second values question related to potential ways to manage coastal hazards. Responses were much more mixed across the 'Agree' and 'Disagree' spectrum, with the most agreeable options being to:

+ Inform private landowners about the risk of erosion and inundation when purchasing or developing in coastal hazard areas, (89% Strongly Agree or Agree)
+ Revegetate foreshore reserves and preserve dunes as much as possible, even if this means closing some paths to the beach to consolidate access points (81.5% Strongly Agree or Agree)
+ Prevent more intensive development (such as units where there is a single house) in hazard areas (78.2% Strongly Agree or Agree)
+ Leave beach wrack in location (seaweed) to lower the risk of coastal erosion, even if this means short periods of beaches affected by weed and occasional smells (77.2% Strongly Agree or Agree)

Whilst there is strong support for these suggestions, there is less and mixed support for the following:

+ Allow approved land uses to continue in developed areas until erosion becomes intolerable, even if this means that some activities may be periodically impacted by storms, erosion and inundation (54.3% Disagree or Strongly Disagree and 26% were neutral)
+ Retain all public access to beaches and foreshore reserves as it exists today, even where this might result in or increase risk of erosion and inundation and be limited periodically by storms, erosion and inundation damage (52.2% Disagree or Strongly Disagree)

Doing nothing was also strongly disagreed with (71.7% Disagree or Strongly Disagree).

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The last value question sought feedback on funding. Responses were also mixed, with the following options the most agreeable;

+ Undertake protection work and ask the State and Federal government to help (84.8% Strongly Agree or Agree)
+ The City should consider acquiring properties that are at risk - funded by State or Federal (70.6% Strongly Agree or Agree). Only 35.8% Strongly Agreed or Agreed with this statement when funding was to come from rates and levies.
+ Landowners can protect their own private property at their own cost (60.8% Strongly Agree or Agree)

Any option suggesting the use of rates and levies was generally disagreeable to respondents. Doing nothing was also disagreeable.

In general, the feedback suggests that the natural coastal environment is highly valued, over and above developed foreshore areas. Natural responses are strongly supported. In any case, lower cost to the ratepayer is preferred. This will need to be carefully considered when looking at adaptation options in later stages of the CHRMAP.

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SECTION 3
VULNERABILITY ASSESSMENT

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3 Vulnerability Assessment

Vulnerability analysis constitutes the second stage of the risk identification process. A vulnerability assessment defines the degree of impact coastal hazards are likely to have on coastal assets over the planning timeframe.

The **vulnerability** of coastal assets to coastal hazards is related to its **exposure** to the hazard, its **sensitivity** to that exposure, and the **adaptive capacity** of the **asset at risk** (modified or adapted) to manage this exposure. This is displayed diagrammatically in ***Figure 37***.

This chapter summarises the following:

1. **Likelihood and consequence** – review likelihood and consequence scales in the CVS, update assets' exposure (likelihood) and sensitivity (consequence) to coastal hazards.
2. **Update risk assessment** – establish potential impact based on the likelihood and consequence scales.
3. **Assess the Adaptive Capacity** – of the assets to cope with coastal hazards.
4. **Identifies Vulnerability** – establish vulnerability to coastal impacts, so the community can understand potential impact, even if they are willing to accept certain risks.

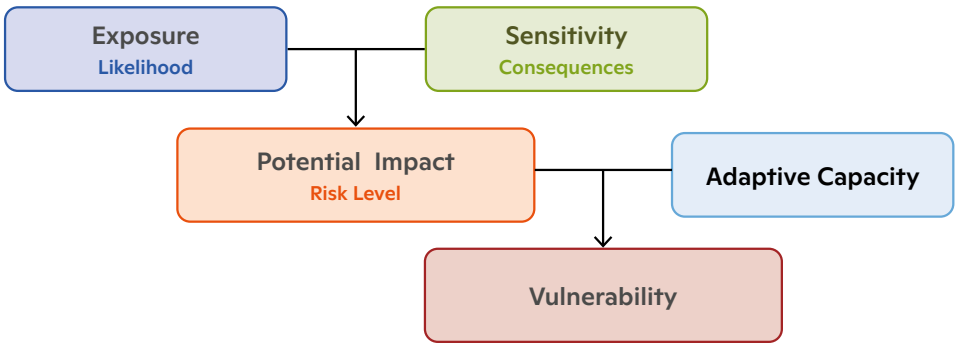


Figure 37: Vulnerability relationship

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3.1 Exposure/Likelihood

The **exposure/likelihood** of identified assets represents the likelihood of coastal hazards impacting on an asset. That is, the chance of erosion and / or storm surge inundation impacting on existing and future assets and their values (WAPC, 2019).

As likelihood can be subjective, the likelihoods were defined based on the predicted hazard extents for the various planning timeframe as recommended in WAPC (2019).

The likelihood scale adopted is presented in ***Table 15***.

Table 15: Exposure/Likelihood rating description for erosion and inundation

Likelihood Rating	Description	Annual Exceedance Probability
Almost Certain	Expected to occur in most circumstances	>90%
Likely	Impact to asset for a given planning timeframe is likely	50-90%
Possible	Impact to asset for a given planning timeframe is possible	10-50%
Unlikely	Impact to asset for a given planning timeframe is unlikely	1-10%
Rare	May occur in exceptional circumstances	<1%

Over the years, there has been significant variation in defining the likelihood ratings based on coastal hazard assessment outcomes. The hazard maps were developed based on a number of components, each of which has its own assumptions and degree of uncertainty.

For instance, the assessment of S1 erosion risk has considered storm events which, by themselves, represent their likelihood of occurrence, however such occurrences change over the different planning timeframes. Likelihood of sea level rise (SLR) and historic shoreline movement are very difficult to define quantitatively by scientific terms. It is therefore important to adapt a straight-forward approach to transfer the information presented in the coastal hazard maps into likelihood of impact to assets.

This CHRMAP adopts the approach recommended by WAPC (2019) as demonstrated in ***Figure 38***.

The likelihood of the current study for erosion is thereby determined by ***Table 16***.

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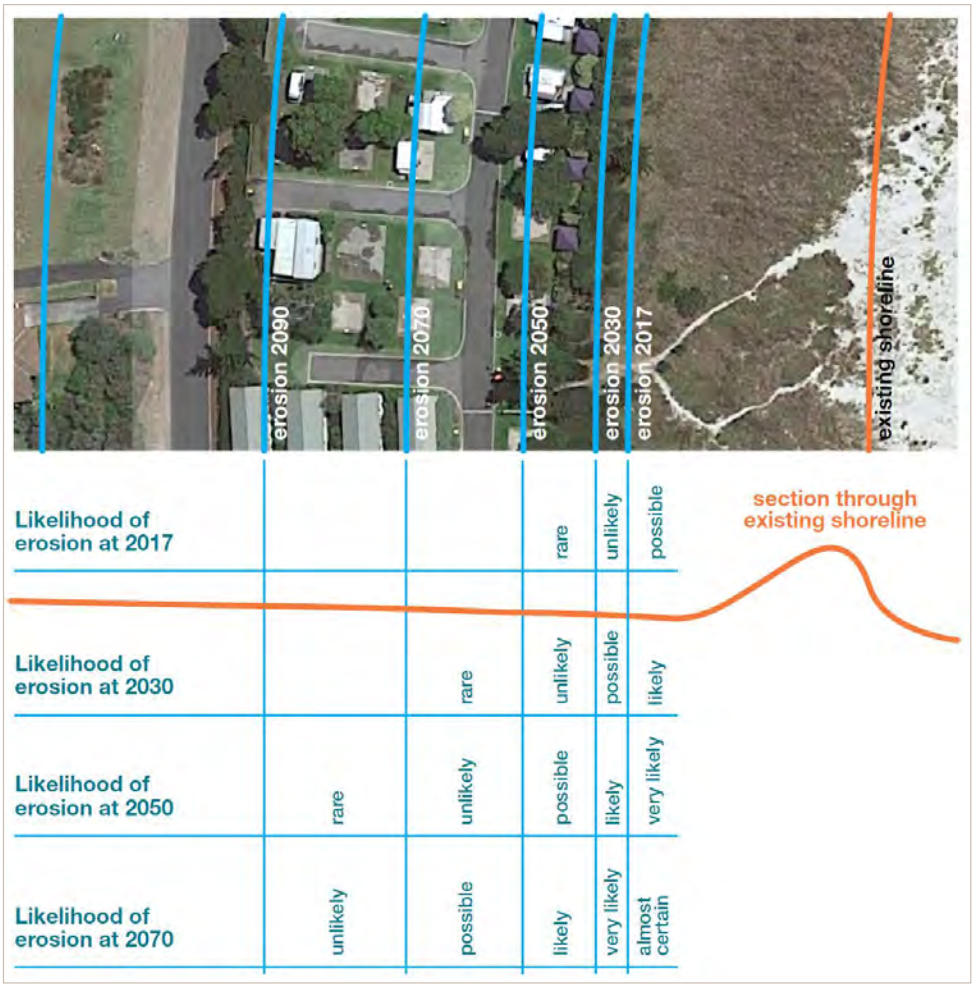


Figure 38: Example of likelihood (or exposure) of erosion hazard for different timeframes (source: WAPC, 2019)

Table 16: Adopted likelihood rating for the planning timeframe (source: WAPC, 2019)

Likelihood Rating	Planning Timeframe				
	Present Day 2025	2035	2050	2075	2125
2025	Likely	Almost Certain	Almost Certain	Almost Certain	Almost Certain
2035	Possible	Likely	Almost Certain	Almost Certain	Almost Certain
2050	Unlikely	Possible	Likely	Almost Certain	Almost Certain
2075	Rare	Unlikely	Possible	Likely	Almost Certain
2125	Rare	Rare	Unlikely	Possible	Likely

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For the purpose of inundation assessment, 500-year ARI inundation scenario was applied. ***Table 17*** presents the probability of a 500-year ARI event occurring over the planning timeframes. By applying the definitions of the likelihood scale of ***Table 15***, the likelihood of inundation for the current study is presented in ***Table 18***.

Calculation of the probabilities behind the likelihood ratings is complex and simplification is necessary in order to carry out the vulnerability and risk assessments. Any adaptation measures will consider applying 'triggers' (catalysts) before implementation which reduces the risk of this simplification process. For example, a trigger might be reached by an inundation event with certain consequences occurring twice in a given year.

Table 17: Probability of the 500-yr ARI inundation event occurring between now and the various planning timeframes

Time Frame	Probability (500-year ARI)
Present Day	0.2%
2035	2%
2050	5%
2075	10%
2125	18%

Table 18: Exposure/likelihood of Inundation hazards across the planning timeframes

Time Frame	500-year ARI Inundation Event
Present Day	Rare
2035	Unlikely
2050	Unlikely
2075	Possible
2125	Possible

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3.2 Sensitivity/Consequence

The sensitivity/consequence is an asset's responsiveness to a coastal hazard. This could be a gradual response or a stepped change in response to discrete events (WAPC, 2019). The sensitivity can be applied to the asset itself, or to the asset's function and the criticality of the service it provides (NCCARF, 2017).

The consequence ranking presented in ***Table 19*** constitutes the physical impact of the event to the asset, as well as that of the values attributed to it by the success criteria defined earlier in the study. The success criteria were generated and then tested via the coastal values stakeholder and community engagement and are listed in ***Section 1.13***.

Table 19 can be interpreted as follows:

- The **Physical, Financial** column considers the physical impact as well as a qualitative assessment of the economic costs associated with the various consequences.
- The remaining columns include the application of the success criteria.
    - The **Environment** column considers how the environment may be impacted through an erosion or inundation event, including consideration of if a similar habitat may exist elsewhere. Includes threats that could impact the viability of natural assets or that compromise the sustainability of the environment.
    - The **Community / Social & Cultural** column considers how impacts to an asset may affect the community, also allowing for if alternative assets / functions exist elsewhere. Consideration of community safety is also included.

For each hazard, the consequence is assessed against the criteria qualitatively, based on experience of the impacts of coastal erosion and inundation, and the examples presented in the consequence scale.

The purpose of assigning vulnerability is to identify and prioritise what requires adaptation. The consequence rankings differ to traditional internal local government risk assessment rankings as they are to be applied for a different purpose.

Local governments will still apply their internal risk assessment processes when considering adaptation actions such as the removal or repair of assets. The rankings presented within this report are purely to inform the CHRMAP.

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Table 19: Sensitivity/Consequence ranking

Consequence	Physical, Financial	Environment	Community / Social & Cultural
Insignificant	No or minimal damage, perhaps requiring increased maintenance Financial loss less than $20,000	Negligible to no impact to environment	Minimal short-term inconvenience to asset, services and function, <5% of community affected. Many alternatives exist
Minor	Minor damage to assets resulting in restrictions in capability, financial loss of $20,000 to $200,000	Short term damage to environment. Recovery will be strong. Local or regional alternate habitat exists	Isolated but noticeable (short term) decline or disruption to asset, services and function, <10% of community affected. Alternative sites exist
Moderate	Damage to assets resulting in isolated loss of capability, financial loss of $200,000 to $2 million.	Medium term loss of environmental assets. Recovery is likely. Local or regional alternate habitats exist	Moderate (short to medium term) decline or disruption to assets, services and function, <25% of community affected. No convenient alternative exists
Major	Significant damage to many assets resulting in very limited capability, financial loss of $2 million to $5 million	Long-term damage to environmental assets. Limited chance of recovery. No local alternate habitat(s) exist. Regional habitats exist	Severe (medium-term) decline or disruption to asset, services and function, <50% of community affected. No convenient alternative exists
Catastrophic	Significant damage to most assets resulting in loss of capability, financial loss of over $5 million	Permanent damage to environmental assets. No chance of recovery. No alternate habitat(s) exist.	Long term or permanent loss of asset, services and function >75% of community affected. No alternative exists

Each asset category was assigned a sensitivity / consequence rating, presented in ***Table 20*** and ***Table 21*** for erosion and inundation respectively. A rating was assigned to each of the consequence columns from ***Table 19*** and then the overall rating assigned as the worst case scenario. This applies a conservative factor to this large-scale approach.

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Table 20: Sensitivity / consequence rating by asset category: erosion

Asset Category	Physical, Financial	Environment	Community / Social & Culture	Overall Rating
Aboriginal Heritage	Major	Major	Major	Major
Environmental Assets	Moderate	Major	Major	Major
Regional Open Space Reserve	Moderate	Major	Major	Major
Residential Land	Catastrophic	Minor	Major	Catastrophic
Commercial Land and Assets	Catastrophic	Minor	Major	Catastrophic
Rural	Major	Moderate	Moderate	Major
Roads	Catastrophic	Minor	Major	Catastrophic

Table 21: Sensitivity / consequence rating by asset category: inundation

Asset Category	Physical, Financial	Environment	Community / Social & Culture	Overall Rating
Aboriginal Heritage	Moderate	Moderate	Moderate	Moderate
Environmental Assets	Minor	Moderate	Minor	Moderate
Regional Open Space Reserve	Minor	Moderate	Minor	Moderate
Residential Land	Major	Minor	Moderate	Major
Commercial Land and Assets	Major	Minor	Moderate	Major
Rural	Moderate	Minor	Minor	Moderate
Roads	Minor	Minor	Minor	Minor

3.3 Potential Impact (Level of Risk)

Risk level, or **potential impact**, is calculated as the **product** of exposure and sensitivity (see ***Table 22***). It provides a classification of the potential impact of coastal hazards on identified assets, which should be determined for each considered planning timeframes. Level of risk is evaluated mainly based on its tolerability (i.e., **consequence**). Definitions are provided in ***Table 23***.

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Table 22: Risk level (potential impact) matrix as product of sensitivity (consequence) and exposure (likelihood)

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	Low	Low	Low	Medium	Medium
Unlikely	Low	Low	Medium	Medium	High
Possible	Low	Low	Medium	High	Extreme
Likely	Low	Medium	High	Extreme	Extreme
Almost Certain	Low	Medium	High	Extreme	Extreme

Table 23: Risk profile definition

Risk Level (Potential Impact)	Description
Low	Tolerable risk. A level of risk that is low and manageable without intervention outside routine asset maintenance.
Medium	A level of risk that may require intervention to mitigate, such as changes to design standards or asset maintenance. Short to medium term action required.
High	A level of risk requiring significant intervention to mitigate in the immediate to short term.
Extreme	Immediate action required to reduce risk to acceptable levels

3.4 Adaptive Capacity

The **adaptive capacity** is the asset's ability to adjust/adapt to the identified hazard. It is determined based on the potential for the system to be modified to cope with the impacts from coastal hazards.

Assets with high adaptive capacity can easily be adapted or have some capacity to self-adapt with changing conditions. For instance, beach and dune systems often have higher adaptive capacity than coastal infrastructure and residential land. The scale of adaptive capacity is provided in ***Table 24***. Rating of adaptive capacity is determined by assets/asset groups as well as opinions from the stakeholders and communities.

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Table 24: Adaptive capacity

Adaptive capacity	Description
No adaptation required	Potential impact has insignificant effect on asset. Controls are re- established naturally or with ease before more damage would likely occur.
Very High (can adapt easily)	Good adaptive capacity. Functionality restored easily. Adaptive systems restored at a relatively low cost or naturally over time.
High (can adapt)	Decent adaptive capacity. Functionality can be restored, although additional adaptive measures should still be considered. Natural adaptive capacity restored slowly over time under average conditions
Medium (may adapt)	Small amount of adaptive capacity. Difficult but possible to restore functionality through repair and redesign.
Low (difficulty adapting)	Little or no adaptive capacity. Potential impact would destroy all functionality. Redesign required.

Assigned adaptive capacity ratings by category are presented in ***Table 25*** for both erosion and inundation.

Table 25: Adaptive capacity rating by asset category

Asset Category	Adaptive Capacity: Erosion	Adaptive Capacity: Inundation
Aboriginal Heritage	Low	Moderate
Environmental Assets	Low	High
Regional Open Space Reserve	Moderate	High
Residential Land	Low	Moderate
Commercial Land and Assets	Low	Moderate
Rural	Moderate	High
Roads	Low	Moderate

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3.5 Vulnerability

Vulnerability is calculated as the **product** of potential impact (risk level) and the adaptive capacity. As per WAPC (2019), four levels of vulnerability are considered in this study which should be assessed for each of the planning timeframes considered by this CHRMAP.

Figure 37 illustrates the vulnerability relationship. ***Table 26*** presents the product of risk and adaptive capacity in a matrix.

Table 26: Vulnerability matrix as a Product of Risk Level and Adaptive Capacity

Risk Level (Potential Impact)	Adaptive Capacity			
	Very High Can adapt easily	High Can adapt	Moderate May adapt	Low Difficulty adapting
Low	Low	Low	Low	Medium
Medium	Low	Low	Medium	High
High	Low	Medium	High	Very High
Extreme	Medium	High	Very High	Very High

Applying the described methodology, assets in all management units are identified and categorised:

- **Exposure / Likelihood** level is rated as AC (Almost Certain), L (Likely), P (Possible), U (Unlikely) and R (Rare).
- **Sensitivity / Consequence** is rated as IN (Insignificant), MI (Minor), MO (Moderate), MA (Major) and CA (Catastrophic).
- **Risk / Potential Impact** and **Vulnerability** are rated as EX (extreme), HI (High), ME (Medium) and LO (Low).
- **Adaptive Capacity** is rated as VH (Very High), High (HI), Moderate (MO) and Low (LO).

3.6 Vulnerability Assessment Results

The method discussed in the previous sections was applied to all identified assets. Complete results for all steps by management unit, category and planning horizon are presented in Appendix F.

Vulnerability ratings for each category within each management unit at each planning horizon is presented in ***Table 27*** for erosion and inundation respectively. There is a substantive number of at-risk assets, including more than 1,000 residential dwellings and many kilometres of roads.

The vulnerability ratings are assessed based on the grouping of **seven asset categories** as detailed in ***Section 2.6.1: Asset categories***.

Note: Asset categories with no vulnerability are marked Not Applicable.

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Table 27: Erosion and inundation vulnerability ratings, grouped by management unit & planning horizon

Asset Categories	Vulnerability Ratings					Summary
	2025	2035	2050	2075	2125	
MU1 Blue Bay						● **Three categories** are vulnerable to **Erosion** from High to Very High levels. Housing, Roads and Reserve are vulnerable in the present day. Adaptation in some form is required from the present day. ● **One category** is vulnerable to **Inundation** at a Medium level. Adaptation in some form may be required from the present day.
Regional Open Space Reserve	● ●	● ●	● ●	● ●	● ●	
Residential Land	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Roads	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Asset category not present or not vulnerable	Aboriginal Heritage, Environmental Assets, Commercial Land and Assets, Rural Lots					
MU2 Back Beach						● **Three categories** are vulnerable to **Erosion** from High to Very High levels. Housing, Roads and Reserve are in the present day and increasing. Adaptation in some form is required from the present day. ● **No category** is vulnerable to **Inundation** at this time.
Regional Open Space Reserve	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Residential Land	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Roads	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Asset category not present or not vulnerable	Aboriginal Heritage, Environmental Assets, Commercial Land and Assets, Rural Lots					
MU3 Calypso						● **Three categories** are vulnerable to **Erosion** from High to Very High levels. Roads and Reserve are vulnerable in the present day. The waste water treatment plant will come under increasing pressure to adapt. Adaptation in some form is required from the present day. ● **No category** is vulnerable to **Inundation** at this time.
Regional Open Space Reserve	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Roads	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Services - Waste Water Treatment Plant	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Asset category not present or not vulnerable	Aboriginal Heritage, Environmental Assets, Residential Land, Commercial Land and Assets, Rural Lots					

Legend

Erosion Vulnerability ○ Low ○ Medium ● High ● Very High

Inundation Vulnerability ○ Low ○ Medium ● High ● Very High

⊘ Not Applicable (for erosion or inundation respectively)

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Table 27: Erosion and inundation vulnerability ratings, grouped by management unit & planning horizon (continued)

Asset Categories	Vulnerability Ratings					Summary
	2025	2035	2050	2075	2125	
MU4 Seascapes						
Aboriginal Heritage	● ●	● ●	● ●	● ●	● ●	● **Four categories** are vulnerable to **Erosion** from High to Very High levels. Housing, Roads, Reserve and Aboriginal Heritage assets are vulnerable in the present day. Adaptation in some form is required from the present day. ● **Two categories** are vulnerable to **Inundation** at a Low to Medium level. Adaptation in some form may be required from the present day.
Regional Open Space Reserve	● ●	● ●	● ●	● ●	● ●	
Residential Land	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Roads	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Asset category not present or not vulnerable	Environmental Assets, Commercial Land and Assets, Rural Lots					
MU5 Rakoa						
Regional Open Space Reserve	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	● **Three categories** are vulnerable to **Erosion** from High to Very High levels. Housing, Roads and Reserve are vulnerable in the present day. Adaptation in some form is required from the present day. ● **No category** is vulnerable to **Inundation** at this time.
Residential Land	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Roads	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Asset category not present or not vulnerable	Aboriginal Heritage, Environmental Assets, Commercial Land and Assets, Rural Lots					

Legend

Erosion Vulnerability ● Low ● Medium ● High ● Very High

Inundation Vulnerability ● Low ● Medium ● High ● Very High

⊘ Not Applicable (for erosion or inundation respectively)

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Table 27: Erosion and inundation vulnerability ratings, grouped by management unit & planning horizon (continued)

Asset Categories	Vulnerability Ratings					Summary
	2025	2035	2050	2075	2125	
MU6 Falcon Bay						● **Four categories** are vulnerable to **Erosion** from High to Very High levels. Housing, Roads, Reserves and Commercial assets are vulnerable in the present day. Adaptation in some form is required from the present day. ● **Four categories** are also vulnerable to **Inundation** at a Low to Medium level at the current day, increasing to High by 2075. Adaptation in some form may be required from the present day.
Regional Open Space Reserve	●●	●●	●●	●●	●●	
Residential Land	●●	●●	●●	●●	●●	
Commercial Land and Assets	●●	●●	●●	●●	●●	
Roads	●●	●●	●●	●●	●●	
Asset category not present or not vulnerable	Aboriginal Heritage, Environmental Assets, Rural Lots					
MU7 Gearies-Avalon						● **Three categories** are vulnerable to **Erosion** from High to Very High levels. Housing, Roads and Reserves are vulnerable in the present day. Adaptation in some form is required from the present day. ● **One category** is vulnerable to **Inundation** at a Low to Medium level. Adaptation in some form may be required from the present day.
Regional Open Space Reserve	●●	●●	●●	●●	●●	
Residential Land	●⊘	●⊘	●⊘	●⊘	●⊘	
Roads	●⊘	●⊘	●⊘	●⊘	●⊘	
Asset category not present or not vulnerable	Aboriginal Heritage, Environmental Assets, Commercial Land and Assets, Rural Lots					
MU8 Dawesville Cut						● **One category** is vulnerable to **Erosion** at Very High levels. Environmental Assets are vulnerable in the present day. Adaptation in some form is required from the present day. ● **One category** is vulnerable to **Inundation** at a Low to Medium level. Adaptation in some form may be required from the present day.
Environmental Assets	●⊘	●⊘	●⊘	●⊘	●⊘	
Regional Open Space Reserve	⊘●	⊘●	⊘●	⊘●	⊘●	
Asset category not present or not vulnerable	Aboriginal Heritage, Residential Land, Commercial Land and Assets, Rural Lots, Roads					

Legend

Erosion Vulnerability: Low, Medium, High, Very High

Inundation Vulnerability: Low, Medium, High, Very High

⊘ Not Applicable (for erosion or inundation respectively)

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Table 27: Erosion and inundation vulnerability ratings, grouped by management unit & planning horizon (continued)

Asset Categories	Vulnerability Ratings 2025	2035	2050	2075	2125	Summary
MU9 Pyramids Beach-Golf Course						
Aboriginal Heritage	High / N/A	High / N/A	Very High / N/A	Very High / N/A	Very High / N/A	**Six categories** are vulnerable to **Erosion** from High to Very High levels. Present day vulnerability is relatively high for all categories other than Rural lots. Adaptation in some form is required from the present day. **Three categories** are vulnerable to **Inundation** at a Low to High level. Adaptation in some form may be required from the present day.
Environmental Assets	Very High / N/A	Very High / N/A	Very High / N/A	Very High / N/A	Very High / N/A	
Regional Open Space Reserve	High / Low	Very High / Medium	Very High / Medium	Very High / Medium	Very High / Medium	
Residential Land	High / N/A	High / N/A	High / N/A	Very High / N/A	Very High / N/A	
Commercial Land and Assets	Very High / Medium	Very High / Medium	Very High / Medium	Very High / High	Very High / High	
Roads	High / Medium	Very High / Medium	Very High / Medium	Very High / Medium	Very High / Medium	
Asset category not present or not vulnerable	Rural Lots					
MU10 - Florida-Melros						
Regional Open Space Reserve	High / N/A	Very High / N/A	Very High / N/A	Very High / N/A	Very High / N/A	**Three categories** are vulnerable to **Erosion** from High to Very High levels. Housing, Roads and Reserves are vulnerable in the present day. Adaptation in some form is required from the present day. **No category** is vulnerable to **Inundation** at this time.
Residential Land	High / N/A	High / N/A	Very High / N/A	Very High / N/A	Very High / N/A	
Roads	High / N/A	High / N/A	Very High / N/A	Very High / N/A	Very High / N/A	
Asset category not present or vulnerable	Aboriginal Heritage, Environmental Assets, Commercial Land and Assets, Rural Lots					

Legend

Erosion Vulnerability: Low, Medium, High, Very High

Inundation Vulnerability: Low, Medium, High, Very High

Not Applicable (for erosion or inundation respectively)

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Table 27: Erosion and inundation vulnerability ratings, grouped by management unit & planning horizon (continued)

Asset Categories	Vulnerability Ratings					Summary
	2025	2035	2050	2075	2125	
MU11 Yalgorup						● **Three categories** are vulnerable to **Erosion** from High to Very High levels. Aboriginal Heritage, Environmental Assets and Regional Open Space Reserves are affected. This MU has the first Rural Lots affected, with one single dwelling more vulnerable over time. Adaptation in some form is required from the present day. ● **One category** is vulnerable to **Inundation** at a Low to Medium level. Adaptation in some form may be required from the present day.
Aboriginal Heritage	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Environmental Assets	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Regional Open Space Reserve	● ●	● ●	● ●	● ●	● ●	
Rural Lots	● ⊘	● ⊘	● ⊘	● ⊘	● ⊘	
Asset category not present or not vulnerable	Residential Land, Commercial Land and Assets, Roads					

Legend

Erosion Vulnerability: ● Low ● Medium ● High ● Very High

Inundation Vulnerability: ● Low ● Medium ● High ● Very High

⊘ Not Applicable (for erosion or inundation respectively)

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SECTION 4
RISK EVALUATION

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4 Risk Evaluation

This section assesses any available controls against the vulnerability ratings assigned in the previous ***Section 3: Vulnerability Assessment*** Chapter.

Section 1: Establishing the Context has already assigned any relevant planning and physical controls.

4.1 Planning Controls

A summary of relevant planning controls for the study area is provided ***Section 1: Establishing the Context***.

The study area contains a large array of planning documentation, and although some of these do reflect on coastal hazards or values which will provide input into the CHRMAP process, none of the existing documents contain planning instruments that directly control or require management of coastal hazards in a way that would change any of the vulnerability rating assigned.

This CHRMAP will consider what planning controls (existing or required) may be appropriate as adaptation measures within each management unit.

4.2 Physical Controls

The physical controls in the Southern Beaches study area are summarised below in ***Table 28***. The study area is mostly natural beach, except Dawesville Entrance Channel breakwaters, spur groyne and revetment, all of which interrupt longshore sediment transport, whereas the seawall at Falcon Beach provides protection from erosion.

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Table 28: Summary of Existing Controls

Control	Location	Purpose	Year Implemented	Assumed design life / management timeframe
'Soft' Management Controls				
Annual Sand Bypassing	Dawesville Entrance Channel (DEC)	Seasonally provide for continuity of longshore sediment movement northwards across the DEC which interrupts the natural coastal process (***Picture 11***) .	1994	Ongoing
Adhoc Sand Nourishment	Falcon Bay	Several small campaigns of sacrificial sand nourishment were undertaken to increase beach amenity and provide a buffer to coastal erosion between with an approximate total of 23,000m^3	2004 and 2007	Several months
'Hard' Engineering Controls				
Rubble mound breakwaters (and associated spur groyne and revetment)	Dawesville Entrance Channel (DEC)	The breakwaters form the outlet and assist in maintaining navigability of an artificial channel constructed between the Peel-Harvey Estuary and the ocean. The channel acts to permit flows to improve water quality in the estuary. Some available documentation suggests the revetment at Pyramids Beach may extend south towards the Port Bouvard SLSC. The extent and characteristics of the wall are unclear; further investigations will be recommended to understand the presence and design of the revetment in more detail.	1994	50 to 100 Years
Rock Protection	Egg Farms Surf Break Car Park	DoT owned/managed as part of The Dawesville Channel operations.	1995	50 to 100 Years
Seawall	Falcon Bay	To provide erosion protection to the Falcon Beach amenities (***Picture 12***).	2019	50 Years
Seawall	Port Bouvard SLSC	Documentation has been discovered that suggests a revetment seawall was built in front of the SLSC in 2009 to protect it from coastal erosion. The documentation does not represent as-constructed information so the extent and characteristics of the wall are not confirmed. Further investigations will be recommended to understand the presence and design of the seawall in more detail.	2009 (to be confirmed)	Estimated - 25-50 years

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The Falcon Bay seawall, a steel sheet pile wall with a 4.0mAHD concrete crest height, has a useful life of 30-50 years. This was not taken into consideration during the previous vulnerability assessment as that considered a worst-case scenario. Subsequent vulnerability assessment has been undertaken based on the alternative hazard mapping with the seawall in place. Although several asset categories reduced in vulnerability the summary rating for the whole Management Unit did not substantially change.

In addition to man-made hard structures mentioned above, there are several locations along the study area, where informal structures such as dumped rock or large logs may have been placed with the intent to maintain beach access, reduce erosion, promote accretion or provide some amenity, including at:

- Avalon Foreshore Boat Ramp (MH195) - large logs
- Beach access at Rakoa Street – rock protection
- Rocky Pool Bay (adjacent Boardwalk Boulevard) - informal rock structure

While locally and in the short-term these may continue to provide some protection for coastal erosion, in the context of the CHRMAP, long-term planning timeframes and extents of the study area, these are considered unlikely to provide any significant protection from coastal hazards.

4.3 Priorities for Treatment

The erosion vulnerability ratings presented in ***Section 3: Vulnerability Assessment*** have been considered for each Management Units as a whole by identifying the critical vulnerability ratings of individual asset categories and summary ratings are presented in ***Table 29.*** All Management Units within the study area and at all planning horizons have unacceptable levels of vulnerability for erosion (High and Very High), and therefore need to be considered for risk treatment options.

The inundation vulnerability ratings presented in ***Section 3: Vulnerability Assessment*** have been considered for each MU by identifying the critical vulnerability ratings of individual categories and summary ratings are presented in ***Table 30***. Management Units 1, 4, 6, 7, 8, 9, and 11 have unacceptable levels of vulnerability for inundation (Medium and above) for most timeframes.

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Further review of the inundation and erosion hazard mapping shows that for Management Units 1, 4, 7 and 11 for all planning horizons, the erosion hazard lines are significantly further landward compared to the inundation area. There is no benefit to considering treatment of inundation vulnerabilities at these Management Units as erosion hazard mitigation pathways will drive decision making. For MU8 there are areas of land identified as vulnerable to inundation but not erosion – it is recommended these are considered further by DoT and the City who jointly operate in this area.

MU6 (Falcon Bay) and the northern end of MU9 (Pyramids Beach/Surf Life Saving Club and associated areas) are recommended to be considered for treatment of inundation vulnerabilities.

Table 29: Erosion vulnerability ratings, grouped by management unit & planning horizon

Management Unit	Present Day	2035	2050	2075	2125
MU1- Blue Bay	Very High	Very High	Very High	Very High	Very High
MU2- Back Beach	High	Very High	Very High	Very High	Very High
MU3- Calypso	High	High	High	Very High	Very High
MU4- Seascapes	High	Very High	Very High	Very High	Very High
MU5- Rakoa	Very High	Very High	Very High	Very High	Very High
MU6- Falcon Bay	High	Very High	Very High	Very High	Very High
MU7- Gearies-Avalon	High	Very High	Very High	Very High	Very High
MU8- Dawesville Cut	Very High	Very High	Very High	Very High	Very High
MU9- Pyramids Beach-Golf Course	High	Very High	Very High	Very High	Very High
MU10- Florida-Melros	High	High	Very High	Very High	Very High
MU11- Yalgorup	High	Very High	Very High	Very High	Very High

Table 30: Inundation vulnerability ratings, grouped by management unit & planning

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horizon

Management Unit	Present Day	2035	2050	2075	2125
MU1- Blue Bay	Medium	Medium	Medium	Medium	Medium
MU2- Back Beach					
MU3- Calypso					
MU4- Seascapes	Medium	Medium	Medium	Medium	Medium
MU5- Rakoa					
MU6- Falcon Bay	Medium	Medium	Medium	High	High
MU7- Gearies-Avalon	Low	Medium	Medium	Medium	Medium
MU8- Dawesville Cut	Low	Medium	Medium	Medium	Medium
MU9- Pyramids Beach-Golf Course	Medium	Medium	Medium	High	High
MU10- Florida-Melros					
MU11- Yalgorup	Low	Medium	Medium	Medium	Medium

4.4 Summary and Next Steps

The vulnerability ratings assigned in ***Section 3: Vulnerability Assessment*** have been assessed against any available controls in the Mandurah Southern Beaches CHRMAP study area.

The inundation and erosion vulnerability ratings were considered for each Management Unit by identifying summary vulnerability rating. In the Mandurah Southern Beaches study area the identified critical vulnerability ratings depict a greater vulnerability to erosion than to inundation. Unacceptable levels (medium and above) of vulnerability for inundation and/or erosion have been identified in all Management Units at all planning horizons, and therefore need to be considered for hazard mitigation pathways and risk treatment options to be assessed using Multi Criteria Analysis.

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SECTION 5
RISK TREATMENT

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5 Risk treatment

Adaptation Hierarchy

The WA State Government's State Planning Policy 2.6 – State Coastal Planning Policy (SPP 2.6) identifies a hierarchy of four pathways for adapting to coastal hazards to guide decision making in coastal areas when considering adaptation options to minimise coastal hazards and the subsequent risks at the local level.



Avoid

Identify future no build areas and use planning controls to prevent new development in areas at risk now or in the future.



Retreat

Withdraw, relocate or abandon assets that are at risk; ecosystems are allowed to retreat landward as sea levels rise.



Accommodate

Continue to use the land but accommodate changes by raising buildings, converting land uses or growing flood or salt-tolerant plants.



Protect

Construct hard structures (e.g. seawalls) or soft solutions (e.g. dunes and vegetation) to protect land from the sea. May be prohibitively expensive, especially in the long term.

Further to the risk management and adaptation hierarchy identified in SPP 2.6, **No Regrets** and **Do Nothing** are two risk treatment options that are relevant to the CHRMAP process and will be considered in the risk treatment assessment.



No Regrets

Complete assessments that are required to determine a preferred risk treatment option. Monitoring and planning actions.



Do Nothing

Assume that all levels of risk are accepted and that no further action will be taken.

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The hierarchy describes a clear preference against the adoption of protect as a long-term adaptation pathway.

This preference is emphasised in SPP2.6, the policy guidelines, the CHRMAP Guidelines and the WA Coastal Zone Strategy.

The objectives of SPP 2.6 are to:

- Ensure that the location of coastal facilities takes into account coastal processes, hazards and climate change projections.
- Ensure the identification of appropriate areas for the sustainable use of the coast.
- Provide for public coastal foreshore reserves and access to them on the coast.
- Protect, conserve and enhance coastal zone values, particularly in areas of landscape, biodiversity and ecosystem integrity and cultural significance.

It is important to note that no law requires public authorities to protect private property from environmental hazards nor provide compensation when property or assets are damaged due to coastal hazards.



5.1 Avoid

Avoid (AV) option aims to avoid the construction of new public and private assets within areas identified to be affected by coastal hazards. The project lifetime of a new asset should be a key consideration in deciding the suitability of locating new assets in coastal hazard areas. For example, the construction of new public assets, such as picnic facilities and public toilets, should be avoided where these assets are likely to be impacted by coastal hazards within the lifetime of the asset.

Similarly, the construction of new private assets which are likely to be affected by coastal hazards over their projected lifetimes should not be permitted. The option of avoid can be applied to manage coastal erosion and inundation hazard risks.



AV – Avoid locating assets in areas that will be vulnerable to coastal hazards

Assets will not be vulnerable to risk arising from coastal hazards.

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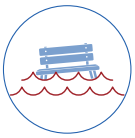
5.2 Planned and Managed Retreat

Planned and Managed Retreat (PMR) aims to relocate or remove assets which are located in hazard areas, in an orderly manner, where hazard risks are likely to be unacceptable over relevant planning timeframes.

Planned and Managed Retreat is mostly applicable to developed areas, where there is less potential to adapt to coastal hazards through development planning controls, such as coastal setbacks in undeveloped areas. The strategy of retreat is based on social, environmental and economic sustainability, and ties into the SPP 2.6 objectives and adaptation hierarchy.

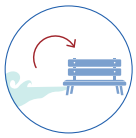
The CHRMAP Guidelines (WAPC, 2019) suggest a range of mechanisms for Planned and Managed Retreat in developed areas, including special control areas, planning policies or compulsory or voluntary acquisition provisions outlined in WA legislation.

Planned and Managed Retreat is an option that can be applied to manage coastal erosion and inundation hazards; however, this option can require a significant investment of public resources to fund acquisitions or retreat plans. Therefore, land managers, landholders, and the broader community should be aware of the risks in any decisions they make about managing, developing, or purchasing land in coastal areas. For some places, Planned and Managed Retreat may mean significant change, as suitable land within proximity may also be subject to coastal hazards.



PMR1 – Leaving assets unprotected

For low values assets, accept loss following event. Only implement repairs to maintain public safety. Allow for retreat that allows natural recession of the shoreline over the long-term.



PMR2 – Demolition/removal/relocation of asset from inside hazard area.

Relevant for assets of low value where it is impractical both technically and financially to design the asset to withstand the impact of the coastal hazards instead of relocating it.



PMR3 – Prevention of further development/prohibit expansion of existing use rights

This risk treatment option allows all assets to maintain current development and usage rights, without expanding those development rights, until the risk from coastal hazards becomes intolerable. This would be outlined in the local planning scheme.



PMR4 – Planned and Managed Retreat

For private property assets, this option outlines mechanisms to support the consideration of assets in the long-term situated in areas of elevated risk.

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5.3 Accommodate

Accommodate (AC) options aim to utilise design and management strategies which render the risks from identified coastal hazards as acceptable. Design and management strategies include minimum finished floor levels to minimise inundation risks. In this way, the Accommodate option allows landholders to continue to use land until hazard risks become unacceptable.

Accommodate design and management strategies can be facilitated through modifications to local planning frameworks. These planning frameworks need to provide clear direction for planning authorities when assessing applications for new development and for affected landholders.

Planning frameworks might include the introduction or modification of the following instruments:

- Special control areas, to ensure planning discretion over new development (Albany and Broome example schemes)
- Clear development assessment criteria, to ensure that new development gives due regard to coastal processes (planning policy)
- Time or event limited planning permits, to allow the continued use of land until hazards become unacceptable.

Accommodate is an option that can be applied to help minimise the effect of coastal inundation hazards however is more challenging for erosion hazards, where the shoreline is allowed to recede directly impacting the physical or natural asset.

An additional consideration to the Accommodate option, particularly in regard to managing coastal erosion, is that the current WA legislative framework means that permanently inundated private land does not become Crown land.

Therefore, where the shoreline is allowed to recede beyond private property boundaries, issues of public access and trespass may arise. This should be a consideration when assessing the appropriateness of the Accommodate option.



AC1 – Design assets to withstand impacts

Where avoiding or relocating an asset is not an option, design of assets to withstand the impact of inundation.

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5.4 Protect

Protect (PR) option aims to stabilise the position of the shoreline using hard or soft coastal protection measures such as seawalls, groynes, offshore breakwaters, geotextile sand-containers, sand renourishment and levee banks. Protection is an option that can be applied to manage both coastal erosion and inundation hazards.

The adaptation hierarchy considers the construction of new protection measures as the least preferred option of all potential options listed in the hierarchy. Protection measures, particularly hard measures such as rock groynes and seawalls, modify local coastal process and can have unintended consequences if not designed carefully.

Protection measure can also exacerbate erosion impacts down drift of the structure, 'shifting the problem' along the coastline. Subsequently, careful consideration and planning needs to be adopted for staging of protection structures, to understand and mitigate likely flow on impacts (increase coastal erosion risk) of proposed structures.

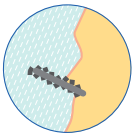
Protection measures can also inflate property values in hazard areas, create expectations that the measures will be maintained into the future, and may limit the capacity of future decision makers to change strategies as situations change.

It is currently unclear if there is any legal responsibility on the behalf of the agency or landowner who develops protection measures if any failure of the measure results in damage to person or property.



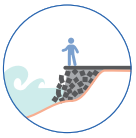
PR1 – Sand nourishment

Placement of sand within the beach profile and/or dunes to activate beach coastal processes and provide a sediment supply.



PR2 – Groyne

Construction of groynes to stop or restrict the movement of sand around the end of the structure, to provide protection to assets behind the beach/foreshore reserve. They are primarily effective where there is longshore sand movement or when partnered with PR1 sand nourishment.



PR3 – Seawall

Construction of a seawall usually along an entire section of shoreline. Where a beach is to be retained, this risk treatment option should generally be accompanied with PR1 beach nourishment or replenishment. The primary use of a seawall is for the protection of the adjacent land and assets.

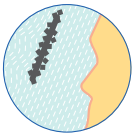
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PR4 – Artificial reef



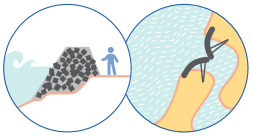
Construction of a submerged artificial reef offshore, to dissipate wave energy impacting the shore by causing waves to break on their seaward side and reducing wave energy on the leeward side. During storm events water depths over the reef may be sufficient to allow waves to pass over the reef without breaking, reducing their effectiveness in protecting the beach from erosion. This option should generally be accompanied with PR1 beach nourishment.

PR5 – Offshore breakwater



Construction of an emergent (above water) offshore barrier (often referred to as an offshore breakwater). Offshore breakwaters block wave energy by absorbing wave impact on their seaward side. They create a lower wave energy section of beach immediately in its lee, which is characterised by sand accreting in the low energy environment, when designed appropriately. Often also includes sand nourishment during construction. This option should generally be accompanied with PR1 beach nourishment.

PR6 – Levee/weir/storm surge barrier



Inundation protection to minimise inundation on low-lying land. This could be a levee on the banks of a river, a storm surge barrier at the entrance to an inlet/estuary etc. Details would be specific to the relevant conditions of each Management Unit.



5.5 No Regrets

No regrets (NR) options cover a period of time where assessments are required or are being undertaken to determine a preferred risk treatment option, prior to implementing specific asset risk management measures.

This is particularly pertinent where a more costly or difficult risk treatment option, or better understanding regarding the level of risk to an asset, may be required.

No regrets options are cost effective in the current day and provide flexibility for more resilient and appropriate long term management options to respond to coastal hazard risks.

NR1 – Monitoring



Involves long-term baseline monitoring and event-based monitoring following storm erosion events.

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NR2 – Protection structure audit

Involves undertaking an audit of existing protection structures, to determine their current condition, effectiveness and future protection potential.

NR3 – Notification on Certificates of Title



Indicates to current and future landowners that an asset is likely to be affected by coastal erosion and/or inundation over the planning timeframe. Helps current and future owners make informed decisions about level of risk they are/may be willing to accept, and that risk management is likely to be required at some stage within the planning timeframe.

NR4 – Emergency planning



Where existing assets may be affected by inundation and are not already identified in an existing emergency evacuation management plan. Such plans are important in managing the safety of community and stakeholders.

5.6 Do Nothing

Do Nothing (DN) assumes that all levels of risk are accepted and that no further action will be taken. A do nothing option provides the basis for comparison of all other risk treatment options.

A Do Nothing option may also be reflected in reality where the selection of another option (e.g. protect) is not funded. In this case, the selection of an option results in 'nothing happening' despite recommendations in a CHRMAP. This needs to be considered when selecting the most appropriate option to address risk.



DN1 – Do nothing

Assumes all levels of risk are accepted and that there is no change in existing planning controls, and no actions are implemented (i.e., no controls are implemented to treat known coastal risks).

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5.7 Hierarchy Summary

The objectives of SPP2.6 (***Section 1.2***) guide decision-making within the coastal zone. Maintaining public access is one of the objectives of SPP 2.6 and is also identified as a key value of the Mandurah southern beaches community.

As discussed, the SPP 2.6 coastal planning framework means that where the shoreline recedes beyond private property boundaries, issues of public access and trespass are likely to arise. In this case public authorities have two main adaptation options available to them for providing public coastal access:

- **Planned and Managed Retreat** i.e., Maintaining a foreshore reserve through planned relocation, demolition and/or removal of assets in the hazard zone if possible and feasible; or,
- **Protect** i.e., Preventing the shoreline from receding beyond private property boundaries by stabilising the current shoreline position using various protection measures (e.g., seawalls, levees).

Where public authorities cannot commit to either of these options over the long term, or be certain that they can be implemented within the necessary timeframes, it is likely that public authorities will need to **Accommodate**. This will require modifying local planning frameworks to help ensure that new development is appropriately designed and located.

Public authorities in this situation may also choose to consider the appropriateness of interim Protection measures to preserve public interest by delaying shoreline recession and minimising the effect of regular nuisance inundation events on existing development and infrastructure, where possible.

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5.8 Summary for Decision-Makers

It is important to note that there is no law requiring public authorities to provide protection of private property from natural hazards, nor compensation when land is lost due to coastal hazards. The CHRMAP process aims to minimise coastal hazard risks and maximise beneficial use of the coast.

The following guidance is provided for decision-makers:

- Adaptation options should minimise coastal process interference and legacy issues, for example, down drift erosion causing impact elsewhere.
- Coastal development must be sustainable in the long term, and must balance the community, economic, environmental and cultural needs.
- Local Governments are responsible for managing risks to public assets and any assets they manage.

Decision-makers should also:

- Develop local policies and regulations consistent with applicable legislation and policy.
- Facilitate building resilience and adaptive capacity within the local community.
- Work in partnership with community to identify and manage risks and impacts.
- Introduce management strategies that preserve the natural coastline and move development away from the active coastal zone. For example, of particular relevance to the CHRMAP process is the user pays principle, whereby those who benefit most from protection must provide the greatest financial contribution.
- Provide adaptation options that maintain future flexibility, in order to build resilient coastal communities, where practical.
- Introduce land use planning instruments, including those to support Planned and Managed Retreat, as key adaptation options.

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SECTION 6
RISK TREATMENT OPTIONS

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6 Risk Treatment Options

SPP 2.6 provides a hierarchy of adaptation pathways to guide decision making in coastal areas for use by planning authorities and development proponents when considering adaptation options to minimise coastal hazard risks at the local level. Not all of these options are suitable in every case.

This chapter presents a list of generally available adaptation options suitable in Mandurah southern beaches (***Table 31***). These relate to both short and long term adaptation to coastal hazards. The columns on the right-hand side provide some discussion as to the possibility of option suitability for the study area.

Whilst the risks and their corresponding adaptation options are assessed separately, triggers to implement the option can be modified to suit the circumstances at any given point in time, for example, if risks from erosion or inundation are being experienced sooner, a trigger may bring adaptation responses forward in time.

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6.1 Options and Suitability for Mandurah Southern Beaches

Table 31 discusses all the available adaptation options for the vulnerable assets in the study area and the suitability and cost considerations for each option.

Table 31: Available Adaptation Options

Option	Suitability and Cost Considerations
Avoid	
AV – Avoid locating assets in areas that will be vulnerable to coastal hazards	This option applies to undeveloped land. In most Management Units the majority of undeveloped land is already located within Regional Open Space reserves. Careful location of any new public assets, such as paths, playgrounds or public facilities should be: - Located outside of the hazard zone; or - Should be designed to limit impact on any natural defences (foreshore vegetation etc) as much as possible; and - Should only be located within the hazard zone if the life-cycle of the asset is likely to be reached well before the period in which the asset is to be impacted, so that it may be relocated at end-of-life. There are very few residential or commercial properties that are still able to be developed (i.e. vacant land). Notwithstanding, any developable land could be subject to this option where possible (acquisition). No further private land should be made available through large developments, such as new subdivision areas. In any case where Avoid can be implemented, the community will benefit through low financial wastage and through the opportunity of avoiding later expenditure.
Planned and Managed Retreat	
PMR1 – Leaving assets unprotected	Although this saves financial resources for alternative uses, and allows for retreat that enables natural recession of the shoreline over the long-term, care will need to be taken to avoid damaged assets from impacting on public safety. Leaving assets unprotected may result in a need for emergency responses (for example, cleaning up after storms), and bear the possibility of resulting in reactive, rather than proactive, adaptation responses, which may impact more appropriate decision making in the future. This option is generally not preferred in the study area, although, there is a potential use case in MU11 - Yalgorup, and to a lesser extent for MU3 - Calypso and MU9 - Pyramids Beach-Golf Course.

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Table 31: Available Adaptation Options (continued)

Option	Suitability and Cost Considerations
PMR2 – Demolition/ removal/ relocation of asset from inside hazard area	For public assets that have already been located in the hazard zone, asset audits should be undertaken to determine the likely end-of-life of the asset to determine if early intervention is required, so that demolition and relocation can be effected. This should include assets such as stairs and paths, seating, public buildings (including toilets) and playgrounds etc. Relocation plans should be put in place to allow the cost of relocation to be shared with the cost of asset replacement. This option is suitable across the study area. For residential and commercial property, this option may require changes to development permissibility over time, such as limits to density and siting of development (PMR3), or removal of asset(s) within specific lots (PMR4). Planned retreat enables the social and economic values of assets to be retained until such time that the asset needs to be relocated.
PMR3 – Prevention of further development/ prohibit expansion of existing use rights	This enables existing development and use rights to continue, until such time that risk arising from coastal hazards becomes intolerable. It includes mechanisms for ensuring that the City, landowners and prospective buyers are made aware of the risk. For private landowners, this means limiting the ability for small lot subdivision, but it may also include limiting the location of development to the landward side of the lot where possible, to place development as far from an erosion hazard zone as possible, and potentially allowing for acquisition of foreshore land (PMR4). For public assets,such as the Port Bouvard SLSC, this could include management of long term use through the lease (with the City of Mandurah), including limiting the length of lease, conditions of lease that dictate adaptation responses to anticipated events, or other event or time limited controls considered suitable in the future.
PMR4 – Planned and Managed Retreat	This option provides for the removal, demolition and/or relocation of private property asset(s) located within a zone that would otherwise allow development to be permitted, to ensure land in the coastal zone is continuously provided for coastal foreshore management, public access, recreation and conservation. This may occur if risks become intolerable over time and where alternative risk treatment options are no longer viable or economically feasible for the property and adjacent land. It is an option for any area where private land is within the hazard zone, and can be achieved over long periods of time, as more land becomes impacted. It may also relate to small sub-sections of lots closest to the seaward edge, rather than lots in their entirety. Voluntary or other forms of land acquisition is a very expensive option and should only be considered after thorough assessment has occurred. In general, voluntary acquisition is not considered a financially viable option for the City unless supported by State or Federal Government funding. Implementation of this option needs to consider the public funding required to effectively manage a coastal foreshore and mitigate identified risks.

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Table 31: Available Adaptation Options (continued)

Option	Suitability and Cost Considerations
Accommodate	
AC1 – Design assets to withstand impacts	This is aimed at retaining existing assets in locations but reducing the consequences of an inundation hazard. It is cheaper to mitigate the impacts with initial design outcomes as opposed to retrofitting (adapting) existing assets in the future. This option is only relevant to MU6 - Falcon Bay and MU9 - Pyramids Beach-Golf Course where inundation presents an obvious risk in the next 100 years. Based on the age of assets in these two Management Units, it is a suitable and achievable option. Planning controls can be utilised to require any future development to reflect the option, through establishment of design requirements for new builds or renovations (e.g. Substantial renovations would require development of Queenslander style or stumped housing, raised above an agreed finished floor level). Redevelopment of the Port Bouvard SLSC and other assets in the area, at the relevant replacement time, could take into account new minimum finished floor levels or similar ground clearance.
Protect	
PR1 – Sand nourishment	This option requires regular and ongoing maintenance, and thus can be considered somewhat temporary, and can be effective in association with other options. A sand source will be required and despite an extensive local sandy coastline, external sand supply may be required in the future. This option is suitable for most locations, with some care required to avoid impacts to snorkelling and swimming, surf and marine life in the near shore environment. It should be recognised that sand nourishment can be expensive over time with potentially decreasing benefits to protection objectives. The community supports this option, and is familiar with it.
PR2 – Groyne	This hard protection option can be very effective at stabilising shorelines, but can also lead to down drift erosion issues if not designed and constructed appropriately. This option would generally need to be accompanied by PR1. For the length of the study area, groynes would need to be carefully considered, as impediment to longshore transport of sediment (sand) is already a significant concern for the community. They may become decreasingly effective at managing erosion as sea levels rise. In most management units, a decision to implement groynes would require several groynes over the length of the management unit, and would impact beach use to achieve the goal of erosion management. Rock and sand source would need to be determined, and it is not clear if the supply of materials within a reasonable transport proximity will meet demand for this study area and the many others considering similar options. Assessment of this option also needs to consider a well funded long term maintenance plan, as this will extend the life of the groyne. Groynes may impact sand bypassing operations at the Dawesville Cut and at Roberts Point, and would be less suitable in MU1-Blue Bay and MU9-Pyramids Beach-Golf Course immediately south of these locations. They are generally suitable across the study area if well designed. The community has expressed a mixed interest in groynes.

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Table 31: Available Adaptation Options (continued)

Option	Suitability and Cost Considerations
PR3 – Seawall	This is an expensive but effective option, that requires an well funded long term maintenance plan, as this will extend the life of the seawall. Seawalls can be constructed from a variety of materials, including rock and concrete designs. This option would generally need to be accompanied by PR1. Finding and maintaining a suitable rock and sand source may be challenging, as noted in PR2. Seawalls are likely to reduce the availability of a sandy beach, and can divert erosion issues elsewhere, such as to beaches either side of, and directly in front of, the wall. Seawalls may retain values associated with landward side assets in the medium term, followed by rapid change due to loss of beach on the seaward side. Seawalls can also create a sense of permanent protection, resulting in difficulty removing them at a later time. They are suitable across the study area if well designed. The community has expressed mixed interest in seawalls.
PR4 – Artificial reef	Artificial reefs are strongly supported by the community in the study area, primarily because they have the potential to provide a surfing experience. This option would generally need to be accompanied by PR1. Finding and maintaining a suitable rock and sand source may be challenging, as noted in PR2. . The primary shortcoming of artificial reefs is their effectiveness against coastal hazards versus their cost. They are expensive to design, build and maintain, and are unlikely to be effective for reducing erosion hazard risk over time as sea levels rise. Alternatively they may require expensive upgrades over time. They are not effective at reducing inundation hazard risk. Reefs designed for surfing are not necessarily suitable for coastal hazard management and vice versa. In addition, in all management units, a recommendation for an artificial reef requires more than one to respond to the coastal hazard, leading to a multiplier effect in cost. A reef may be considered for other reasons (i.e. surf), and may then be assessed based on a detailed design and cost investigation to determine feasibility based on likely effectiveness. Artificial reefs are generally not recommended due to cost and uncertainty of effectiveness. Any recommendation for considering this option in any management unit of the study area requires an effective and well funded long term maintenance plan.
PR5 – Offshore breakwater	Offshore breakwaters are similar to reefs in that they are very expensive to design, build and maintain, however they are considered more reliably effective against coastal hazards. They will have no effect on reducing inundation hazard risk. Over time they may require expensive upgrades to match sea level rise. This option would generally need to be accompanied by PR1 - sand nourishment. Finding and maintaining a suitable rock and sand source may be challenging, as noted in PR2. As with reefs, in all management units, a recommendation for offshore breakwater requires more than one breakwater per management unit to respond to the coastal hazard, leading to a multiplier effect in cost. Offshore breakwaters would need to be carefully designed and located to avoid impacting existing beach use values, such as surfing breaks, and other non-motorised vessel use (paddles etc). The community has expressed a low interest in offshore breakwaters.

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Table 31: Available Adaptation Options (continued)

Option	Suitability and Cost Considerations
PR6 – Levee/ weir/storm surge barrier	A levee may be effective at reducing inundation. In locations where inundation is a risk (MU6 - Falcon Bay and MU9 - Pyramids Beach-Golf Course), a levee is unlikely to be required until closer to the end of the century, and many other decisions are likely to have been made in that time. Levees can be very effective and reasonably adaptable over time. However, they can be expensive. Levees can change the way an environment looks creating a feeling of separation from the coast. Drainage also needs to be considered in the design to prevent increase impacts of terrestrial flooding (i.e. Flood waters unable to regress to coastal waters). Levees should continue to be considered over time for the study area, but have limited use in the short - medium term.
No Regrets	
NR1 – Monitoring	Monitoring enables assessment of the frequency and severity of events, the impact and consequences on various land uses, and the ability to revise risk assessment over time. Monitoring gives the the coastal manager and the community more data upon which to make decisions, and to determine the effectiveness or appropriateness of risk management measures over time. Regular monitoring will support the identification of triggers for risk management measures to be implemented. Monitoring is suitable in all management units at different levels of frequency. It can be implemented in a variety of ways, including engaging the community in citizen science projects that allow shared ownership of the challenge of coastal hazards.
NR2 – Protection structure audit	Depending upon the expected life and future protection from existing protection structures, there may be a need to update hazard estimates, for example, at MU9 - Pyramids Beach-Golf Course where the as-constructed detail of the seawall is uncertain. Protection structure audits are suitable in all management units where a structure exists. The audit will aid in planning for management and maintenance, and lead to more clarity in decision making about medium to long term adaptation recommendations (to repair/reconstruct, or to remove).
NR3 – Notification on Certificates of Title	An option which is low cost and suitable in all management units, this option is implemented through the planning and development approval system. A notification requirement can be conditioned as part of a development application or subdivision of land, and subsequently obliges the landowner to place a notification of their Certificate of Title. A Certificate of Title runs with the land, meaning any future purchaser will see the notification. The notification indicates to current and future landowners that an asset is likely to be affected by coastal erosion and / or inundation over the planning timeframe, and helps current and future owners make informed decisions about level of risk they are / may be willing to accept, and that risk management is likely to be required at some stage within the planning timeframe. Can be tied to PMR2, PMR3 and PMR4.

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Table 31: Available Adaptation Options (continued)

Option	Suitability and Cost Considerations
NR4 – Emergency planning	Establishing emergency management plans where existing assets may be affected by coastal hazards to manage the safety of community and stakeholders. This option is a low-cost option to address coastal hazards that may be more visible during and after storm events. Suitable in all locations.
Do Nothing	
DN1 – Do nothing	Does not involve any new actions, and is suitable where existing levels of risk are low, such as MU11 - Yalgorup. It is not suitable in any other management unit, as assets are already present and unmanaged risk would undesirable.



Picture 17: The Coastal Community Reference Group at work considering adaptation options

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SECTION 7
MULTI CRITERIA ANALYSIS

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7 Multi Criteria Analysis

Successful risk management and adaptation planning requires identification and diligent assessment of suitable options to ensure selection of the best strategy. The chosen option should mitigate risk to an acceptable level whilst maximising the values that are identified as being important to the stakeholders. To assess options, we use Multi-Criteria Analysis (MCA).

The MCA assessment of adaptation options in the CHRMAP process follows four key steps, described in ***Table 32***.

Table 32: Adaptation Options Assessment Process

Steps	Description	Considerations
Step 1	Establishing an MCA framework - the criteria	Step 1 includes development of criteria that are relevant to the study area. The equally weighted criteria need to be able to differentiate between a variety of options so they can be compared against like considerations.
Step 2	Undertaking a technical assessment of the MCA	Step 2 is important in developing any CHRMAP. The suitability of certain measures from an engineering or scientific perspective is imperative. Step 2 includes assessment of options for individual or grouped assets based on rigorous technical analysis (including rejecting options that are not considered effective in reducing erosion or inundation risks to vulnerable assets, if necessary).
Step 3	Undertake an MCA assessment of values driven criteria (using feedback *from* or completing *with* the community)	Step 3 is critical to ensure that some rigour and local knowledge is applied to the assessment. Values driven criteria are also critical to ensuring the communities relationship to the coast, coastal uses and historical knowledge can be included in decisions. This study committed to testing of community values *with* stakeholders in the study area. The CCRG were tasked with confirming the criteria, the approach to scoring, and to provide feedback on the technical scores applied *for the Planned and Managed Retreat, and Protect Options*. These options were the only options presented to the CCRG, as other options are strongly driven by technical input and SPP 2.6 requirements. The engagement tasks undertaken and the confirmed values, feedback and MCA scores are captured in the Engagement Outcomes Report (***Appendix E***).
Step 4	Combine scores and establish the final MCA	Combining the preliminary technical results with the community results from the CCRG, a final MCA output is established, which scores each of the adaptation options for each management unit.

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7.1 Criteria

Criteria, descriptions and measures were established by the project team based on past experience in developing suitable criteria for CHRMAP projects. Technical criteria for this MCA are Effectiveness, Future Adaptability and Cost.

Effectiveness is the ability for the option to mitigate the coastal hazard risk. It was scored based on technical experience in coastal hazard management, knowledge of existing examples and trials (success/failure), and considering how the same option might perform in the future with sea level rise and potential for increased storm activity and severity.

Future Adaptability considers whether the option is easily adaptable in future, such as for updated sea level rise actuals or predictions. It also considers whether the option limits the feasibility of selecting other options in future. It was also scored based on technical experience in coastal hazard management and experience with areas that have selected options that have later been challenging to deal with, either technically or through community expectation.

Cost considers the upfront capital costs combined with the ongoing maintenance costs of the option. It is scored based on technical experience with recent adaptation options of a similar style and nature in a similar coastal environment, and also with an understanding of the construction sector and access to source materials such as sand and rock.

Values Driven criteria for this MCA are Environment, Community/Social and Physical and Economic. In this MCA, Values Driven criteria were developed in response to the values engagement undertaken early in development of the CHRMAP, as well as past criteria of a similar nature.

Environment considers the impact on existing native vegetation / dunes / coastal processes and includes consideration of any construction / clearing impacts, impact of maintenance on the environment, and any impact to flora and fauna (including marine). Scores were drafted by the technical team based on the values engagement, but final scores reflect feedback directly from the CCRG. The criteria was expanded to include geo-heritage and fossils, and the description expanded to include the ability of the natural environment to have adequate room to adapt to the changing coastline, either natural or constructed.

Community/Social considers the impact on known social, cultural, aesthetic and mental health values tested with the community in the values engagement, and included an assessment of potential loss of access to popular beach and water use and impact to community experiences.

Physical and Economic considers ongoing access to physical assets, functions and spaces (in the coastal zone), impact on economic and employment generating uses, and impacts to existing physical assets that currently attract residents, businesses and visitors.

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As noted, these were tested with the community in the CCRG, who subsequently accepted the six proposed criteria and provided some refinement to the scoring measures and descriptions. The final criteria descriptions and measures are shown in ***Table 33***.

Table 33: Multi-Criteria Analysis Criteria and Scoring Values

	Positive; +2	Positive; +1	Neutral; 0	Negative; -1	Negative; -2
Effectiveness	Expected to be very effective at reducing vulnerability, or removing it entirely.	Expected to be effective at reducing vulnerability.	May or may not be effective, unable to predict or requires further investigation.	Likely to be ineffective in the short, medium or long term at reducing vulnerability.	Very likely to be ineffective in the short, medium or long term at reducing vulnerability.
Future Adaptability	Very adaptable, not likely to leave legacy issues. Provides flexibility for future decision makers.	Adaptable, not likely to leave legacy issues.	May leave legacy issues. Further investigation required to understand post-implementation impacts or community willingness to change direction at a later time	Likely to create legacy issues.	Will create legacy issues. Once implemented will be very difficult not to repeat and obliges future decision makers.
Cost	Low costs. Very low economic loss.	Reasonable costs. Low economic loss.	Moderate costs.	High initial or ongoing costs. High economic loss.	Very high initial or ongoing costs. Very high economic loss.
Environment (includes geoheritage, fossils)	Significant positive effect; allows coastline ample room to adapt to change, provides natural processes room. Provides space for habitat for species to adjust to changing environment.	Positive effect; allows coastline room to adapt to change and allows natural processes some room. Species have some space to adjust to new environment.	No (or unclear) environmental impact, further investigation required before option can be considered.	Potential negative effect, including losing coastal foreshore vegetation and beaches, possible increased loss of environmentally sensitive flora or fauna and reduction in room for environment to adapt to changing coastal environment.	Certain negative effect, loss of coastal foreshore vegetation, beaches and any habitat altogether. Certain loss of environmentally sensitive flora or fauna and no room for environment to adapt to changing coastal environment.

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Table 33: Multi-Criteria Analysis Criteria and Scoring Values (cont'd)

Community / Social (Includes heritage in the sense of connection to country)	Significant positive, noticeable community or social benefit as it retains or increases access to known social, cultural, aesthetic, landscape integrity, and mental health values already tested with the community (that are otherwise at risk).	Positive, noticeable community or social benefit as it will provide retention of known social, cultural, aesthetic, landscape integrity, and mental health values already tested with the community that are at risk.	Not discernible or indeterminate net impact. Further engagement and understanding of impact necessary	Negative noticeable community or social impact. Loss or reduction of social, cultural, aesthetic, landscape integrity, and mental health values is likely, and the community will be directly affected.	Significant negative, noticeable community or social impact. Certain loss or substantial reduction of social, cultural, aesthetic, landscape integrity, and mental health values is almost certain, and the community will be directly affected in a way that impacts sense of place and connection to the area.
Physical and Economic	Provides retention of and access to community functions and physical spaces in perpetuity as a result of option. Supports and increases the economic outcomes of the locality and the City.	Provides access for community functions and physical spaces in short and medium term, and potentially long term. Supports economic outcomes for the locality and the City, or impacts are easily mitigated.	Not discernible or indeterminate net effect; loss of physical and economic assets unclear.	Potential significant loss of and access to community functions and physical spaces. Potential loss of economic benefit to the area and may discourage new or existing people from coming to the area due to loss of existing assets.	Almost certain unacceptable loss of and access to community functions and physical spaces. Loss of economic benefit to the area and loss of existing assets that currently attract residents, businesses and visitors.

7.2 Technical Assessment

The technical criteria of Effectiveness, Future Adaptability and Cost were presented at a high level to the CCRG and were generally supported. ***Table 34*** provides an overall summary of how these criteria scored against each of the adaptation options. Detailed scores are included in ***Appendix G***.

NB: whilst an assessment of physical processes and hazards was completed for MU8 - Dawesville Cut because it is strongly integrated with the rest of the study area and project, MU8 was excluded from the MCA because other legislation determines the management approach. It is not subject to the P&D Act and SPP2.6 in the same way as the rest of the study area, and management is not controlled by the City of Mandurah.

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Table 34: Overall scoring of technical criteria

Option	Scoring across Technical Criteria
AV – Avoid	Avoid scores very well across all three technical criteria. It is highly effective, very adaptable, and very low cost
PMR1 – Leaving assets unprotected	PMR scores generally positive. PMR1 scores neutrally against effectiveness, because it does not achieve reduction in risk All other PMR options score well to very well. All PMR options score well to very well against Future Adaptability PMR 2 and PMR4 score poor to very poor against cost, as they attract large funding requirements. PMR 1 and PMR 3 score well on this criteria
PMR2 – Demolition/removal/ relocation	
PMR3 – Prevention of further development rights	
PMR4 – Planned and Managed Retreat	
AC1 – Design assets to withstand impacts	AC1 scores well across all technical criteria where it is relevant (MU6 - Falcon Bay and MU9 - Pyramids Beach-Golf Course where inundation is present)
PR1 – Sand nourishment	PR1 score well against effectiveness, neutrally against adaptability and poorly against cost. MU9 - Pyramids Beach-Golf Course is the only exception, where it scores very well for effectiveness (due to its role in sand bypassing)
PR2 – Groyne	PR2 score well against effectiveness, well against adaptability and poorly against cost. MU1 - Blue Bay is the only exception, where it scores neutrally for adaptability (due to its impact on sand bypassing)
PR3 – Seawall	PR3 score well against effectiveness, and poorly against adaptability and cost. MU1 - Blue Bay and MU9 - Pyramids Beach-Golf Course are the only exceptions, where it scores neutrally for effectiveness (due to its impact on sand bypassing)
PR4 – Artificial reef	PR4 scores poor to very poor for adaptability and cost. There is not sufficient evidence that it is effective, and without designs it cannot be described as ineffective; as such it is classified as neutral for effectiveness in all Management Units.
PR5 – Offshore breakwater	PR5 scores generally well for effectiveness but poor to very poor for adaptability and cost. The most positive score was for a breakwater at MU9 - Pyramids Beach-Golf Course, which might support other functions in the area as well.
PR6 – Levee	PR6 scores well for effectiveness and future adaptability, and poorly for cost in MU6 - Falcon Bay and MU9 - Pyramids Beach-Golf Course (where inundation is present)
NR1 – Monitoring	All no regrets options score well to very well across all technical criteria
NR2 – Protection structure audit	
NR3 – Notification on Title	
NR4 – Emergency planning	

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Option	Scoring across Technical Criteria
DN1 – Do nothing	DN1 scores poorly against all technical criteria, as it does nothing to mitigate risk, and should not be considered a suitable response for most management units. The exception is MU11 - Yalgorup, where it scores positively due to limited need for adaptation.

7.3 Values Driven Criteria Assessment

Values Driven criteria for this MCA are Environment, Community/Social and Physical and Economic. These criteria were tested with the CCRG and then the CCRG assessed PMR2 and all protect options against the criteria.

Of the proposed preliminary management options presented, artificial reef was the most positively scored option, followed by sand nourishment. Positive scoring for sand nourishment corresponded with management units where maintaining a sandy beach was identified as a valued asset in earlier CCRG meetings and was reflected in the MCA comments. Comments supporting artificial reef were often associated with surf breaks and minimising visual impact on the beach and disruption to the natural environment, and the positive scores related to the Environment and Community/Social criteria.

The most negatively scored options were groynes and seawall. Concerns about groynes and seawalls pertained mostly to their visual impact (Community/Social), impeding access to the beach (Community/Social) and disrupting the natural environment (Environment). Loss of sandy beach was also highly noted for seawall (Community/Social).

Planned/managed retreat also scored negatively for several management units, but was the preferred or second most preferred option at MU3 - Calypso and MU9 - Pyramids Beach-Golf Course, both of which have fewer built assets.

The prominent concerns noted in the comments across the MCA relate to minimising disruption to natural processes, retaining sandy beaches, enabling water-based activities and protecting residential properties. This is generally consistent with outcomes of the values engagement stage, although the high value placed on using public facilities such as picnic areas and boardwalks/lookouts in this earlier work was not as strongly represented in the MCA.

More detail on the CCRG can be found in (***Appendix E***).

7.3.1 Technical Analysis compared to CCRG Analysis

In drafting the MCA for each management unit, the project team prepared a preliminary analysis of the values based criteria using the data and information about community values available to them from the earlier engagement. This was not presented to the CCRG to avoid any introduction of bias or create confusion.

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The community calibrated a number of scores either up or down from the technical teams preliminary analysis of values driven criteria. Variances of three or more points were noted against seawalls (the CCRG proposed lower scores than the technical team) and sand nourishment and reefs (the CCRG proposing higher scores).

Other scores were closer to the technical team assumptions, although groynes and seawalls never scored above neutral with the CCRG (as a total score across the values driven criteria).

The variance in CCRG MCA scores from the project team's for these criteria highlights the vital role community engagement plays for MCA in coastal hazard planning. The process of fully engaging a representative group helped gain greater insights into what is important for the southern beaches community. The local knowledge and experience introduced in the MCA CCRG process has shifted the overall assessment in the MCA.

7.3.1.1 Artificial Reefs and the Community's Preferences

It was evident during the MCA scoring process that the CCRG strongly supported artificial reefs. It was primarily identified that this was because they have the potential to provide a surfing experience, with surfing highly valued across the southern beaches community. A secondary benefit identified was inrceased marine habitat.

Noting the previously discussed shortcoming of artificial reefs, being uncertain effectiveness at reducing vulnerability and high costs/low future adaptability, an artificial reef (or reefs) would ordinarily be excluded from further review, as reducing vulnerability is the key objective of this CHRMAP.

Respecting community feedback, the concept of an artificial reef could be progressed through separate pathways, such as one-off grant and/or research funding as has been achieved for the City of Albany artificial reef (designed as a surf reef) and the City of Cockburn artificial reef (designed as an erosion protection trial) or through recreational grant avenues. Determining the objectives of a reef are would be important - surf/erosion management/both. Design would then need to respond accordingly.

Notwithstanding, such a trial in the Southern Beaches coastal environment may be of significant interest to other coastal managers, as the coastline is similar to (but not exactly the same as) other parts of the WA coastline. This could provide more certainty for future CHRMAP analysis in other similar locations, or conversely, confirm a lack of suitability.

Such a process would need to look at the preferred location across the study area, rather than any single MU on its own. The CCRG promoted MU3 - Calypso as the highest preference location for a reef (just over a third of respondents), followed by MU1 - Blue Bay and MU5 - Rakoa (just under 20% of respondents respectively). Other locations were MU4 - Seascapes, MU7 - Gearies-Avalon and MU9 - Pyramids Beach-Golf Course (just under 10% each).

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7.4 Final MCA Score

The final scores reflect both the views of the CCRG and a technical comparison. These scores will help inform the development of preliminary options; however, the final decisions on treatment options will also consider further community consultation, additional technical assessments, and financial impacts. The final scores, with detailed comparison between technical and CCRG based scores, are included in ***Appendix G***.

7.4.1 Management Unit 1 - Blue Bay

Analysis for Blue Bay indicates that non-physical adaptation options (such as planning-related and no-regrets measures) may perform well in this area and are considered suitable for implementation.

Based on scores, sand nourishment and some planned and managed retreat options should be considered in more detail in the immediate to short term.

An economic investigation has been completed using Cost Benefit Analysis (CBA) to analyse the cost implications of the options available. It was pragmatic to compare higher scoring options with a seawall or groyne option for Blue Bay, as these are commonly implemented options which scored well in the technical analysis.

The CBA suggests that sand nourishment currently provides the best value for money option, although this is highly dependent on the availability and cost of sand sources. An additional investigation, a Benefit Distribution Analysis (BDA), helps determine which parties might be required to support the final adaptation option financially. The BDA is discussed further in ***Section 8.5***.

Decision making for this management unit becomes increasingly urgent in the short term. Additional coastal hazard impacts may arise within this management unit from erosion or inundation hazards from Doddi's Beach, which are subject to separate investigations into long-term mitigation options. These may need to be considered in conjunction during decision making.

Monitoring, which scores very well for this management unit, should be prioritised to determine actual rates of erosion over the next 0-10 years.

7.4.1.1 Short-term actions

Sand nourishment: Increased sand nourishment is encouraged in the immediate term and should be implemented to provide more time to determine the best long-term course of action.

Planned and managed retreat: Planning for managed retreat should also commence in the short term, in consultation with the State Government. This should include consideration of public assets, direct liaison with affected landowners, and investigations into potential funding avenues. Managed retreat of private assets should only be considered after due process, including assessment of other relevant Council policies and requirements.

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7.4.1.2 Medium-term actions

Breakwaters and artificial reefs: Further assessment of offshore breakwaters and artificial reefs, which both scored close to neutral, should not proceed per ***Section 7.3.1.1***. Whilst these scored two to three points higher respectively through the CCRG analysis than the technical assessment, comments indicate preferences towards surfing and marine biodiversity outcomes rather than reducing vulnerability.

As reducing vulnerability is the key objective of this CHRMAP, it is not recommended that they be assessed further for coastal hazard management in this location. If they are to be assessed further due to increased public interest (for example), more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

If offshore breakwaters are to be further considered, design will be a key consideration. For example, offshore breakwaters could be built closer to shore to give more flexibility on construction and maintenance options and costs.

Seawalls and groynes: Seawalls and groynes scored very poorly against values driven criteria from the CCRG, and also scored lower against technical criteria than they did in other management units (due to potential sand bypassing impacts). Further consideration of either option should proceed cautiously. If they are to be assessed further, more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries. Preference for a sandy beach in this location would contradict pathways for seawalls or groynes over longer periods.

7.4.1.3 Long-term considerations:

Ongoing adaptation planning: As climate change and coastal hazard impacts increase, continued monitoring, assessment, and engagement will be essential. Offshore and land-based options should only be advanced following clear evidence of need and after short- and medium-term measures have been exhausted.

Comparative analysis: It has been pragmatic to compare higher-scoring options with a seawall or groyne option for Blue Bay, as these are already implemented in some areas and scored well in the technical analysis.

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7.4.2 Management Unit 2 - Back Beach

Analysis for Back Beach indicates that non-physical adaptation options (such as planning-related and no-regrets measures) may perform well in this area and are considered suitable for implementation.

Based on scores, sand nourishment and some planned and managed retreat options should be considered in more detail in the immediate to short term.

Decision making for this management unit becomes increasingly necessary beyond 2050, with foreshore reserve vulnerable to loss at this time, and private housing vulnerable at 2075. Monitoring, which scores very well for this management unit, is encouraged in the short term to determine actual rates of erosion over the next 0-10 years and provide evidence to support long-term decision making.

7.4.2.1 Short-term actions

Sand nourishment: Increased sand nourishment is encouraged in the immediate term and should be implemented to provide more time to determine the best long-term course of action.

Planned and managed retreat: Planning for managed retreat should also commence in the short term, in consultation with the State Government. This should include consideration of public assets, direct liaison with affected landowners, and investigations into potential funding avenues. Managed retreat of private assets should only be considered after due process, including assessment of other relevant Council policies and requirements.

7.4.2.2 Medium-term actions

Breakwaters and artificial reefs: Further assessment of offshore breakwaters and artificial reefs, should not proceed per ***Section 7.3.1.1***. Whilst reefs scored nearly four points higher through the CCRG analysis than the technical assessment, comments indicate preferences towards surfing and marine biodiversity outcomes rather than reducing vulnerability.

If they are to be assessed further due to increased public interest (for example), more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

If offshore breakwaters are to be further considered, design will be a key consideration. For example, offshore breakwaters could be built closer to shore to give more flexibility on construction and maintenance options and costs.

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Seawalls and groynes: Seawalls and groynes scored poorly against values driven criteria from the CCRG. Further consideration of either option should proceed cautiously. If they are to be assessed further, more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

7.4.2.3 Long-term considerations:

Ongoing adaptation planning: As climate change and coastal hazard impacts increase, continued monitoring, assessment, and engagement will be essential. Offshore and land-based options should only be advanced following clear evidence of need and after short- and medium-term measures have been exhausted.

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7.4.3 Management Unit 3 - Calypso

Calypso comprises one primary asset - the waste water treatment plant owned and operated by Water Corporation. No public assets are expected to be affected at Calypso until around 2075, when minor features such as paths may fall within the hazard zone.

Analysis suggests that all non-physical adaptation options (planning related and no regrets options) perform well for this management unit and would be suitable for implementation.

Based on scores, some planned and managed retreat options should be considered in more detail in the long term. Monitoring, which scores very well for this management unit, is encouraged in the short term to determine actual rates of erosion over the next 0-10 years and provide evidence to support long-term decision making.

7.4.3.1 Short-term actions

Planned and managed retreat: Planning for managed retreat should commence in the medium term, in consultation with the State Government.

7.4.3.2 Medium-term actions

Sand nourishment: Sand nourishment scores positively, however, this management unit has low levels of vulnerability and action would not be required until approximately 2075. Sand nourishmment may be considered in the medium term but should not be prioritised compared to other localities.

Artificial reefs: Further assessment of artificial reefs, should not proceed per ***Section 7.3.1.1***. Whilst these scored well through the CCRG analysis, comments indicate preferences towards surfing and marine biodiversity outcomes rather than reducing vulnerability.

If they are to be assessed further due to increased public interest (for example), more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

Breakwaters, seawalls and groynes: Breakwaters, seawalls and groynes scored poorly against values driven criteria from the CCRG and in technical assessment. Further consideration of any option should proceed cautiously. If they are to be assessed further, more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries. Preference for a sandy beach in this location would contradict pathways for seawalls or groynes over longer periods

7.4.3.3 Long-term considerations:

Ongoing adaptation planning: As climate change and coastal hazard impacts increase, continued monitoring, assessment, and engagement will be essential. Offshore and land-based options should only be advanced following clear evidence of need and after short- and medium-term measures have been exhausted.

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7.4.4 Management Unit 4 - Seascapes

Seascapes is a long management unit with numerous assets. Analysis for Seascapes suggests that all non-physical adaptation options (planning related and no regrets options) perform well for this management unit and would be suitable for implementation.

Based on scores, sand nourishment should be considered in more detail in the immediate to short term. Other options did not score well due to strongly held foreshore asset values.

Decision making for this management unit becomes increasingly necessary beyond 2050, with vulnerability increasing beyond 2075. Monitoring, which scores very well for this management unit, is encouraged in the short term to determine actual rates of erosion over the next 0-10 years and provide evidence to support long-term decision making.

7.4.4.1 Short-term actions

Sand nourishment: Increased sand nourishment is encouraged in the immediate term and should be implemented to provide more time to determine the best long-term course of action.

7.4.4.2 Medium-term actions

Breakwaters and artificial reefs: Further assessment of offshore breakwaters and artificial reefs, should not proceed per ***Section 7.3.1.1***. Whilst these scored nearly three to five points higher through the CCRG analysis than the technical assessment, comments indicate preferences towards surfing and marine biodiversity outcomes rather than reducing vulnerability.

If they are to be assessed further due to increased public interest (for example), more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

If offshore breakwaters are to be further considered, design will be a key consideration. For example, offshore breakwaters could be built closer to shore to give more flexibility on construction and maintenance options and costs.

Seawalls and groynes: Seawalls and groynes scored poorly against values driven criteria from the CCRG. Further consideration of either option should proceed cautiously. If they are to be assessed further, more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

7.4.4.3 Long-term considerations:

Ongoing adaptation planning: As climate change and coastal hazard impacts increase, continued monitoring, assessment, and engagement will be essential. Offshore and land-based options should only be advanced following clear evidence of need and after short- and medium-term measures have been exhausted.

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7.4.5 Management Unit 5 - Rakoa

Analysis for Rakoa indicates that non-physical adaptation options (such as planning-related and no-regrets measures) may perform well in this area and are considered suitable for implementation.

Based on scores, sand nourishment and some planned and managed retreat options should be considered in more detail in the immediate to short term.

An economic investigation has been completed using Cost Benefit Analysis (CBA) to analyse the cost implications of the options available. It was pragmatic to compare higher scoring options with a seawall or groyne option for Rakoa, as these are commonly implemented options which scored well in the technical analysis.

The CBA suggests that sand nourishment currently provides the best value for money option, although this is highly dependant on the availability and cost of sand sources. An additional investigation, a Benefit Distribution Analysis (BDA), helps determine which parties might be required to support the final adaptation option financially. The BDA is discussed further in ***Section 8.5***.

Decision making for this management unit becomes increasingly urgent in the medium term. Monitoring, which scores very well for this management unit, should be prioritised to determine actual rates of erosion over the next 0-10 years.

7.4.5.1 Short-term actions

Sand nourishment: Increased sand nourishment is encouraged in the immediate term and should be implemented to provide more time to determine the best long-term course of action.

Planned and managed retreat: Planning for managed retreat should also commence in the short term, in consultation with the State Government. This should include consideration of public assets, direct liaison with affected landowners, and investigations into potential funding avenues. Managed retreat of private assets should only be considered after due process, including assessment of other relevant Council policies and requirements.

7.4.5.2 Medium-term actions

Breakwaters and artificial reefs: Further assessment of offshore breakwaters and artificial reefs, which both scored close to neutral, should not proceed per ***Section 7.3.1.1***. Whilst these scored four to six points higher respectively through the CCRG analysis than the technical assessment, comments indicate preferences towards surfing and marine biodiversity outcomes rather than reducing vulnerability.

If they are to be assessed further due to increased public interest (for example), more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

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If offshore breakwaters are to be further considered, design will be a key consideration. For example, offshore breakwaters could be built closer to shore to give more flexibility on construction and maintenance options and costs.

Seawalls and groynes: Seawalls and groynes scored very poorly against values driven criteria from the CCRG. Further consideration of either option should proceed cautiously. If they are to be assessed further, more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

7.4.5.3 Long-term considerations:

Ongoing adaptation planning: As climate change and coastal hazard impacts increase, continued monitoring, assessment, and engagement will be essential. Offshore and land-based options should only be advanced following clear evidence of need and after short- and medium-term measures have been exhausted.

Comparative analysis: It has been pragmatic to compare higher-scoring options with a seawall or groyne option for Rakoa, as these are already implemented in some areas and scored well in the technical analysis.

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7.4.6 Management Unit 6 - Falcon Bay

Falcon Bay is a much loved local asset, which has an existing seawall present. It is one of only two locations impacted by inundation (although toward the end of the planning horizon).

Analysis for Falcon Bay indicates that non-physical adaptation options (such as planning-related and no-regrets measures) may perform well in this area and are considered suitable for implementation.

Based on scores, designing assets to withstand impacts, some planned and managed retreat options, sand nourishment, a levee, protection structure audits and emergency planning should be considered in more detail. The levee would not be required until towards the turn of the century. Design details will need to be considered at a future timeframe when modern design and technology can be better considered.

An economic investigation has been completed using Cost Benefit Analysis (CBA) to analyse the cost implications of the options available. It was pragmatic to compare higher scoring options with a seawall for Falcon Bay, as this is currently present and a commonly implemented option which scores well in the technical analysis.

The CBA suggests that sand nourishment or a replacement seawall provides similar levels of value for option. An additional investigation, a Benefit Distribution Analysis (BDA), helps determine which parties might be required to support the final adaptation option financially. The BDA is discussed further in ***Section 8.5***.

Decision making for this management unit becomes increasingly urgent in the medium term, although the existing seawall provides a level of protection that allows the City time to consider the best long term adaptation response. Monitoring, which scores very well for this management unit, should be undertaken to determine actual rates of erosion over the next 0-20 years.

7.4.6.1 Short-term actions

Sand nourishment: Increased sand nourishment is encouraged in the medium term and should be implemented to provide more time to determine the best long-term course of action.

Planned and managed retreat: Planning for managed retreat should also commence in the short term, in consultation with the State Government. This should include consideration of public assets, direct liaison with affected landowners, and investigations into potential funding avenues. Managed retreat of private assets should only be considered after due process, including assessment of other relevant Council policies and requirements.

Protection structure audits: An audit of the existing seawall should be completed to determine potential replacement timeframes or maintencance requirements.

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7.4.6.2 Medium-term actions

Inundation responses: Designing assets to withstand impacts, a levee and emergency planning are responses to potential inundation. These can be planned over time, and are suitable for implementation in the medium term.

Breakwaters and artificial reefs: Further assessment of offshore breakwaters and artificial reefs, which both scored close to neutral, should not proceed per ***Section 7.3.1.1***. Whilst these scored four to five points higher respectively through the CCRG analysis than the technical assessment, comments indicate preferences towards surfing and marine biodiversity outcomes rather than reducing vulnerability.

If they are to be assessed further due to increased public interest (for example), more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

If offshore breakwaters are to be further considered, design will be a key consideration. For example, offshore breakwaters could be built closer to shore to give more flexibility on construction and maintenance options and costs.

Seawalls and groynes: Seawalls and groynes scored very poorly against values driven criteria from the CCRG, despite the existence of a seawall in the current day. This is likely due to strong preferences for a sandy beach in this location. Long term replacement of the seawall should proceed with more intensive local engagement, and should include explicit consideration of funding contributions from beneficiaries.

7.4.6.3 Long-term considerations:

Ongoing adaptation planning: As climate change and coastal hazard impacts increase, continued monitoring, assessment, and engagement will be essential. Offshore and land-based options should only be advanced following clear evidence of need and after short- and medium-term measures have been exhausted.

Comparative analysis: It has been pragmatic to compare higher-scoring options with a seawall option for Falcon Bay, as this is currently present and a commonly implemented option which scores well in the technical analysis.

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7.4.7 Management Unit 7 - Gearies-Avalon

Gearies-Avalon is a very natural management unit, and just under 50% of respondents in the CCRG selected this location as the greatest priority for retention of natural landscapes.

Analysis indicates that non-physical adaptation options (such as planning-related and no-regrets measures) may perform well in this area and are considered suitable for implementation.

Based on scores, sand nourishment and some planned and managed retreat options should be considered in more detail in the medium term.

An economic investigation has been completed using Cost Benefit Analysis (CBA) to analyse the cost implications of the options available. It was pragmatic to compare higher scoring options with a seawall or groyne option for Gearies-Avalon, as these are commonly implemented options which scored well in the technical analysis.

The CBA suggests that planning for relocating assets provides the best value for money option. An additional investigation, a Benefit Distribution Analysis (BDA), helps determine which parties might be required to support the final adaptation option financially. The BDA is discussed further in ***Section 8.5***.

Decision making for this management unit becomes increasingly urgent in the short term and there may be additional coastal hazard impacts within this management unit arising from erosion or inundation hazards present in the canal estate. This aspect has not been assessed in this study, but will be assessed in a separate CHRMAP in the future. Monitoring, which scores very well for this management unit, should be prioritised to determine actual rates of erosion over the next 0-10 years.

7.4.7.1 Short-term actions

Sand nourishment: Increased sand nourishment is encouraged in the immediate term and should be implemented to provide more time to determine the best long-term course of action.

Planned and managed retreat: Planning for managed retreat should also commence in the short term, in consultation with the State Government. This should include consideration of public assets, direct liaison with affected landowners, and investigations into potential funding avenues. Managed retreat of private assets should only be considered after due process, including assessment of other relevant Council policies and requirements.

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7.4.7.2 Medium-term actions

Breakwaters and artificial reefs: Further assessment of offshore breakwaters and artificial reefs, which both scored close to neutral, should not proceed per ***Section 7.3.1.1***. Whilst these scored four to six points higher respectively through the CCRG analysis than the technical assessment, comments indicate preferences towards surfing and marine biodiversity outcomes rather than reducing vulnerability.

If they are to be assessed further due to increased public interest (for example), more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

If offshore breakwaters are to be further considered, design will be a key consideration. For example, offshore breakwaters could be built closer to shore to give more flexibility on construction and maintenance options and costs.

Seawalls and groynes: Seawalls and groynes scored very poorly against values driven criteria from the CCRG, and also scored lower against technical criteria than they did in other management units (due to potential sand bypassing impacts). Further consideration of either option should proceed cautiously, as the outcomes may have a significant effect on community values. If they are to be assessed further, more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

7.4.7.3 Long-term considerations:

Ongoing adaptation planning: As climate change and coastal hazard impacts increase, continued monitoring, assessment, and engagement will be essential. Offshore and land-based options should only be advanced following clear evidence of need and after short- and medium-term measures have been exhausted.

Comparative analysis: It has been pragmatic to compare higher-scoring options with a seawall or groyne option for Gearies-Avalon, as these are already implemented in some areas and scored well in the technical analysis.

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7.4.8 Management Unit 8 - Dawesville Cut

The Dawesville Cut allows significant water exchange for environmental improvements in the Peel-Harvey estuary system and a navigable channel for vessels. It has an critical environmental and marine safety function. The Dawesville Cut is entirely managed by the state government and is outside the remit of this CHRMAP. An MCA was not undertaken.

Notwithstanding, it is noted that permanent fixed sand bypassing was a key adaptation action for the Mandurah Ocean Entrance channel identified in the Northern Beaches CHRMAP and given the linkages to the Dawesville Cut operations the combination of both channels having a permanent sand bypass would provide a more natural flow of sand throughout the year and on-demand, as required.

The City and DoT (on behalf of the state government) are working collaboratively to assess the cost and benefits of sand bypassing at both Dawesville Cut and the Mandurah Channel. A Feasibility Investigation has been completed and the first stages of its recommended implementation plan have been progressed.

Independently, the community has expressed apprehension about the function and effectiveness of the sand bypassing operations, reckoning that the Dawesville Cut operations are not achieving adequate bypassing compared to a pre-Dawesville Cut environment.

Reflecting these ongoing investigations, and the importance of the effects of this Management Unit to the community, some suggestions and observations relating to the bypassing operations are noted here:

- Increased engagement and education on the sand bypassing works in general and investigations as they progress is encouraged.
- Installation of fixed bypassing plant at both Dawesville Cut and the Mandurah Channel is desirable subject to further investigations.
- Investigate possible synergies to improve bypassing along with coastal management – e.g. from Dawesville Channel north to locations up to Falcon Bay; and/or from Mandurah Channel to Back Beach. These possibilities would need to carefully consider potential impacts on beaches throughout the City's coastline.
- Investigate potential combinations of mobile and fixed plant to maximise sand bypassing efficiencies into the future.
- Assess funding models to consider the use of the equipment for multiple strategic goals – beach amenity and coastal management as well as bypassing interrupted sand. Additional sand could also potentially be brought into the system to supplement natural sand supply.

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7.4.9 Management Unit 9 - Pyramids Beach-Golf Course

Analysis for Pyramids Beach-Golf Course suggests that all non-physical adaptation options (planning related and no regrets options) perform well for this management unit and would be suitable for implementation.

Based on scores, designing assets to withstand impacts, sand nourishment, protection structure audit and emergency planning should be considered in more detail. Notwithstanding, action is not urgent in this management unit, and could be delayed to the medium term. Some planned and managed retreat options should be considered in more detail in the medium term, with nearly two-thirds of respondents in the CCRG selecting this location for planned and managed retreat.

Monitoring, which scores very well for this management unit, should be prioritised to determine actual rates of erosion over the next 0-10 years.

7.4.9.1 Short-term actions

Protection structure audits: An audit of the existing seawall should be completed to determine potential replacement timeframes or maintenance requirements.

7.4.9.2 Medium-term actions

Inundation responses: Designing assets to withstand impacts, a levee and emergency planning are responses to potential inundation in the northern part of the management unit. These can be planned over time, and are suitable for implementation in the medium term.

Sand nourishment: Sand nourishment scores positively, however, this management unit has low levels of vulnerability and action is not required imminently. Sand nourishment may be considered in the medium term but should not be prioritised compared to other localities.

Planned and managed retreat: Planning for managed retreat should commence in the medium term, in consultation with the State Government. This should include consideration of public assets, direct liaison with affected landowners, and investigations into potential funding avenues. Managed retreat of private assets should only be considered after due process, including assessment of other relevant Council policies and requirements.

Breakwaters and Artificial reefs: Further assessment of breakwaters and artificial reefs, should not proceed per ***Section 7.3.1.1***. Whilst these scored three to six points higher through the CCRG analysis than the technical assessment, comments indicate preferences towards surfing and marine biodiversity outcomes rather than reducing vulnerability.

If they are to be assessed further due to increased public interest (for example), more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

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Seawalls and groynes: Seawalls and groynes scored poorly against values driven criteria from the CCRG and in technical assessment. Further consideration of either option should proceed cautiously. If they are to be assessed further, more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

7.4.9.3 Long-term considerations:

Ongoing adaptation planning: As climate change and coastal hazard impacts increase, continued monitoring, assessment, and engagement will be essential. Offshore and land-based options should only be advanced following clear evidence of need and after short- and medium-term measures have been exhausted.

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7.4.10 Management Unit 10 - Florida-Melros

Florida-Melros is a fairly long management unit, bounded by large areas of undeveloped land to the north and south with numerous assets. Analysis for Florida-Melros suggests that all non-physical adaptation options (planning related and no regrets options) perform well for this management unit and would be suitable for implementation.

Based on scores, sand nourishment and some planned and managed retreat options should be considered in more detail in the short term. The northern most section of the management unit is slightly more vulnerable at the current day, and should be the focus.

Decision making for this management unit becomes increasingly necessary beyond 2050, with vulnerability increasing beyond 2075. Monitoring, which scores very well for this management unit, should be undertaken to determine actual rates of erosion over the next 0-10 years to provide evidence to support long-term decision making.

7.4.10.1 Short-term actions

Sand nourishment: Increased sand nourishment is encouraged in the medium term and should be implemented to provide more time to determine the best long-term course of action.

7.4.10.2 Medium-term actions

Breakwaters and artificial reefs: Offshore breakwaters and artificial reefs scored negatively for this management unit despite a general positive uplift from CCRG analysis. These options should be excluded from further review based on cost, adaptability and effectiveness measures.

Seawalls and groynes: Seawalls and groynes scored poorly against values driven criteria from the CCRG. Further consideration of either option should proceed cautiously. All commentary of these options reflect concerns about loss of a sandy beach. If they are to be assessed further, more intensive local engagement should be undertaken, and should include explicit consideration of funding contributions from beneficiaries.

7.4.10.3 Long-term considerations:

Ongoing adaptation planning: As climate change and coastal hazard impacts increase, continued monitoring, assessment, and engagement will be essential. Offshore and land-based options should only be advanced following clear evidence of need and after short- and medium-term measures have been exhausted.

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7.4.11 Management Unit 11 - Yalgorup

Yalgorup is an extensive management unit, consisting almost entirely of undeveloped land with the exception of one sole privately owned lot. Analysis for Yalgorup strongly favours non-physical adaptation options (planning related and no regrets options). Prevention of use rights and 'do nothing' score well across criteria and would be suitable for implementation.

Planned and managed retreat options and monitoring score relatively poorly for this management unit, as the cost associated with these options is an expense that has limited benefit, and there is no significant community/social or physical and economic benefit derived. This was reflected in the CCRG scores for other options.

All protect adaptation options have negative scores and should not be considered further. Implementation would not be required within the planning horizon. Other minor assets should be relocated outside of the hazard zone when they have reached their replacement date.

7.4.11.1 Short to Long Term actions

Do Nothing: Take limited action in this management unit, with the exception of removal of public assets when impacted by proximity to erosion or inundation impacts).

7.5 MCA Summary

Table 35 provides a simple summary of the adaptation options that have been recommended for progressing into the next stages of the CHRMAP.

It should be noted that the CHRMAP policy preferences the most flexible adaptation pathways; the pathways that provide for the broadest possible decision making at the time when a decision becomes necessary.

For this reason, recommended options favour Avoid and Planned and Managed Retreat where these are available. Notwithstanding, when an avoid or retreat option is recommended, many other options remain valid. This CHRMAP also requires regular review, at which time the recommended pathways should again be considered.

Regardless of the recommended option, planning can continue to be undertaken on all valid options until the point a decision is to be made. Every option recommended remains subject to detailed design and investigation, which will confirm the specific design and design life, the likely impacts to adjacent areas and detailed costings.

Adaptation treatment pathways are outlined in more detail in ***Section 8***.

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Table 35: Summary of Strategies and Pathways

Management Unit	Immediate to Short Term (0-10 years)	Medium term or longer (10-50 years or beyond 50 years)
All	- AV - Avoid all further development. - PMR3 – Prevention of further development rights through planning controls suitable for each management unit or across the study area - NR3 – Notification on Certificate of Titles as and when possible.	
MU 1 - Blue Bay	- PR1 – Sand nourishment - supported by a sand source investigation - NR1 – Monitoring	- PMR – Consider planned and managed retreat options; and/or - Possibly PR3 - seawall or PR2 - groyne
MU2 - Back Beach	- PR1 – Sand nourishment - supported by a sand source investigation - NR1 – Monitoring	- PMR – Consider planned and managed retreat options
MU 3 - Calypso	- NR1 – Monitoring	- PMR – Consider planned and managed retreat options
MU4 - Seascapes	- PR1 – Sand nourishment - supported by a sand source investigation - NR1 – Monitoring	- PMR – Consider planned and managed retreat options
MU5 - Rakoa	- PR1 – Sand nourishment - supported by a sand source investigation - NR1 – Monitoring	- PMR – Consider planned and managed retreat options; and/or - Possibly PR3 - seawall or PR2 - groyne
MU 6 - Falcon Bay	- PR1 – Sand nourishment - supported by a sand source investigation - NR1 – Monitoring - NR2 – Protection structure audit - NR4 - Emergency Planning	- PMR – Consider planned and managed retreat options; and/or - Possibly PR3 - seawall; and/or - PR6 - Levee
MU7 - Gearies-Avalon	- PR1 – Sand nourishment - supported by a sand source investigation - NR1 – Monitoring	- PMR – Consider planned and managed retreat options; and/or - Possibly PR3 - seawall or PR2 - groyne

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Table 45: Summary of Strategies and Pathways (Cont'd)

Management Unit	Immediate to Short Term (0-10 years)	Medium term or longer (10-50 years or beyond 50 years)
MU8 - Dawesville Cut	- Ongoing investigations and consideration of synergies with CHRMAP sand nourishment requirements - Rock protection structures should be maintained in perpetuity	
MU9 - Pyramids Beach-Golf Course	- NR1 – Monitoring - NR2 – Protection structure audit - NR4 - Emergency Planning	- PMR1 – Leaving assets unprotected - PR1 – Sand nourishment - supported by a sand source investigation - PMR – Consider planned and managed retreat options - AC1 – Design assets to withstand impacts - PR6 – Levee
MU10 - Florida-Melros	- PR1 – Sand nourishment - supported by a sand source investigation - NR1 – Monitoring	- PMR – Consider planned and managed retreat options
MU11 - Yalgorup	- DN1 – Do Nothing	- DN1 – Do Nothing

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SECTION 8
ADAPTATION STRATEGIES

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8 Adaptation Strategies

8.1 Overarching Strategies

All assets within the study area become more vulnerable over time...

This requires consideration of other management and adaptation planning options that may be relevant to all assets. This section summarises the key strategic planning, statutory planning, and policy or governance interventions that the City will need to implement regardless of the proposed adaptation options chosen per area or asset. These instruments are particularly useful for implementing Avoid, Accommodate and Planned and Managed Retreat options.

Strategy 1: Engagement

It is common for large communities, such as the Southern Beaches community to be unaware of significant projects such as the CHRMAP. This is for various reasons, including how busy people are with more personally important things, or simply not seeing information about the project when it was communicated. CHRMAP are also very long term plans, and its possible stakeholders simply see the issue as lacking urgency.

For this reason, it is recommended that the City maintain ongoing engagement with the community on the CHRMAP project. Maintaining a regular communication channel with registered community members, and providing regular updates is important. So too, is taking advantage of groups such as the CCRG, the City's advisory groups and key community organisations to continue sharing progress towards the strategies and pathways of the CHRMAP.

A program of communication and engagement for the next three (or so) years should be prepared.

Further to this, it is recommended that letters be sent directly to all property owners within the 2050 coastal hazard zone, who are most likely to be impacted in the short to medium term, to advise them of the vulnerability of land in the area.

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Communication should include a series of frequently asked questions and simple fact sheets on development in the coastal hazard zone, who is responsible for coastal hazard management, and what impacts may be experienced in the future.

This information should also be sent to any known real estate agents and settlement agents operating in the area.

(Options: PMR3 - Planning controls for managed retreat).

Strategy 2: Coastal Hazard Summary and Fact Sheet

Coastal hazard management is complicated for most people to understand - the modelling is difficult for even the most experienced administrators. As such, it is recommended that the City prepare more accessible material.

This may include a shorter, less complex version of this document, and preparation of a short fact sheet for developing in the City, once a policy is developed.

(Options: PMR3 - Planning controls for managed retreat).

Strategy 3: Monitoring

Monitoring is essential to managing coastal hazards, tracking when coastal hazards reach trigger points, understanding the coastline evolution, capturing changes to vulnerabilities, and measuring the success of coastal management actions. Monitoring is recommended across the study area.

A suitable monitoring program will enable the City to determine actual rates of erosion over the next 0-10 years and may be supported by grants.

Coastal monitoring will inform the short-term implementation phase and increase the knowledge base for subsequent CHRMAP revisions and targeted investigations. Monitoring and review tasks include:

- Review of existing coastal monitoring programs
- Review of coastal hazard projections outlined in erosion hazard assessment
- Recommend coastal monitoring activities to identify trigger points, to record dilapidation, to record when trigger points occur and to include indicative costs of monitoring works
- Recommend Trigger points
- Recommend CHRMAP review.

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Review of Existing Coastal Monitoring

The following coastal monitoring activities are currently undertaken in the study area and should be continued:

1. Ad hoc storm monitoring of study area beaches, including additional beach profile surveys collected before and after storm events undertaken by the City
2. Beach width measurements, beach field photos, limited beach profiles, oblique aerial photos, and drones collecting LiDAR beach / topographic survey undertaken by PNP (noting the first drone surveys complete in May 2025 at Falcon Bay and Blue Bay/Doddies Beach).
3. Shoreline vegetation movement analysis from aerial photos undertaken by DoT
4. Regional water level monitoring undertaken by DoT
5. Wave monitoring at Rottnest and Mandurah Waverider Buoys undertaken by DoT
6. Bathymetric surveys commissioned DoT.

Recommended Coastal Monitoring Activities

The monitoring activities described in ***Table 36*** are designed to identify the impacts of the recommended options and to record the evolution of the coastal trigger points. Should any option be modified, or other coastal projects be undertaken (such as maritime, or recreation/tourism projects) where coastal hazard risk management is not the primary focus, they should be subject to the same CHRMAP principles and require their own monitoring program appropriate to their location, size and objectives.

(Option: NR2 - Monitoring)

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Table 36: Recommended Coastal Monitoring Activities

Monitoring Activity	Overview	Location	Timing
Field photos	Collect beach and foredune monitoring photos at the same time as the beach and foreshore topographic survey, particularly for inundation events as it is often impractical to organise detailed survey at short notice. PNP's collection of beach field photos should continue as a regional dataset. This could be supplemented by installing more CoastSnap points at locations the CHRMAP has identified as important to the local community such as Blue Bay, Avalon and Pyramids Beach, noting the existing locations at Doddies Beach and Falcon Bay.	All	2025-2028
Bathymetric survey	Collect additional nearshore bathymetry data (water depths) for future coastal processes investigations and option development in all Management Units. Survey should target reaching depths of approximately -4.0mAHD. If necessary to reduce costs this could be only for areas not surveyed by DoT as part of bypassing operations.	All	2025/2026
Oblique aerial photos	PNP's collection of oblique aerial photos should continue as a regional dataset.	All	Ongoing
Sediment sampling	Beach sediment samples collected for analysis of particle size distribution before and after storm events and at different location across the profile; and composition to identify provenance - to further inform storm erosion monitoring and sediment transport analysis in the future.	All	2028 - 2030
Beach width measurements	PNP's collection of beach width measurements should continue as a regional dataset.	MU 1, 2, 3, 4, 5,6, 7, 10 and 11	Ongoing
Remote imagery camera	Installation remote imagery camera for at least one year to link community observations of beach behaviour with data.	Blue Bay or Avalon	2026 or 2027
Geotechnical investigations	Geotechnical investigations are proposed to identify the potential presence and depths of local bedrock strata below the beach and foreshore. When bedrock is located relatively near the surface, it can provide some natural resistance to erosion and help inform the refinement and design of coastal management options. However, in low-lying areas, the presence of bedrock may not significantly mitigate the coastal hazards. Such investigation may be carried out by ground penetration radar, test pits or survey observations following beach erosion events.	MU 1, 4, 5 & 7	2027 / 2028 / 2029

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Table 46: Recommended Coastal Monitoring Activities (cont'd)

Monitoring Activity	Overview	Location	Timing
Beach and foreshore topographic survey	Engage a certified professional surveyor for a long-term beach and foreshore topographic survey data collection program (assumed as three years). The 2009 survey used for this project is now ~16 years old and should be renewed. Routine beach and dune surveys, in the form of beach profiles as a minimum, are recommended every 6 months, following the summer and winter seasons, every 400m along the coast in undeveloped areas and every 100m in developed areas. Beach profiles may be spaced more closely where Options include trigger points monitoring and/or to support specific project requirements, such as potential locations for ad-hoc sand nourishment in response to persistent erosion. The beach survey may also be continuous along the coast using LiDAR or other appropriate technique with a view to capture coastal processes more accurately, while allowing the processing of beach profile data. It is understood PNP have commenced these surveys (May 2025). The City should continue to coordinate with PNP and state government to confirm a sustainable approach. Additionally, surveys can be undertaken immediately following severe storms producing significant beach erosion. These are useful for recording historical events, confirming the presence of bedrock, and calibrating models. The survey datasets should be centralised into a database, which includes previous historical beach profiles and quality control information such as survey date, datum, survey mark, beach material encountered (rock versus sand) and method used.	MU 1-7, 9 & 11	2025-2028
Coastal protection structure audit	Engage a consultant to undertake an audit (Protection Structure Audit – NR2) of the coastal protection structures where the City is responsible for the care, control and maintenance of including those identified as informal and the structures in front of and adjacent to Port Bouvard SLSC. This will inform the need for regular monitoring of the coastal management structures. Work should be undertaken with consistent methodology to allow comparison between inspections. The initial assessment would identify an appropriate review schedule for each structure, or if there is an issue with an asset. Such assessment would blend into the City's existing asset management reporting systems.	MU 4, 5, 6, 8, & 9	2026

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Strategy 4: Special Control Areas

Amend the City of Mandurah Local Planning Scheme No. 12 (LPS12) to introduce a Special Control Area (SCA) over all currently zoned land identified as being vulnerable to coastal erosion and/or inundation.

The SCA should be applied to relate specifically to land subject to coastal processes (as recommended in WAPC, 2019) and would be delineated by the position of either the erosion setback line or the worst case inundation extent in the year 2125, whichever is the more landward.

An SCA is a planning layer that applies in addition to the underlying zoning and land use permissibility of the land. It identifies areas which are significant for a particular reason and where special provisions in LPS12 may need to apply in addition to any other requirements relevant to the underlying zone.

A SCA classification can be included in a scheme to facilitate land use changes and development control within that area. Part 5, Schedule 1 of the Planning and Development (Local Planning Schemes) Regulations 2015 provides the template for local governments to follow when amending their LPS to include an SCA.

WAPC (2019) provides draft amendment text in the *CHRMAP Guidelines Appendix 4 Planned and Managed Retreat existing planning framework and instruments*. The purpose of the SCA is to provide guidance as to the appropriate scope of land use and development to be permitted within a coastal erosion and inundation hazard risk area.

Its objectives would be:

- To ensure land in the coastal zone is available for coastal foreshore management, public access, recreation and conservation.
- To ensure public safety and reduce risk associated with coastal erosion and inundation.
- To avoid inappropriate land use and development of land at risk from coastal erosion and inundation.
- To ensure land use and development does not accelerate coastal erosion or inundation risks; or have a detrimental impact on the functions of public reserves.
- To ensure that development addresses the City of Mandurah Southern Beaches CHRMAP prepared in accordance with SPP 2.6.

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The SCA would include additional provisions such as:

- All proposed development within the SCA requires approval including development that would not ordinarily require development approval under the LPS (i.e. has an exemption); development provisions would be found within a Local Planning Policy (see Strategy 2). Non-habitable buildings (e.g sheds), minor extensions and a change of land use may be exempted.
- Grouped and multiple dwellings should be prohibited, even if the allocated residential density code would otherwise allow for such development.
- Subdivision of land should be prohibited, even if the allocated density code would otherwise allow for such development.
- Referral of applications - any planning application should be referred to the Department of Transport, the Western Australian Planning Commission (WAPC) and any other relevant authority for advice and comment on the coastal risk.
- Minimum finished floor levels for habitable rooms, for example Queenslander style development with rooms such as laundries and parking permitted at ground level. Minimum finished floor levels would be subject to further technical assessment.
- Other development standards such as minimum AHD of water and power supply outlets.
- That any development proposed and approved in the SCA should be conditional based on a time limit and a Vulnerable Coastal Area Notification being placed on the Certificate of Title. Approvals may also be supported with event limited conditions (see Strategy 6).

Time limited approvals are permitted under the Planning and Development (Local Planning Schemes) Regulations 2015 (Schedule 2, Part 9 Cl. 72). For this CHRMAP, the time proposed on the approval would be the period in which the subject lot is identified as reaching a 'High' level of vulnerability according to the CHRMAP (see Section ***4***). For most properties this will be before 2050, although this varies.

The applicant could later apply for a further time limited approval, which could be granted if the risk from coastal processes was still considered acceptable.

An event limited condition of approval can be used to support a time limited approval and should be tied to external factors including a public road no longer being available/legal access no longer being available to the property, or when water, sewerage or electricity to the lot is no longer available as they have been removed/decommissioned by the relevant authority due to coastal hazards.

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The event limited conditions of approval should also include damage associated with a storm event that exceeds predicted impacts for the timeframe and include reference to proximity of the development to the allowance for absorbing the current risk of storm erosion (S1), as defined in SPP2.6

This event limited approval would require removal and/or rehabilitation of the development to the way the site was before the approval.

An amendment to the Local Planning Scheme for the introduction of an SCA should also include a change of density for all land, where possible, to the lowest available density codes, which minimises the potential for subdivision and development of grouped and multiple dwellings[1].

It is recognised that this strategy has the potential to cause concern amongst the community, especially for landowners, which is a natural response from citizens trying to protect property values. However, it must be noted that there is no obligation on Government to compensate land lost due to coastal hazards, and it is much more proactive for the City to identify land at risk in the future and take appropriate action.

For landowners who may be considering purchasing or developing lands, it is important to note that they should not assume any funds will be forthcoming to support future adaptation responses or retreat.

(Options: PMR3 - Planning controls for managed retreat / Prohibit expanding existing use rights).

1. If this amendment changes the amendment from a simple amendment to complex amendment, this part of the strategy should be undertaken separately.

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Strategy 5: Local Coastal Planning Policy

This strategy establishes an option for the City to address planning control in advance of development of the SCA (described in Strategy 4), or to support the intent of the SCA with planning provisions that are not included within the SCA.

Prepare a local planning policy (LPP) to clarify the City's attitude and expectations in relation to coastal development within an identified area. This should include the type of permanent or temporary assets it is prepared to accept on land subject to coastal processes.

LPPs are prepared and adopted according to the provisions in Part 2 Division 2 of the Deemed Provisions of the Planning and Development (Local Planning Schemes) Regulations 2015. The City may prepare an LPP in respect of any matter related to the planning and development of the Scheme area.

An LPP can provide detail and guidance on what sort of development would be acceptable within the SCA and will also assist the Council in making planning decisions on coastal development requiring the exercise of discretion.

For example, on land at risk of erosion within the life of a proposed development the LPP may encourage use of structures that can be disassembled and/or transported should erosion come within a specified distance of the structure, or may encourage short term commercial uses. The policy would identify the Council's intention to require notifications on title as a condition of development approval.

The primary benefit of including planning provisions in policy rather than the SCA is the flexibility of policies at the local government level. This can mean the City is able to respond more quickly to changes in context, whereas any changes to the SCA would need to go through the more complex scheme amendment process. In the shorter term, before LPS12 can be amended to include the SCA, a policy would establish longer term intentions.

The City does not have any existing coastal policy frameworks. However, it does have a Coastal Management Plan that could be modified or replaced to reflect these strategies.

(Options: PMR3 - Planning controls for managed retreat / Prohibit expanding existing use rights).

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Strategy 6: Notifications on Certificate of Title

All freehold land identified as being at risk of impact from coastal processes in a CHRMAP developed in accordance with SPP2.6 should have a Vulnerable Coastal Area (VCA) notification placed on its certificate of title(s) to make the owner and future landholders aware of the coastal hazard risk.

Section 165 of the Planning and Development Act 2005 enables the WAPC to impose the VCA notification on the certificate of title(s) as a condition of subdivision.

Section 70A of the Transfer of Land Act 1893 enables a VCA notification to be lodged by a local government or public authority, through the development approval process. Section 70A may also be used to place a notification on title in the absence of a development application, with the agreement of the landowner.

Current wording of the VCA notification recommended by the WAPC and in accordance with SPP2.6 is as follows:

"This lot is located in an area likely to be subject to coastal erosion and/or inundation over the next 100 years from the date this notification is registered."

(Options: PMR3 - Planning controls for managed retreat / Prohibit expanding existing use rights, NR3 - Notification on title).

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Strategy 7: Sand and Rock Source Investigation

A number of the at-risk assets include possible sand nourishment (either via bypassing locally or importing sand from elsewhere) as a management option, however, it is acknowledged that the availability of sand for nourishment outside of City availability is not well understood.

Similarly, but for armour rock suitable for building coastal management structures, some options require rock which needs to be fit for purpose.

It is recommended that the City assess sand availability to determine the capacity of local sand supplies, including the feasibility of both terrestrial and marine sand sources, and an analysis of the availability of such rock suitable for marine works, with suitable density, quarry yields, proximate location and tolerable costs. Potential environmental impacts should be considered in both studies, as well as any approvals required.

It is recommended the City liaise directly with the DoT for this assessment, and consider the recent DoT Materials Study for Sand and Rock Supply during the early design phases of any relevant coastal project.

This investigation may also align with investigations for the Dawesville Cut and Mandurah Channel sand bypassing operations.

(Options: PR1-5 - all Protect Options are supported by this strategy).

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Strategy 8: City Asset Management Planning

It is recommended that the City ensure that all future infrastructure assets placed in the coastal hazard zone either be sacrificial or have a design life that ensure the asset will be redundant before risk becomes almost certain. This can be done through the City's Asset Management Planning either spatially or via a database.

This will ensure that hard assets such as seating, pathways, toilets, playgrounds etc, as well as soft assets such as landscaping, be developed in such a way as to continue enjoyment of the coastal zone for as long as possible whilst also reducing or removing the risk associated with assets.

An asset management pathway should enable:

- Progressive relocation of non-critical assets (MR2) away from the coastal hazard zone once they reach the end of asset life, or replace assets with suitably durable and/or sacrificial infrastructure. This may include vulnerable recreational car parks; recreational amenities such as public ablutions; barbeque/picnic/shade areas; playground and other recreational equipment; and access structures such as ramps, stairs and paths and fences, etc.
- Planning for the relocation of critical service infrastructure outside of the coastal hazard zone once they reach the end of asset life, or at a minimum, modify the service infrastructure asset so that it does not run parallel to the coastline and can be progressively removed when exposed to intolerable risk levels.

Assets within the coastal hazard zone should be designed to reduce impact on the natural dune vegetation in the area.

(Options: PMR3 - Planning controls for managed retreat, NR2 - Protection structure audit).

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Strategy 9: Resilience Planning

Ongoing dune rehabilitation can support a healthy coastline and provide a unique line of defence against lower severity storms. Dune rehabilitation is considered a 'soft' protect option.

This strategy suggests developing a plan for an ongoing program of securing grants for dune repair, maintenance and revegetation, which the City can continue to apply for, support and manage. This aligns with community preferences for more natural options.

The management of beach access is included in this strategy, ensuring beach access is managed in a planned, appropriate manner to maintain community values of being able to access sandy beaches whilst also preserving dunes. This may include consolidation of beach access points, or improved/more resilient locations being selected for beach access.

This strategy should be partnered with high quality communication and education programs to share information about coastal hazards through signage, citizen science programs and school based education.

It is recommended that the plan include an assessment for priority resilience planting and signage, which may include an ongoing schedule, as well as an event response criteria and action plan for post storm events.

It is also recommended that the City use this plan to support ongoing grant applications through grant bodies such as Coastwest. The development of this plan may be supported by grant programs.

This plan could form part of the development of emergency planning for responding to inundation events in Management Unit MU6 - Falcon Bay and MU9 - Pyramids Beach-Golf Course where inundation is present towards the end of the planning horizon.

(Option: Protect)

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Strategy 10: Emergency Planning

Preparation of emergency plans to cover unexpected events, significant coastal erosion and/or inundation resulting in emergency asset repair or removal. This plan could be undertaken alongside Strategy 9.

The City should also liaise with various service authorities to ensure that underground and above ground services are designed and maintained in recognition of the coastal hazards identified in this CHRMAP. The City should engage all local service authorities in the emergency planning process to understand their respective strategic planning intentions.

The development of an emergency plan may be supported by grants.

(Option: NR4 - Emergency planning).

Strategy 11: Coastal Management Strategy

A Coastal Management Strategy (CMS) is an important mechanism to increase the protective capacity of the natural dune system and should address:

- The requirements of SPP2.6 and its supporting documentation
- The findings of this CHRMAP
- Potential environmental issues such as biodiversity and environmental impacts, and detail a weed management strategy for the coastline
- Findings of Asset Management Plans as appropriate
- Include recommendations for closing excess beach access points, ensuring appropriately fenced and signed paths, signage for dune repair and clear signage for 4-wheel drive access and permissibility (where relevant)
- Include recommendations for an education strategy for coastal and environmental management, and work to inform the community about coastal planning and hazards. The education strategy should also include appropriate on-ground signage and information for beach access, camping and 4-wheel driving, where applicable.
- Monitoring for impacts of 4WD vehicles (where applicable) and general beach access on nesting habitats and migratory bird species in dune areas
- The need for a bush fire management plan for the dune and coastal areas if relevant.

This strategy may comprise a update/replacement of the City's Coastal Management Plan (2004). The development of CMS may be supported by grants.

(Options: MR2 - Remove/Relocate, Protect - Dune care, NR1 - Monitoring, NR2 - Protection structure audit).

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Strategy 12: Foreshore Reserve Investigation

As identified in the MCA, planned and managed retreat may be contemplated to achieve the gradual increase of the foreshore reserve in the coastal hazard zone when the foreshore is impacted in a way that affects the community's values. Such a decision would require the demolition and removal, or the relocation of public and private assets in the coastal hazard zone.

It is recommended that the City investigate:

- The extent of foreshore reserve that may be required, and therefore the assets that might need to be removed to achieve this outcome.
- The cost of such an option over the timeframe of the CHRMAP.
- Potential pathways to achieving planned and managed retreat over time.

This strategy should commence in the short term, be supported by a detailed engagement process with affected landowners who are located within the coastal hazard zone or adjacent to the foreshore reserve area, and include discussions with the state government regarding potential implications.

For landowners who may be considering purchasing or developing lands, it is important to note that they should not assume any funds will be forthcoming to support future adaptation responses or retreat, however, this study would begin to identify the possible approach, including the financial approach.

(Option: PMR3 - Planning controls for managed retreat).

Strategy 13: Other Instruments

Other instruments may be useful for implementing adaptation options. These include:

- A layer being added to the City's online mapping system "Intramaps" to inform residents, prospective purchases and City staff of properties identified as being vulnerable to coastal erosion and/or inundation as a notification tool prior to the introduction of a Special Control Area via an amendment to LPS12.
- Special Area Rates, which can be used to ensure that the costs associated with protection options are equitably distributed across beneficiaries.
- Implementation of an internal procedure at the City of Mandurah. Settlement agents typically request a property report for a property that is subject to dealing in real estate transactions. This is linked to the sale of land (these typically include details of rates paid, outstanding issues, approved development etc). Settlement agents would be obliged to share this information with purchasers that they represent (even though the action does not limit or effect any sale procedure).

(Options: PMR3 - Planning controls for managed retreat).

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Strategy 14: Regular Review

This CHRMAP will require regular review, at approximately 10 year intervals, at which time the recommended pathways should again be considered. 10 year reviews should occur comprehensively, for the whole of the study area.

Future reviews should also aim to resolve the irregularity between the various CHRMAPs prepared. This might include any boundary interface issues such as:

- The inundation showing at Doddies Beach as part of the Northern Beaches CHRMAP (which due to mapping and model extents is not evident at Management Unit 1 - Blue Bay).
- The potential erosion or inundation which may be present in the canal estates which will be identified as part of the Estuary/Peel Inlet CHRMAP (which may intersect at Management Unit 7 - Gearies-Avalon).

Notwithstanding this 10-year review recommendation, some of the management units require shorter term action (MU1 - Blue Bay, MU5 - Rakoa and MU7 - Gearies-Avalon), and these management units may be subject to a more detailed review or site specific CHRMAP analysis at a shorter timeframe.

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8.2 Risk Management Pathways

This section describes the recommended adaptation actions proposed for the individual management units where assets are identified at risk. Pathways are provided for individual assets as appropriate.

This section introduces the concept of 'triggers'. Triggers are an indicator of increasing risk to an asset and are consistent with the 'S1' factor from SPP 2.6 – the extreme storm erosion factor.

It should be noted that the CHRMAP policy preferences the most flexible adaptation pathways; the pathways that provide for the broadest possible decision making at the time when a decision becomes necessary.

This is the direct benefit of preferencing more flexible adaptation options, because it retains the greatest possible decision making available for a later time when the trigger has been met.

The risk treatment strategies outlined in ***Section 8.1*** provide a number of tasks that can be undertaken independent of the management unit based pathways – this will contribute to providing greater levels of certainty regarding particular options.

8.2.1 Triggers

The coastal hazard mapping provides an indicative timeframe as to when adaptation will be required. However, it is recommended to employ the use of triggers for adaptation, including for relocation or managed retreat purposes.

SPP 2.6 and the CHRMAP Guidelines provide guidance on the appropriate triggers or criteria to commence a particular management response. Initiation of any option to remove or reduce vulnerability can be controlled by triggers such as:

Proximity trigger: Where the most landward part of the Horizontal Shoreline Datum (HSD) is within the Storm Erosion Allowance (S1 – defined by digital GIS mapping of present-day erosion hazard) of the most seaward point of a public asset of interest or private property lot boundary. Due to the high value of the foreshore reserve, the foreshore reserve may be considered as "the most seaward point". If individual assets have a specific distance-based trigger relating to the HSD then the beach and dune survey activities described above should be used to collect topographic data that can be used to map the updated HSD position. A proximity trigger can be linked to time limited approvals (which can also be supported by an event limitation).

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Replacement trigger: Where an existing coastal adaptation option has reached the end of its life cycle and needs either replacement or significant upgrade.

Access trigger: Where a public road is considered no longer available or able to provide legal access to the property. An access trigger can also be linked to an event limited approval.

Utilities trigger: When water, sewage, communications or electricity to the lot is no longer available as they have been removed/decommissioned by the relevant authority due to coastal hazards. A utilities trigger can also be linked to an event limited approval.

Damage trigger: Any property within the hazard zone and within a dedicated Special Control Area, that is damaged by a coastal hazard shall require LGA approval before being repaired. The review process should involve re-fit of minor or moderately damaged assets to accommodate coastal hazards in the future, or removal and redevelopment outside the hazard zone for damaged assets.

There is a preference for the list to be sequential. That is, a "proximity trigger" is recommended over a "damage trigger".

The following triggers have been adopted and applied to each management unit.

- Trigger 1: Proximity Trigger, the most landward part of the Horizontal Shoreline Datum (HSD) is within S1 of the most seaward point of a development or structure (noting that S1 changes across the coastal frontage).
- Trigger 2: End of the design life of an implemented accommodation or interim protection measure (replacement). Further accommodation or interim protection may be feasible, or retreat.
- Trigger 3: Event - Access, utility or damage trigger.

Table 36 provided a simple summary of the adaptation options that have been recommended for this CHRMAP for specific management units.

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8.3 Management Unit Pathways

This section describes risk management options, and the associated timeframes (approximate) for risk management measures to be established for individual Management Units. These management pathways provide the City with a decision-making strategy pathway that is made up of a sequence of decision points over time and at the appropriate time. This will allow the City to be responsive to changing circumstances over time and decisions can be planned, prioritised and prepared for.

The pathway for each management unit is broken down by timeframe, being:

- Immediate - Action as soon as possible. Where immediate actions are not suggested, this management unit is not predicted to require an urgent response.
- Short Term - Action within the next 10 years.
- Medium Term - Action between 10 and 25 years. All options include CHRMAP review in this time period per Strategy 14.
- Medium-Long Term - Action between 25 and 50 years - can be combined with long term where impacts are predicted to occur closer to 50 years.
- Long Term - Actions beyond 50 years

The potential costs for adaptation options are significant. All recommended options require further analysis of the cost implication for the community, considering the funding available (see ***Section 8.5***).

8.3.1 Management Unit 1 - Blue Bay

Vulnerability is very high at the present day and decision making becomes more urgent in the short term. Key areas to consider include Halls Head Parade from Roberts Point to Janis Street, the new shared path, beach stairs, car parking areas and the Roberts Point viewing deck.

8.3.1.1 Short Term

- Monitoring to commence and continue annually
- Sand source investigation
- Ad hoc sand nourishment until preferred adaptation option selected
- Planning for managed retreat in consultation with the State Government

8.3.1.2 Medium - Long Term

- Subject to continued engagement with the local community - continue preferred adaptation option (protect or planned and managed retreat)
- Continue monitoring

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8.3.2 Management Unit 2 - Back Beach

Vulnerability is very high by 2035 and decision making becomes more imperative in the medium term. Key areas to consider include the privately owned properties immediately fronting the foreshore (e.g. Janis Street, Admiralty Crescent etc) and the coastal path and stairs.

8.3.2.1 Short Term

- Monitoring to commence and continue annually
- Sand source investigation
- Ad hoc sand nourishment until preferred adaptation option selected
- Planning for managed retreat in consultation with the State Government

8.3.2.2 Medium - Long Term

- CBA and BDA to be undertaken on sand nourishment and planned and managed retreat for long term adaptation
- Demolition/removal/relocation of public and private assets in the hazard zone OR continued sand nourishment.

8.3.3 Management Unit 3 - Calypso

Vulnerability remains high (rather than very high) until 2050 for all assets other that the public foreshore. This includes the public park, toilets and play area at Calypso Road, the Giant and the foreshore paths and stairs.

8.3.3.1 Short Term

- Monitoring to commence and continue annually

8.3.3.2 Medium - Long Term

- Demolition/removal/relocation of public and private assets in the hazard zone

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8.3.4 Management Unit 4 - Seascapes

Vulnerability is very high and increasing up to 2050 for residential land and roads. Key areas to consider include all privately owned properties immediately fronting the foreshore and those along Boardwalk Boulevard and Acerosa Boulevard, the coastal path and stairs, playgrounds, toilets and parkland.

8.3.4.1 Short Term

- Monitoring to commence and continue annually
- Sand source investigation
- Ad hoc sand nourishment until preferred adaptation option selected
- Geotechnical investigations to determine extent of rock at key nodes.

8.3.4.2 Medium - Long Term

- CBA and BDA to be undertaken on sand nourishment, planned and managed retreat for long term adaptation
- Demolition/removal/relocation of public and private assets in the hazard zone OR continued sand nourishment.

8.3.5 Management Unit 5 - Rakoa

Vulnerability is very high at the present day and decision making becomes more urgent in the short term. Key areas to consider include Gretel Drive and Spinaway Parade coastal paths, beach stairs, car parking areas and several playgrounds/parklands, including the Rakoa Street beach access area. A new coastal path is proposed in this area that has been designed in response to the preliminary CHRMAP findings.

8.3.5.1 Short Term

- Monitoring to commence and continue annually
- Sand source investigation
- Ad hoc sand nourishment until preferred adaptation option selected
- Planning for managed retreat in consultation with the State Government

8.3.5.2 Medium - Long Term

- Subject to continued engagement with the local community - continue preferred adaptation option (protect or planned and managed retreat)
- Continue monitoring

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8.3.6 Management Unit 6 - Falcon Bay

Vulnerability is very high for roads at the present day, foreshore reserve in the next 10 years and otherwise beyond 2075. Key areas to consider include Spinaway Parade, Panamuna Drive, the Falcon Bay lookout, coastal paths, beach stairs, car parking areas and the playground and parklands. A new coastal path is proposed in this area that requires careful consideration. Inundation vulnerability increases towards the end of the planning horizon.

8.3.6.1 Immediate Term

- Protection structure audit

8.3.6.2 Short Term

- Monitoring to commence and continue annually
- Sand source investigation
- Ad hoc sand nourishment until preferred adaptation option selected
- Emergency planning

8.3.6.3 Medium - Long Term

- Subject to continued engagement with the local community - continue preferred adaptation option (protect or planned and managed retreat)
- Continue monitoring

8.3.7 Management Unit 7 - Gearies-Avalon

Vulnerability is very high from 2035 across assets, and decision making becomes more urgent in the short term. Key areas to consider include Panamuna Drive, Avalon Parade, properties immediately fronting the foreshore near Bouvard, car parks, coastal paths, beach stairs, the beach (and boat launching), car parking areas lookouts, and facilities at Avalon Foreshore.

8.3.7.1 Short Term

- Monitoring to commence and continue annually
- Sand source investigation
- Ad hoc sand nourishment until preferred adaptation option selected
- Planning for managed retreat in consultation with the State Government

8.3.7.2 Medium - Long Term

- Subject to continued engagement with the local community - continue preferred adaptation option (protect or planned and managed retreat)
- Continue monitoring

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8.3.8 Management Unit 8 - Dawesville Cut

The Dawesville Cut is entirely managed by the state government (DoT) and is outside the remit of this CHRMAP. An MCA was not undertaken.

Notwithstanding, the project team recognise that this feature of the study area impacts on and is impacted by decisions that may be taken to respond to coastal hazards in the Southern Beaches study area. This section describes some observations resulting from this study.

The Dawesville Cut allows significant water exchange for environmental improvements in the Peel-Harvey estuary system and a navigable channel for vessels. As such it is a permanent interruption to the coastal processes, most notably longshore sediment transportation, compensation for which is provided by the ongoing mechanical sand bypassing operation form south to north.

Throughout the engagement activities undertaken during this CHRMAP project the important role of, and interest in, the Dawesville sand bypassing operations to the local and broader community has been clearly and repeatedly raised by community members.

The erosion hazard mapping extents produced in this CHRMAP is expected to be very similar even if Dawesville channel was never built and the same CHRMAP project was undertaken. This is because the largest component of the calculations and modelling to prepare the erosion extent is sea level rise – which is a much longer-term issue. Analysis of historical vegetation lines from before Dawesville channel to after its construction does not show an obvious difference in movement. Storm erosion is not likely to be affected.

In a few decades the sea level rise impacts are expected to overtake the ability of any bypassing system – this CHRMAP project is attempting to look very long term (up to 100 years ahead) about priorities and management of the coast.

In the Mandurah Southern Beaches CHRMAP study area there are sand bypassing modification options that could be considered as part of future coastal management, including opportunity to pump sand to different locations through the bypassing program alongside coastal management – e.g. from Dawesville Channel north to locations up to Falcon Bay; and/or from Mandurah Channel to Back Beach. These possibilities would need to carefully consider potential impacts on beaches throughout the City's coastline.

Installation of fixed bypassing plant at both channels are under investigation by the DoT in collaboration with the City.

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8.3.9 Management Unit 9 - Pyramids Beach-Golf Course

Vulnerability is high to very high for a number of assets in the next 10-50 years. Key areas to consider include Port Bouvard SLSC and associated car park, the golf course and extensive coastal path networks. Inundation vulnerability increases towards the end of the planning horizon.

8.3.9.1 Port Bouvard Surf Life Saving Club

Throughout the engagement activities undertaken during this CHRMAP project the important nature and role of the Port Bouvard SLSC to the local and broader community has been clear.

SPP 2.6 recognises that Surf Life Saving Clubs and their facilities may need to occur within an area identified to be potentially impacted by physical coastal processes within the 100-year planning timeframe. SPP 2.6 requires they be considered within a CHRMAP framework, identified in a strategic plan and co-located with other public recreation and coastal node facilities. Any proposed development will be assessed on a case-by-case basis against SPP 2.6 and in consultation with other relevant agencies and community.

These buildings are identified as being directly vulnerable to coastal erosion in the present day if no protection structures are present. As such it is recommended that these facilities are investigated in more detail as a priority site for the City. A seawall is present.

It is recommended that this area is investigated in more detail depending on confirmation of the characteristics, condition and remaining design life of the seawall. Subsequent investigations could consider an alternative location for these facilities or targeted modifications or replacement of the seawall at a future time.

8.3.9.2 Immediate Term

- Protection structure audit

8.3.9.3 Short Term

- Monitoring to commence and continue annually
- Emergency planning

8.3.9.4 Medium Term

- Ad hoc sand nourishment until preferred adaptation option selected
- CBA and BDA to be undertaken on sand nourishment, planned and managed retreat or levee for long term adaptation
- Demolition/removal/relocation of public and private assets in the hazard zone
- Design assets to withstand impacts

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8.3.9.5 Long Term

- Subject to CBA and BDA - continue preferred adaptation option (protect or planned and managed retreat)
- Continue monitoring
- Consider retreat of Golf Course

8.3.10 Management Unit 10 - Florida-Melros

Vulnerability is very high by 2050 for residential land and roads. Key areas to consider include all privately owned properties immediately fronting the foreshore and those along Hunter Street Florida Parade, Balladonia Parade, Cowderoy Street and Oceanic Drive. Coastal paths, Florida Beach car park and toilets, Melros Beach (and boat launching) and stairs, playgrounds, toilets, parkland and viewing platforms are all considered.

8.3.10.1 Short Term

- Monitoring to commence and continue annually
- Sand source investigation
- Ad hoc sand nourishment until preferred adaptation option selected

8.3.10.2 Medium - Long Term

- CBA and BDA to be undertaken on sand nourishment, planned and managed retreat for long term adaptation
- Demolition/removal/relocation of public and private assets in the hazard zone OR continued sand nourishment

8.3.11 Management Unit 11 - Yalgorup

Vulnerability is high for Aboriginal Heritage, Environmental and open space assets in this management unit, but in general the area is at low levels of vulnerability until the end of the planning horizon. Beach access should be carefully managed to avoid over-use of tracks and damage to the dunes. The Yalgorup National Park Concept Master Plan applies to this area, and would be considered the primary control of activities in this area.

8.3.11.1 Short Term

- Do nothing

8.3.11.2 Medium - Long Term

- Demolition/removal/relocation of public assets in the hazard zone

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8.3.12 Summary of Management Unit Pathways

Table 37 summarises the Actions proposed for all Management Units across timeframes.

Table 37: Management Unit Pathways Summary

MU	Immediate	Short term (< 10 years)	Medium term (10-25 years)	Medium-long or Long term (25-50 or 50-100 years)
MU1 Blue Bay Bay	- Monitoring - Sand source investigation - Ad hoc sand nourishment	- Continue monitoring - Ad hoc sand nourishment	- Continue monitoring	- Subject to continued engagement with the local community - continue preferred adaptation option (protect or planned and managed retreat) - Continue monitoring
MU 2 Back Beach	- Monitoring - Sand source investigation	- Continue monitoring - Ad hoc sand nourishment	- Continue monitoring - CBA and BDA to be undertaken on sand nourishment, planned and managed retreat	- Demolition/removal/ relocation of public and private assets in the hazard zone OR continued sand nourishment.
MU3 Calypso		- Monitoring	- Continue monitoring	- Demolition/removal/ relocation of public and private assets in the hazard zone
MU4 Seascapes		- Monitoring - Sand source investigation - Ad hoc sand nourishment - Geotechnical investigations	- Continue monitoring - CBA and BDA on sand nourishment, planned and managed retreat	- Demolition/removal/ relocation of public and private assets in the hazard zone OR continued sand nourishment

NOTE: For all Management units, these recommendations are the same and progress regardless of additional adaptation pathways: Engagement, Planning Actions, Notifications of Certificate of Title, Planting/Revegetation, Monitoring (inc. Geotech), Asset Management Planning, Investigations – including foreshore reserve investigation, Coastal Management Strategy, Emergency Management Planning , Other instruments (rates, property reports), Regular Review, Avoid all further development. Prevention of further development rights.

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Table 48: Management Unit Pathways Summary (cont'd)

MU	Immediate	Short term (< 10 years)	Medium term (10-25 years)	Medium-long or Long term (25-50 or 50-100 years)
MU5 Rakoa	- Monitoring - Sand source investigation - Ad hoc sand nourishment	- Continue monitoring - Ad hoc sand nourishment	- Continue monitoring	- Subject to continued engagement with the local community - continue preferred adaptation option (protect or planned and managed retreat) - Continue monitoring
MU6 Falcon Bay	- Protection structure audit	- Monitoring - Sand source investigation - Ad hoc sand nourishment - Emergency planning	- Continue monitoring	- Subject to to continued engagement with the local community - continue preferred adaptation option (protect or planned and managed retreat) - Continue monitoring
MU7 Gearies-Avalon		- Monitoring - Sand source investigation - Ad hoc sand nourishment	- Continue monitoring	- Subject to continued engagement with the local community - continue preferred adaptation option (protect or planned and managed retreat) - Continue monitoring
MU9 Pyramids Beach-Golf Course	- Protection structure audit	- Monitoring - Emergency planning	- Continue monitoring	- Ad hoc sand nourishment until preferred adaptation option selected - CBA and BDA on sand nourishment, planned and managed retreat or levee for long term adaptation - Demolition/removal/ relocation of public and private assets in the hazard zone - Design assets to withstand impacts

NOTE: For all Management units, these recommendations are the same and progress regardless of additional adaptation pathways: Engagement, Planning Actions, Notifications of Certificate of Title, Planting/Revegetation, Monitoring (inc. Geotech), Asset Management Planning, Investigations – including foreshore reserve investigation, Coastal Management Strategy, Emergency Management Planning , Other instruments (rates, property reports), Regular Review, Avoid all further development. Prevention of further development rights.

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Table 48: Management Unit Pathways Summary (cont'd)

MU	Immediate	Short term (< 10 years)	Medium term (10-25 years)	Medium-long or Long term (25-50 or 50-100 years)
MU10 Florida-Melros		- Monitoring - Sand source investigation - Ad hoc sand nourishment	- Continue monitoring - CBA and BDA on sand nourishment, planned and managed retreat	- Demolition/removal/ relocation of public and private assets in the hazard zone OR continued sand nourishment
MU11 Yalgorup		- Do Nothing		- Demolition/removal/ relocation of public assets in the hazard zone

NOTE: For all Management units, these recommendations are the same and progress regardless of additional adaptation pathways: Engagement, Planning Actions, Notifications of Certificate of Title, Planting/Revegetation, Monitoring (inc. Geotech), Asset Management Planning, Investigations – including foreshore reserve investigation, Coastal Management Strategy, Emergency Management Planning , Other instruments (rates, property reports), Regular Review, Avoid all further development. Prevention of further development rights.

8.4 Medium - Long Term Actions

Medium and long-term implementation actions identified in this CHRMAP provide a strategic consideration of how the City will adapt to long-term climate change impacts. Therefore, medium- and long-term implementation are not described in detail in the CHRMAP. Further to this, several investigations have been recommended which may influence the appropriateness of the long term adaptation pathways.

Longer-term responses identified generally include:

- Continuing to action the revised planning instruments implemented in the short-term, such as notifications on certificates of titles through the Special Control Area, and implementation of policies associated with built form and other development.
- Providing temporary/interim coastal hazard protection, noting that it may become more costly, and a change in adaptation pathway could be required (for example, as sea level rise progresses, it is possible that options using sand or rock resources to protect assets near the coast may become economically unsustainable).
- Implementing planned managed retreat if protection is found not to be feasible.

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Long-term adaptation strategies/pathways have been recommended for each MU that will allow for the continuous function of local communities whilst accommodating the increasing burden of coastal hazards. The long-term strategy informs future planning instruments, supports monitoring, recommends planning reviews and underpins collaboration between coastal land managers, stakeholders and the community.

8.5 Funding

The potential financial and economic implications of adaptation options over the planning horizon are extensive and funding is one of the most significant challenges of coastal hazard planning. Few local government's have the capacity to self fund adaptation through general rates revenue. The cost for coastal management can be very high and grants are competitive across WA and through Commonwealth sources.

Beneficiaries (local landowners) may not understand the total cost impost to the taxpayers of WA and overestimate the realistic capacity of the State or the Commonwealth to support adaptation, where it may not be possible for them to contribute, leading to large gaps in funding.

This section identifies all revenue-raising mechanisms available for obtaining funds to assist implementation. Funding mechanisms considered include:

- 10-year Long Term Financial Planning (LTFP) and annual budgeting for both capital and operational budgets, general rates and coastal management fund
- Special area rates / differential rating
- Yearly budgeting
- Levies
- Lease land management
- State grants
- Federal grants
- Beneficiary Pays

8.5.1 General Rates and Coastal Management Fund

The City should consider establishing a coastal management fund that includes specific allowance for managing and adapting to the risk posed by coastal erosion and inundation. The purpose of this fund includes:

- To allocate a percentage of the organisation's operating budget for coastal management (between 1% and 2% is suggested).
- To save funds routinely so that when triggers are met the established management actions can be implemented efficiently.
- To acknowledge coastal management costs are forecast to increase in line with sea level rise.

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8.5.1.1 Rates and Levies

It is recommended the City investigate the feasibility of establishing a special rate or levy for coastal management that would be a transparent source of the coastal management fund as described above. This could be applied across the City in the form or ordinary rates or to local residents as a special area rate/ differential rate where adaptation options are designed to protect specific sections of coastal land to the benefit of private property or the immediate neighbourhood.

8.5.2 State Grants - CoastWA

CoastWA aims to implement a strategic response to the growing impacts of coastal hazards to ensure sustainable land use and development on the coast for the long-term. For further information visit wa.gov.au/organisation/department-of-planning-lands-and-heritage/coastwa

It comprises the following grant programs:

- Coastal Adaptation and Protection grants
- Hotspot Coastal Adaptation and Protection Major Project Fund
- Coastwest grants
- Coastal Management Plan Assistance Program

The Department of Transport (DoT) administers the Coastal Adaptation and Protection (CAP) grants and the Hotspot Coastal Adaptation and Protection (H-CAP) Major Project Fund.

CAP grants provide financial assistance for local projects that identify and manage coastal hazards. The program aims to build partnerships with local coastal managers to help coastal hazard adaptation. CAP Grants fund up to 50% of project costs (and must be matched by the applicant).

H-CAP supports projects which design and implement adaptation options at coastal hazard hotpots identified by the DoT (hotspots for both erosion and inundation). Invitations to apply for H-CAP are sent directly to eligible coastal managers (those with a completed CHRMAP and an identified hotspot).

Coastwest grants support eligible coastal land managers and community organisations to undertake projects that manage and enhance WA's coastal environments through rehabilitation, restoration and preventative actions. Coastwest grants are administered by the Department of Planning, Lands and Heritage (DPLH).

Coastal Management Plan Assistance Program (CMPAP) grants support eligible coastal land managers to develop adaptation and management plans and strategies for coastal areas that are, or are predicted to become, under pressure from a variety of challenges. CMPAP grants are also administered by the DPLH.

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8.5.3 State Grants - Other

One other grant program relevant to coastal hazard risk management is available in WA; the Local Government Financial Assistance Grants. These are administered by the Department of Local Government, Sport and Cultural Industries.

There are also grants, funded by the Commonwealth Government, which allow councils to spend funds according to local priorities, and could include relocation of community facilities outside of the hazard zone once triggers are reached. For further information visit: dlgsc.wa.gov.au/local-government/local-governments/financial-assistance-grants

Other state grants available from time to time may include:

- Lotterywest Grants.
- State Natural Resource Management Grants (NRM).

It should be noted that State funding mechanisms require matching cash contributions from the land manager, and as such, funding will still need to be sourced through one or more of the other available measures. State funding grants may also restrict access to funding where public monies would partially or predominantly benefit private landowners or users.

It should also be noted that an application is never guaranteed to be successful; all applications are reviewed against funding criteria.

8.5.4 Federal Grants

Federal grants are variable and often unpredictable, but it is important for the City to stay aware of funding and grant programs available. Early planning and preparation will mean more competitive applications can be prepared quickly when grants are announced. This CHRMAP is a tool to utilise in supporting grant applications.

Federal grants at the time of preparation of this CHRMAP include:

- Disaster Ready Fund.
- Growing Regions Program (for works in regional and rural areas).

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8.5.5 Beneficiary (user) Pays

SPP 2.6, it's supporting suite of guidance and the WA Coastal Zone Strategy noted in ***Section 1.11.1.2*** introduce the concept of 'User Pays'. User Pays principles essentially dictate that the beneficiaries of adaptation options should pay for them. Where adaptation options are designed to protect specific sections of coastal land and assets that is primarily to benefit private property it is recommended that the City prepare a BDA to understand who should pay and how much.

A BDA identifies where the community (locals and visitors) may contribute, or where private contribution is not relevant. The rate applied to beneficiaries may vary over the 100-year time line as more properties are impacted.

Contributions could be in the form of a levy applied to rates, facility hire or accommodation at key destinations, or could be direct funded by beneficiaries in lump sum amounts. Community contribution could also be proposed as a whole-of-WA benefit, where the City makes the case that protection has a state wide benefit. This would support grant funding applications.

It should be noted that the assessment of costs, and allocation of funding for, the benefit distribution must include both capital and maintenance costs over the defined period.

A key assumption of BDA is that coastal adaptation will result in beneficiaries continuing to enjoy their current benefits in perpetuity. For this reason, it is only protect options that would result in distribution of costs to individual beneficiaries in the BDA.

8.5.5.1 The Significance of BDA

The cost of most adaptation options far exceeds the budgetary capacity of the City. In most cases, seeking support through grants would be limited to a contribution of 50% of the capital cost of an option. The remaining 50% cost is still considerable, and maintenance would be considered separately.

Even if all ratepayers agreed to substantial rate increases, the cost of the combined options in the Northern Beaches CHRMAP, this CHRMAP and the forthcoming Estuary/Peel Inlet CHRMAP increase this financial challenge considerably.

As such, BDA begins to determine if certain parties stand to benefit more than others, and therefore should contribute more to the response, reducing the financial implication for other ratepayers or taxpayers who will not or are unlikely to benefit from the option.

The BDA identifies contribution in percentages. It does not identify contribution in dollar amounts, as these will be impacted by time of implementation and changes in delivery and technology. As such, it is silent on the quantum of costs that these percentages may reflect.

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8.5.5.2 The Distribution of Costs in a BDA

Firstly, this initial BDA is an economic investigation that begins to consider the cost implications that the City will be required to make decisions about. It shows a potential distribution, not a final assessment.

The BDA considers the current economic value of environmental (community) amenity, private property (residential and commercial), potential revenue (rates etc) and wages received from commerce. It then estimates the percentage benefit to each of these indices, and attributes that percentage as a benefit.

For example, an adaptation option that protects (benefits) $500,000 worth of private residential property, $460,000 worth of community amenity (a park etc) and creates $40,000 worth of revenue (from rates over the timeframe, and other income) has a total value of $1 million in benefit. 50% of the benefit is attributed to the private residential development, and 50% to the broader community.

Although simplistic, in this case, if the cost of the option was $10 million, then $5 million is the potential contribution by those private owners (50% of the cost), and $5 million by public sources (the 50% balance)

Using the example above, this would leave $5 million of the funding still to be sourced through other funds which will need to include local rates (i.e. other rate payers) combined with other funding such as grants.

What this also means is that regardless of any private investment in adaptation options, there may still not be adequate funding for the option.

8.5.5.3 BDA in this CHRMAP

As has been noted in this report, decision making has become more urgent in the immediate term for Management Unit 1 - Blue Bay, Management Unit 5 - Rakoa and Management Unit 7 - Gearies-Avalon.

Whilst not imminent, it is also relevant to understand what decision might be made once the seawall at Management Unit 6 - Falcon Bay reaches the end of its design life too, given the high value placed on this precinct.

As such, a high level BDA has been undertaken to approximate the different parties who stand to benefit from adaptation options in these four Management Units. No benefit is distributed for the do nothing, demolition/ removal/relocation of assets/acquisition, as this option is assumed to only benefit public interests.

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8.5.5.4 Management Unit 1 - Blue Bay

For this management unit, sand nourishment or groynes were selected as the protect options to consider through CBA and BDA against the base case (do nothing/retreat). Sand nourishment was assessed in the CBA as being the best value for money for the community, subject to funding availability.

- PR1 Beach Nourishment allows for treatment of the whole foreshore (1400m) with a 2025 implementation.
- PR2 Groynes with PR1 Beach Nourishment allows for treatment of the whole foreshore (1400m), with 7 rock groynes, 100m long, approximately 200m apart. Locations to be determined and a 2025 Implementation.

The BDA indicates that approximately $192 million of asset value and other community and financial benefits will potentially be impacted by coastal hazards over the next 50 years for this Management Unit.

The BDA assesses the value of protection proposed to mitigate the risk and finds that approximately 42% of the benefit of providing coastal hazard adaptation would be apportioned to private interests, who would be expected to contribute to protection measures.

8.5.5.4 Management Unit 5 - Rakoa

For this management unit, sand nourishment or groynes were selected as the protect options to consider through CBA and BDA against the base case (do nothing/retreat). Sand nourishment was assessed in the CBA as being the best value for money for the community, subject to funding availability.

- PR1 Beach Nourishment allows for treatment of the whole foreshore (2100m) with a 2035 implementation.
- PR2 Groynes with PR1 Beach Nourishment allows for treatment of the whole foreshore (2100m), with 10 rock groynes, 100m long, approximately 200m apart. Locations to be determined and a 2035 Implementation.

The BDA indicates that approximately $151 million of asset value and other community and financial benefits will potentially be impacted by coastal hazards over the next 50 years for this Management Unit.

The BDA assesses the value of protection proposed to mitigate the risk and finds that approximately 32% of the benefit of providing coastal hazard adaptation would be apportioned to private interests, who would be expected to contribute to protection measures.

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8.5.5.5 Management Unit 6 - Falcon Bay

For this management unit, sand nourishment or a seawall was selected as the protect options to consider through CBA and BDA against the base case (do nothing/retreat). Both options are assessed in the CBA as being generally of equal best value for money for the community, subject to funding availability.

- PR1 Beach Nourishment allows for treatment of the whole foreshore (750m) with a 2050 implementation.
- PR3 Seawall with PR1 Beach Nourishment allows for treatment of the whole foreshore (750m), with a rock revetment and a 2050 Implementation

The BDA indicates that approximately $37 million of asset value and other community and financial benefits will potentially be impacted by coastal hazards over the next 50 years for this Management Unit.

The BDA assesses the value of protection proposed to mitigate the risk and finds that approximately 30% of the benefit of providing coastal hazard adaptation would be apportioned to private interests, who would be expected to contribute to protection measures.

8.5.5.6 Management Unit 7 - Gearies-Avalon

For this management unit, sand nourishment or a seawall was selected as the protect options to consider through CBA and BDA against the base case (do nothing/retreat). Neither option was assessed by the CBA as being good value for money for the community, with the preferred option being do nothing/retreat.

- PR1 Beach Nourishment allows for treatment of the whole foreshore (2,300m) with a 2035 implementation.
- PR3 Seawall with PR1 Beach Nourishment allows for treatment of the whole foreshore (2,300m), with a rock revetment and a 2035 Implementation.

The BDA indicates that approximately $96 million of asset value and other community and financial benefits will potentially be impacted by coastal hazards over the next 50 years for this Management Unit.

The BDA assesses the value of protection proposed to mitigate the risk and finds that approximately 24% of the benefit of providing coastal hazard adaptation would be apportioned to private interests, who would be expected to protection measures.

Should relocation of assets become the preferred pathway, all benefit derived from the pathway is public, rather than private. As such, in this Management Unit, if do nothing/retreat is the selected pathway, there would be no costs apportioned to private interests, as their would be no private benefit derived

The CBA and BDA can be found in ***Appendix H***.

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SECTION 9
IMPLEMENTATION ACTION PLAN

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9 Implementation Action Plan

The CHRMAP process recognises that coastal hazard planning evolves as greater certainty is gained, as new information becomes available or as community views change over time.

The tables in this section identify the individual actions/options to implement the strategies and pathways of this CHRMAP, the Management Unit of interest, the relevant trigger and the required timeframe. The timeframes used are immediate (now), short term (within 10 years), medium term (10-25 years), medium-long term (25-50 years) and long term (beyond 50 years). All timeframes for asset actions are approximate, as the trigger point is the key determinant of action.

With regard to cost, it should be noted that more substantial individual options would require a detailed cost assessment based on final design and source material availability and cost. Protection measures should not be implemented if maintenance schedules cannot be adhered to, as this places undue risk on future populations.

The recommended implementation actions have been guided by the outcomes of the MCA process in conjunction with robust and ongoing engagement with the CCRG, the broader community and stakeholder groups and many local and State organisations.

9.1 Key assumptions

The timeframes envisaged in the coastal adaptation pathways are not absolute. These timeframes are related to the current state of local land planning, coastal processes knowledge and climate projections, as outlined in the CHRMAP.

Therefore, the timeframes are typically not aligned on “worst-case” or “best-case” scenarios but often framed around adequate strategic planning for an event or scenario in the hope that triggers are not met. Many of the identified triggers are subject to ongoing monitoring in accordance with the monitoring strategies outlined in ***Table 36***.

Regular review of the overarching hazard models should also occur at least every 10 years, and may result in changes to longer term pathways. A review of immediate actions recommended in the CHRMAP should be undertaken within two years to confirm progress.

Other options may be envisaged over time, particularly if land planning practices, coastal processes knowledge or climate projections are changed. Therefore, the implementation pathway will evolve. Community and stakeholder inputs continue to be required as decisions are made over time.

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Table 38: Implementation Actions - Immediate

No.	Action	Description	MU	Trigger	Timing
1	Continued engagement to seek feedback, provide updates and involve in implementation	Described in Strategy 1 - Section 8.1	All	CHRMAP endorsed	Immediate / Ongoing
2	Prepare CHRMAP Summary and fact sheets	Described in Strategy 2 - Section 8.1	All	CHRMAP endorsed	Immediate
3	Monitoring: Oblique aerial photos	Described in Strategy 3 - Section 8.1 and ***Table 36***	All	CHRMAP endorsed	Immediate / Ongoing
4	Monitoring: Bathymetric survey		All	CHRMAP endorsed	~2026/27
5	Monitoring: Field photos		All	CHRMAP endorsed	~2026-2028
6	Monitoring: Beach width measurements		MU 1, 2, 3, 5, 6, 7, 10 and 11	CHRMAP endorsed	Immediate / Ongoing
7	Monitoring: Beach and foreshore topographic survey		MU 1-7, 9 & 11	CHRMAP endorsed	~2026-2028
8	Monitoring: Geotechnical investigations		MU 1, 4, 5 & 7	CHRMAP endorsed	~2027-2029
9	Monitoring: Remote imagery camera		MU1 or MU7	CHRMAP endorsed	~2026/27
10	Monitoring: Informal protection structure audit		MU 4, 5 & 7	CHRMAP endorsed	~2026
11	Monitoring: Formal protection structure audit		MU6, MU9	CHRMAP endorsed	Immediate / Ongoing
12	At next review of 10-year Long Term Financial Planning (LTFP) and annual budgeting, assess budget constraints for sand nourishment and asset replacement	Include review of budget availability for ad-hoc nourishment (Action 29-32 and 40-44) and any immediate to short term asset replacement requirements	All	CHRMAP endorsed	<2 years

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Table 39: Implementation Actions - Short Term (0-10 Years)

No.	Action	Description	MU	Trigger	Timing
13	Establish a Special Control Area in LPS12 to control land use planning on land identified as being at risk	Described in Strategy 4 - Section 8.1	All	CHRMAP endorsed	<2 years
14	Develop Local Coastal Planning Policy to work hand in hand with the Action 13	Described in Strategy 5 - Section 8.1	All	CHRMAP endorsed	<2 years
15	Provision of a Section 70A notification on the property title as a condition of any approval to alert prospective purchasers of the potential coastal hazard impacts on the lot, as required by SPP2.6	Described in Strategy 6 - Section 8.1 NB: These notifications can only be applied where triggered by a Subdivision or Development approval	All	CHRMAP endorsed	<2 years
16	Completion of a sand and rock source investigation to determine the capacity of local sand supply and external options	Described in Strategy 7 - Section 8.1	All	CHRMAP endorsed	<2 years
17	City Asset Management Planning to make sure that future assets are sensibly located to manage risk to assets	Described in Strategy 8 - Section 8.1	All	CHRMAP endorsed	<2 years
18	Resilience Planning to support dune rehabilitation, revegetation and beach access management	Described in Strategy 9 - Section 8.1	All	CHRMAP endorsed	<2 years

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Table 49: Implementation Actions - Short Term (0-10 Years) (cont'd)

No.	Action	Description	MU	Trigger	Timing
19	Preparation of an emergency management plan to provide for community safety	Described in Strategy 10 - Section 8.1	All	CHRMAP endorsed	<2 years
20	Update the City's Intramaps system	Described in Strategy 13 - Section 8.1	All	CHRMAP endorsed	<2 years
21	Update property procedures (for property settlement communications)	Described in Strategy 11 - Section 8.1	All	CHRMAP endorsed	<2 years
22	CHRMAP immediate action review	A regular review process to assess completion of actions in line with the CHRMAP, and subsequent communication of actions to the community	All	CHRMAP endorsed	<2 years
23	Monitoring: Sediment sampling	Described in Strategy 3 - Section 8.1 and ***Table 36***	All	CHRMAP endorsed	2-5 years
24	Preparation of a coastal management strategy	Described in Strategy 11 - Section 8.1	All	CHRMAP endorsed	2-5 years
25	Investigate Special Area Rates	Described in Strategy 13 - Section 8.1	All	CHRMAP endorsed	2-5 years
26	CHRMAP full review	Described in Strategy 14 - Section 8.1	All	CHRMAP endorsed	5-10 years
27	Liaise with State Government regarding funding availability for agreed short term adaptation options	Liaise to understand funding availability, including known and future grant availability, and other options relating to Action 34	MU1, MU5, MU6, MU7	CHRMAP endorsed	<2 years
28	Foreshore reserve investigation	Described in Strategy 12 - Section 8.1	MU1-MU7, MU9-MU10	CHRMAP endorsed	2-5 years

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Table 49: Implementation Actions - Short Term (0-10 Years) (cont'd)

No.	Action	Description	MU	Trigger	Timing
29	Sand nourishment when the seaward point of any public asset is within S1 of the Horizontal Shoreline Datum (HSD) S1 varies in this MU up to 31m	Ad hoc sand nourishment is suggested to be implemented where consistent loss of sandy beach has been observed through monitoring including field photos (Action 5) and beach width measurements (Action 6) which are described in Strategy 3 - Section 8.1 and ***Table 36*** Nourishment would be required where observations of beach width have shown persistent loss of beach width with no signs of recovery. S1 varies considerably across the study area. Specific S1 values are shown in ***Table 6*** and ***Table 7*** reflecting locations shown in ***Figure 26*** and ***Figure 27***	MU1	Where the HSD is within S1 of the most seaward point of a public asset in the MU	2-5 years
30	Sand nourishment when the seaward point of any public asset is within S1 of the HSD S1 varies in this MU up to 16m		MU5	Where the HSD is within S1 of the most seaward point of a public asset in the MU	2-5 years
31	Sand nourishment when the seaward point of any public asset is within S1 of the HSD S1 varies in this MU up to 7m		MU6	Where the HSD is within S1 of the most seaward point of a public asset in the MU	2-5 years
32	Sand nourishment when the seaward point of any public asset is within S1 of the HSD S1 varies in this MU up to 31m		MU7	Where the HSD is within S1 of the most seaward point of a public asset in the MU	2-5 years
33	Detailed engagement with community on hard protect options to understand appetite for seawall or groyne alternatives	Described in Strategy 1 - Section 8.1 and suggested approaches to engagement on potential seawalls and groynes in Section 7.4	MU1, MU5, MU6, MU7	Action 29, 30, 31 or 32 (as relevant) no longer considered feasible	5-10 years

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Table 40: Implementation Actions - Medium Term (10-25 Years)

No.	Action	Description	MU	Trigger	Timing
34	Managed retreat planning; progressively move public assets out of the hazard zone for all non-critical assets	Removal or relocation of minor infrastructure and assets within the hazard zone that have reached the end of design life, where risk to asset is deemed intolerable Links to Action 20	All	At replacement timeframes	Short-Medium (10-25 years)

Table 41: Implementation Actions - Medium-Long Term (25-50 Years)

No.	Action	Description	MU	Trigger	Timing
35	Planning, design and physical works	This Action is required if protection structures are proposed and agreed to or if Action 34 necessitates a detailed planning exercise for redevelopment	All	If required	Medium - Long (25-50 years)
36	Subject to CBA and BDA - continue preferred adaptation option (protect or planned and managed retreat)	These actions rely on an agreed adaptation pathway for the associated Management Unit, determined after future reviews These are described here as *possible* pathways subject to recommendations in this CHRMAP	MU1, MU5, MU6, MU7	Reviewed CHRMAP	Medium - Long (25-50 years)
37	CBA and BDA to be undertaken on sand nourishment, planned and managed retreat for long term adaptation		MU2, MU4, MU10	CHRMAP Review	Medium - long (25-50 years)
38	CBA and BDA to be undertaken on sand nourishment, planned and managed retreat or levee for long term adaptation		MU9	CHRMAP Review	Medium - long (25-50 years)

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Table 51: Implementation Actions - Medium-Long Term (25-50 Years) (cont'd)

No.	Action	Description	MU	Trigger	Timing
39	Detailed engagement with community on hard protect options to understand appetite for seawall or groyne alternatives	See description Action 33	MU2, MU3, MU4, MU9, MU10	Action 35, 36, 37, 38 or 39 (as relevant) no longer considered feasible	Medium - long (25-50 years)
40	Sand nourishment when the seaward point of any public asset is within S1 of the HSD S1 varies in this MU up to 12m	See description for Action 29-32	MU2	Where the HSD is within S1 of the most seaward point of a public asset in the MU	Medium - Long (25-50 years)
41	Sand nourishment when the seaward point of any public asset is within S1 of the HSD S1 varies in this MU up to 10m		MU3	Where the HSD is within S1 of the most seaward point of a public asset in the MU	Medium - Long (25-50 years)
42	Sand nourishment when the seaward point of any public asset is within S1 of the HSD S1 varies in this MU up to 23m		MU4	Where the HSD is within S1 of the most seaward point of a public asset in the MU	Medium - Long (25-50 years)
43	Sand nourishment when the seaward point of any public asset is within S1 of the HSD S1 varies in this MU up to 18m		MU9	Where the HSD is within S1 of the most seaward point of a public asset in the MU	Medium - Long (25-50 years)
44	Sand nourishment when the seaward point of any public asset is within S1 of the HSD S1 varies in this MU up to 13m		MU10	Where the HSD is within S1 of the most seaward point of a public asset in the MU	Medium - Long (25-50 years)

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Table 42: Implementation Actions - Long Term (50-100 Years)

No.	Action	Description	MU	Trigger	Timing
45	Demolition/removal/ relocation of public and private assets in the hazard zone OR continued sand nourishment	All actions described in the long term timeframe will be subject to review well in advance of implementation. These are described here for completeness in the CHRMAP, as *possible* long term pathways Planning beyond a 50 year timeframe will be impacted by shorter term decisions made and any new community values, changes in scientific research and understanding, and improved certainty over optimal adaptation solutions	MU2, MU3, MU4, MU10, MU11	CHRMAP Review	Long
46	Demolition/removal/ relocation of public and private assets in the hazard zone Design assets to withstand impacts		MU9	CHRMAP Review	Long
47	Subject to CBA and BDA - continue preferred adaptation option (protect or planned and managed retreat)		MU9	CHRMAP Review	Long
48	Consider planned and managed retreat of golf course		MU9	CHRMAP Review	Long

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Glossary

Acceptable Risk

These are risks that do not need further treatment. The term acceptable risk refers to the level at which it is decided that controls (further restrictions or otherwise altering the activity) is not worthwhile, as the current risk does not warrant further action.

Adaptation

Changes made in response to the likely threats and opportunities arising from climate variability and climate change.

Adaptation Pathway

Adaptation planning is about being ready to manage the risks and impacts of coastal processes a location experiences, by planning for the most appropriate decisions and options to implement over time.

A flexible adaptation pathway approach enables the establishment of a decision-making strategy that is made up of a sequence of decision points over time, preventing a decision maker from being locked into a risk treatment option (and associated risk management measures), which may not be appropriate for dealing with the long-term problem. The intent is for decision-making to be responsive to changing circumstances over time.

Annual Recurrence Interval (ARI)

An annual recurrence interval is the average number of years that it is predicted will pass before an event of a given magnitude occurs. For example, a 50 year ARI event would happen every 50 years on average.

Assets

Something that has value to the decision-maker, community and stakeholders – this can be tangible or intangible, includes consideration of risk and liabilities, and can be positive or negative at different stages of the assets life.

Assets may be natural or man-made and include:

- Beach
- Foreshore reserve (including dunes, flora and fauna)
- Foreshore reserve amenity (including things like car parks, paths, public ablutions, barbeque/picnic/shade areas, playgrounds, infrastructure for public safety and pedestrian access structures such as ramps, stairs and paths)
- Marinas
- Recreational boating facilities
- Facilities to benefit the broader public (such as cafés and restaurants)
- Surf life-saving facilities
- Commercial and residential land
- Protection structures such as groynes, seawalls and sand nourishment.

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Benefit Distribution Analysis

SPP 2.6 and it's supporting suite of guidance introduces the concept of 'User Pays'. This establishes a principle that the beneficiaries of adaptation options should pay for them, as they stand to gain the most. Where adaptation options are designed to protect specific sections of coastal land and assets that is primarily to benefit private property it is recommended that the decision maker determines who should contribute and how much.

A Benefit Distribution Analysis (BDA) systematically assesses the distribution of benefits between stakeholders from implementing risk treatment options such as coastal protection works, compared to a 'Do Nothing' base case.

CHRMAP (Coastal Hazard Risk Management and Adaptation Plan)

A study that identifies the key hazards and assesses the risk to assets of coastal erosion and inundation.

Coastal Hazard

Means the consequence of coastal processes that affect the environment and safety of people. Potential coastal hazards include erosion, accretion and inundation.

Coastal Processes

Any action of natural forces on the coastal environment (and for the purposes of a CHRMAP, natural forces that affect land areas).

Coastal Zone

Area of water and land that may be influenced by coastal processes. This includes tidal areas of the lagoon or inland water bodies.

Cost Benefit Analysis

Cost benefit analysis (CBA) is a process used to prioritise risk treatment options and inform decision-maker about alternative courses of action. It can assist in identifying the risk treatment option that achieves maximum value for money benefit. It identifies many costs (losses) and benefits (gains) of a risk treatment option, including social and environmental values according to their net economic benefit.

Erosion

Refers to shoreline movement where the shoreline shifts landward as a result of sediment being transported away by waves, winds and currents, reducing the size (width) of a coastal foreshore reserve and the distance to an asset on the adjoining land.

Habitat

The areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (e.g. substrate and topography), and the biotic factors.

Horizontal Shoreline Datum (HSD)

The active limit of the shoreline under storm activity. It is the line from which the erosion hazard allowance will be applied.

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Inundation

The flow of water onto previously dry land. It may either be permanent (for example due to sea level rise) or a temporary occurrence during a storm event.

In the context of CHRMAP, inundation does not include circumstances where groundwater or stormwater runoff may sit at the surface of land and be unable to infiltrate back into the soil.

Intolerable Risk

Risk that is unacceptable in any circumstances or at any level.

Longshore

Parallel to the shoreline.

Multi-Criteria Analysis (MCA)

A decision-making tool that supports the prioritisation of risk management options using multiple criteria as reviewed by the community and government stakeholders.

Mean Sea Level (MSL)

The average surface level of coastal bodies of water (from which elevation may be measured).

Rehabilitation

The re-establishment of vegetation and other ecological attributes, acknowledging that the area and the environmental asset will remain modified.

Risk

Risk is specified in terms of a hazardous event or circumstances and the consequence that may flow from it. Risk is measured in terms of a combination of the likelihood of an event occurring and the consequence of that event occurring.

Sand Nourishment

Sand nourishment is one possible protection adaptation option to coastal hazards. It may be a standalone measure for protection, or be used to improve the beach amenity when used in combination with other adaptation measures such as a seawall.

It is considered to be a soft management option and usually mimics natural beach and dune systems.

Sandy Coast

Comprises unlithified and/or unconsolidated sediments, rock is either not present or not dominant. They typically feature gently to moderately sloping shores and are often backed by dunes or beach ridges, which may contain dune blowouts. The shoreline can quickly alternate between accretion and erosion but is likely to retreat as a result of sea level rise.

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Sediment Cell

A length of shoreline in which interruptions to the movement of sediment along the beaches or near shore sea bed do not significantly affect beaches in the adjacent lengths of coastline. Within a sediment cell the sediments sources, transport pathways and sinks should be clearly definable.

Storm Surge

The increase in water level at the shoreline due to the forcing of winds (wind-setup) and atmospheric pressure.

Trigger

A pre-determined point that is set to trigger the commencement of planning and /or implementation actions; a catalyst for decision making.

Unacceptable Risk

These are risks that require action or treatment, as the current risk is intolerable to the community, the economy or the environment.

Vulnerability

The underlying properties of an asset which result in susceptibility to a risk source that can lead to an event with a consequence.

Wave Overtopping

Water carried over the top of a structure or landform due to wave run-up or surge action exceeding the crest.

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Appendices

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Appendix A

Appendix A: Community and Stakeholder Engagement Plan

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Appendix B

Appendix B: Mike Hydrodynamics And Wave Climate Modelling

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Appendix C

Appendix C: SBEACH – Storm Erosion Hazard Modelling

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Appendix D

Appendix D: Hazard Maps

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Appendix E

Appendix E: Mandurah Southern Beaches CHRMAP Engagement Outcomes Report

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Appendix F

Appendix F: Erosion Vulnerability Results & Inundation Vulnerability Results

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Appendix G

Appendix G: Multi-Criteria Analysis

Part One: Multi-Criteria Analysis Summary Tables

Part Two: Multi-Criteria Analysis detailed assessment tables including comparison between technical and CCRG based scores

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Part One: Multi-Criteria Analysis Summary Tables

Table 43: Blue Bay Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0	0	0	6
PMR1 – Leaving assets unprotected	0	1	1	-1	-2	-2	-3
PMR2 – Demolition/removal/relocation	1	2	-1	-0.2	-1.4	-1.6	-1.2
PMR3 – Prevention of further development rights	1	2	2	0	-1	-1	3
PMR4 – Planned and Managed Retreat	2	2	-2	1	-1	-1	1
AC1 – Design assets to withstand impacts	N/A						
PR1 – Sand nourishment	1	0	-1	0.4	0.8	1.2	2.4
PR2 – Groyne	1	0	-1	-1.2	-0.6	-0.6	-2.4
PR3 – Seawall	0	-1	-1	-1.6	-1.6	-0.4	-5.6
PR4 – Artificial reef	0	-1	-2	1.2	1.4	1.2	0.8
PR5 – Offshore breakwater	1	-2	-2	1	0.25	1	-0.75
PR6 – Levee/weir/storm surge barrier	N/A						
NR1 – Monitoring	2	2	2	0	1	0	7
NR2 – Protection structure audit	N/A						
NR3 – Notification on Title	2	2	2	0	0	0	6
NR4 – Emergency planning	N/A						
DN1 – Do nothing	-2	-2	-1	0	-2	-2	-9

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Part One: Multi-Criteria Analysis Summary Tables

Table 44: Back Beach Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0	0	0	6
PMR1 – Leaving assets unprotected	0	1	1	-1	-2	-2	-3
PMR2 – Demolition/removal/relocation	1	2	-1	0	-0.75	-2	-0.75
PMR3 – Prevention of further development rights	1	2	2	0	-1	-1	3
PMR4 – Planned and Managed Retreat	2	2	-2	1	-1	-1	1
AC1 – Design assets to withstand impacts	N/A						
PR1 – Sand nourishment	1	0	-1	0.8	0.6	1.25	2.65
PR2 – Groyne	1	1	-1	-1.2	-1	0	-1.2
PR3 – Seawall	1	-1	-1	-1.6	-1.6	-0.2	-4.4
PR4 – Artificial reef	0	-1	-2	1.4	1.2	1	0.6
PR5 – Offshore breakwater	1	-2	-2	1.2	0.8	1.2	0.2
PR6 – Levee/weir/storm surge barrier	N/A						
NR1 – Monitoring	2	2	2	0	1	0	7
NR2 – Protection structure audit	N/A						
NR3 – Notification on Title	1	2	2	0	0	0	5
NR4 – Emergency planning	N/A						
DN1 – Do nothing	-2	-2	-1	0	-2	-2	-9

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Part One: Multi-Criteria Analysis Summary Tables

Table 45: Calypso Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0.00	0.00	0.00	6
PMR1 – Leaving assets unprotected	0	1	1	-1	-2	-2	-3
PMR2 – Demolition/removal/relocation	1	2	0	0.4	0.6	1	5
PMR3 – Prevention of further development rights	2	2	2	0	0	0	6
PMR4 – Planned and Managed Retreat	N/A (for private assests only)						
AC1 – Design assets to withstand impacts	N/A						
PR1 – Sand nourishment	1	0	-1	0.6	0.4	0.3	0.1
PR2 – Groyne	1	1	-1	-2	-0.6	0.6	-1
PR3 – Seawall	1	-1	-1	-1.4	-1.6	-0.6	-4.6
PR4 – Artificial reef	0	-1	-2	1.4	1.6	1.8	1.8
PR5 – Offshore breakwater	1	-2	-2	-0.2	-0.2	0.2	-3.2
PR6 – Levee/weir/storm surge barrier	N/A						
NR1 – Monitoring	2	2	2	0	1	0	7
NR2 – Protection structure audit	N/A						
NR3 – Notification on Title	1	2	2	0	0	0	5
NR4 – Emergency planning	N/A						
DN1 – Do nothing	-2	-2	-1	0	-2	-2	-7

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Part One: Multi-Criteria Analysis Summary Tables

Table 46: Seascapes Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0	0	0	6
PMR1 – Leaving assets unprotected	0	1	1	-1	-2	-2	-3
PMR2 – Demolition/removal/relocation	1	2	-1	0.5	-1	-2	-0.5
PMR3 – Prevention of further development rights	1	2	2	0	-1	-1	3
PMR4 – Planned and Managed Retreat	2	2	-2	1	-1	-1	1
AC1 – Design assets to withstand impacts	N/A						
PR1 – Sand nourishment	1	0	-1	0.5	0.75	1	2.25
PR2 – Groyne	1	1	-1	-1.5	-1.75	-0.5	-2.75
PR3 – Seawall	1	-1	-1	-1.5	-1.5	0.25	-3.75
PR4 – Artificial reef	0	-1	-2	1.5	1.5	1.5	1.5
PR5 – Offshore breakwater	1	-2	-2	1.25	0.75	1.5	0.5
PR6 – Levee/weir/storm surge barrier	N/A						
NR1 – Monitoring	2	2	2	0	1	0	7
NR2 – Protection structure audit	N/A						
NR3 – Notification on Title	1	2	2	0	0	0	5
NR4 – Emergency planning	N/A						
DN1 – Do nothing	-2	-2	-1	0	-2	-2	-9

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Part One: Multi-Criteria Analysis Summary Tables

Table 47: Rakoa Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0	0	0	6
PMR1 – Leaving assets unprotected	0	1	1	-1	-2	-2	-3
PMR2 – Demolition/removal/relocation	1	2	-1	0	-0.5	-1.25	0.25
PMR3 – Prevention of further development rights	1	2	2	0	-1	-1	3
PMR4 – Planned and Managed Retreat	2	2	-2	1	-1	-1	1
AC1 – Design assets to withstand impacts	N/A						
PR1 – Sand nourishment	1	0	-1	1.5	1.5	1.25	4.25
PR2 – Groyne	1	1	-1	-1.75	-1.25	-0.25	-2.25
PR3 – Seawall	1	-1	-1	-1.5	-1.5	0.75	-3.25
PR4 – Artificial reef	0	-1	-2	1.5	1.5	1	1
PR5 – Offshore breakwater	1	-2	-2	1.25	0.75	1.25	0.25
PR6 – Levee/weir/storm surge barrier	N/A						
NR1 – Monitoring	2	2	2	0	1	0	7
NR2 – Protection structure audit	N/A						
NR3 – Notification on Title	1	2	2	0	0	0	5
NR4 – Emergency planning	N/A						
DN1 – Do nothing	-2	-2	-1	0	-2	-2	-9

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Part One: Multi-Criteria Analysis Summary Tables

Table 48: Falcon Bay Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0	0	0	6
PMR1 – Leaving assets unprotected	0	1	1	-1	-2	-2	-3
PMR2 – Demolition/removal/relocation	1	2	-1	0.75	-1.5	-1.75	0.25
PMR3 – Prevention of further development rights	1	2	2	1	-1	-1	4
PMR4 – Planned and Managed Retreat	2	2	-2	0	-1	-1	0
AC1 – Design assets to withstand impacts	2	2	1	0	0	0	5
PR1 – Sand nourishment	1	0	-1	1.25	1.25	1.25	3.75
PR2 – Groyne	1	1	-1	-1.5	-1.75	0	-2.25
PR3 – Seawall	1	-1	-1	-1.75	-1.5	0.5	-3.75
PR4 – Artificial reef	0	-1	-2	1.25	1.25	1.25	0.75
PR5 – Offshore breakwater	1	-2	-2	1.25	1	1.5	0.75
PR6 – Levee/weir/storm surge barrier	2	1	-1	0	-1	0.25	1.25
NR1 – Monitoring	2	2	2	0	1	0	7
NR2 – Protection structure audit	2	2	2	0	1	1	8
NR3 – Notification on Title	1	2	2	0	0	0	5
NR4 – Emergency planning	1	2	2	0	0	0	5
DN1 – Do nothing	-2	-2	-1	0	-2	-2	-9

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Part One: Multi-Criteria Analysis Summary Tables

Table 49: Gearies-Avalon Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0	0	0	6
PMR1 – Leaving assets unprotected	0	1	1	-1	-2	-2	-3
PMR2 – Demolition/removal/relocation	1	2	-1	1	-1.25	-2	-0.25
PMR3 – Prevention of further development rights	1	2	2	0	-1	-1	3
PMR4 – Planned and Managed Retreat	2	2	-2	1	-1	-1	1
AC1 – Design assets to withstand impacts	N/A						
PR1 – Sand nourishment	1	0	-1	1.4	1.4	1.4	4.2
PR2 – Groyne	1	1	-1	-1.6	-2	-0.6	-3.2
PR3 – Seawall	1	-1	-1	-1.8	-1.4	0	-4.2
PR4 – Artificial reef	0	-1	-2	0.8	1	0.8	-0.4
PR5 – Offshore breakwater	1	-2	-2	1	0	1	-1
PR6 – Levee/weir/storm surge barrier	N/A						
NR1 – Monitoring	2	2	2	0	1	0	7
NR2 – Protection structure audit	N/A						
NR3 – Notification on Title	1	2	2	0	0	0	5
NR4 – Emergency planning	N/A						
DN1 – Do nothing	-2	-2	-1	0	-2	-2	-9

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Part One: Multi-Criteria Analysis Summary Tables

Table 50: Pyramids Beach-Golf Course Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0	0	0	6
PMR1 – Leaving assets unprotected	0	1	1	-1	-1	-1	-1
PMR2 – Demolition/removal/relocation	1	2	-1	1.5	0.5	0.25	4.25
PMR3 – Prevention of further development rights	1	2	2	0	0	0	5
PMR4 – Planned and Managed Retreat	2	2	-2	1	1	0	4
AC1 – Design assets to withstand impacts	2	2	1	0	1	1	7
PR1 – Sand nourishment	2	0	-1	1.25	0.75	1	4
PR2 – Groyne	1	1	-1	-1.25	-1.25	-0.75	-2.25
PR3 – Seawall	0	-1	-1	-1.5	-1.5	-0.5	-5.5
PR4 – Artificial reef	1	-1	-2	1.25	0.75	0.75	0.75
PR5 – Offshore breakwater	2	-2	-2	1.25	-0.5	-0.25	-1.5
PR6 – Levee/weir/storm surge barrier	2	1	-1	-0.5	-0.75	0	0.75
NR1 – Monitoring	2	2	1	0	1	0	6
NR2 – Protection structure audit	2	2	2	0	1	1	8
NR3 – Notification on Title	1	2	2	0	0	0	5
NR4 – Emergency planning	1	2	2	0	0	0	5
DN1 – Do nothing	-2	-2	-1	0	-1	-1	-7

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Part One: Multi-Criteria Analysis Summary Tables

Table 51: Florida-Melros Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0	0	0	6
PMR1 – Leaving assets unprotected	0	1	1	-1	-2	-2	-3
PMR2 – Demolition/removal/relocation	1	2	-1	1.25	-0.25	-0.75	2.25
PMR3 – Prevention of further development rights	1	2	2	0	-1	-1	3
PMR4 – Planned and Managed Retreat	2	2	-2	1	-1	-1	1
AC1 – Design assets to withstand impacts	N/A						
PR1 – Sand nourishment	1	0	-1	0.5	1	1.25	2.75
PR2 – Groyne	1	1	-1	-1.75	-1.5	0	-2.25
PR3 – Seawall	1	-1	-1	-1.25	-1.75	0	-4
PR4 – Artificial reef	0	-1	-2	0.5	1	1	-0.5
PR5 – Offshore breakwater	1	-2	-2	0.25	0	1	-1.75
PR6 – Levee/weir/storm surge barrier	N/A						
NR1 – Monitoring	2	2	2	0	1	0	7
NR2 – Protection structure audit	N/A						
NR3 – Notification on Title	1	2	2	0	0	0	5
NR4 – Emergency planning	N/A						
DN1 – Do nothing	-2	-2	-1	0	-1	-1	-7

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Part One: Multi-Criteria Analysis Summary Tables

Table 52: Yalgorup Multi-Criteria Analysis

Option	Effectiveness	Future Adaptability	Cost	Environment	Community/ Social	Physical and Economic	Score
AV – Avoid	2	2	2	0	0	0	6
PMR1 – Leaving assets unprotected	0	1	1	0	2	2	6
PMR2 – Demolition/removal/relocation	1	2	0	1.20	0.60	0.40	5.20
PMR3 – Prevention of further development rights	1	2	2	2	2	2	11
PMR4 – Planned and Managed Retreat	2	2	0	1	-2	-2	1
AC1 – Design assets to withstand impacts	N/A						
PR1 – Sand nourishment	1	0	-1	-0.20	-0.20	0.00	-0.40
PR2 – Groyne	1	1	-1	-2	-1.20	-1.30	-3.50
PR3 – Seawall	1	-1	-1	-1.20	-0.80	-1.30	-4.30
PR4 – Artificial reef	0	-1	-2	0.40	0.80	0.60	-1.20
PR5 – Offshore breakwater	1	-2	-2	0	0.60	0.40	-2
PR6 – Levee/weir/storm surge barrier	N/A						
NR1 – Monitoring	2	2	0	0	-2	-2	0
NR2 – Protection structure audit	N/A						
NR3 – Notification on Title	1	2	2	0	0	0	5
NR4 – Emergency planning	N/A						
DN1 – Do nothing	0	2	2	0	0	0	4

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Part Two: Multi-Criteria Analysis detailed assessment tables including comparison between technical and CCRG based scores

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Appendix H

Appendix H: Economic Analysis - Cost Benefit and Benefit Distribution

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MANDURAH SOUTHERN BEACHES COASTAL HAZARD RISK MANAGEMENT AND ADAPTATION PLAN

COMMUNITY AND STAKEHOLDERS ENGAGEMENT PLAN

JULY 2024 [FINAL]



SHAPE URBAN

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ACKNOWLEDGEMENT

Shape Urban acknowledge the Bindjareb people as traditional custodians of the land on which we have worked for this project. We recognise their cultural heritage, beliefs and relationship to the land, which continue to be important to the Bindjareb people today.

We pay our respects to Elders past and present, and to the land which they have cared for.

PROJECT PARTNERS

CITY OF MANDURAH

SHAPE URBAN

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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DOCUMENT CONTROL

Mandurah Southern Beaches Coastal Hazard Risk Management and Adaptation Plan
Community and Stakeholders Engagement Plan - July 2024 [FINAL]

No.	Author	Reviewed By	Date	Purpose
1	K Yang	Anna Kelderman	21 May 2024	First Draft
2	K Yang	Anna Kelderman	21 May 2024	Draft for Steering Committee
3	K Yang	Anna Kelderman	9 July 2024	Finalised
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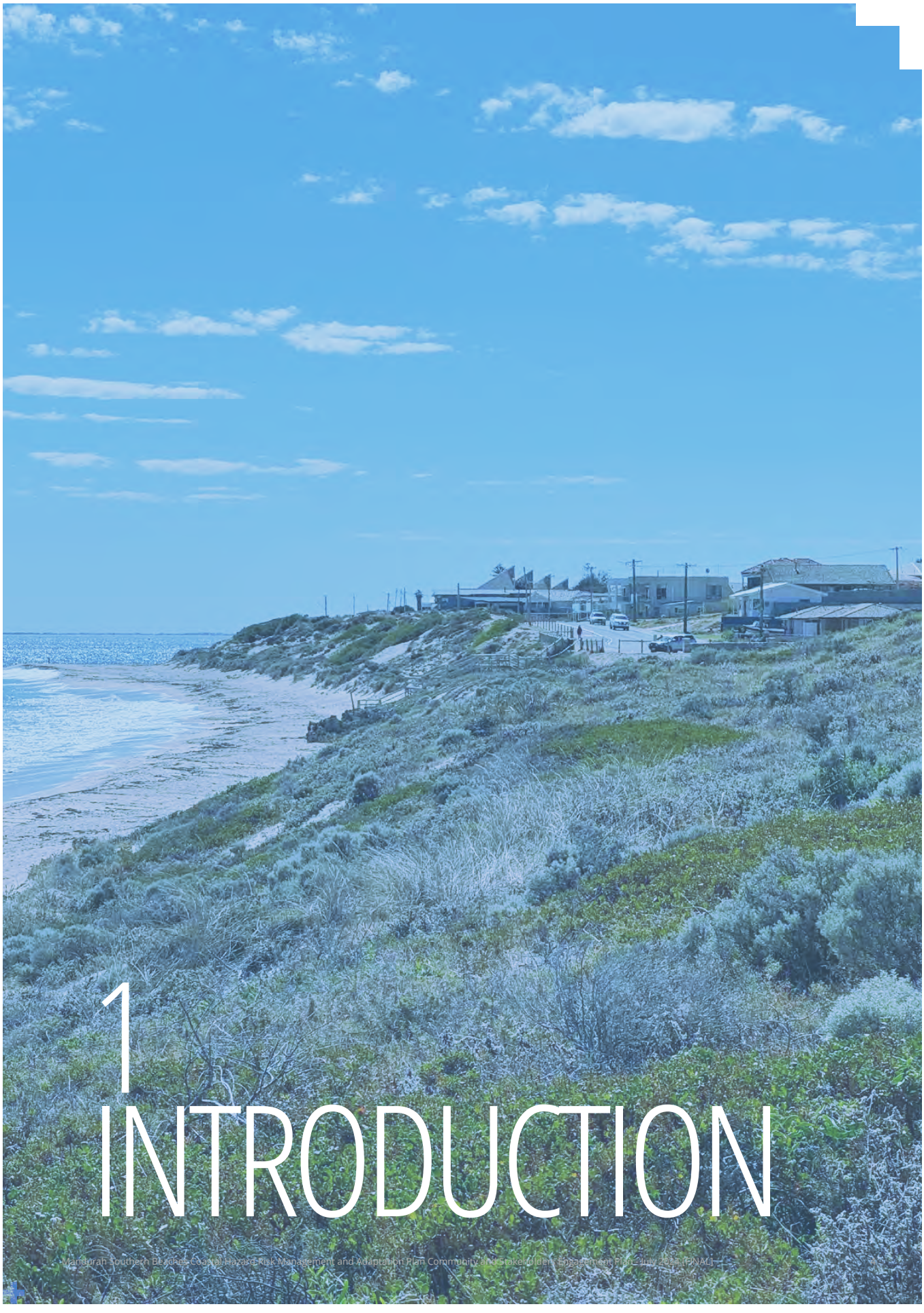
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1 INTRODUCTION

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1 INTRODUCTION

Our engagement approach is designed to empower stakeholders and the community to understand coastal hazard planning and give stakeholders an extensive role in determining their future, enabling them to take ownership and responsibility over the outcome.

1.1 Document Purpose

The City of Mandurah (the City) has commenced a project to prepare a *Mandurah Southern Beaches Coastal Hazard Risk Management and Adaptation Plan* (**Southern Beaches CHRMAP**) for the ocean-facing coastlines from Roberts Point Halls Head to the southern most border of the City in the Clifton locality (Figure 1).

The project will involve the preparation of an engagement process, and staged chapter report deliverables, that will equip the City with proactive coastal management actions for the risk of coastal erosion and inundation in the next 100 years.

Our approach has been prepared to meet the requirements of the request taking into account and being consistent with, the requirements of the *State Planning Policy No.2.6 State Coastal Planning Policy* (SPP 2.6) and *SPP 2.6 Coastal Hazard Risk Management and Adaptation Planning Guidelines*.

The purpose of this Community and Stakeholder Engagement Plan (CSEP) is to provide an overview of the engagement proposed to support the development of the Southern Beaches CHRMAP.

It is to be read as an engagement management tool, describing activities and actions in accordance with proposed timeframes and clarifying the objective of each activity, linking back to the requirements of the City and SPP 2.6.

1.2 Engagement Objectives

The overarching purpose of engagement is to provide the community and stakeholders the opportunity to contribute to the Southern Beaches CHRMAP, to address their wants and needs, but also to share and build capacity in the community and with stakeholders to understand coastal hazard planning and the reason for the actions being progressed.

Recognising there are other factors that must also be considered in the final agreed options (e.g. environment, cost, effectiveness), this CSEP provides a methodology for connecting with and listening to the needs of locals and other stakeholders, with adequate flexibility to change and pivot proposed actions if conditions change.

More specifically, the objectives of the engagement are:

- To raise awareness of the project amongst the community and stakeholders;
- To understand community values, wants, needs and barriers;
- To build community connections;
- To engage with a broad cross section of community;
- To identify others who may be affected by coastal hazards;
- To provide a ‘space’ for the stakeholders to speak freely; and
- To use feedback to inform options and recommendations for the CHRMAP.

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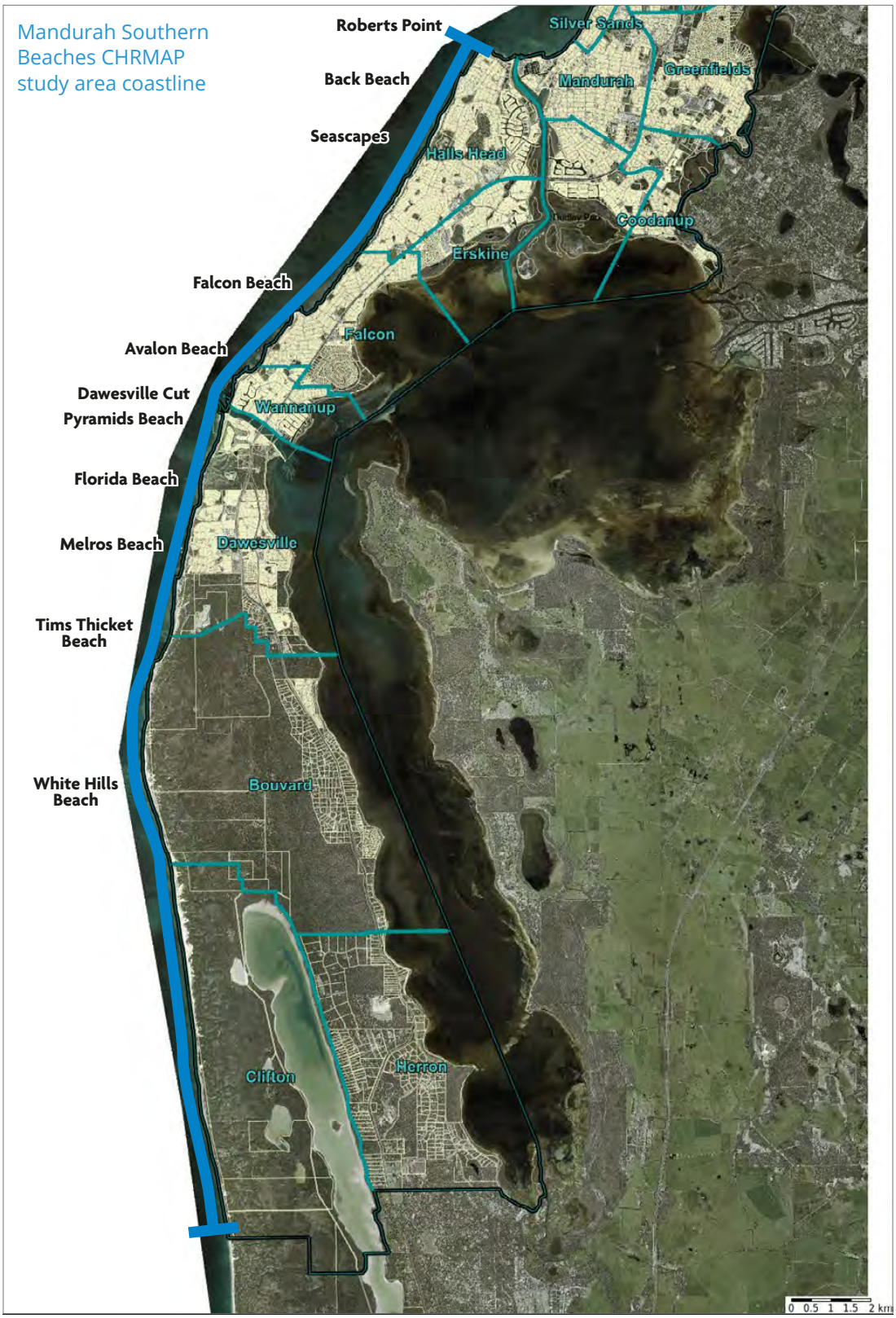


Figure 1 Southern Beaches CHRMAP Study Area (source: City of Mandurah)

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1.3 Project Team

The project will be led by Shape Urban, including all elements associated with engagement. Table 1 provides an overview of the key personnel associated with the engagement components of the project.

Table 1 Project team for engagement tasks

Name	Role
City of Mandurah	
Damien Slack	Damien is the Manager Marina & Waterways, the chair of the Project Steering Committee and the day to day contact for the project and will be managing the project.
Brett Brenchley	Brett is Executive Manager Natural Environment and the vice chair of the Project Steering Committee.
Chris Abbiss	Chris is the Coordinator Marina & Waterways and Technical Advisor of the Project Steering Committee and will act as the Proxy Chair of the Project Steering Committee when the Chair and Vice Chair are unavailable.
Bonnie Beal Richardson	Bonnie works in the Environment Engagement team for the City and will be responsible for approving and coordinating all communications materials to the City's standard.
Consultant Team	
Anna Kelderman *Shape Urban*	Anna is the project lead for the consultant team, the planning and engagement lead, the lead author and will be facilitating all engagement activities with key stakeholders and the community; as well as overseeing all project deliverables including reports and materials.
Keyon Yang *Shape Urban*	Keyon is a Town Planner and will support Anna in the delivery of engagement activities and materials and will be responsible for undertaking all reporting.
Karl Ilich *Water Technology*	Karl is a Senior Coastal Engineer and the coastal engineering lead, author for technical (coastal) components and will be managing the coastal study and engineering components of the project.
Nick Dugan *Water Technology*	Nick is a Regional General Manager and the quality assurance (engineering component) and will be overseeing the coastal engineering components of the project.
Gildas Colleter *Water Technology*	Gildas is a Senior Coastal Engineer and the coastal engineering project reviewer for the project.

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1.4 Timeframes

The project will run for a period of 18 months, involving 8 stages and 24 tasks (Table 2, Figure 2 and Figure 3).

Engagement activities will occur throughout the project including scheduled meetings with the Project Steering Group, briefing to the City of Mandurah Elected Members and a robust community and stakeholder consultation that will occur at three key stages:

+ Stage 2 - to identify key assets and community values where affected by the coastal risk hazard.
+ Stage 5 - to understand the community sentiments toward preliminary treatment option, trade-offs that is acceptable to them.
+ Stage 8 - public comment process before the Council adoption of Final CHRMAP.

Table 2 Project timeframes

Project stage	Indicative timing
Stage 1 – Establish the Context	Milestone 1: Concurrent Chapters March – September 2024
Stage 2 – Risk Identification	
Stage 3 – Vulnerability Analysis	
Stage 4 – Risk Evaluation	
Stage 5 – Risk Treatment	Milestone 2: Concurrent Chapters Late 2024 – Early 2025
Stage 6 – Implementation	
Stage 7 – Monitor and Review	
Stage 8 – Final CHRMAP	Final CHRMAP Late 2025

Descriptions of the engagement activities and indicative timing is outlined in more detail in Section 4 of this CSEP.

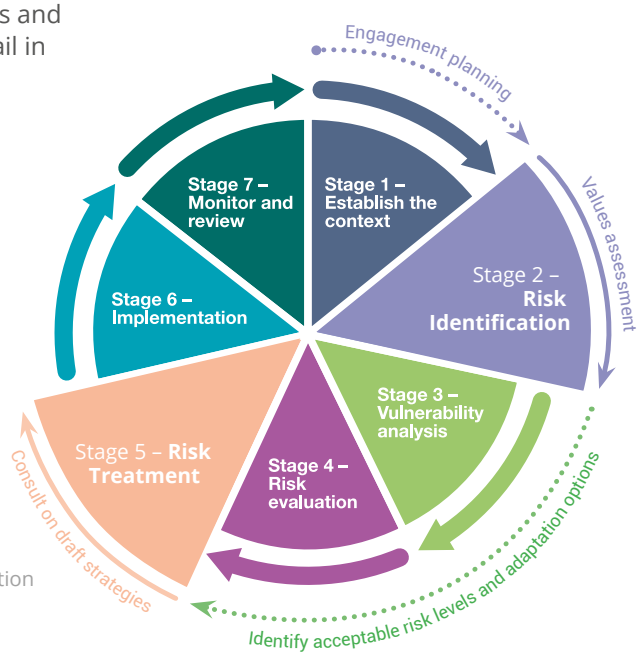


Figure 2 CHRMAP Engagement approach in relation to the CHRMAP process (adapted from CHRMAP Guidelines, 2019)

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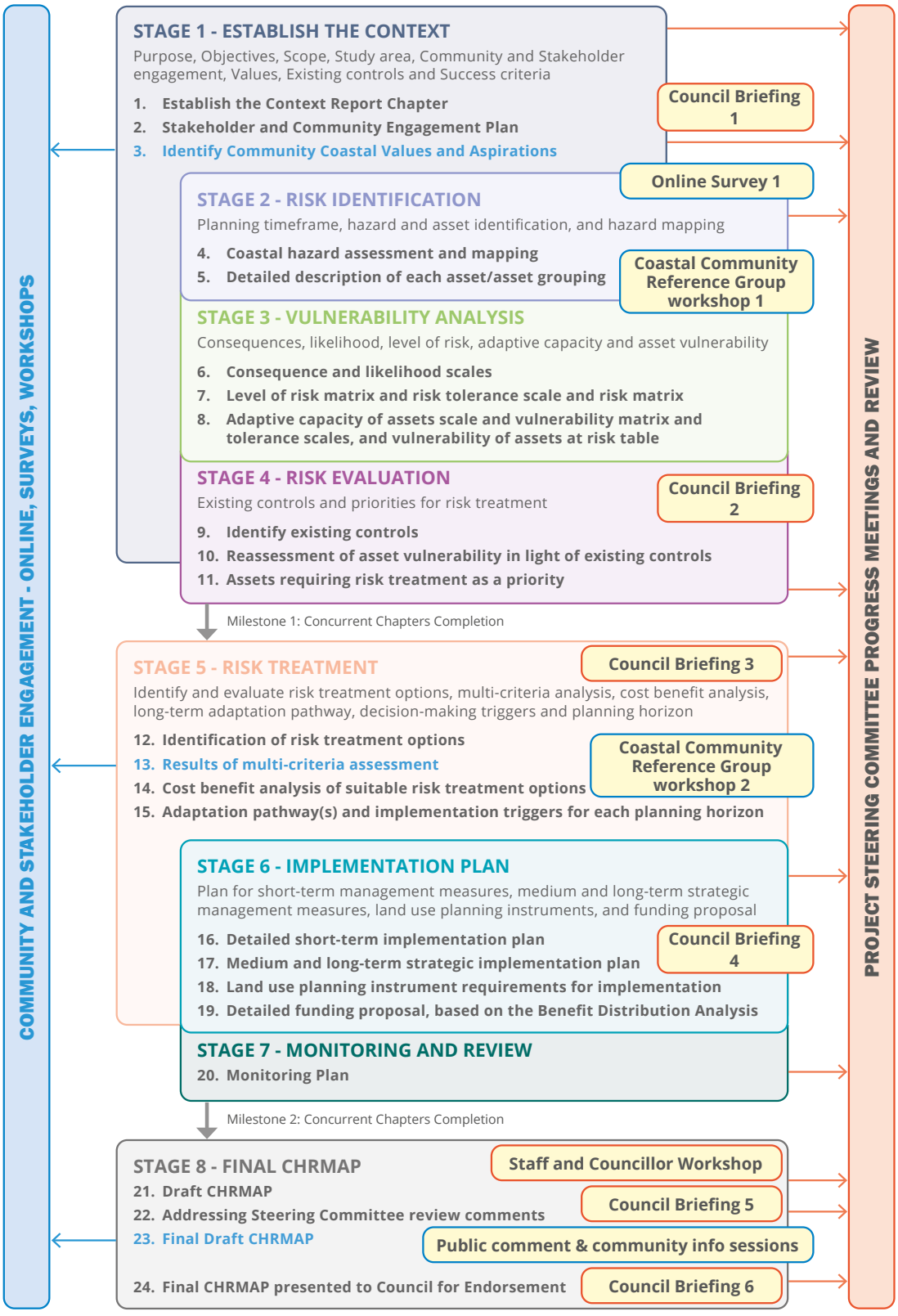


Figure 3 CHRMAP process flow chart, adapted from the CHRMAP Guidelines

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2 ENGAGEMENT CONTEXT

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2 ENGAGEMENT CONTEXT

2.1 Project Context

In accordance to the State Planning Policy 2.6 – State Coastal Planning Policy (SPP2.6), local government in Western Australia must prepare and implement a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP), where development is vulnerable to coastal hazards, in accordance to the SPP2.6 and the CHRMAP Guidelines.

The City has recently completed the Mandurah Northern Beaches CHRMAP (Northern Beaches CHRMAP) for the beaches from Madora Bay to Doddies Beach, Halls Head, adopted by Council in November 2022, with a 10 Year CHRMAP Action plan adopted by Council in July 2023 to implement the immediate short term CHRMAP recommendations.

The City has now commenced the preparation of the **Mandurah Southern Beaches CHRMAP (Southern Beaches CHRMAP)** for the ocean-facing coastline from Roberts Point, Halls Head through to White Hills Beach, Clifton. The nearby Peel-Harvey Estuary to the east of the Mandurah Southern Beaches coastlines is excluded in this study, and there is a planned CHRMAP for the estuarine environment after the completion of this project. The study area is indicated in Figure 4, showing its relationship with other CHRMAPs in the vicinity.

For the Southern Beaches CHRMAP, a Project Steering Committee (PSC) was formed with representatives from the City including two Councillors, the Peron Naturaliste Partnership (PNP), Department of Planning, Lands and Heritage (DPLH), and the Department of Transport (DoT).

A team of consultants – Shape Urban and Water Technology was awarded a contract to lead the Southern Beaches CHRMAP project in March 2024.

2.2 Parallel Projects

2.2.1 Northern Beaches CHRMAP Implementation

The Northern Beaches CHRMAP took about four years in preparation, with various engagement processes including surveys, workshops and focus groups taking place to inform the context and adaptation pathways.

The Action Plan for the Northern Beaches CHRMAP has identified a few key projects to be completed over 2023-2024:

+ Develop and implement a 10 Year Capital renewal and upgrade program for Coastal and Marine assets
+ Coastal Monitoring Program review and improved preparedness for events that cause coastal impacts
+ Expand and continue the CoastSnap initiative on Mandurah's northern beaches
+ Coastal Protection Options Assessment for Doddies Beach
+ Detailed Design Upgrade of Town Beach Buried Seawall
+ Permanent Sand Bypassing Feasibility Investigation

The commencement of these projects in parallel to the Southern Beaches CHRMAP will have positive and negative implications towards the effective communications and consultation to the project works, with particular attention to the Doddies Beach project which abuts the Southern Beaches study.

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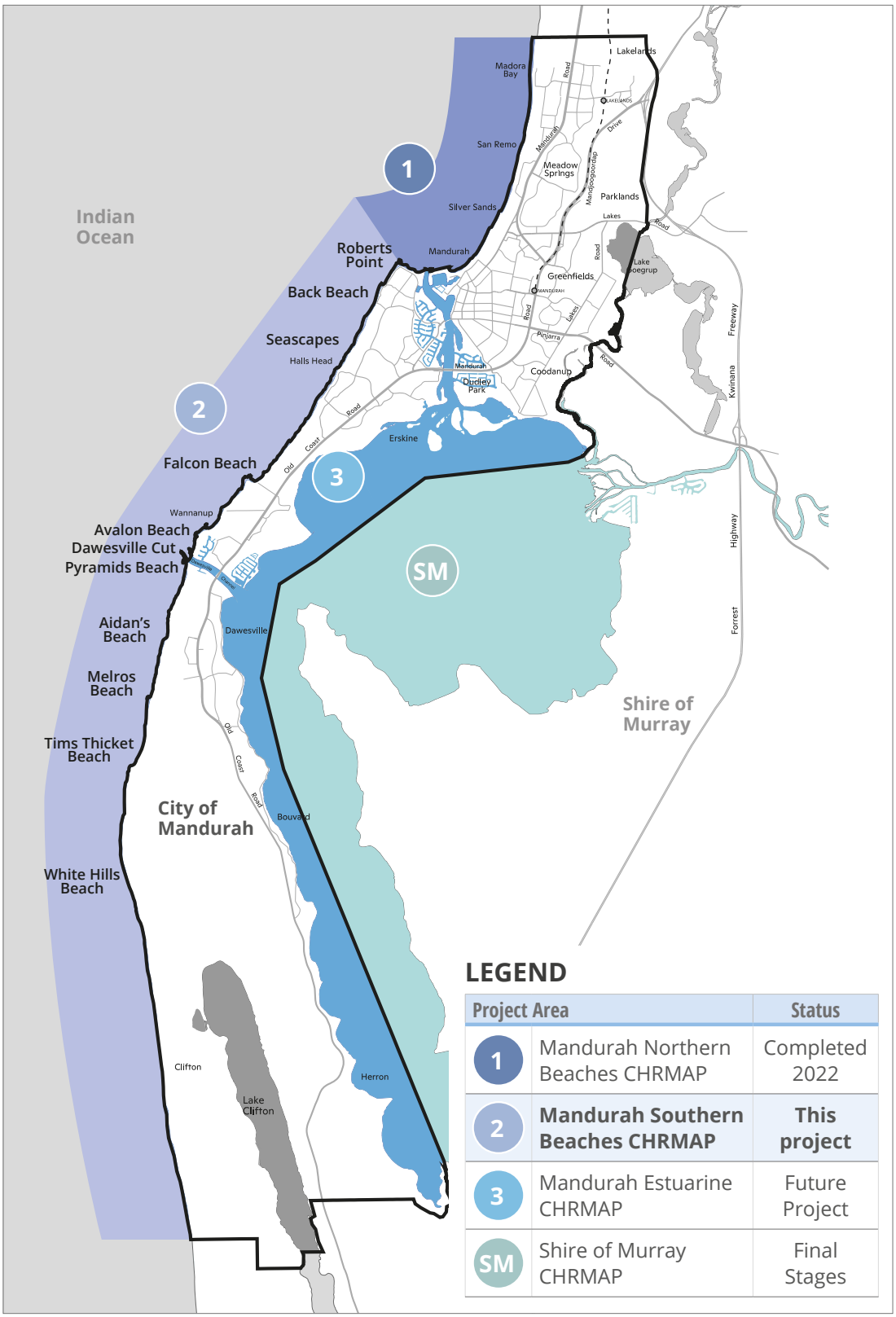


Figure 4 Mandurah Southern Beaches CHRMAP study area in relation to other CHRMAP study areas in the vicinity.

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2.2.2 Shire of Murray CHRMAP

The Shire of Murray CHRMAP (Murray CHRMAP) covers the estuarine areas bordering the City of Mandurah, and is currently at its final stage of the CHRMAP process.

The most significant recommended actions in the draft Murray CHRMAP includes the introduction of Special Control Area (SCA) for lands affected by either erosion or inundation hazard over the 100-year planning period, to avoid development for erosion hazard area and only allow development that can address inundation hazard.

With its close proximity and shared characteristics of the estuarine environment, the proposed actions in the Murray CHRMAP maybe used as a reference by the local communities in Mandurah.

2.2.3 Western Foreshore Leisure Precinct and Commercial Site Business Plan

This precinct business plan involves a small scale coastal study, for which engagement activities currently underway on Mandurah Matters. It might cause confusion when communicating the CHRMAP project, especially for the residents and businesses in Halls Head and Port Mandurah.

2.2.4 Waterways Waterfront Master Plan

Independent to the precinct business plan, this master plan aims to develop a long-term vision for the waterways in Mandurah city centre (between Stingray Point, Mandjar Bay, and the Eastern and Western Foreshores). Communications must clarify the differences of these parallel projects.

2.2.5 Falcon Coastal Shared Path

A project similar to the Halls Head coastal shared path is currently underway, which includes a section of coastline subject to the Southern Beaches CHRMAP. The hazard modelling outcomes and its implications to adaptation options and benefit distribution which are close to the shared path alignment need to be communicated with care.

Project planning is still progressing. This is a big project with a long scope. Staging and timing are still to be determined with grant funding partners DoT. Communications will be sent to inform the community of the latest progress.

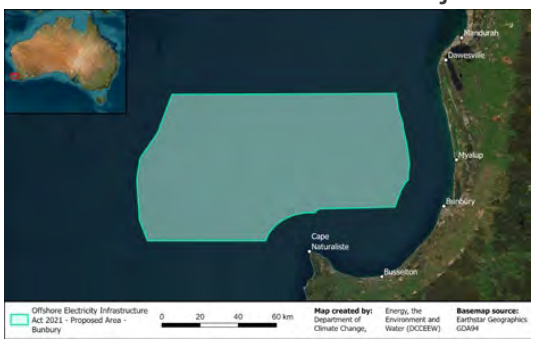
2.2.6 Sand Bypassing

Department of Transport pumps sand around the Mandurah Ocean Entrance and Dawesville Channels each year to ensure safe navigation while allowing the natural flow of sediment to continue northwards along the coast.

Falcon Bay to Rakoa St is the main beneficiary relative to the sediment supply volume passing through Dawesville Channel. The sand then migrates north to play a crucial role for replenishment of sand at other erosion hotspots outside the study area at Doddies Beach and Mandurah Northern Beaches[1].

A Permanent Sand Bypassing Feasibility Investigation has recently been completed between both CoM and DoT.

2.2.7 DCCEEW Offshore Wind Project



The Department of Climate Change, Energy, the Environment and Water (DCCEEW) has proposed an Offshore Wind Project: Indian Ocean off Bunbury, WA which the wind turbines would be visible on shore 31km away southwest from Dawesville channel mouth. The project has just entered the initial consultation phase and does not currently have approval for the development.

1 Seashore Engineering Pty Ltd for DoT and DPLH, 18 March 2019. *Assessment of Coastal Erosion Hotspots in Western Australia, Appendix D*, p.201-206

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2.2.8 Yalgorup National Park Concept Master Plan (2024)

The Yalgorup National Park Concept Master Plan has been established to identify, plan and deliver infrastructure for the sustainable development of eco-tourism opportunities on landholdings within and immediately adjacent to Yalgorup National Park.

A key part of the plan is beach access management, reflecting the recognised concerns about damage to the dunes from recreational use, whilst seeking to provide a foreshore with access for the community to enjoy.

2.3 Dawesville Channel

Dawesville Channel was constructed in 1994 as an attempt to relieve the nutrient-rich issues in the Peel Inlet and Harvey Estuary. Since then, the ecosystem has been experiencing a complex feedback loop that has continued to present challenges to the environmental management of the area.

Department of Water and Environment Regulations, Healthy Estuarine WA, Peel-Harvey Catchment Council and many environmental groups are highly interested in any proposed changes to the Dawesville Channel. Whilst the scope of this CHRMAP has excluded the estuarine environment there is likely to be references to it by stakeholders. There will be a Mandurah Estuarine CHRMAP (tentative) after the completion of this CHRMAP.

The South East Dawesville Foreshore Master Plan is another parallel project that is currently underway. It is important to communicate clearly the differences between these projects.

2.4 High Public Interest

The project may attract political interest, particularly in light of past coastal planning decisions in areas such as Doddies Beach. As a result, political interest may be generated as the project enters the engagement phase.

As the project represents continuity from the Northern Beaches CHRMAP, public interest is already high, as shown in the Q&A of the Mandurah Matters dedicated project page – Our Coastal Future - Coastal Management Planning.

Recognizing the value of engagement continuity after the Northern Beaches CHRMAP project, we recommend continuing to use the City's Engagement HQ platform 'Mandurah Matters' for this project. We also propose the use of an online mapping tool for the project.

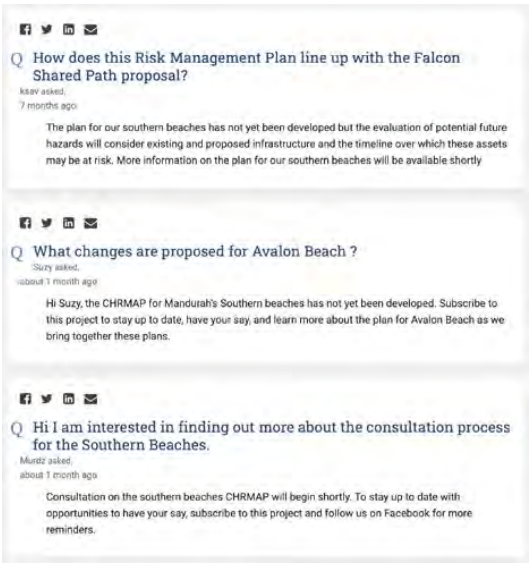


Figure 5 Current interest on the City's engagement portal

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2.5 Community Values for Waterways

The City of Mandurah local government area is surrounded by various water bodies, including the ocean, rivers, estuaries and lakes, which extend to the beaches, foreshores coastal heath, wetlands and bushlands, forming the unique environment that is highly valued by the community, evidenced by the extensive water-based activities observed in the study area (images below). This is further emphasised in the City's strategic documents:

2.5.1 Strategic Community Plan

The City is currently reviewing the Strategic Community Plan 2024-2044 and is in the process of confirming the updated shared Community Vision to:

Woven by waterways; a city that is thriving and connected to its people and nature.

...along with a new City Purpose:

Shaping a vibrant city, delivering possibility for everyone.

2.5.2 Environment Strategy

The City has endorsed the Environment Strategy and Implementation Plan 2023-2033, which has a Strategic Goal:

A healthy and diverse natural environment where we walk softly on our Mandjoogoordap.

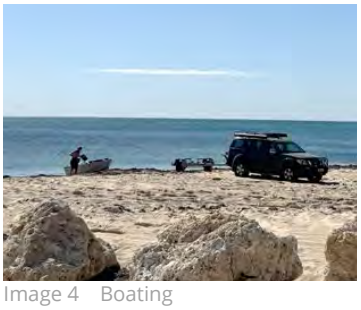
...with the following Guiding Principles:

+ Built in nature, not on nature
+ Woven by waterways
+ Lead and serve in equal measures
+ Stewards of the environment, custodians of culture


Image 1 Swimming and paddling


Image 2 Surfing


Image 3 Picnic and gathering


Image 4 Boating

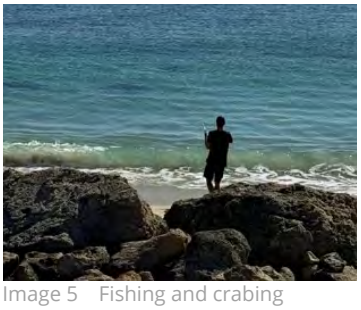

Image 5 Fishing and crabing


Image 6 Walking

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Image source: City of Mandurah website

2.6 Aboriginal Engagement

We recognise and acknowledge the Bindjareb people as the Traditional Owners and First Peoples of the lands and waters in Mandjoogoordap.

There are several Aboriginal Cultural Heritage Places exist in the study area, including sites near Tims Thicket, Seascapes and Winjan Camp.

Engagement with local Elders is a fundamental element of the CHRMAP's development. The local knowledge, stories and histories the Elders can share about the area are invaluable to the process.

We will seek to engage with the Bindjareb Elders via the City's Reconciliation Action Plan (RAP) Community Development team, to organise these on-country yarns with the Elders whilst in Manjoogoordap. It is expected that coordination of this task will start as soon as practical on launch of engagement, and potentially run throughout the entire project.

Other local Aboriginal groups and businesses engagement will be coordinated as per advice from the City's Community Development team.

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2.7 Risk and Mitigation

There is potential for government agency, community and political concerns to be raised during the various phases of the project including community and stakeholder values, risk identification, risk treatment options, advertising and final approval. It is vital that key stakeholders are consulted and kept informed of the progress of the review in an appropriate, timely and coordinated manner (i.e. giving them the right information at the right time and in the right way).

The risks identified are considered to impact all community and stakeholders involved with the project. Notwithstanding this, Table 3 outlines the identified risks associated with the engagement component of the project.

Table 3 Identified engagement risks

Identified risk	Mitigation strategy
Hazard modelling The implications of the hazard modelling is the highest risk to the effective communication in the CHRMAP engagement process. In the absence of the hazard modelling information, community values engagement may yield a different outcome with or without the hazard modelling as perceived values vary due to level of asset vulnerability.	Early and preliminary hazard modelling can mitigate a downstream shock reaction to unanticipated risk profile. The hazard modelling in Stage 2 risk identification will be brought forward to the Council consideration for the public communication purpose. Preliminary mapping will be clearly communicated with disclaimer, including the knowledge gaps such as geotechnical information. A peer-reviewed and finalised hazard mapping must be produced and used for Stage 5 engagement for constructive discussion for adaptive pathways discussion.
Divergent community opinions There is a risk that not all community members will agree with the recommendations of the adaptation pathways and express concern that it does not reflect what the community want.	With any project, there is always a risk that some community members or stakeholders will not agree with the recommendations or the final plan. To ensure that the CHRMAP meets the community's values, early engagement is proposed to allow community input early in the project. We will clearly communicate what the negotiables and non-negotiables of the project are, so there are clear parameters around which elements of the project the community can influence and those that they cannot. Opportunities to engage will be communicated widely using a range of mediums to maximise awareness of the project and opportunities to get involved.
Community reach Northern Beaches CHRMAP implementation has caught some community by surprise as they perceived not being informed about prior engagement.	Sending letters (mail and email) at the start of the CHRMAP process to affected residents, including absentee landlords can help reduced risk of blame for uninformed engagement. The community and stakeholders participation on the CHRMAP journey, to collaborate on the formation of optimised coastal management pathways, can foster ownership of the final outcome.

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Table 3 Identified engagement risks (continued)

Identified risk	Mitigation strategy
Availability of community and stakeholders to participate in the project The diversity of users and stakeholders in the coastal locations, means it may be hard to get all stakeholders in the room.	To maximise the opportunity to participate in the project, our approach offers multiple opportunities to get involved, using a variety of methods (both in person and online). Multiple communication methods with an existing large audience will be utilised. The formation of the Coastal Community Reference Group will provide cohesive journey in formulating the optimised coastal management plan.
Under-representation of certain demographics Community such as those who are from a lower socioeconomic and certain cultural profiles, time poor or younger age may not participate in engagement. Community south of Dawesville Cut may have perception of being left out from previous engagement.	Incentives such as vouchers and cash could be an effective way to encourage participation. The formation of a Coastal Community Reference Group (CCRG) with the use of a stratified selection process could ensure fair representation of different interest groups. A repeated reminder at the beginning of engagement workshop will be used to remind the Coastal Community Reference Group their role to represent the broader community and their needs.
Stakeholders Collaboration Getting info from some key stakeholders might be difficult and will have a significant influence on future planning of the area	To ensure the key stakeholders are involved, establishing connection will be essential at the early engagement. It is useful to include key stakeholders in the formation of the CCRG.
Key community members who want to be on the CCRG are not selected. Creates lack of buy-in to outcomes and suggestions that the process was unfair.	Key community groups to be identified at the outset and specifically invited to participate through agreed positions on the CCRG. Other stakeholders that may express concerns to be invited to prepare a position statement directly to the CCRG (unedited by the project team) or to present their position to the CCRG via a formal presentation.
Repeated consultation on the similar topic from other projects There was recent consultation for the Northern Beaches CHRMAP, Strategic Community Plan, Environment Strategy, etc.	A review of the relevant recent engagement methodology and outcomes is being completed prior to the design of the engagement activities and the online survey questions, so that messaging can clearly identify where previous feedback has already or will be used.
Sand Bypassing Project The annual sand bypassing at Dawesville cut and Mandurah Ocean Entrance has attracted contentious opinions among the community.	Coastal engineer will address the sand bypassing implications in the coastal study. Involving the sand bypassing project manager to provide information during CHRMAP engagement could improve understanding of the work progress. Existing and additional infographics related to the sand bypassing on various platforms can reduce the risk of misinformation.

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2.8 Engagement Principles

This CSEP has been prepared to align with the International Association for Public Participation (IAP2) engagement principles set out in the IAP2 Code of Conduct. These principles are that - Public Participation:

- Is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
- Includes the promise that the public's contribution will influence the decision.
- Promotes sustainable decisions by recognising and communicating the needs and interests of all participants, including decision makers.
- Seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
- Seeks input from participants in designing how they participate.
- Provides participants with the information they need to participate in a meaningful way.
- Communicates to participants how their input affected the decision.

In addition, the approach to stakeholder engagement in the CSEP includes principles based on the recognised benefits of community engagement, acknowledging that the outcomes of engagement are often greater than what the engagement is explicitly trying to achieve.

These additional principles are:

- Public participation promotes local agents for implementation, bestowing decision making power to communities and enabling local support for delivery.
- Public participation develops a shared agenda and alignment to shared tasks and activities.
- Public participation build cohesiveness and inclusiveness in communities.

IAP2 has developed a framework that defines the level of public participation in a spectrum (Figure 6). In the IAP2 spectrum, the further to the right of the spectrum, the greater the ability of the public to influence or impact decision-making.

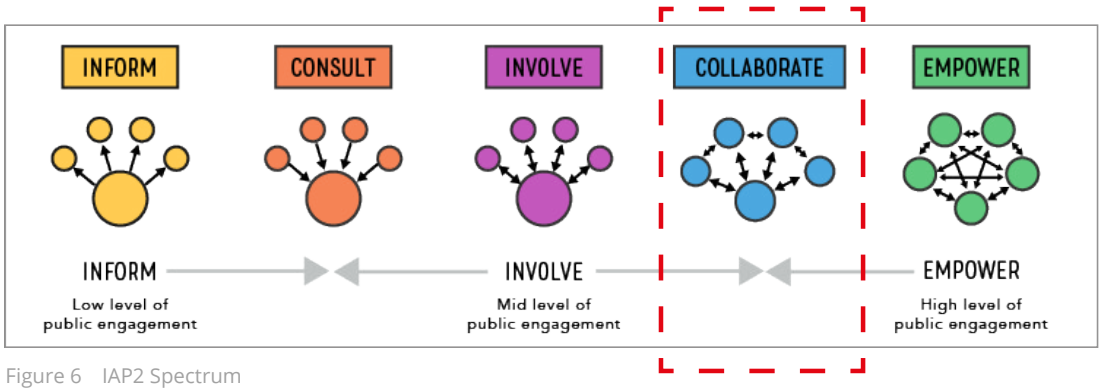


Figure 6 IAP2 Spectrum

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Our CSEP attempts to provide opportunities for the engagement process to achieve the level of **Collaborate**.

+ **Public Participation Goal** - *To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.*
+ **Promise to the Public** - *We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.*

2.9 Deliberative Engagement Approach

It is challenging to reach all members of the community without undertaking a direct approach, as not all communication channels suit all users (think social media versus the local paper). Therefore, in this project, all ratepayers and residents within proximity to the coastal area being studied will be directly engaged via a mail-out coordinated through the City, including key information such as the way coastal hazard lines are determined. Draft communications material will be provided by the engagement consultant.

BUILDING COMMUNITY COASTAL LITERACY

We will ensure educational infographics that build knowledge and educate the community on coastal processes, hazards and risks, available adaptation options, and what this means for the local community are available in easy to read options.

Over time this information will also include excerpts of interviews with key stakeholders and community members representatives to help inform the complexity of decision making associated with coastal management, associated and ongoing financial costs and what selected management actions mean for the City and delivery partners.

We propose to upload the infographics on the project webpage and make these available for the duration of the project.

DIRECT MAIL-OUT

A letter at the start of this project inviting all community members to register for updates will enable a strong database of participants and greatly increase the chances of meaningful engagement.

This will be the simplest way to reach the broadest possible cross-section of the community, as existing community groups and communications channels have been shown not to have substantive penetration into the whole community.

The letter will also invite expressions of interest to be part of the Coastal Community Reference Group (CCRG).

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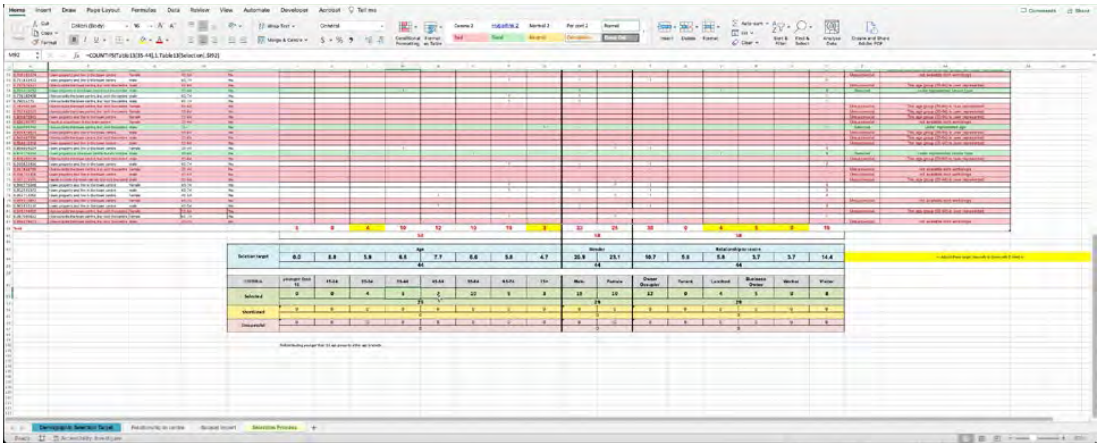


Figure 7 Screenshot showing the spreadsheet in a random selection process

CCRG APPROACH

We will be delivering the CHRMAP using best-practice engagement, that includes a representative sample of your community through a random selection process* to form a Coastal Community Reference Group (CCRG). Figure 7 indicates a screenshot during a recorded random selection process where the identity of the nominated persons are concealed.

Traditional stakeholder engagement approaches rely on relatively passive engagement techniques, with self-selection the primary mechanism for people becoming involved. This often leads to a disconnect between those 'passionately engaged' and the many varied community members who do not follow Council matters.

Deliberative engagement is fundamentally different from these techniques, in that it comprises the selection of community members that are representative of the entire community, and provides them with the opportunity to share with us an equitable assessment of the values of our community. This is even more so on complex projects where varied stakeholders approach the issues quite differently.

The result is informed decision making, based on full access to all information, and done in a transparent and impartial way. Elected Members can rely on this information in their decisions, and participants can continue to be part of ongoing work.

The design and facilitation of the CCRG workshops will be in locations near the affected coastal areas. The aim of the CCRG workshops is to share information with the community about the project and seek feedback on potential options for management.

These workshops will be carefully managed, through a deliberative engagement format and stratified sampling from the community:

+ To engage with those who see a potential loss (immediately affected landowners).
+ To engage with those who may be impacted by the financial impact of the decisions being made (ratepayers from other locations in the City or visitors).

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***Random Selection Process**

A 'Selection Spreadsheet' is prepared for the project and is formatted to automatically calculate the number of responses against each selection criteria (e.g. the number of people who selected 'residential', or 'aged 50+', or 'female' etc). The 'Selection Spreadsheet' would be populated with the agreed CCRG target numbers.

The selection process will then be undertaken in full by Shape urban, as follows:

1. Hide personal details to remove any potential bias.
2. Copy all survey data (CCRG nominations) into the 'Selection Spreadsheet'.
3. Assign each survey entry a 'random number' in Excel using the random number function.
4. Order rows from smallest to largest.
5. People who are not available for the preliminary workshop and first meeting date (critical introductory and background discussion), are automatically unsuccessful.
6. Where the CCRG target numbers are under-represented, people who meet the under-represented target are automatically selected.
7. People are then randomly selected from the top of the list in small 'groups' of approximately 3-6 people.
8. After approximately 20 persons are selected, the targets are reassessed to determine if any cohorts have met their quota. If the quota is met, all other nominees from that cohort are deemed unsuccessful.
9. We continued to select small groups from the top of the list and reassessing if the CCRG targets are met until all 50 positions are filled.

Once all positions are filled, names will be revealed. All successful members will be advised via email and a follow up phone call to confirm availability by the consultant team and provide some basic information about the project and their role, and to ascertain any requirements of the member that need to be provided for, including accessibility needs. Where a successful member is no longer available, their position will be reassigned to another nominee using steps 7-9 above.

+ Oversample is proposed to cover natural attrition over the course of the project timeframe (people moving, people becoming sick etc). Our actual target numbers are 40 persons.
+ Interest groups or people not selected on the CCAG who want to 'have their say' may be invited to present their own position statements.
+ Proxies may attend for interest groups but not other participants.
+ We recommend some form of remuneration/City discount/incentive, plus very good food.

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2.10 Negotiables and Non-negotiables

When we engage with any stakeholder, we need to be clear about what it is they are being engaged for and what they can influence. The negotiables and non-negotiables enable us to clearly identify their role in the project.

NEGOTIABLES

In this project, the negotiable elements that can be influenced and shaped by stakeholders are:

- Community values
- Asset identification
- Management Unit and asset grouping
- Multi Criteria Analysis (MCA) scoring and weighting
- Adaptation pathways
- Tradeoffs and preferences
- Implementation timeframes

NON-NEGOTIABLES

The non-negotiable elements are:

- Mandurah Southern Beaches CHRMAP is going to be prepared, and thereafter, implemented
- The format, process of developing and content of the CHRMAP is to comply with the CHRMAP Guidelines of SPP 2.6
- The planning horizon is up to 100 years for coastal erosion and inundation
- The recommendations will include implementation planning for short, medium and long term
- The estuarine environment and including canal estates are outside of the scope of the project

2.11 Key Messages

- The City of Mandurah is preparing the Southern Beaches CHRMAP for the ocean-facing coastline from Roberts Point, Halls Head, to the southern end of the Clifton locality.
- The CHRMAP process includes a technical assessment by coastal engineers to understand the extent of erosion and inundation (seawater flooding) over the next 100 years.
- The City wants to maximise the benefits to community and ensure efficient use of the coastline, because the beaches, foreshores and waterways are highly valued by the people of Mandurah.
- By identifying the potential risks and vulnerability of assets, the City is preparing a forward looking document to guide future planning and management of our coastal areas.
- Recommendations are based on long term predictions, many of which may seem unlikely at the current day. Ongoing monitoring of what is happening on the ground helps us decide when to make decisions in accordance with a well considered CHRMAP.
- A CHRMAP identifies a long term scenario based on current information, but allows a flexible approach if or when the predicted scenario happens.
- Community participation in the CHRMAP process is crucial for shaping a resilient coastal community.

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3 STAKEHOLDERS

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3 STAKEHOLDERS

3.1 Stakeholders Identification

The stakeholder listed in below is based on the Project Team and PSC preliminary identification.

PRIMARY STAKEHOLDERS

+ CoM staff and Elected Members
+ Department of Planning, Lands and Heritage (DPLH)
+ Department of Transport (DoT)
+ Property and land owners in the coastal hazard areas
+ Users of the foreshore and beaches
+ Adjacent businesses
+ Aboriginal groups and community

SECONDARY STAKEHOLDERS

+ Youth Advisory Group
+ Access and Inclusion Advisory Group
+ Mandurah Environmental Advisory Group
+ Department of Biodiversity, Conservation and Attractions (DBCA)
+ Department of Water and Environment Regulation (DWER)
+ Local recreation community groups
+ Water-based sporting clubs
+ 4WD and Powered water craft users community
+ Recreational crayfishing and fishing
+ Coastal and Water-based businesses

TERTIARY STAKEHOLDERS

+ Surrounding residents
+ The broader community
+ Broadcast and printed media
+ Social Media

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3.2 Stakeholder Analysis

Table 3 provides a summary of stakeholder groups and organisations that will need to be considered, engaged and activated throughout this process. Each stakeholder group is considered in terms of the level of interest, the impact the project might have on them, and the influence they may have on over the project outcomes.

The scale in Table 4 should be read as follows:

+ L = Low - low level of interest, impact or influence on the project,
+ M = Medium - medium level of interest, impact or influence on the project and
+ H = High - high level of interest, impact or influence on the project.

NB: These ratings are assumptions used when building the stakeholder database for project communications purposes. They may not reflect accurate levels of interest, impact, and influence from the perspective of stakeholders or individuals, which will be tested through engagement.

Table 4 Stakeholder Analysis

Stakeholder	Relationship To Project	Interest	Impact	Influence
Federal				
Mr Andrew Hastie MP, Federal Member for Canning	+ Electorate includes City of Mandurah + Liberal Party of Australia + Principal Electorate Office in Mandurah	L	L	M
State Government (assumes various Ministers unless specified)				
Hon. John Carey, Minister for Planning; Lands; Housing; Homelessness	+ Ministerial approval of the CHRMAP is not required however if the project gains any political interest, the Minister for Planning may have a level of interest and influence.	M	H	M
Mrs Lisa Munday MLA, Member for Dawesville	+ Electorate includes the study area + Australian Labour Party + Electorate Office in Falcon + Active advocate for the Halls Head Shared Path Project.	H	H	H
Mrs Robyn Clarke MLA, Member for Murray-Wellington	+ The project may attract some political interest + Electorate includes Bouvard + Australian Labour Party + Electorate Office in Pinjarra	H	H	H
Mr David Templeman MLA, Member for Mandurah	+ Electorate is outside of the study area + Australian Labour Party + Electorate Office in Mandurah	L	L	M

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Table 4 Stakeholder Analysis (continued)

Stakeholder	Relationship To Project	Interest	Impact	Influence
Department of Water and Environment Regulation (DWER)	+ Authority for Healthy Estuaries WA. + Waterways manager for the Peel-Harvel Inlet and Dawesville Channel	M	L	H
Department of Biodiversity, Conservation and Attractions (DBCA)	+ ParksWA manages Yalgorup National Park, near beach sections from Tims Thicket to White Hills Beach. + The beaches adjacent to the Park are managed by the City of Mandurah and the Shire of Waroona under management orders with DPLH.	M	L	H
DPLH / WAPC	+ The CHRMAP is prepared in accordance with State Planning Policy 2.6 which is prepared and administered by the DPLH. + The CHRMAP does not require adoption by the DPLH however they do provide a level of endorsement of the document. + A grant funding partner through the CMPAP grants.	H	H	H
Department of Primary Industries and Regional Development (DPIRD)	+ Peel Development Commission is the related agency	L	L	L
Department of Fire and Emergency Services (DFES)	+ Emergency WA responds to natural hazards, including cyclones, storms, floods, and marine hazards. + Maybe interested in emergency planning.	L	M	L
Department of Transport (DoT)	+ The DoT manages some of the technical information required to undertake the assessment and modelling for the coastal inputs for the CHRMAP project. + Manages the annual sand bypassing for Dawesville and Mandurah channel. + Coastal erosion hotspots study at Falcon Bay.	H	H	H
Department of Education (DoE)	+ The Department hold swimming lessons at Avalon Beach during the summer holidays and term 1.	M	H	L

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Table 4 Stakeholder Analysis (continued)

Stakeholder	Relationship To Project	Interest	Impact	Influence
Heritage Council of WA	+ Aboriginal Cultural Heritage registered places exist within the study area, including the Winjan Camp, Seascapes and Tims Thicket. + There is no known Historic Heritage Places.	L	L	L
Water Corporation, Western Power, ATCO Gas, Telstra, NBN Co.	+ Coastal hazard risks will impact on energy, water and sewerage, telecommunication service provision.	M	H	L
Peel Development Commission	+ Peel Development Commission is a statutory authority established in 1993 by the Western Australian State Government under the Regional Development Commissions Act 1993.	L	L	L
Local Government				
CoM Elected Members	+ Responsible for endorsing the final CHRMAP. + Has strong interest for the project + Provide project support by sharing opportunities for community participation and engagement and advocating for project outcomes.	H	H	H
CoM Administration	+ Responsible for implementing CHRMAP once endorsed. + Manage day to day project and planning inquiries from rate payers, residents and the community.	H	H	M
CoM Environmental Advisory Group	+ Responsible for advising Council on strategic environmental direction taken by the City and general environmental issues.	H	H	H
CoM Audit and Risk Committee	+ Monitor and receive reports concerning the development, implementation and on-going management of a City-wide risk management plan.	H	H	M
CoM Marina and Waterways	+ Project manager for the CHRMAP + Responsible for the review and implementation of the City's Coastal Adaptation Plan.	H	H	H

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Table 4 Stakeholder Analysis (continued)

Stakeholder	Relationship To Project	Interest	Impact	Influence
Aboriginal Community				
South West Aboriginal Land and Sea Council (SWALSC)	+ The Gnaala Karla Booja Aboriginal Corporation is a member of the SWALSC, which is the Central Services Corporation for the South West Native Title Settlement.	L	L	L
Gnaala Karla Booja Aboriginal Corporation	+ The project area sits within the Gnaala Karla Booja region. + Office in Bunbury	L	L	L
Local Elders and Knowledge Holders	+ As the traditional owners of land within the study area, the Bindjareb People. + The Aboriginal community of Mandjoogoordap are the custodians of the land and have a strong connection to waterways, rivers, lakes, the estuary and the ocean and coastal plains creating an historic thoroughfare in Mandurah today. + May have knowledge of obscure Aboriginal sites in the study area.	H	M	L
Our Knowledge, Our Land	+ Bilya Country Story Trail consists of 13 sites, usually close to a water body, none of which on the ocean-facing coast. + May have knowledge of obscure Aboriginal sites in the study area.	M	L	L
Mandjoogoordap Dreaming (business)	+ Aboriginal business and cultural advisory.	L	L	L
Winjan Aboriginal Corporation	+ Provide cultural services, Aboriginal input into decision making, and community services to Aboriginal people in the area.	M	M	L
Winjan Reference Group	+ Recommended initial contact by the City's Community Development team. + Key contact include George Walley and Franklyn Nannup.	M	M	L
Koolbardies Talking Mandurah	+ Meeting place for Indigenous and non-Indigenous women, providing an opportunity to share stories and change public perceptions. + Active sub-group of Winjan Aboriginal Corporation.	M	M	L

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Table 4 Stakeholder Analysis (continued)

Stakeholder	Relationship To Project	Interest	Impact	Influence
City's Community Development team	+ City's point of contact for coordinating engagement with the local Aboriginal community	M	M	L
Community Committee, Working Groups and other local stakeholders				
Peron Naturaliste Partnership	+ A cross-government partnership working on the coastal hazard planning and management for the project area.	H	H	H
Peel-Harvey Catchment Council Inc. (PHCC)	+ Corporate body that promotes sustainable natural resource management within the catchment. + The study area is within the catchment of Peel-Yalgorup Ramsar System. + May be interested in management options.	H	M	M
Mandurah Environment & Heritage Group (MEHG)	+ Set up in conjunction with the City of Mandurah's Community Development Team in April 2012.	M	M	M
Bouvard Coast Care Group	+ Active local conservation group in coastal rehabilitation and amenity uplift programs, also part of MEHG.	H	H	M
Estuary Guardians Mandurah	+ Dolphins rescue and research group at the Dawesville Cut	M	M	L
WA Seabird Rescue	+ Rescue and rehabilitate seabirds active in the area.	L	L	L
Coastal Waste Warriors	+ Active local conservation group runs monthly clean up events at different locations around Mandurah's beaches and waterways.	H	H	M
Port Mandurah Ratepayers Association	+ Active resident groups in the study area.	H	H	M
Wannanup Ratepayers Association		H	H	M
Seascapes Community Association	+ Active resident group in the study area. + Involved in the 3km coastal Interpretive Signage Walkway from Daydream Plaza to Gretel Drive.	H	H	M

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Table 4 Stakeholder Analysis (continued)

Stakeholder	Relationship To Project	Interest	Impact	Influence
South Halls Head Primary School	+ Local schools participated in the Seascapes Interpretive Walkway project. May share local knowledge and have interest in the CHRMAP project. + Halls Head College are active in dune revegetation works.	M	L	L
Halls Head College		M	L	L
Other local schools	+ Halls Head Primary School + Frederick Irwin Anglican School + Falcon Primary School + Ocean Road Primary School + St Damien's Catholic Primary School	M	L	L
Mandurah Southern Districts Volunteer Bush Fire Brigade	+ Local volunteers working to protect or assist natural areas and the safety and wellbeing of people in the project area. + Will have an interest in having input into the project and understanding how the CHRMAP will impact the future of the area. + Changes to access in adaptation plans may hinder rescue services in extreme events.	L	M	L
Mandurah State Emergency Service		M	M	L
Marine Rescue Mandurah		L	M	L
Mandurah Volunteer Fire & Rescue Services Association (VFRS)		L	M	L
Port Bouvard Surf Life Saving Club	+ The club building located adjacent to the sand trap site south of the Dawesville Channel. + Annual Cut 2 Club Swim along the Dawesville Channel (The Cut) + Changes to the sand bypassing operation may affect their activities.	H	M	M
Mandurah Board Riders	+ Community shortboard surfing club that runs a junior summer series event and senior winter series event along the coast.	M	H	L
Surfing WA/World Surf League	+ May host event on the surf beach in the study area.	L	H	L
Kitesurfing WA	+ Use Avalon-Falcon-Gearies and the Avalon boat ramp as launching zone. + Changes to beach condition may affect the sport.	M	H	M
Mandurah Ocean Club	+ Aka Mandurah Ocean Paddlers and Mandurah Outrigger Canoe Club, based in Halls Head.	M	H	L

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Table 4 Stakeholder Analysis (continued)

Stakeholder	Relationship To Project	Interest	Impact	Influence
Mandurah Surf Lessons (Star Surf and Skate)	+ Local surf school runs lessons at Mandurah Wedge (Pyramids), Avalon and Falcon.	M	H	L
Mandurah Mannas Swimming Club	+ Aka Mandurah Masters Swimming Club + Swims at Doddies Beach at Halls Head.	M	H	L
Mandurah Triathlon Club	+ Race event uses the coast line near Halls Head	M	H	L
RecFish West, Fishability WA and Diving organisations	+ Organisations with an interest in access to and use of marine environment.	L	L	L
Mandurah Offshore Fishing and Sailing Club (MOFSC)	+ Based in Mandurah Marina (outside of the study area) + Members may have interest in implementation plan	L	L	L
Powered craft users (boats, jet skis, paddles, etc.)	+ Boat ramps for beach launching + Others access via MOFSC	L	L	L
Mandurah Fishing	+ Active local fishing Facebook group with 6.8k members. + Changes to access on beach may impact the user group	L	L	L
Tims Thicket/White Hills Responsible 4WD Group	+ Active local 4WD Facebook group with 6.7k members. + Changes to access on beach may impact the user group	M	H	H
The Cut Golf Course	+ Hazard line implication to the golf course.	H	H	M
Community				
Property and land owners	+ Owner/occupier and landowners of property on the land affected by the coastal hazard who will be interested in recommendations that impact on the future use of their property.	H	H	M
Residents	+ Residents in the City of Mandurah and user of the beach recreation area who can provide local knowledge and perspective.	M	H	L
Businesses	+ This includes both water and land based businesses whose infrastructure may be impacted.	H	H	M

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Table 4 Stakeholder Analysis (continued)

Stakeholder	Relationship To Project	Interest	Impact	Influence
Youth	+ Youth may have an interest in the projects to understand how the area may be impacted in the future by coastal changes. + Youth Advisory Group.	M	H	L
Broader community	+ The broader community are likely users of the coast even if they do not live directly adjacent to it. Understanding their values about the coast will be important to inform the CHRMAP. + They include residents in nearby local government areas of Murray, Boddington, Waroona who considers the study area their local beach.	M	M	L
Visitors / Tourists	+ Local, regional and international visitors and tourists visit attractions such as the Giants of Mandurah and use of recreational amenities on the coast. + Understanding their values will be important for informing the CHRMAP + Visit Mandurah would be a good contact to represent this group	L	L	L
Media				
Print media	+ Local print media (Mandurah Times, Mandurah Mail, Sound Telegraph) can be used to promote opportunities to get involved with the project. + May be an avenue to voice community concern or interest in the project.	M	M	H
Social media	+ City's active social media (e.g. Facebook, X, Linkedin) can be used to promote opportunities to get involved with the project. + Local community social media platforms may be used to voice concern or interest in the project and will need to be monitored.	M	M	H
Radio	+ Announcement on community radio (Coast FM 97.3, Heritage FM, Radio Fremantle) + May be used by Elected Members or other high profile and interested stakeholders – Mayor Rhys Williams is a regular guest on 97.3 Coast FM.	M	M	H

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4 ENGAGEMENT ACTIONS

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4 ENGAGEMENT ACTIONS

Following the project inception meeting, we will prepare a CSEP (this document). Communications materials associated with the project launch will be prepared to provide the text and content description for project information, opportunities to get involved and generate project awareness.

This section of the CSEP describes the engagement program and actions required during the various project phases.

Each action plan table includes the following details;

- **Activity**: The activity to be undertaken
- **Detailed task**: The individual tasks associated with that activity
- **Communications (Comms) Content**: The list of communications materials required for that task.
- **Responsibility**: Identification of the personnel/organisation responsible for actioning the task.
- **Timing**: Indicative timing of task. As with any planning document, actual dates may change slightly, and actions may be moved accordingly without the need to update this CSEP in its entirety.

The Action Plan needs to be regularly reviewed and potentially updated to guide the implementation of the community engagement and communications actions for the project.

A separate *Communications Content Package* will be prepared that provides all the text for all launch letter, local newspapers and social media and upload of information to the City and other agreed websites will be undertaken in accordance with the approved CSEP and Communications Package.

The action plan tables in section 4 details the roles and responsibilities of the PSC members and the project team as indicated in the responsibility column and should be read as follows:

- SU = Shape Urban
- WT = Water Technology
- CoM = City of Mandurah (Project Manager and Comms team)
- PT = Project Team (SU, WT & CoM)
- PSC = Project Steering Committee



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4.1 Stage 2 Engagement

PROJECT LAUNCH

In conjunction with the project launch, community and stakeholder coastal values for the project area will be collated and collected. This includes:

- A survey that asks the community about values associated with each built and natural asset, including social, environmental, infrastructure and economic values within the coastal zone, and that undertakes an early test of the community's understanding of adaptation options and trade-offs
- A mapping tool where the community can pin 'activities' they value or make comments at specific locations along the project area - pin 'drops' will allow for comments or images to be uploaded by community members
- A series of direct contacts with key identified stakeholders.
- Signage and posters displayed at key locations (particularly beach access points)

This information will also help build on the asset review process undertaken by the project team in Stage 2.

The project team will monitor feedback and escalate any contentious issues throughout the project, including those on engagement platforms and social media.

To launch the project with adequate time to communicate the project with the community and stakeholders plays a critical role in the success of the CHRMAP process. With a tight project timeline, it is essential for all parties to adhere to the action plan as much as possible.

VALUE SURVEY

An online value survey including a mapping tool will be used to collect feedback from the community and stakeholders. The survey will be opened for about 5 weeks to give enough time for feedback alongside the project awareness campaign.

The information collected in this task will be a key input to the multi-criteria analysis (MCA) process described in Stage 5 Engagement and the Benefit Distribution Analysis described in Stage 6 Implementation.

CCRG WORKSHOP 1

During this stage, turnaround times are requested to be quick in order to accommodate CCRG selection process and meeting the program timeline.

Table 5 includes the activities and tasks associated with engagement for the following stages of the CHRMAP process:

- Stage 1 Establish the Context
- Stage 2 Risk Identification
- Stage 3 Vulnerability Analysis
- Stage 4 Risk Evaluation



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Table 5 Engagement Actions - Stage 2 Engagement

Activity	Detailed Task	Responsibility	Timing
PSC Meeting 2	Inception Meeting	PSC	25 Mar '24
Site Visit	Site Visit	PT/PSC	22 Apr '24
Prepare CSEP	Confirm project branding to be used and engagement timing	CoM	Apr '24
	Prepare CSEP to align with City's Engagement Plan and the team's project methodology	SU	Apr '24
	Review of CSEP	CoM/PSC	Mid May '24
	Update and finalise CSEP	SU	Late May '24
Communications Materials	Prepare; + Website content including FAQs + Value Survey (hard copy and online) + Online Mapping Tool + EOI registration for the CCRG + Social media program + Community notices (web and hard copies), displays/posters and email/mail outs + Councillor and staff briefing notes	SU	June '24
	Review all communications content	CoM	Mid Jun '24
	Finalise all communications content	SU	Late Jun '24
PSC Meeting 3	CSEP & Updates	PSC	30 May '24
CCRG preparation	Identify all relevant interest groups that will be a focus for inclusion in key engagement processes	SU/CoM	June '24
	Confirm Community and stakeholders stratification benchmarking	CoM	June '24
Engagement activities preparation	Prepare a schedule of all engagement activities throughout the project timeframe	SU	June '24
	Program all event dates and book all venues/ catering	CoM	June '24
PSC Meeting 4	Hazard Mapping discussion and Stage 2 Engagement messages	PSC	20 Jun '24
Council Briefing 1	Project overview and CSEP presentation	PT	16 Jul '24

The timing is indicative. Please refer to the *Communications Content Package* for finalised tasks and dates.

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Table 5 Engagement Actions - Stage 2 Engagement (continued)

Activity	Detailed Task	Responsibility	Timing
Stage 2 Engagement Launch	Publish website content including FAQs	CoM	early August '24
	Open registration – EOI for CCRG		
	Open online value and mapping survey		
	Send direct mail (addressed letters) to properties within 300 - 500 metres of the coastline and identified beach user groups		
	Publish community notices on website and in local newspaper		
	Display pop-up information		
	Send email notifications to relevant stakeholders and local Members of Parliament		
	Send information packs to Councillors and staff		
	Publish social media content		
CCRG selection process	EOI for CCRG closed, registration data sent for selection process.	CoM	late Aug '24
	CCRG selection process	SU	late Aug '24
	CCRG success notification/confirmation of attendance	SU	late Aug '24
CCRG Workshop 1	CCRG Workshop 1 (6-hour)	SU/PT	early Sept '24
Face to face/online meetings	Coordinate invitations for meetings	SU	late Aug '24
	Aboriginal engagement	CoM/SU	early Sept '24
	Conduct meetings - government stakeholders	SU	
	Conduct meeting - business and community groups (not represented in CCRG or by request)	SU	
	Prepare minutes for all meetings	SU	
Online survey	Close online value and mapping survey	CoM	mid Sept '24
Engagement Outcomes	Draft Engagement Outcomes Report	SU	late Sept '24
	Review Engagement Outcomes Report	CoM/PSC	early Oct '24
	Update and finalise Engagement Outcomes Report	SU	mid Oct '24
Council Briefing 2	+ Stage 2 Engagement Outcomes + Project updates	PT	Sept '24
PSC Meeting 5	+ Engagement Outcomes + Chapter 1, 2, 3 and 4 reporting + Finalise Asset Grouping & Management Units	PSC	Oct '24

The timing is indicative. Please refer to the *Communications Content Package* for finalised tasks and dates.

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4.2 Stage 5 MCA Engagement

CCRG MCA WORKSHOP 2

A second CCRG workshop to present the summary of previous engagement, but importantly to discuss adaptation options and timeframes. How this discussion is facilitated is important given that options will need to be canvassed, which could fundamentally affect how the community functions in the future.

The objective will be to provide input to the evaluation of different adaptation options from the community perspective. With the community, we will develop assessment criteria/scoring that reflects the outcomes of the earlier engagement.

We will establish simple communication around the options and the differences between them.

Where we have done this in previous projects, the community presented highly nuanced criteria and scores, in some cases removing elements from the assessment that we as consultants assumed would be a given. A second benefit is that the community becomes much more aware of the complexity of the decisions being made and will be more likely to support even difficult decisions.

This workshop process will include an assessment of willingness to pay for protection over the marginal/incremental changes in the quantity or quality of coastal assets.

The workshop will continue the collective coastal management approach, and values and outputs will be used as input into the Cost Benefit Analysis.

STAFF WORKSHOP

We propose an internal workshop for staff who are in the directorates likely to be responsible for implementing the CHRMAP to determine the level of support for draft recommendations.

PROJECT UPDATE

The project webpage will be updated with a snapshot of findings from the first round of engagement and those who have registered for updates will receive an update via email. In addition, we will continue to use the following components of the Project Awareness Campaign to reach all interested stakeholders and community members and advertise the Community Workshops:

+ Social media posts
+ E-News article
+ Posters / Flyers

Table 6 includes the activities and tasks associated with engagement for the following stages of the CHRMAP process:

+ Stage 5 Risk Treatment
+ Stage 6 Implementation
+ Stage 7 Monitoring Plan



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Table 6 Engagement Actions - Stage 5 MCA Engagement

Activity	Detailed Task	Responsibility	Timing
Communications Materials	Prepare Updates; + Website content and FAQs + Social media program + Community notices (web and hard copies), displays and email/mail outs + Councillor and staff briefing notes	SU	early Sep '24
	Review all communications content	CoM	late Sep '24
	Finalise all communications content	SU	late Sep '24
PSC Meeting 6	+ Confirm Stage 5 Engagement messages	PSC	Nov '24
CCRG preparation	CCRG project update/confirmation of attendance Invitation	SU/CoM	mid Oct '24
Stage 5 Engagement Launch	Publish updated website content including FAQs	CoM	Jan '24
	Publish community notices on website and in local newspaper		
	Send email updates to registered individuals		
	Send information packs to Councillors and staff		
	Publish social media content		
CCRG Workshop 2	CCRG Workshop 2a (4 hours)	SU/PT	Feb '25
	CCRG Workshop 2b (4 hours)	SU/PT	Feb '25
Face to face/online meetings	Coordinate invitations for meetings	SU	Feb '24
	Aboriginal engagement (if required)	CoM/SU	Feb '24
	Conduct meetings - government stakeholders	SU	
	Conduct meeting - business and community groups (not represented in CCRG or by request)	SU	
	Prepare minutes for all meetings	SU	
Staff Workshop	Implementation actions workshop	CoM	Feb '24
PSC Meeting 7	+ Stage 5 Engagement outcomes + Invite relevant City's staff to discuss options	PSC	Feb '24
Engagement Outcomes	draft Final Engagement Outcomes Report	SU	late Jan '25
	Review Final Engagement Outcomes Report	CoM/PSC	early Feb '24
	Finalise Final Engagement Outcomes Report	SU	early Feb '24
Council Briefing 3	+ Stage 5 Engagement outcomes	PT	Mar '24
PSC Meeting 8	+ Stage 5, 6 and 7 reporting	PSC	Mar '25

The timing is indicative. Please refer to the *Communications Content Package* for finalised tasks and dates.

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4.3 Stage 8 Engagement

In this phase, we will synthesise the information from the technical CHRMAP into a short and easy-to-read document suitable for public communication. Our team spends a significant amount of time working with technical language and converting it to 'normal speak' for communicating with many and varied stakeholders with all levels of knowledge.

This phase of engagement focuses on providing clear information, which is transparent and honest, about the challenges of coastal hazard planning and the cost implications of both doing 'nothing' and delivering adaptation measures.

STAFF WORKSHOP

The draft public-facing CHRMAP for staff review. Noting that the request suggests that the City will present the draft CHRMAP to the Council seeking endorsement to release the plan for community and stakeholder consultation, we will await feedback on the document. We have allowed for attendance at this meeting to hear the discussion but have not allowed for the preparation of a formal presentation.

COUNCILLORS ROUNDTABLE

We propose an in-person round table session with the Councillors at the City to update them on activities undertaken in the project and the outcomes and recommended management actions to discuss the way forward. It is assumed that PSC members will also be in attendance to enable any recommended changes to be considered by the PSC.

COMMUNITY DROP-IN SESSIONS OR PRESENTATION EVENT

Public engagement will be undertaken through two drop-in information sessions, presentations or meetings as determined at the relevant time, with previously identified key stakeholders.

The information session for the local community aims to close the loop on community engagement. At the information sessions (to be held after hours on weekdays or on suitable weekends), the project team and City staff will explain the draft public documents, the process and outcomes, and will advise attendees on how public feedback can be provided.

Public comments that are received by the City will be provided to the project team in a table format. The team will respond to this feedback and, once agreed with the City, will update the public facing CHRMAP as required.

Table 7 includes the activities and tasks associated with the final stage of the CHRMAP project.

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Table 7 Engagement Actions - Stage 8 Draft CHRMAP

Activity	Detailed Task	Responsibility	Timing
PSC Meeting 9	+ Draft CHRMAP presentation	PSC	May '25
Staff Review Workshop	Draft public-facing CHRMAP for staff review	CoM	May '25
Councillor +PSC Workshop	in-person round table session to discuss the recommended management actions and the way forward	PT/PSC	May '25
PSC Meeting 10	+ Finalise Draft CHRMAP + Advertising messages	PSC	May '25
Council Briefing 4	+ Endorse Draft CHRMAP for public comment	PT	May '25
Communications Materials	Prepare Updates; + Website content and FAQs + Social media program + Community notices (web and hard copies), displays and email/mail outs + Councillor and staff briefing notes	SU	Jun '25
	Review all communications content	CoM	Jun '25
	Finalise all communications content	SU	Jun '25
Stage 8 Engagement Launch	Publish updated website content including FAQs	CoM	Jun '25
	Publish community notices on website and in local newspaper		
	Send information packs to Councillors and staff		
	Publish social media content		
	Open public comment for 4 weeks		
Community Drop-in Sessions	Community Drop-in Session 1	SU/PT	early Jul '25
	Community Drop-in Session 2	SU/PT	early Jul '25
Submission Close	Public Comment submission close	CoM	mid Jul '25
	Prepare schedule of submission Table	CoM	mid Jul '25
	Review schedule of submission with recommendations	PT	early Aug '25
PSC Meeting 11	+ Post Advertising schedule of submissions review meeting + Finalise Final CHRMAP	PSC	late Aug '25
Council Briefing 6	+ Final CHRMAP for Council endorsement	PT	Oct '25

The timing is indicative. Please refer to the *Communications Content Package* for finalised tasks and dates.

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5 COMMUNICA-TIONS

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5 COMMUNICATIONS

A key component of the engagement strategy is to provide information in a frank and honest tone - clearly articulating the adaptation options that are being considered through the CHRMAP and providing advice on possible next steps.

5.1 Communication Objectives

The following key communication objectives will assist in reducing the potential for conflicting advice and/or lack of information about project progress:

- Efficient and effective Project Team and Project Steering Committee that meets regularly.
- Scheduled communication activities.
- Consistent messaging from Project Team.
- Clear messaging and lead times regarding timing and scope of consultation periods.
- Single branded communication from a single point of contact as agreed by Project Team (website, phone and email address).

5.2 Communication Goals

The goals for the tone and key messages for the project are:

- Proactive communication with key stakeholders.
- Timely, accurate and non-biased information is provided in a manner that is open, honest and transparent.
- Audiences are informed about the engagement process and care is given to contributions given.
- Majority support for The Project is received.

5.3 Brand Voice

Use the City's brand tone of voice as an approachable leader who adapts their tone-of-voice dependent on their audience.

- Use conversational language when appropriate, but avoid overly matey or familiar tone
- Never be too formal or cold; and, at all costs, avoid coming across as dismissive or unconcerned.
- Avoid language that could be considered bureaucratic, jargonistic or unnecessarily technical.
- Subscribe to a 'Plain English' style that is concise and clear, as it is an important part of the City's commitment to accessibility.
- Keep it visual where possible, using images, illustrations, icons and graphics.

5.4 Sub-Brand

The CHRMAP is a function nested under the City's "Environment" sub-brand.

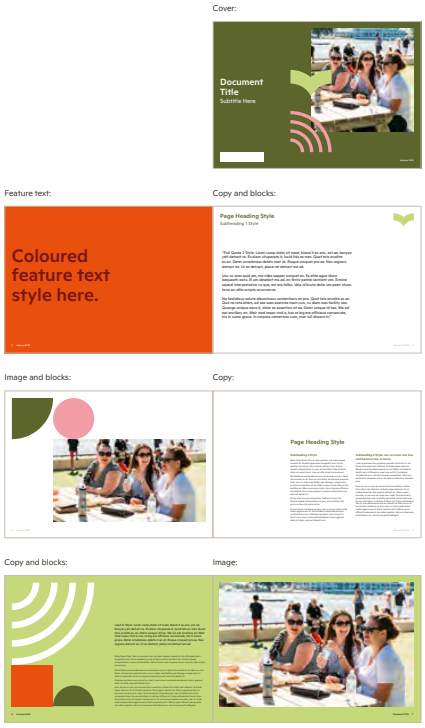
All communication materials, including DMs, social media posting, notices, reports will be branded under the City of Mandurah Environment sub-brand.

CITY OF MANDURAH ENVIRONMENT

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mandurah MATTERS creating a shared vision for our future





5.5 Communication Channels

MANDURAH MATTERS

The project will be communicated using the City's Mandurah Matters engagement portal. it provides a central location for all project information, including background information, frequently asked questions, opportunities for engagement (e.g., surveys and interactive mapping tool), background documents and project contact information.

This will include a registration tool, an interactive mapping tool that will enable the community to 'pin' comments spatially and a survey tool to share their feedback at the relevant times through the project.

OTHER CHANNELS

Other channels that could be used to promote opportunities to get involved with the project and spread awareness include:

+ Direct mail-out to residents and ratepayers, letterbox drop
+ Notices on the City's News and Media section of the website
+ Social media (Facebook, X, Instagram)
+ Emails and letters to relevant/ registered community members and stakeholders
+ E-news notices
+ Signage and information displays in locations (along the Southern Beaches coastline), at the administration building, local community centre, leisure centre, libraries and other prominent sites
+ At community events at local beaches and information sessions
+ Other advertising - print, radio and social media

Project information will also be shared via the Project Steering Committee (PSC) and the City's Cross Functional Team (CFT).

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6 EVALUATION

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6 EVALUATION

Evaluating community engagement involves assessing the quality of the engagement process.

It seeks to measure how well the engagement process was planned, implemented and managed and informs continuous improvement of the engagement approach.

Table 8 describes our targeted reach and engagement. The targets have been estimated based on the number of potentially interested stakeholders identified in Table 4 and existing City's media reach.

Table 8 Engagement Evaluation

Measurement	Target
Engagement Activities	
+ Number EOI for CCRG	120 nominations
+ Formation of the stratified Coastal Community Reference Group (CCRG)	90% match of the stratified sampling
+ Attendance of the members to all CCRG workshops	> 80% of attendance
+ Support for the selected adaptation pathways	80% support
+ In-person engagement activities	65% satisfied or very satisfied
+ Number participating in surveys/activities	250
+ Online engagement activities	65% satisfied or very satisfied
Project webpage (Mandurah Matters)	
+ Total visits	1,500
+ Engaged visitors	200
+ Informed visitors	400
+ Aware visitors	1,200
+ Stakeholder project interest registrations	100
Social Media	
+ Total impressions (reactions, comments and shares)	500

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End of document

SHAPE URBAN



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WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

APPENDIX B
MIKE HYDRODYNAMICS AND WAVE CLIMATE MODELLING



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A-1 Model Tools

Numerical modelling was used to determine the wave climate and hydrodynamics along the Mandurah foreshore area.

DHI's MIKE 21 Hydrodynamics (HD) and Spectral Wave (SW) models were used to investigate coastal erosion and inundation hazards.

- The DHI MIKE 21 Hydrodynamic model resolves the Reynolds-averaged Navier Stokes, depth-integrated hydrostatic equations and is capable of simulating hydraulic and environmental phenomena in oceans, lakes, estuaries, bays and coastal areas.
- The DHI MIKE 21 Spectral Wave (SW) model is a fully spectral wave model that simulates the growth, propagation, refraction and diffusion of wind waves.

DHI MIKE 21 HD and SW models can be run either in coupled or decoupled models, depending on project applications and key coastal processes to be modelled.

In this assessment, coastal erosion hazard is investigated through a coupled HD/SW model with inclusion of 100-year storm event, simulated erosive waves extracted as inputs for beach erosion modelling.

A-1-1 Model Set-up

A-1-1-1 Model grid and Bathymetry

Model domain varies between 61 km wide and 130 km long. The numerical model domain mesh structure and bathymetry is presented in Figure A-3, a zoomed version at the study area is presented in Figure A-4. The flexible mesh allows for high-resolution element model bathymetry to be simulated around the area of interest leading to high accuracy where needed, while maintaining reasonable model simulation time. The numerical model resolution ranges from 1 km across deep offshore extent to incrementally increase in resolution up to 60 m across the nearshore of Mandurah. The shallow nearshore areas cause wave shoaling, refraction and breaking, and therefore highly influence the wave climate at the study site. The higher model mesh resolution closer to the shore in the study area describes the bathymetry in great detail which is important for enhancing the numerical simulation accuracy.
The model bathymetry is referenced to the Australian Height Datum (mAHD), and is based on the following datasets, as described in Table A-1
The bathymetry is developed using WA DoT data up to about 30 m depth, and AusSeabed marine data is used for the rest of the model domain. Refer Figure A-1 and Figure A-2 for the WA DoT and AusSeabed bathymetry variations.

Table A-1 Bathymetry scatter data sets

Dataset	Spatial Resolution (m)	Reference Year	Custodian
WA DoT Bathymetry Portal (Lidar, Multibeam)	10 (Lidar), 1 (Multibeam)	2009(Lidar), 2019(Multibeam)	Department of Transport
AusSeabed Marine Data Portal	250	Not specified	Geoscience Australia

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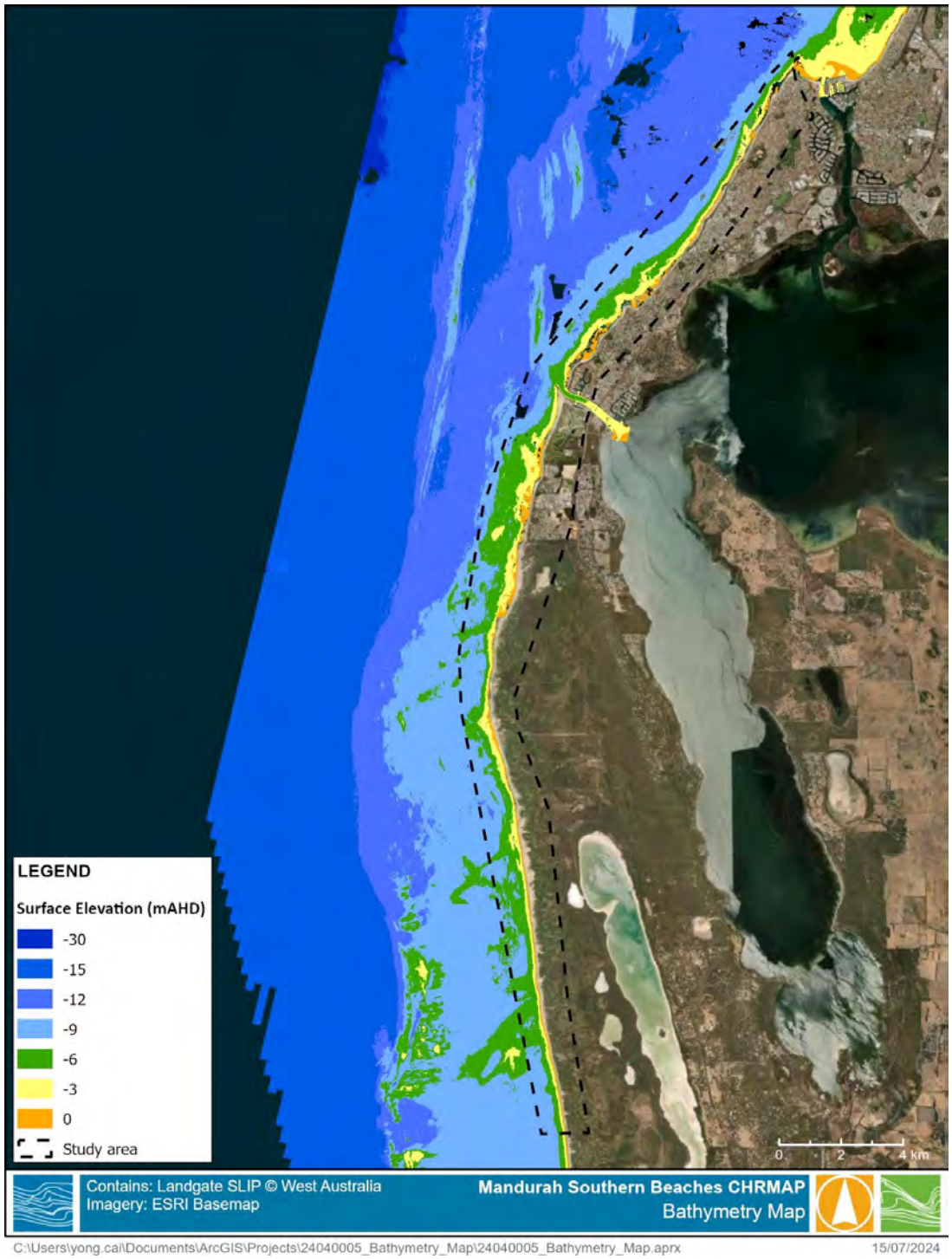


Figure A-1 WA DoT Bathymetry Portal (Lidar, Multibeam) data

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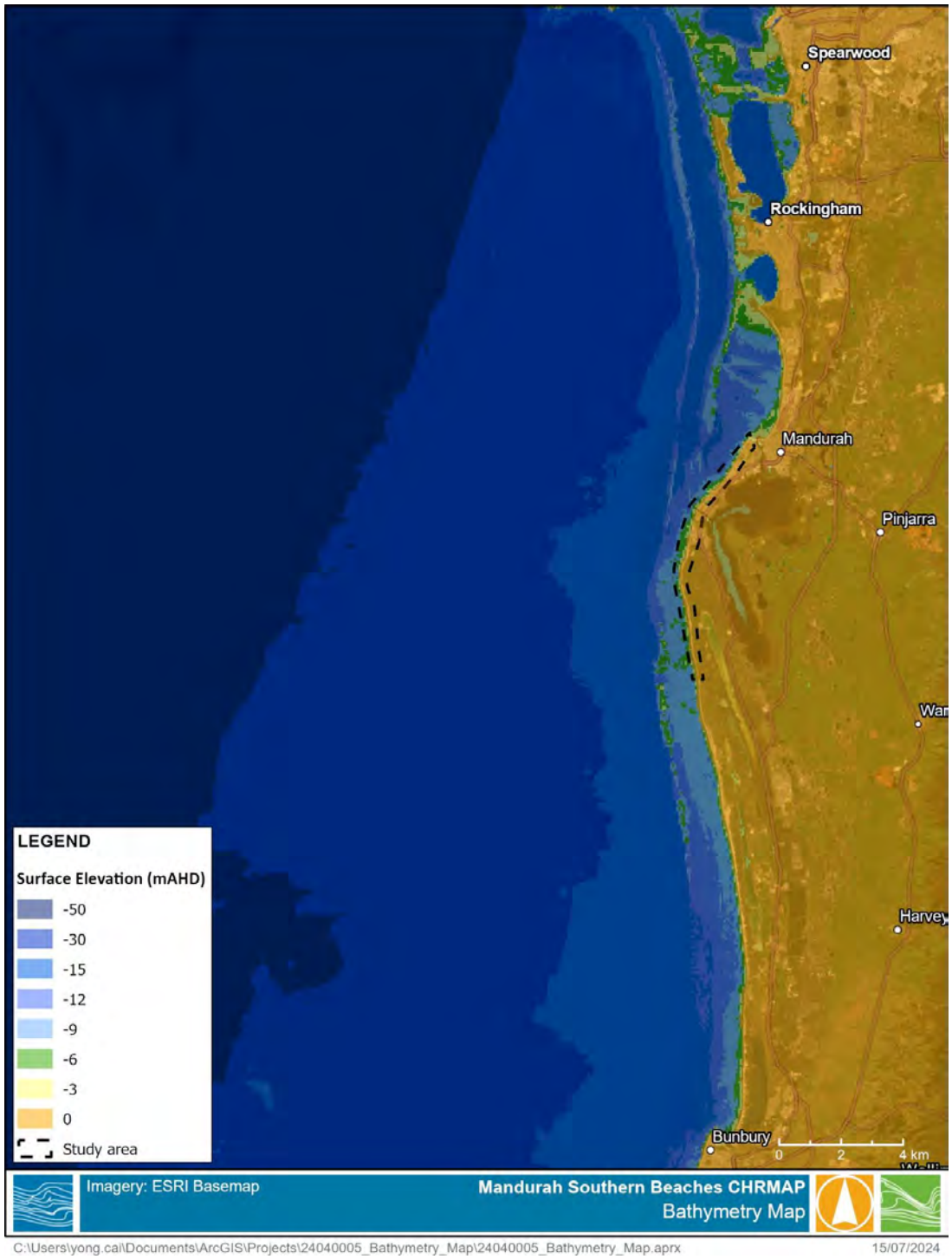


Figure A-2 AusSeabed Marine Portal data

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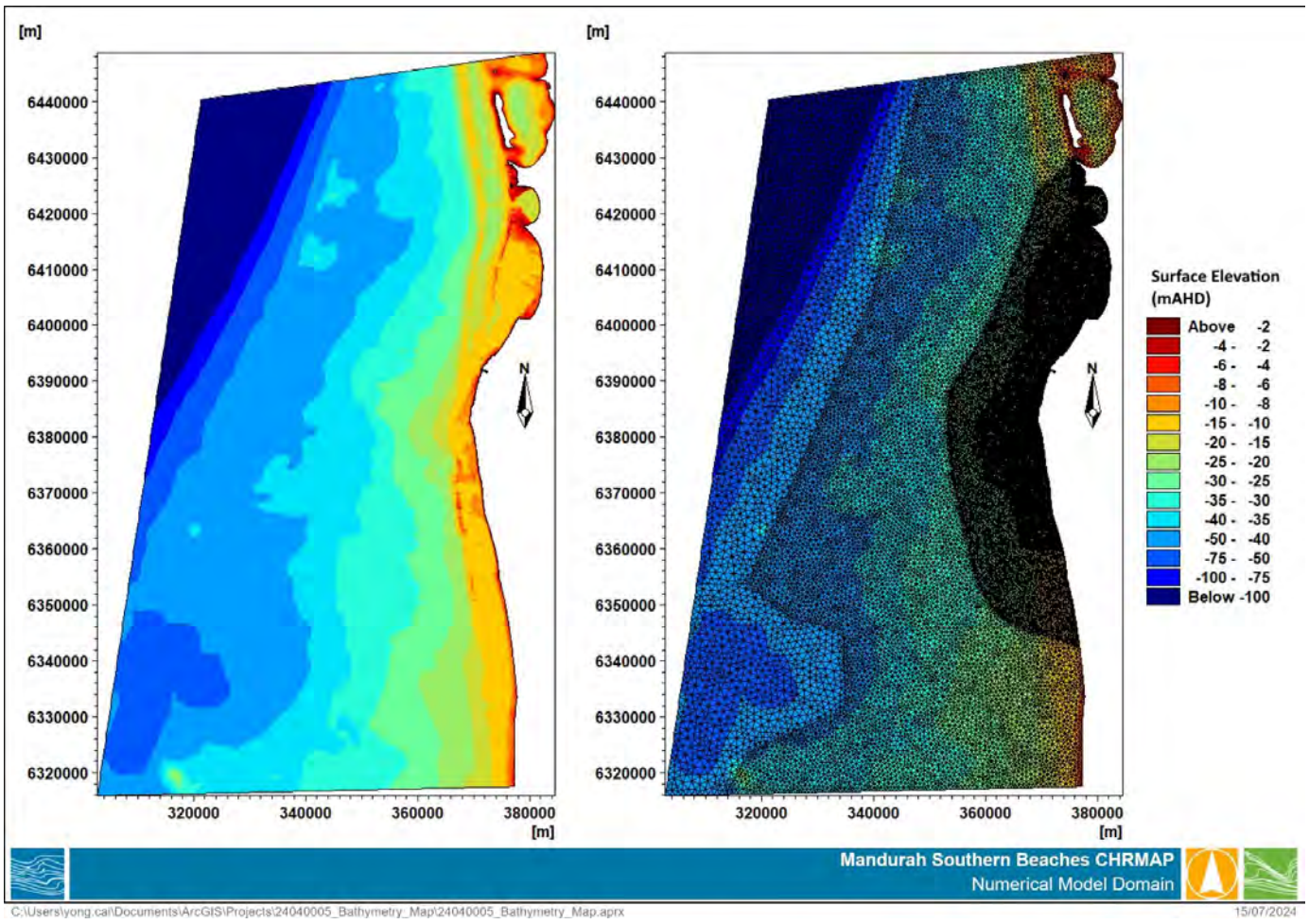


Figure A-3 Numerical model domain with varying resolution

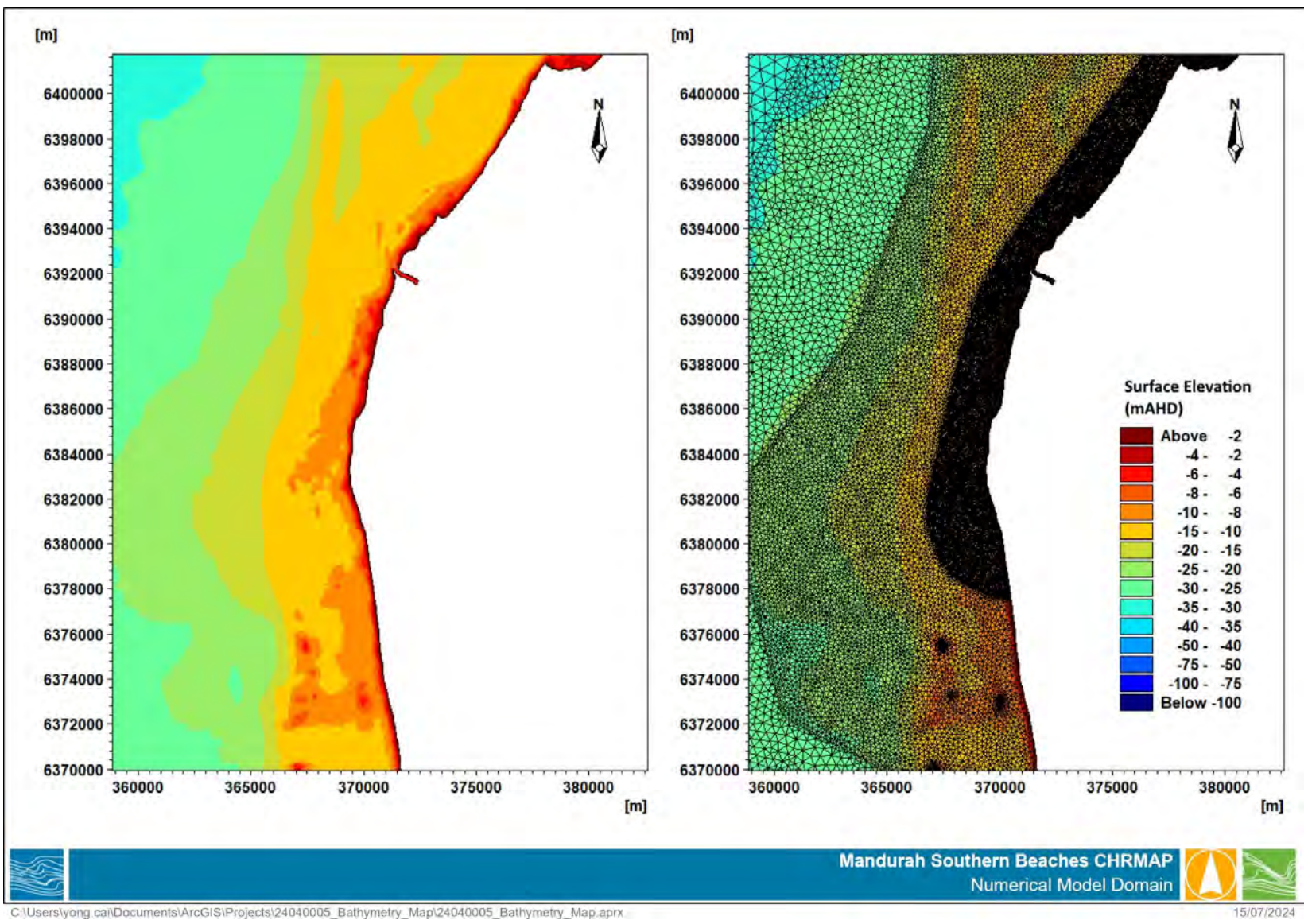


Figure A-4 Numerical model domain with varying resolution near Study area

A-1-2 Model Calibration

A-1-2-1 Input Data

Water Level

The wave model was forced with historical measured varying water levels recorded at Cape Bouvard (-32.601376^{0}S, 115.629983^{0}E GDA 2020), refer Figure A-5.



Figure A-5 Location of Water Level measurement

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Wind

ERA reanalysis modelled wind data was used to force the wave model, applied varying in time and space across numerical model domain. Comparing ERA 5 wind data with BoM wind data available for Mandurah (at -32.5219, 115.7119 LAT/LONG), it is identified that ERA 5 data provides better representation of wind field over the study area, and it provides higher wind speeds, and provides the worst-case scenario in terms of wind generated waves and water levels.

Wave

Measured wave data (significant wave height, peak wave period, swell wave direction) at Rottnest (-32.0941540S, 115.4077890E GDA 2020) was used to force wave model offshore boundary. Refer Figure A-6 for location of measurement. Department of Transport measured wave data is available for three locations relevant to the study area. However, based on the distance to the study area Cape Naturaliste measurements were identified as irrelevant. Based on the previous numerical models for western Australia coasts, it is understood that for accurate simulation of wave climate, the numerical model domain needs to extend at least to 50 m depth offshore. Hence measured wave data at Rottnest is used in the present study, please note, measured data for Mandurah is available at 30 m depth. Tremarfon (2019) presents analysis of recorded wave data near the study area and their findings support use of the deeper Rottnest wave data to force the model.

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Figure A-6 DoT Wave Buoy Data Measurement Locations

Model Setup

A directionally decoupled parametric formulation, with quasi stationary formulation was applied. This approach is less computationally heavy compared to a fully spectral model with a non-stationary time formulation, and still resolves the wave processes at a level of accuracy suitable for present scope.

The model versions were calibrated by tuning mesh resolution, bed roughness, wave breaking coefficient (gamma), and the resolution of the directional discretisation. The model was calibrated against deep-water measured wave at Mandurah (30 m depth) and the nearshore, near the study area at Mandurah (10 m depth). Refer Figure A-6 and Figure A-7 for the locations of wave data measurements. Figure A-6 shows the measurement location at Mandurah at 30 m depth, and Figure A-7 shows the two AWAC measurements locations at 10 m depths.

The wave model was calibrated for a period of three months, June to August in 2015. The AWAC measurements are available from 2014 to 2017, however continuous data set is available for the year 2015.

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Since the purpose of this model is to simulate a storm condition, the winter time is selected for calibration, since critical high waves are present in winter months. Validation plots are presented in Figure A-8 to Figure A-10, for Mandurah measurement and for AWAC measurements respectively. The time series plots show a good agreement between the modelled and measured data, with simulation results following the trend of significant wave height (Hs), peak period (Tp) and mean wave direction, particularly during peak events which confirms the model's capability in simulating storm events.

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Figure A-7 AWAC Data Measurement Locations

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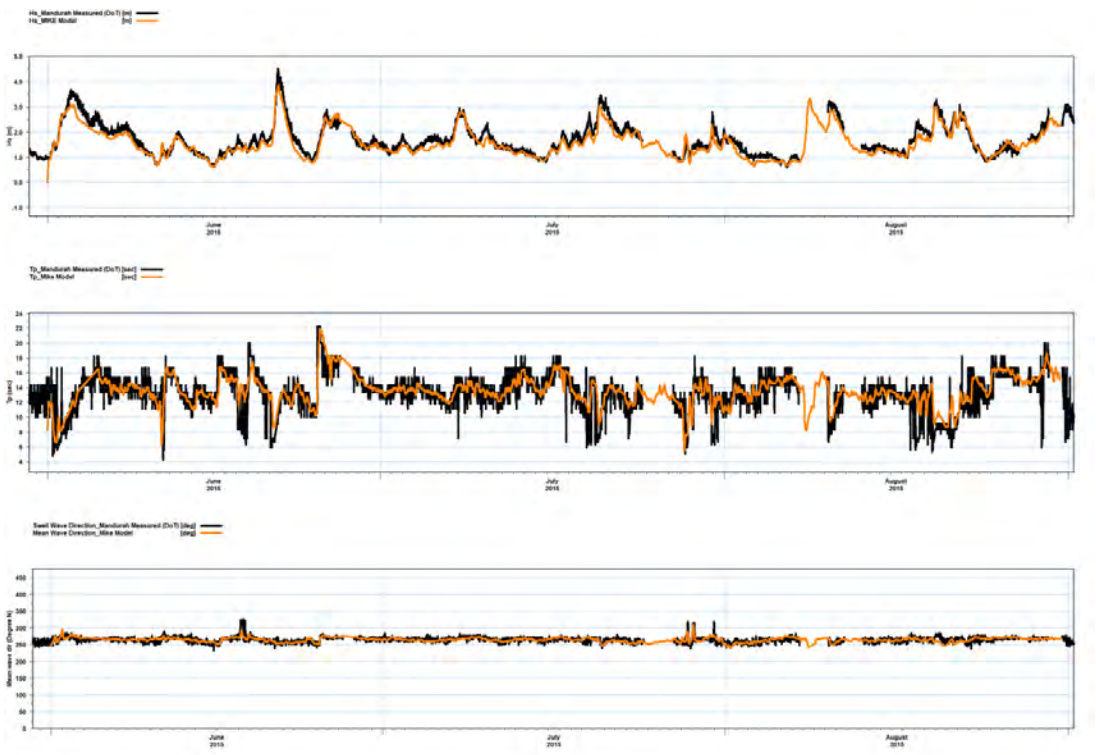


Figure A-8 Numerical model calibration, comparison with measured data at deep water, measured data at Mandurah (-32.452787^{0}S, 115.572227^{0}E (GDA 2020), 30 m depth

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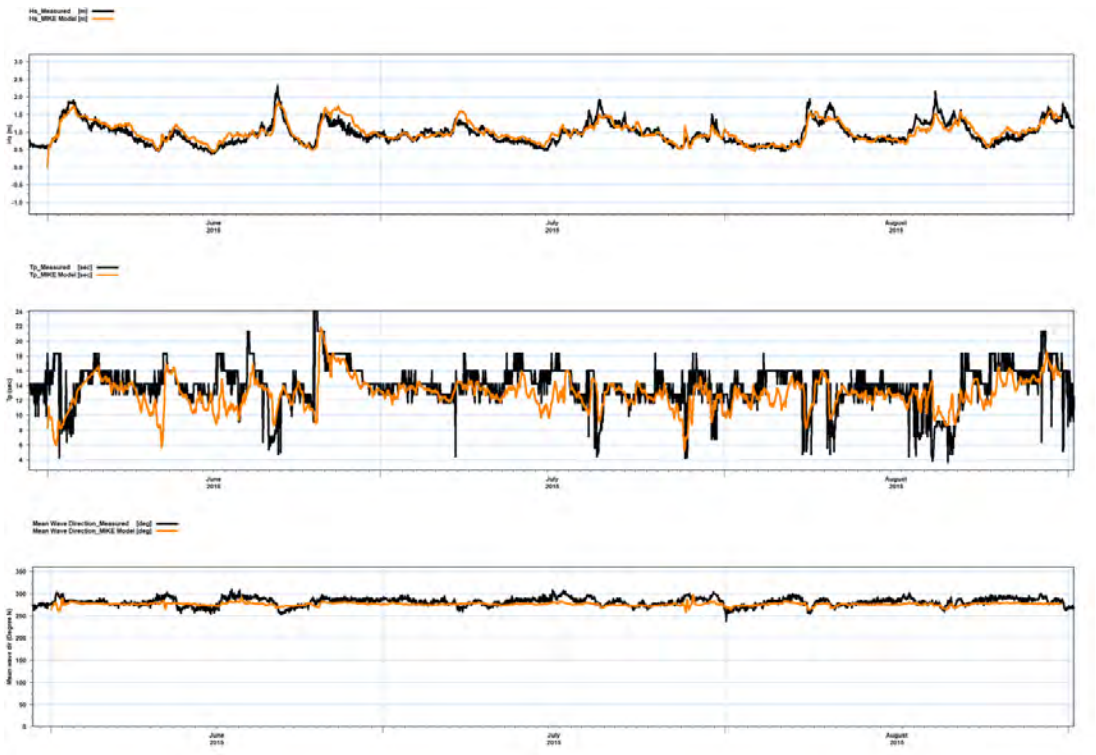


Figure A-9 Numerical model calibration, comparison with measured data at shallow water, measured data at Mandurah (-32.468120^{0}S, 115.720744^{o}E (GDA 2020), ~10 m depth

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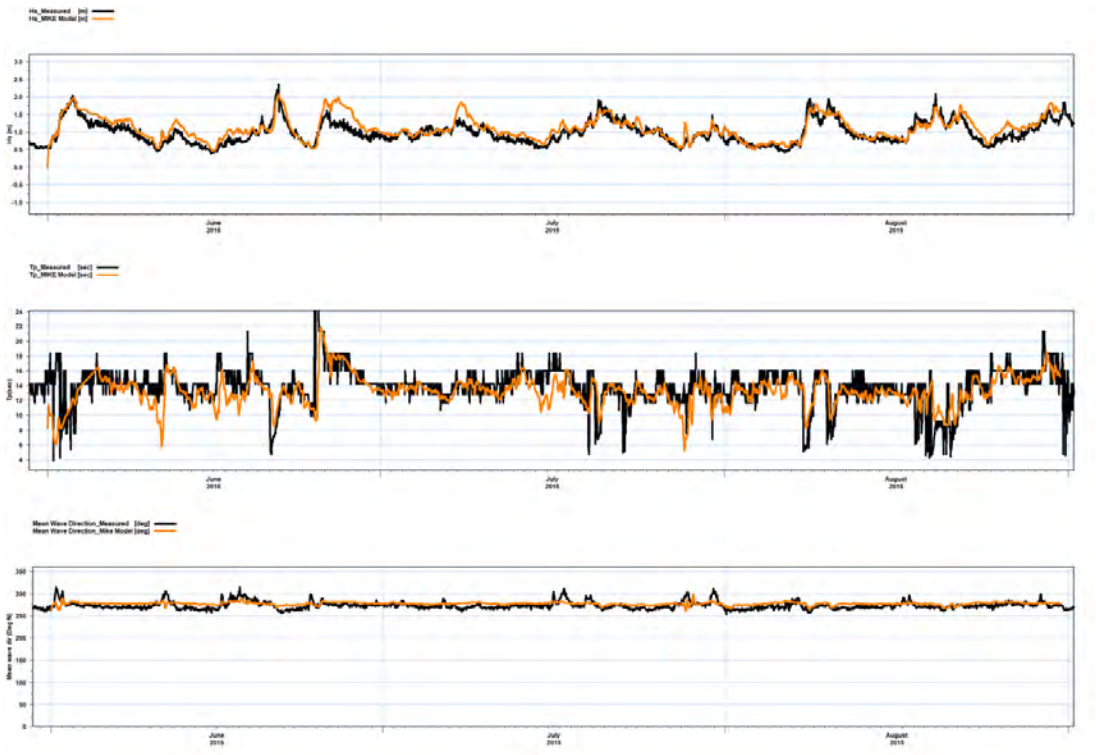


Figure A-10 Numerical model calibration, comparison with measured data at shallow water, measured data at Mandurah (-32.491287^{0}S, 115.708778^{o}E (GDA 2020), ~10 m depth

A-1-3 Model Application

The calibrated model was used for 100-year ARI simulation following the SPP 2.6 guidelines. Storm conditions developed by MP Rogers (2018) were used. Based on available storms, Metropolitan/Peel was identified as relevant to study area. Both 100a storm and 100b storm were simulated. The simulation was run in HD/SW coupled mode, to allow for water level feedback into wave calculation and vice versa. The model was forced with water level, wind and wave parameters as per MPRA 2018, refer Figure A-11 to Figure A-13.

Based on the results of 100a storm and 100b storm, the wave parameters and water levels were extracted at end of each of selected beach profiles for SBEACH model. Based on extracted data, 100b storm was selected for SBEACH model for erosion hazard assessment, refer Appendix B.

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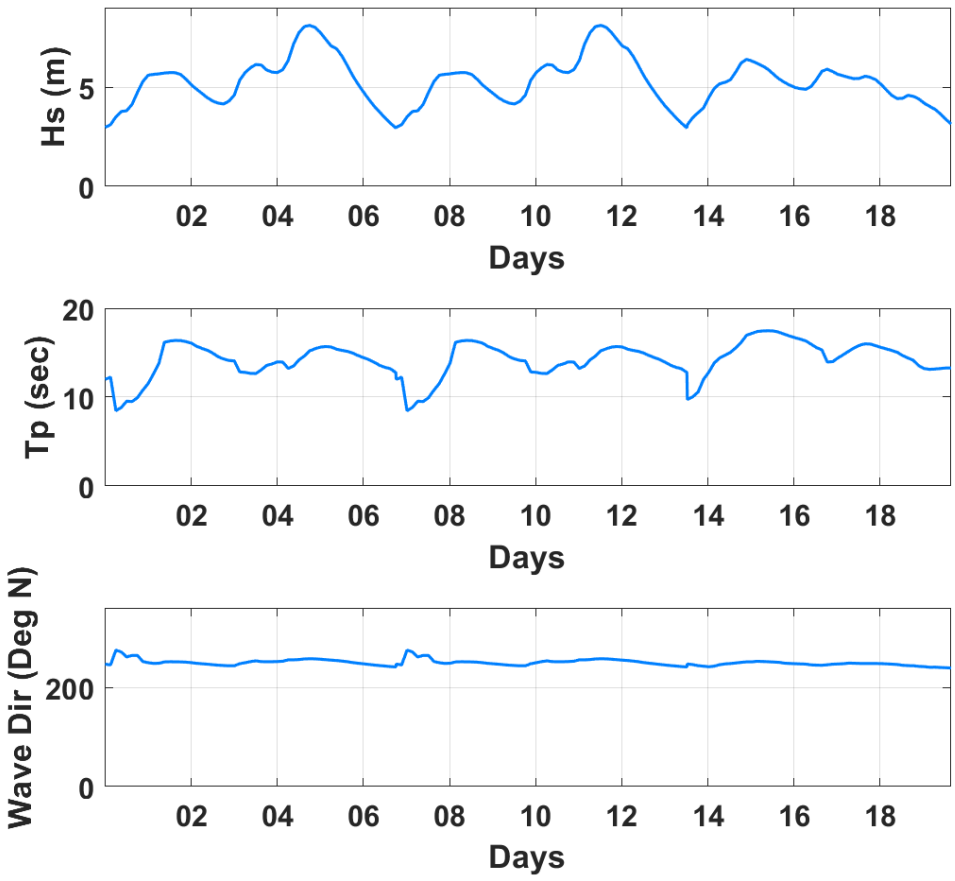


Figure A-11 Wave parameters: Hs (m), Tp (sec), Wave direction (Deg N), 100b-year ARI (MPRA, 2018)

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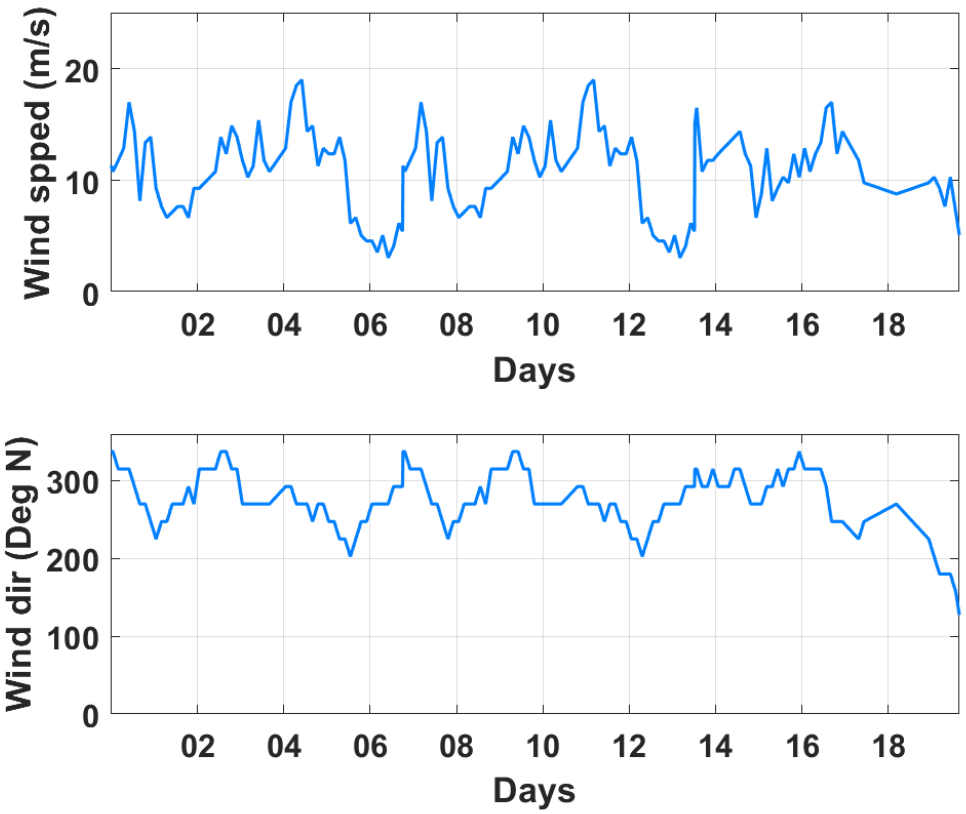


Figure A-12 Wind parameters: Wind speed (m/s), Wind direction (Deg N), 100b-year ARI (MPRA, 2018)

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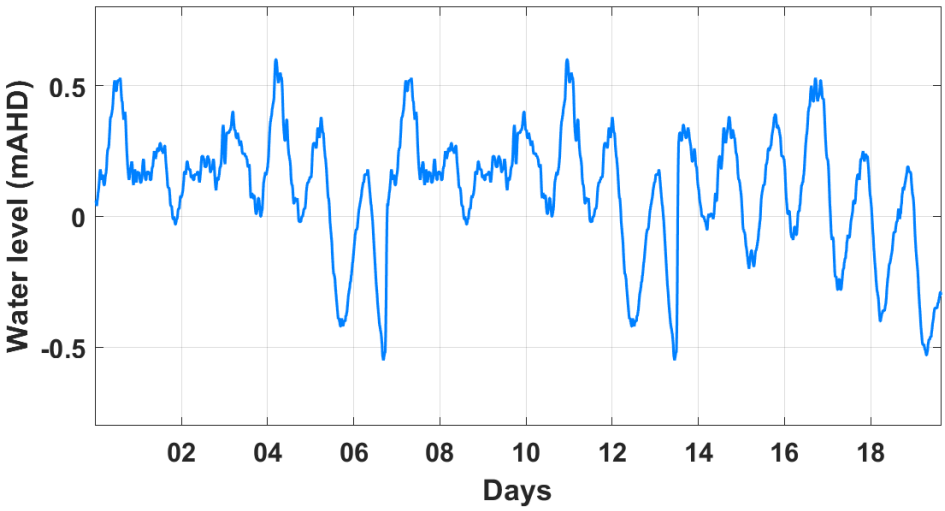


Figure A-13 Water level (mAHD), 100b-year ARI (MPRA, 2018)

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APPENDIX C
SBEACH – STORM EROSION HAZARD MODELLING



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B-1 S1-Acute Erosion Allowance

The potential for storm-induced erosion was assessed using the SBEACH numerical model. This model was developed to calculate short term wave induced erosion and has been utilised in a range of studies including numerous shoreline erosion/stability assessments in Western Australia.

For SBEACH analysis profiles were extracted based on WA DoT data (refer Table A-1), and Department of Water and Environmental Regulation Lidar data, DWER, (2008), refer Figure B-1. A regular grid resolution of 1 m grid is applied extending from the landside of the dune system to beyond the depth of closure (profile extend ~10m depth offshore). Having a fine grid in the sediment movement active zone is important for accuracy. Twenty-one profiles were selected over the study area and considering the identified management units. Refer Figure 5-1 for identified Management Units and refer Figure B-2 for selected beach profile locations for SBEACH analysis.

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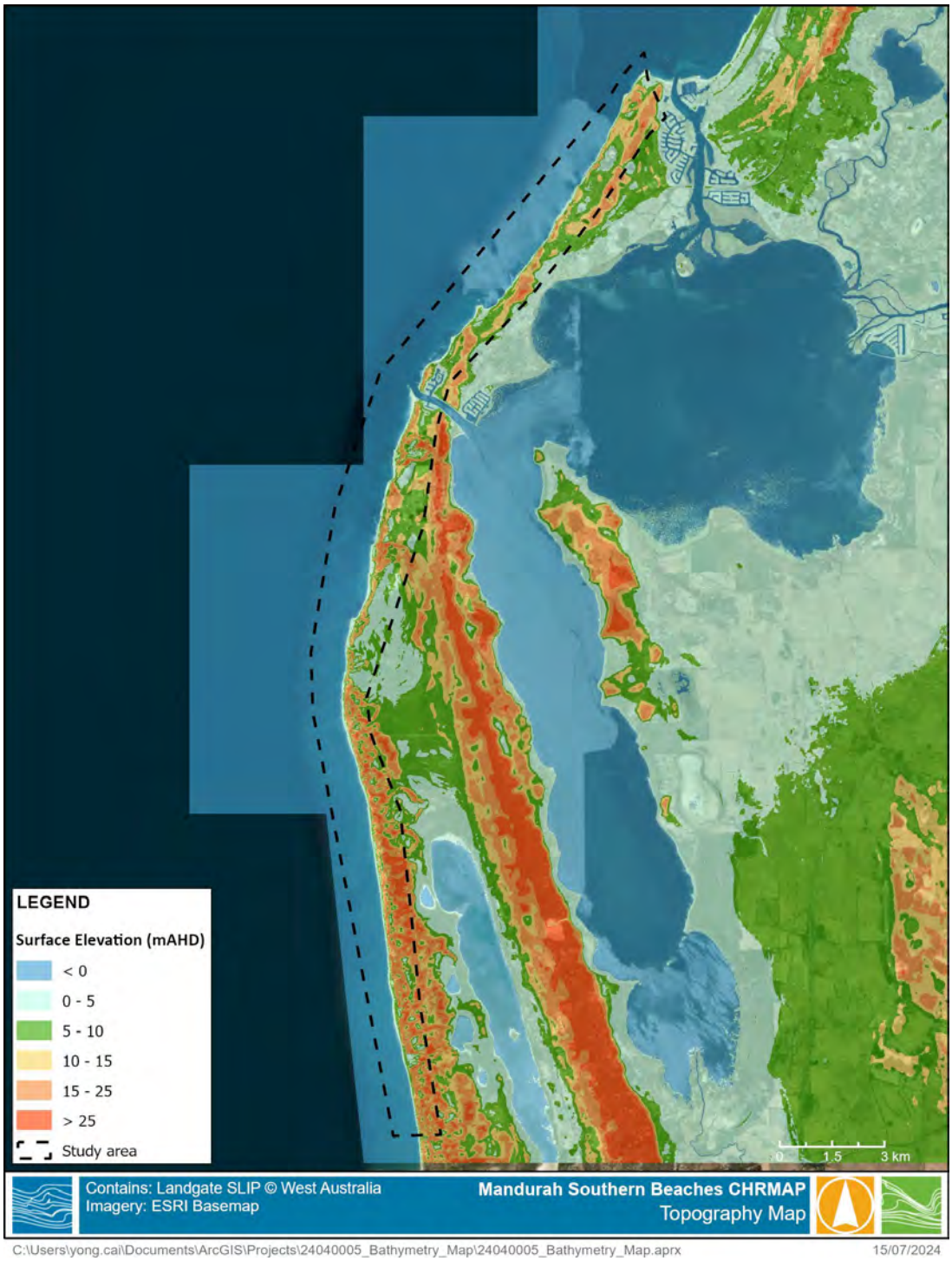


Figure B-1 Topography Data, DWER (2008)

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Figure B-2 Beach profiles for SBEACH Model

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Sediment grain sizes are obtained based on sediment samplings carried in May 2024. Eight sediment sampling locations, representing the study area is identified, refer Figure B-3. Sediment samples were collected at three parts of the cross -shore profile, beach face (top of swash zone), berm top and foredune. A total of 24 sediment samples were collected during the site visit. Laboratory tests were carried for 8 samples which collected at beach face Remaining 16 samples were analysed using SandSnap SandSnap Submission (arcgis.com) web tool . SandSnap is a nationwide database of beach sand grain sizes, led by the U.S. Army Corps of Engineers. The D50 values obtained with SandSnap tool is further refined based on comparison with available laboratory test results. Please refer *24040005_Mandurah Southern Beaches CHRMAP_M03_SBeach* (Water Technology, 2024), submitted to CoM for further details. Refer Table B-1 for sediment diameter, D_{50} (mm). It is noted sediment size gradually increases from Halls Head beach at North towards south end of the study area.



Figure B-3 Locations of sediment samples

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Table B-1 Sediment size inputs for SBEACH modelling

Location	Co-ordinate (GDA 2020)		D_{50} (mm)
	X (mE)	Y (mN)	
1	370116.725	6386306.681	0.31
2	370578.495	6389006.302	0.42
3	371435.738	6391937.653	0.45
4	372536.162	6393616.851	0.36
5	373473.000	6394476.015	0.45
6	375487.612	6396909.324	0.39
7	376524.010	6398532.279	0.44
8	378072.982	6401239.879	0.32
PNP (Damara, 2021)	371207	6372739	0.57

Other model settings e.g., temperature, transport rate coefficient, transport rate decay coefficient, avalanche slope and surf zone depth etc are configured as appropriate and in line with the model manual.

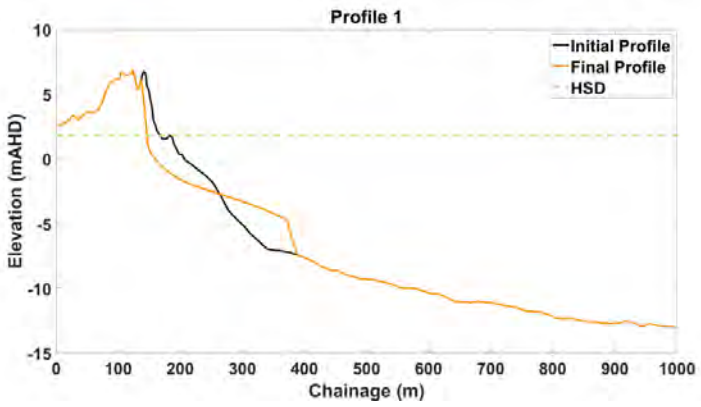
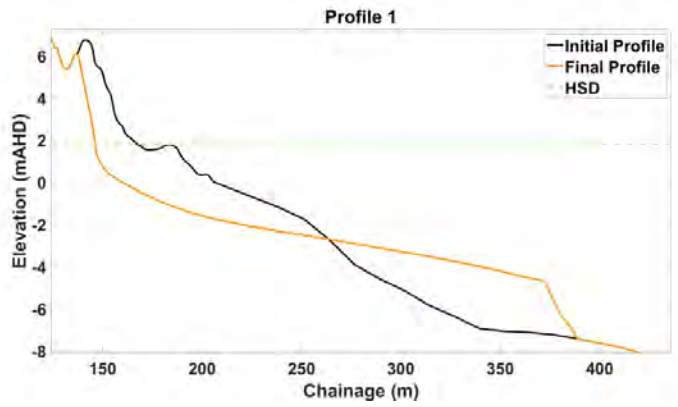
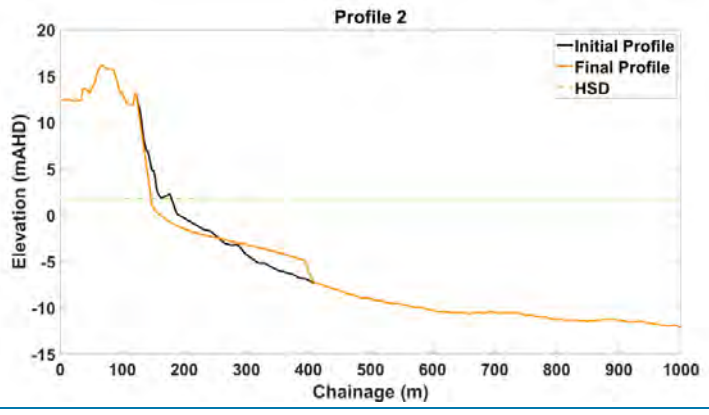
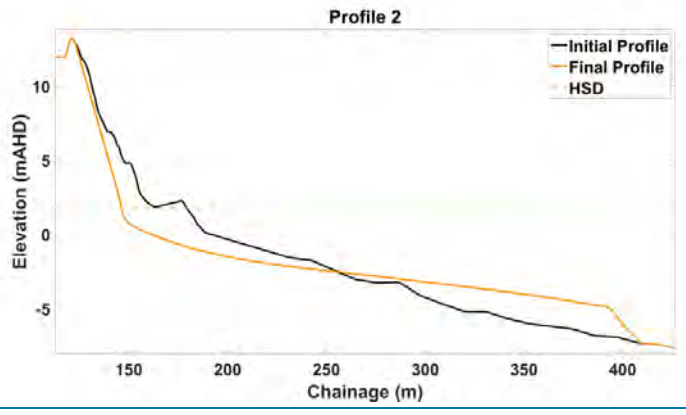
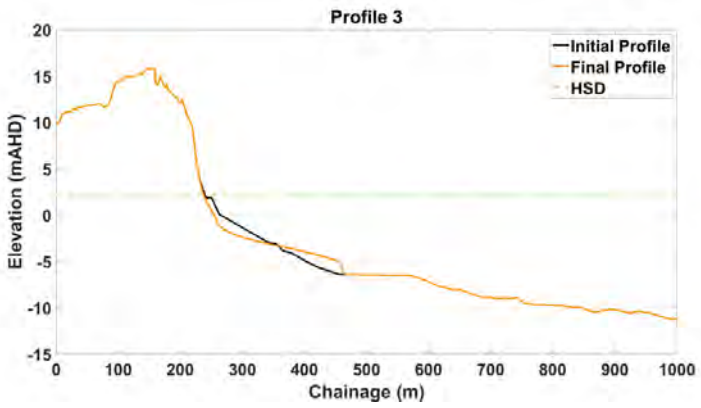
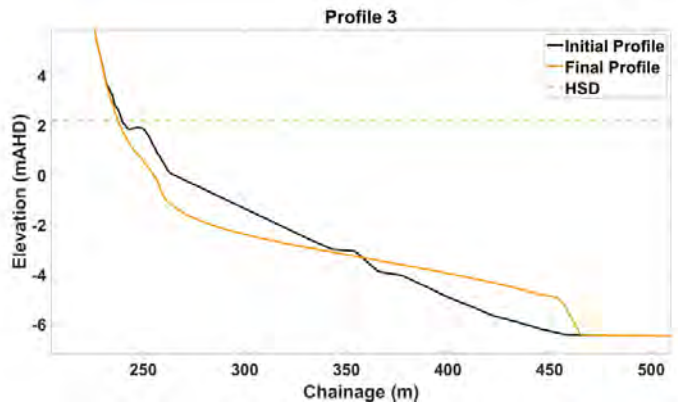
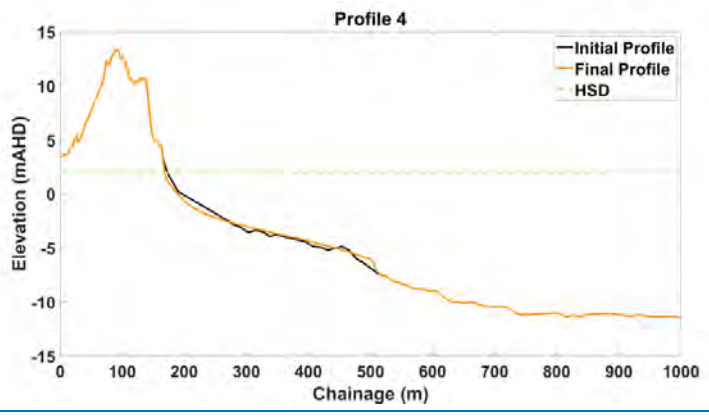
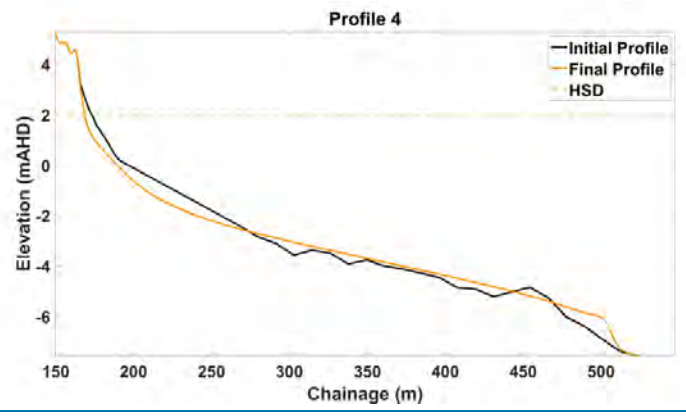
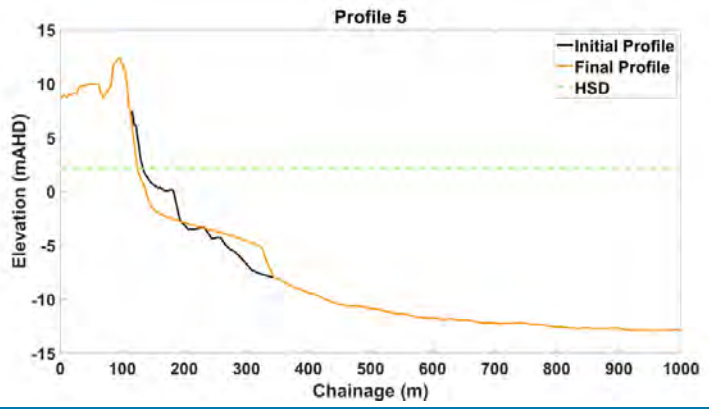
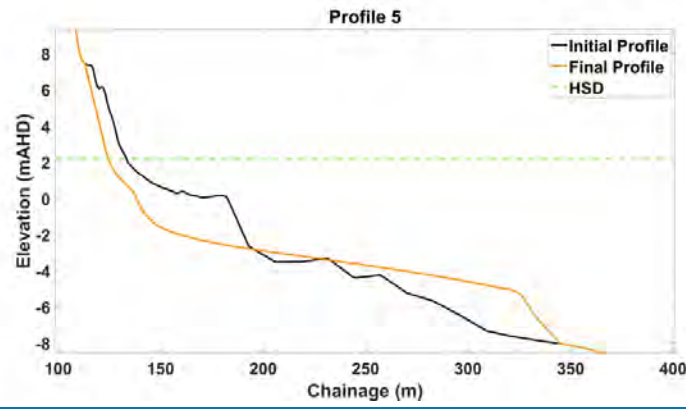
Critical model inputs utilised include:

- Bathymetry data extending beyond depth of closure for all the profiles (~ 10 m depth).
- Time series of water level for each profile as tide plus surge based on 100-year ARI storm (storm 100b from MPRA, 2018) event MIKE 21 HD/SW coupled model simulation.
- Time series of Significant wave height (Hs), Peak wave period (Tp) 100-year ARI storm (storm 100b from MPRA, 2018) event model simulation.
- Wave direction for each profile is set as zero, since the profiles were extracted perpendicular to the beach shoreline, and since the critical wave presents perpendicular to the beach. The exception is P12 which has been run assuming a worst-case scenario of waves arriving in line with the profile orientation.
- Wind forcing is assumed zero, since wind forcing is included into the 100-year ARI storm (storm 100b from MPRA, 2018) model run.

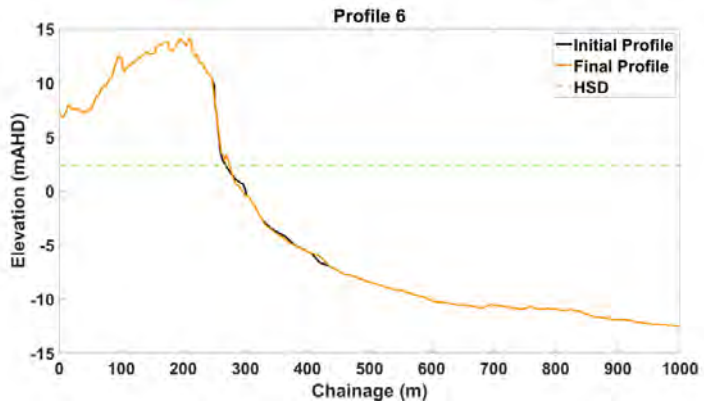
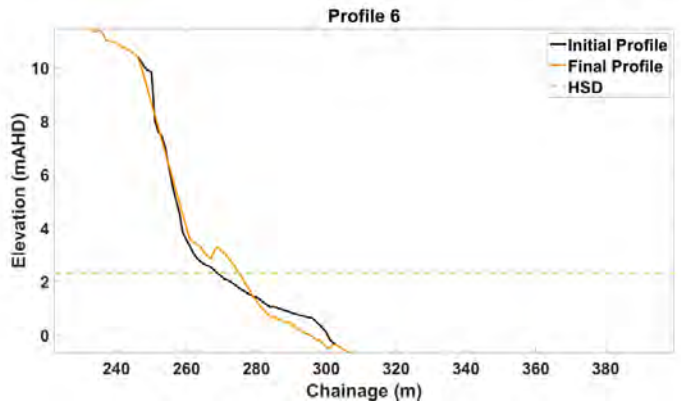
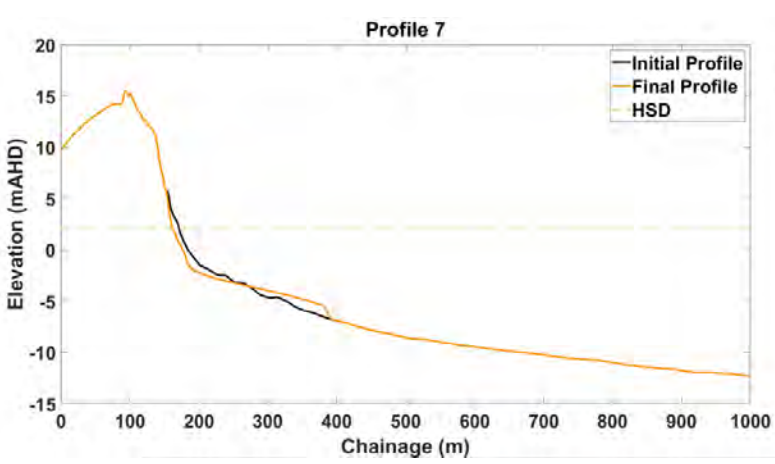
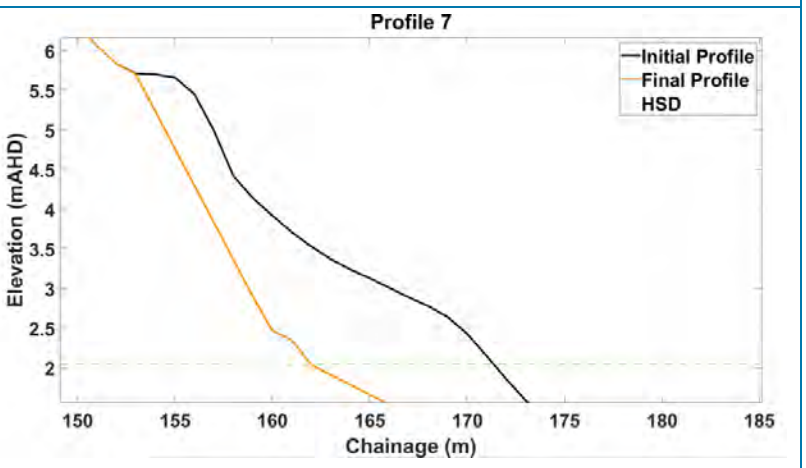
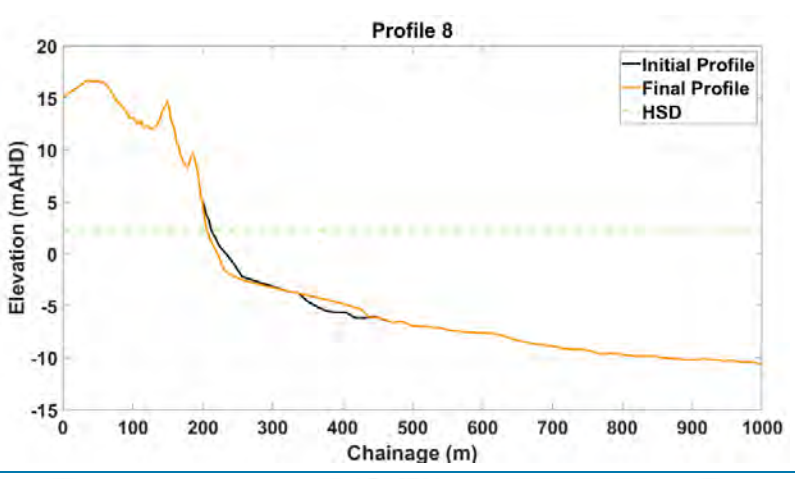
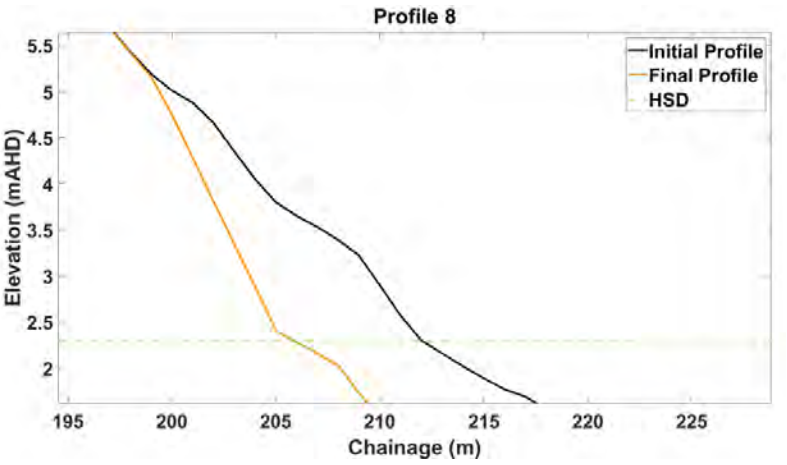
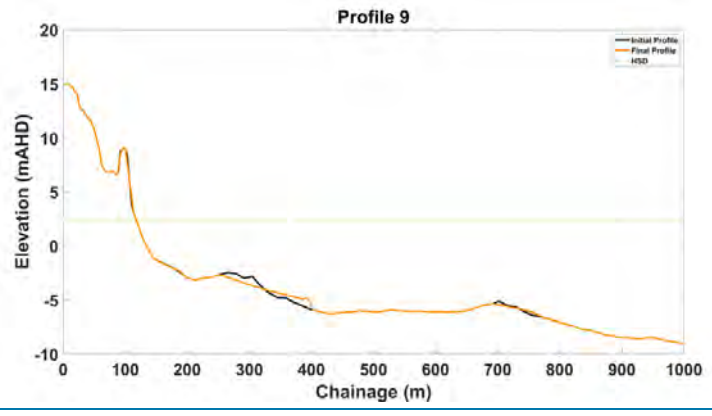
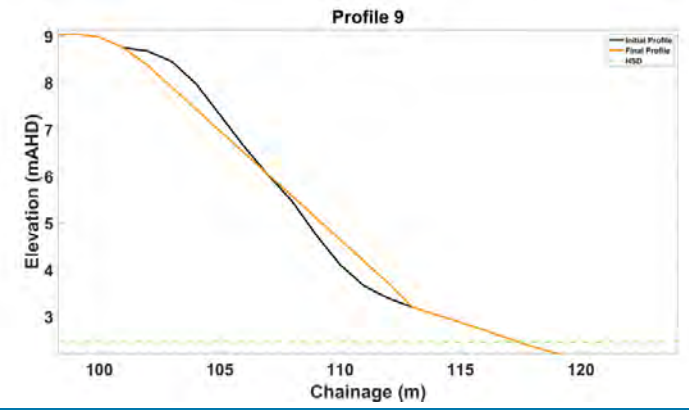
Model results are presented in Table B-2. SBEACH results for the whole profile extending up to depth of closure is presented in left column, a zoomed in version near HSD is presented in right column.

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Table B-2 SBEACH Model Results – for storm 100b from MPRA, 2018

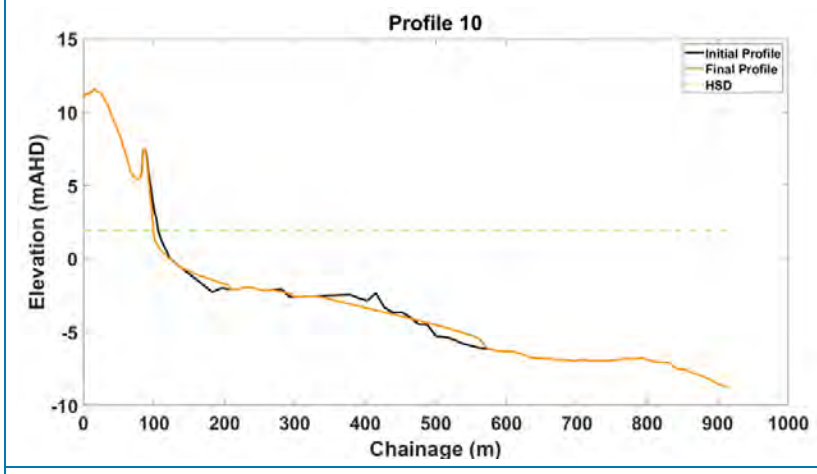
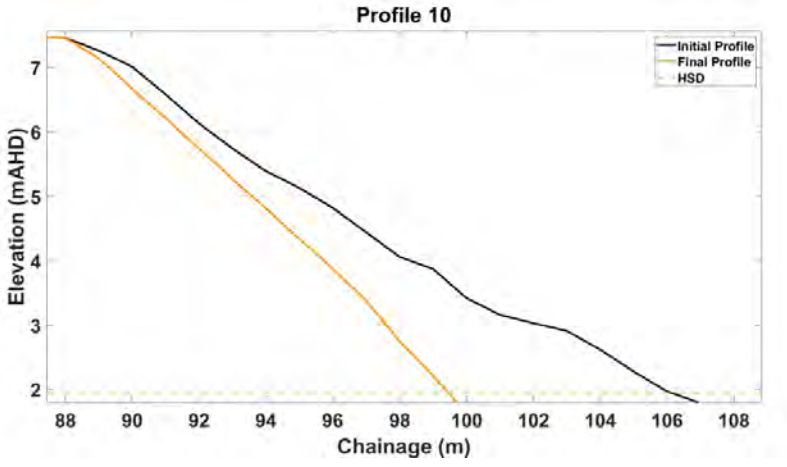
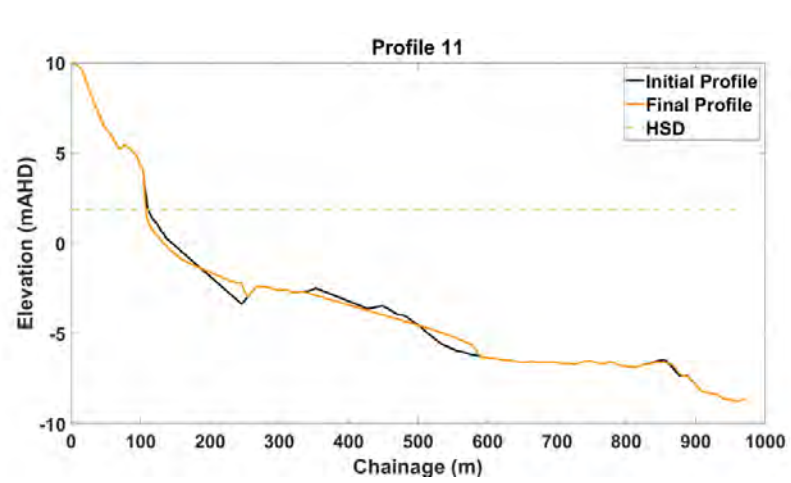
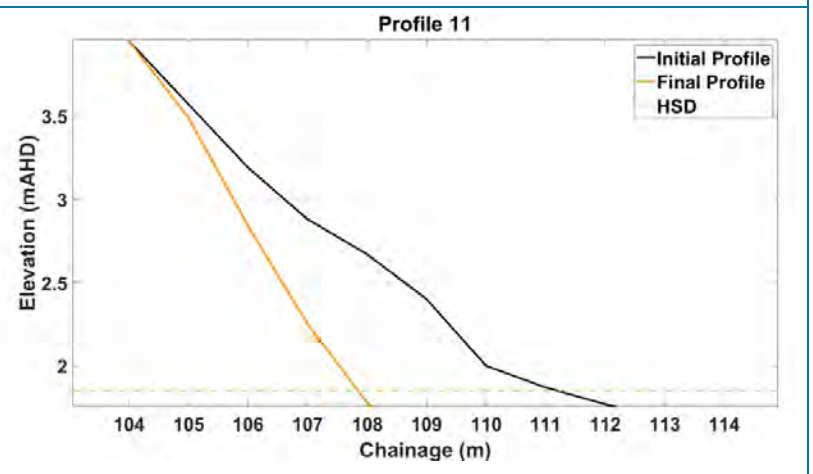
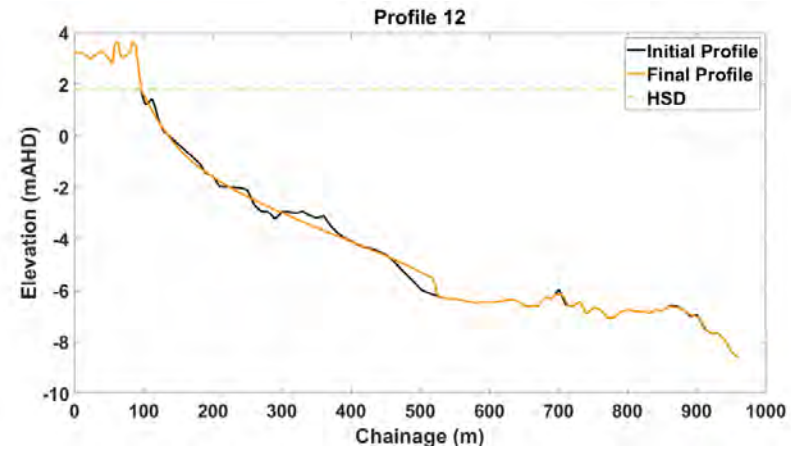
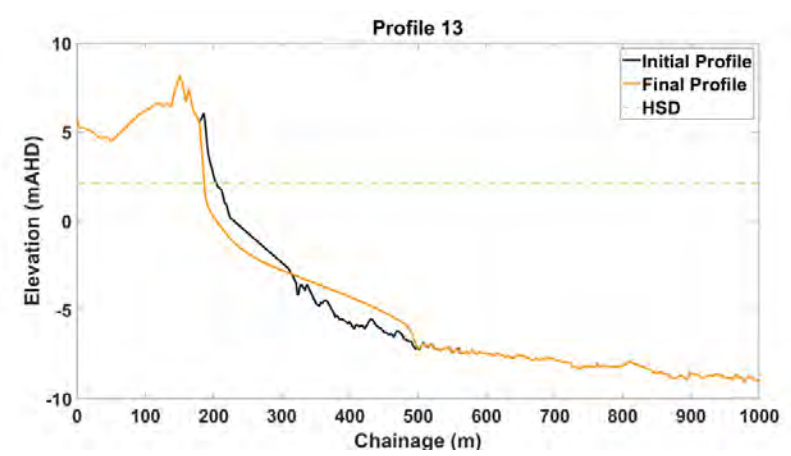
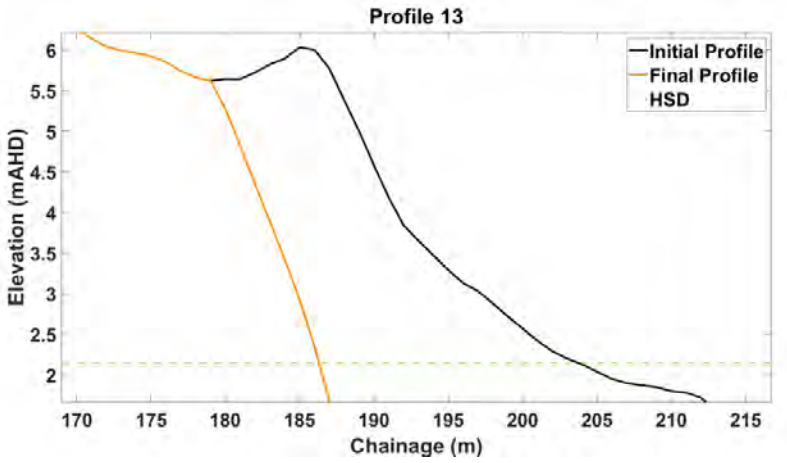
SBEACH Results	Zoomed in at HSD
	
	
	
	
	

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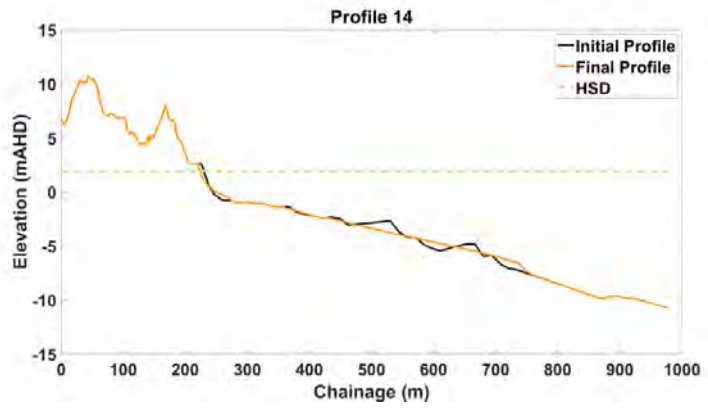
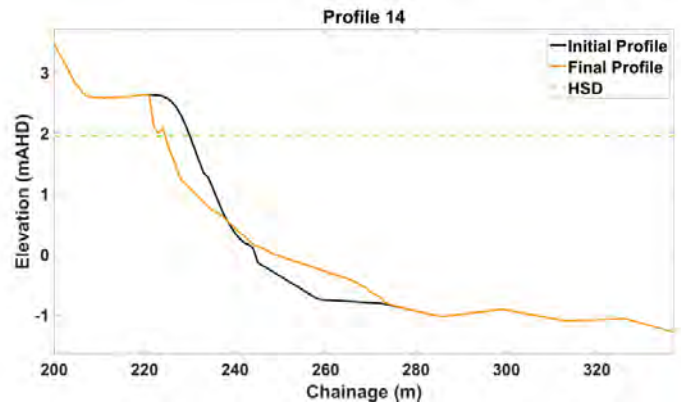
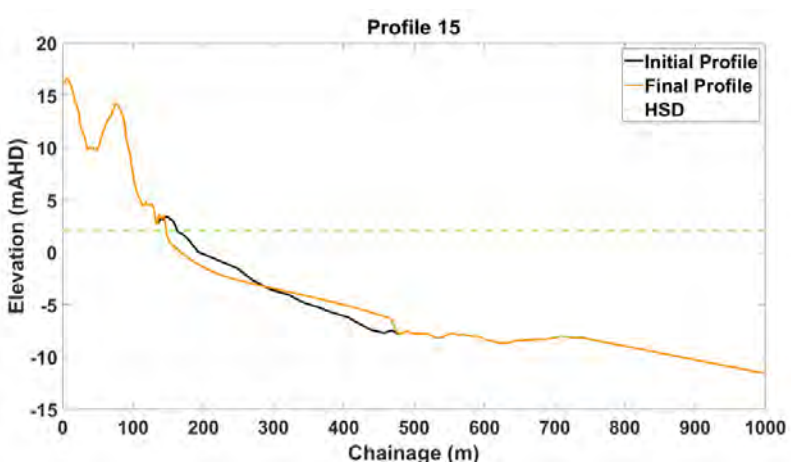
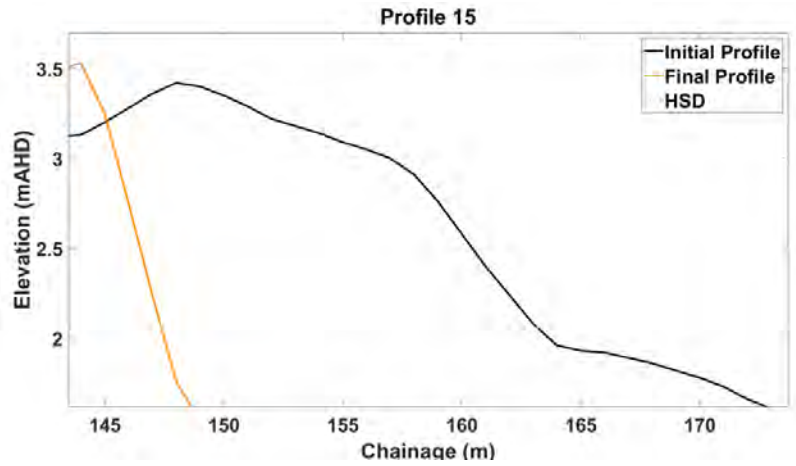
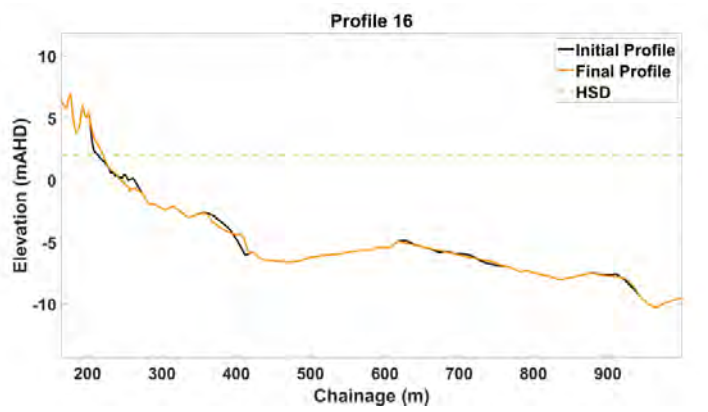
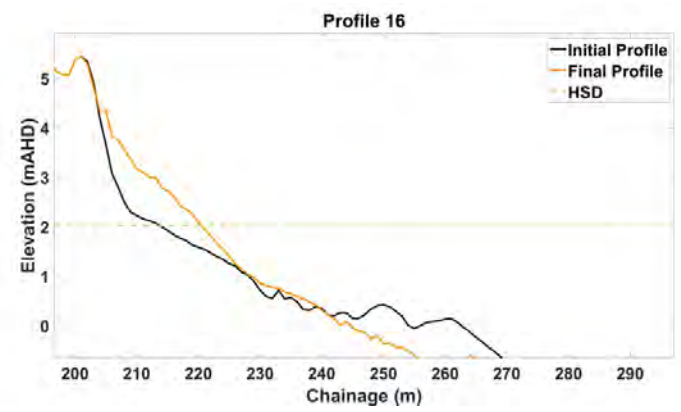
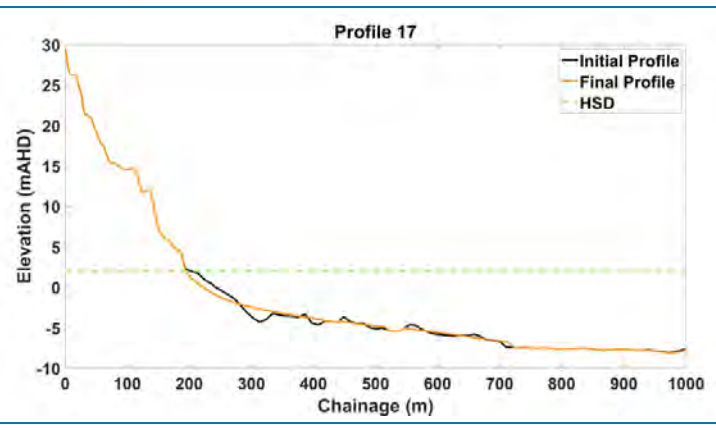
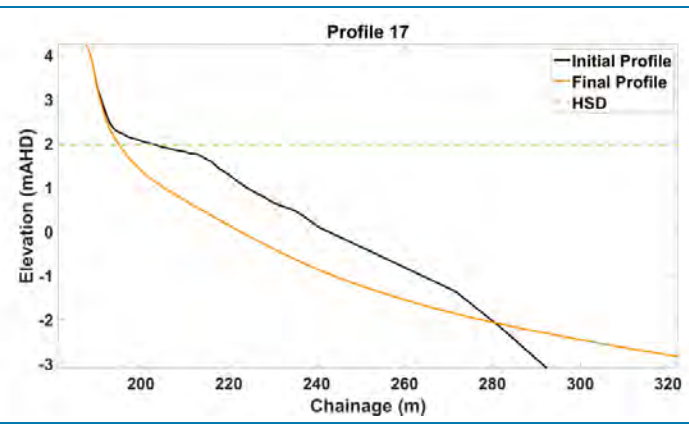
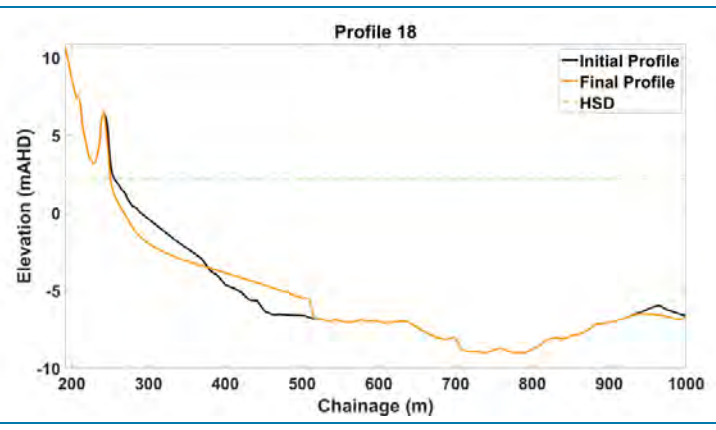
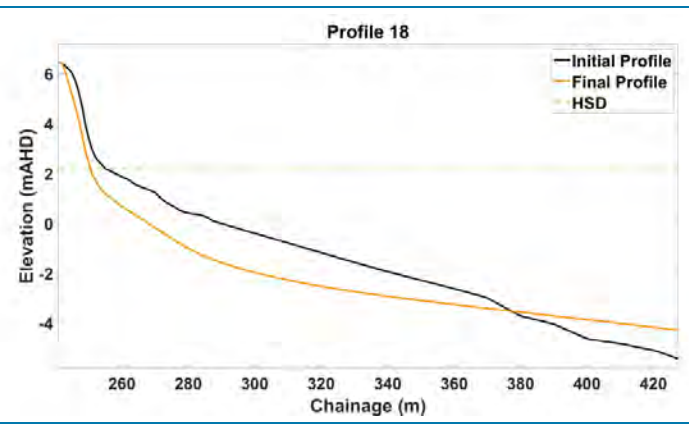
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SBEACH Results	Zoomed in at HSD
	
	
	
	

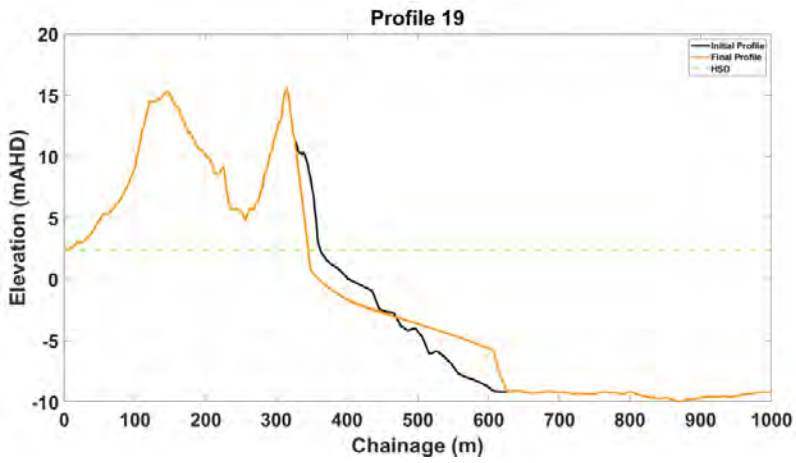
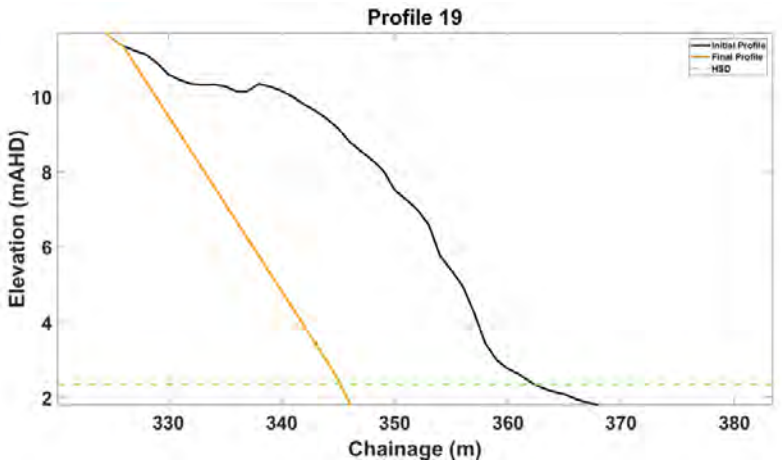
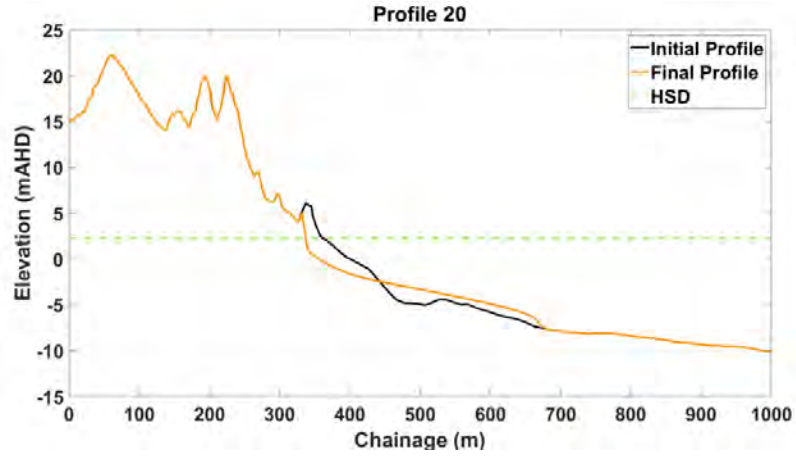
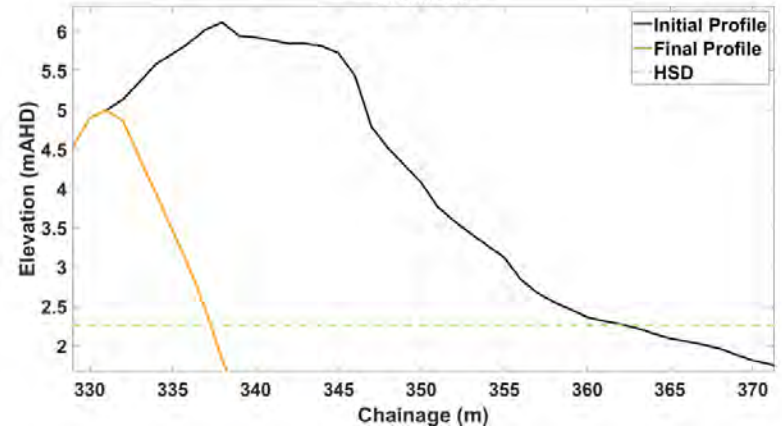
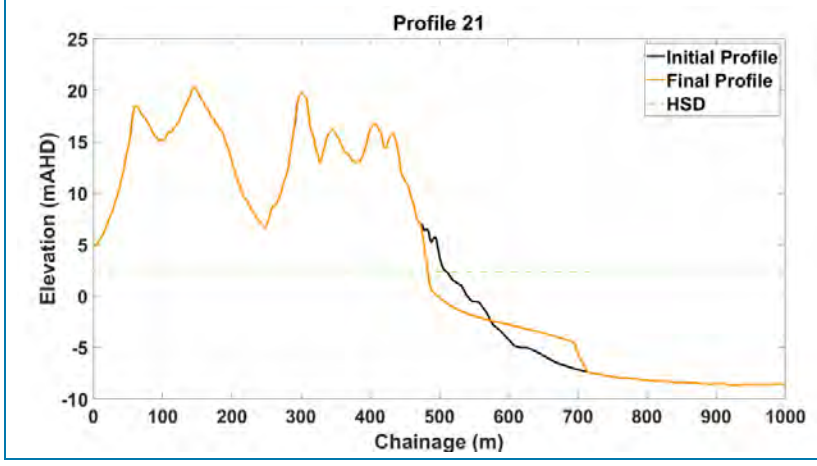
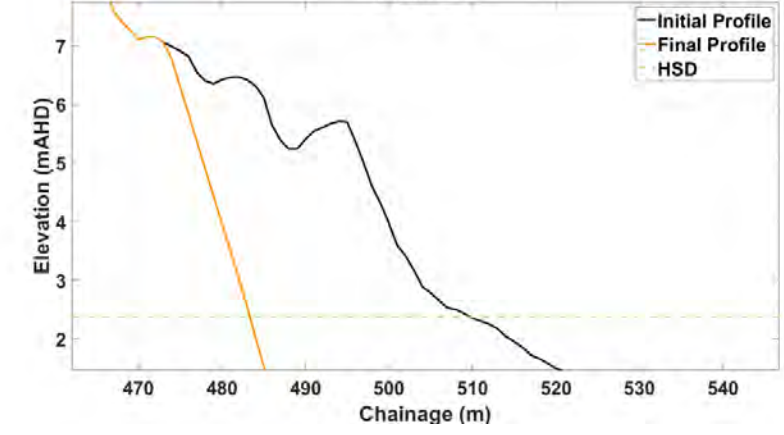
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SBEACH Results	Zoomed in at HSD
	
	
	
	
	

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SBEACH Results	Zoomed in at HSD
	
	
	

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Mandurah Southern Beaches CHRMAP Risk Analysis for Management Units. [Preliminary findings by Water Technology]. Created on 15/10/2024 by Shape Urban for discussion purposes.

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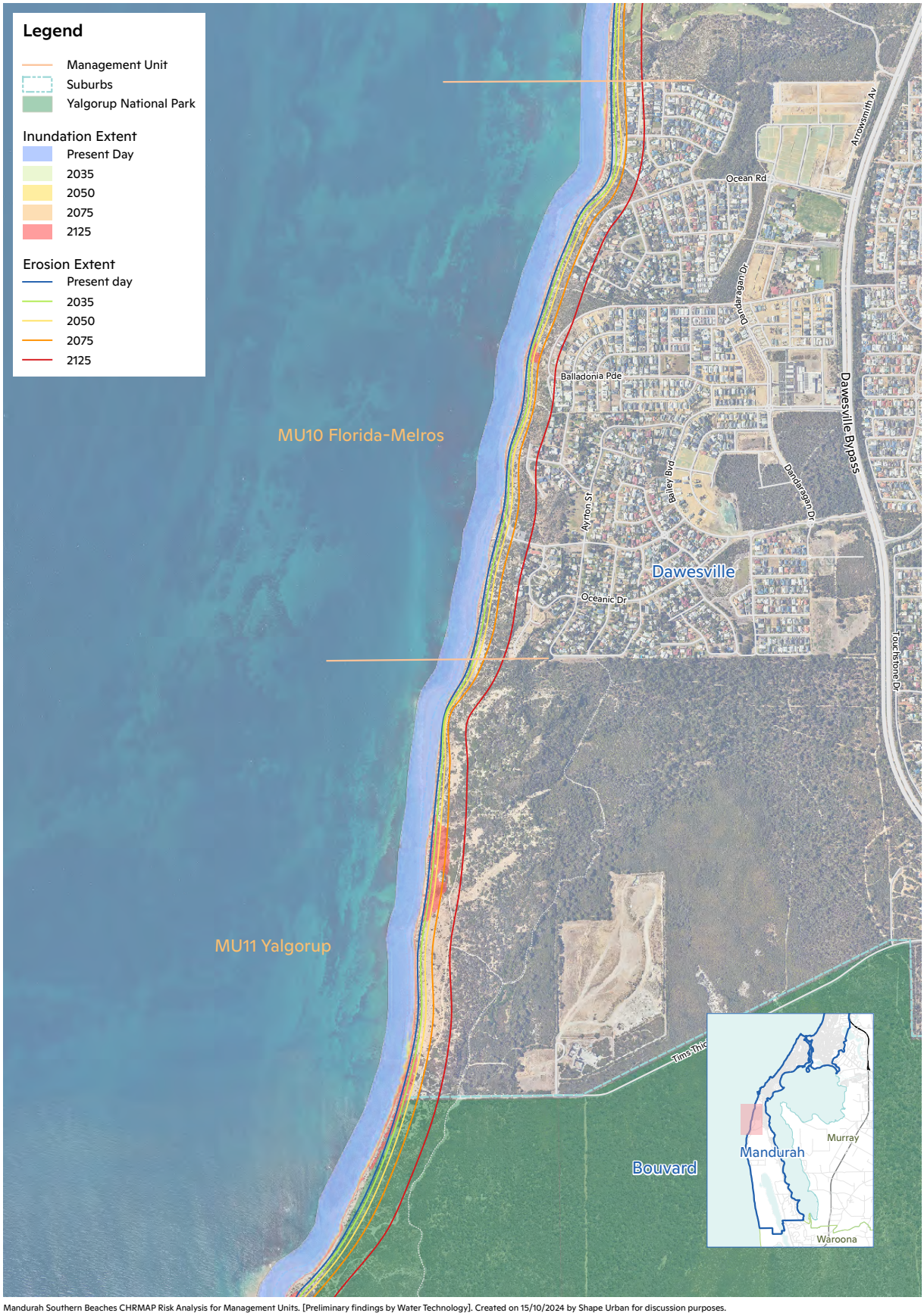
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CITY OF MANDURAH ENVIRONMENT

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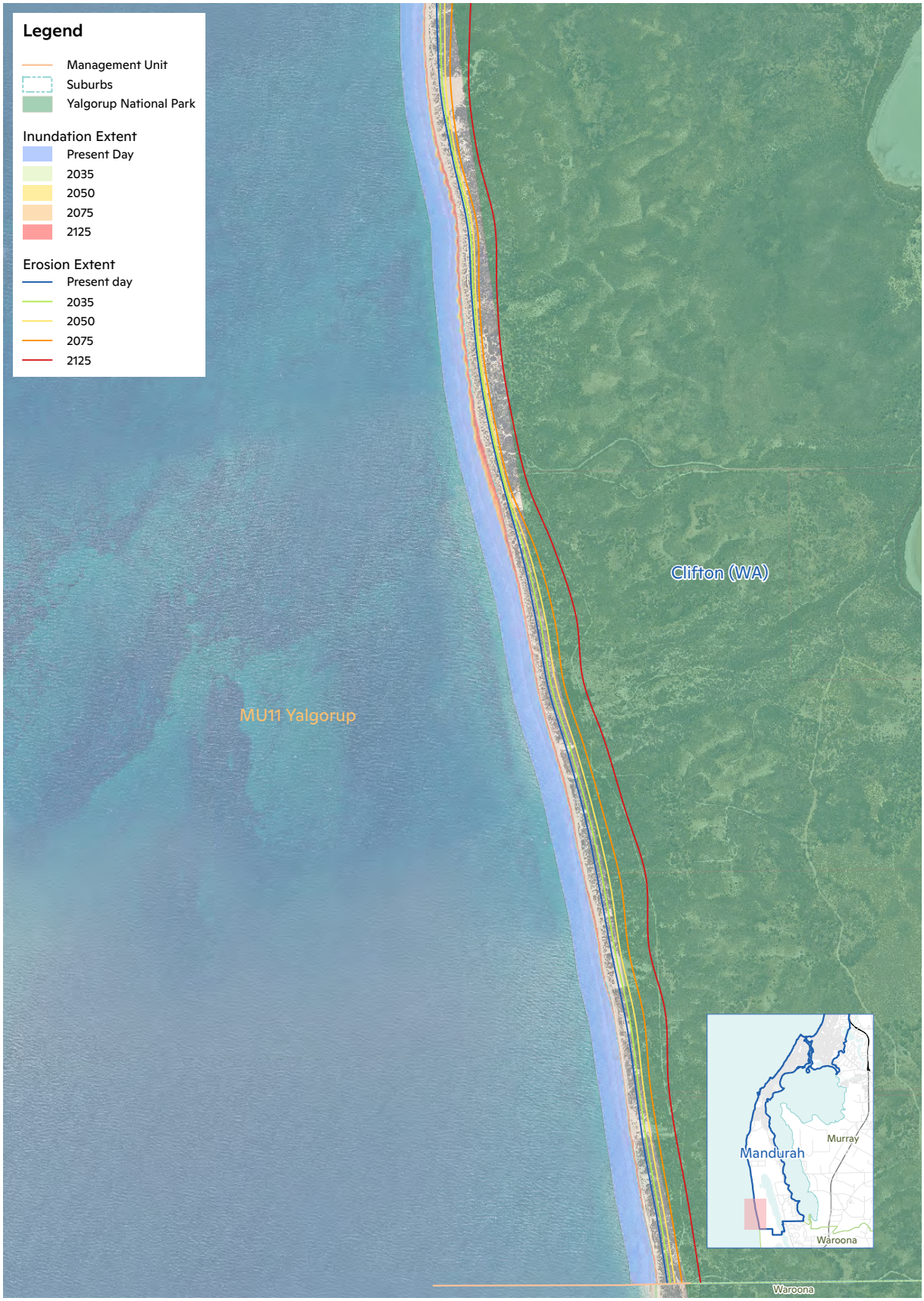


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CITY OF MANDURAH SOUTHERN BEACHES CHRMAP COMMUNITY ENGAGEMENT OUTCOMES REPORT

FEBRUARY 2026

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ACKNOWLEDGEMENT

Shape Urban acknowledge the Bindjareb people as traditional custodians of the land on which we have worked for this project. We recognise their cultural heritage, beliefs and relationship to the land, which continue to be important to the Bindjareb people today.

We pay our respects to Elders past and present, and to the land which they have cared for.

This document has been prepared with the support of many people from the City of Mandurah community. We wish to acknowledge the City of Mandurah community for your contribution.

PROJECT PARTNERS

CITY OF MANDURAH

SHAPE URBAN

WATER TECHNOLOGY

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DOCUMENT CONTROL

City of Mandurah Southern Beaches CHRMAP
Community Engagement Outcomes Report - February 2026

No.	Author	Reviewed By	Date	Purpose
1	K Yang	A Kelderman	08/10/24	First Draft Values Report
2	O Chetkovich	A Kelderman	25/11/24	Final Values Report
3	O Chetkovich	A Kelderman	25/03/25	Options Update
4	O Chetkovich	A Kelderman	24/02/26	Draft CHRMAP Update
5				Final

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EXECUTIVE SUMMARY

The City of Mandurah (the City) is developing the *Mandurah Southern Beaches Coastal Hazard Risk Management and Adaptation Plan* (Southern Beaches CHRMAP). A critical part of this project is the engagement with the local community and relevant stakeholders.

Community engagement for the Southern Beaches CHRMAP was undertaken in three key stages:

- Values Engagement
- Risk Treatment Options Engagement
- Draft CHRMAP Engagement.

Values engagement

The Values Engagement stage sought to raise awareness and understand the community's values for the southern beaches area through:

- Online mapping exercise
- Online surveys
- Stakeholder meetings
- City advisory groups
- Coastal Community Reference Group
- Invitation for written feedback.

The project was launched on 1 August 2024 on the City's Mandurah Matters engagement platform and promoted through social media, physical signage and other channels managed by the City.

The online values survey was completed by 97 participants in August and September and revealed that respondents are, in general, regular users of the beach and foreshore area, with the majority visiting the southern beaches at least once a week.

When asked about preferred activities, the natural, low key, family friendly nature of the coastline was valued above other more intense uses. Natural options to potentially manage coastal hazards were also generally preferred.

Several stakeholder meetings and discussions were undertaken, including with:

- Winjan Aboriginal Corporation
- Mandurah Environment Advisory Group
- Youth Advisory Group
- Access and Inclusion Advisory Group.

The meeting with Winjan emphasised the need to protect culturally sensitive areas like the Seascape caves from human disturbance, as a sign of respect for Aboriginal culture and a commitment to preserving heritage.

A key message from MEAG and the environmental community generally was to ensure environmental considerations would be recognised and respected throughout the process.

Meetings with YAG and AIAG revealed group preferences for particular beaches and activities, with accessibility being a key factor for AIAG.

The CCRG was convened and consists of a representative sample of the community to undertake a deliberative engagement process to support the development of principles used to inform the draft Southern Beaches CHRMAP.

CCRG members participated in Workshop One on 19 October 2024, the purpose of which was to provide project background information, introduce the identified risks and gain an understanding of local community values, explored through individual and group exercises.

The outcomes of the CCRG values exercises are consistent with the online community values survey. CCRG members most highly value the natural environment, followed by surfing, swimming, watching the sunset or sunrise, fishing, walking and dog walking.

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The area of greatest concern for the group is the impact of erosion and loss of beach, followed by sand bypassing, environmentally sensitive matters, managing vehicles and improving access to the beach.

Following Workshop One, the project team proposed preliminary management options for each management unit of the study area and undertook a multi-criteria assessment (MCA) of each option. The options were scored against technical and values criteria, for which the project team proposed scores.

Options engagement

On 8 and 22 February 2025 the CCRG reconvened for Workshops Two and Three, in which they were presented the preliminary proposed management options and, in groups, undertook their own MCAs, focussing on the values criteria (*environment, community/social* and *physical and economic)* - testing the project team's predicted scores. The project team made assumptions for their scores against these criteria, some of which were not calibrated by the CCRG.

This MCA exercise was vital for gaining further insights into what is important for the southern beaches community. Of most interest to the project team was how much more strongly the social/community aspects of sandy beaches, the environmental aspects of the natural landscape and the economic and property aspects of private property and foreshore activity impacted scores.

Draft CHRMAP engagement

Public consultation for the draft Southern Beaches CHRMAP ran from 1 December 2025 to 31 January 2026. The draft CHRMAP and supporting documentation were published on the project webpage and four drop-in sessions were hosted; approximately 76 community members attended a drop-in session. Community members were invited to provide feedback via an online survey - 44 were submitted. One written submission was also received.

The main thematic concerns that emerged from the feedback are:

- Requesting clear communication of recommended actions, including who will be affected
- Ensuring technical veracity and community engagement
- Ensuring implementation, and addressing immediate needs
- Comments implying mistrust in government and climate science
- Querying the suitability of the Falcon Coastal Shared Path.
- Concern about beach access restrictions, in particular for four wheel driving (4WD).

No material changes to the draft Southern Beaches CHRMAP are recommended. The feedback received reflects a need for clear communication and ongoing engagement.

Clear and consistent messaging about the CHRMAP process and implementation of recommended actions is essential to ensure the community can easily access accurate information. It is recommended the project page on the engagement platform be reviewed for currency and simple, summary documents and frequently asked questions should be uploaded to address queries raised in this stage. It is also recommend a new, dedicated coastal planning webpage on the City of Mandurah website be created to host all CHRMAP projects and information.

Community engagement was critical to the development of the CHRMAP and should be continued to ensure community members remain informed about the project, as outlined in *Strategy 1: Engagement* in the Southern Beaches CHRMAP.

The Southern Beaches CHRMAP will now be finalised and presented to Council for endorsement, after which funding can be sourced to action recommendations, including ongoing monitoring, which will be vital in determining future actions.

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1 INTRODUCTION

1.1 Background

The City of Mandurah (the City) is preparing a *Mandurah Southern Beaches Coastal Hazard Risk Management and Adaptation Plan* (Southern Beaches CHRMAP) for the ocean-facing coastlines from Robert Point Halls Head to the southern most border of the City in the Clifton locality (*Figure 1*).

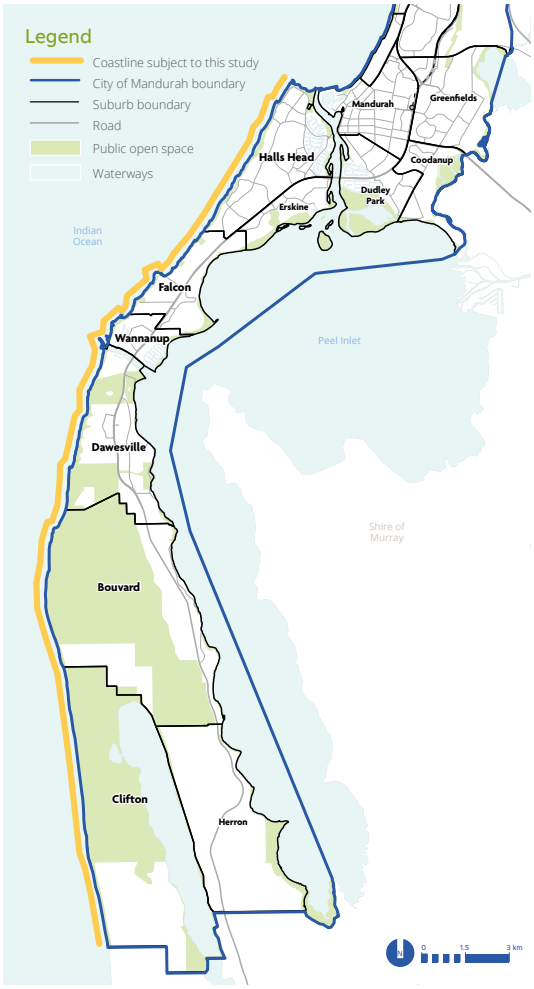


Figure 1 Study area

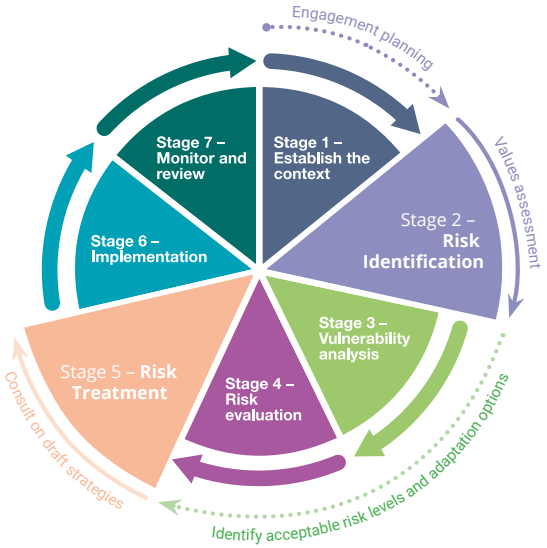


Figure 2 CHRMAP Engagement approach in relation to the CHRMAP process (adapted from CHRMAP Guidelines, 2019)

The CHRMAP will give decision makers and landowners a framework for sustainable coastal development into the future.

A critical part of this project is the engagement with the local community and relevant stakeholders. Engagement for the CHRMAP will confirm or update risk assessments to reflect community and stakeholder values, that will equip the City with proactive coastal management actions, and potential pathways to help adapt to the risk of coastal erosion and inundation in the next 100 years.

Engagement has been carried out to be consistent with the requirements of *State Planning Policy No.2.6 State Coastal Planning Policy* (SPP 2.6) and *SPP 2.6 Coastal Hazard Risk Management and Adaptation Planning Guidelines* (*Figure 2).*

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1.2 Purpose of the Report

This Outcomes Report summarises the engagement activities and undertaken outcomes to support the development of the Southern Beaches CHRMAP.

It details direct stakeholder engagement, Aboriginal engagement, online engagement, Coastal Community Reference Group workshops and advisory group meetings undertaken across the CHRMAP project stages, with a specific focus on engagement undertaken in:

+ Stage 1 & Stage 2 - Values engagement - to identify key assets and community values which may be affected by coastal hazards.
+ Stage 5 - Risk Treatment Options engagement - to understand community sentiment toward preliminary treatment options and trade-offs that are acceptable.
+ Stage 6 & & - Draft CHRMAP engagement - which is the formal public comment process before the Council adoption of a Final CHRMAP.

1.3 Engagement Purpose

The overarching purpose of engagement is to provide the community and stakeholders the opportunity to contribute to the Southern Beaches CHRMAP, to address their wants and needs, but also to share and build capacity in the community and with stakeholders to understand coastal hazard planning and the reason for the actions being progressed.

Recognising there are other factors that must also be considered in the final agreed options (e.g. environment, cost, effectiveness), the engagement approach is designed to connecting with and listen to the needs of locals and other stakeholders, with adequate flexibility to change and pivot proposed actions if conditions change.

More specifically, the objectives of the engagement are:

+ To raise awareness of the project amongst the community and stakeholders;
+ To understand community values, wants, needs and barriers;
+ To build community connections;
+ To engage with a broad cross section of community;
+ To identify others who may be affected by coastal hazards;
+ To provide a space for the stakeholders to speak freely; and
+ To use feedback to inform options and recommendations for the CHRMAP.

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2 ENGAGEMENT METHODS

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2 ENGAGEMENT METHODS

To ensure the community can be actively involved with the project, there will be three opportunities for consultation, each with different methods for participation.



2.1 Engagement Phases

PRE-LAUNCH

The project was announced on the Northern Beaches CHRMAP project page to advise the community of the forthcoming project. The community were able to register their interest during this stage.

A Project Steering Committee (PSC) was established in March 2024 to guide the project progress and undertake review of the technical documents. The PSC consists of the following:

+ City Councillors and staff
+ Peron Naturaliste Partnership (PNP)
+ Department of Planning, Lands and Heritage (DPLH)
+ Department of Transport (DoT)

STAGE 1 & STAGE 2 - VALUES ENGAGEMENT

The project engagement was officially launched on 1 August 2024. The purpose of the first phase of consultation was to raise awareness and understand the community's values for the southern beaches. Feedback was sought through:

+ Online mapping
+ Surveys
+ A Coastal Community Reference Group
+ Stakeholder meetings including Winjan Aboriginal Corporation
+ The City's advisory groups
+ An invitation for written feedback

STAGE 5 - RISK TREATMENT OPTIONS ENGAGEMENT

The purpose of this phase of engagement is to work with the community on refining management options to ensure they are aligned with the outcomes of the first phase of engagement and longer term community expectations. Feedback will be sought through:

+ A Coastal Community Reference Group
+ City's advisory groups
+ Stakeholder meetings including with the Aboriginal community
+ Written feedback

STAGE 6 & STAGE 7 - DRAFT CHRMAP CONSULTATION

The purpose of the final phase of engagement is to formally advertise the Draft CHRMAP and seek feedback from the community. Feedback will be sought through:

+ Online community survey
+ Written submissions.

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2.2 Coastal Community Reference Group

A key method of engagement for the project is the involvement of a Coastal Community Reference Group (CCRG), which consists of a representative sample of the community. This approach ensures a balanced representation by utilising random selection, where identities are kept confidential until after selection to prevent bias, unlike traditional stakeholder engagement which relies on self-selection. This approach ensures a balanced and inclusive engagement process, fostering robust community involvement.

DELIBERATIVE ENGAGEMENT PROCESS

The CCRG also uses a deliberative engagement process, assuming that any stakeholder could make logical and robust recommendations given adequate information and time. This process involves community members representing the entire community, with ample time to deliberate on options and ideas.

CCRG members attend three workshops: one in October 2024, and two in February 2025 Workshops are conducted transparently and impartially, with summaries made public promptly. The same group is involved throughout the project, revisiting information at key milestones.

REPRESENTATIVE SAMPLING

Participation is achieved via stratified sampling to include those potentially facing loss (affected landowners, beach users, community organizations) and those impacted by financial decisions (ratepayers from other locations, visitors).

The CCRG intended composition was:

50%	Local residents and landowners in the suburbs of the southern beaches
30%	Organisations, community groups or businesses that operate in or near the southern beaches
20%	Regular user/visitor to, but not an owner or resident in suburbs of the southern beaches

Selection criteria (stratification) considered demographics such as age, gender, relationship to the southern beaches, and more.

SELECTION PROCESS (RECORDED)

1. Anonymised Nominations: with personal details hidden to remove bias.
2. Random Number Assignment: for each entry and ordered lowest to highest.
3. Availability Check: where those unavailable for all workshops removed from first round selection.
4. Community Groups: nominees representing community groups shortlisted (one representative per organisation) before demographic-based selection.
5. Under-represented Categories: nominees meeting under-nominated categories are automatically selected.
6. Random Selection: groups randomly selected and reassessed until all positions filled against each category.
7. Confirmation: successful nominees contacted to confirm availability and interest, provided with project information, and asked about any specific needs.
8. Finalisation: backfilling any withdrawals. Once all positions are filled, unsuccessful nominees are informed via email.

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An oversample was included to account for natural attrition at workshops, aiming for approximately 40 active members. Nominees not selected were invited to submit position statements for the CCRG.

SELECTION OUTCOMES

There were 76 nominations received during the project launch campaign from 1 August to 22 September 2024. There are no nominations received for age groups 10-19 years which has a target of 6 persons. The quota was redistributed to other age groups proportionate to the demographic base case.

Several nominees withdrew at a later time, with nominations redistributed across demographics as evenly as possible. Some skewing of age based representation can be observed, based on parties who nominated but were not able to commit to all CCRG meetings.

The selection target and outcomes is presented in *Table 1*.

Table 1 CCRG selection target and outcomes

Target Group	Target	Nomination	Selected
10-19 years [6 spots redistributed]	0	0	0
20-29 years	4.6	4	1
30-39 years	5.5	10	4
40-49 years	6.3	13	5
50-59 years	7.2	19	10
60-69 years	7.8	20	14
70 years and above	8.6	10	5
Female	20	39	19
Male	19	37	20
Community Groups and Businesses	12	21	14
Owner Occupier	12	57	31
Renter	4	2	1
Landlord	4	7	2
Beach User	8	4	4
Total	40	76	39*

*Some people represent more than one category.

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3 COMMUNICA-TION METHODS

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3 COMMUNICATION METHODS

Various communication channels were used to communicate the project engagement opportunities.

3.1 Project Webpage

The project was launched on 1 August 2024 and is hosted on the Mandurah Matters engagement platform – the primary communication gateway for the City of Mandurah and for this CHRMAP project. The website provided a single point of information to inform the community about the opportunity to get involved, and to provide access to project related information. (*Figure 3*). With over 2,700 total visits and strong engagement metrics, the website was a successful component of the campaign.

During the public engagement period, there were a total of 4,092 visits to the project webpage, of which 3,433 included visiting at least one page ("Aware Participants").

1,289 actions were performed ("Informed Participants"), such as downloading a document, of which 44 involved completing the feedback survey ("Engaged Participants").

In total, there were 1,131 document downloads. The most downloaded documents were the *Fact Sheet - southern Beaches CHRMAP* (230), *Mandurah Southern Beaches CHRMAP Summary* (229) and *Mandurah Southern Beaches CHRMAP Technical Report* (160).



Figure 3 Project webpage hosted on Mandurah Matters

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3.2 Direct Emails

Email announcement about the engagement was sent directly to the stakeholders and community identified in the stakeholder analysis in the Community and Stakeholder Engagement Plan (CSEP), including the following:

+ Government stakeholders
+ Community groups and sports clubs
+ Real estate agents

The project team communicated directly with the community and stakeholders to provide updates on the project and to advise of engagement opportunities for the draft Southern Beaches CHRMAP.

3.3 Signage

Signs were printed and displayed across the study area at beach stairs and prominent beach front locations (see *Figure 4*). This ensured that anyone, regardless of access to online, printed or hard copy content, was able to recognise the study and the opportunity to be engaged.

The signs featured QR codes that linked directly to the online surveys. The corflute signage was highly effective in reaching individuals directly at the location of interest and saw direct traffic to the Mandurah Matters webpage, accounting for 1,193 aware visits.



Figure 4 Project signage along the study area

3.4 Meetings

Meeting with the local Aboriginal corporation provided the project team the opportunities to understand their holistic view on caring for Country, to inform the overall approach to project outcomes.

Government stakeholders were notified on the project and consulted on the content. Individual meetings were undertaken with community member stakeholders as requested.

The meetings provided the project team with the opportunity to share project updates and get feedback on coastal values and proposed risk treatment options.

3.5 Rates Notice

The project flyer was attached to the 2024 City rates notice to all ratepayers to inform about the project and encourage participation in surveys and nomination to the CCRG.

3.6 Advisory Groups

The project team took opportunities at the City's regular advisory groups meetings to promote the project and to receive direct input during the values engagement phase. The advisory groups include the following:

+ Mandurah Environment Advisory Group
+ Youth Advisory Group
+ Access and Inclusion Advisory Group

The City also extended the engagement opportunity via other City events:

+ Kids Teaching Kids workshop
+ Open Information Session - Permanent Sand Bypassing and Northern Beaches CHRMAP Update.

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3.7 Social Media

The City's Facebook page was used to promote the project and opportunities to be involved with the project (*Table 2*). Posts were designed to raise awareness about the CHRMAP and invite the community to participate in surveys. Three key posts were shared on Facebook and Instagram Reels and Stories. Social media performed well in driving awareness, especially through Facebook where total reach exceeded 36,000 people.

Table 2 Facebook posts - values engagement

Publication date	Summary of Facebook post content	Total reach	Total interactions
2 Aug 2024	Launch of the project and opportunities to be involved during consultation period.	22,305	293
5 Sep 2024	Second post calling for participation in the value surveys and CCRG nomination.	11,086	102
18 Sep 2024	Third post calling for participation in the value surveys and CCRG nomination.	2,730	25
	TOTAL	**36,121**	**421**

Social media, specifically the City's Facebook account, was used to inform the public about the draft Southern Beaches CHRMAP consultation period, sources of information and ways to be involved. Over 49,000 views of the seven posts reflect this channel as effective in reaching the community.

Table 3 Facebook posts - draft CHRMAP engagement

Publication date	Total views	Total interactions
21 Nov 2025	7,571	27
2 Dec 2025	**3,003**	**39**
5 Dec 2025	4,172	19
8 Dec 2025	5,358	14
2 Jan 2026	22,961	110
7 Jan 2026	3,932	9
28 Jan 2026	2,009	20
TOTAL	**49,006**	**227**

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4 COMMUNITY VALUES

4.1 Values Survey

92 visitors to the project website contributed to the values survey during the values engagement. 82% of respondents live in the suburbs of Halls Head (36%), Falcon (17%), Wannanup (10%) and Dawesville (19%), within the vicinity of southern beaches.

Among them, 75% (or 69 persons) described themselves as owning and living in a property in Halls Head, Falcon, Wannanup and Dawesville. About a quarter (25%) of the survey participants are in the age group 50-59 years, 21% in 60-69 years, 14% in 70 years and above, 10% in the 30-39 year category and 9% in 20-29 years.

The Youth Advisory Group (YAG) and Access and Inclusion Advisory Group (AIAG) were asked a simplified version of the survey on 4 September and 1 October respectively).

4.1.1 Visitation

Respondents are, in general, regular users of the beach and foreshore area in the study area, with the majority visiting the southern beaches at least once a week (*Figure 5*). Everyday use is slightly lower in winter, although other usage is either balanced or more regular in winter.

Similar results were received at the YAG and in discussion at the AIAG.

4.1.2 Most visited

The Top 5 most visited areas are:

1. Falcon Bay, Falcon
2. Avalon Beach, Wannanup
3. Blue Bay, Halls Head
4. Pyramids Beach, Dawesville
5. Tims Thicket and Whitehills Beach

Refer to *Figure 6* for the full result

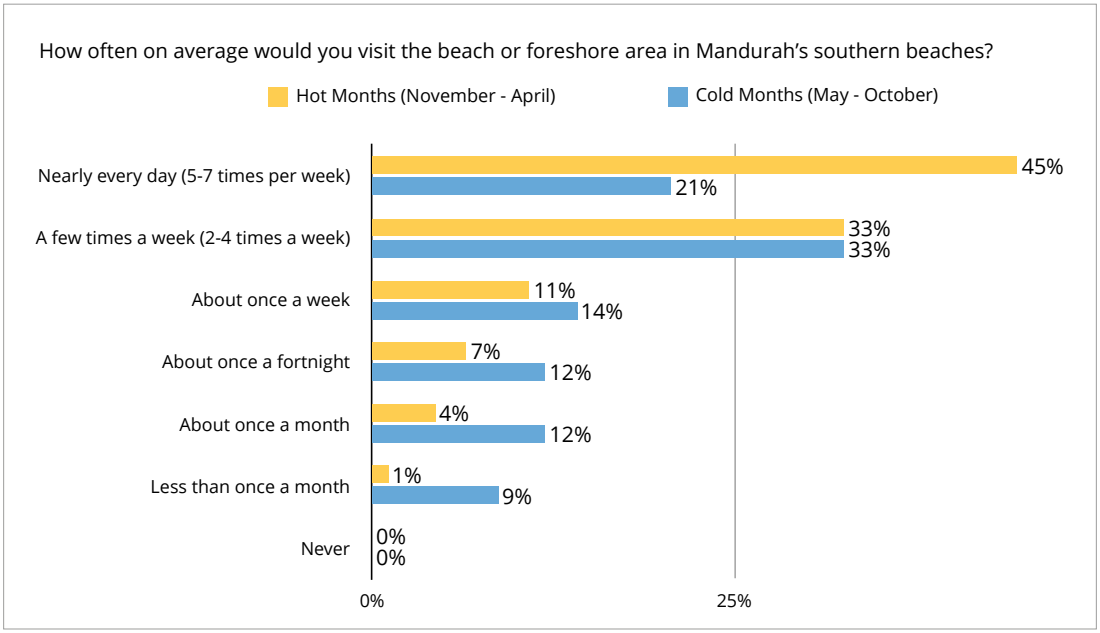


Figure 5 Online Survey result - How often on average would you visit the beach or foreshore area in Mandurah's southern beaches?

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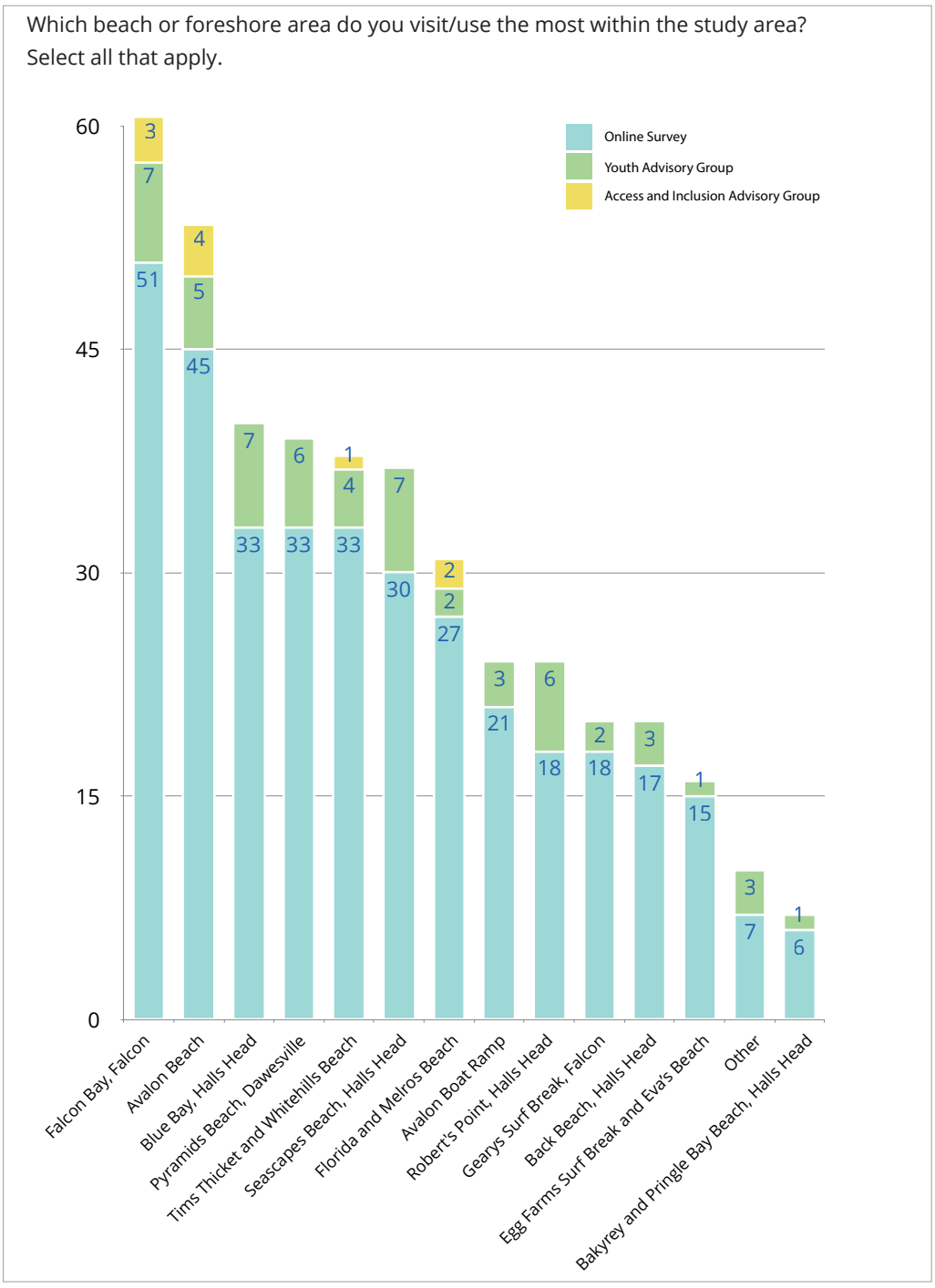


Figure 6 Online survey, YAG and AIAG feedback - Which beach or foreshore area do you visit/use the most within the study area?

4.1.3 Top Activities

Walking, swimming and watching sunsets are the most common activities for online survey respondents (*Figure 7*), and YAG participants (*Figure 8*) enjoying swimming, boarding, walking, family time and watching the sunset.

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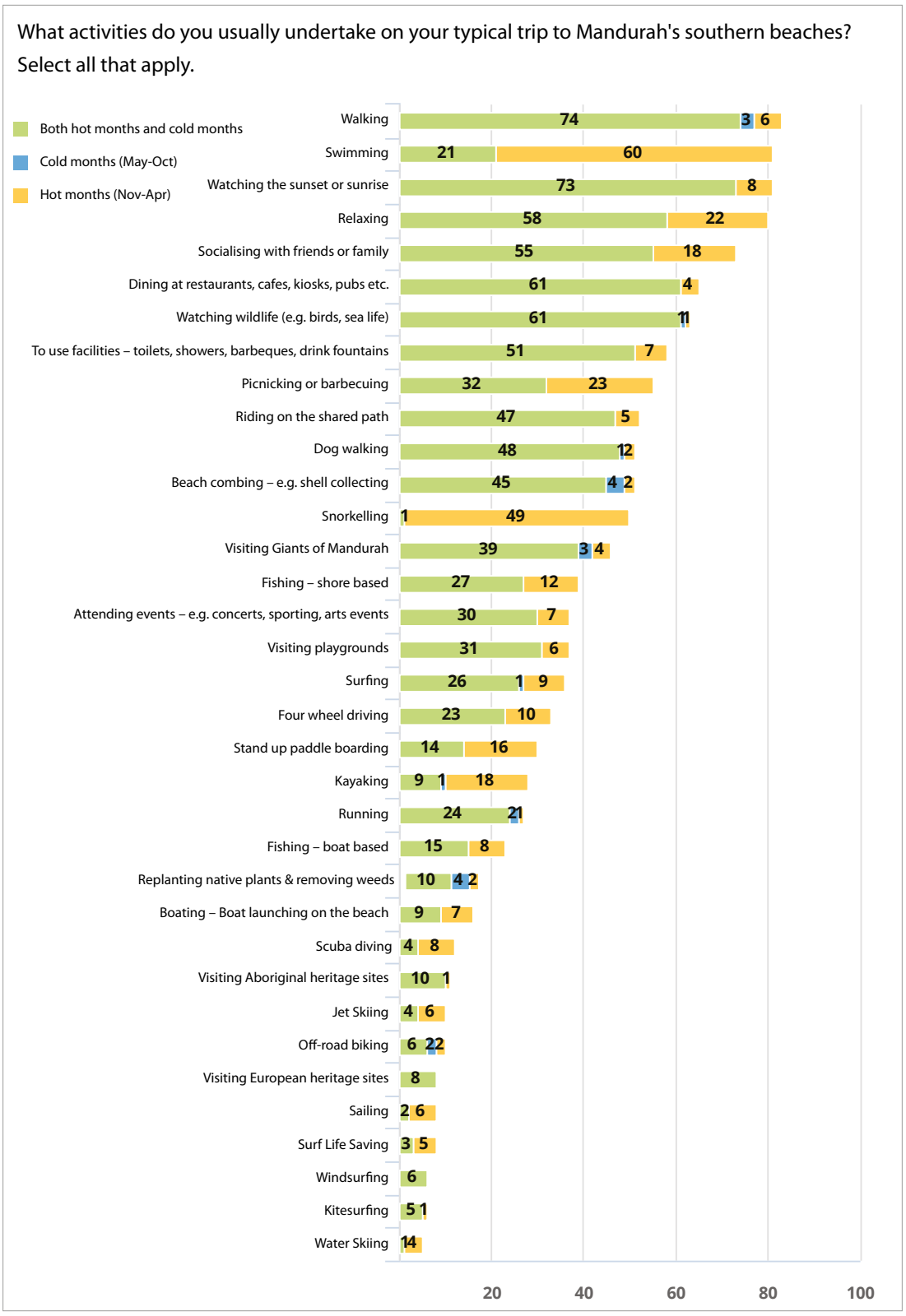


Figure 7 Online survey result - What activities do you usually undertake on your typical trip to Mandurah's southern beaches?

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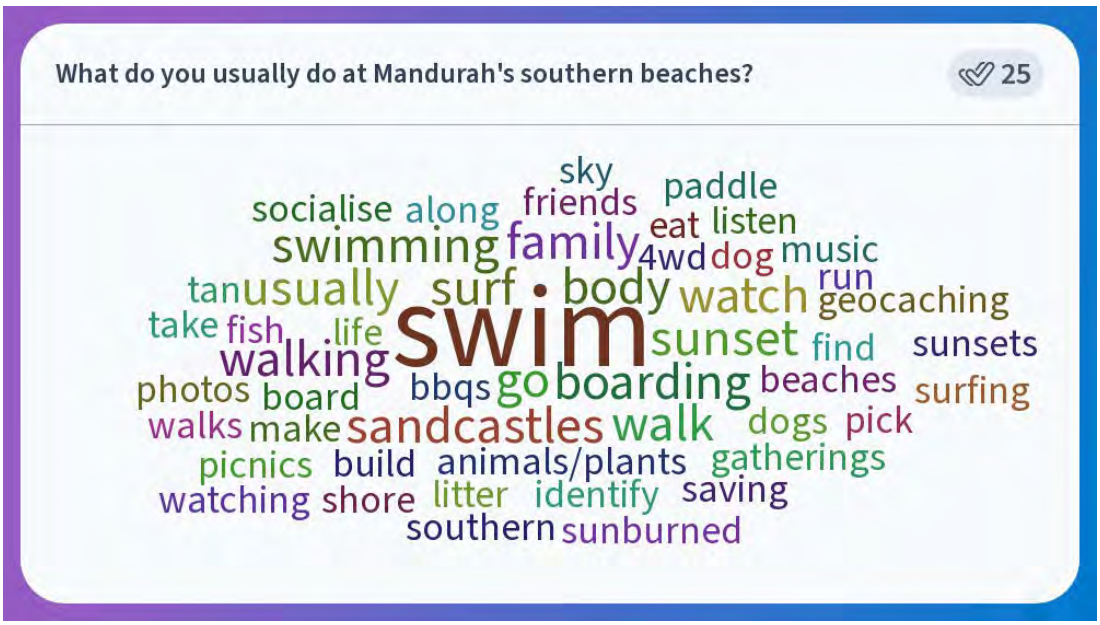


Figure 8 YAG polling result - What activities do you usually do at Mandurah's southern beaches?

4.1.4 Preferencing Questions

The survey also sought to understand the level to which respondents would agree or disagree with certain outcomes.

The first of these questions related to use and enjoyment of the beach and foreshore area. The most agreeable uses (*Figure 9*) included;

- Preserving the natural environment and ecological systems (91 respondents Strongly Agree or Agree)
- Opportunities to use beaches for unstructured recreation activities (89 Strongly Agree or Agree)
- Retention of natural landscapes, not interrupted by human-made structures (88 Strongly Agree or Agree)
- Opportunities to use public foreshore facilities (77 Strongly Agree or Agree)

The feedback suggests that the community values the natural, low key, family friendly nature of the coastline above other more intense uses.

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Figure 9 Survey result - On the scale of 1 to 5 (where 1 is strongly disagree and 5 is strongly agree), how do you value the following?

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The second of these questions related to potential ways to manage coastal hazards. Responses were much more mixed across the 'Agree' and 'Disagree' spectrum (*Figure 10*).

The following options were the most agreeable;

- Inform private landowners about the risk of erosion and inundation when purchasing or developing in coastal hazard areas, even if that causes some concern about long term development rights (82 Strongly Agree or Agree)
- Revegetate foreshore reserves and preserve dunes as much as possible, even if this means closing some paths to the beach to consolidate access points (75 Strongly Agree or Agree)
- Prevent more intensive development (such as units where there is a single house) in hazard areas, even if this means changes to planning rules that currently allow for this development (72 Strongly Agree or Agree)
- Do not remove beach wrack (seaweed) to lower the risk of coastal erosion, even if this means short periods of beaches affected by weed and occasional smells (71 Strongly Agree or Agree)

The following options were the most *disagreeable*;

- Do nothing (66 Disagree or Strongly Disagree).
- Allow approved land uses to continue in developed areas until erosion becomes intolerable, even if this means that some activities may be periodically impacted by storms, erosion and inundation (50 Disagree or Strongly Disagree and 24 were neutral)
- Retain all public access to beaches and foreshore reserves as it exists today, even where this might result in or increase risk of erosion and inundation and be limited periodically by storms, erosion and inundation damage (48 Disagree or Strongly Disagree)

The final question sought feedback on funding. Responses were also mixed (*Figure 11*).

The following options were the most agreeable;

- The City should undertake protection work and ask the State and Federal government to help (78 Strongly Agree or Agree)
- The City should consider acquiring properties that are at risk - funded by State or Federal (65 Strongly Agree or Agree). Only 33 Strongly Agreed or Agreed with this statement when funding was to come from rates and levies.
- Landowners can protect their own private property at their own cost (56 Strongly Agree or Agree)

Any option suggesting the use of rates and levies was generally disagreeable to respondents. Doing nothing was also disagreeable.

In general, the feedback suggests that natural responses are strongly supported, and a lower cost to the ratepayer is preferred. This will need to be carefully considered when looking at adaptation options and in consideration of the beneficiary pays principle.

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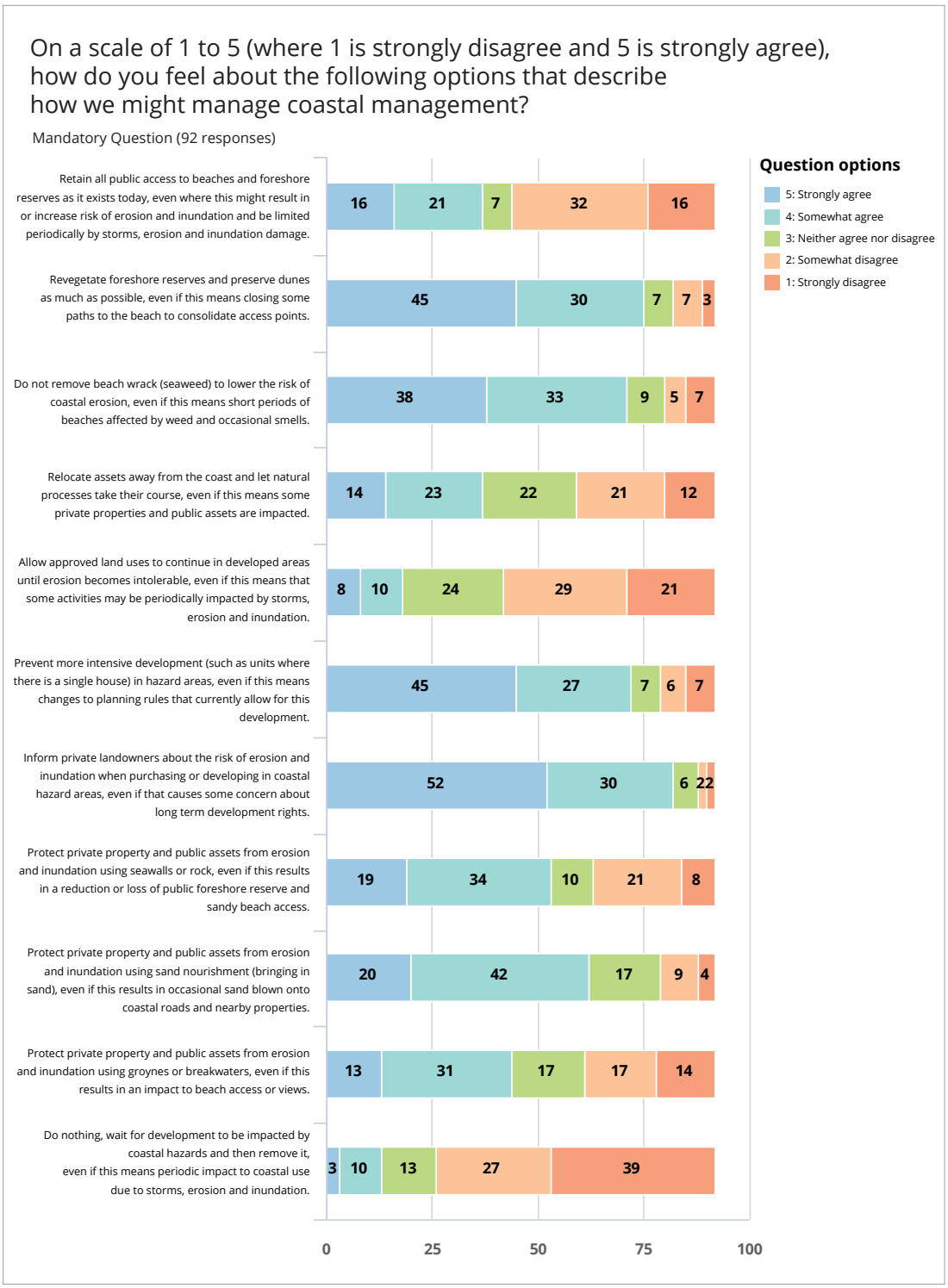


Figure 10 Survey result - On the scale of 1 to 5 (where 1 is strongly disagree and 5 is strongly agree), how do you feel about the following options for managing coastal hazards?

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Figure 11 Survey result - On the scale of 1 to 5 (where 1 is strongly disagree and 5 is strongly agree), how do you feel about the following options that describe how we might pay for coastal management?

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4.2 Assets and Values Mapping

An online mapping tool was used to seek spatial comments from the community (*Figure 12*). A total of 180 pins were placed by 64 contributors on the map from 1 August to 22 September 2024.

A full list of the comments is provided verbatim in *Appendix A*.

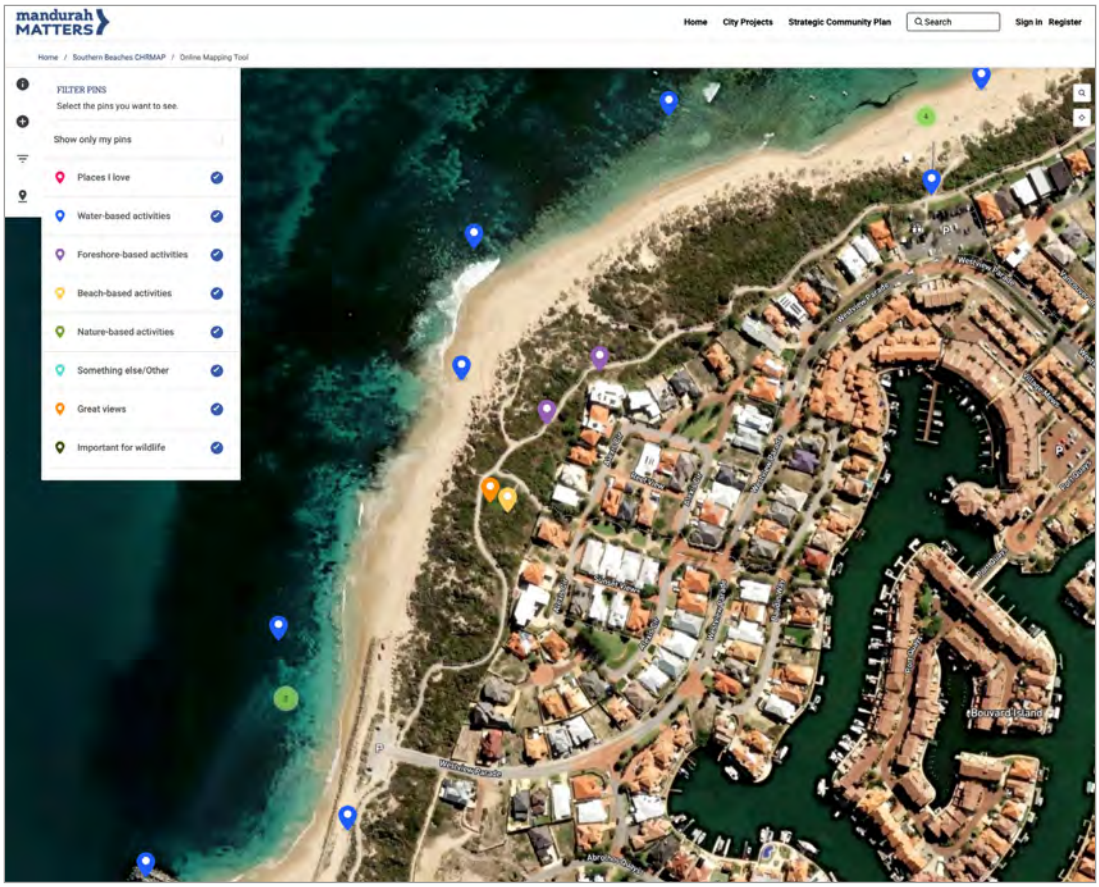


Figure 12 Mapping exercise on Mandurah Matters

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4.3 Aboriginal Engagement

A meeting with Winjan Aboriginal Corporation took place on 3 September 2024. Attendees included five Elders from Winjan and representatives from the City of Mandurah and Shape Urban.

The main focus of the discussion was the importance of preserving the coastline and preventing development near the third dune, approximately 300 meters from the coast. The natural processes of coastal erosion and sand movement were highlighted, along with the role of buried reefs in mitigating erosion. The relationship between coastal vegetation, seaweed, and local fauna was also discussed. There was a strong recommendation to avoid removing seaweed that washes ashore seasonally, despite any nuisance caused by the smell, as it is recognised as vital for the ecosystem.

Winjan shared the cultural and historical use of the coastline and inlet for crabbing and fishing. The Wagyl stories associated with the Mandurah Estuary were highlighted. It was mentioned that the Dawesville Channel is not included in the Wagyl stories because it is man-made and has affected a historical burial site that is now lost. The Elders also talked about the historical changes in the landscape of the region due to sea level rise and fall, such as the formation of Lake Preston and Peel Inlet/Harvey Estuary.

The meeting emphasised the need to protect culturally sensitive areas like the Seascape caves from human disturbance, as a sign of respect for Aboriginal culture and a commitment to preserving heritage. This includes accepting natural erosion processes and recommending educational signage to promote respectful behaviour, with messages such as “Tread lightly, tread softly, tread respectfully.”

Finally, the meeting highlighted the cultural perspective of the local Aboriginal community, which views the ocean as father and the land as mother, contrasting with the local surfers’ perspective of the ocean as mother. This engagement underscored the collaborative efforts to preserve cultural heritage and ecological integrity.

4.4 Mandurah Environmental Advisory Group

The project team presented the project to the Mandurah Environmental Advisory Group (MEAG) meeting on 23 August 2024. The purpose of the presentation was to inform the group of the study, invite questions and encourage registration for the CCRG.

Eight MEAG members, including two elected members, and four City staff were present.

Members noted the extensive knowledge of people from MEAG and the environmental community generally, and sought to ensure that environmental considerations would be recognised and respected through the process.

Members were advised that specific group representation would be enabled for the CCRG (members of MEAG nominated and have been included in the CCRG).

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4.5 Youth Advisory Group

The project team presented the project to the City's YAG on 4 September 2024. The purpose of the presentation was to inform the group of the study, invite questions and encourage registration for the CCRG.

Ten YAG members, including one elected member, and three City staff were present.

The meeting participants were asked how they use the southern beaches via a live polling exercise.

- Blue Bay, Seascapes and Falcon Bay are the top 3 beaches for the group, with seven votes each.
- The top activities are swimming, surfing, and passive recreation.
- YAG report going to the beaches nearly every day or 2-4 times per week in the hot months and less often in the colder months at about once a fortnight or less than once a month.

Full results are available in *Appendix B*.

The group was encouraged to nominate in the CCRG workshop.

4.6 Access and Inclusion Advisory Group

The project team presented the project to the City's AIAG on 1 October 2024. The purpose of the presentation was to inform the group of the study, invite questions and encourage registration for the CCRG.

14 AIAG members and four City staff were present.

Through discussion, the meeting participants were asked questions about their use of the beach and which beaches are important to them.

Avalon beach was described as the best accessible beach, providing most amenity needed. Improved water access and accessible bays were desirable.

Falcon Bay was also desirable and meets a number of accessibility standards. Melros Beach and Whitehills were also enjoyed, predominantly based on four wheel drive access.

In general, the group noted that flatter, less graded beaches were most desirable and accessible for users. This group is also more likely to prefer either wide, flat beach sand, or structured water edges with walking paths, although all members noted a love of the beach and regular use if possible, all year round (not always swimming).

The discussion included recognition that not all beaches could be accessible (especially as they are natural and enjoyed for their ruggedness), and that focussing on a few places for accessibility would be necessary.

The group was encouraged to nominate in the CCRG workshop.

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4.7 Other methods

Assets and Values were also sought from the following engagement activities:

- Kids Teaching Kids workshop on 12 September 2024, attended by kids from Years 2 to 9 (*Appendix C*)
- Open Information Session - Permanent Sand Bypassing and Northern Beaches CHRMAP Update on 19 September 2024.

4.8 CCRG Workshop One

The purpose of Workshop One, held on Saturday 19 October 2024, was to provide the CCRG with project background information, introduce the identified risks and gain an understanding of local community values.

The CCRG undertook two exercises to explore and identify coastal valued assets and areas of concern.

The first exercise was undertaken individually, where participants were asked to identify up to four valued assets and four issues or concerns on worksheets, and to use numbered stickers to indicate the corresponding location of each item on large format maps in the room.

The second exercise was undertaken in groups, where each table was asked to identify up to four of their highest priority assets and, in a similar fashion to the first exercise, indicate their locations on the large format maps.

Overall, the most valued activity was watching wildlife or interacting with nature, followed by surfing, swimming, watching the sunset or sunrise, fishing, walking and dog walking.

The area of greatest concern was the impact of erosion and loss of beach, followed by sand bypassing, environmentally sensitive matters, managing vehicles and improving access to the beach.

The Management Units (MUs) with the most indications across both workshop exercises were Yalgorup and Geary's-Avalon. The next MUs of greatest interest were Blue Bay, Falcon Bay and Dawesville Cut.

Refer to *City of Mandurah Southern Beaches CHRMAP Community Engagement Outcomes Report - Part A* for full details of the CCRG Workshop One outcomes.

4.9 Summary of Values Outcomes

A summary of the key themes raised and relevant to the project across all stakeholders and across all methods are included in *Figure 14* to *Figure 19*.

Figure 20 illustrates the overall number of times an activity was identified as important across the varied communications methods.

It is worth noting that the online survey included the activities as direct prompts (potentially inviting certain responses, whilst the other methods were more flexible).

Qualitative information will be considered alongside the quantitative data from the survey.

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Figure 13 Mandurah Southern Beaches Management Units (MUs)

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Figure 14 Assets and values mapping - Mandurah island north

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Assets and Values Mapping - Mandurah Southern Beaches North

Key Assets

1. Halls Head Shared Path
2. Blue Bay Beach car park
3. Back Beach car park
4. Calypso car park and reserve
5. Halls Head Waste Water Treatment Plant
6. Giants of Mandurah

Highly Valued

1. Doddies Beach – North facing, protected from prevailing wind and big swells.
2. Roberts Point – Great view north and towards Mandurah town. Watching dolphins, seabird life, watching storms in winter
3. Halls Head Beach – Great swimming beach and dog beach. Sunset views.
4. Blue Bay Beach – Great place for people to gather and enjoy a beautiful beach, with easy access to parking and amenities (outdoor shower, grassed area). Protected beach and good swimming spot.

Water based activities

1. Swim, walk, relax, dog-walking, fishing, kayaking, stand-up board, pontoon
2. Swimming, beach walking.
3. Protected swimming spot, good length to swim some laps

Beach based activities

1. Running, playing with dogs
2. Beautiful beach location and semi protected from summer breezes. Beach walks, walking dogs.

Nature based activities

1. Coastal path surrounded by nature & ocean. Dog walking.

Great views

1. Coffee van and sunset view
2. Great views at sunset.
3. Sunset viewing

Important for wildlife

1. Dolphins surf off the reef

Open Information Session

- Halls Head shared path is great for cycling
- Enjoy running on the beach and making sandcastles with grandkids
- Whale spotting
- Dog walking

Youth Values

1. I love swimming in the water at Doddies Beach
2. I love everything about Blue Bay
3. I like the Giant

Activities	Swimming, walking dog, surfing, tanning, collecting seashells
Features	Animals, sand dunes, seashells, oceans, waves, clear water, crabs, pontoons
Dislikes	Plastic

CCRG contributions

- Swimming, snorkelling, paddle boarding, kayaking, marine and bird life
- Surfing
- Views, walking/dog walking
- Safe swimming
- Concerned about erosion, loss of dunes, loss of paths
- Pollution

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Figure 15 Assets and values mapping - Seascapes to Falcon Bay

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Assets and Values Mapping - Seascapes to Falcon Bay

Key Assets

1. Seascapes Beach *Aboriginal Cultural Heritage (ACH) Register Place*
2. Seascapes Boardwalk
3. Josephine Te-Puni Reserve
4. Rakoa Reserve
5. Falcon Bay Foreshore Reserve

Highly Valued

1. Polley's Hole – Swimming, dog walking, abalone fishing area
2. Falcon Bay – Protected from a lot of the sea breezes. Toilets and lovely grassed area for picnic. Great meeting place.

Water based activities

1. Quiet beach for a long walk with the dog and a swim
2. Protected swimming spot inside the reef. Great that you can take your dog. Fun for the kids at low tide
3. Low crowd beach walks and swimming
4. Quiet surf spot, friendly locals
5. Family swimming area with pontoon and is patrolled during summer months by PBSLSC.

Foreshore based activities

1. Great cycling pathway
2. Seascapes Boardwalk – Coastal shared path popular for walking and cycling
3. Good fishing access, without a boat

Beach based activities

1. Local dog beach, dog walking.
2. Local dog walking and socialising.
3. Quiet corner for sunbathing, relaxing
4. Winter beachcombing, photography.
5. Dog friendly beaches. Sunsets.

Something else/Other

1. Concerns about erosion

Great views

1. Great spot to watch the sunset from the wooden platform.
2. Great sunset views, stormwatching, and fireworks

Important for wildlife

1. Bakyrey Bay – Protecting the reef for maintaining biodiversity, supporting marine ecosystems. Reefs act as natural barriers, protecting coastlines from erosion and storm surges.

Kids Values

1	Abalone catching
Activities	Swimming, walking body boarding, making sand castles
Features	Dolphins, sand dunes, soft sands, snakes, clean oceans
Dislikes	Plastic

CCRG

- Swimming, bicycling, the boardwalk, the natural environment
- Safe swimming, pontoon
- Views, walking/dog walking
- Picnicking and gathering
- The boardwalk
- Concerned about erosion, loss of dunes, loss of paths
- Walking through natural habitat is causing damage
- Sand bypassing concerns - impact to beach and surfing
- Pollution is concerning

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Figure 16 Assets and values mapping - Mandurah Souther Beaches Central

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Assets and Values Mapping - Mandurah Southern Beaches Central

Key Assets

1. Yeedong Road Boat Launch
2. Avalon Foreshore Reserve
3. Eggs Farm car park
4. DoT ongoing maintenance sand bypassing operations

Highly Valued

1. Cosies Surf Break.
2. Gearys Surf Break. Area history.
3. Kid friendly location.
4. Yeedong Road boat launching beach with 4wd access. Great place to launch watercraft
5. Good swimming spot – quiet natural beach. Not too many man made structures.
6. Eggs Farm Surf Break. Great spot for surfing. Coffee van, sitting and watching the surfers

Water based activities

1. Surfing
2. Boat ramp and launching area is frequently used by PBSLSC for IRB boat training
3. Avalon Beach – Great place for surfing and nice protected area for swimming. Provides a great recreational playground for everyone. Surfsports training for Nippers
4. Avalon Surf Break – All year round Surfing and summer swimming location. influenced by the sand bypassing operations.
5. Winter Surfing location – influenced by the sand bypassing operations.

Foreshore based activities

1. Coastal path – running and cycling through the dunes and around to watch the dolphins in the cut.

Beach based activities

1. Dog friendly beach access for swimming and surfing. Sunsets too
2. Dog Friendly Beach activities. Easy access to the beach.
3. Avalon Beach – Calm waters. Swim, surf, relax.
4. Dawesville cut training wall groynes – popular for fishing.

Great views

1. A great meeting point for community. Enjoying sunsets, surf, watch wildlife.

Kids Values

1	Avalon Beach - swimming and just being there.
2	Proximity to the Dawesville Cut.
Activities	Swimming, hanging with friends and family, finding shells, playing footy/beach volleyball, walking dog, making sandcastles
Features	Vibrant fish, fauna and flora endemic to us, giant waves
Dislikes	Rise in pollution

CCRG

- Surfing, watching surfers and sunsets
- A local meeting place, quiet compared to Falcon Bay
- The natural environment, dunes and habitat, marine life
- Boat launching and four wheel driving
- Walking, snorkelling, kitesurfing, bicycling
- Safe swimming, sandy beach
- Concerned about erosion, loss of dunes, loss of paths
- Sand bypassing concerns - impact to beach and surfing, impact to the surf club
- Concern about over crowding and losing the natural way of the area

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Figure 17 Assets and values mapping - South of the Dawesville Cut

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Assets and Values Mapping - South of the Dawesville Cut

Key Assets

1. DoT ongoing maintenance sand bypassing operations
2. Port Bouvard SLSC
3. The Cut Golf Course
4. Florida Beach carpark
5. Melros Beach carpark

Highly Valued

1. Port Bouvard SLSC
2. Florida Beach – Good access for homes close by.
3. Melros Beach – Main beach access with car parks and toilets. Access for surfing, beach walks and other beach activities.
4. Coastcare picnic bench, fabulous views over the ocean.
5. Coastal path - beautiful scenic access path for all users including wheel chair.
6. Snorkelling with the kids and walking the dogs

Water based activities

1. Surfers, life saving, event space. Patrolled beach with surf conditions.
2. Quiet place for relaxing on the beach.
3. Surf spot
4. Snorkelling around the reef, where it is protected from the waves.

Beach based activities

1. Vehicle access for fishing at the Cut.
2. Walking along the beach
3. Beach for kids to play. It's a nice quiet space For locals.
4. Exercise dog, swim, relax

Foreshore based activities

1. Walking and Cycling track.

Nature based activities

1. Great for watching dolphins along The Cut foreshore
2. Bushwalking
3. Coastcare planting area

Great views

1. Enjoy watching the Sunset over the ocean from the Lookout.
2. Views from Coastcare lookout with seat.

Important for wildlife

1. Estuary system unique and habitat to so many aquatic birds and marine life. Home to local dolphins.
2. Hooded Plover and occasional Fairy Tern nesting area
3. Home to native local & migratory fauna
4. Bushland - Tims and Yalgorup. One of last remaining areas of bushland

Kids Values

1. Pyramids Beach - big beach, cool name.
2. Florida Beach - the best holiday destination as a kid – massive dunes!

CCRG

- Surfing, swimming, walking and fishing
- The natural environment, dunes and habitat, marine life
- Picnic areas and coastal walkways
- Concerned about erosion, loss of dunes, loss of paths
- Loss of dunes, loss of habitats and need for re-vegetation are concerning

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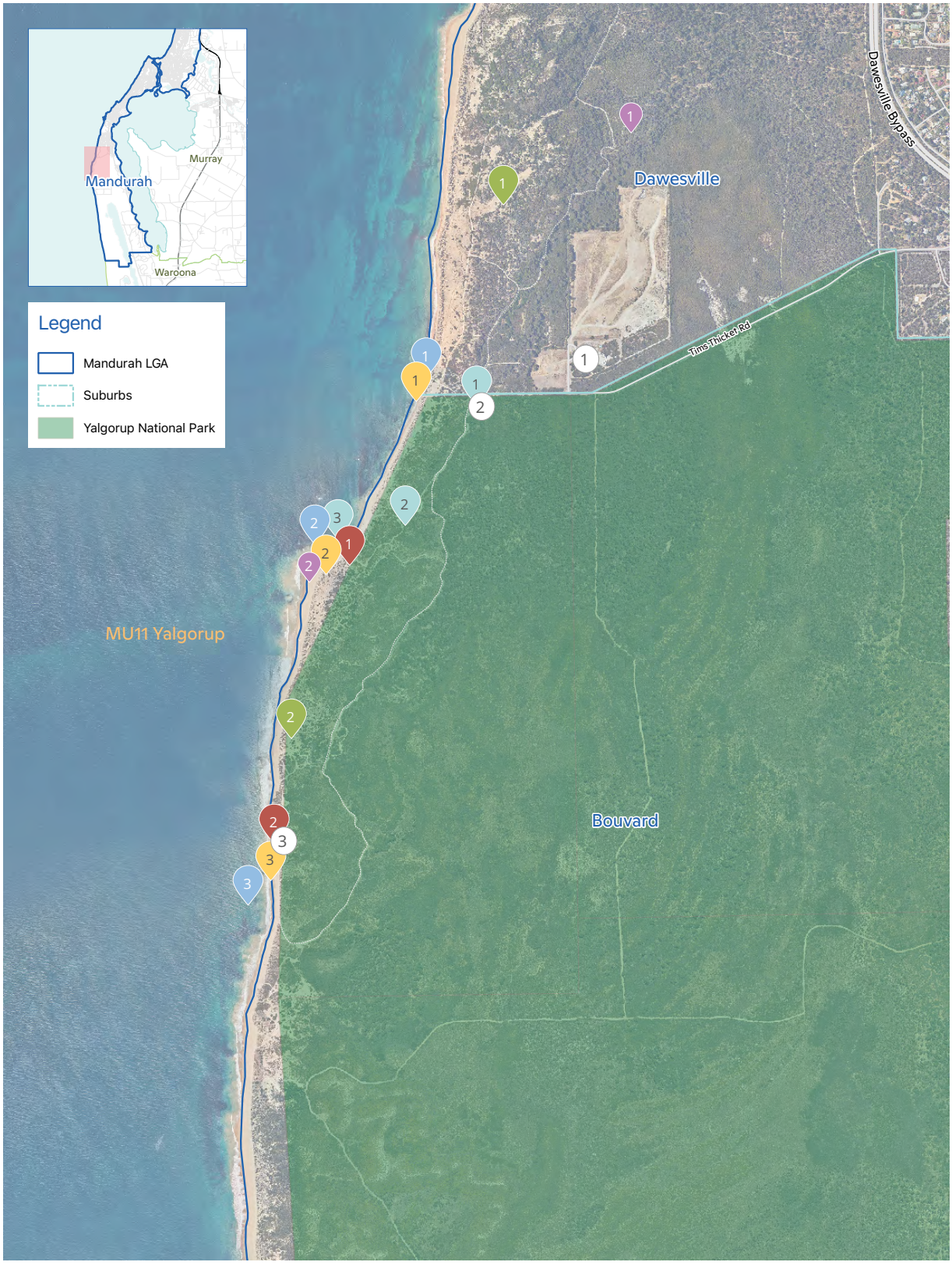


Figure 18 Assets and values mapping - Tims Thicket

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Assets and Values Mapping - Tims Thicket

Key Assets

1. Tims Thicket Inert Disposal
2. Tims Thicket Beach car park
3. Tims Thicket *Aboriginal Cultural Heritage (ACH) Register Place*

Highly Valued

1. Tim Thicket Beach – 4wd access beach. Popular and important for the 4wd community.
2. Popular for beach goers with 4wd.

Water based activities

1. Fishing access point for tailor off the shore or going craydiving or spearfishing at the inshore reefs.
2. Popular for locals and visitors to enjoy 4wding, swimming, fishing, snorkelling, SUPing, diving – the inshore reef provides protection for families and kids.
3. The 4km stretch from Tims to Whitehills has reef, surf, and protected places to park and picnic. It is the best part of the coastline, close to the Perth metro area.

Beach based activities

1. Beach combing and wildlife observations with cycle access to coastal path.
2. Multi purpose beach – iconic Mandurah beach, 4x4, family and friends gathering, relaxing.
3. 4wd along the stretch from Tims Thicket to White Hills find safe space to picnic, fish, surf, snorkel and spearfish. Less ideal south of White Hills.

Nature based activities

1. Coastcare planting area
2. Coastcare planting area, to rejuvenate the dune system.

Something else/Other

1. Tims Thicket carpark – Main access point for 4WDs, surfers & beach goers.
2. Bouvard Coastcare's annual Tims Thicket 4WD cleanup – regularly attended by residents and 4WD enthusiasts.
3. 4 wheel driving issues at beach.

Kids Values

1. I love catching mussels/fish in Dawesville with my family. It's the only time we're all together.
2. Tims Thicket - it's the best fishing spot down south.

CCRG (relevant to this and the following MU11 areas)

- Fishing
- Surfing, swimming, walking and fishing
- Enjoying the views
- The natural environment, dunes and habitat, marine life
- Camping and four wheel driving
- Picnicking, gathering, social activity
- Vehicles on the beach and in the dunes doing too much damage
- Concerned about erosion, loss of dunes, loss of paths
- Loss of dunes, loss of habitats, plant disease and need for re-vegetation are concerning

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Figure 19 Assets and values mapping - White Hills

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Assets and Values Mapping - Whitehills

Key Assets

1. White Hills Road

Highly Valued

1. White Hills Beach – Fishing, swimming and snorkeling

Water based activities

1. White Hills to Preston – Extremely valuable area for the fishing and 4wd community.
2. Great fishing

Beach based activities

1. Beautiful long uncrowded beach and nearby reefs. Snorkelling, swimming, fishing, beach days, relaxing getaway.
2. Beach fishing, swimming and 4 wheel drive.
3. Accessible by vehicle are important. Fishing, swimming, relaxing on the beach.

Nature based activities

1. Fishing, safe swim spot for more adventure swimming, walking in bush that surrounds beach is good for bird watching and coastal plant exploring.

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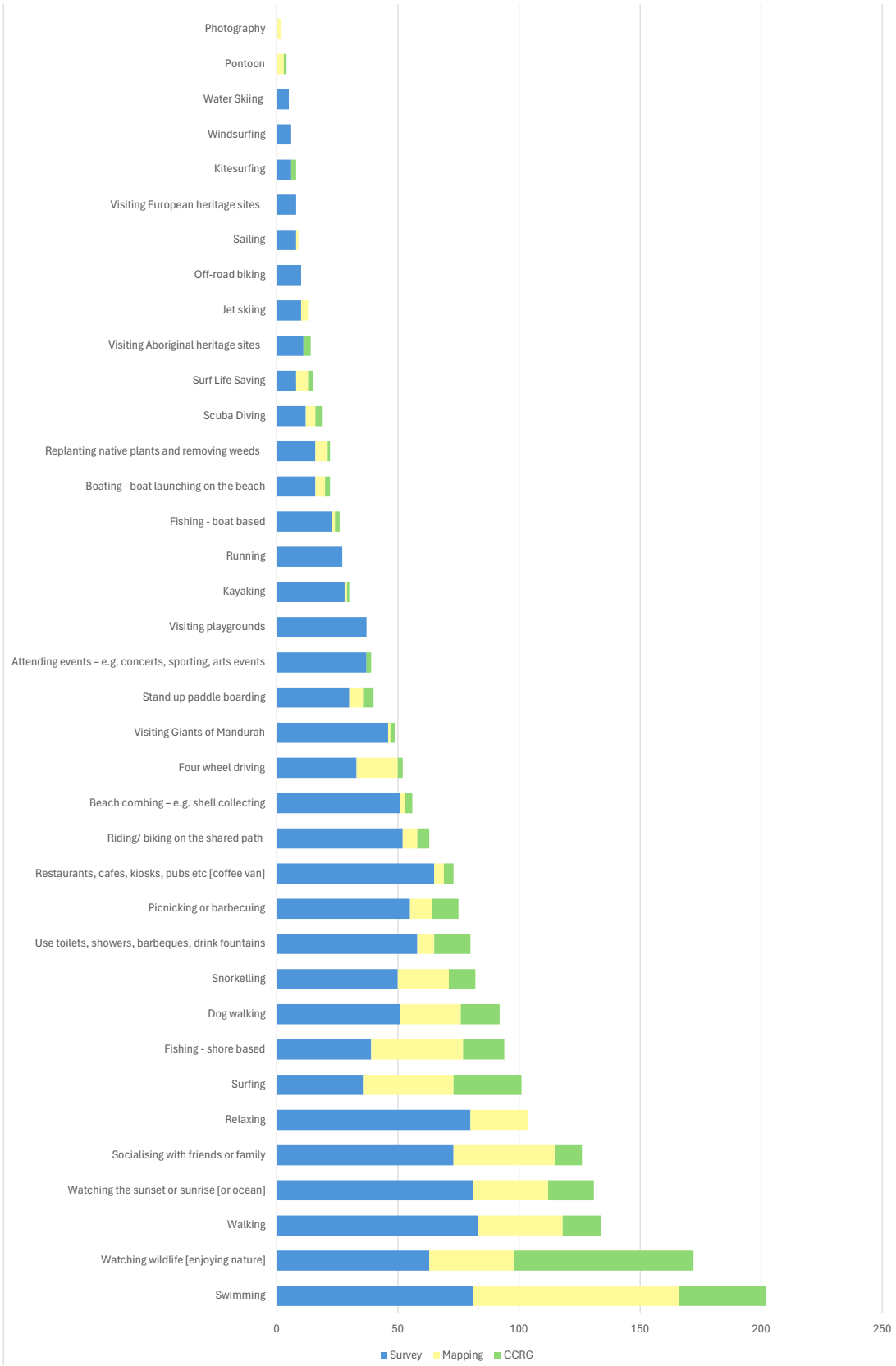


Figure 20 Values and activities

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In general, similar themes are observed across different groups and data gathering methods.

Blue Bay MU1, is valued for walking, swimming, bicycling, snorkelling, socialising, sunset and wildlife watching, dog-walking and the pontoon. Blue Bay is one of the most visited beaches overall.

Back Beach MU2, is valued for walking, swimming, snorkelling, sunsets.

Calypso MU3, is valued for the pathway (bicycling), swimming, Giants, watching sunset.

Seascapes MU4 is valued for Aboriginal Heritage, walking, swimming, running, bicycling, snorkelling, socialising, barbecuing, sunset and wildlife watching.

Rakoa MU5, is valued for walking, swimming, surfing, socialising, and its quiet nature.

Falcon Bay MU6, is valued for walking, swimming, bicycling, snorkelling, socialising, fishing, sunset watching, barbecuing, picnicking, family time, calm waters, paddling, accessibility, and the café.

Falcon Bay is recognised as one of the highest priority assets in the study area, confirmed across methods. It is also the single most visited beach in the study area.

Gearys-Avalon MU7, is valued for accessibility, water based sports (surfing, paddle boarding, kayaking, fishing, swimming, snorkelling), its quiet, natural environment, for, boating, kid-friendly, being dog-friendly, running, walking and bicycling.

This management unit is highly valued by many of the stakeholders, across different groups.

Dawesville Cut MU8, is valued for fishing, winter surfing, watching sunset

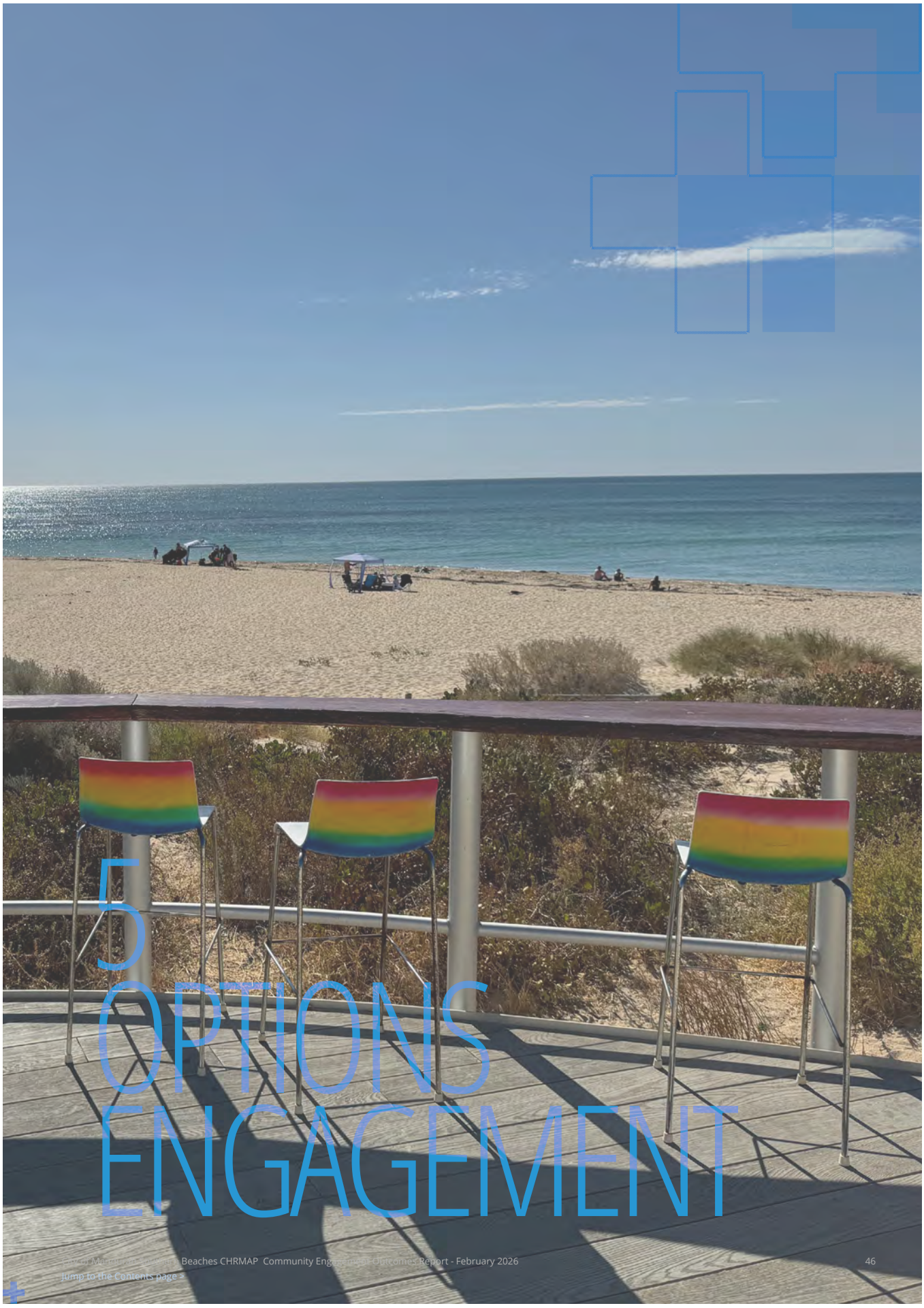
Golf Course MU9, is valued surfing (Pyramids), surf life saving, swimming, snorkelling, quiet, relaxing, bird nesting, natural, bushwalking and watching sunsets

Florida-Melros MU10, is valued for swimming, snorkelling, being kid-friendly, close to homes, walking, sunset and wildlife watching, being natural, scenic, its coastal path and wheelchair access.

Tims Thicket-Whitehills MU11, is valued for four-wheel driving, camping, off-road vehicles, relaxing, socialising, surfing, shore based fishing, wildlife and sunset watching, natural environment, ruggedness, its uncrowded nature and how easy it is to ‘get away from it all’.

This area is consistently one of the most highly rated areas, with the natural environment, and access to quiet coastlines its major attractor.

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5 OPTIONS ENGAGEMENT

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5 OPTIONS ENGAGEMENT

5.1 CCRG Workshops Two and Three

The purpose of Workshops Two and Three, held on Saturdays 8 and 22 February 2025, was for the CCRG to develop a multi-criteria assessment (MCA) for the Southern Beaches CHRMAP.

In Workshop Two, a draft MCA was presented to the CCRG who were asked to review the presented criteria and descriptors for each score, noting if they felt any measures should be changed. The groups accepted the six proposed criteria of *effectiveness*, *future adaptability*, *cost*, *environment*, *community/social* and *physical and economic*, and generally supported the presented descriptor text against these criteria for each score. The project team adjusted some of the wording in the MCA in response to this exercise and represented and used this revised MCA in Workshop Three.

Over Workshops Two and Three, CCRG participants worked in groups to undertake an MCA for proposed preliminary management options for each MU, using a scoring scale of (-2) (most negative) to (+2) (most positive).

The groups scored the *environment*, *community/social* and *physical and economic* criteria for each management option, identifying any benefits or issues. The groups were also invited to review and revise the project team's scores for the *effectiveness*, *future adaptability* and *cost* criteria for each option if they felt the need to query the scores.

On the whole, the CCRG groups accepted the scores against the technical criteria, with some queries raised and alternative scores suggested.

Of the proposed preliminary management options presented, artificial reef was the most positively scored option, followed by sand nourishment. Positive scoring for sand nourishment corresponded with MUs where maintaining a sandy beach was identified as a valued asset in Workshop One and was reflected in the MCA comments. Comments supporting artificial reef were often associated with surf breaks and minimising visual impact on the beach and disruption to the natural environment.

The most negatively scored options were groynes and seawall. Concerns about groynes and seawall pertained mostly to their visual impact, impeding access to the beach and disrupting the natural environment. Loss of sandy beach was also highly noted for seawall.

Planned/managed retreat also scored negatively for several MUs, but was the preferred or second most preferred option at two MUs, both of which have fewer built assets.

The prominent concerns noted in the comments across the MCAs relate to minimising disruption to natural processes, retaining sandy beaches, enabling water-based activities and protecting residential properties. This is generally consistent with outcomes of the values engagement stage, although the high value placed on using public facilities such as picnic areas and boardwalks/lookouts in this earlier work was not as strongly represented in the MCA.

Prior to Workshops Two and Three, the project team completed an MCA for all preliminary management options for each MU, assigning scores for each of the six criteria; including the values driven criteria.

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The team's scores for the technical criteria (*effectiveness, future adaptability* and *cost)* was based on technical knowledge and assessment of each MU's conditions. The team used findings from the online community surveys and outputs from Workshop One, which identified the CCRG's most valued assets and priority concerns, to predict scores for the values driven criteria (*environment, community/social* and *physical and economic*).

In the options engagement stage, CCRG participants drew on their community's and their own values, experiences and local knowledge to score the options against *environment, community/social* and *physical and economic.*

Of most interest to the project team was how much more strongly the social/ community aspects of sandy beaches, the environmental aspects of the natural landscape and the economic and property aspects of private property and foreshore activity impacted scores.

The variance in CCRG MCA scores from the project team's for these criteria highlights the vital role community engagement plays for gaining further insights into what is important for the southern beaches community.

This calibration exercise is a clear sign to the project team; the CCRG reflected community values will drive improved scoring across the other options that were not put to the CCRG for scoring.

Refer to *City of Mandurah Southern Beaches CHRMAP Community Engagement Outcomes Report - Part A* for full details of CCRG Workshops Two and Three outcomes.

5.2 Engagement with Stakeholder Groups

Community advisory groups, Aboriginal organisations and government stakeholders were informed of the progress of the project up to the MCA stage.

To this time, the only stakeholder who has sought further engagement is the Water Corporation, who has a large asset within the study area (a waste water treatment plant).

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5.3 Summary of Options Engagement

The similarities between the broader engagement and the CCRG engagement have been very clear. Although the CCRG had substantially more information to use in providing their comments, the values remained consistent across all engagement methods. The CCRG scores for the MCA reflect a broader sentiment.

Options that impact the natural sandy beach line are likely to be opposed more significantly than options that potentially create recreational or environmental benefits. Seawalls and groynes need to be considered cautiously.

Planned and managed retreat is also something that needs to be considered cautiously. It is supported in some locations, which would be suitable trial sites, whilst strongly opposed in others where it might be beneficial. The City will need to consider this carefully.

Sand nourishment is an option along the entirety of the study area, however, the City will need to consider the scale of this task as a whole.

The CCRG exercise has been incredibly successful in properly calibrating the technical team and community scores.

Further engagement is encouraged per MU, as decisions begin to be more certain.

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6 DRAFT CHRMAP ENGAGEMENT

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6 DRAFT CHRMAP ENGAGEMENT

6.1 Public consultation

Public consultation for the draft Southern Beaches CHRMAP ran from 1 December 2025 to 31 January 2026. Refer to the *Southern Beaches CHRMAP Public Advertising Summary of Submissions* for detailed reporting on this stage of engagement.

During the public consultation period, the draft Southern Beaches CHRMAP and supporting documentation, such as a fact sheet, were published on the project webpage and community members were invited to provide feedback via an online survey. Written submissions were also accepted.

The City advertised the engagement period, which included four community information drop-in sessions, through direct communication with project stakeholders and through its regular news and updates channels.

During the engagement period, there were a total of 4,092 visits to the project webpage, 1,131 document downloads, 44 online survey submissions, one written submission and approximately 76 attendees at the drop-in sessions.

6.2 Submissions analysis

The main thematic concerns that emerged from the feedback are:

- Requesting clear communication of recommended actions, including who will be affected
- Ensuring technical veracity and community engagement
- Ensuring implementation, and addressing immediate needs
- Comments implying mistrust in government and climate science
- Querying the suitability of the Falcon Coastal Shared Path.
- Concern about beach access restrictions, in particular for four wheel driving (4WD).

Feedback received during the public engagement period reflects a need for clear and consistent communication and ongoing community engagement.

A significant amount of the oppositional or concerned feedback received appears to be influenced by other concurrent coastal projects. The most commented issue was concern that beach access, in particular for 4WD, would be restricted as a protection measure at Tim's Thicket and Whitehills Beaches (MU11 - Yalgorup).

Recommended actions in the Southern Beaches CHRMAP for this Management Unit do not include restricting beach access. The CHRMAP defers to the Yalgorup National Park Concept Master Plan (Department of Biodiversity, Conservation and Attractions, 2024) as the primary control of activities for this area, which makes several recommendations regarding managing visitor use and beach access, although no documentation explicitly changes current 4WD access.

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6.3 Recommendations

Feedback received during the public engagement period did not identify any element of the draft CHRMAP that would require material changes.

A minor update is required in the final CHRMAP to include a brief summary of this public engagement phase (page 61, Section 1.10.2.3, which refers to this phase and previously included only placeholder text).

A summary of this report is also required to be included in Appendix E to the CHRMAP; the overall engagement summary. The minor amendments noted above are proposed amendments to the CHRMAP.

Notwithstanding the limited changes proposed to the CHRMAP technical reporting, the public engagement period reflects a need for ongoing clear and consistent communication and engagement.

The following actions are recommended to ensure accurate and up-to-date information is easy to find:

- Update the Southern Beaches CHRMAP project page on the Mandurah Matters engagement platform to remove out-of-date information
- Create a dedicated coastal planning webpage on the City of Mandurah website to ensure the community can easily find all CHRMAP information (including other projects)
- Prepare a CHRMAP Summary and Fact Sheet (Southern Beaches CHRMAP *Strategy 2: Coastal Hazard Summary and Fact Sheet*)
- Ensure project communication is clear and consistent.

Consistent with Southern Beaches CHRMAP *Strategy 1: Engagement,* the following actions are recommended to ensure the community remains engaged with this project, and other CHRMAP developments and reviews into the future:

- Actively engage with the community by sending regular updates to community members who have registered for project updates
- Publish eNews updates on the City's website to update the community about the progress of recommended actions
- Leverage groups like the CCRG for information sharing
- Consider reconvening stakeholder groups, including CCRG members, to create MU-specific groups
- Directly contact property owners in the 2050 coastal hazard zone to inform them about potential vulnerabilities, along with providing FAQs and simple fact sheets on coastal hazard management
- Provide information about potential vulnerabilities, FAQs and simple fact sheets on coastal hazard management to local real estate and settlement agents.

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6.4 Next steps

The Southern Beaches CHRMAP will now be finalised and presented to Council for endorsement, after which funding can be sourced to action recommendations, including ongoing monitoring, which will be vital in determining future actions.

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7 EVALUATION

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7 EVALUATION

Evaluating community engagement involves assessing the quality of the engagement process.

It seeks to measure how well the engagement process was planned, implemented and managed, and informs continuous improvement of the engagement approach.

Table 3 provides an overview of the engagement levels for the project. The targets were estimated based on the number of potentially interested stakeholders identified in the stakeholder analysis undertaken in the engagement planning stage and existing City of Mandurah media reach.

Whilst the attendance rate for CCRG Workshop One was high, numbers dropped significantly for Workshops Two and Three, held four months later. It is recommended that the City seek to undertake these meetings in closer timeframes in the future, if utilising the same method. Increased remuneration may also be beneficial.

Online engagement, via the Mandurah Matters project webpage, was consistently strong through the three phases of engagement. Total webpage visits, informed visitors and aware visitors exceeded target figures, and the number of engaged visitors (performed an engagement action) was within 93% of the target.

Table 4 Engagement Evaluation

Measurement	Target	Actual
Engagement Activities		
Number EOI for CCRG	120 nominations	76 nominations
Formation of the stratified CCRG	90% match of the stratified sampling	79% match
Attendance of the members to all CCRG workshops	> 80% attendance	W1: 97% W2: 55% W3: 45%
Support for the selected adaptation pathways	80% support	<0.1% objections
In-person engagement activities	65% satisfied or very satisfied	>70% support for the process and the belief that the process was genuine across all measures
Number participating in surveys/activities	250	435
Online engagement activities	65% satisfied or very satisfied	Only 6 persons provided negative feedback on engagement detail
Project Webpage (Mandurah Matters)		
Total visits	1,500	6,790
Engaged visitors	200	186
Informed visitors	400	1,304
Aware visitors	1,200	5,633
Stakeholder project interest registrations	100	173
Social Media		
Impressions (reaction, comment, share)	500	648

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APPENDICES

Appendix A: Online Values Mapping - Survey Results

Appendix B: Youth Advisory Group polling activities results

Appendix C: Kids Teaching Kids Southern Beaches CHRMAP Engagement

Appendix D: Engagement Presentation – Workshop One

Appendix E: Engagement Presentation – Workshop Two

Appendix F: Engagement Presentation – Workshop Three

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APPENDIX A

Appendix A: Online Values Mapping - Survey Results

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Figure: Online values mapping - Mandurah island north

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Online Values Mapping - Beach Profile Area - Mandurah Island North

	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
	Places I love		
1	Enjoy visiting to relax	Enjoy the place	Sitting relaxing, walking
2	Protected beach from the prevailing winds	Protected beach from the prevailing winds	Swimming. Playing with the kids. Relaxing.
3	I visit Robert Point and walk down to Blue Bay Beach on many days through the year.	Robert Point is a special place where you can look north across the bay to Singleton and back towards Mandurah town.	I go here to walk alone, walk my dog, walk with my family and friends, watch the sunrise/ sunset/dolphins/pelicans, etc. During summer and the warmer months, I swim to the pontoon off Doddis Beach, swim along the beach, and go on my stand-up board.
4	great swimming beach and dog beach	i go there almost every day in summer and winter	swimming, surfing, dog walking, relaxing
5		Sunset views, ocean swell swimming	Walking, swimming, watching sunsets
6		It's a great place for people to gather and enjoy a beautiful beach, with easy access to parking and amenities. Could do with some public BBQ's though.	Swimming, sunning and socialising
7	swimming, surfing	protected beach and good swimming spot	swimming surfing
8	Please bring more grassed areas along the coast like Blue Bay.		
9		great access to the beach	beach walks, swimming, nature watching
10		North facing beach protected from big swells and afternoon winds	Swimming, kayaking, fishing and walking the dog
	not commented		
	Water based activities		
1	Swim to and around the pontoon, and jump and dive off the pontoon!	Great spot to swim to, climb and get a view of the beach and coastline	Swimming, snorkling
2		northern most point on local beach constantly changing revealing variety of reef life	swimming, walking, watching dolphins, seabird life, watching storms in winter, spending time with family and friends
3			Swimming, dog walks
4		Pristine coastline	Swimming, beach walking

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
5	Beautiful swimming spot	Protected swimming spot, good length to swim some laps	Swimming
	not commented		
	Foreshore based activities		
1	Be nice to see this are done as another park area with bbqs and shade, amazing place to park and look back at the foreshore all year round		
	Beach based activities		
1	One of the few beaches where you can go swimming with your dogs without having the reef making it dangerous	Not many other beaches where to swim with your dog	Swimming, running, playing with dogs
2	beach walks	closest access from my home to the ocean	beach walks and swimming
3	walking dog		
4	Walking	Beautiful, protected north facing beach with lovely views of coastline and channel entrance	Walking my dog, walking alone, walking with family
5		Beautiful beach location and semi protected from summer breezes	
6	One of the best swimming beaches on the coast	One of the best swimming beaches on the coast	Swimming. Playing with the kids. Relaxing.
	not commented		
	Nature based activities		
1	One of my favourite dog walks along this path. Surrounded by nature & ocean. Always clean.	Still natural with just a bitumen path. Isn't ruined by heaps of bins, fences or signage.	Walking with my dog. Sunset / sunrise watching. Ocean watching.
	not commented		
	Something else/Other		
1	Maintenance sand bypassing operations	Navigational safety	DoT and CoM ongoing maintenance sand bypassing operations to Town Beach.
2	Love the outdoor shower after a swim	Swimming, view, feel safe.	Swimming, walking, socialising, showers, sitting on lawn, coffe van
	Great views		
1	After we have swim we buy coffee from the van and sit and admire the view.	Childhood memories of swimming	Swimming, lawn, outdoor showers, seating, view, watching sea lions and seals and coffee van.

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
2	Great views at sunset, it does need a boardwalk/stairs access to the beach to protect the dunes.	Great place to sit & watch the view change through the day.	Swimming, walking the dog.
3	Sunset viewing	Good spot for sunset views, plenty of beach space for kids and dogs to play	Watching the sunset with friends
1	*not commented*		
1	*not commented*		
	Important for wildlife		
1	Dolphins	Dolphins surf off the reef	Watching the dolphins, walking on the beach, sitting on the beach
	not commented		

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Figure: Online values mapping - Seascapes to Falcon Bay

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Online Values Mapping - Beach Profile Area - Seascapes to Falcon Bay

	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
	Places I love		
1	Polley's Hole	Community activities	Swimming, dog walking, abalone fishing area
2	This place is so special. Protected from a lot of the sea breezes. Toilets and lovely grassed area for picnic	Swimming and facilities are great for family picnics	swimming, picnics
3	Beautiful spot to visit	Enjoy the place	Sitting relaxing, swiming, walking
4	Family friendly meeting place that is popular all year around	Great meeting place and northerly aspect is protected from summer seabreezes	Meeting friends and family, beach swims, kids surfing (winter)
5	Falcon bay	Beautiful spot for friends and family to gather on the reserve and beach	Swimming, snorkeling, coffee (would love another cafe or van as always huge Q's at Falcon bay cafe)
	Water based activities		
1	Swimming spot	Quiet beach for a long walk with the dog and a swim	Walking the dog, swimming
2	Great for swimming and walking	Clean quiet and a good walk	Swimming, walking, sunsets
3	Lovely spot to swim. Great that you can take your dog. Fun for the kids at low tide along the reef and rock pools	Easy access from the car park, can take your dog	Swimming, snorkelling
4	Swimming spot	Protected swimming spot inside the reef	Swimming, snorkeling, spearfishing
5	great beach	Great place to swim especially with my little children	swimming snorkelling walking
6	Uncrowded beach walks and swimming spot	uncrowded and dog friendly	walks, swimming, relaxing
7	Great surf	Quiet ish surf spot with friendly locals	Surfing
8	Morning swimming spot	great place for a morning swim, with lots of friendly locals	swimming
9	Surfing		
10	A shark barrier would be a great addition, additional shade shelters and seating areas. keep the pontoon.	Iconic mandurah beach, family and friends gathering	swimming /surfing / sunsets / family and friend gatherings
11	Falcon Bay	Community swimming area.	Falcon bay is an ideal swimming area for families and is patrolled during summer months by PBSLSC
12	Swimming to the pontoon	Great spot for kids to build their confidence swimming out to the pontoon and doing bombies	swimming
13		Pristine coastline that should be preserved.	Swimming to the pontoon and swimming parallel to the beach

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
	Foreshore based activities		
1	Great cycling pathway	Many residents and visitors use this cycleway	Cycling
2	Great beach for the dog	We need a beach for the dog to run and swim	Running with the dog
3		Great coastal shared path and popular for walking, cycling etc	
4	Fishing	Good fishing. Good access, don't require a boat	Fishing
	Beach based activities		
1	Great beach for dog walking	Many residents use the beach to walk their dogs	Dog walking
2	Good place to take the dog for a long walk	Easy access and plenty of space for the dog to explore. Lots of other dogs to play with	Walking the dog
3	Quiet corner to read a book	Quiet corner to set up and read a book in summer	Sunbathing, reading, listening to music
4	Winter beachcombing		Beachcombing, photography
5	Dog Friendly walks, sunsets, swimming	To be able to go for dog friendly walks in the morning and have a swim. To watch the sunsets - very healing	Dog Friendly walks, sunsets, swimming
	Something else/Other		
1	Concerns raised to Mandurah Environment & Heritage Group (MEHG) regarding erosion issues	Foredunes and access need urgent action as stairs have been washed away.	
	Great views		
1	Great spot to watch the sunset from the wooden platform.	Many residents use this platform	Looking at the sunset
2	Sunset views	Great sunset views, stormwatching, and fireworks	Watching the sunset with friends, watching fireworks
	Important for wildlife		
1	Protecting the reef along this area of Bakyrey Bay is crucial for maintaining biodiversity, supporting marine ecosystems. Reefs act as natural barriers, protecting coastlines from erosion and storm surges, while also serving as critical habitats for fish and other marine species.	Reef	Viewing reef life

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Figure: Online values mapping - Mandurah island south

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Online Values Mapping - Beach Profile Area - Mandurah island south

	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
	Places I love		
1	Cosies surf break - please add shower facilities for surfers		great surf and swim spot
2		Great place to take kids	Walking, swimming, snorkelling, fishing, paddlebaording
3	Fantastic beach used as a mix use of boat launching and 4x4 beach access. needs to be maintained as a dual access.	Fantastic beach used as a mix use of boat launching and 4x4 beach access. needs to be maintained as a dual access.	Swimming, relaxing with friends, beach snorkelling
4	Our favourite spot to launch the jetski or just park and and enjoy the sunset. 4WD access should be allowed without a boat trailer.	There are no 4wd beach access areas in Mandurah.	Jetski, snorkle, swim
5	Great place to launch small boat or jetski in summer , needs to be maintained as community beach boat launch location	Boat launching / fishing / jet skiing	Boat launching / fishing / jet skiing / families
6		Good swimming spot	swimming, snorkelling, fishing, paddle boarding
7	Quiet natural beach	Not too many man made structures.	Swimming
8	Surfing spot. Beach access. Very small area hence no need for concrete toilets as it would destroy the vibe. Plenty of other areas with toilets close by.	Small look-out area with memorial to Benny who lost his life from a shark attack.	Watching the sunset, accessing beach.
9	Avalon beach	Great spot for our surfies	Grabbing a van coffee, sitting and watching the surfers
	Water based activities		
1	surfing		
1	surfing		
1			surfing
2	Yeedong Road boat ramp	Boat ramp and launching area is frequently used by PBSLSC as a IRB boat training location due to its condtions	Surf lifesaving activities
3	I love swimming in this beautiful water early in the morning in the summer months.	This water is important because it is very clear and clean and a nice temperature.	Swimming
4	People meet here each day to swim across Avalon Bay to boat.	Swimming group swim the bay all year round.	Swimming
5	Great place for surfing and nice protected area for swimming	Good place to relax.	Surfing, Swimming and relaxing on the beach

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
6	Favourite surf spot	Provides a great recreational playground for everyone.	Surfing, walking dog, sunrise/ sunset watching
7	beautiful beach to swim at and be part of the ocean.	Great place to swim especially with my little children	swimming
8	Mandurah's best surf spot.	Mandurah's best surf spot. If the sand is pumped across the channel in the correct way the point can get very good. If it's not done right the wave can be very bad.	Surfing
9	All year round Surfing and summer swimming location.	Surfing / Swimming / Diving / Dog Walking location for community	Surfing Swimming Diving Dog Walking. Location is effected by erosion and sand pumping for maintaining ammenity through winter / summer
10	Winter Surfing location. This plan has the potential to increase the surfing amenity of this location considerably with the detailed design for the discharge of sand pumping.	Well utilised surfing location, opportunity to significantly improve amenity with controlled sand pumping discharge	Surfing
11	All these groynes are a great spot for fishing, can access fairly deep water and get beyond the swells of the beach. Fishing from the rocks allowing for fishing for a range of species not normally accessible to land based anglers like mulloway and snapper.	Fishing	
12	Access gate needs to be removed to allow vehicle access to the groins and rockwall for fishing activities and swimming.	Fishing / family safe access	Fishing / swimming
13	Beach access for water craft	Access for boats/jet skis	Fishing, water sports
14		Pristine coastline that should be preserved.	Swimming, chilling, reading on the beach
15	Surfsports training for Nippers	Avalon beach is used by PBSLSC for lower risk water training	Swimming, surf Life saving training
16	Surf	Amazing surf	Surf

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
	Foreshore based activities		
1	I love walking along this track through the dunes and around to watch the dolphins in the cut.	This is a well located walking track in the immediate coastal dune, with great outlooks across the beach.	I like walking along this track; my husband also uses this track to get to fishing points along the cut and groyne. Unfortunately there is way to much dog poo left along the track, which detracts from the walking experience.
2	Shared Path	running/cycling path along entire length of coast	running/cycling
	Beach based activities		
1	Dog friendly beach access for swimming and surfing. Sunsets too	To be able to relax on the beach with family and the dog, while surfing and swimming.	Sunset, dog walks, swimming, surfing
2	Bay is somewhat protected by the reef so is great for swiming	Not too busy	Swimming
3	Dog Friendly Beach activities	Easy access to the beach with and without dogs	Swimming, dog walks along the beach
4	Great spot for swimming and surfing	Calm waters	Swim, surf, relax
5	Please restore the lookout	A great meeting point for community	Enjoying sunsets, check surf, watch wildlife
6	Vehicle access to the groynes and cut	Important for recreational activities esp. fishing at the cut. It is important for vehicle access for young families and also those who are not unable to walk and carry their equipment long distances	Fishing
	Something else/Other		
1	Unfortunately this area is now mostly use for hooning both day and night, with 4WDs doing donuts, and climbing the dunes and rocks. Vehicles speed in and out the access road, doing burnouts as they enter the intersection, and driving on the wrong side of the road. It's become a testing ground for 4WDs.		
	Great views		
1	the addition of a toilet block, BBQ and additional parking.	area history	surfing / sunsets / family and friend gatherings
2		Great views from the coastal shared path over Avalon surf break	

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Figure: Online values mapping - Dawesville

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Online Values Mapping - Beach Profile Area - Dawesville

	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
	Places I love		
1	Good access for homes close by	Florida beach	My kids love to run and play on the beach
2		I love this beach because you can't see the houses and it feels more natural	Walks along the beach.
3		Get beach for all to relax and unwind	Fishing, swimming, walking, watching sunsets, picnics, SUP, snorkelling
4	Lovely beach, good for walking.	Main beach access for Melros and local residents. Good for car parking and toilets.	Walking
5	Coastcare picnic bench, fabulous views over the ocean.	Beautiful viewing point over dunes and Indian ocean.	Picnics
6	What a beaxh	It's a beautiful spot.	Walking and talking
7	Coastal path - beautiful scenic access path for all users including wheel chair access.	Used by many locals on a daily basis.	Walking and meeting other residents
8			Snorkelling with the kids and walking the dogs
9	Port Bouvard SLSC	Volunteer services to community	Surf Life saving related. Swimming, rescue training
	Water based activities		
1	This estuary system is unique and habitat to so many aquatic birds and Maine life. Any activities that detract from keeping the peel inlet and estuaries in its current state should be stopped. We need harsher penalties for speeding boats and polluters.	Because it's unique marine zone close to metropolitan areas	I have a boat in Marina. Member of Mandurah offshore fishing and sailing club. Also member volunteer of Fishability fishing for the disabled
2	Vehicle Access	Important for recreational activities esp. fishing at the cut. It is important for vehicle access for young families and also those who are not unable to walk and carry their equipment long distances	Surfing, Fishing and Dolphin watching
3	Mandurah surfers and life saver training ground. Best place for junior surfers to practice in a safe beach break location. Plus hosts several sporting groups such as Mandurah board riders club junior and senior competitions all year round.	Great family sun and surf location. Plus location for surf training and competitions.	Surfing , Life Saving , Swimming

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
4	Pyramids Beach	Only patrolled beach in Mandurah area with surfable conditions	Swimming, surfing, life saving
5	Quiet place for relaxing on the beach.	Good place to spend time with family	Swimming, Surfing, Relaxing on the beach, Walking the dog.
6	My children love snorkeling around the reef, where it is protected from the waves.	It is important because it has not been over developed like Florida beach where I grew up. It needs to be protected from development on sand dunes .	Snorkeling, fishing, walking, relaxation
7	Amazing beach	Access for surfing, beach walks and other beach activities	surfing and beaching
	Foreshore based activities		
1	Walking and Cycling track is enjoyable to use.	Good for enjoying the scenic natural surrounds	Walking and Cycling
	Beach based activities		
1		Beautiful beach and part of the natural waterways in the area. Home to local dolphins and entrance to The Cut	Swimming, walking along the beach, walking along coastal path.
2	Surf spot	Surfing	Surfing, relaxing walks
3	Beach for kids to play	It's a nice quiet space	For locals
4			Exercise dog, swim, relax
	Nature based activities		
1	Anywhere along The Cut foreshore is great for Watching the Dolphins	Dolphin watching	Watching Nature, fishing.
2	Bushwalking		
3	Planting area by Bouvard coastcare to regenerate dunes.	This is a wind tunnel area and very difficult to vegetate, however we are slowly making progress.	Planting and brushin
4	important planting area, Coastcare tried to plant a windbreak here to protect the wind tunnel area, however trees didn't survive.	Need to plant a windbreak here.	Planting

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
	Something else/Other		
1	A permanent solution for dredging needs to be implemented, alternatively the groin needs to be removed. lack of correct dredging over years has made the surf beach of poor quality	Surfing spot.	surfing
2	DoT ongoing sand bypassing operations	Navigational safety	DoT ongoing maintenance sand bypassing operations to northern side of The Cut
	Great views		
1	Enjoy watching the Sunset over the ocean from the Lookout.	Scenic and easy access to the lookout	Relaxing
2	Great views from Coast care lookout with seat.	Great surf checking spot	Contemplation
3	Fab views from Coastcare Memorial lookout with seat.	Great views for surf checking.	Wonderful contemplation spot amidst ocean and bushland.
	Important for wildlife		
1		Home to many of the local wildlife.	Walking and dolphin watching.
2		Hooded Plover and occasional Fairy Tern nesting area	
3		Home to many native local & migratory fauna	Study, and learn about the area and its biodiverse ecosystem, walking and spending time alone in peace
4	Bushland - Tims and Yalgorup	One of last remaining areas of bushland	

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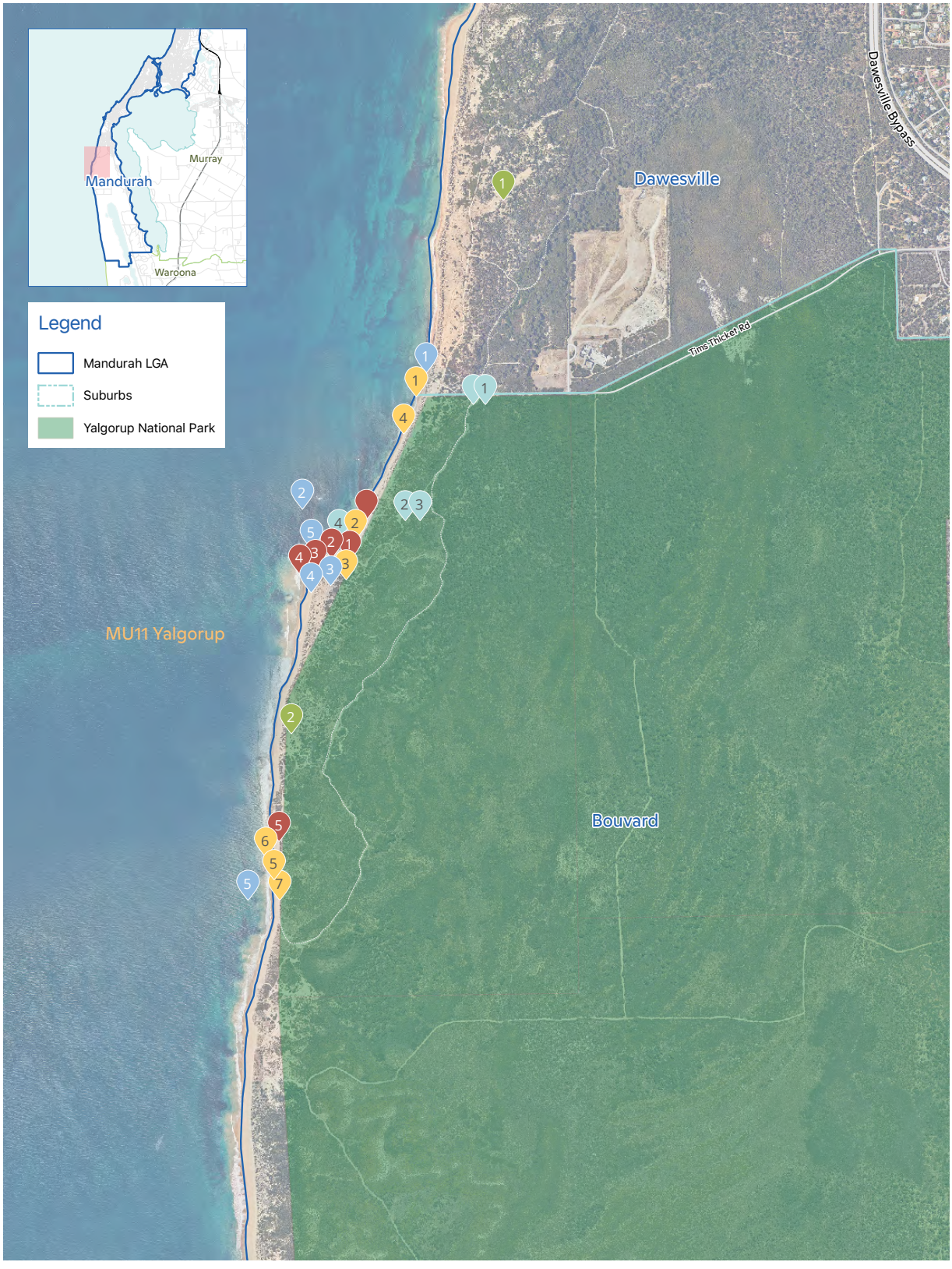


Figure: Online values mapping - Tims Thicket

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Online Values Mapping - Beach Profile Area - Tims Thicket

	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
	Places I love		
1	Great place to take the family for the day	One of the only places you can access the beach via 4wd	4wd, swim. snorkle,
2	Great area for 4x4 access to beach.	Ideal to bring friends and family for a real Australian beach trip.	Perfect for fishing, swimming, snorkelling, beach BBQ and beach fun.
3		Great views, swimming, fishing, picnic area and great memories	
4	best place to come down with the 4wd and enjoy a day in the sun and sand. dont ruin it for the majority of decent residence for the sake of a few	as a local member of the community this area is amaxing for family outings and fishing , swimming etc	
5	Best beach in the area, bonus if its 4x4 accessible. High tide the inland tracks were a godsend to get around the headland. Please keep it open!	4x4 access during high tides around the inland of the headland is a must!	4x4 access to beaches for fishing, swimming, taking the kids down to the beach.
	not commented		
	Water based activities		
1	Extremely important access point for fishers from the Mandurah area, particularly for those fishing for tailor off the shore or going craydiving or spearfishing at the inshore reefs.		
2		spending time with family during school holiday	SUP Diving, snorkeling
3	Tims Thickett Beach	Really unique place for locals and visitors alike to enjoy 4wding, swimming, fishing, SUPing, diving close to a major hub. Unlike Whitehills and Preston beaches, the inshore reef provides protection for families/little ones to enjoy.	Fishing, swimming, diving, 4wding
4	This is one of the most special places south of Mandurah	4x4 beach access for many beach activities for big days out at the beach. The perfect place to set up with the car and spend the day. Days at Tims are so special, cleansing, stress free and extremely good for ones mental health. So special and precious	4x4 beach access, swimming, surfing and fishing

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
5	amazing spot to spend the day fishing, swimming being able to take the 4wd out is the most important part	offers a space to clear the head and get back to nature . no council should have the right to take that away from its residents	fishing, snorkeling, beach 4wding, swimming
6	I spearfish and 4WD to picnic with the family from Tims to Whitehills. That stretch has reef out the front, surf and better protected areas than that South of Whitehills. Tims will get too busy and congested during Spring and Summer with the new recent track closures around the outcrops which previously allowed people to spread out along the coast with 4WD's and find safe space. Remove the track closures and let people drive along the beach. A submission to remove the aboriginal cultural heritage site should be submitted. The tracks are established and Parks and Wildlife has already driven over much of the Aboriginal Heritage area with machinery placing logs for dune erosion prevention. If the Aboriginal Cultural Heritage site was not removed, I think it would be reasonable for local indigenous people to allow continuation of use of the existing tracks that have been used for over 30 years by locals.	The 4km stretch from Tims to Whitehills has reef, surf, and protected places to park and picnic. It is the best part of the coastline.	Spearfishing, surfing, 4WD to park and picnic with the family.
	Beach based activities		
1	Tims Thicket beach - excellent for beach combing. Also have found and rescued baby turtles here after storm surges.	Easy access from Tims Thicket car park, although beach access a little steep. Also has cycle access to coastal path.	Beach combing and wildlife observations.
2			Fishing, swimming
3	multi purpose beach and is an asset in the joy it brings in its current state.	Iconic Mandurah beach, 4x4, family and friends gathering, relaxing	swimming / 4x4 /surfing / sunsets / family and friend gatherings

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
4	The stretch between Tims and Whitehills is the best section of beach with reef inshore and protected areas for picnics, fishing, surfing and spearfishing & 4WD. Nice and local to us saving hours of driving. Love to go down with family and friends and set up the cars and spend a nice long day at the beach, swimming, fishing, sunset watching etc South of Whitehills is not the same- No reef, no surf, no protected areas to park and picnic and narrower beach.		
5	I spearfish and 4WD to picnic with the family from Tims to Whitehills. That stretch has reef out the front, surf and better protected areas than that South of Whitehills. Tims will get too busy and congested during Spring and Summer with the new recent track closures around the outcrops which previously allowed people to spread out along the coast with 4WD's and find safe space. Remove the track closures and let people drive along the beach. A submission to remove the aboriginal cultural heritage site should be submitted. The tracks are established and Parks and Wildlife has already driven over much of the Aboriginal Heritage area with machinery placing logs for dune erosion prevention. If the Aboriginal Cultural Heritage site was not removed, I think it would be reasonable for local indigenous people to allow continuation of use of the existing tracks that have been used for over 30 years by locals.	To be able to 4wd along the km stretch from Tims to Whitehills find safe space to picnic, fish, surf, snorkel and spearfish.	Picnic with family, surf, spearfish, snorkel
6	Access via 4wd is so critical in this area - taking the family snorkeling , fishing	as a local member of the community this area is a haven for family outings and fishing	fishing, snorkeling, beach 4wding,

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	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
7	It is essential that track is left open to access the beach south of the headland. This is extremely important as it allows 4x4 access to the beach for all manner of beach and water based activities. Allow access by at least on track to reduce congestion and overcrowding at Tims Thicket. Let people enjoy the beautiful beach down there.	If access is restricted this will make our beautiful Tims Thicket even more congested. Congestion causes major issues both socially and environmentally. It is common sense to allow people to spread out along the southern coast of Tims.	Fishing, swmming, surfing, snorkling, beach days
	Nature based activities		
1	Coastcare planting area provides beautiful quiet waves and wind sounds while planting, very cathartic	Up to 40 residents enjoy the annual planting sessions in this area.	Brushing & planting
2	Bouvard Coastcare planting area, to rejuvenate the dune system.	While most beach users behave responsibly, sadly a number of errant 4WD and trail bikes illegally ingress into this area from the beach and severely damage the dune system which provides wildlife protection from the storm events.	Brushing & planting
	Something else/Other		
2	Bouvard Coastcare's annual Tims Thicket 4WD cleanup regularly attended by 40-50 residents and 4WD enthusiasts who contribute time & effort & enjoy the comradarie.	4WD tracks provide access to Tims iconic beach areas.	Rubbish collection - feels great to be looking after our bushland.
1	Tims Thicket carpark has significant public use and needs access signage & toilets to prevent bush use for personal needs!	Main access point for 4WDs, surfers & beach goers.	
3	4 wheel driving just ruins the beach, this place sucks for that exact reason,	4 wheel driving just ruins the beach, this place sucks for that exact reason,	4 wheel driving just ruins the beach, this place sucks for that exact reason,
4	Beach fishing, swimming, SUP'ing, BBQ'ing, enjoying the ocean views and marine life, bird watching - it's all you could want all rolled into one!	Enjoy all this beach has to offer, great to be able to drive on the beach and set up for the day. Yes, there are some idiots that abuse the freedom of beach access, but all in all it's used wisely by families, young and old people.	Beach fishing, swimming, SUP'ing, BBQ'ing, enjoying the ocean views and marine life, bird watching,
	not commented		

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Figure: Online values mapping - White Hills

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Online Values Mapping - Beach Profile Area - White Hills

	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
	Places I love		
1	Fishing, swimming and snorkling	It's some I have gone my entire life	Fishing, swimming and picnic
	Water based activities		
1	Extremely valuable area from here down to Preston for the fishing and 4wd community. Also attracts tourists from the metro region as it is the closest access point for beach driving to the southern suburbs.		
2	Great fishing		
	Beach based activities		
1		Great beach frontage, wide and I enjoy the reef nearby for snorkeling. It also isn't too far south regarding travel time. Plenty of space to enjoy this stretch of beach.	Relax on the beach, snorkeling on nearby reef, picnic by the beach. Swimming.
2	Beautiful long uncrowded beach	Access to uncrowded beaches	snorkelling, swimming, fishing, beach days, relaxing and getting away from the chaos
3		An area close to Mandurah (all the way to Preston Beach) that allows beach fishing using 4 wheel drive. It's important to preserve these spots by ensuring the dunes are protected from unsupervised driving.	Fishing only. Do not approve of camping overnight unless it's supervised.
4	Uncrowded beach activities with the 4x4	4x4 beach based activities	fishing, swimming, beach days
5	Beach based activities accessible by vehicle are important. Fishing, swimming, relaxing on the beach etc.	As above! Fishing, swimming, relaxing on the beach.	As above! Fishing, swimming, relaxing on the beach
	Nature based activities		
1	great wild space in the ocean	fishing, safe swim spot for more adventure swimming, walking in bush that surrounds beach is good for bird watching and coastal plant exploring	beach snooze, fish, swim, walk with grandkids

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Online Values Mapping - Outside of study area

	Your Comment	Why is this place important?	What activities do you enjoy doing at this spot?
Collins Pool			
	Places I love		
	Beautiful	Unspoilt and undeveloped	Relaxing. Watching wildlife and kids crabbing
Lake Clifton			
	Important for wildlife		
		The Thrombolites are thousands of years old and if not already, should be heritage listed	Taking in nature
Madora Beach			
	Beach based activities		
	A stunning area for all the local families to come and enjoy the coastline - from beach walks to swimming. The beach is sadly unprotected, leading to erosion and rough water to swim in.	It is a central point for Madora Bay residents to enjoy our stunning coastline.	Walking the dog on the beach, watching the ocean, swimming and other water sports.
San Remo			
	Places I love		
	The dunes along this stretch of coast should be protected from development. They will be under enormous pressure from massive housing increase in next few years. All the way to Singleton the integrity of the dunes needs to be maintained.	We need to keep the beaches as a family resource moving forward.	Fishing ,swimming,walking.
Silver Sands			
	Places I love		
	The dunes are very stark and degraded. I have planted over 300 dune plants here. I wish the shire would add brush and water plants to help to maintain and improve.	Lovely open, clean beach for all water activities, walking, fishing, photographing, meditating etc	As above
	Great family location for watching kids surf and watching the sunset, needs to be redeveloped shortage of car parking and north side of car park has access blocked by car park bay	It's the only place north of marina until secret harbour that has surf	Fishing walking along beach

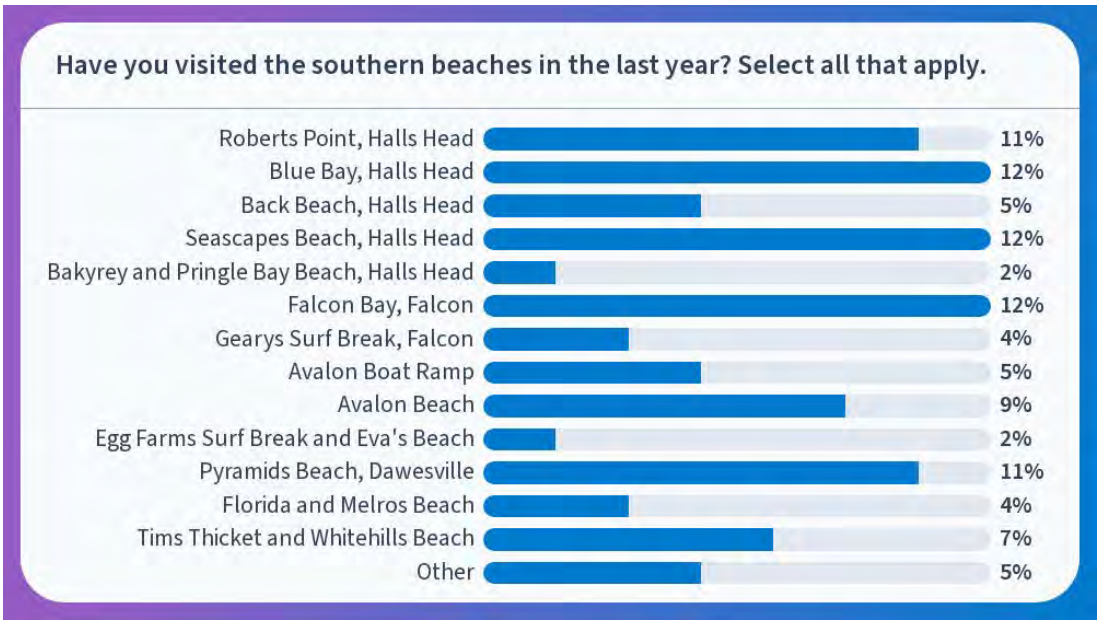
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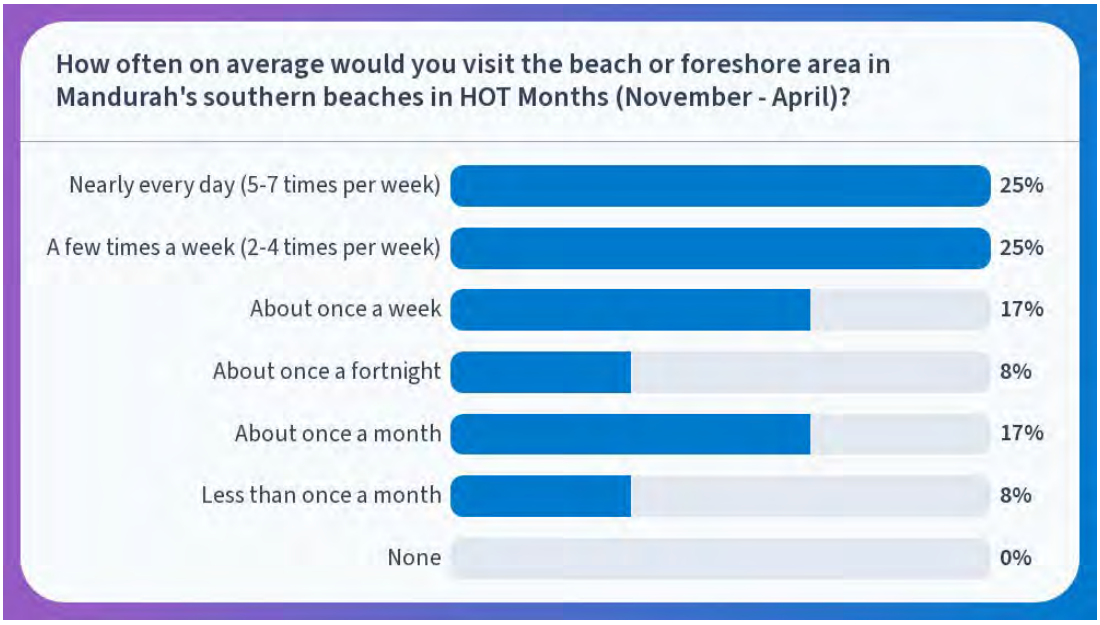
APPENDIX B

Appendix B: Youth Advisory Group polling activities results

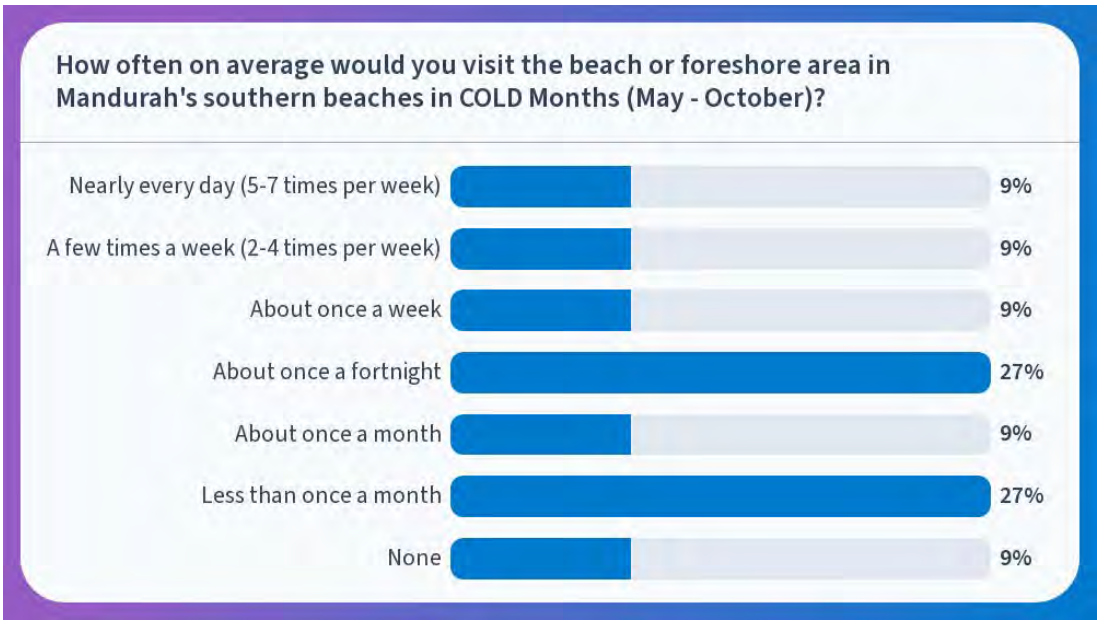
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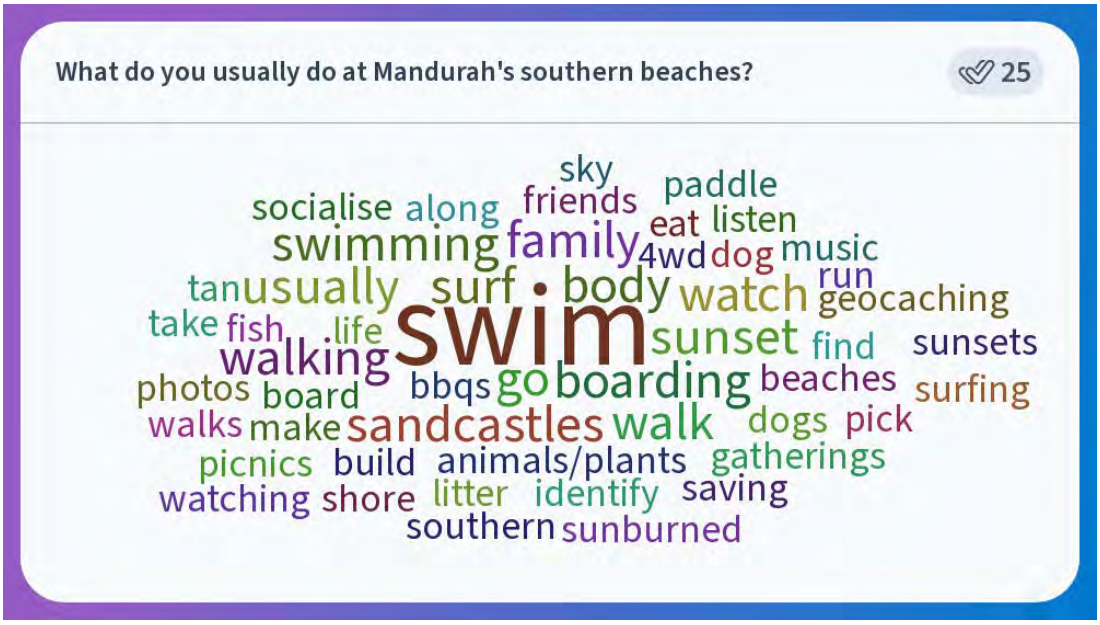
Youth Advisory Group Polling Activities Results





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APPENDIX C

Appendix C: Kids Teaching Kids Southern Beaches CHRMAP Engagement

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Kids Teaching Kids Southern Beaches CHRMAP Engagement - Values Mapping

MAP 1

- Our beaches are super pretty and nice to swim in
- Love swimming and walking dog
- I love the variety of beaches! Everywhere is different.
- Surfing
- I like the diversity
- I like swimming and making sandcastles
- Body boarding down the dunes
- I don't like plastic
- I like the soft sand
- Sand
- I love the beach because they have seashells. The sea animals are nice and pretty.
- Playing in the sand dunes. Careful animals.
- Clear water and dunes and no rubbish.
- I like swimming.
- Animals
- Clean oceans and sand
- Sand dunes because of snakes
- I love everything except plastic.
- I love to walk along the beach and jetties
- Water
- I love how many pretty shells and pretty ocean.
- I love swimming and crabs!
- I love seeing fish and ocean animals!
- I like to tan and collect shells while at the beach.
- Surfing at the beach is really fun.
- I like the giant.
- I like the water being clear.
- I love to swim at the beach.
- I like the view and the waves.
- I love our dolphins and how inquisitive they are.
- I love abalone catching.
- We usually have great surf.
- I love everything about Blue Bay.
- Seagrass populations
- I don't love rubbish in the water.
- I love the beaches in south Mandurah. I think we need some more protections centres for the animals.

Doddi's Beach

- I love swimming in the water at Doddi's Beach because it has very pretty and clear water.
- I like diving off the pontoon at Doddi's.
- I love swimming and jumping off the jetty (Robert's Point/Doddi's)

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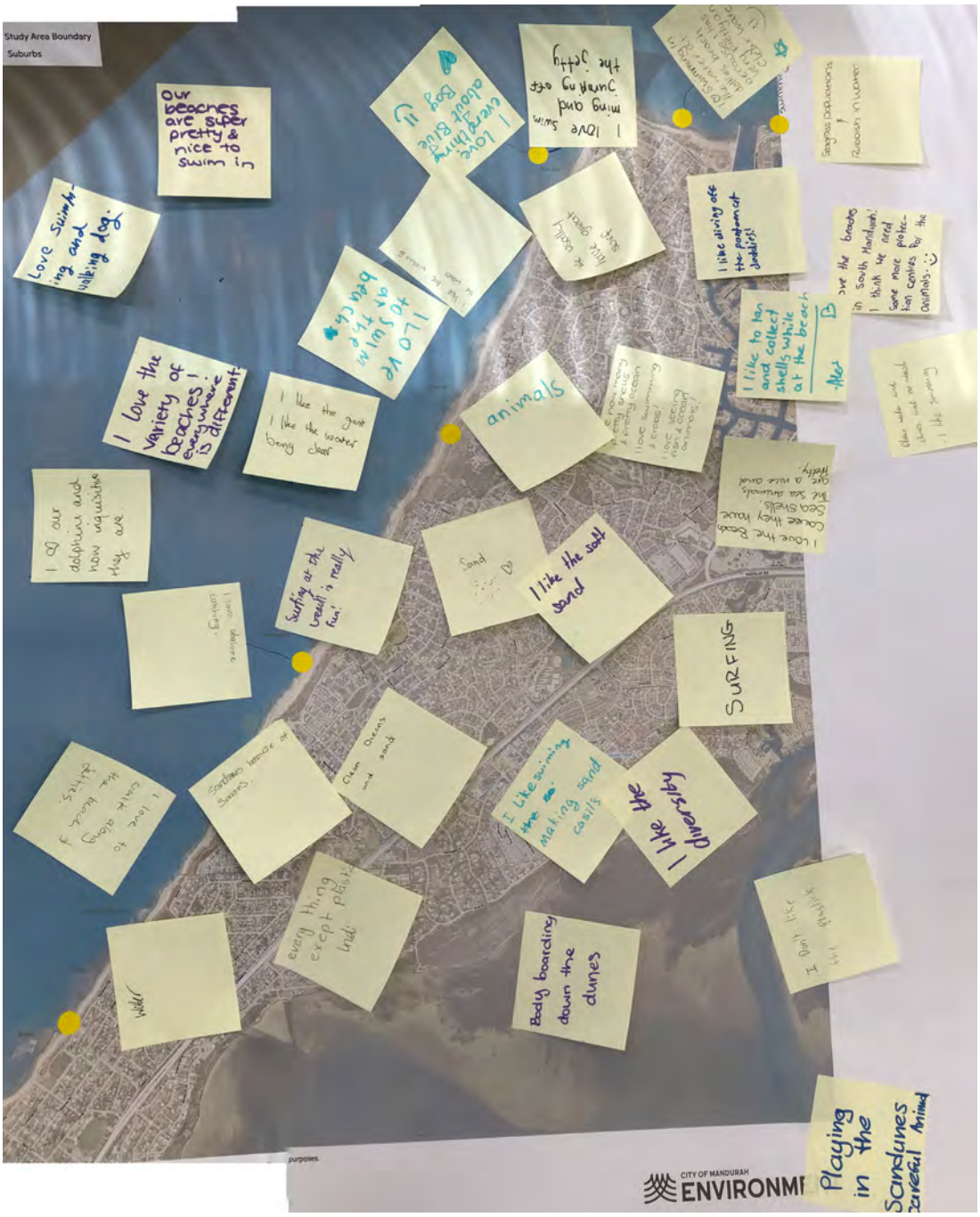


Figure: Kids Teaching Kids Southern Beaches CHRMAP Engagement Map 1

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MAP 2

- Avalon Beach – I love swimming and just being there.
- Pyramids Beach – big beach, cool name.
- Pyramids Beach – I like going past the waves.
- Florida Beach – the best holiday destination as a kid – massive dunes!
- I love hanging out with friends and family at the beach.
- I go pick plastic and I love the water.
- I love that all the fish are so vibrant.
- I love swimming and finding shells.
- I like the fauna and flora, since some are endemic to us.
- I love giant waves or snorkelling.
- Beach cricket.
- Swimming
- Sand
- Dunes
- Swimming
- I love the animals
- I like our ocean animals and I like to find shells. I like to swim in it as well.
- Don't like: water rising, pollution.
- It's peaceful and overall a nice place to be at.
- Swimming at the beach
- I immensely enjoy watching the serene sunsets.
- Love finding shells.
- I like the feeling of the soft sand.
- I like playing beach volleyball.
- Swimming
- The water and the sand.
- Skim boarding
- I like to watch sunsets and see different sea animals.
- Don't like: a rise in pollution.
- I love finding shells at the beach.
- I love our ocean animals.
- I play footy at the beach.
- I like finding shells.
- I like how clear the water is.
- Love walking dog at local beach.
- Pyramids Beach – I love surfing at the Pyramids and partying at the beaches.
- I love that my house is near the Dawesville Cut.
- Sandcastles
- I like finding shells on the beach.
- Low tide (Estuary side).

MAP 3

- I love catching mussels/fish in Dawesville with my family. It's the only time we're all together.
- Tims Thicket - it's the best fishing spot down south.

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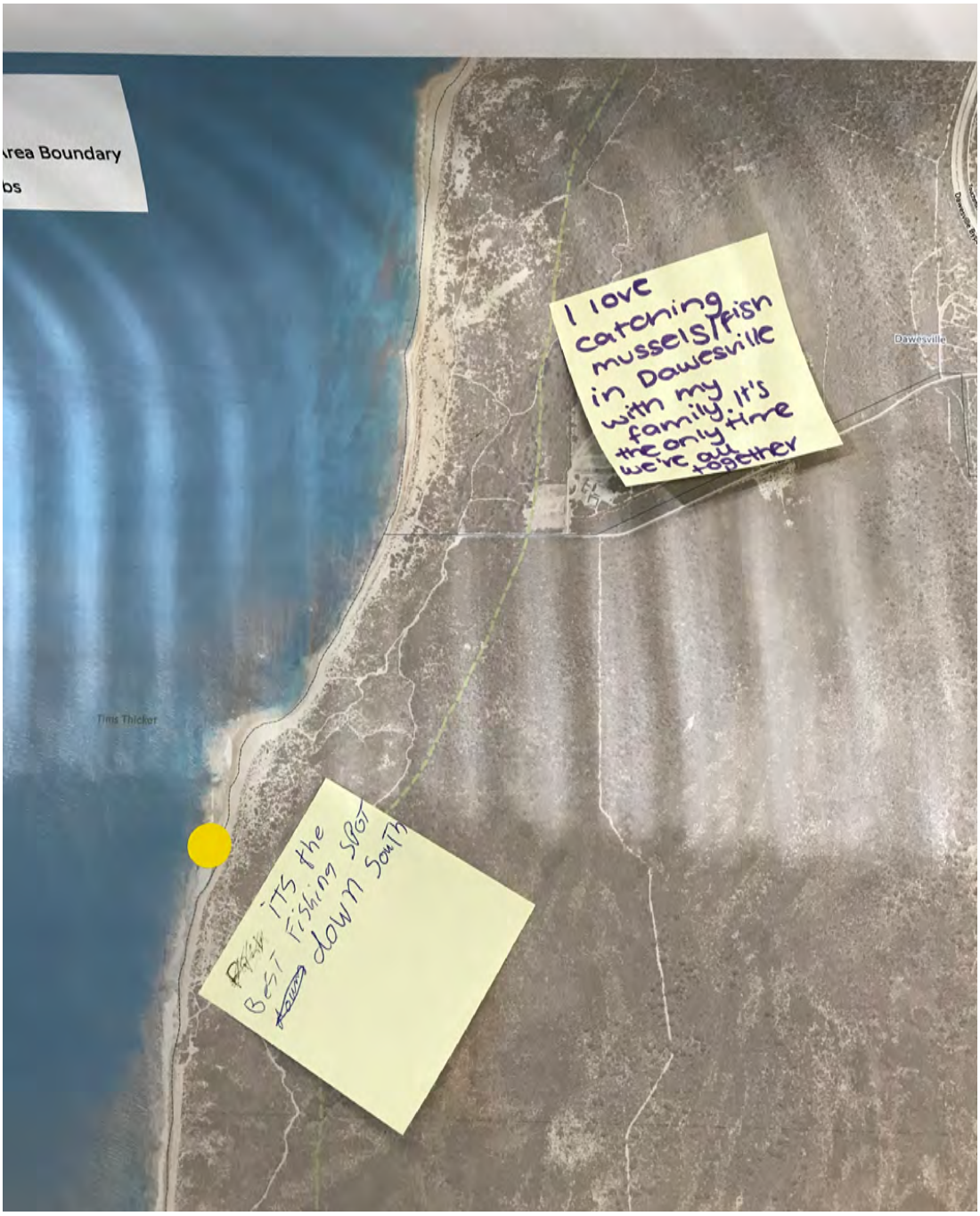


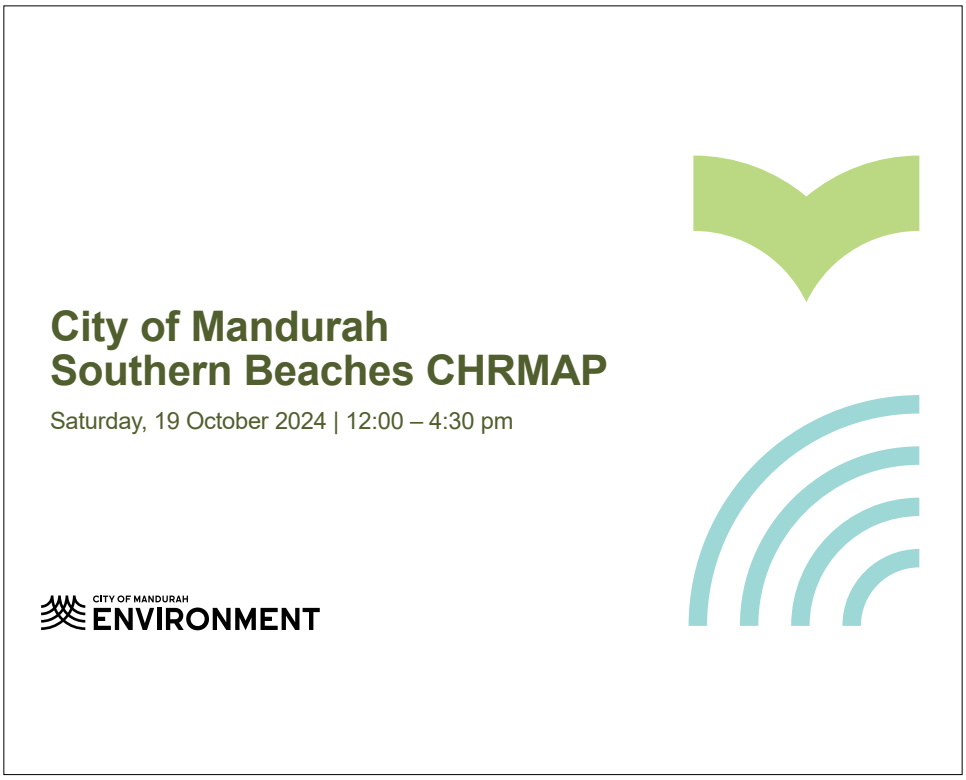
Figure: Kids Teaching Kids Southern Beaches CHRMAP Engagement Map 3

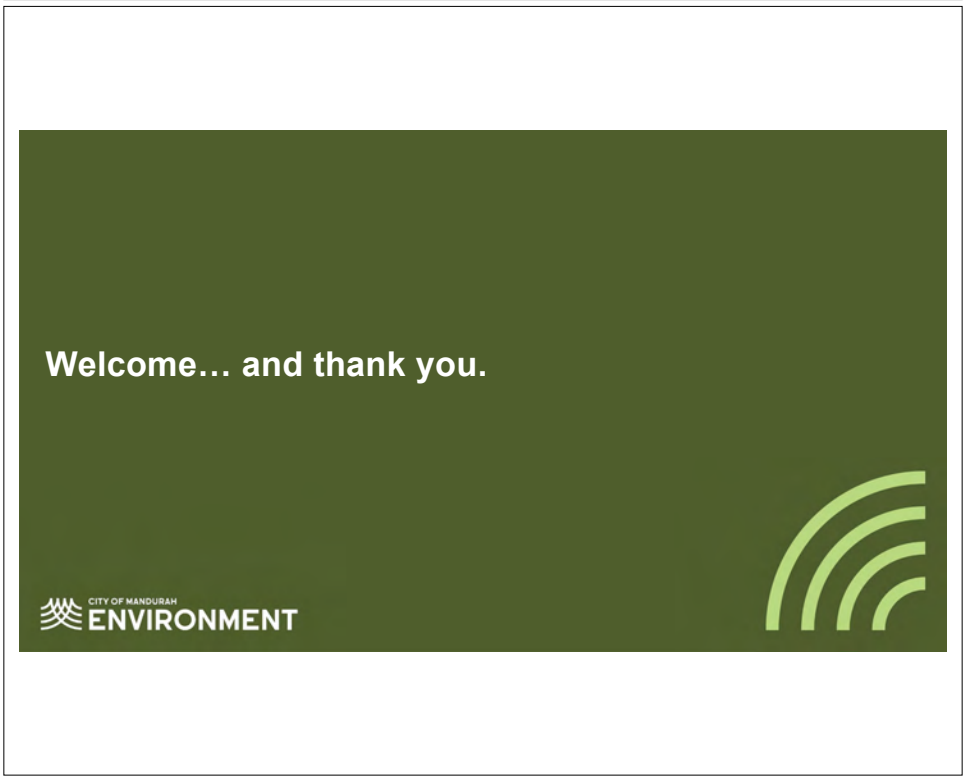
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APPENDIX D

Appendix D: Engagement Presentation – Workshop One

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Acknowledgement of Country

The City of Mandurah acknowledges and pays respect to the Bindjareb people, who are the Traditional Owners and First Peoples of this land. We pay respect to the Elders past and present and acknowledge the continuing contribution they make to the life of this City and this region.



Coastal Hazard Risk Management and Adaptation Plans

as per WA State Planning Policy 2.6 – Coastal Planning

- A plan for the future – for 100 years.
- So we know when to make good decisions
- So we don't make bad decisions
- Planning….



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Who is running the project?

Project Steering Committee

CITY OF MANDURAH

Department of Planning, Lands and Heritage

Government of Western Australia Department of Transport

Perth Naturaliste Partnership

Consultant Team

SHAPE URBAN

WATER TECHNOLOGY

Coastal Community Reference Group (CCRG)

a.k.a. you all in the room today.

Why are we here today?

We are preparing the Mandurah Southern Beaches Coastal Hazard Risk Management and Adaptation Plan (CHRMAP)

This process is about *your community* driving the criteria and management options for coastal hazards caused by sea level rise



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What are we doing today?

- Discussing coastal processes, risks and hazards (context)
- Understand community values
- Getting a better idea of key issues and concerns
- Considering options available
- Beginning to think about the criteria to assess management options



Why do we need a CHRMAP?

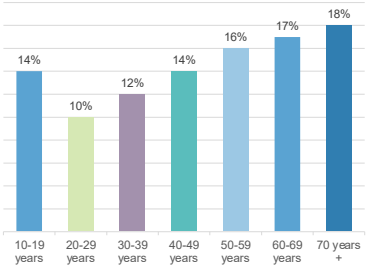
- To understand areas that may be impacted so we don't put people or assets in harm's way
- Guides decision-makers in developing and implementing effective coastal management
- Based on internationally recognised science – following WA State Planning Policy 2.6 – State Coastal Planning
- To plan for responding to coastal hazard challenges
- To plan for the next 100 years (!!)…. *but it is more urgent in some areas*



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Who is in the Room? – CCRG Criteria

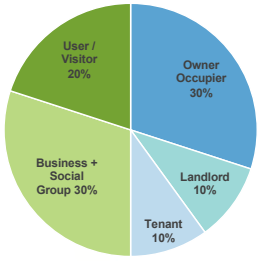
Age Group*



Gender*

51% Female
49% Male

Relationship to study area

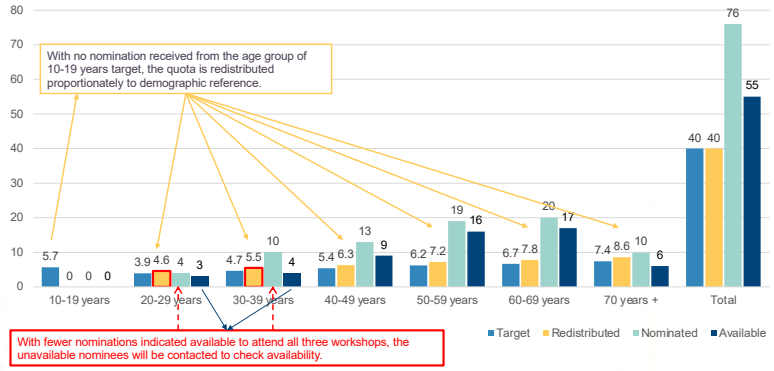


*Benchmarking 2021 Census data for the four suburbs – Halls Head, Falcon, Wannanup, Dawesville.
The census does not include results for non-binary or undisclosed genders.

Who is in the Room? – Nomination and target redistribution

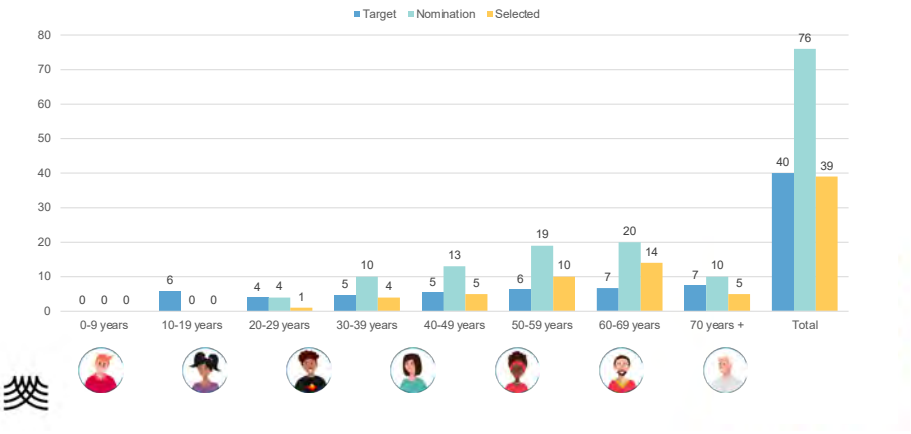
76 Nominations received.

CCRG Target vs Nomination received as of 22 September 2024 (nomination closed)



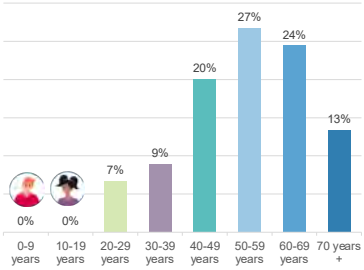
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Who is in the Room?



Who is in the Room?

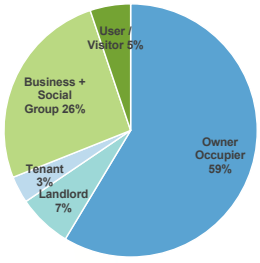
Age Group



Gender

49% Female
51% Male
2% Other

Relationship to study area



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The role of the CCRG

Relationship with other engagement

- CCRG will review the outcomes of the other engagement (e.g., survey, presentation) undertaken to determine its relevancy.

How the workshop outcomes will be used

- The CCRG workshop outcomes will be shared with the broader community.
- The identified values and assets will inform the development of the success criteria, ensuring that the community values are embedded in the final CHRMAP.

What is CCRG?



Coastal Community Reference Group

- Represent the broader community of Southern Beaches
- Learn about coastal processes, hazards and risks that impact our coastline
- Identify what you value along the coast – share your local experience and knowledge (local expert)
- Understand different management options
- Support the development of management options for assets and values at risk

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So… What will you influence?

- A better understanding of community values (more measurable)
- The preferred option for each at-risk asset
- Future engagement activities

Remit (non-negotiables)

- Mandurah Southern Beaches CHRMAP will be prepared and, thereafter, implemented
- Format, process and content per SPP 2.6
- Planning horizon - 100 years
- The recommendations will include implementation planning for short, medium and long-term



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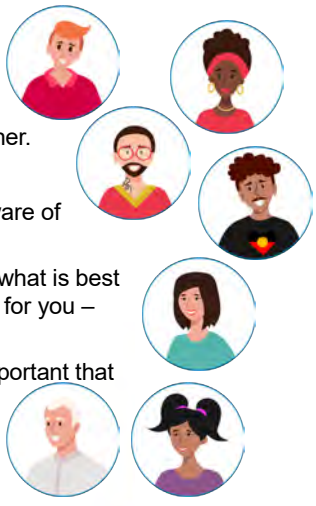
Remit

How do we address coastal management in the best way possible to make sure we balance current user expectations with longer term accountability to future generations, so everyone can enjoy the coastline that we love?

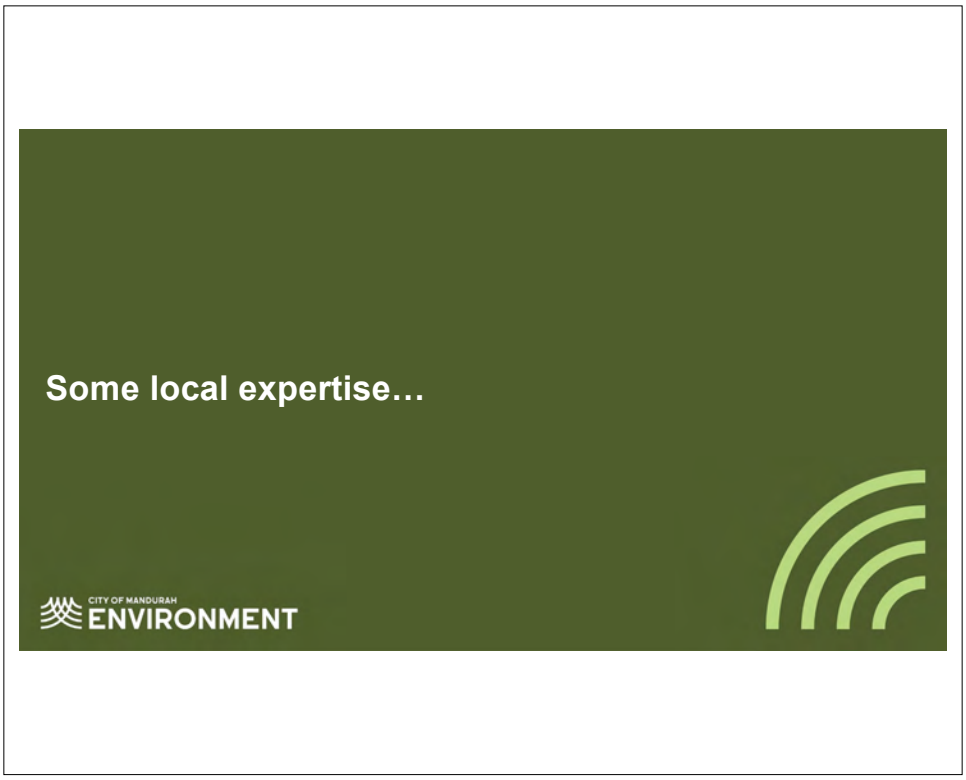


Some tips before we begin

- Be curious. Learn as much as you can…
- Keep an open mind. Listen to each other. Work together.
- Focus on the remit – avoid going down rabbit holes
- Question your own pre-existing point of view and beware of confirmation bias
- Remember that you are here as a citizen to consider what is best for the whole community, not necessarily what is best for you – remember who isn't here!
- If something isn't working for you, let us know. It is important that you are not distracted from your task
- Trust the process



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Who is here in the room?

- What is your interest?
- Who else can you speak for?
- What would you like to see most from this process?
- What are you most worried about?

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What is the Process?

CITY OF MANDURAH ENVIRONMENT

Firstly -What has been done?

- Mandurah Northern Beaches CHRMAP for the beaches from Madora Bay to Doddies Beach, Halls Head
- Completed and adopted by Council in November 2022.
- 10-year CHRMAP Action Plan to implement the immediate short-term CHRMAP recommendations – adopted by Council in July 2023.





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Northern Beaches CHRMAP – 10 Year Action Plan

Year 1 Key Projects

1. Permanent Sand Bypassing Feasibility Investigation
2. Doddi's Beach Coastal Adaptation Options Study
3. Town Beach Buried Seawall Upgrade Detailed Design

Community Open Information Session – 19 September 2024



Permanent Sand Bypassing



Mechanical 'Slurry Track' Operation

Feasibility Investigation

Appraise the technical feasibility and financial viability of installing a new permanent sand bypassing system against the existing conventional system at Doddi's Sand Trap in Mandurah



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Permanent Sand Bypassing

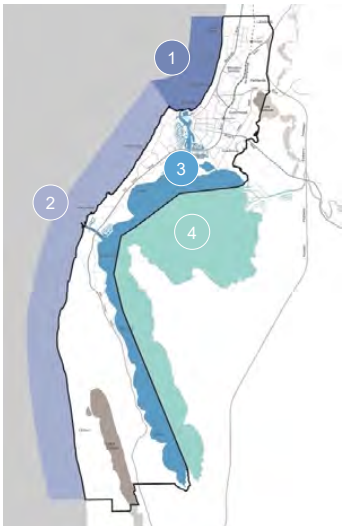
Option 1 – Jet Pumps





Project Scope

	Project Area	Status
1	Mandurah Northern Beaches CHRMAP	Completed
2	**Mandurah Southern Beaches CHRMAP**	**This project**
3	Mandurah Estuarine CHRMAP	Future Project
4	Shire of Murray CHRMAP	Final stages



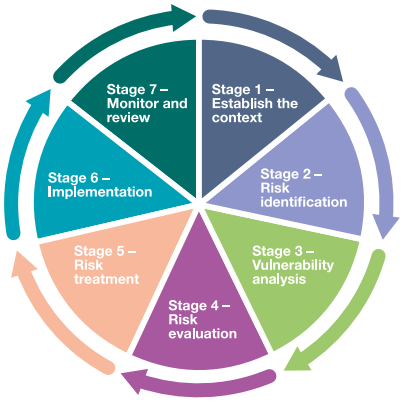
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Study Area

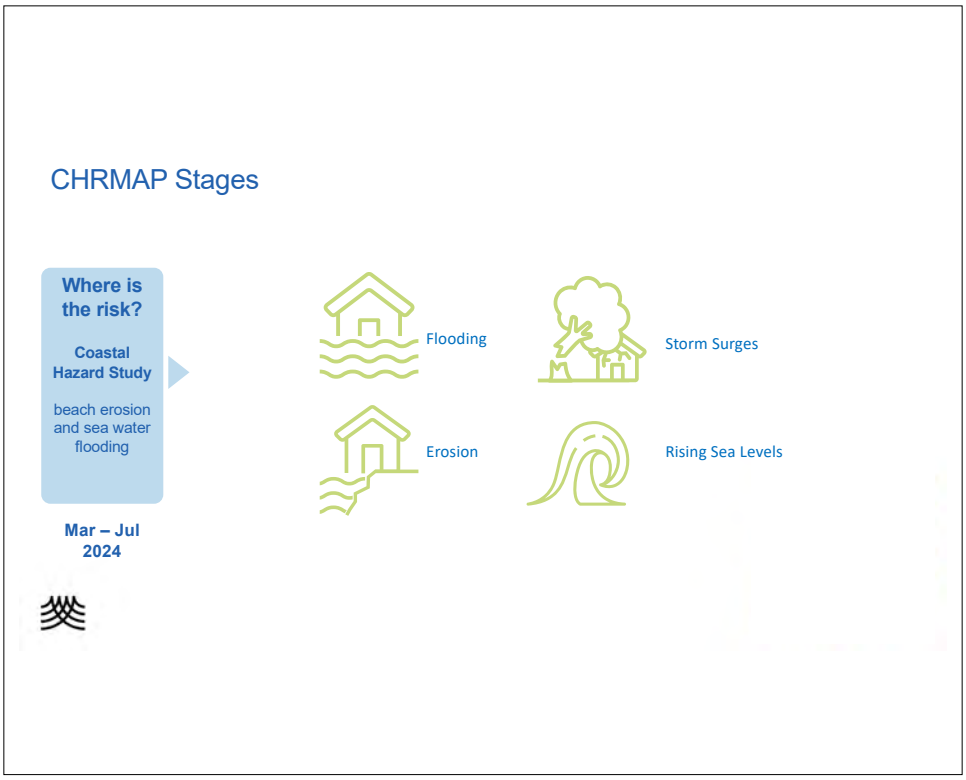
- 36 km of ocean-facing coastline
- from Roberts Point, Halls Head, through to the southern end of the Clifton locality.
- The estuarine environment, including canal estates, is outside of the scope of the project.

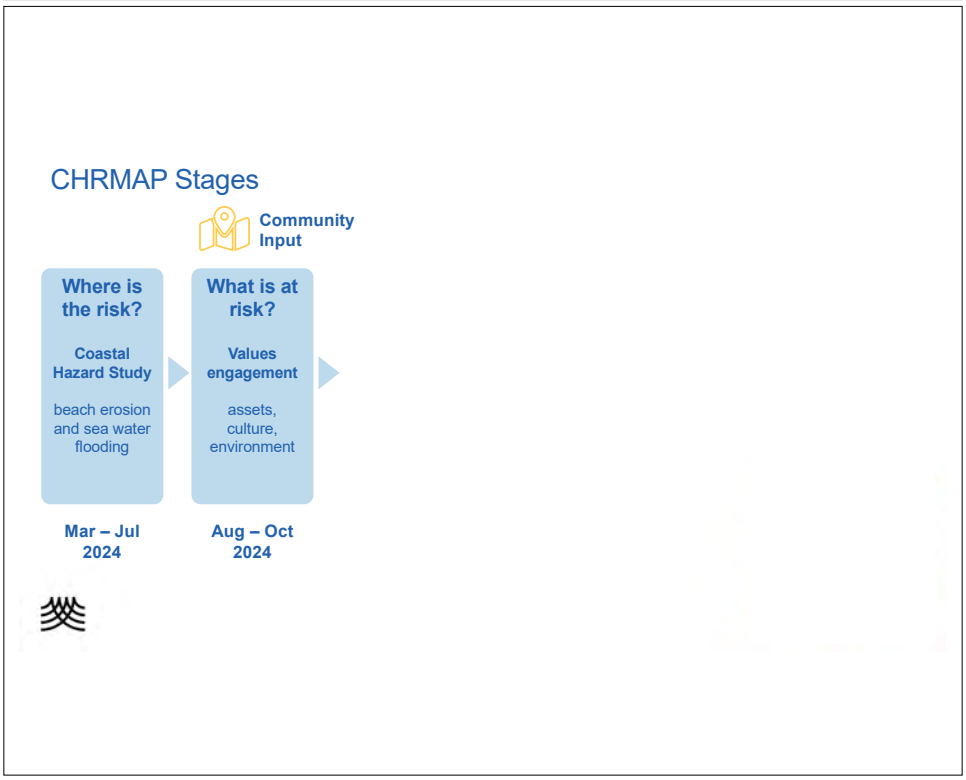


The CHRMAP Process

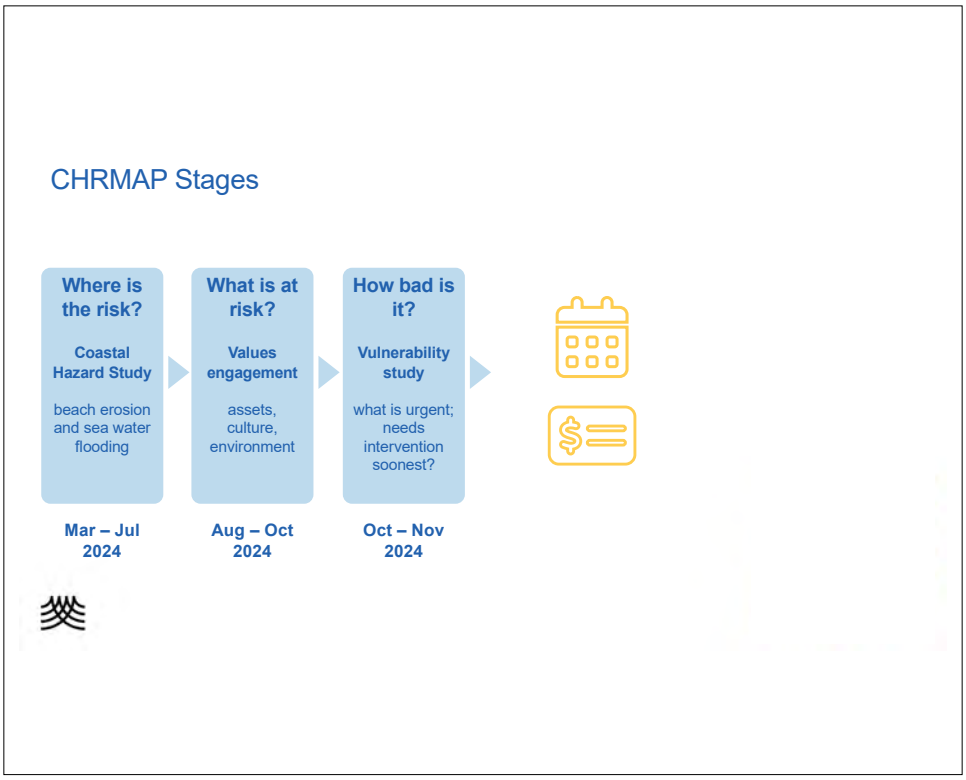


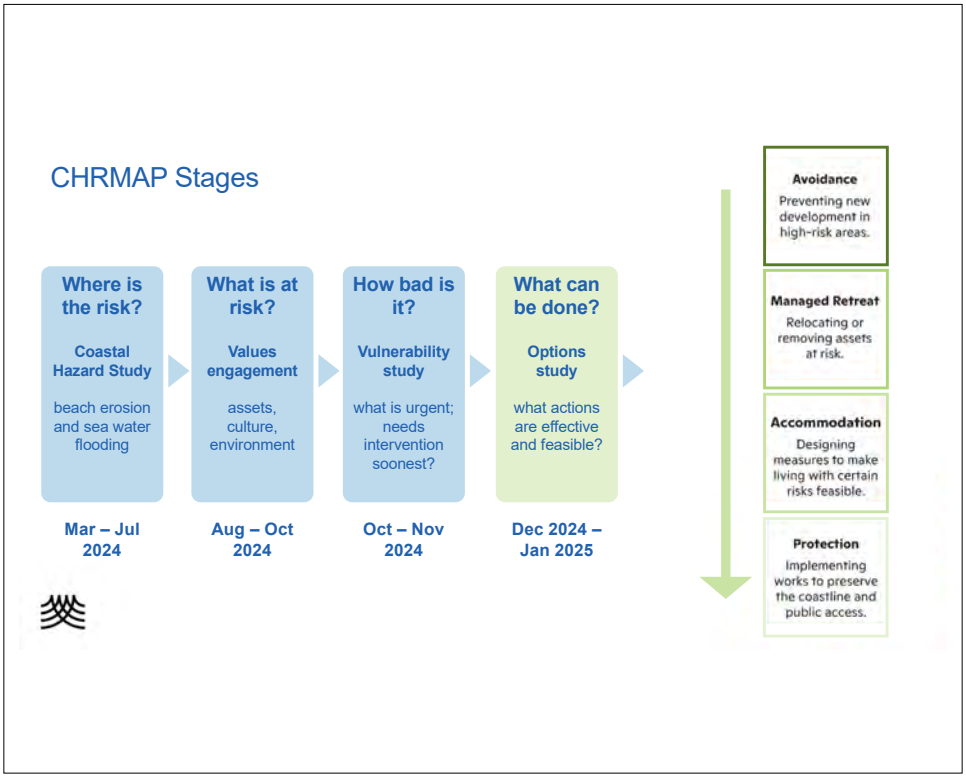
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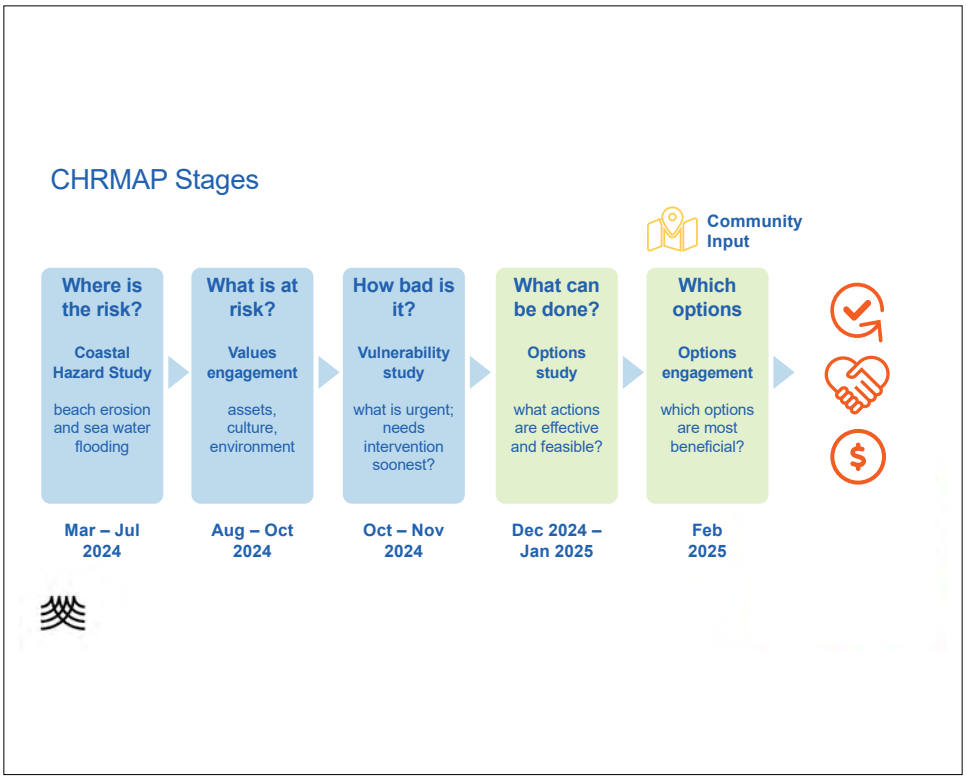


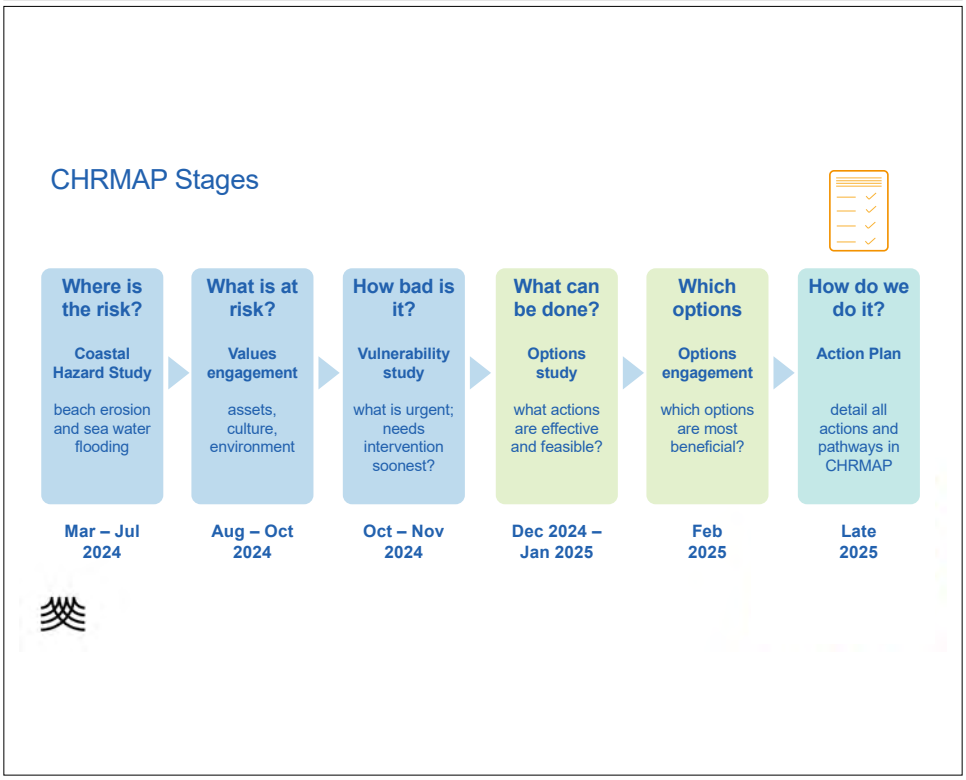
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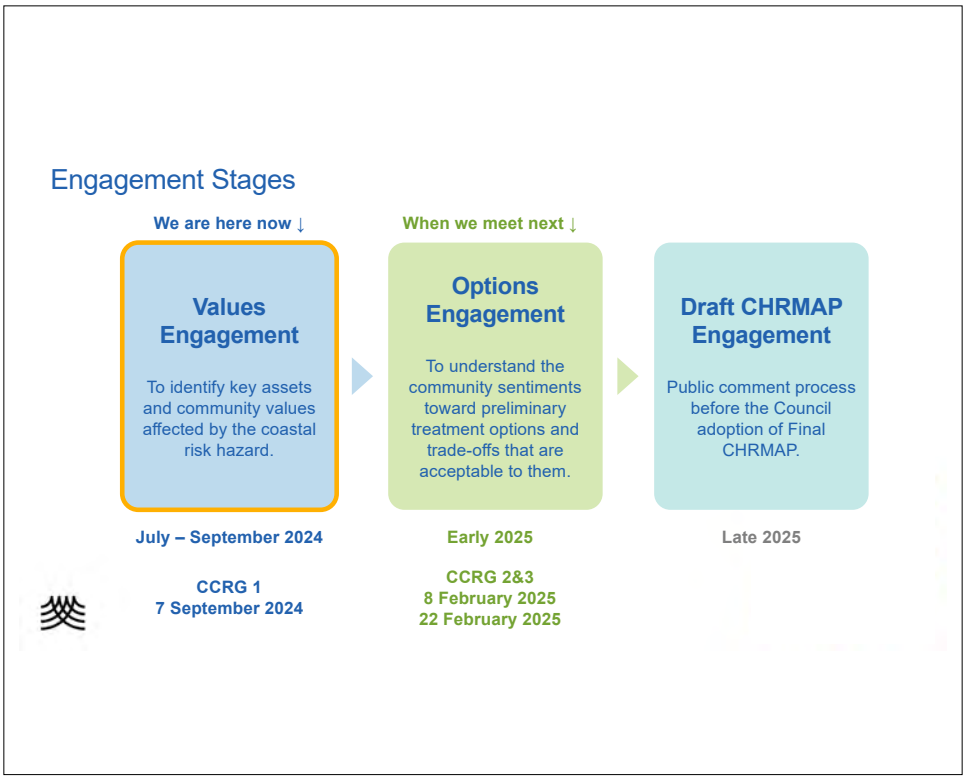


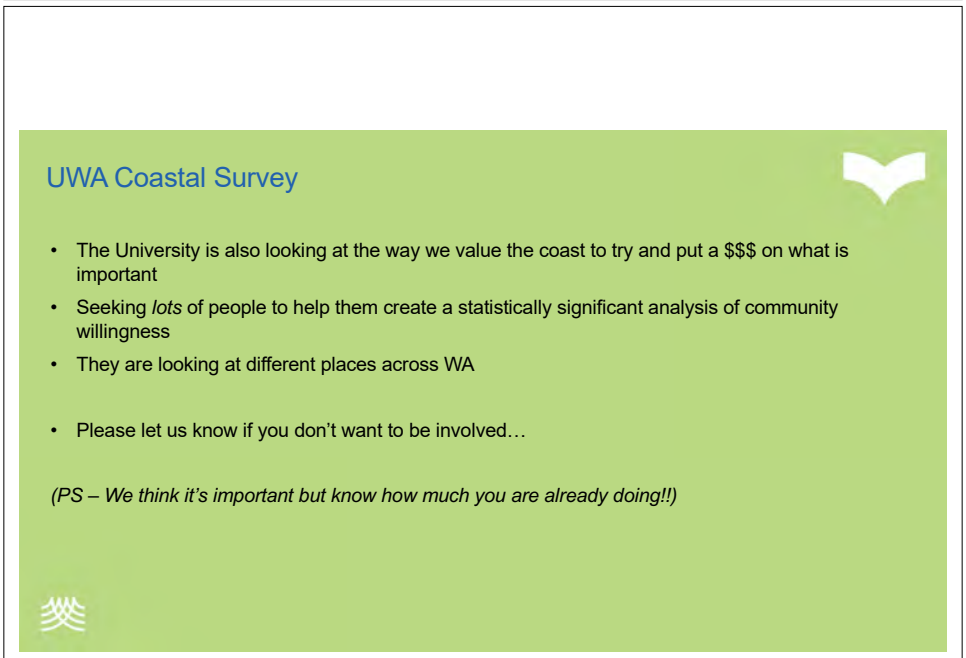
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Remit

How do we address coastal management in the best way possible to make sure we balance current user expectations with longer term accountability to future generations and so everyone can enjoy the coastline that we love?



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Coastal Processes and Hazards

CITY OF MANDURAH ENVIRONMENT

What does a CHRMAP study do?

Identify the *risk* of **erosion** + **inundation** with sea level rise.

It identifies areas that could potentially be impacted by these hazards over the next 100 years relative to storm events and projected sea level rise

It uses vulnerability assessment to identify:

- How likely the impact is to occur
- Consequence of the impact
- How easy it is to adapt before or after the impact

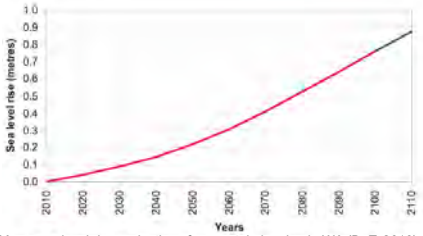


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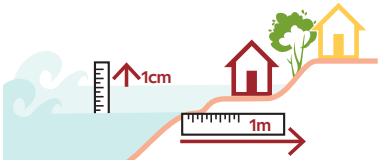
Sea Level Rise

Sea Level Rise – rise in sea level due to climate change

- Global projections (SSP5) forecasts a SLR of 0.94m between 2024 and 2124. (DoT, 2010)



Mean sea level rise projections for coastal planning in WA (DoT, 2010).

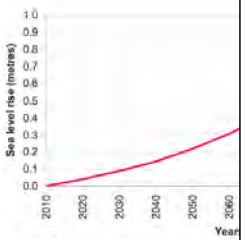


An approximate rule of thumb (for sandy shores) – a 1 cm rise in sea level will lead to a 1 m retreat of the coastline (CoastAdapt)

Sea Level Rise

Sea Level Rise – rise i e

- Global projections (SS etween 2024 and 2124. (DoT, 2010)

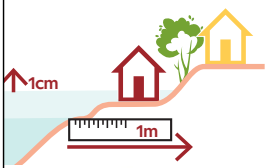


Mean sea level rise projections for coast


PLANNING AND DEVELOPMENT ACT 2005

STATE PLANNING POLICY No. 2.6

STATE COASTAL PLANNING POLICY



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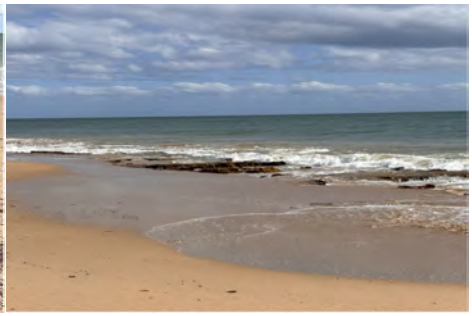
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Sandy Coast

Southern Beaches coastline is mainly sandy or mixed sandy and rocky with some rocky sections (WAPC, 2013)



Mixed sandy and rocky, Back Beach, Halls Head

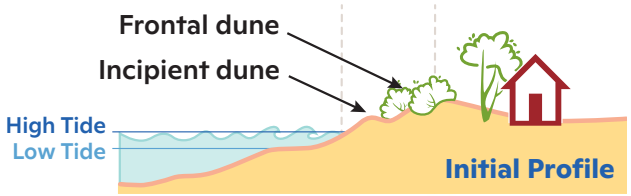


Mixed sandy, Back Beach, Halls Head

Coastal Erosion

Erosion – the loss of beach, vegetation and built assets

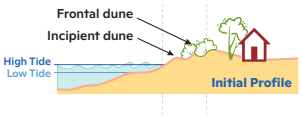
- **Long term beach recession** – beach profile displaced landward due to permanent sand loss (more than storm erosion)



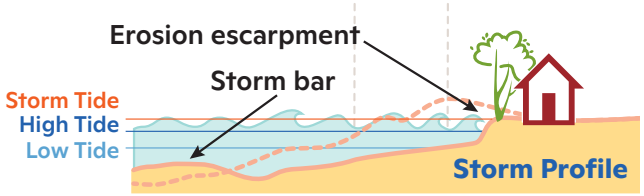
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Coastal Erosion

Erosion – the loss of beach, vegetation and built assets

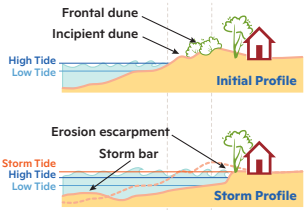


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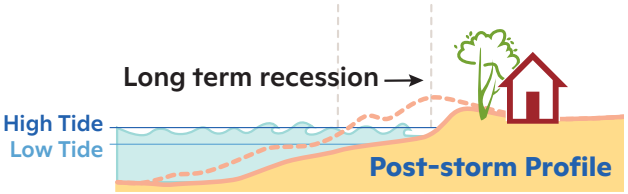


Coastal Erosion

Erosion – the loss of beach, vegetation and built assets



- **Long term beach recession** – beach profile displaced landward due to permanent sand loss (more than storm erosion)



Coastal Erosion



Coastal Erosion at Port Beach (CoastWA, 2022)



Storm smashed the already eroded Port Beach north of Fremantle.
(ABC News: Nicolas Perpitch)

Storm Erosion



Collaroy beach erosion before and after the 2016 'superstorm'
(Photo: Christopher Drummond)

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Coastal hazards - erosion

- Erosion:
  - Severe storm ("100 year")
  - Seasonal trends (beach is wide in summer & narrow in winter)
  - Long-term recession/accretion
  - Erosion from sea level rise

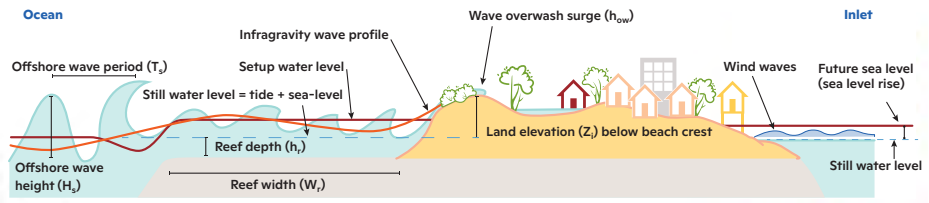

Erosion at Dalyellup, 2020



Coastal Inundation

Inundation – temporary or permanent flooding from sea water

- **Ocean side** – offshore waves travelling across the reef, causing wave setup and runup (i.e., elevated water levels and flooding)
- Note this image does not show added issue of sea level rise



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Coastal Inundation



Coastal Inundation at Bunbury



Coastal Inundation at Bunbury

Coastal hazards - inundation

- Inundation hazard:
  - Severe storm (“500 year”)
  - Sea level rise



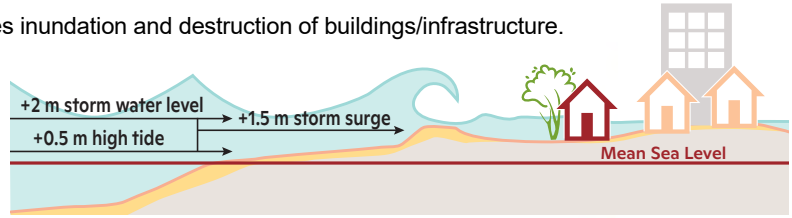
Inundation at Onslow, 2015

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Storm Surge

Storm surge – rise in sea level during storm

- Caused by strong onshore winds + tropical cyclones/winter storms.
- It can be over 100 kilometres wide and may rise to 5 meters above normal sea level—it can exceed 5 meters in category 5 cyclones and worsen with high tide.
- It can persist for several hours to over 24 hours.
- Causes inundation and destruction of buildings/infrastructure.





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Assets and Values in Coastal Hazard Zones

CITY OF MANDURAH ENVIRONMENT

Asset Categories

1. **Aboriginal Heritage** e.g., Registered sites and other heritage places.
2. **Environmental Assets**
   - Matters of National Environmental Significance (such as the Australian Fairy Tern colony).
   - Threatened and Priority Ecological Communities/known locations of threatened flora.
3. **Regional Open Space Reserve**
   - Vegetated (undeveloped) areas, including beaches, dunes, and bushlands in the foreshore areas.
   - Developed areas containing public assets, e.g., car parks, public ablutions, playgrounds, walkways, and access structures.
4. **Residential Land**
   - Occupied and vacant land directly abutting the coast.
   - Occupied and vacant land landward of a coastal road.
5. **Commercial Land and Assets**, e.g., cafés, shops, etc.
6. **Waste Water Treatment Plant** (public purposes)
7. **Rural Lots**
8. **Roads**

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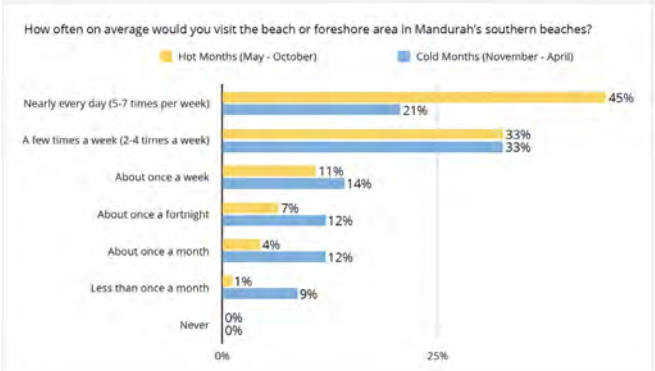
Management Units

Assets are grouped in smaller Management Units for Multi Criteria Analysis – to determine the best management options for them

- Look at hazard extents
- Nature of built or natural assets
- Tenure/ownership
- Type of coastal processes at play

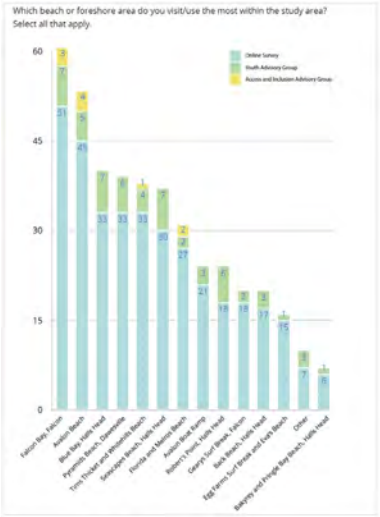


What have we heard so far?

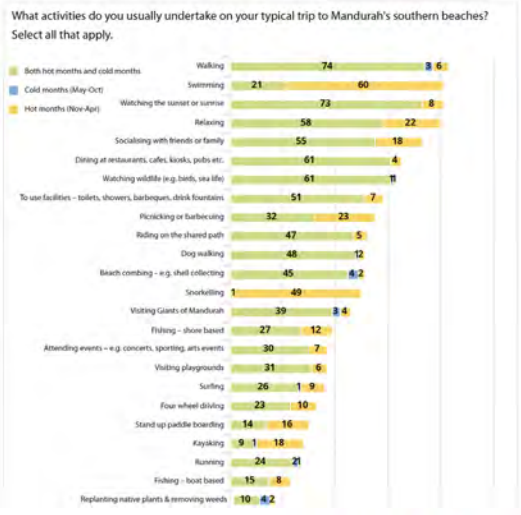


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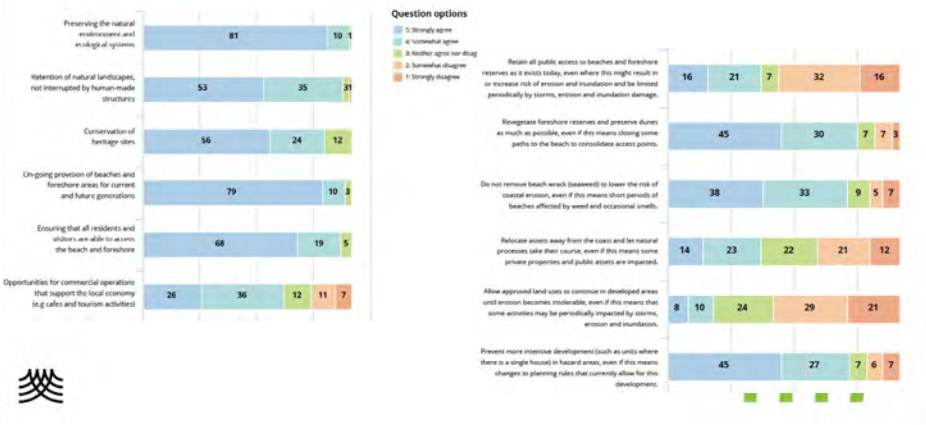


What have we heard so far?



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What have we heard so far?





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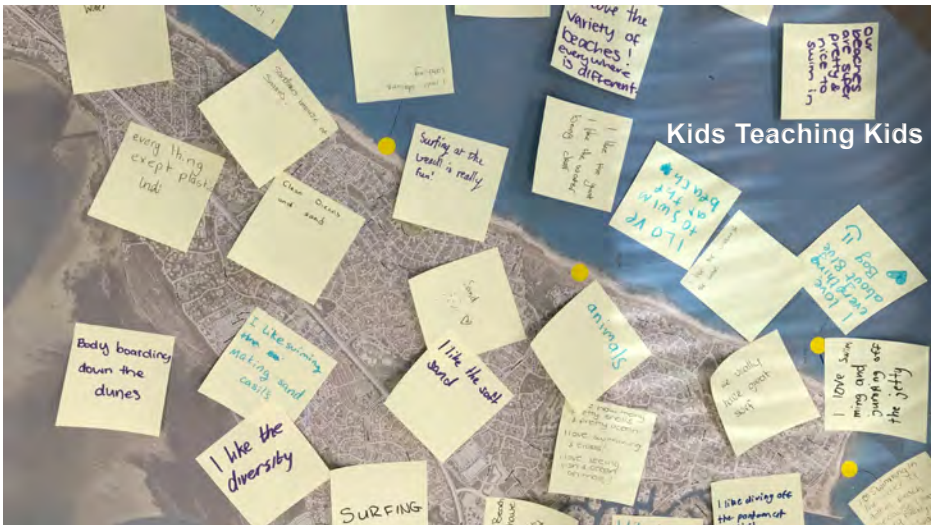








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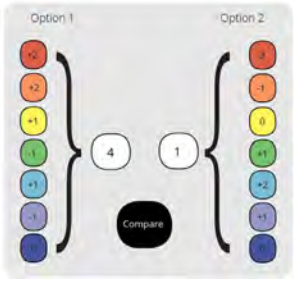


Why do we try to understand the values?

Your values help us make decisions…

- We use 'multi-criteria analysis' (MCA) to help make decisions





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Multi Criteria Analysis

Aims to initially narrow options – identify potential options and those which are inappropriate

Option	Technical		Social		Environment	Economic	
	Effectiveness	Flexibility	Provide beach for recreation	Provide foreshore facilities	Preserve beach / dunes	Capital cost	Ongoing / maintenance cost
Option 1							
Option 2							
Option 3							
Option 4							
Option 5							

Task One

What assets are important to you in the coastal zones?

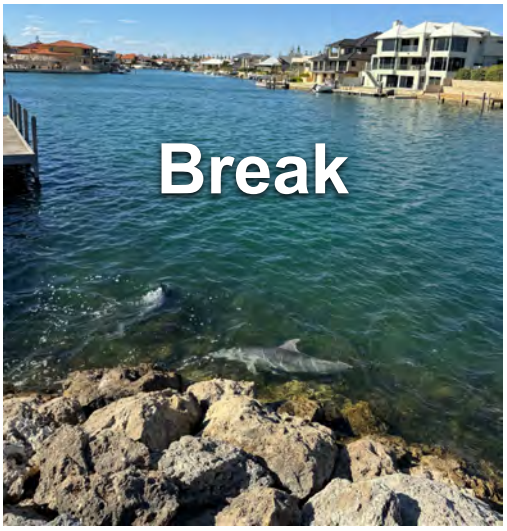
- Look over the maps
- Tell us about assets that are important – and why!
- Mark them on the map
- Think about:
  - Are there any assets that we might not know about?
  - Are there any sacrificial assets we don't need to worry about?



20 minutes

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Preliminary Findings

CITY OF MANDURAH ENVIRONMENT

MU1 Blue Bay

Erosion
- Vegetated foreshore, developed foreshore, and road (present day)
- Residential property (by 2050)

Inundation
- Limited to the sandy beach.

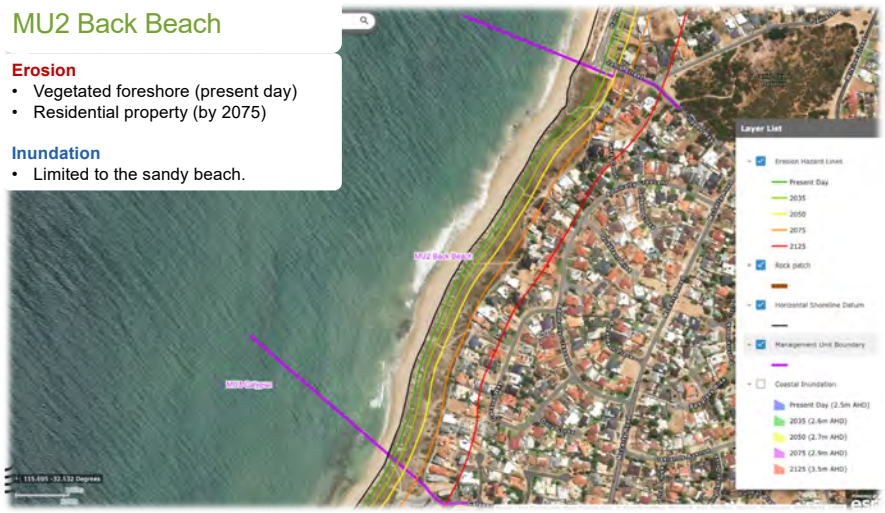


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MU2 Back Beach

Erosion
- Vegetated foreshore (present day)
- Residential property (by 2075)

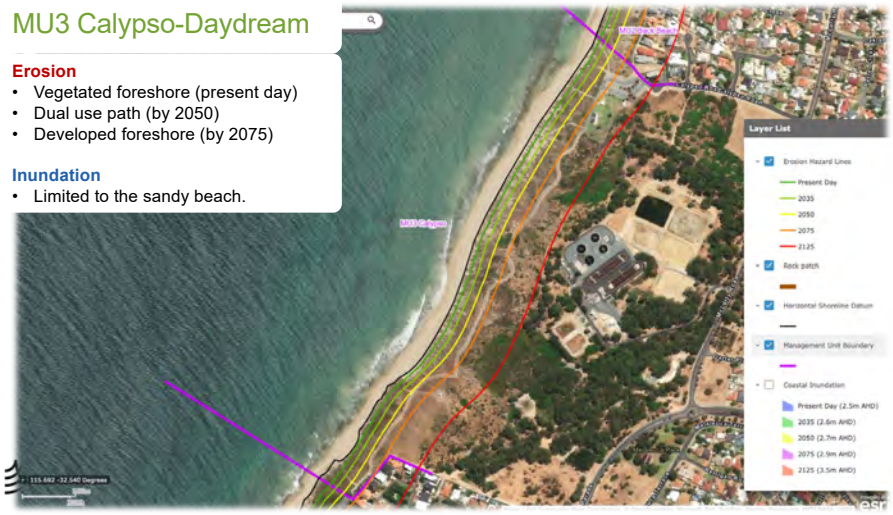
Inundation
- Limited to the sandy beach.



MU3 Calypso-Daydream

Erosion
- Vegetated foreshore (present day)
- Dual use path (by 2050)
- Developed foreshore (by 2075)

Inundation
- Limited to the sandy beach.



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MU4 Seascapes Boardwalk

Erosion
- Vegetated foreshore (present day)
- Dual use path and developed foreshore (by2035)
- Residential property (by 2075)

Inundation
- Limited to the sandy beach and very small vegetated foreshore



MU5 Rakoa-Falcon

Erosion
- Vegetated foreshore (present day)
- Dual use path, roads and developed foreshore (by 2035)
- Residential property (by 2050)

Inundation
- Limited to the sandy beach and very small vegetated foreshore



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MU6 Falcon Bay

Erosion
- Vegetated foreshore (present day)
- Developed foreshore (by 2035)
- Roads (2050)
- Residential property (by 2075)

Inundation
- Developed foreshore, roads, residential property (present day)
- Risk increases slowly to 2125.



MU7 Gearys-Avalon

Erosion
- Vegetated foreshore (present day)
- Developed foreshore (by 2035)
- Roads, residential property (by 2050)

Inundation
- Primarily limited to the sandy beach.
- Small areas of vegetated foreshore, developed foreshore, car park, roads, dual use path and residential property near to Avalon Beach (by 2125)



MU8 Dawesville Cut

Erosion
- Protected by structures associated with the Dawesville Channel and sand bypassing operations.

Inundation
- Access areas behind Dawesville Channel structures (present day)



MU9 Golf Course

Erosion
- Vegetated foreshore and dual use path (present day)
- Port Bouvard SLSC building & developed foreshore and golf greens (by 2050)

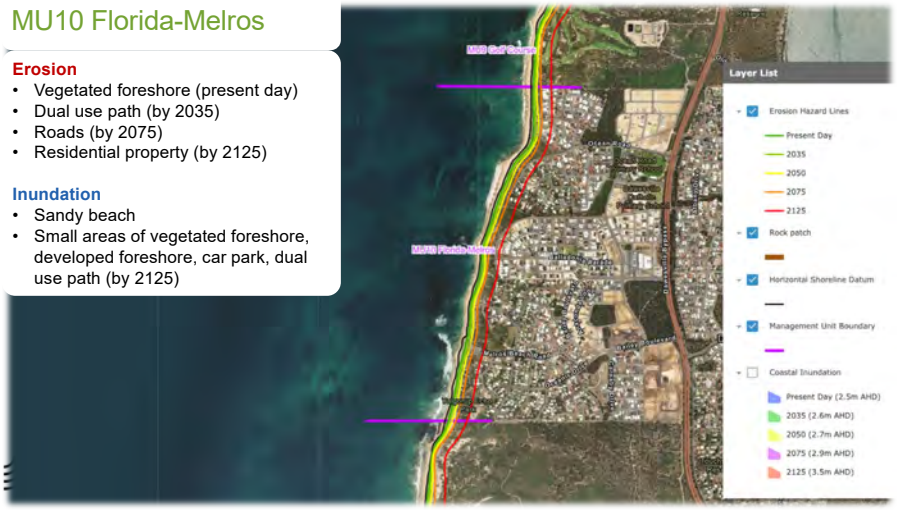
Inundation
- Primarily limited to the sandy beach.
- Small areas of vegetated foreshore, developed foreshore, roads, dual use path and car park; the southern end of the Cut Golf Course (by 2125)



MU10 Florida-Melros

Erosion
- Vegetated foreshore (present day)
- Dual use path (by 2035)
- Roads (by 2075)
- Residential property (by 2125)

Inundation
- Sandy beach
- Small areas of vegetated foreshore, developed foreshore, car park, dual use path (by 2125)

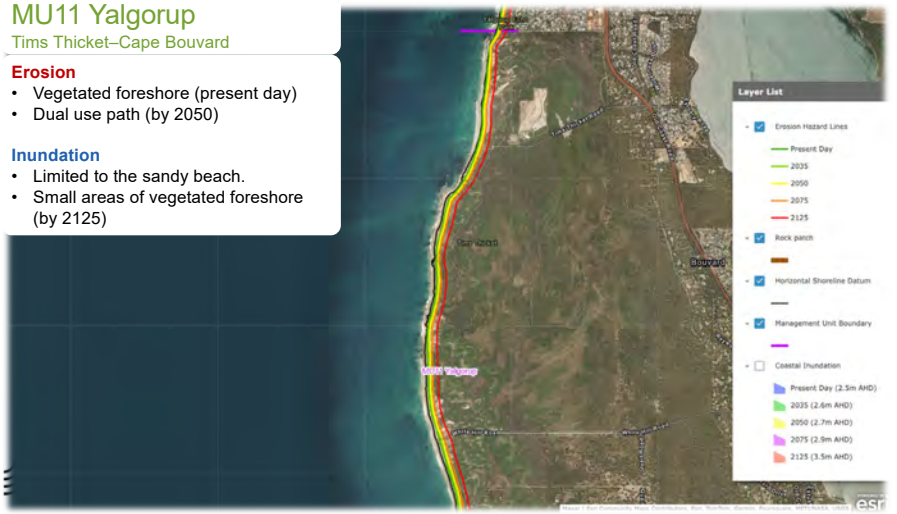


MU11 Yalgorup

Tims Thicket–Cape Bouvard

Erosion
- Vegetated foreshore (present day)
- Dual use path (by 2050)

Inundation
- Limited to the sandy beach.
- Small areas of vegetated foreshore (by 2125)

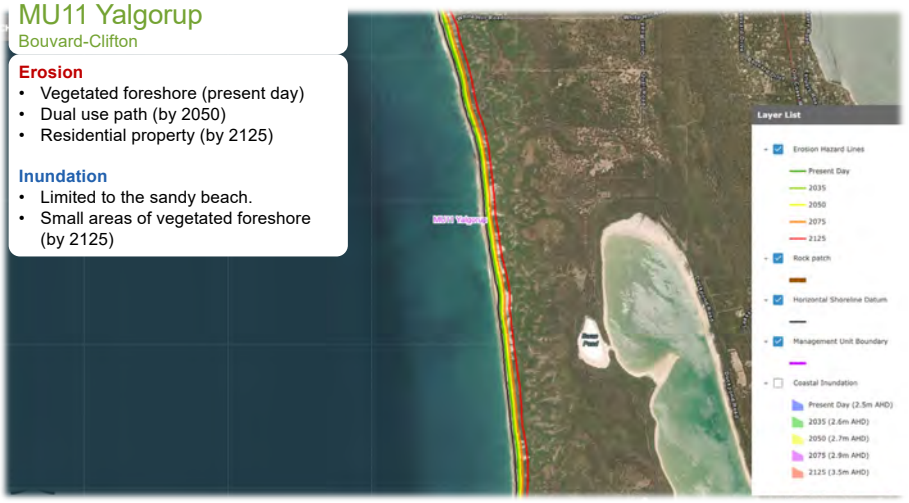


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MU11 Yalgorup
Bouvard-Clifton

Erosion
- Vegetated foreshore (present day)
- Dual use path (by 2050)
- Residential property (by 2125)

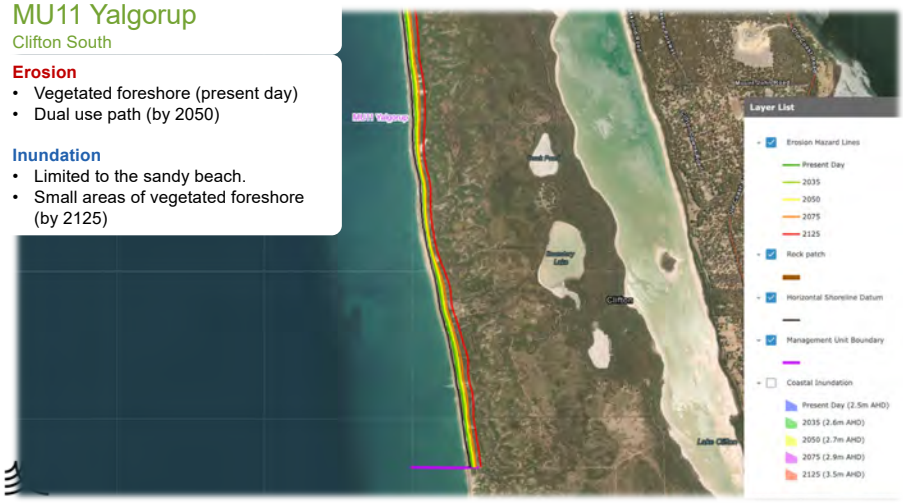
Inundation
- Limited to the sandy beach.
- Small areas of vegetated foreshore (by 2125)



MU11 Yalgorup
Clifton South

Erosion
- Vegetated foreshore (present day)
- Dual use path (by 2050)

Inundation
- Limited to the sandy beach.
- Small areas of vegetated foreshore (by 2125)

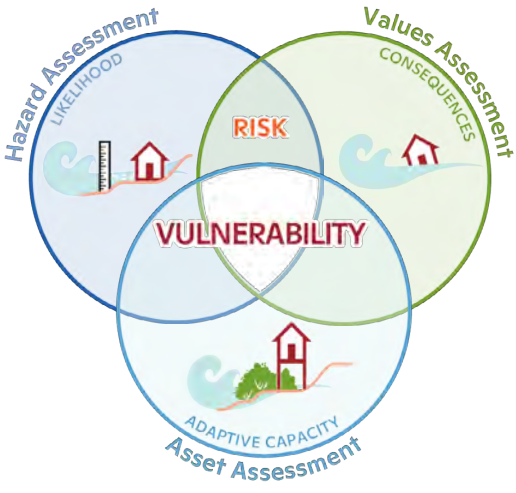


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Risk Assessment

1. Looks at the likelihood of exposure to an asset
2. Looks at the consequence of exposure to an asset
3. Then, consider the adaptability of the asset
4. Assign vulnerability ratings

Then figure out what to do!!



Risk Management / Adaptation Approaches

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Hierarchy of Control

as per WA State Planning Policy 2.6 – Coastal Planning



Avoid
Identify future no build areas and use planning controls to prevent new development in areas at risk now or in the future.

Retreat
Withdraw, relocate or abandon assets that are at risk; ecosystems are allowed to retreat landward as sea levels rise.

Accommodate
Continue to use the land but accommodate changes by raising buildings, converting land uses or growing flood or salt-tolerant plants.

Protect
Hard structures (e.g. seawalls) or soft solutions (e.g. dunes and vegetation) to protect land from the sea. May be prohibitively expensive, especially in the long term.



Hierarchy of Control

as per WA State Planning Policy 2.6 – Coastal Planning

In addition to the risk management and adaptation hierarchy identified in SPP 2.6, No Regrets and Do Nothing are two risk treatment options relevant to the CHRMAP process and will be considered in the risk treatment assessment.



No Regrets
Assessments required being undertaken to determine a preferred risk treatment option. Monitoring and planning actions.



Do Nothing
Assumes that all levels of risk are accepted and that no further action will be taken.

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Avoid



Locate assets in areas that will not be vulnerable to coastal hazards



Jindalee – new development set back - Google Earth

Planned / Managed Retreat



Options which progressively retreat/relocate development

Advantages

- Provides foreshore reserve, public access, recreation and conservation for the entire community which may be more appropriate than the existing use on the freehold land, depending on the location

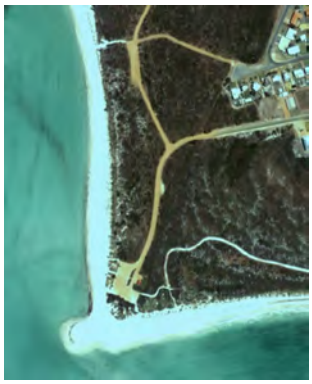
Disadvantages

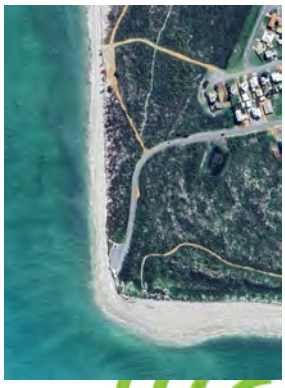
- Can be expensive, depending on the location and number of private properties
- Can cause community great community concern if residential home and commercial business land is affected (acquisition and/or removal required)

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Planned / Managed Retreat







Cervantes 2003-2022 Google Earth

Accommodate



Design assets to withstand impacts - where avoiding or relocation is not option

Advantages

- Good for inundation
- Can work with landscape

Disadvantages

- Requires considered planning to limit impact to residents. Daily impact to residents accessing homes.
- Cost of construction/change
- Risk to servicing requirements

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Accommodate



Beach House, Cocos (Keeling) Islands





Stilt house, Denham



Queenslander, Cains

Protect



Can be designed with or without a dry white sandy beach
Undertaken when the assets on coastal land are valued more highly than the cost of protecting

Advantages

- Includes 'soft' protection options, such as beach nourishment and revegetation of the dunes, and 'hard' protection options such as constructing groynes and seawalls.
- Protects assets on coastal lands with confidence

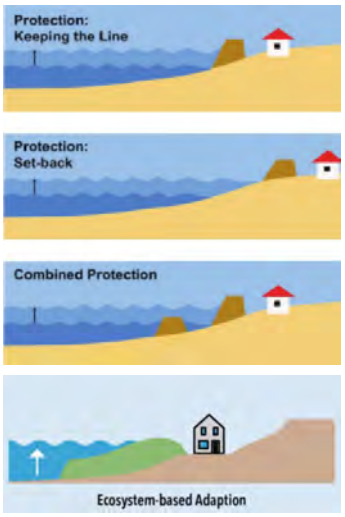
Disadvantages

- No protection option is considered permanent, and all have associated expenses to implement, maintain and replace.
- Protect options are significantly expensive, funding needs to be identified

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Protect





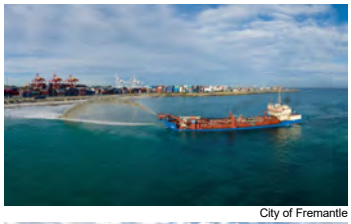
Protect





Florida – Daily Mail

Beach Nourishment



City of Fremantle



Local examples at Port Beach, Cockburn, South Fremantle

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Protect





Tanker Jetty - Shire of Esperance

Groynes / Headlands



Sorrento – Department of Transport



Quinns - City of Wanneroo

Protect





Busselton – Emerge Associates

Seawalls



Seabird – Neo Infrastructure
(via watoday.com.au)

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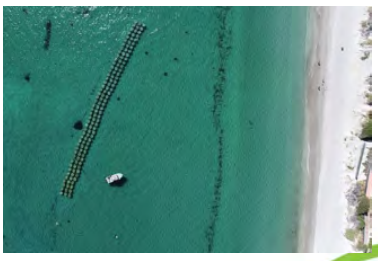
Protect



Artificial Reefs



Cables Reef at Cottesloe - Google Earth



City of Cockburn – councilmagazine.com.au

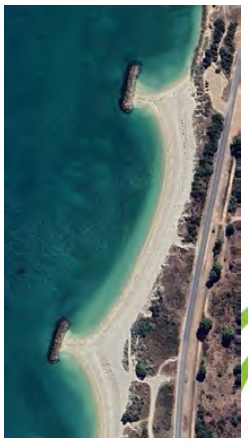
Protect



Offshore Breakwaters



Emu Point at Albany and Kwinana Beach
Google Earth



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Protect



Levee (Inundation)



SES



California water blog

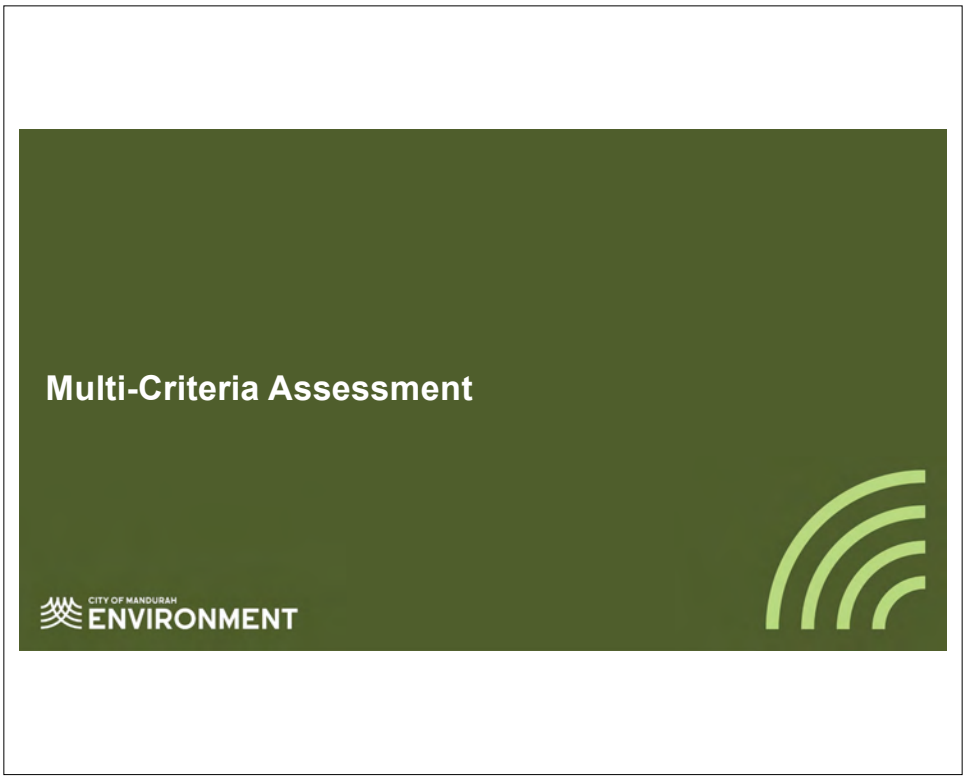
Task Two

With that introduction to coastal processes and adaptation options, **let's focus** on the mapped values….

- Of the values mapped on your table, what is of particular importance to you?
- Using the template on your table, tell us the characteristics that make it highly valued to you

20 minutes

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Criteria…

Once we understand values, what's at risk, and options, we consider selection criteria….

Fairly standard identified criteria for adaptation option assessment

- Then; options go through the multi-criteria analysis
  - Important assets and locations
  - Typical risk management approaches and viable options available
  - Ideas and suggestions

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Multi Criteria Analysis

Capital Costs
- How much it costs us to build something up front (in todays' $)

Maintenance Costs
- How much it costs us to keep maintaining something over 100 years (in todays' $)

Effectiveness
- Short term options suitable for minor protection
- Untested / unclear how effective
- Well tested and understood – works to reduce risk

Flexibility
- Once chosen, are other options off the table or very difficult to implement
- Sets expectations/ties decision makers and future community to the decision/costs
- No regrets – can change mind later with little impact.

Multi Criteria Analysis

Environmental Impact
- Damage/loss of beach, vegetation, seagrass, fauna habitat
- Erosion in adjacent areas

Social Impact - Property
- Property is affected and may be lost or damaged
- May have restriction placed on use
- Collective within Management Units

Social Impact – Communal
- Loss of ability to walk on the beach, access to car parks
- Loss of foreshore, parklands, footpaths
- Loss of assets such as cafes, SLSC etc.

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Discussion…

- Are all these criterion equal?
- Should all these criterion have equal affect on the assessment of options?

Option	Technical		Social		Environment	Economic	
	Effectiveness	Flexibility	Provide beach for recreation	Provide foreshore facilities	Preserve beach / dunes	Capital cost	Ongoing / maintenance cost
Option 1							
Option 2							
Option 3							
Option 4							
Option 5							

Homework Task Three

- Individually review the criteria
- Tell us which criteria is most important to you – rank
- Write any comments if you think something is missing
- Write any comments that you think you need to add to clarify for us key points

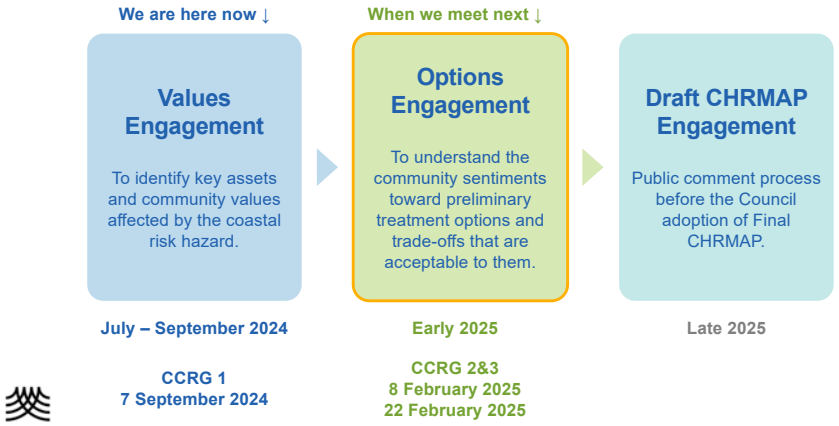


What's Next?

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Engagement Stages



In between the workshops

- Criteria homework
- Observe the coastline changes – winter versus summer
- Consider the management options
- Homework – talk to the people you know, especially youth who are under-represented here

Any questions in between, contact

- Olivia: olivia@shapeurban.place or 0421 015 100
- Damien: Damien.Slack@mandurah.wa.gov.au or 9550 3747

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Thank you

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Literature Review (continued)

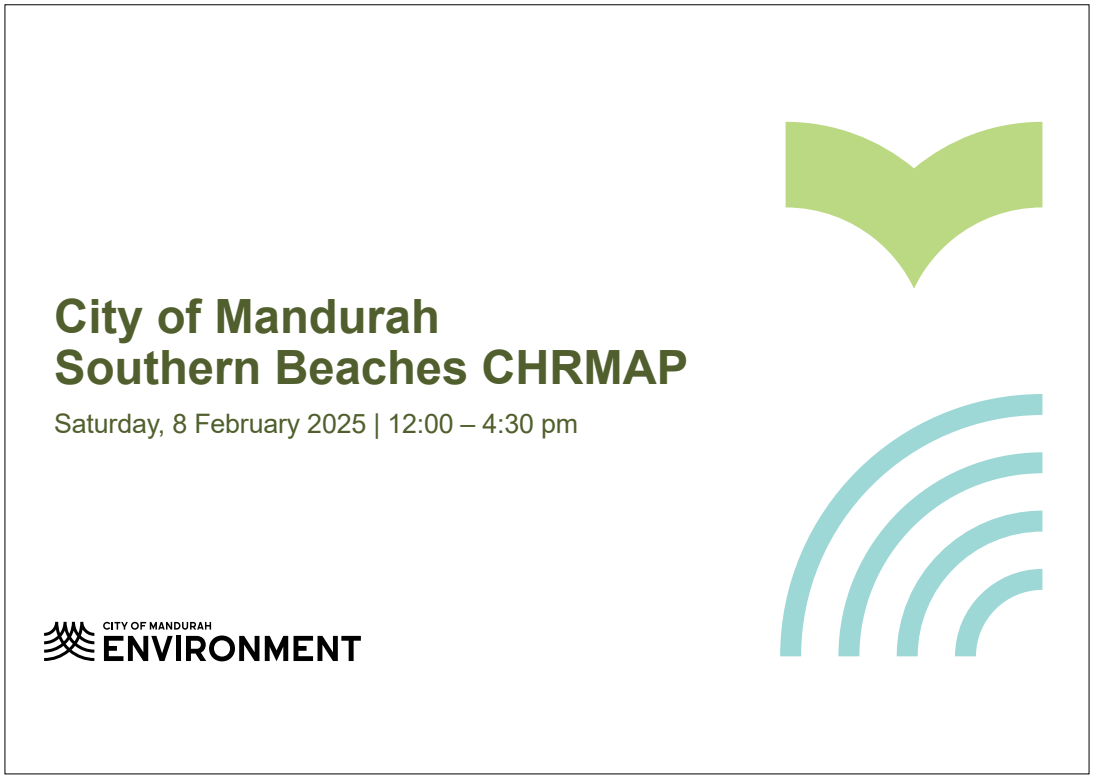
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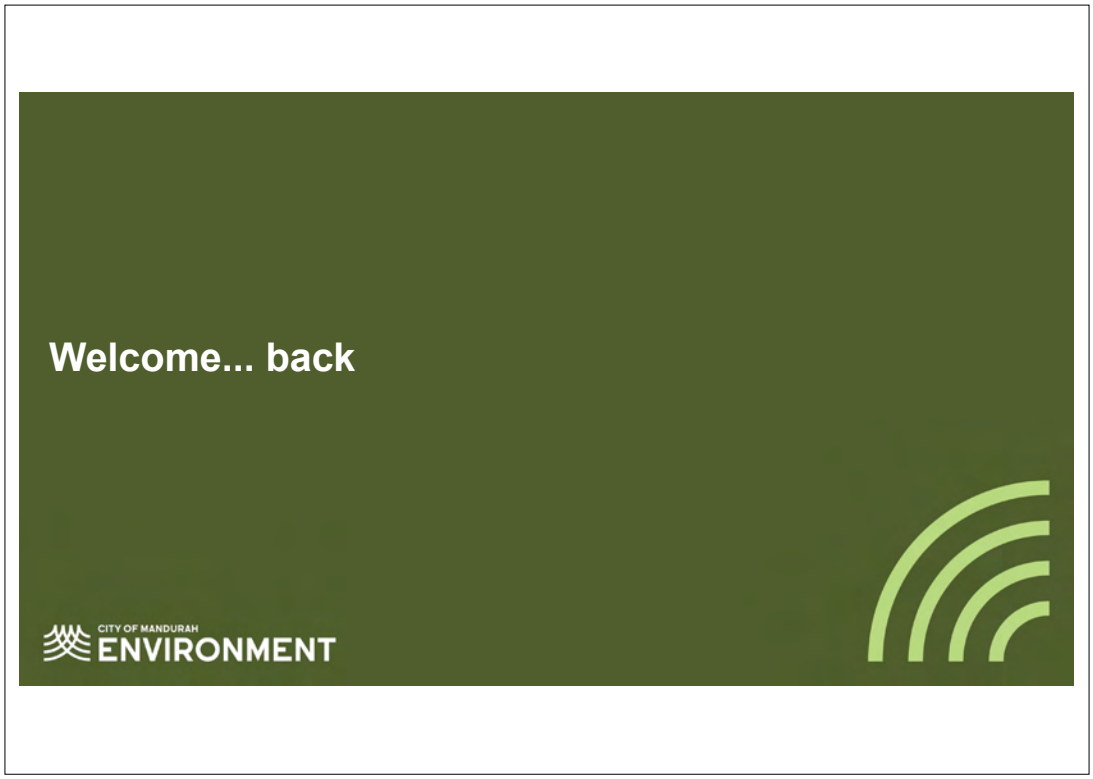
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APPENDIX E

Appendix E: Engagement Presentation – Workshop Two

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Acknowledgement of Country

The City of Mandurah acknowledges and pays respect to the Bindjareb people, who are the Traditional Owners and First Peoples of this land. We pay respect to the Elders past and present and acknowledge the continuing contribution they make to the life of this City and this region.



Who is running the project?

Project Steering Committee

CITY OF MANDURAH

Department of Planning, Lands and Heritage

Government of Western Australia Department of Transport

Peron Naturaliste Partnership

Consultant Team

SHAPE URBAN

WATER TECHNOLOGY

Coastal Community Reference Group (CCRG)

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What are we doing today?

- Recap of coastal processes, risks and hazards
- Outcomes from Workshop One: your values
- Considering management options available
- Developing multi-criteria analysis
- Evaluating management options



The role of the CCRG

Relationship with other engagement

- CCRG will review the outcomes of the other engagement (e.g., survey, presentation) undertaken to determine its relevancy.

How the workshop outcomes will be used

- The CCRG workshop outcomes will be shared with the broader community.
- The identified values and assets will inform the development of the success criteria, ensuring that the community values are embedded in the final CHRMAP.

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So… What will you influence?

- A better understanding of community values (more measurable) – CCRG #1 and utilising values for CCRG #2 and #3
- The preferred option for each at-risk asset
- Future engagement activities

Remit (non-negotiables)

- Mandurah Southern Beaches CHRMAP will be prepared and, thereafter, implemented
- Format, process and content per SPP 2.6
- Planning horizon - 100 years
- The recommendations will include implementation planning for short, medium and long-term



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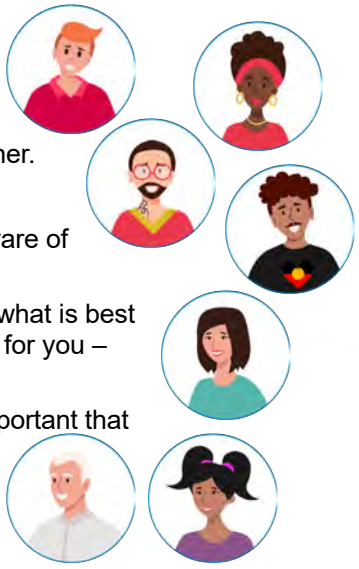
Remit

How do we address coastal management in the best way possible to make sure we balance current user expectations with longer term accountability to future generations, so everyone can enjoy the coastline that we love?



Some tips before we begin

- Be curious. Learn as much as you can…
- Keep an open mind. Listen to each other. Work together.
- Focus on the remit – avoid going down rabbit holes
- Question your own pre-existing point of view and beware of confirmation bias
- Remember that you are here as a citizen to consider what is best for the whole community, not necessarily what is best for you – remember who isn't here!
- If something isn't working for you, let us know. It is important that you are not distracted from your task
- Trust the process



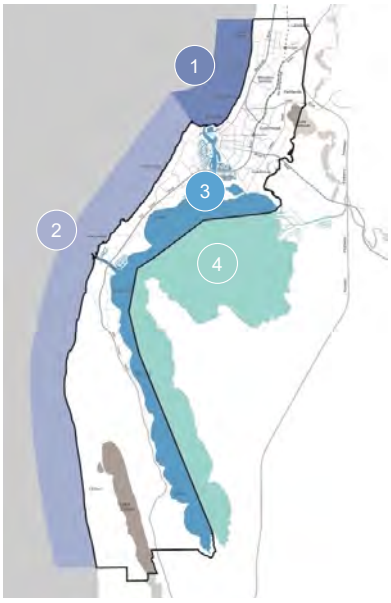
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Project Background Recap

CITY OF MANDURAH ENVIRONMENT

Project Scope

	Project Area	Status
1	Mandurah Northern Beaches CHRMAP	Completed
2	**Mandurah Southern Beaches CHRMAP**	**This project**
3	Mandurah Estuarine CHRMAP	Future Project
4	Shire of Murray CHRMAP	Final stages



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Study Area

- 36 km of ocean-facing coastline
- From Roberts Point, Halls Head, through to the southern end of the Clifton locality
- The estuarine environment, including canal estates, is outside of the scope of the project



What does a CHRMAP study do?

Identify the *risk* of **erosion** + **inundation** with sea level rise.

It identifies areas that could potentially be impacted by these hazards over the next 100 years relative to storm events and projected sea level rise.

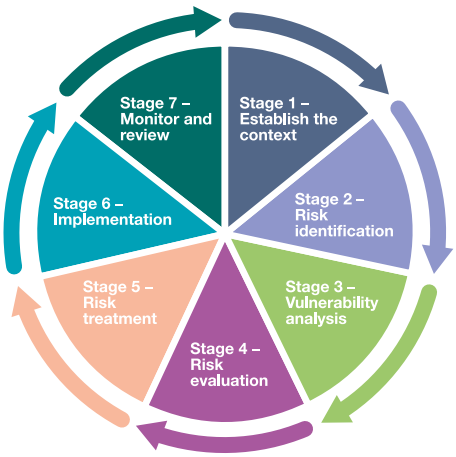
It uses vulnerability assessment to identify:

- How likely the impact is to occur
- Consequence of the impact
- How easy it is to adapt before or after the impact



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The CHRMAP Process



CHRMAP Stages

Where is the risk?
Coastal Hazard Study
beach erosion and sea water flooding
Mar – Jul 2024

What is at risk?
Values engagement
assets, culture, environment
Aug – Oct 2024

How bad is it?
Vulnerability study
what is urgent; needs intervention soonest?
Oct – Nov 2024

What can be done?
Options study
what actions are effective and feasible?
Dec 2024 – Jan 2025

Avoidance
Preventing new development in high-risk areas.

Managed Retreat
Relocating or removing assets at risk.

Accommodation
Designing measures to make living with certain risks feasible.

Protection
Implementing works to preserve the coastline and public access.

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CHRMAP Stages



Who pays for coastal management?

We all do!

- Local Government (rates and levies) – distribute costs or define areas
- Department of Planning Lands and Heritage – Coastwest and Coastal Management Plan Assistance Program (CMPAP)
- Department of Transport - Coastal Adaptation and Protection (CAP) Grants, Hotspot Coastal Adaptation and Protection (H-CAP) grants (prioritise hotspots, funding co-contribution required - 50-50 split
- Commonwealth – no long term fund

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Who pays for coastal management?

- What is benefit distribution analysis?
  - Distributing costs fairly/equitably
  - Public expenditure focused on public benefits
  - Private expenditure focused on private benefits
  - BDA helps define the beneficiary and allocate costs
  - Is a requirement of WA guidelines
  - Is becoming increasingly common across Australia

Why it matters to understand funding

- CHRMAP recommendation that *only* rely on expensive options for management may effectively be 'do nothing'
- CHRMAP guidelines recommend flexible pathways – time to make the best decision
- This process allows us to 'plan for the worst and hope for the best'…

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Coastal Processes and Hazards Recap

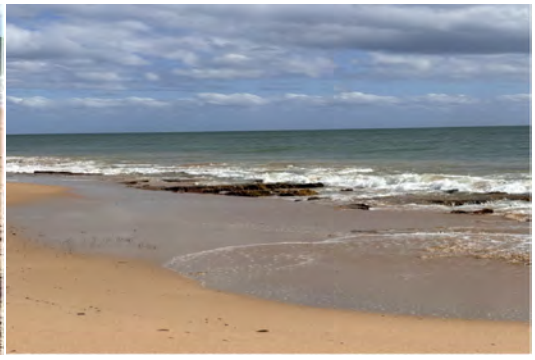
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Sandy Coast

Southern Beaches coastline is mainly sandy or mixed sandy and rocky with some rocky sections (WAPC, 2013)



Mixed sandy and rocky, Back Beach, Halls Head



Mixed sandy, Back Beach, Halls Head

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Coastal Erosion



Coastal Erosion at Port Beach (CoastWA, 2022)



Storm smashed the already eroded Port Beach north of Fremantle.
(ABC News: Nicolas Perpitch)

Storm Erosion



Collaroy beach erosion before and after the 2016 'superstorm'
(Photo: Christopher Drummond)

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Coastal Inundation



Coastal Inundation at Bunbury

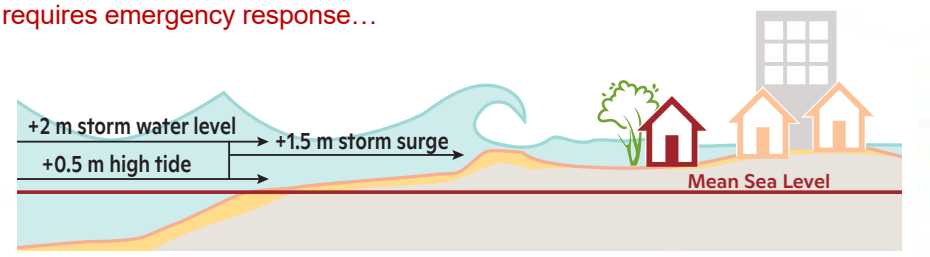


Coastal Inundation at Bunbury

Storm Surge (event based)

Storm surge – rise in sea level during storm

- Caused by strong onshore winds + tropical cyclones/winter storms.
- > 5 meters above normal sea level—or worse with high tide.
- It can persist for several hours to over 24 hours.
- Causes inundation and destruction of buildings/infrastructure
- Often requires emergency response…



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Hazard Maps and Adaptation Options Recap

CITY OF MANDURAH ENVIRONMENT

Hazard Maps



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Hierarchy of Control

as per WA State Planning Policy 2.6 – Coastal Planning



Avoid
Identify future no build areas and use planning controls to prevent new development in areas at risk now or in the future.

Retreat
Withdraw, relocate or abandon assets that are at risk; ecosystems are allowed to retreat landward as sea levels rise.

Accommodate
Continue to use the land but accommodate changes by raising buildings, converting land uses or growing flood or salt-tolerant plants.

Protect
Hard structures (e.g. seawalls) or soft solutions (e.g. dunes and vegetation) to protect land from the sea. May be prohibitively expensive, especially in the long term.



Hierarchy of Control

as per WA State Planning Policy 2.6 – Coastal Planning



No Regrets
Assessments required being undertaken to determine a preferred risk treatment option. Monitoring and planning actions.



Do Nothing
Assumes that all levels of risk are accepted and that no further action will be taken.

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A Wicked Problem



No option comes without trade-offs. This is a wicked problem.

It is complicated, hard to define/control, with no simple solution, and involves many people with different interests and opinions.

There are no win-win solutions……

Workshop One Outcomes

CITY OF MANDURAH ENVIRONMENT

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CCRG Homework!

- What did you observe?
- What did your family and friends think about it?
- What else would you share?

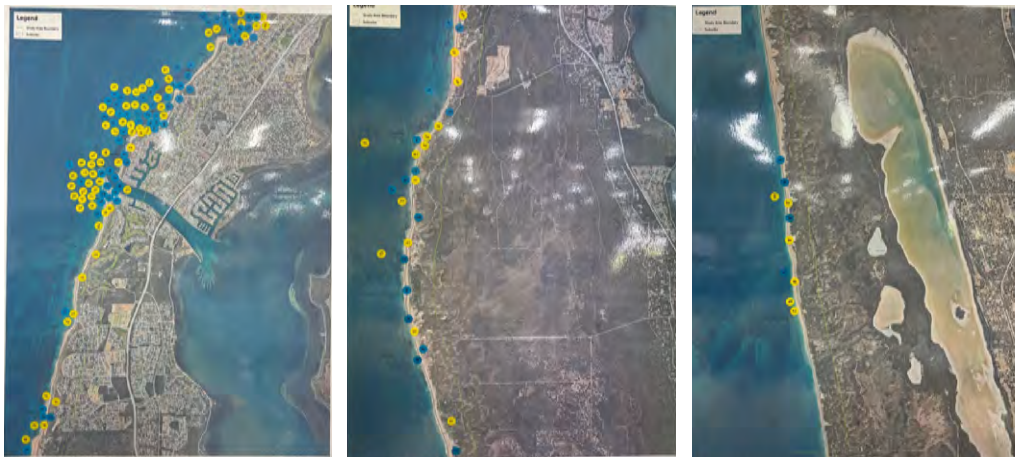
CCRG Update

- Meeting 1:
  - Information sharing
  - Values
  - Issues
  - Mapping!!





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Uses - values - concerns

Blue Bay

- Swimming, water based activities, sunset and wildlife watching, dog-walking, clean waters, picnicking
- The reef, the dunes, sandy beach, observing seasonal changes, proximity to their own home
- Erosion, weed, stormwater outfall, loss of paths, concern about the environment, loss of swimming beach

Back Beach

- Swimming, water based activities, sunset watching, reef
- Sandy beach, natural environment
- Pollution, storm surge, vegetation

- Priority asset/s (9x)

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Uses - values - concerns

Calypso

- Walking, surfing, water based activities, dog walking
- Natural environment, observing the seasons, the Giants
- Erosion

- Priority asset/s (5x)

Seascapes

- Bike riding swimming, water-based activities, boardwalk accessibility
- Sandy beach, natural environment, diversity of the reef and marine life, seaweed
- Loss of beach, erosion, walking through the dunes, seaweed, improving emergency signage

Priority asset/s (6x)

Uses - values - concerns

Rakoa

- Dog walking, surfing, watching the sunset
- Sandy beach, safe swimming, clean water, natural environment, biodiversity, reef and marine life
- Erosion, accessibility, sand bypassing, loss of vegetation, pollution,

Falcon Bay

- Safe swimming, picnic, swimming, surfing, accessibility, cafe, general recreation, water-based sports
- Social events, childhood memories, parking, ceremonial place
- Erosion, re-vegetation, standby scene bypassing, car parking

One of the highest priority asset/s (21x)

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Uses - values - concerns

Geary's-Avalon (81)

- Surfing, views of the sunset, watching surfers, swimming, dunes, walking, snorkelling, kite surfing, bike riding, boating, water-based activities, facilities
- Meeting place, childhood memories, not too crowded, biodiversity, picnic spot, natural environment safe swimming, sandy beach, not too developed,
- Erosion, sand bypassing, impact vehicles on the beach, maintaining the natural environment, overcrowding, impact of dogs, improving accessibility, timing vegetatio

• One of the highest priority asset/s (17x)

Uses - values - concerns

Dawesville Cut

- Surfing, accessibility, swimming, walking, fishing
- Surf life, marine life, meeting place
- Sand bypassing, concern about the natural environment, concern about changing waves and currents, need to improve beach access, erosion at surf club, loss of safe swimming

Priority asset/s (11x)

Golf Course

- Swimming and body surfing
- Erosion and loss of beach, waves and surf, birdlife habitat loss, development

Priority asset/s (9x)

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Uses - values - concerns

Florida-Melros

- Swimming, surfing, walking, fishing,
- Picnic bench, coastal walkways, Sandy Beach, dunes, natural habitat
- Erosion, loss of sandy beach, environmental issues, stormwater run-off impacts, safe swimming, insufficient parking

Tims Thickett-Whitehills

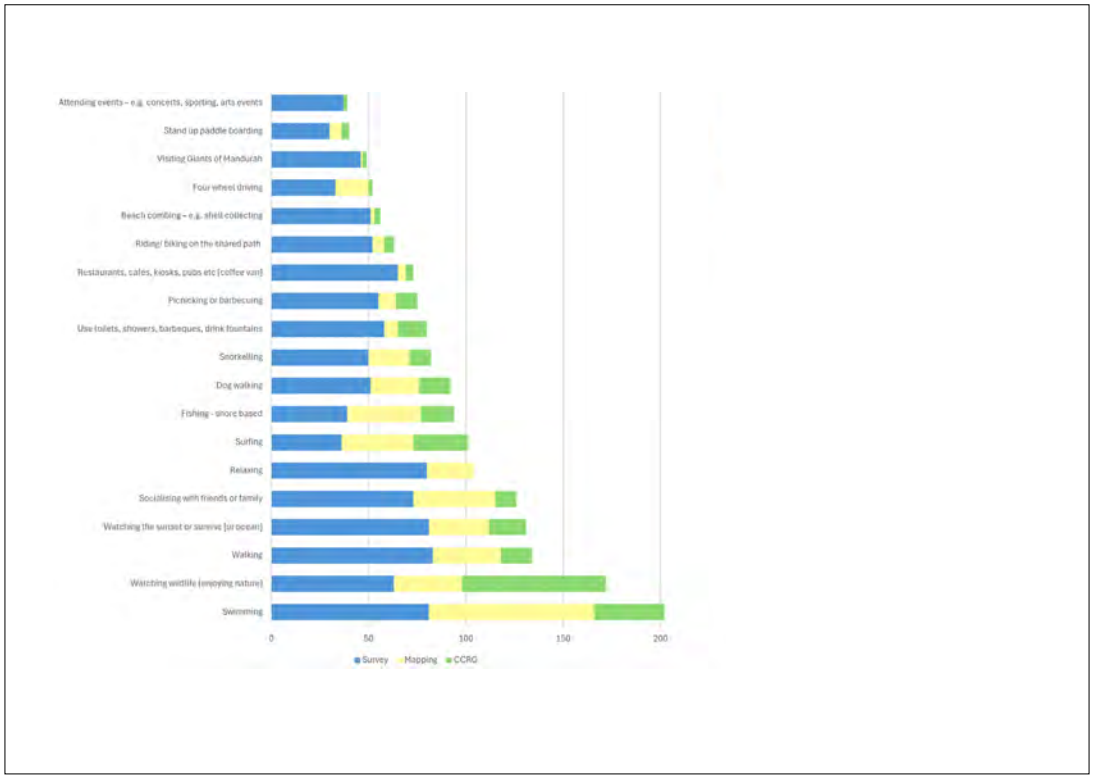
- Fishing, surfing, swimming, walking, diving, snorkelling, paddle boarding, picnicking, camping, four-wheel driving
- Enjoying the views, coastal path, social events, meeting place, childhood memories,
- Vehicles damaging the dunes and the vegetation, overuse of the area, beach and dune erosion, pollution, accessibility

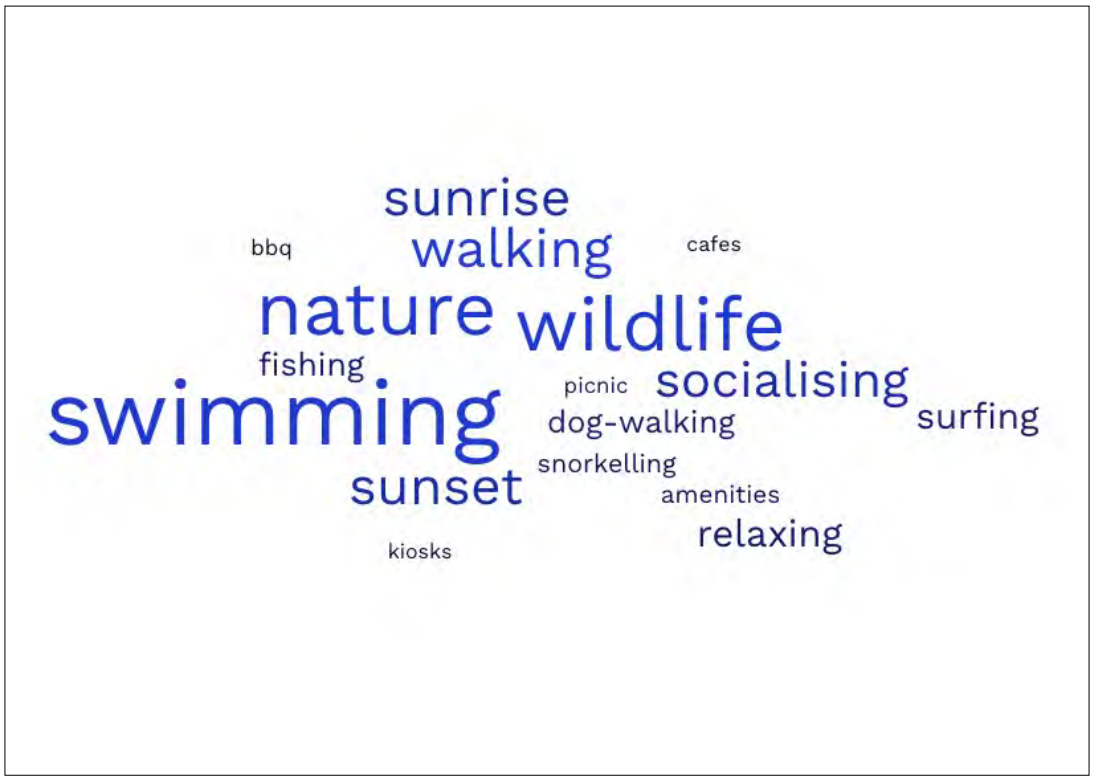
The highest priority asset/s (23x)

Update Engagement Summary

CITY OF MANDURAH ENVIRONMENT

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Survey Outcomes

- Swimming 200+
- Using Facilities 80+
- Sunset watching ~65
- Walking 130+
- Dog Walking 90+
- Wildlife watching 170+
- Socialising 120+
- Picnicking 75+
- Riding 60+
- Relaxing 100+
- Surfing 100+
- Fishing 90+

Multi-Criteria Analysis

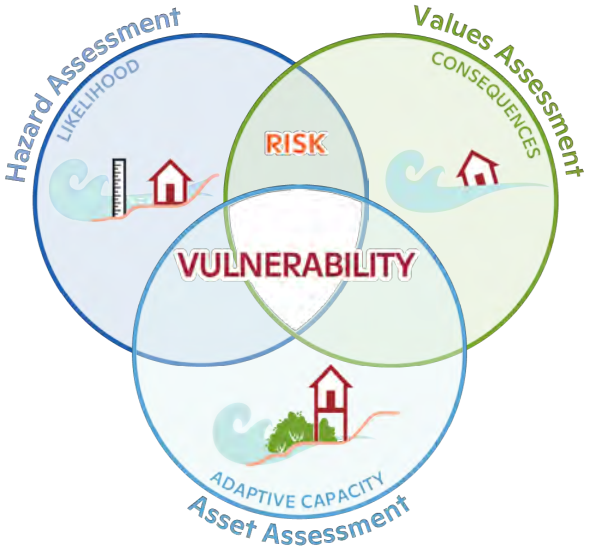
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Risk Assessment - Recap

1. Looks at the likelihood of exposure to an asset
2. Looks at the consequence of exposure to an asset
3. Then, consider the adaptability of the asset
4. Assign vulnerability ratings

Then figure out what to do!!



MU3 Calypso	2025	2035	2050	2075	2125
Aboriginal Heritage	⊘⊘	⊘⊘	⊘⊘	⊘⊘	⊘⊘
Environmental Assets	⊘⊘	⊘⊘	⊘⊘	⊘⊘	⊘⊘
Regional Open Space Reserve	●⊘	●⊘	●⊘	●⊘	●⊘
Residential Land	⊘⊘	⊘⊘	⊘⊘	⊘⊘	⊘⊘
Commercial Land and Assets	⊘⊘	⊘⊘	⊘⊘	⊘⊘	⊘⊘
Rural Lots	⊘⊘	⊘⊘	⊘⊘	⊘⊘	⊘⊘
Roads	●⊘	●⊘	●⊘	●⊘	●⊘
Waste Water Treatment Plant	●⊘	●⊘	●⊘	●⊘	●⊘

Legend
Erosion Vulnerability: Low, Medium, High, Very High
Inundation Vulnerability: Low, Medium, High, Very High
⊘ Not Applicable (for erosion or inundation respectively)

Three categories are vulnerable to **Erosion** from High to Very High levels. Roads and Reserve are vulnerable in the present day.

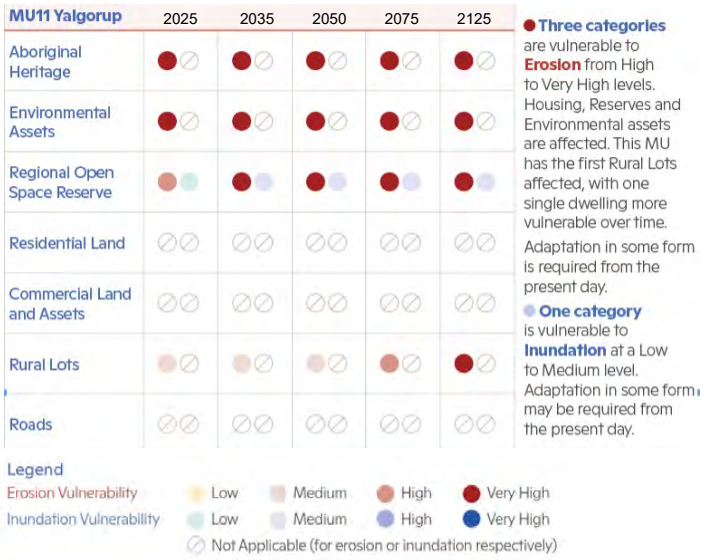
The waste water treatment plant will come under increasing pressure to adapt.

Adaptation in some form is required from the present day.

No category is vulnerable to **Inundation** at this time.

Example

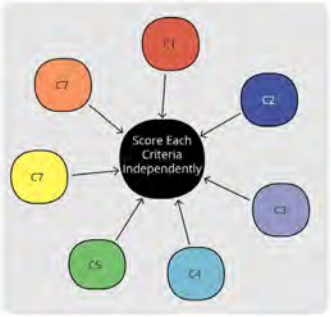
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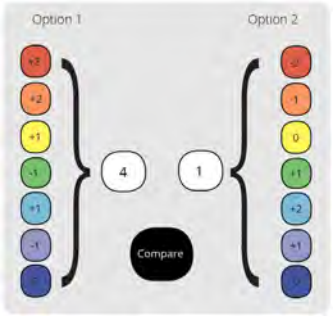


Example

Why do we try to understand the values?

Once we understand values, what's at risk, and options, we undertake a **Multi-Criteria Assessment**





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Why do we try to understand the values?

Multi-criteria analysis (MCA) helps us make decisions – using technical criteria (more objective) and values driven criteria (more subjective)

Your values help us make decisions…

Fairly standard identified criteria for adaptation option assessments – for your review!

Multi Criteria Analysis - the criteria*

Cost

- Upfront capital costs.
- Ongoing maintenance costs.

Future Adaptability

- Whether the option is easily adaptable in future, such as for updated sea level rise actuals or predictions.
- If the option limits the feasibility of selecting other options in future.

Effectiveness

- Ability for the option to mitigate the coastal hazard risk.

Community / Social

- Considers impact on known social, cultural, aesthetic and mental health values already tested with the community.
- May include loss of access to popular beach and water use.
- May include impact to community experience.

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Multi Criteria Analysis - the criteria*

Environmental

- Impact on existing native vegetation / dunes / coastal processes.
- Includes consideration of:
  - Any construction / clearing impacts.
  - Impact of maintenance on the environment.
  - Impact to flora and fauna (including marine).

Physical and economic

- Considers ongoing access to physical assets, functions and spaces (in the coastal zone).
- Considers impact on economic / employment generating uses.
- Considers impact to existing physical assets that currently attract residents, businesses and visitors.

Multi Criteria Analysis



Option	Technical			Values Driven		
	Effectiveness	Future Adaptability	Cost	Environment	Community / Social	Physical and Economic
Option 1	-2	-1	1	0	1	-1
Option 2	-1	2	1	1	2	-2
Option 3	2					
Option 4	2					-2
Option 5	2				-2	

No option will score better than +12 points

No option will score worse than -12 points

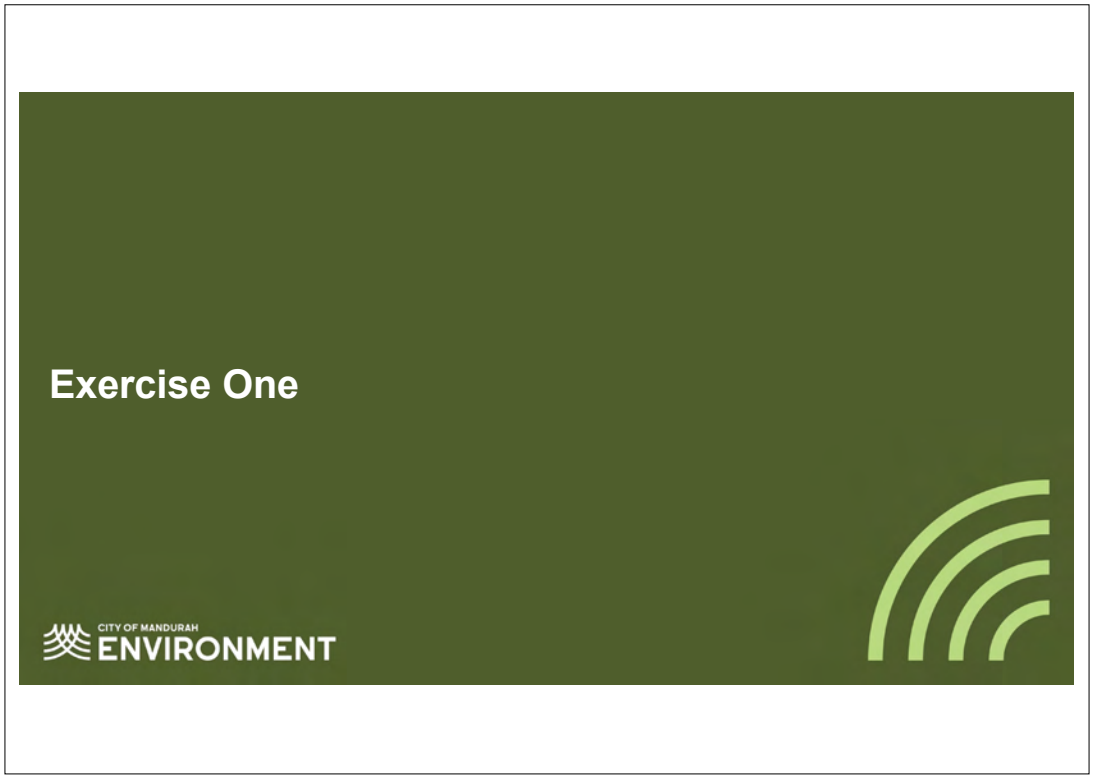
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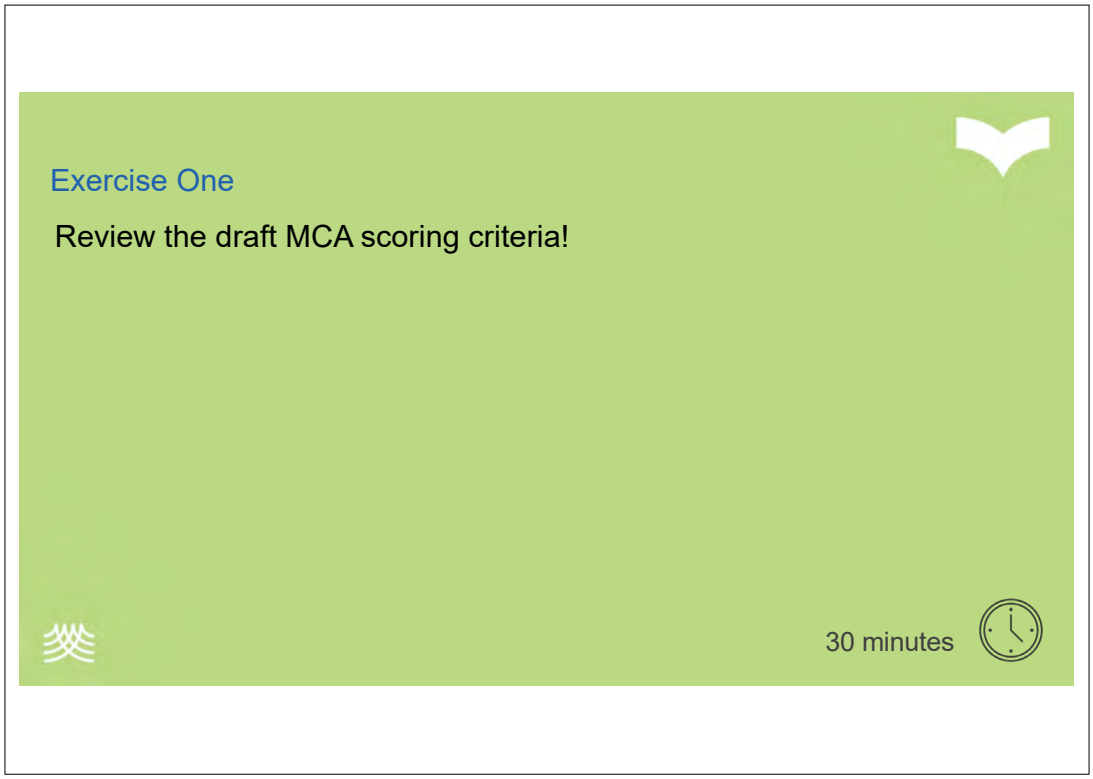
Example – Albany (with a CCRG)

	Community Advisory Panel Scores					Technical Scores				
Criteria	Avoid Further Development	Leave Assets Unprotected	Relocate Assets	Seawall (rock)	Seawall (sandbags)	Avoid Further Development	Leave Assets Unprotected	Relocate Assets	Seawall (rock)	Seawall (sandbags)
Maintenance Cost	1	3	3	1	2	1	3	3	1	2
Environmental Impact	2.3	3.6	2.3	3.4	3.5	2	4	2	4	4
Social Impact - Residential not protected	2.9	3.7	3.1	2.1	2.3	3	3	4	1	1
Social Impact - Residential protected already										
Social Impact - Business property										
Social Impact (community)	2.4	3.7	3.1	2.9	3.1	1	3	1	4	4
Reversibility	2.7	3.4	3.4	4.1	3.3	1	1	1	4	3
Effectiveness	2.9	3.5	2.2	2.8	2.8	3	3	2	1	1
TOTAL COMBINED	**14.2**	**20.8**	**17.3**	**16.3**	**17.1**	**11**	**17**	**13**	**15**	**15**



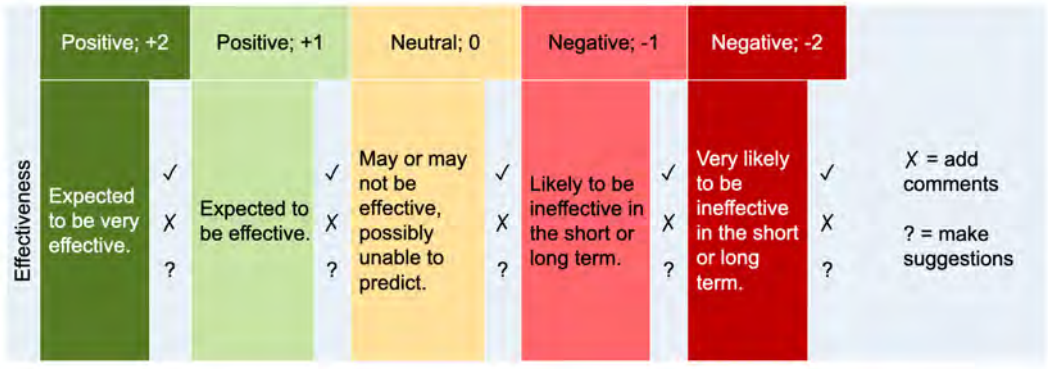
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What to do… example



Exercise One

Review the draft MCA scoring criteria

- What is right?
- Is anything missing?
- Would you add any conditions or change any of the measures?
- Comments on group templates

+ Present back and stick on the wall

30 minutes

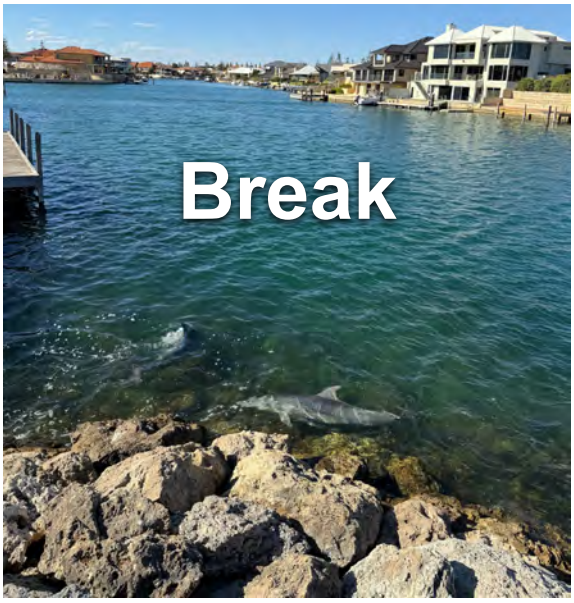
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Something to help…









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S2 nationalmap.gov.au







Management Options Recap

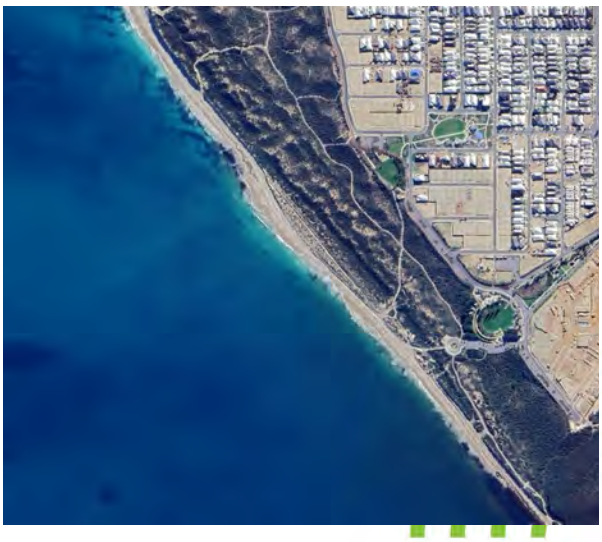
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Avoid

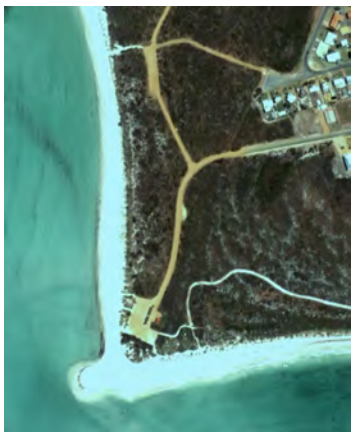


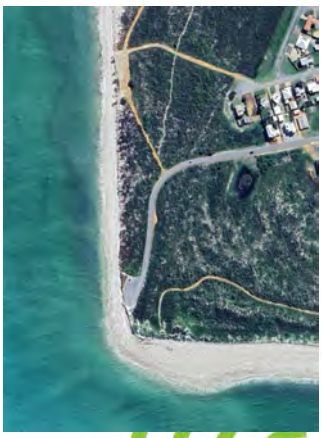
Locate assets in areas that will not be vulnerable to coastal hazards



Planned / Managed Retreat







Cervantes 2003-2022 Google Earth

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Accommodate



Beach House, Cocos (Keeling) Islands





Stilt house, Denham



Queenslander, Cains

Protect





Busselton – Emerge Associates

Seawalls



Seabird – Neo Infrastructure (via watoday.com.au)

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Exercise Two

CITY OF MANDURAH ENVIRONMENT

Today is a first pass….

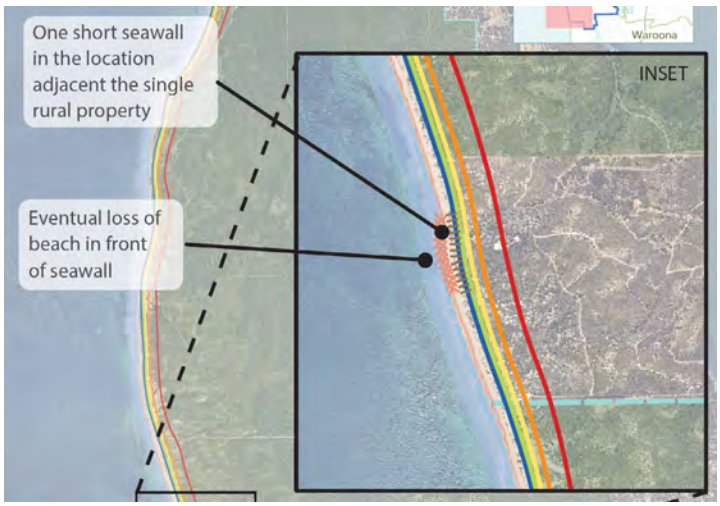
We will practice today…

If we have missed anything obvious – use the 'helpful hints' wall – tell us how we can help you more!

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Yalgorup – Management Unit 11





Yalgorup – Management Unit 11

KEY VULNERABLE ASSETS

Erosion Vulnerability

- Aboriginal Heritage - Very High (Current Day)
- Environmental Assets - Very High (Current Day)
- Vegetated foreshore - High (Current Day); Very High (2035)
- Developed foreshore (dual use path) at risk by 2075
- One rural property at risk by 2125

Inundation Vulnerability

- Limited to sandy beach. Small areas of vegetated foreshore are at risk by 2125

Priority for Action

- **Present Day - Low***

*Although vulnerability is high for many natural assets, the urgency to act for most built assets (paths, house) is not for many years. Compared to other Management Units, urgency is low.

Asset Categories	Vulnerability Ratings 2025	2035	2050	2075	2125	Summary
MU11 Yalgorup						
Aboriginal Heritage	●⊘	●⊘	●⊘	●⊘	●⊘	● **Three categories** are vulnerable to **Erosion** from High to Very High levels. Housing, Reserves and Environmental assets are affected. This MU has the first Rural Lots affected, with one single dwelling more vulnerable over time. Adaptation in some form is required from the present day. ● **One category** is vulnerable to **Inundation** at a Low to Medium level. Adaptation in some form may be required from the present day.
	●⊘	●⊘	●⊘	●⊘	●⊘	
Regional Open Space Reserve	●●	●●	●●	●●	●●	
Residential Land	⊘⊘	⊘⊘	⊘⊘	⊘⊘	⊘⊘	
Commercial Land and Assets	⊘⊘	⊘⊘	⊘⊘	⊘⊘	⊘⊘	
Rural Lots	●⊘	●⊘	●⊘	●⊘	●⊘	
Roads	⊘⊘	⊘⊘	⊘⊘	⊘⊘	⊘⊘	

LEGEND
Erosion Vulnerability: Low, Medium, High, Very High
Inundation Vulnerability: Low, Medium, High, Very High
⊘ Not Applicable (for erosion or inundation respectively)

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Yalgorup – Management Unit 11

PROTECT: Seawalls (PR3)

Assumes rock seawall in front of rural property in approximately 2075.

An expensive but effective option, which may reduce the availability of a sandy beach over time, resulting in a revetment type water's edge. In this location, it may impact four-wheel driving.

Potentially expensive if no nearby suitable and sustainable rock source available, although cost likely borne by sole beneficiary.

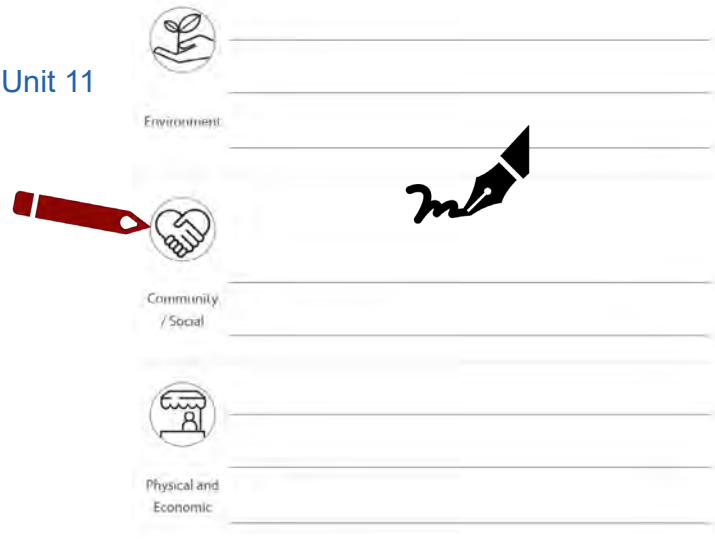
Replacement would be approximately 50 years.

The private road to the beach may be impacted by erosion at the northern end of the seawall requiring additonal road construction.

May impact nesting birds.



Yalgorup – Management Unit 11



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Multi Criteria Analysis

Option	Technical			Values Driven		
	Effectiveness	Future Adaptability	Cost	Environment	Community / Social	Physical and Economic
Option 1						
Option 2						
Option 3						
Option 4						
Option 5						

Exercise Two

As a group, review the Options for MU11 - Yalgorup

- Look at the scoring criteria and indicate your group 'score'
- Provide comments – what are the benefits and issues with each option?
- Do you have a group preferred option (or two)?

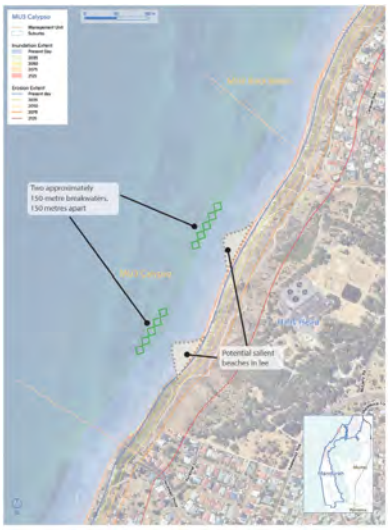
20 minutes

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Exercise Three

CITY OF MANDURAH
ENVIRONMENT

Calypso – Management Unit 3



MU3 - Calypso

KEY VULNERABLE ASSETS

Erosion Vulnerability

- Vegetated foreshore - High (Current Day); Very High (2125)
- Developed Foreshore (Car park, parkland) - High (Current Day); Very High (2050)
- Calypso Road - Roads - High (Current Day); Very High (2075)
- Waste Water Treatment Plant - High (Current Day); Very High (2075)

Inundation Vulnerability

- None identified

Priority for Action

- **Present Day - High**
- Priority increases to Very High for most assets by 2075

PROTECT: Offshore breakwater (PR5)

Assumes two breakwaters approximately 150m long and spaced 150m apart at a depth of ~5mAHD water and sand nourishment to build salients as part of capital construction (location shown approximate).

An effective option, the location, in water, may allow for construction from the beach, with some shore based impacts during construction. It will be costly to build and maintain. It could also be very expensive if no nearby suitable and sustainable rock source is available.

Effectiveness will reduce over time as the sea level rises, with increased crest heights necessary. Replacement would be approximately 50 years.

The breakwaters may result in enhanced marine life.

The breakwaters would be designed to attempt to create salient beaches in their lee. It is not clear if the structures would impact sand movement along the coast.

Effective-ness | Future Adaptability | Cost

Environment

Community / Social

Physical and Economic

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Exercise Three

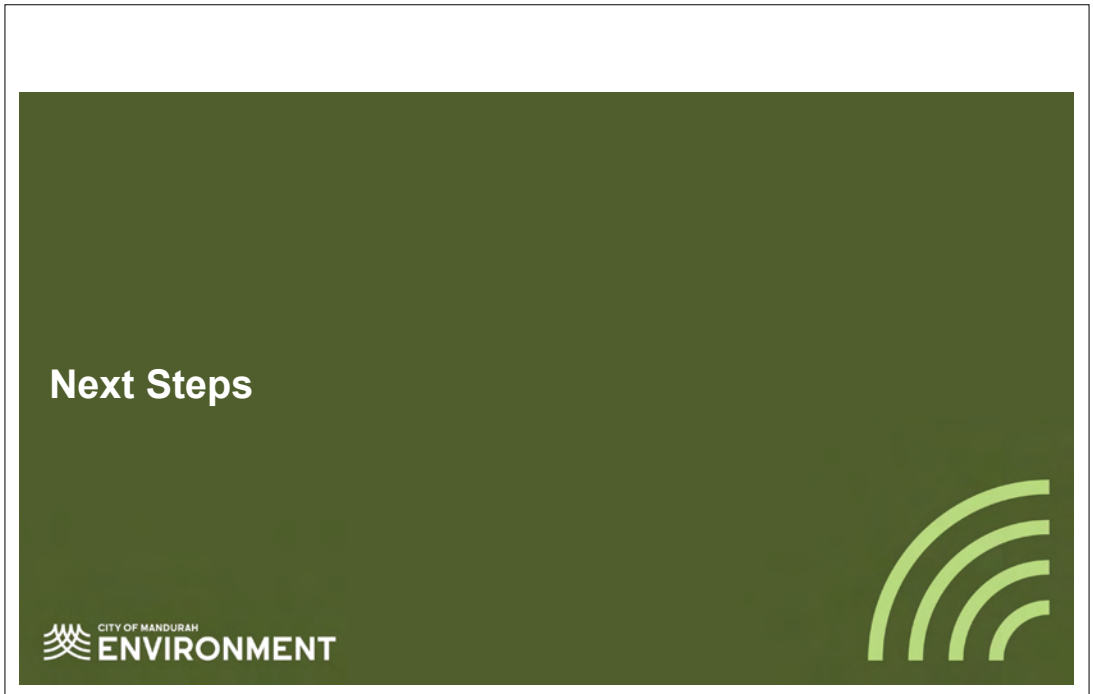
As a group, review the Options for MU3 - Calypso

- Look at the scoring criteria and indicate your group 'score'
- Provide comments – what are the benefits and issues with each option?

- Do you have a group preferred option (or two)?

20 minutes

What did you say?



Workshop Three

- Saturday 22 February, between 12:00pm – 4:30pm.
- Falcon Pavilion, 27 Lynda Street, Falcon

- We will workshop the proposed options for the remaining management units and make recommendations together

In between the workshops

- We will share the maps for the Calypso Management Unit
- Consider the management options and discussion today – consider how this analysis process might extend to other management units
- Talk to the people you know, especially youth, who are under-represented here

Any questions in between, contact

- Olivia: olivia@shapeurban.place or 0421 015 100
- Damien: Damien.Slack@mandurah.wa.gov.au or 9550 3747

Thank you

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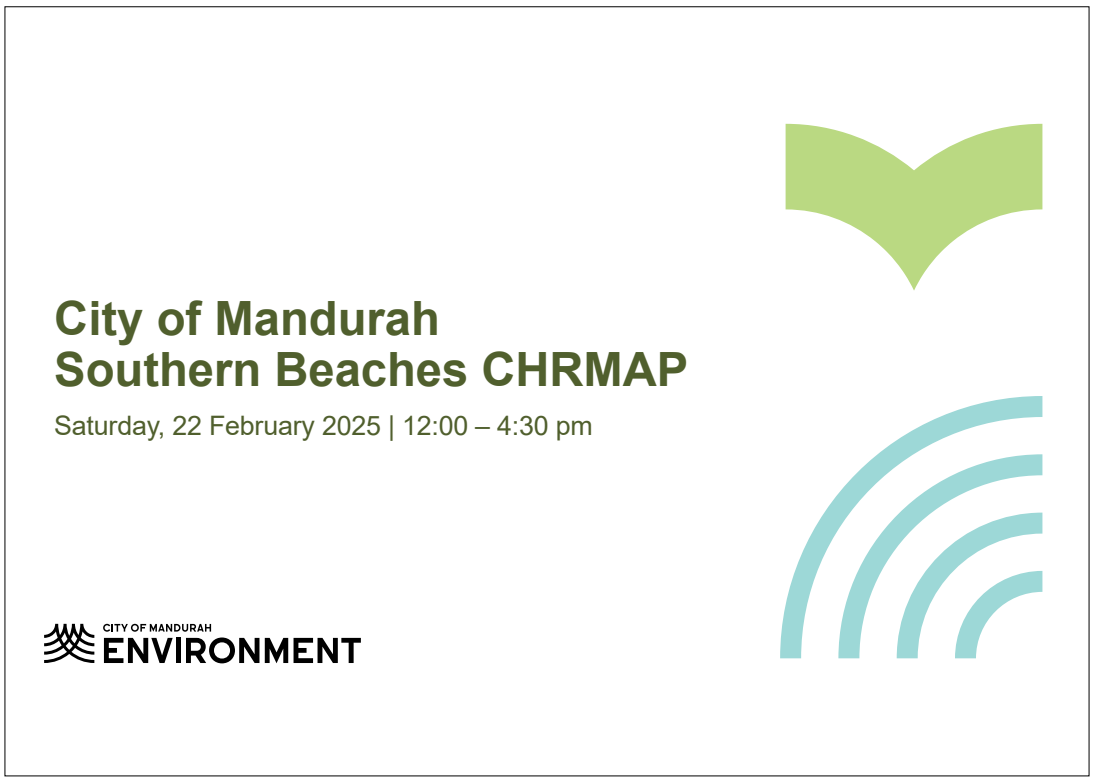


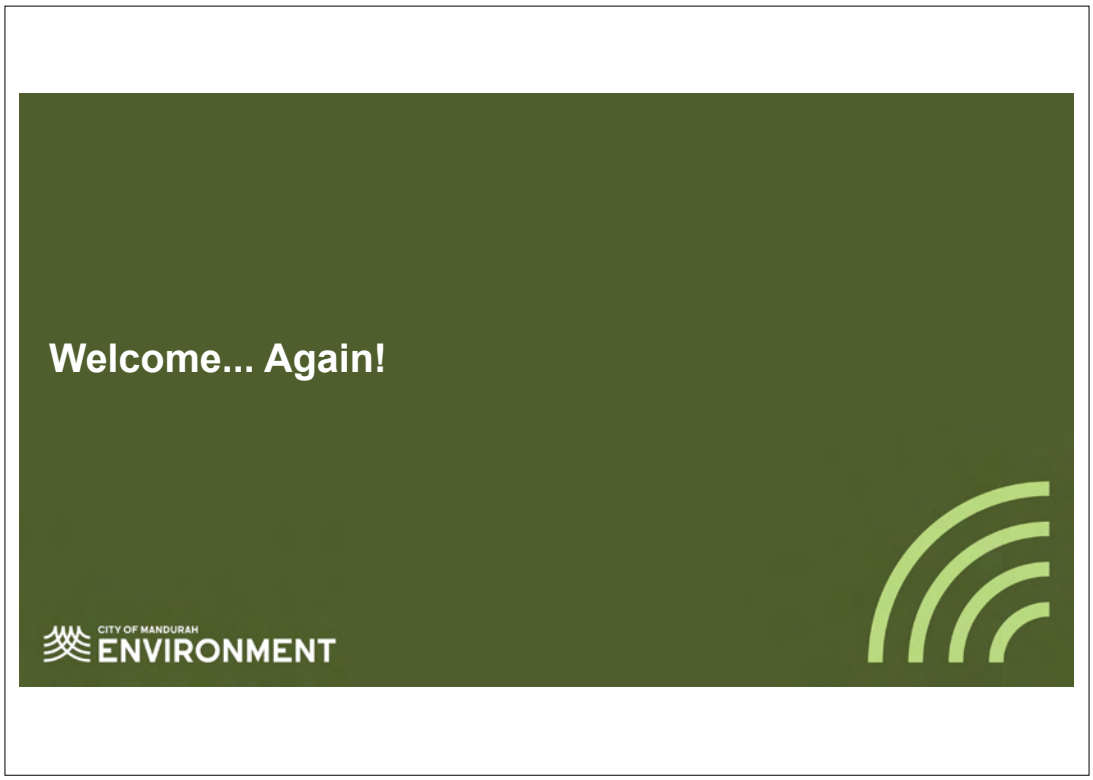
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APPENDIX F

Appendix F: Engagement Presentation – Workshop Three

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Acknowledgement of Country

The City of Mandurah acknowledges and pays respect to the Bindjareb people, who are the Traditional Owners and First Peoples of this land. We pay respect to the Elders past and present and acknowledge the continuing contribution they make to the life of this City and this region.



Project Steering Committee

CITY OF MANDURAH

Department of Planning, Lands and Heritage

Government of Western Australia Department of Transport

Peron Naturaliste Partnership

Consultant Team

SHAPE URBAN

WATER TECHNOLOGY

Coastal Community Reference Group (CCRG)

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Study Area

- 36 km of ocean-facing coastline
- From Roberts Point, Halls Head, through to the southern end of the Clifton locality
- The estuarine environment, including canal estates, is outside of the scope of the project



What are we doing today?

- Covering some tricky topics / what the CHRMAP is trying to achieve
- Looking at some of the 'other' management options for the whole of the study area
- Considering management options available per vulnerable asset / groups of assets
- Using multi-criteria analysis - evaluating management options
- Talking about next steps



Remit (non-negotiables)

- Mandurah Southern Beaches CHRMAP will be prepared and, thereafter, implemented
- Format, process and content per SPP 2.6
- Planning horizon - 100 years
- The recommendations will include implementation planning for short, medium and long-term



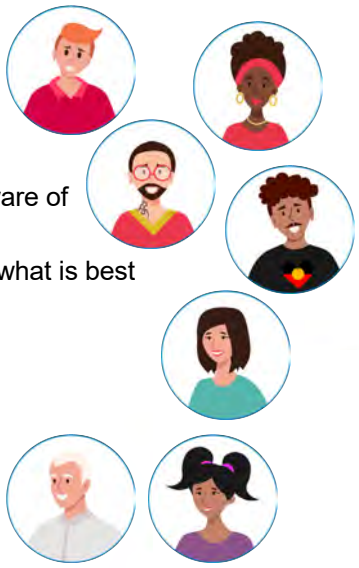
Remit

How do we address coastal management in the best way possible to make sure we balance current user expectations with longer term accountability to future generations, so everyone can enjoy the coastline that we love?



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Some tips before we begin



- Be curious. Learn as much as you can…
- Focus on the remit – avoid going down rabbit holes
- Question your own pre-existing point of view and beware of confirmation bias
- Remember that you are here as a citizen to consider what is best for the whole community
- Remember who isn't here
- If something isn't working for you, let us know

- **Today – try and think about the whole study area**

Sand Bypassing – our elephant

- Some things to discuss…
  - The INTENT of sand bypassing
  - The EFFECT of sand bypassing now
  - The EFFECT of sand bypassing in the future
  - The AVAILABILITY of sand bypassing in the future

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Northern Beaches CHRMAP – 10 Year Action Plan

Year 1 Key Projects

1. Permanent Sand Bypassing Feasibility Investigation
2. Doddi's Beach Coastal Adaptation Options Study
3. Town Beach Buried Seawall Upgrade Detailed Design

Community Open Information Session – 19 September 2024



Permanent Sand Bypassing



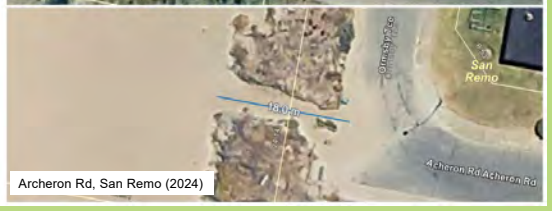
Mechanical 'Slurry Track' Operation

Feasibility Investigation

Appraise the technical feasibility and financial viability of installing a new permanent sand bypassing system against the existing conventional system at Doddi's Sand Trap in Mandurah



Archeron Rd, San Remo (2009)



Archeron Rd, San Remo (2024)

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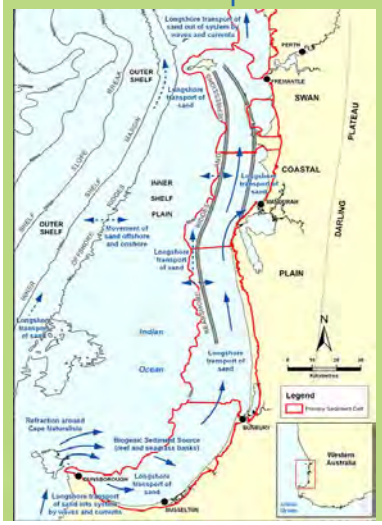
Permanent Sand Bypassing

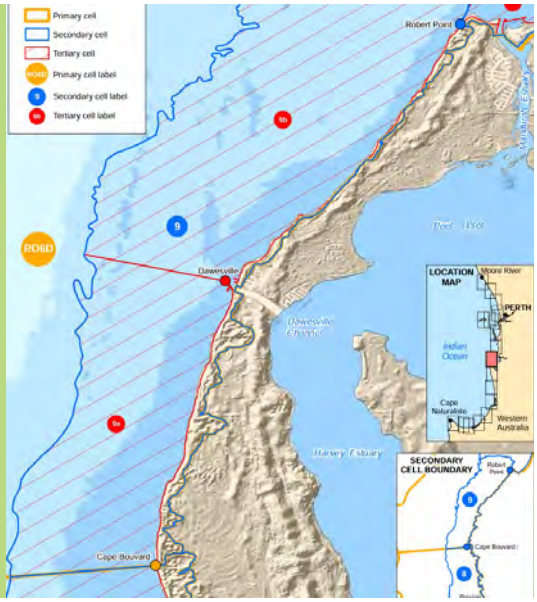
Option 1 – Jet Pumps





Sand Bypassing – sediment transport

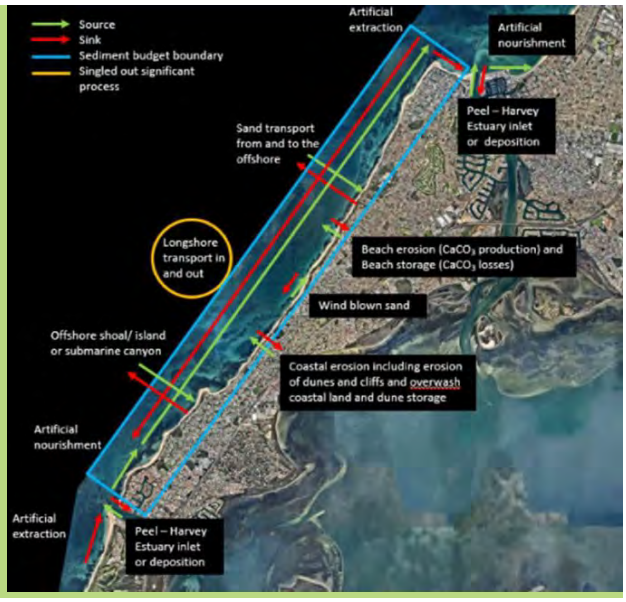




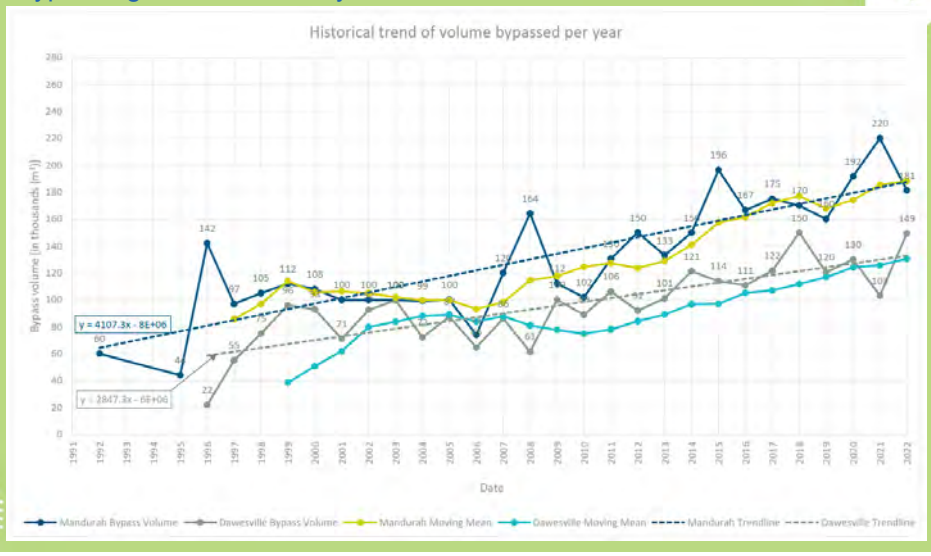
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Sand Bypassing – sediment transport

- Sediment sources, sinks and pathways
- 24/7 is a long time – the ocean doesn't get tired
- Ocean could be moving hundreds of thousands of cubic metres
- Severe events can change / upset things



Sand Bypassing – volume history



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Sand Bypassing

- Current sand bypassing is considered effective at emulating natural sediment transport in very shallow water that the channels and their structures interrupt
- It is still at the mercy of natural processes (there's lots!) affecting volumes
- Any bypassing infrastructure can only move sand that is available on the beach. Mobile plant can access sand a fixed system can't reach – the details are important
- Current approach has two major constraints: One set of equipment shared across two sites and, speed of response once sand moves into sand traps

Sand Bypassing has no significant effect on the CHRMAP hazard maps

- **Erosion hazard mapping is expected to be very similar even if Dawesville channel was never built**
- Largest component of erosion mapping is sea level rise – much longer-term issue in time and space
- Historical vegetation lines do not have an obvious difference in movement from before Dawesville channel to after
- Storm erosion not likely to be affected

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Dawesville Historical Vegetation line



Sand Bypassing has no significant effect on the CHRMAP hazard maps

- In a few decades the **sea level rise impacts are expected to overtake** the ability of any bypassing system – this project is attempting to look very long term about priorities and management of the coast
- There are **opportunities to look at synergies** to improve bypassing along with coastal management – e.g. pumping sand to different locations
- **We will be able to make recommendations for improvements**

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Dawesville Sand Bypassing – advocacy role

- During the break, we will provide templates to provide support for an advocacy task
- Your feedback will be used by CoM to continue engaging with DoT
- Your feedback will help this project with recommendations for improvements
- A later exercise will help us understand if there is any (community) benefit in bypassing to different locations

Dawesville Sand Bypassing Video

https://youtu.be/Sy7R1R8_b7A

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Coastal Processes, Hazards and Options

CITY OF MANDURAH ENVIRONMENT

What does a CHRMAP study do?

Identify the *risk* of **erosion** + **inundation** with sea level rise.

It identifies areas that could potentially be impacted by these hazards over the next 100 years relative to storm events and projected sea level rise.

It uses vulnerability assessment to identify:

- How likely the impact is to occur
- Consequence of the impact
- How easy it is to adapt before or after the impact



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Sandy Coast

Southern Beaches coastline is mainly sandy or mixed sandy and rocky with some rocky sections (WAPC, 2013)



Mixed sandy and rocky, Back Beach, Halls Head



Mixed sandy, Back Beach, Halls Head

Coastal Erosion



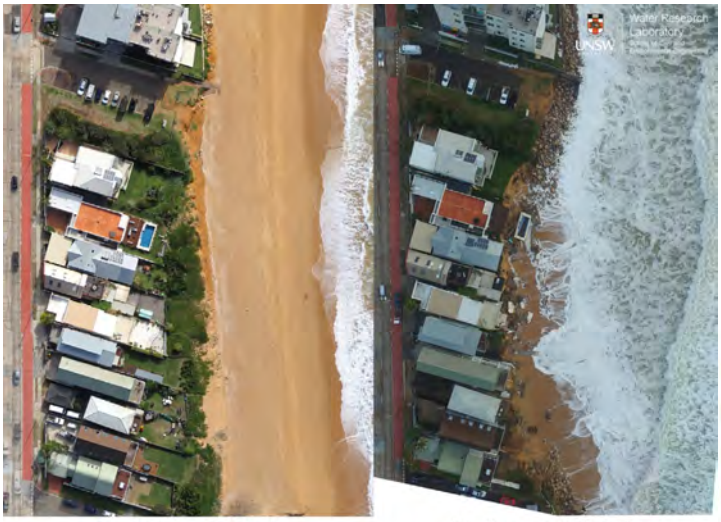
Coastal Erosion at Port Beach (CoastWA, 2022)



Storm smashed the already eroded Port Beach north of Fremantle.
(ABC News: Nicolas Perpitch)

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Storm Erosion



Collaroy beach erosion before and after the 2016 'superstorm' *(Photo: Christopher Drummond)*

Coastal Inundation



Coastal Inundation at Bunbury



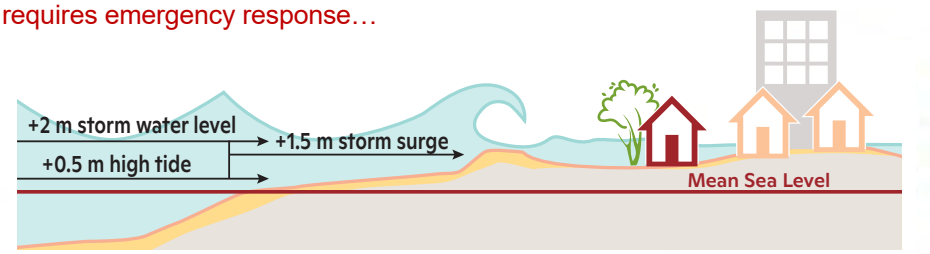
Coastal Inundation at Bunbury

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Storm Surge (event based)

Storm surge – rise in sea level during storm

- Caused by strong onshore winds + tropical cyclones/winter storms.
- > 5 meters above normal sea level—or worse with high tide.
- It can persist for several hours to over 24 hours.
- Causes inundation and destruction of buildings/infrastructure
- Often requires emergency response…



Adaptation Options - reminder of what they do…

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Hierarchy of Control

as per WA State Planning Policy 2.6 – Coastal Planning



Avoid
Identify future no build areas and use planning controls to prevent new development in areas at risk now or in the future.

Retreat
Withdraw, relocate or abandon assets that are at risk; ecosystems are allowed to retreat landward as sea levels rise.

Accommodate
Continue to use the land but accommodate changes by raising buildings, converting land uses or growing flood or salt-tolerant plants.

Protect
Hard structures (e.g. seawalls) or soft solutions (e.g. dunes and vegetation) to protect land from the sea. May be prohibitively expensive, especially in the long term.



Hierarchy of Control

as per WA State Planning Policy 2.6 – Coastal Planning

In addition to the risk management and adaptation hierarchy identified in SPP 2.6, No Regrets and Do Nothing are two risk treatment options relevant to the CHRMAP process and will be considered in the risk treatment assessment.



No Regrets
Assessments required being undertaken to determine a preferred risk treatment option. Monitoring and planning actions.



Do Nothing
Assumes that all levels of risk are accepted and that no further action will be taken.



LET'S TALK ABOUT THESE ONES FIRST

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No regrets



Education, wayfinding, and citizen science programs





Emergency planning







Coast Snap Video



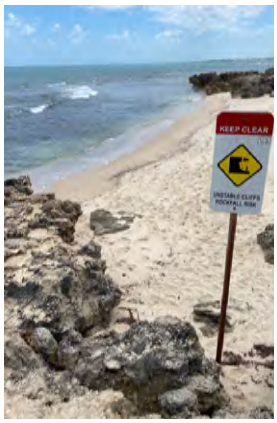


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No regrets



Emergency responses



Planting, dune care





No regrets



School partnerships

Community engagement / ongoing reference groups



Research partnerships

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No regrets

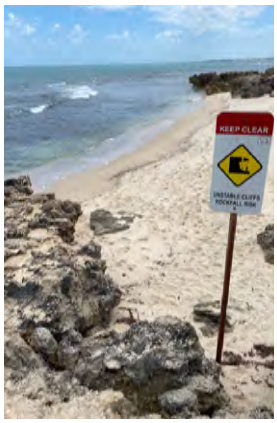
Planting, dune care







Emergency responses



No regrets

Community engagement / ongoing reference groups

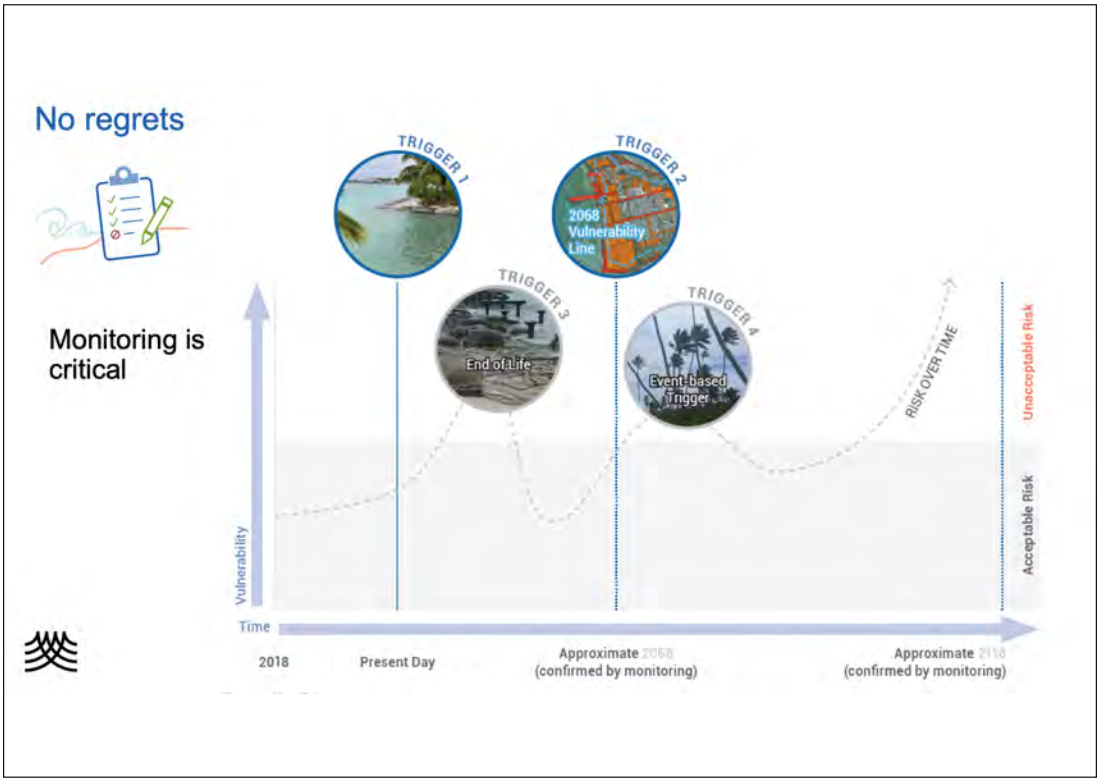


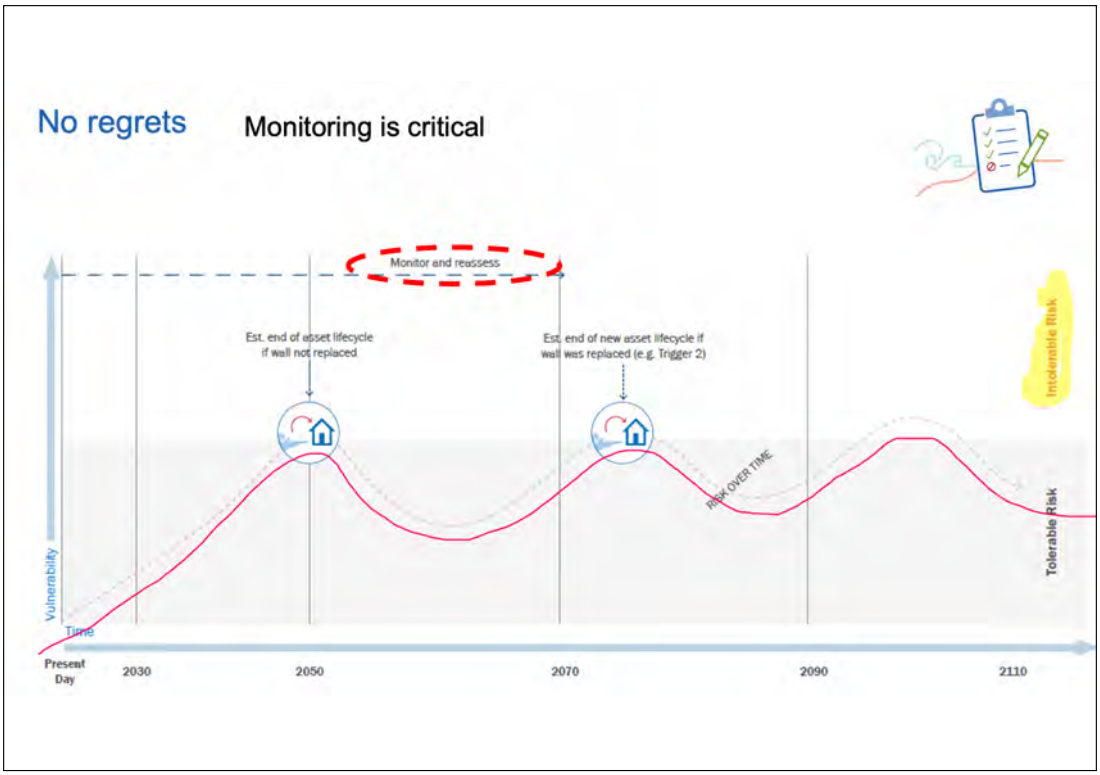
School partnerships



Research partnerships

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Avoid



Locate assets in areas that will not be vulnerable to coastal hazards

- Includes planning legislation and controls
- Include Certificate of Title controls





Jindalee – new development set back - Google Earth

Planned / Managed Retreat



Options which progressively retreat/relc nt

Advantages

- Removes vulnerability entirely
- Can be undertaken over time responding to changing circumstances and monitoring
- Planning can create certainty for community
- Provides space for nature to adapt

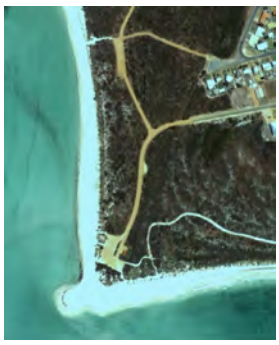
Disadvantages

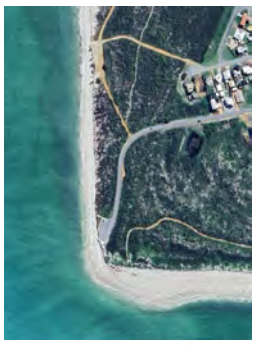
- Can be very unsettling / upsetting for people with strong ties to existing coastal facilities or private assets
- Can be very expensive if including acquisition or land swaps (or similar pathways)
- Few examples available
- Takes a long time

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Planned / Managed Retreat







Cervantes 2003-2022 Google Earth

Surfers Point, California

Planned / Managed Retreat



Old Onslow Google Earth



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Planned / Managed Retreat









Accommodate

Design assets to withstand impacts - where avoiding or relocation is not option

Advantages

- Good for inundation (not for erosion)
- Can work with landscape
- Flexible – can be responsive and done over time
- Allows people to remain in place and connected



Disadvantages

- Requires considered planning to limit impact to residents. Daily impact to residents accessing homes.
- Cost of construction/change
- Risk to servicing requirements

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Accommodate



Beach House, Cocos (Keeling) Islands

Raising land, Google





Stilt house, Denham



Queenslander, Cains

Protect



Can be designed with or without a dry white sandy beach
Undertaken when the assets on coastal land are valued more highly than the cost of protecting

Advantages

- Includes 'soft' protection options, such as beach nourishment and revegetation of the dunes, and 'hard' protection options such as constructing groynes and seawalls.
- Protects assets on coastal lands with confidence

Disadvantages

- No protection option is considered permanent, and all have associated expenses to implement, maintain and replace.
- Protect options are significantly expensive, funding needs to be identified

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Protect



Beach Nourishment



Florida – Daily Mail

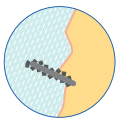


City of Fremantle



Local examples at Port Beach, Cockburn, South Fremantle

Protect



Groynes / Headlands



Sorrento – Department of Transport



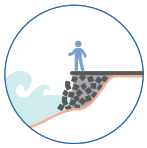
Tanker Jetty - Shire of Esperance



Quinns - City of Wanneroo

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Protect



Seawalls



Seabird – Neo Infrastructure
(via watoday.com.au)



Busselton – Emerge Associates

Protect

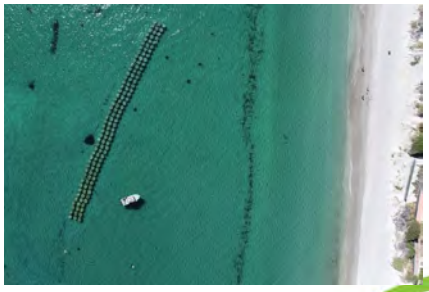


Artificial Reefs

- Cables – surfing
- Cockburn – erosion and habitat (sheltered)
- Albany – surfing
- Fishing reefs = habitat



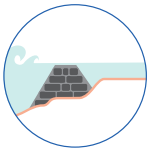
Cables Reef at Cottesloe - Google Earth



City of Cockburn – councilmagazine.com.au

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Protect

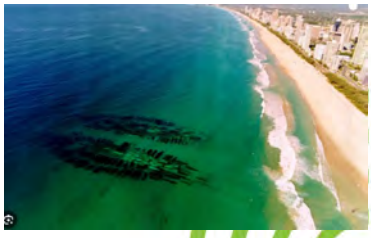


Artificial Reefs

- It is difficult to confidently design them to manage erosion on an open ocean coast
- It is more difficult to design multi-purpose artificial reefs – e.g. Narrowneck
- Surf reefs could be considered separately – e.g. Middleton Beach at Albany



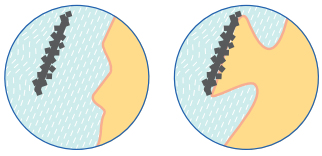
Middleton Beach, Albany – Raised Water Research

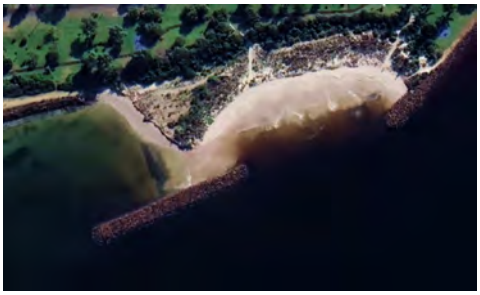


Narrowneck Gold Coast - Seabreeze

Protect

Offshore Breakwaters





Emu Point at Albany and Kwinana Beach
Google Earth



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Protect – Levee (inundation)





Questions



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Multi-Criteria Analysis – Scoring tables and Approach

CITY OF MANDURAH ENVIRONMENT

Multi Criteria Analysis

Option	Technical			Values Driven		
	Effectiveness	Future Adaptability	Cost	Environment	Community / Social	Physical and Economic
Option 1	2	-1	-2	1	-1	1
Option 2	1	2	-1	2	0	-1
Option 3	-1	0	-2	0	2	0
Option 4	-1	0	1	2	-2	-2
Option 5	1	-1	2	-1	1	0

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Scoring – some changes!

	NOTES	Positive; +2	Positive; +1	Neutral; 0	Negative; -1	Negative; -2
Effectiveness		Expected to be very effective at reducing vulnerability, or removing it entirely.	Expected to be effective at reducing vulnerability.	May or may not be effective, unable to predict or requires further investigation.	Likely to be ineffective in the short, medium or long term at reducing vulnerability.	Very likely to be ineffective in the short, medium or long term at reducing vulnerability.
Future Adaptability		Very adaptable, not likely to leave legacy issues. Provides flexibility for future decision makers.	Adaptable, not likely to leave legacy issues.	May leave legacy issues. Further investigation required to unuderstand post-implementation impacts or community willingness to change direction at a later time	Likely to create legacy issues	Will create legacy issues. Once implemented will be very difficult not to repeat and obliges future decision makers.
Cost		Low costs. Very low economic loss.	Reasonable costs. Low economic loss.	Moderate costs.	High initial or ongoing costs. High economic loss.	Very high initial or ongoing costs. Very high economic loss.
Environment	includes geoheritage, fossils	Significant positive effect; allows coastline ample room to adapt to change, provides natural processes room. Provides space for habitat for species to adjust to changing environment.	Positive effect; allows coastline room to adapt to change and allows natural processes some room. Species have some space to adjust to new environment.	No (or unclear) environmental impact, further investigation required before option can be considered	Potential negative effect, including losing coastal foreshore vegetation and beaches, possible increased loss of environmentally sensitive flora or fauna and reduction in room for environment to adapt to changing coastal environment.	Certain negative effect, loss of coastal foreshore vegetation, beaches and any habitat altogether. Certain loss of environmentally sensitive flora or fauna and no room for environment to adapt to changing coastal environment.
Community / Social	includes heritage in the sense of Aboriginal sense of, or connection to, country	Significant positive, noticeable community or social benefit as it retains or increases access to known social, cultural, aesthetic, landscape integrity, and mental health values already tested with the community (that are otherwise at risk).	Positive, noticeable community or social benefit as it will provide retention of known social, cultural, aesthetic, landscape integrity, and mental health values already tested with the community that are at risk.	Not discernible or indeterminate net impact. Further engagement and understanding of impact necessary	Negative noticeable community or social impact. Loss or reduction of social, cultural, aesthetic, landscape integrity, and mental health values is likely, and the community will be directly affected.	Significant negative, noticeable community or social impact. Certain loss or substantial reduction of social, cultural, aesthetic, landscape integrity, and mental health values is almost certain, and the community will be directly effected in a way that impacts sense of place and connection to the area.
Physical and Economic		Provides retention of and access to community functions and physical spaces in perpetuity as a result of option. Supports and increases the economic outcomes of the locality and the City.	Provides access for community functions and physical spaces in short and medium term, and potentially long term. Supports economic outcomes for the locality and the City, or impacts are easily mitigated.	Not discernible or indeterminate net effect; loss of physical and economic assets unclear.	Potential significant loss of and access to community functions and physical spaces. Potential loss of economic benefit to the area and may discourage new or existing people from coming to the area due to loss of existing assets.	Almost certain unacceptable loss of and access to community functions and physical spaces. Loss of economic benefit to the area and loss of existing assets that currently attract residents, businesses and visitors.

Exercise One

CITY OF MANDURAH
ENVIRONMENT

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Exercise One

Reviewing the MCA for MU3 and MU11

- Any further comments?
- Add anything to your sheets on a post-it
- Change scores if you feel necessary (make it clear!!)

+ Hand back to the team

25 minutes



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Elective Exercise

CITY OF MANDURAH ENVIRONMENT

Dawesville Sand Bypassing – advocacy

- During the break, use templates provided to support the City's advocacy agenda
- Your feedback will be used by CoM to continue engaging with DoT
- Your feedback will help this project with recommendations for improvements

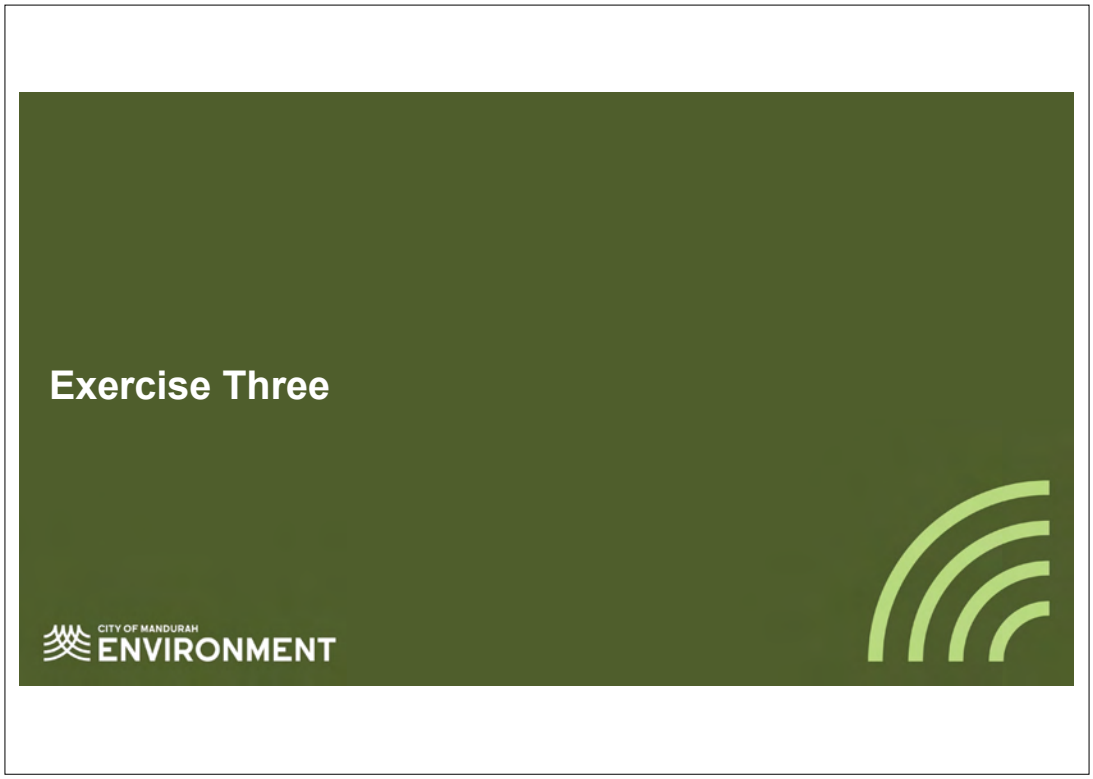
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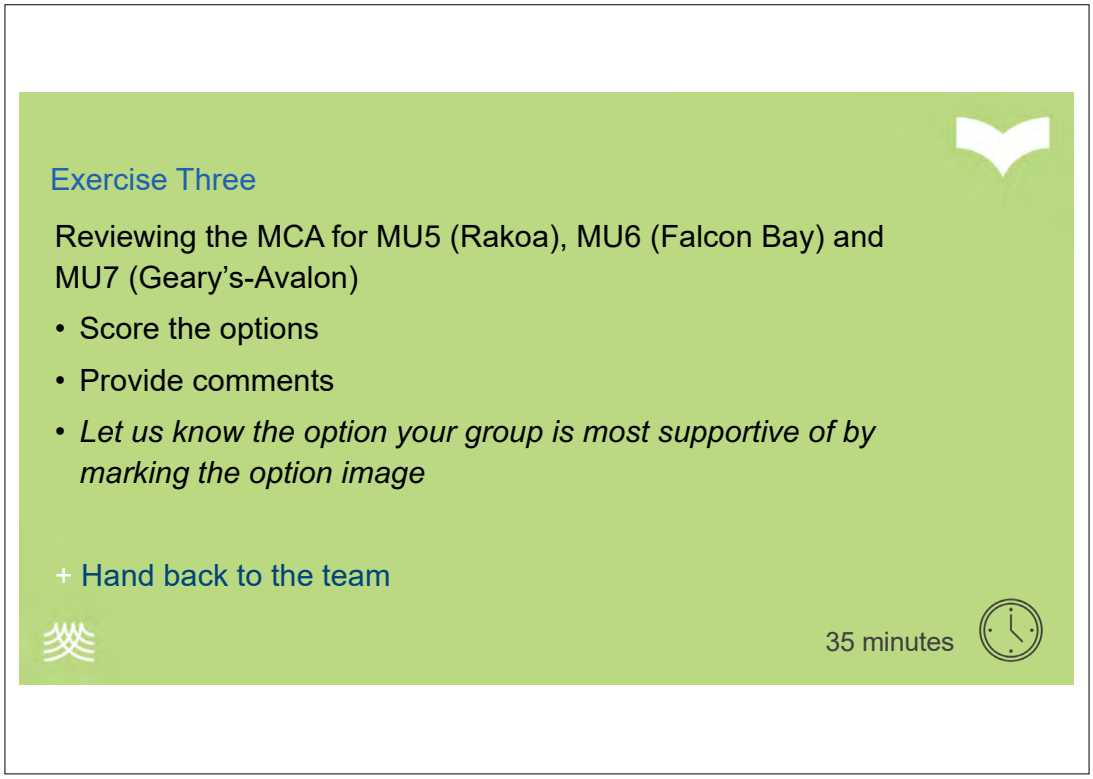


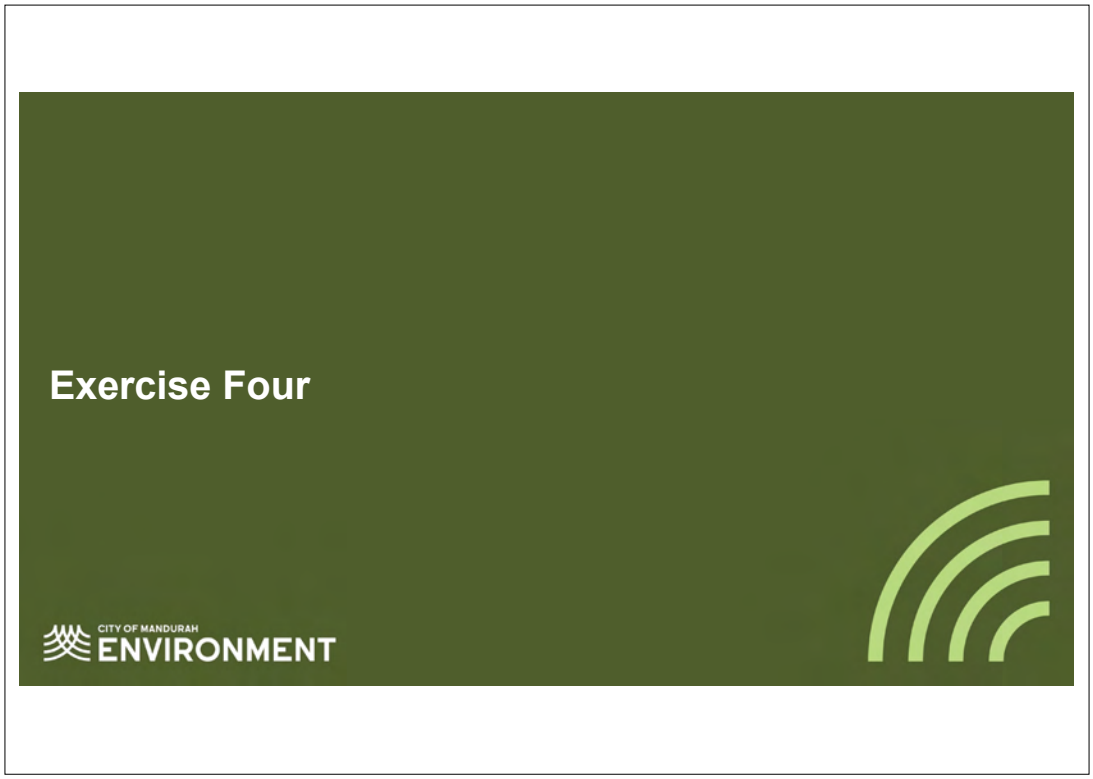
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Exercise Four

Reviewing the MCA for MU9 (Golf Course), MU10 (Florida-Melros)

- Score the options
- Provide comments
- *Let us know the option your group is most supportive of by marking the option image*

+ Hand back to the team

25 minutes

What would you prioritise?

CITY OF MANDURAH ENVIRONMENT

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What we have observed…

- One thing we have noted is that many places are important to you…
- But many places are also at high risk / vulnerability

- Some priority locations will likely be selected for adaptation
- We need some advice from you….

Exercise Five

Using the sticky dots (one each)

- If you had to choose one location to prioritise an outcome, where would it be?
  - Sandy beach is most important here – yellow
  - Reef / breakwater – green (let us know which one!)
  - Seawall
  - Groynes
  - Natural – leave me alone
  - Retreat – this makes sense here
- *You don't have to select something if it's not of interest to you or you don't agree with the option anywhere*

15 minutes

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Summary

CITY OF MANDURAH ENVIRONMENT

What have we observed?

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Next Steps

CITY OF MANDURAH ENVIRONMENT

What next…

- A lot of reporting!!
- We will share the outcomes and the full MCA with you asap, as well as the report of the CCRG process
- We will keep you informed about the sand bypassing discussions
- We will be in touch in coming months as we prepare the CHRMAP – when we are ready to release the draft you will be the first to know
- Future engagement opportunities…

Any questions about next steps

- Damien: Damien.Slack@mandurah.wa.gov.au or 9550 3747

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Thank you – from the City

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End of document

SHAPE URBAN



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Table A-1 Erosion vulnerability and component ratings grouped by management unit & asset category

Management Unit	Exposure / Likelihood					Sensitivity / Consequence	Potential Impact / Level of Risk					Adaptive Capacity	Vulnerability				
	present	2035	2050	2075	2125		present	2035	2050	2075	2125		present	2035	2050	2075	2125
MU1 - Blue Bay																	
Aboriginal Heritage	Rare	Unlikely	Possible	Likely	Almost Certain	Major	Medium	Medium	High	Extreme	Extreme	Low	High	High	Extreme	Extreme	Extreme
Environmental Assets						Major						Low					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Catastrophic	Extreme	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
Commerical Land and Assets						Catastrophic						Low					
Rural						Major						Moderate					
Roads	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Catastrophic	Extreme	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
MU2 - Back Beach																	
Aboriginal Heritage	Rare	Unlikely	Possible	Likely	Almost Certain	Major	Medium	Medium	High	Extreme	Extreme	Low	High	High	Extreme	Extreme	Extreme
Environmental Assets						Major						Low					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land	Rare	Unlikely	Possible	Likely	Almost Certain	Catastrophic	Medium	High	Extreme	Extreme	Extreme	Low	High	Extreme	Extreme	Extreme	Extreme
Commerical Land and Assets						Catastrophic						Low					
Rural						Major						Moderate					
Roads	Rare	Rare	Rare	Unlikely	Possible	Catastrophic	Medium	Medium	Medium	High	Extreme	Low	High	High	High	Extreme	Extreme
MU3 - Calypso																	
Aboriginal Heritage						Major						Low					
Environmental Assets						Major						Low					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land						Catastrophic						Low					
Commerical Land and Assets						Catastrophic						Low					
Rural						Major						Moderate					
Roads	Rare	Rare	Rare	Unlikely	Possible	Catastrophic	Medium	Medium	Medium	High	Extreme	Low	High	High	High	Extreme	Extreme
Wastewater Treatment Plant	Rare	Rare	Rare	Unlikely	Possible	Catastrophic	dium	Medium	Medium	High	Extreme	Low	High	High	High	Extreme	Extreme
MU4 - Seascapes																	
Aboriginal Heritage	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
Environmental Assets						Major						Low					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land	Rare	Rare	Unlikely	Possible	Likely	Catastrophic	Medium	Medium	High	Extreme	Extreme	Low	High	High	Extreme	Extreme	Extreme
Commerical Land and Assets						Catastrophic						Low					
Rural						Major						Moderate					
Roads	Rare	Rare	Unlikely	Possible	Likely	Catastrophic	Medium	Medium	High	Extreme	Extreme	Low	High	High	Extreme	Extreme	Extreme

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Management Unit	Exposure / Likelihood					Sensitivity / Consequence	Potential Impact / Level of Risk					Adaptive Capacity	Vulnerability				
	present	2035	2050	2075	2125		present	2035	2050	2075	2125		present	2035	2050	2075	2125
MU5 - Rakoa																	
Aboriginal Heritage						Major						Low					
Environmental Assets						Major						Low					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land	Unlikely	Possible	Likely	Almost Certain	Almost Certain	Catastrophic	High	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
Commerical Land and Assets						Catastrophic						Low					
Rural						Major						Moderate					
Roads	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Catastrophic	Extreme	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
MU6 - Falcon Bay																	
Aboriginal Heritage						Major						Low					
Environmental Assets						Major						Low					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land	Rare	Rare	Unlikely	Possible	Likely	Catastrophic	Medium	Medium	High	Extreme	Extreme	Low	High	High	Extreme	Extreme	Extreme
Commerical Land and Assets	Unlikely	Possible	Likely	Almost Certain	Almost Certain	Catastrophic	High	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
Rural						Major						Moderate					
Roads	Rare	Unlikely	Possible	Likely	Almost Certain	Catastrophic	Medium	High	Extreme	Extreme	Extreme	Low	High	Extreme	Extreme	Extreme	Extreme
MU7 - Geargs-Avalon																	
Aboriginal Heritage						Major						Low					
Environmental Assets						Major						Low					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land	Rare	Unlikely	Possible	Likely	Almost Certain	Catastrophic	Medium	High	Extreme	Extreme	Extreme	Low	High	Extreme	Extreme	Extreme	Extreme
Commerical Land and Assets						Catastrophic						Low					
Rural						Major						Moderate					
Roads	Rare	Unlikely	Possible	Likely	Almost Certain	Catastrophic	Medium	High	Extreme	Extreme	Extreme	Low	High	Extreme	Extreme	Extreme	Extreme
MU8 - Dawesville Cut																	
Aboriginal Heritage						Major						Low					
Environmental Assets	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
Regional Open Space Reserve						Major						Moderate					
Residential Land						Catastrophic						Low					
Commerical Land and Assets						Catastrophic						Low					
Rural						Major						Moderate					
Roads						Catastrophic						Low					

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Management Unit	Exposure / Likelihood					Sensitivity / Consequence	Potential Impact / Level of Risk					Adaptive Capacity	Vulnerability				
	present	2035	2050	2075	2125		present	2035	2050	2075	2125		present	2035	2050	2075	2125
MU6 - Falcon Bay																	
Aboriginal Heritage						Major						Low					
Environmental Assets						Major						Low					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land	Rare	Rare	Rare	Possible	Likely	Catastrophic	Medium	Medium	Medium	Extreme	Extreme	Low	High	High	High	Extreme	Extreme
Commerical Land and Assets	Rare	Rare	Rare	Almost Certain	Almost Certain	Catastrophic	Medium	Medium	Medium	Extreme	Extreme	Low	High	High	High	Extreme	Extreme
Rural						Major						Moderate					
Roads	Unlikely	Likely	Likely	Likely	Almost Certain	Catastrophic	High	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme

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Management Unit	Exposure / Likelihood					Sensitivity / Consequence	Potential Impact / Level of Risk					Adaptive Capacity	Vulnerability				
	present	2035	2050	2075	2125		present	2035	2050	2075	2125		present	2035	2050	2075	2125
MU9 - Golf Course																	
Aboriginal Heritage	Rare	Unlikely	Possible	Likely	Almost Certain	Major	Medium	Medium	High	Extreme	Extreme	Low	High	High	Extreme	Extreme	Extreme
Environmental Assets	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land	Rare	Rare	Rare	Unlikely	Possible	Catastrophic	Medium	Medium	Medium	High	Extreme	Low	High	High	High	Extreme	Extreme
Commerical Land and Assets	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Catastrophic	Extreme	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
Rural						Major						Moderate					
Roads	Rare	Unlikely	Possible	Likely	Almost Certain	Catastrophic	Medium	High	Extreme	Extreme	Extreme	Low	High	Extreme	Extreme	Extreme	Extreme
MU10 - Florida - Melros																	
Aboriginal Heritage						Major						Low					
Environmental Assets						Major						Low					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land	Rare	Rare	Unlikely	Possible	Likely	Catastrophic	Medium	Medium	High	Extreme	Extreme	Low	High	High	Extreme	Extreme	Extreme
Commerical Land and Assets						Catastrophic						Low					
Rural						Major						Moderate					
Roads	Rare	Rare	Unlikely	Possible	Likely	Catastrophic	Medium	Medium	High	Extreme	Extreme	Low	High	High	Extreme	Extreme	Extreme
MU11 - Yalgorup																	
Aboriginal Heritage	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
Environmental Assets	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Low	Extreme	Extreme	Extreme	Extreme	Extreme
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Major	High	Extreme	Extreme	Extreme	Extreme	Moderate	High	Extreme	Extreme	Extreme	Extreme
Residential Land						Catastrophic						Low					
Commerical Land and Assets						Catastrophic						Low					
Rural	Rare	Rare	Unlikely	Possible	Likely	Major	Medium	Medium	Medium	High	Extreme	Moderate	Medium	Medium	Medium	High	Extreme
Roads						Catastrophic						Low					

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Table B-1 Inundation vulnerability and component ratings grouped by management unit & asset category

Management Unit	Exposure / Likelihood					Sensitivity / Consequence	Potential Impact / Level of Risk					Adaptive Capacity	Vulnerability				
	present	2035	2050	2075	2125		present	2035	2050	2075	2125		present	2035	2050	2075	2125
MU1 - Blue Bay																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve	Possible	Likely	Almost Certain	Almost Certain	Almost Certain	Moderate	Medium	High	High	High	High	High	Medium		Medium	Medium	Medium
Residential Land						Major						Moderate					
Commerical Land and Assets						Major						Moderate					
Rural						Moderate						High					
Roads						Minor						Moderate					
MU2 - Back Beach																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve						Moderate						High					
Residential Land						Major						Moderate					
Commerical Land and Assets						Major						Moderate					
Rural						Moderate						High					
Roads						Minor						Moderate					
MU3 - Calypso																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve						Moderate						High					
Residential Land						Major						Moderate					
Commerical Land and Assets						Major						Moderate					
Rural						Moderate						High					
Roads						Minor						Moderate					
MU4 - Seascapes																	
Aboriginal Heritage	Rare	Rare	Unlikely	Unlikely	Possible	Moderate	Low	Low	Medium	Medium	Medium	Moderate	Medium	Medium	Medium	Medium	Medium
Environmental Assets						Moderate						High					
Regional Open Space Reserve	Rare	Rare	Unlikely	Unlikely	Possible	Moderate	Low	Low	Medium	Medium	Medium	High	Low	Low	Medium	Medium	Medium
Residential Land						Major						Moderate					
Commerical Land and Assets						Major						Moderate					
Rural						Moderate						High					
Roads						Minor						Moderate					

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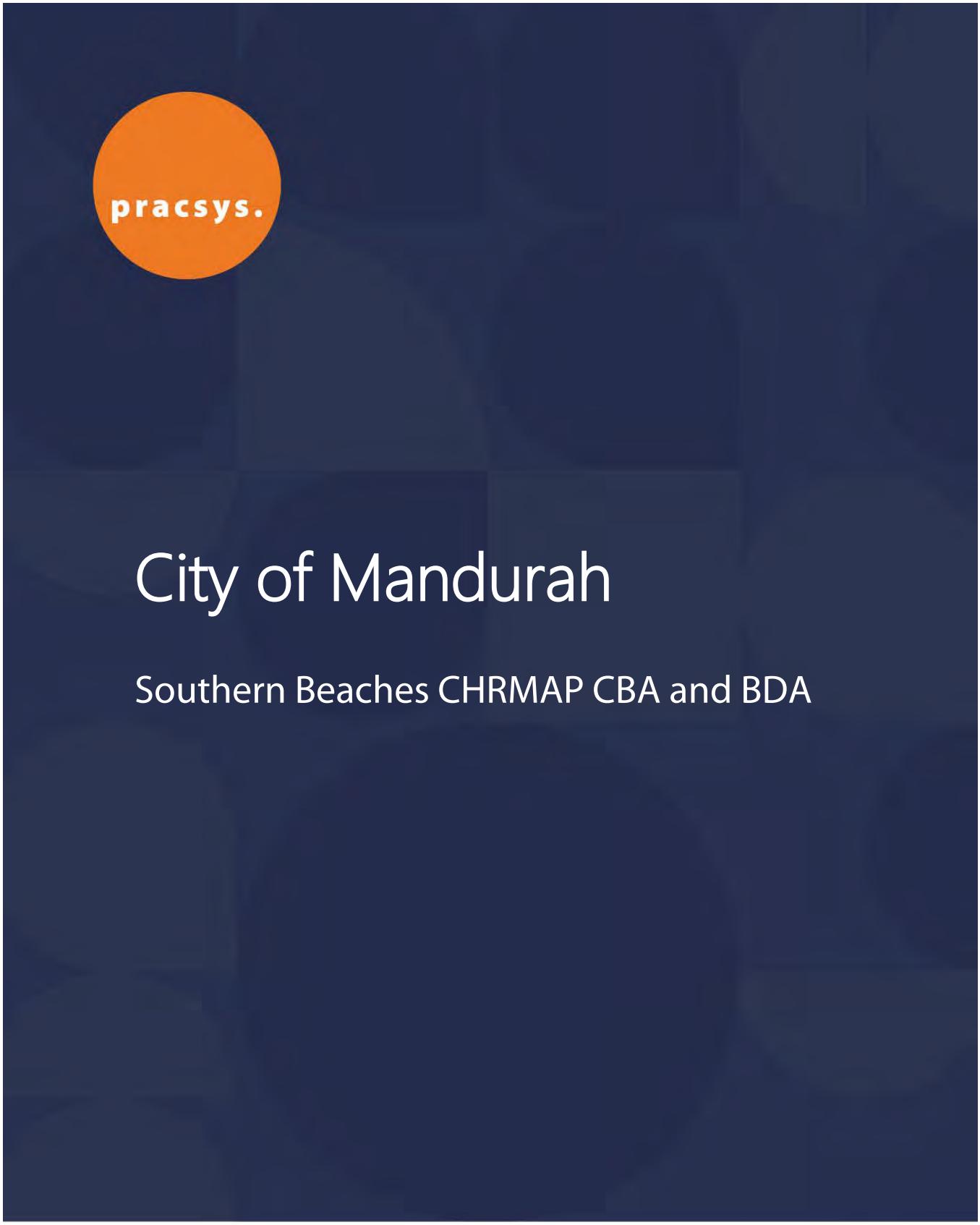
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Management Unit	Exposure / Likelihood					Sensitivity / Consequence	Potential Impact / Level of Risk					Adaptive Capacity	Vulnerability				
	present	2035	2050	2075	2125		present	2035	2050	2075	2125		present	2035	2050	2075	2125
MU5 - Rakoa																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve						Moderate						High					
Residential Land						Major						Moderate					
Commerical Land and Assets						Major						Moderate					
Rural						Moderate						High					
Roads						Minor						Moderate					
MU6 - Falcon Bay																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve	Rare	Unlikely	Unlikely	Possible	Possible	Moderate	Low	Medium	Medium	Medium	Medium	High	Low	Medium	Medium	Medium	Medium
Residential Land	Rare	Unlikely	Unlikely	Possible	Possible	Major	Medium	Medium	Medium	High	High	Moderate	Medium	Medium	Medium	High	High
Commerical Land and Assets	Rare	Unlikely	Unlikely	Possible	Possible	Major	Medium	Medium	Medium	High	High	Moderate	Medium	Medium	Medium	High	High
Rural						Moderate						High					
Roads	Rare	Unlikely	Unlikely	Possible	Possible	Minor	Low	Low	Low	Low	Low	Moderate	Medium	Medium	Medium	Medium	Medium
MU7 - Gearys-Avalon																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve	Rare	Unlikely	Unlikely	Possible	Possible	Moderate	Low	Medium	Medium	Medium	Medium	High	Low	Medium	Medium	Medium	Medium
Residential Land						Major						Moderate					
Commerical Land and Assets						Major						Moderate					
Rural						Moderate						High					
Roads						Minor						Moderate					
MU8 - Dawesville Cut																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve	Rare	Unlikely	Unlikely	Possible	Possible	Moderate	Low	Medium	Medium	Medium	Medium	High	Low	Medium	Medium	Medium	Medium
Residential Land						Major						Moderate					
Commerical Land and Assets						Major						Moderate					
Rural						Moderate						High					
Roads						Minor						Moderate					



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Management Unit	Exposure / Likelihood					Sensitivity / Consequence	Potential Impact / Level of Risk					Adaptive Capacity	Vulnerability				
	present	2035	2050	2075	2125		present	2035	2050	2075	2125		present	2035	2050	2075	2125
MU9 - Golf Course																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve	Rare	Unlikely	Unlikely	Possible	Possible	Moderate	Low	Medium	Medium	Medium	Medium	High	Low	Medium	Medium	Medium	Medium
Residential Land						Major						Moderate					
Commerical Land and Assets	Rare	Unlikely	Unlikely	Possible	Possible	Major	Medium	Medium	Medium	High	High	Moderate	Medium	Medium	Medium	High	High
Rural						Moderate						High					
Roads	Rare	Unlikely	Unlikely	Possible	Possible	Minor	Low	Low	Low	Low	Low	Moderate	Medium	Medium	Medium	Medium	Medium
MU10 - Florida - Melros																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve						Moderate						High					
Residential Land						Major						Moderate					
Commerical Land and Assets						Major						Moderate					
Rural						Moderate						High					
Roads						Minor						Moderate					
MU11 - Yalgorup																	
Aboriginal Heritage						Moderate						Moderate					
Environmental Assets						Moderate						High					
Regional Open Space Reserve	Rare	Unlikely	Unlikely	Possible	Possible	Moderate	Low	Medium	Medium	Medium	Medium	High	Low	Medium	Medium	Medium	Medium
Residential Land						Major						Moderate					
Commerical Land and Assets						Major						Moderate					
Rural						Moderate						High					
Roads						Minor						Moderate					



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v2.0	Draft Southern Beaches CBA and BDA	Jason Cook	Jason Cook	24th Jul 2025
v3.0	Draft Southern Beaches CBA and BDA	Jason Cook	Jason Cook	31st Jul 2025
v4.0	Final Southern Beaches CBA and BDA	Jason Cook	Jason Cook	26th Nov 2025

Disclaimer

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Appendix 1: Risk Treatment Options 38

Appendix 2: Costing Methodology 40

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1 EXECUTIVE SUMMARY

The following Cost Benefit Analysis (CBA) and Benefit Distribution Analysis (BDA) has been prepared to inform a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) undertaken by Shape Urban for the City of Mandurah's southern beaches.

1.1 Risk Treatment Options

This CBA and BDA considers the following Management Units and selected protection risk treatment options (Figure 1). Present Value reflects the cost of the option across the assessment period in current terms.

Figure 1. Management Unit and Risk Treatment Option Summary

Management Unit	Options	Description	Total Cost ($)	Present Value ($)
MU1 – Blue Bay	Beach Nourishment (PR1)	Treatment of whole foreshore (1,400m) 2025 implementation	$52,500,000	$19,961,716
	Beach Nourishment (PR1) Groynes (PR2)	Treatment of whole foreshore (1,400m) Seven rock groynes, 100m long, 200m apart 2025 implementation	$74,000,000	$47,206,869
MU5 – Rakoa	Beach Nourishment (PR1)	Treatment of whole foreshore (2,100m) 2035 implementation	$63,200,000	$14,762,888
	Beach Nourishment (PR1) Groynes (PR2)	Treatment of whole foreshore (2,100m) Ten rock groynes, 100m long, 200m apart 2035 implementation	$96,480,000	$34,495,509
MU6 – Falcon Bay	Beach Nourishment (PR1)	Treatment of whole foreshore (750m) 2050 implementation	$16,800,000	$1,768,714
	Seawall (PR3)	Treatment of whole foreshore (750m) with rock revetment seawall 2050 implementation	$12,600,000	$1,906,144
MU7 – Gearies-Avalon	Beach Nourishment (PR1)	Treatment of whole foreshore (2,300m) 2035 implementation	$69,200,000	$16,164,428
	Seawall (PR3)	Treatment of whole foreshore (2,300m) with rock revetment seawall 2035 implementation	$46,440,000	$16,604,182

Source: Water Technology 2025, Pracsys 2025

1.2 Cost Benefit Analysis

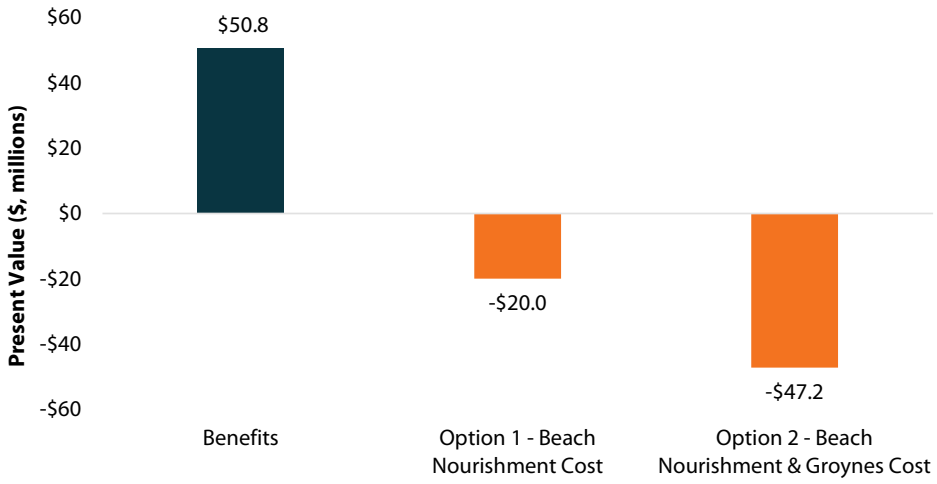
The identified benefits apply to each risk treatment option in each Management Unit as all risk treatment options are designed to mitigate coastal erosion vulnerability. Benefits are estimated by comparing the relevant risk treatment option by Management Unit to the base case for that Management Unit. The base case for the study area is inclusive of managed retreat, acquisition of properties and replacement/relocation of amenities. This would involve the costs associated with acquiring or replacing or losing residential land, public open space, community infrastructure, commercial land, beach utility and more. A number of benefits are therefore based on reductions of costs compared to the base case (i.e. at risk houses no longer needing to be acquired).

Benefits that did not have identified costs by City of Mandurah were monetised using the 'benefit transfer' method. The benefit transfer method involves calculating values using financial proxies from high-quality studies and reports and applying them to the context in question.

Management Unit 1 – Blue Bay Cost Benefit Analysis

The implementation of Option 1 – Beach Nourishment at MU1 – Blue Bay generates a positive Net Present Value (NPV)[1] of $31 million and a Benefit Cost Ratio (BCR)[2] of 2.5 (Figure 2). Option 2 – Beach Nourishment and Groynes has a larger cost and a subsequent NPV of approximately $4 million and BCR of 1.1.

Figure 2. MU1 – Blue Bay Present Value Costs and Benefits



Source: Pracsys 2025

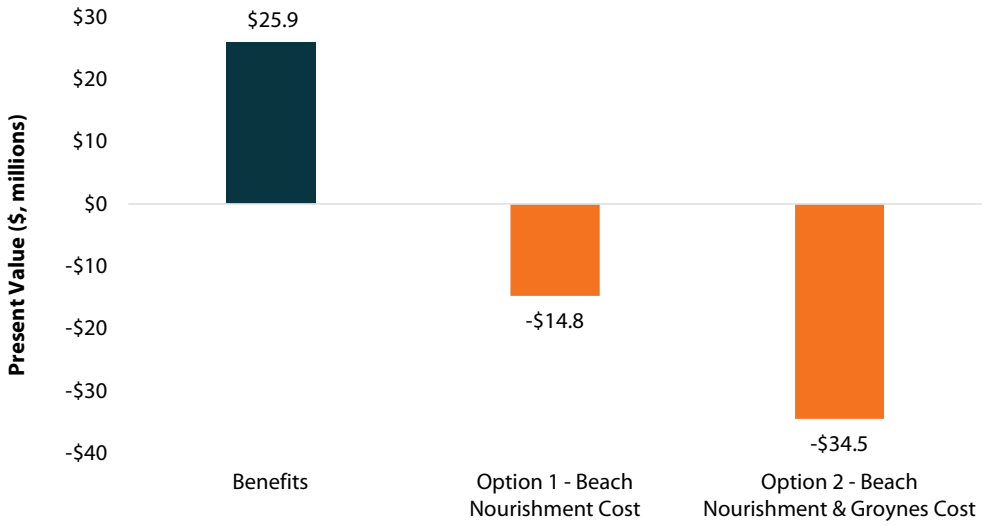
[1] Net Present Value is the result of present value benefits minus present value costs. A positive NPV indicates a positive value for money.
[2] Benefit Cost Ratio is the result of present value benefits over present value costs. A BCR of 1 would indicate that for every dollar spent on a risk treatment option, $1 would be received in the form of benefits.

At a 7% discount rate, the implementation of Option 1 – Beach Nourishment currently provides the greatest value for money outcome for the City.

Management Unit 5 – Rakoa Cost Benefit Analysis

The implementation of Option 1 – Beach Nourishment at MU5 – Rakoa generates a positive NPV of $11 million and a BCR of 1.8 (Figure 3). Option 2 – Beach Nourishment and Groynes has a larger cost and a subsequent NPV of approximately -$9 million and BCR of 0.8.

Figure 3. MU5 – Rakoa Present Value Costs and Benefits



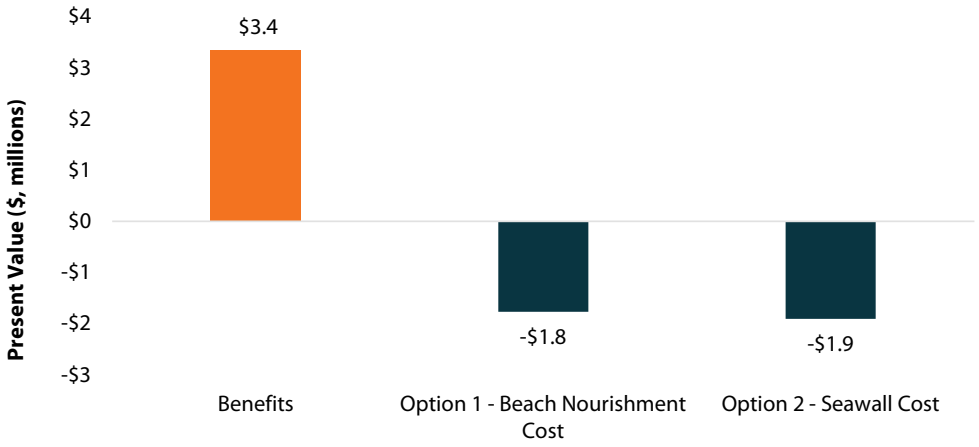
Source: Pracsys 2025

At a 7% discount rate, the implementation of Option 1 – Beach Nourishment currently provides the greatest value for money outcome for the City.

Management Unit 6 – Falcon Bay Cost Benefit Analysis

The implementation of Option 1 – Beach Nourishment at MU6 – Falcon Bay generates a positive NPV of $1.6 million and a BCR of 1.9 (Figure 4). Option 2 – Seawall has an NPV of approximately $1.4 million and BCR of 1.8.

Figure 4. MU6 – Falcon Bay Present Value Costs and Benefits



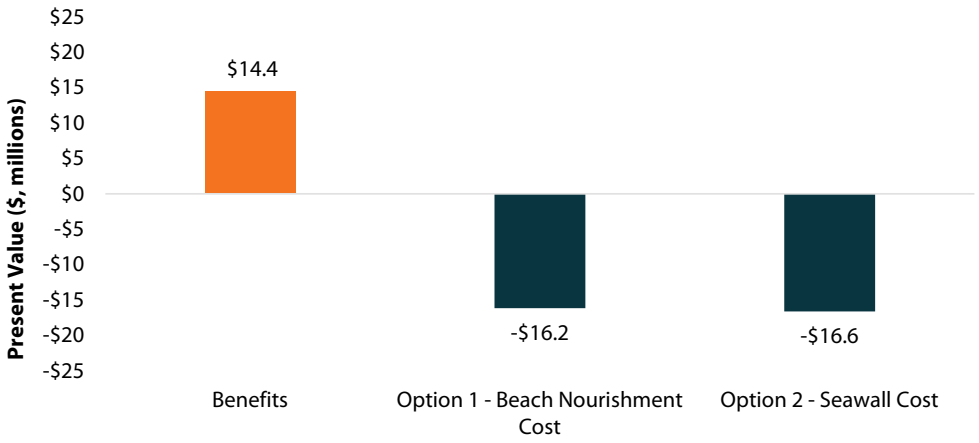
Source: Pracsys 2025

At a 7% discount rate, both Option 1 – Beach Nourishment and Option 2 – Seawall provide a similar value for money outcome for the City.

Management Unit 7 – Gearies-Avalon Cost Benefit Analysis

The implementation of Option 1 – Beach Nourishment at MU7 – Gearies-Avalon generates a NPV of -$1.8 million and a BCR of 0.9 (Figure 5). Option 2 – Seawall has an NPV of approximately -2.2 million and BCR of 0.9.

Figure 5. MU7 – Gearies-Avalon Present Value Costs and Benefits



Source: Pracsys 2025

At a 7% discount rate, neither implementation of Option 1 – Beach Nourishment or Option 2 – Seawall provide a positive value for money outcome for the City.

1.3 Benefit Distribution Analysis

This BDA intends to support decision-making regarding potential funding methods/contributions but has not detailed recommended options.

The distribution of economic and social benefits has been applied to the primary beneficiaries of the proposed risk treatment options. Beneficiaries are those who experience positive outcomes from the proposed project. This is often not the owner of an asset; the local council may maintain public open space at a foreshore, but it is the local community who use it and benefit from its retention. Assets may also have multiple beneficiaries based on different valuations; owners of private residential properties benefit from retention of the house and land value, and the associated local government benefits from rates from the retention of the land.

Identified beneficiaries include the following (Figure 6).

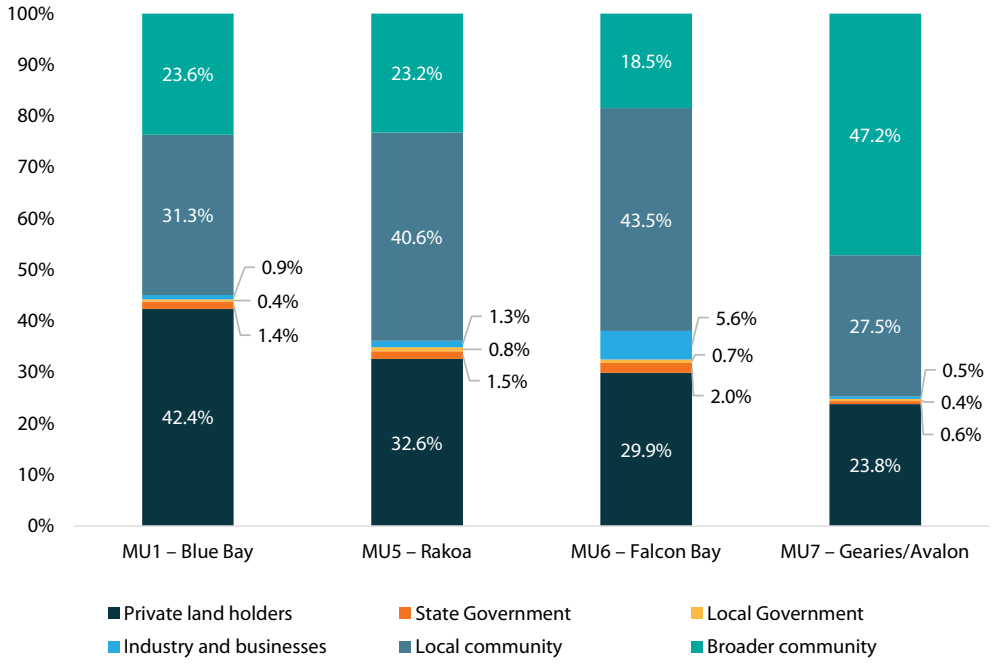
Figure 6. Risk Treatment Beneficiaries

Name	Description
Private land holders	Owners of residential properties affected by relevant coastal hazards
State Government	WA Department of Treasury and Finance
Local Government	City of Mandurah
Industry and businesses	All businesses by Management Unit
Local community	City of Mandurah residents for whom the affected Management Units are their closest accessible beach
Broader community	City of Mandurah residents for whom the affected Management Units are not their closest accessible beach

Source: Pracsys 2025 adapted from Marsden Jacobs 2023

The following graph details the proportion owing to identified beneficiaries for each assessed Management Unit (Figure 7).

Figure 7. Benefit Distribution Analysis by Management Unit



Source: Pracsys 2025

2 INTRODUCTION

The following Cost Benefit Analysis (CBA) and Benefit Distribution Analysis (BDA) has been prepared to inform a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) undertaken by Shape Urban for the City of Mandurah's southern beaches.

The Western Australian coast supports a number of environmental, economic and cultural assets across a range of planning zones including urban, residential and recreational, with high demand for recreational activity spaces. Coastal hazards threaten coastal ecological quality, residential dwellings, recreational and wellbeing uses and the significant economic contribution of coastal activities. Climate change, global sea level rise and the growing frequency and intensity of storm events will increase the risk of inundation and erosion.

The Department of Planning, Lands and Heritage's (DPLH) State Planning Policy 2.6 – Coastal Planning (SPP2.6)[3] states that adequate coastal hazard risk management and adaptation should be undertaken for vulnerable coastal areas; those that are expected to be subject to coastal erosion and/or inundation in the next 100 years. CHRMAPs are developed by coastal local government authorities to understand the potential risks of coastal erosion, inundation and other hazards in the future. CHRMAPs set a strategy for mitigating or responding to these risks in a consistent and considered way.

2.1 Background

Pracsys has been engaged to complete the CBA and BDA component of the City of Mandurah's Southern Beaches CHRMAP. The CBA and BDA can be attributed to 'Stage 5 – Risk treatment' of developing a CHRMAP and have been completed sequentially.

This CBA and BDA have been conducted according to SPP2.6, CHRMAP Guidelines[4], and CoastWA's information sheet for BDAs[5]. The CBA supports the initial selection of risk treatment options for relevant beaches/management units and values benefits and costs for the BDA. The BDA provides guidance for the implementation of the risk treatment options by depicting who benefits from an adaptation investment, how much they benefit, when they benefit and for how long. The BDA aligns with the beneficiary pays principal (BPP) outlined in the WA Coastal Zone Strategy and the CHRMAP Guidelines.[6]

The CBA draws from Shape Urban's Multi-Criteria Assessment (MCA) of risk treatment options for all Southern Beaches management units. All risk treatment options were tested against their effectiveness to mitigate risk, upfront capital and ongoing cost, impact on the natural environment, impact on community and social outcomes, and impact on public and private assets. The MCA resulted in the recommendation of two risk treatment options per Southern Beaches management unit. The identification of and valuation method for

[3] Western Australian Planning Commission, 2013, *State Planning Policy 2.6 – State Coastal Planning Policy*, Government of Western Australia, Link
[4] Western Australian Planning Commission, 2019, *Coastal hazard risk management and adaptation planning guidelines*, Government of Western Australia , Link
[5] CoastWA, 2024, *Module 3: Benefit distribution analysis*, Department of Planning, Lands and Heritage, Link
[6] Western Australian Planning Commission, 2019, WA Coastal Zone Strategy, Government of Western Australia, Link

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benefits and costs are constant between risk treatment options for different Management Units. The costs and benefits vary based on number of assets directly affected and number of dwellings for which the relevant beaches form a dwelling's closest beach access.

The CBA and BDA will be living documents that are updated as treatments are implemented to support ongoing decision making based on the actual outcomes of coastal erosion and extreme weather events. This ensures that the City can proactively manage the Southern Beaches area, resulting in efficient and effective treatment of coastal erosion over time.

The following map details Management Units owing to the Southern Beaches relevant to the greater City of Mandurah coastline (Figure 8).

Figure 8. Map of City of Mandurah's Southern Beaches



Source: Shape Urban 2025

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3 MANAGEMENT UNITS AND RISK TREATMENT OPTIONS

A select number of Management Units and risk treatment options[7] were identified to be assessed as part of the CBA and BDA to progress decision-making input. All risk treatment options are designed to mitigate the vulnerability of the relevant Management Unit.

MU1 – Blue Bay

MU1 – Blue Bay lies between Robert Point and Janis Street with a vegetated and developed foreshore consisting of public open space, roads and paths, services and residential properties. These assets are currently at risk. The following risk treatment options have been assessed as part of the CBA and BDA (Figure 9).

Figure 9. MU1 – Blue Bay Risk Treatment Options

Options	Option 1	Option 2
Risk Treatment	Beach nourishment	Groynes + Beach nourishment
Code	PR1	PR2 + PR1
Description	Placement of sand on the upper beach face and dunes to re-establish the sandy beach and provide a sediment supply.	Beach nourishment as well as the construction of groynes to stop or restrict the movement of sand around the end of the structure, to provide protection to assets behind the beach / foreshore reserve.
Implementation Year	2025	

Source: Water Technology 2025, DPLH CHRMAP Guidelines 2019

MU5 – Rakoa

MU5 – Rakoa is approximately two kilometres of coastline between Getel Drive and Mercedes Avenue. The Management Unit's vegetated foreshore and beaches are currently at risk of erosion and inundation. The associated roads and paths, services and residential properties will be at risk by 2035. The following risk treatment options have been assessed as part of the CBA and BDA (Figure 10).

[7] See Appendix 1: Risk Treatment Options for a description of risk treatment options.

Figure 10. MU5 – Rakoa Risk Treatment Options

Options	Option 1	Option 2
Risk Treatment	Beach nourishment	Groynes + Beach nourishment
Code	PR1	PR2 + PR1
Description	Placement of sand on the upper beach face and dunes to re-establish the sandy beach and provide a sediment supply. This has periodically occurred in the past to help retain the beach.	Beach nourishment as well as the construction of groynes to stop or restrict the movement of sand around the end of the structure, to provide protection to assets behind the beach / foreshore reserve. Groynes may cause further need for sand nourishment in northern beaches if downdrift erosion occurs.
Implementation Year	2035	

Source: Water Technology 2025, DPLH CHRMAP Guidelines 2019

MU6 – Falcon Bay

MU6 – Falcon Bay is approximately 750 metres of coastline, and the most visited beach in the study area according to community surveys.[8] The foreshore contains a variety of public amenities including picnic tables, BBQs, a playground and toilet/shower facilities as well as a café. There is a current inundation risk for all assets and areas, and an existing erosion risk for the vegetated foreshore and remaining foreshore post-2035 with the assumed implementation of potential protection options in 2050. The following risk treatment options have been assessed as part of the CBA and BDA (Figure 11).

Figure 11. MU6 – Falcon Bay Risk Treatment Options

Options	Option 1	Option 2
Risk Treatment	Beach nourishment	Seawall
Code	PR1	PR3
Description	Placement of sand on the upper beach face and dunes to re-establish the sandy beach and provide a sediment supply.	Typically, the construction of wall along an entire section of developed foreshore. There is an existing 170-metre-long seawall.
Implementation Year	2050	

Source: Water Technology 2025, DPLH CHRMAP Guidelines 2019

[8] City of Mandurah, Draft Southern Beaches CHRMAP, 2025

MU7 – Gearies-Avalon

MU7 – Gearies-Avalon is around 2,300 metres of coastline, and the second most visited beach of Mandurah's Southern Beaches according to community feedback.[9] The Yeedong Road boat ramp and surf break contribute to the high level of visitation as well as Gearies-Avalon's natural landscape. The coast's vegetated foreshore and beach are currently at risk of erosion inundation while roads and paths, services and residential properties will be at risk by 2050 with the assumed implementation of potential protection options in 2035. The following risk treatment options have been assessed as part of the CBA and BDA (Figure 12).

Figure 12. Gearies-Avalon Risk Treatment Options

Options	Option 1	Option 2
Risk Treatment	Beach nourishment	Seawall
Code	PR1	PR3
Description	Placement of sand on the upper beach face and dunes to re-establish the sandy beach and provide a sediment supply.	Typically, the construction of wall along an entire section of developed foreshore. There is an existing 2,300-metre-long seawall.
Implementation Year	2035	

Source: Water Technology 2025, DPLH CHRMAP Guidelines 2019

Summary

The following Management Units and selected protection risk treatment options have been included in the CBA and BDA (Figure 13).

Figure 13. Management Unit and Risk Treatment Option Summary

Management Unit	Option 1	Option 2	Implementation
MU1 – Blue Bay	Beach Nourishment (PR1)	Nourishment (PR1) Groynes (PR2)	2025
MU5 – Rakoa	Beach Nourishment (PR1)	Nourishment (PR1) Groynes (PR2)	2035
MU6 – Falcon Bay	Beach Nourishment (PR1)	Seawall (PR3)	2050
MU7 – Gearies-Avalon	Beach Nourishment (PR1)	Seawall (PR3)	2035

Source: Water Technology 2025

[9] IBID.

4 METHODOLOGY OVERVIEW

The methodology utilised in this CBA and BDA align with SPP2.6, CHRMAP Guidelines[10], and CoastWA's information sheet for BDAs[11]. The CBA supports the initial selection of risk treatment options for relevant beaches/management units and values benefits and costs for the BDA. The BDA provides guidance for the implementation of the risk treatment options by depicting who benefits from an adaptation investment, how much they benefit, when they benefit and for how long. The BDA aligns with the beneficiary pays principal (BPP) outlined in the WA Coastal Zone Strategy and the CHRMAP Guidelines.[12]

4.1 Cost-Benefit Analysis Method and Key Assumptions

The CBA supports decision-makers by comparing options in current dollar terms using Present Value estimates. Present Value estimates assume that benefits, items or assets are worth more now than in the future. This represents the unseen risks and opportunity costs associated with assets over time.

Current values are discounted over time using WA Treasury SAMF Guidelines (2025) and the Office of Best Practice Regulations (2020) standard discount rate of 7%.[13] A sensitivity analysis has also been undertaken to consider scenarios where risk is higher (utilising a 10% discount rate), and risk is lower (utilising a 4% discount rate). The values of benefits and costs associated with risk treatment options that are not implemented until later timepoints may appear lower compared to those implemented earlier as a result.

Total economic value across all identified present value benefits is compared against costs from implementation to 2075 through two metrics; Net Present Value (NPV), and Benefit-Cost Ratio (BCR). These metrics summarise the 'value for money' or 'social-economical value' of an option or project.

Benefit Valuation

This CBA identifies and quantifies the likely economic and social impacts of undertaking each treatment option by MU. Impact pathways are central to the assessment of benefits. Impact pathways are a method of summarising the process by which value is created through a project (Figure 14).

Figure 14. Impact Pathways Approach



Source: Pracsys 2017 based on the SROI Network International's Guide to Social Return on Investment 2015

Once identified, impacts are monetised using the 'benefit transfer' method by calculating values using financial proxies from high-quality studies and reports, and applying them to the context in question. The

[10] Western Australian Planning Commission, 2019, *Coastal hazard risk management and adaptation planning guidelines*, Government of Western Australia, Link
[11] CoastWA, 2024, *Module 3: Benefit distribution analysis*, Department of Planning, Lands and Heritage, Link
[12] Western Australian Planning Commission, 2019, WA Coastal Zone Strategy, Government of Western Australia, Link
[13] CHRMAP Guidelines (2019) state that discount rates utilised in CHRMAP CBAs should be consistent with WA Treasury guidelines.

consistent quantification of metrics allows the direct comparison of project costs and benefits. This methodology was utilised to value the loss of land identified by both Water Technology and GIS PRO, and to value lost beach utility, government revenue and commercial revenue in the base case, compared to the treatment option.

This CBA also considers the replacement cost of community infrastructure owned by the City of Mandurah. The City of Mandurah Strategic Asset Management team provided data for relevant infrastructure including buildings, bathrooms and transport assets.

Base Case

The aggregation of the benefits associated with protecting the coast reflects the cost of the base case; a situation in which the response to coastal hazards is to retreat, acquire properties and replace/relocate amenities. Identified benefits of implementing risk treatment options include the value of:

- Residential and commercial land that would have to be acquired
- Public open space that would have to be replaced
- Infrastructure and amenities that would have to demolished, relocated or replaced
- Lost local rates revenue
- Lost local retail expenditure
- Lost stamp duty revenue
- Lost beach utility

Benefits that did not have identified costs by City of Mandurah were monetised using the 'benefit transfer' method.

4.2 Benefit Distribution Analysis Method and Key Assumptions

The BDA utilises the present value of market and non-market benefits identified in the CBA and allocates the benefit to the stakeholder who is the primary beneficiary. Identified beneficiaries include the following (Figure 15).

Figure 15. Risk Treatment Beneficiaries

Name	Description
Private land holders	Owners of residential properties affected by relevant coastal hazards
State Government	WA Department of Treasury and Finance
Local Government	City of Mandurah
Industry and businesses	All businesses by Management Unit
Local community	City of Mandurah residents for whom the affected Management Units are their closest accessible beach
Broader community	City of Mandurah residents for whom the affected Management Units are not their closest accessible beach

Source: Pracsys 2025 adapted from Marsden Jacobs 2023

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Beneficiaries are those who experience positive outcomes from the proposed project. This is often not the owner of an asset; the local council may maintain public open space at a foreshore, but it is the local community who use it and benefit from its retention. Assets may also have multiple beneficiaries; owners of private residential properties benefit from retention of the house and land value, and the associated local government benefits from rates from the retention of the land.

Benefits associated with City of Mandurah assets, such as buildings, ablutions and gates, have been distributed between the local community and broader community based on high level assumptions of usage frequency (Figure 16).

Figure 16. Beneficiary Split of the Retention of City of Mandurah Assets

Name	Local Community	Broader Community
Buildings	80%	20%
Open Space Assets	80%	20%
Transport Assets	80%	20%

Source: Pracsys 2025

The attribution of benefits are then utilised to determine the proportion of benefit owing to each identified stakeholder group to uphold that BPP. This can be utilised at a later stage to inform potential funding implementation.

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5 COSTS

The primary costs considered in a CHRMAP CBA and BDA are those associated with the construction and/or maintenance of risk treatment options. Water Technology have developed the cost estimates for all Management Units and risk treatment options.

5.1 Estimates

Water Technology cost estimation included:

- Scoping and designing the adaptation options to an initial conceptual level only
- Estimating quantities of materials required based on standard geometry and typical materials
- Pricing the implementation of risk treatment options based on unit rates
- Presenting a summary of the adaptation options capital and maintenance cost estimates

The length and width of the area that requires protection influences the extent of the risk treatment option required and the subsequent cost (Figure 17). See Appendix 2: Costing Methodology for further detail regarding the methodology for risk treatment option costing.

Figure 17. Details of Risk Treatment Options by Management Unit

MU	Options	Description	Total Initial Capital Cost ($)	Replacement Schedule	Annual Maintenance Cost ($)	Total Cost ($)
MU1 – Blue Bay	Beach Nourishment (PR1)	Treatment of whole foreshore (1,400m) 2025 implementation	$10.5 million	10 years	-	$52.5 million
	Beach Nourishment (PR1) Groynes (PR2)	Treatment of whole foreshore (1,400m) Seven rock groynes, 100m long, 200m apart 2025 implementation	$37 million	50 years	$740,000	$74 million

MU	Options	Description	Total Initial Capital Cost ($)	Replacement Schedule	Annual Maintenance Cost ($)	Total Cost ($)
MU5 – Rakoa	Beach Nourishment (PR1)	Treatment of whole foreshore (2,100m) 2035 implementation	$15.8 million	10 years	-	$63.2 million
	Beach Nourishment (PR1) Groynes (PR2)	Treatment of whole foreshore (2,100m) Ten rock groynes, 100m long, 200m apart 2035 implementation	$53.6 million	50 years	$1.1 million	$96.5 million
MU6 – Falcon Bay	Beach Nourishment (PR1)	Treatment of whole foreshore (750m) 2050 implementation	$5.6 million	10 years	-	$16.8 million
	Seawall (PR3)	Treatment of whole foreshore (750m) with rock revetment seawall 2050 implementation	$8.4 million	50 years	$168,000	$12.6 million
MU7 – Gearies-Avalon	Beach Nourishment (PR1)	Treatment of whole foreshore (2,300m) 2035 implementation	$17.3 million	10 years	-	$69.2 million
	Seawall (PR3)	Treatment of whole foreshore (2,300m) with rock revetment seawall 2035 implementation	$25.8 million	50 years	$516,000	$46.4 million

Source: Water Technology 2025

5.2 Total and Present Value Costs

The total cost of the risk treatment option (implementation to 2075) and the present value in current terms has been summarised by Management Unit (Figure 18).

Figure 18. Total and Present Value Costs of Risk Treatment Options by Management Unit

MU	Options	Total Cost ($)	Present Value ($)
MU1 – Blue Bay	Beach Nourishment (PR1)	$52,500,000	$19,961,716
	Beach Nourishment (PR1) & Groynes (PR2)	$74,000,000	$47,206,869
MU5 – Rakoa	Beach Nourishment (PR1)	$63,200,000	$14,762,888
	Beach Nourishment (PR1) & Groynes (PR2)	$96,480,000	$34,495,509
MU6 – Falcon Bay	Beach Nourishment (PR1)	$16,800,000	$1,768,714
	Seawall (PR3)	$12,600,000	$1,906,144
MU7 – Gearies-Avalon	Beach Nourishment (PR1)	$69,200,000	$16,164,428
	Seawall (PR3)	$46,440,000	$16,604,182

Source: Pracsys 2025

5.3 Discussion and Limitations

The costs estimates presented are concept-level and have been based on several high-level assumptions and estimates. It has been necessary to undertake option scoping and concept design on limited information as no design information is currently available.

Assumptions about price, extent of forecast vulnerabilities and the very long timeframe mean the results are suitable for the relative comparison of options, but preliminary and detailed design phases require further consideration of actual costs. No engineering design or drawings have been prepared to for this cost estimation. No contractor quotations have been sourced specifically for the purposes of this cost estimation.

The following assumptions are provided as potential consequences / risks in relation to the long-term budgetary planning:

- Resources required for coastal engineering will continue to be available as needed

- Coastal management technologies will not substantially change in the future
- Assumed base costs for works (informed by historical information) are representative of future markets

6 BENEFITS

The identified benefits apply to each risk treatment option in each Management Unit as all risk treatment options are designed to mitigate coastal erosion vulnerability. Benefits are estimated by comparing the relevant risk treatment option by Management Unit to the base case for that Management Unit. The base case for the study area is inclusive of managed retreat, acquisition of properties and replacement/relocation of amenities. This would involve the costs associated with acquiring or replacing or losing residential land, public open space, community infrastructure, commercial land, beach utility and more. A number of benefits are therefore based on reductions of costs compared to the base case (i.e. at-risk houses no longer needing to be acquired).

Typically, a disbenefit would be included for risk treatment options that include groynes as these are considered unattractive, impacting beach visitation and utilisation. However, a clear link and associated quantitative impact on visitation by the implementation of groynes could not be established. The heightened costs associated with groynes adequately reflects the potential impact on beach visitation relative to other options.

MU1 – Blue Bay has been used as an example for each benefit to interpret model outputs that are summarised for each Management Unit in tables below.

6.1 Assets

Five categories were utilised to estimate the value of replacing/relocating, demolishing and acquiring assets:

- Land (e.g. regional open space, residential)[14]
- Buildings (e.g. public toilet blocks)
- Open space (e.g. signs, fences)
- Transport (e.g. pavement)
- Stormwater and drainage (e.g. pipes)

These categories include more than thirty detailed asset types. Land assets are considered using area (m^2) provided by Shape Urban and GIS PRO, while individual buildings, open space, transport, and stormwater and drainage assets were identified and provided by the City of Mandurah. Examples of individual assets within the reported asset categories and their associated costs is detailed in Appendix 3: Asset Valuation.

Approximately $134 million of assets, largely accounted for by residential properties, will be impacted in MU1 – Blue Bay as a result of the impact of inundation and erosion between 2025 and 2075 (Figure 19). This is approximately $35 million in current terms at a 7% discount rate.

[14] While it may not be possible to replace a coastal regional open space, the value of the relevant land has been used as a proxy for the loss of utility provided through use of a coastal regional open space.

Figure 19. Total Value and Present Value of Assets by Management Unit

Asset Category	MU1 – Blue Bay	MU5 – Rakoa	MU6 – Falcon Bay	MU7 – Gearies/Avalon
Land	$130,566,207	$91,241,582	$26,632,598	$47,533,182
Buildings	$144,000	-	$174,150	$209,728
Open Space	$317,377	$339,627	$127,061	$456,555
Transport	$2,820,899	$1,509,694	$225,797	$1,559,143
Stormwater and Drainage	$185,233	$160,793	$79,547	$104,186
Total	**$134,033,716**	**$93,251,696**	**$27,239,153**	**$49,862,793**
Present Value	**$34,758,586**	**$15,769,180**	**$2,408,768**	**$6,377,729**

Source: Pracsys 2025, GIS PRO 2025, City of Mandurah 2025

6.2 Other Benefits

Non-land value benefits have been developed to reflect benefits that accrue to various segments of the community including Local and State Government. These benefits represent social and economic costs in the base case.

Rates Revenue

The loss of residential land is expected to have adverse effects on council rates revenue. In MU1 – Blue Bay, the City of Mandurah is expected to lose approximately $93,786 in rates revenue from the loss of approximately 11 properties between 2025 and 2035.[15] Between 2025 and 2075, the present value of lost rates revenue to the City of Mandurah is $222,000 in current terms (Figure 20).

Figure 20. Total and Present Value of Rates Revenue by Management Unit

Benefit	MU1 – Blue Bay	MU5 – Rakoa	MU6 – Falcon Bay	MU7 – Gearies/Avalon
Total	$1,223,485	$1,492,442	$255,781	$673,556
Present Value	$222,238	$209,694	$21,934	$60,609

Source: Pracsys 2025

Retail Expenditure

The loss of residential land reduces the total extent of local expenditure on daily and weekly goods and services such as grocery shopping.[16] In MU1 – Blue Bay, dwellings on impacted land would have spent

[15] Calculated using Actual Total Rate Revenue over number of contributing properties from the City of Mandurah Annual Financial Report 2023 – 2024, Link.
[16] Based on the high-level assumption that the loss of a coastal dwelling is loss of total dwelling capacity that is not substitutable. For example, if N is total dwelling capacity in Mandurah, and 100 coastal dwellings are lost the new total dwellings possible in the City of Mandurah is N - 100

approximately $1.8 million at local businesses on retail between 2025 and 2075. [17] The present value of lost retail expenditure on local businesses in current terms is $442,000 in MU1 – Blue Bay (Figure 21).

Figure 21. Total and Present Value of Shop/Retail Expenditure by Management Unit

Benefit	MU1 – Blue Bay	MU5 – Rakoa	MU6 – Falcon Bay	MU7 – Gearies/Avalon
Total	$1,795,563	$2,033,611	$299,260	$798,028
Present Value	$441,593	$335,639	$25,663	$73,988

Source: Pracsys 2025

Stamp Duty

The loss of residential land removes the opportunity for affected properties to be sold, and the extent of stamp duty that could be collected by the State Government. In MU1 – Blue Bay, one of the 11 impacted properties between 2025 and 2035 could have sold each year and generated up to $29,000 in stamp duty revenue.[18] Over the assessment period, the present value of lost stamp duty revenue in current terms is approximately $707,000 for MU1 – Blue Bay (Figure 22).

Figure 22. Total and Present Value of Stamp Duty by Management Unit

Benefit	MU1 – Blue Bay	MU5 – Rakoa	MU6 – Falcon Bay	MU7 – Gearies/Avalon
Total	$3,805,194	$2,677,469	$764,775	$949,301
Present Value	$707,041	$376,501	$65,583	$85,421

Source: Pracsys 2025

Beach Utility

It is assumed the erosion of the beach at each assessed Management Unit will require local residents to travel to the next closest option; south of Port Bouvard Bridge or north of Mandurah Traffic Bridge.[19] The change in travel time in the base case was applied to an estimated hourly value of travel time.[20] This rate was conservatively applied to all dwellings within relevant Statistical Area Level 1s (SA1s) and a visitation distance decay function for coasts.[21]

Approximately 29 of the City of Mandurah's 196 SA1s were closest to MU1 – Blue Bay, accounting for 6,582 dwellings. On average, these residents would have to travel up an additional three kilometres each time they visited the next closest beach in the base case. The annual cost of additional travel time would be

[17] Calculated by aggregating weekly household retail expenditure categories from ABS Household Expenditure Survey (Link) against income quintiles for dwellings in the City of Mandurah by SA1.
[18] Based on the estimate that 6% of housing stock changes ownership each year from Bloxham P, McGregor D, & Rankin E, 2010, *Housing Turnover and First-home Buyers,* Reserve Bank of Australia, Link.
[19] Assumes MU1 to MU7 are considered one unit when assessing the implementation of risk treatment options; either risk treatment options are implemented at all Management Units or at none.
[20] Calculated using the Australian Transport Assessment and Planning (ATAP) method (Link): 40% of ABS average weekly ordinary time earnings by weekly working hours.
[21] The coast visitation is based on an average of 3.4 visits per month (Link) and the distance decay for coast visitation outlined in Elliot et al., 2020, *Research Note: Residential distance and recreational visits to coastal and inland blue spaces in eighteen countries*, Landscape and Urban Planning, 198, Link.

approximately $450,000 for dwellings belonging to MU1 – Blue Bay or a total of $23 million across the assessment period, and $7 million in current terms (Figure 23).

Figure 23. Annual, Total and Present Value of Beach Utility for the Local Community

Benefit	MU1 – Blue Bay	MU5 – Rakoa	MU6 – Falcon Bay	MU7 – Gearies/Avalon
Total	$22,925,696	$18,618,431	$2,668,881	$6,345,122
Present Value	$6,649,830	$3,305,346	$248,518	$1,126,455

Source: Pracsys 2025

The erosion and inundation of the study area will also impact the broader community. The distance decay function for the City of Mandurah indicated that people who live between 25 and 50 kilometres away visit the beach approximately 15 times in a year. This visitation was conservatively applied to the total number of dwellings in the broader community and the utility value of the beach.[22]

The impact of erosion on visitation to each Management Unit was assumed to be equal to each Management Unit's proportion of the total coastline. MU1 – Blue Bay accounts for around 3% of the total coastline and contributes approximately $544,000 annually, $27 million between 2025 and 2075, and $8 million in current terms, to the broader community's beach utility (Figure 24).

Figure 24. Annual, Total and Present Value of Beach Utility for the Broader Community

Benefit	MU1 – Blue Bay	MU5 – Rakoa	MU6 – Falcon Bay	MU7 – Gearies/Avalon
Total	$27,757,427	$33,290,643	$6,250,364	$37,651,962
Present Value	$8,051,323	$5,910,116	$582,013	$6,684,384

Source: Pracsys 2025

[22] The recreational value for residents of beaches has been escalated and used as a proxy for beach utility from Zhang et al., 2014, *The recreational value of gold coast beaches, Australia: An application of the travel cost method*, Ecosystem Services, 11, Link.

7 COST BENEFIT ANALYSIS

The following analysis compares the present value of costs and benefits to determine the Net Present Value (NPV) and Benefit Cost Ratio (BCR) of each assessed risk treatment option. A positive NPV indicates that a risk treatment option's benefits are greater than its costs in present value terms. A BCR of 1 indicates that for every dollar spent on a risk treatment option there is approximately $1 in benefits generated for the identified beneficiaries.

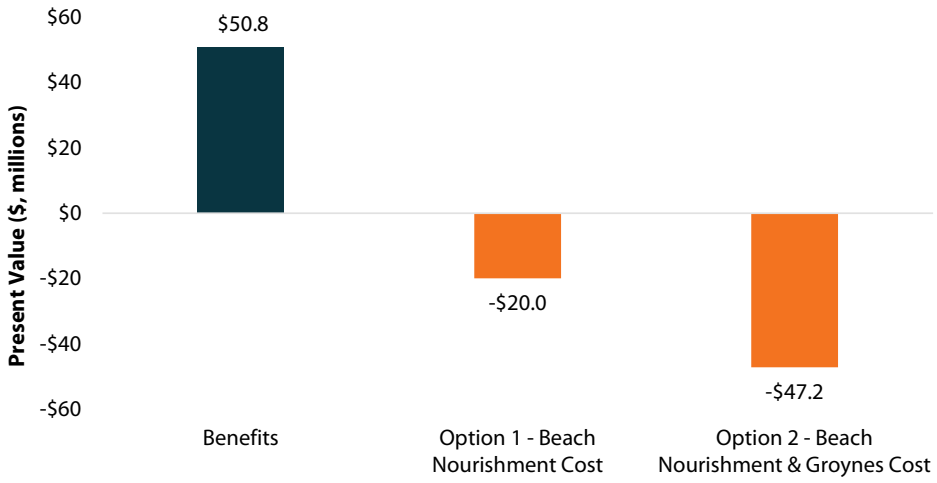
The analysis has converted values over time to current terms using WA Treasury SAMF Guidelines (2025) and the Office of Best Practice Regulations (2020) standard discount rate of 7%. A sensitivity analysis has also been undertaken to consider scenarios where risk is higher (utilising a 10% discount rate), and risk is lower (utilising a 4% discount rate).

CHRMAP principles indicate that planning for future coastal hazards should be undertaken early and with robust analysis and research. This can penalise options that only realise benefits in the distant future but require implementation in the shorter term to be effective. The evaluation of long-term social benefits justifies use of a lower discount rate to fairly consider expected benefits.

MU1 – Blue Bay

The implementation of Option 1 – Beach Nourishment at MU1 – Blue Bay generates a positive NPV of $31 million and a BCR of 2.5 (Figure 25). Option 2 – Beach Nourishment and Groynes has a larger cost and a subsequent NPV of approximately $4 million and BCR of 1.1.

Figure 25. MU1 – Blue Bay Present Value Costs and Benefits



Source: Pracsys 2025

Option 1 – Beach Nourishment has a high NPV and BCR despite the application of a 10% discount rate (Figure 26). At a higher discount rate of 10%, Option 2 – Beach Nourishment and Groynes has a negative return of $0.8 for every dollar spent.

Figure 26. MU1 – Blue Bay Sensitivity Analysis

	Option 1 – Beach Nourishment		Option 2 – Beach Nourishment & Groynes	
Discount Rate	Net Present Value	Benefit Cost Ratio	Net Present Value	Benefit Cost Ratio
4%	$53,268,114	3.0	$27,513,821	1.5
7%	$30,868,896	2.5	$3,623,742	1.1
10%	$19,789,078	2.2	-$8,191,874	0.8

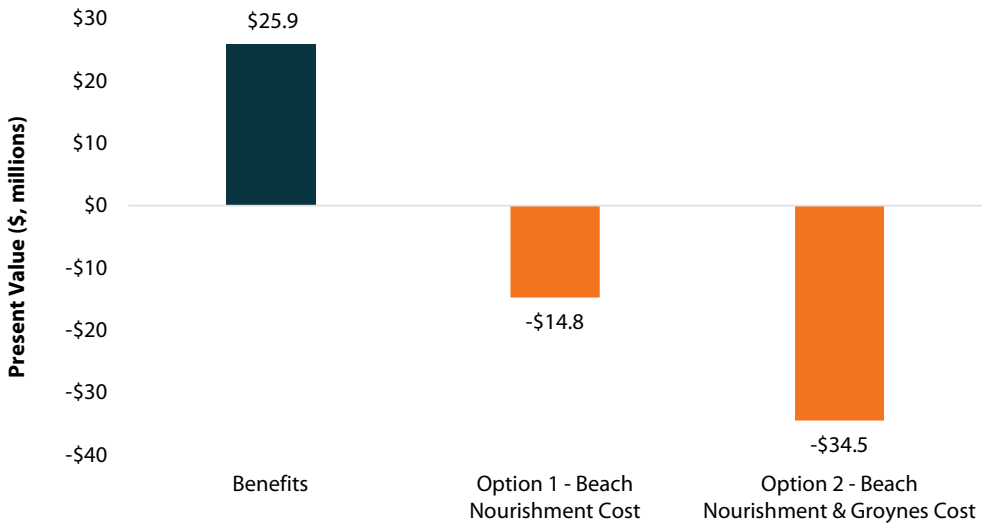
Source: Pracsys 2025

At a 7% discount rate, the implementation of Option 1 – Beach Nourishment currently provides the greatest value for money outcome for the City.

MU5 – Rakoa

The implementation of Option 1 – Beach Nourishment at MU5 – Rakoa generates a positive NPV of $11 million and a BCR of 1.8 (Figure 27). Option 2 – Beach Nourishment and Groynes has a larger cost and a subsequent NPV of approximately -$9 million and BCR of 0.8.

Figure 27. MU5 – Rakoa Present Value Costs and Benefits



Source: Pracsys 2025

Option 1 – Beach Nourishment has a positive NPV and BCR at a higher discount rate (Figure 28). At a lower discount rate of 4%, Option 2 – Beach Nourishment and Groynes has a neutral return of $1 for every dollar spent.

Figure 28. MU5 – Rakoa Sensitivity Analysis

	Option 1 – Beach Nourishment		Option 2 – Beach Nourishment & Groynes	
Discount Rate	Net Present Value	Benefit Cost Ratio	Net Present Value	Benefit Cost Ratio
4%	$25,324,043	2.0	$239,798	1.0
7%	$11,143,587	1.8	-$8,589,034	0.8
10%	$5,197,191	1.6	-$10,135,077	0.6

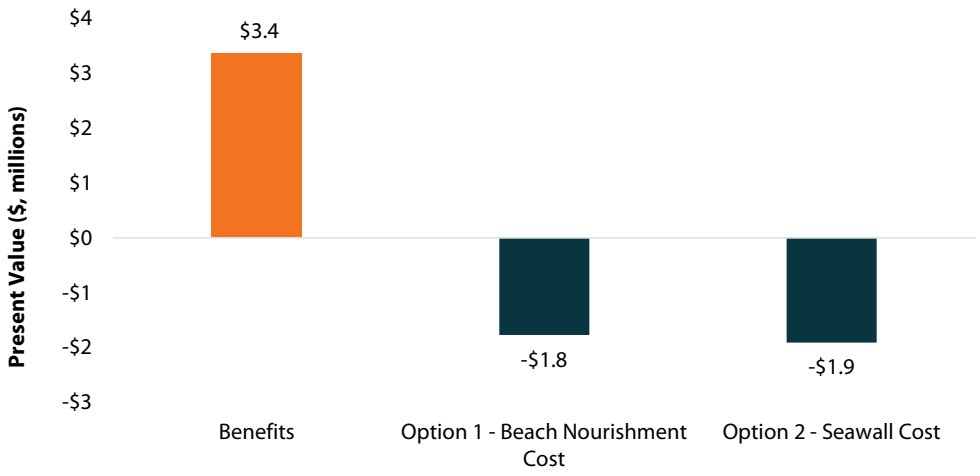
Source: Pracsys 2025

At a 7% discount rate, the implementation of Option 1 – Beach Nourishment currently provides the greatest value for money outcome for the City.

MU6 – Falcon Bay

The implementation of Option 1 – Beach Nourishment at MU6 – Falcon Bay generates a positive NPV of $1.6 million and a BCR of 1.9 (Figure 29). Option 2 – Seawall has an NPV of approximately $1.4 million and BCR of 1.8.

Figure 29. MU6 – Falcon Bay Present Value Costs and Benefits



Source: Pracsys 2025

Both Option 1 – Beach Nourishment and Option 2 – Seawall have similar, positive NPVs and BCRs across all discount rates (Figure 30). Option 2 – Seawall provides a greater value for money at a 4% discount rate however, this is likely a result of the timeframe of the assessment.[23]

[23]A seawall appears to provide a greater return than beach nourishment as the assessment period only considers one round of replacement for a seawall. Future CBAs may require the consideration of a timeline that includes two iterations of a seawall to accurately reflect their greater cost in the long term.

Figure 30. MU6 – Falcon Bay Sensitivity Analysis

	Option 1 – Beach Nourishment		Option 2 – Seawall	
Discount Rate	Net Present Value	Benefit Cost Ratio	Net Present Value	Benefit Cost Ratio
4%	$4,631,704	2.1	$4,882,441	2.2
7%	$1,583,765	1.9	$1,446,336	1.8
10%	$563,306	1.7	$415,201	1.5

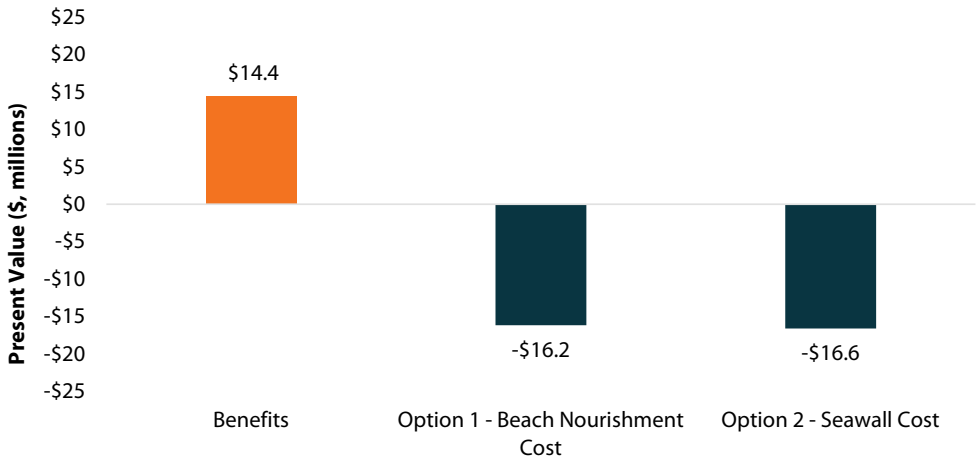
Source: Pracsys 2025

At a 7% discount rate, both Option 1 – Beach Nourishment and Option 2 – Seawall provide a similar value for money outcome for the City.

MU7 – Gearies-Avalon

The implementation of Option 1 – Beach Nourishment at MU7 – Gearies-Avalon generates a NPV of -$1.8 million and a BCR of 0.9 (Figure 31). Option 2 – Seawall has an NPV of approximately -2.2 million and BCR of 0.9.

Figure 31. MU7 – Gearies-Avalon Present Value Costs and Benefits



Source: Pracsys 2025

The NPV and BCR for Option 1 – Beach Nourishment and Option 2 – Seawall are positive in a lower risk scenario under a discount rate of 4% (Figure 32).

Figure 32. MU7 – Gearies-Avalon Sensitivity Analysis

	Option 1 – Beach Nourishment		Option 2 – Seawall	
Discount Rate	Net Present Value	Benefit Cost Ratio	Net Present Value	Benefit Cost Ratio
4%	$1,963,438	1.1	$5,500,968	1.2
7%	-$1,755,842	0.9	-$2,195,595	0.9
10%	-$2,497,988	0.8	-$4,135,529	0.7

Source: Pracsys 2025

At a 7% discount rate, neither implementation of Option 1 – Beach Nourishment or Option 2 – Seawall provide a positive value for money outcome for the City.

8 BENEFIT DISTRIBUTION ANALYSIS

The distribution of economic and social benefits has been applied to the primary beneficiaries of the proposed risk treatment options, and, where appropriate, distributed between multiple beneficiaries. Benefit categories are discussed in Section 6, Benefits, and expanded on in Appendix 3: Asset Valuation. This BDA intends to support decision-making regarding potential funding methods/contributions; it is not recommending that costs be applied directly based on identified proportions.

A large proportion of the benefits for MU1 – Blue Bay can be attributed to private land holders who are expected to be impacted by erosion and inundation by 2075 (Figure 33). Close to half (42%) of the benefit of implementing risk treatment options can be attributed to private land holders.

Figure 33. MU1 – Blue Bay Benefit Distribution

Benefits	Private Land Holders	State Government	Local Government	Industry & Businesses	Local Community	Broader Community
Land	$21,556,427				$7,801,280	$3,619,930
Buildings					$115,200	$28,800
Open Space Assets					$182,579	$45,645
Transport Assets					$1,030,526	$257,631
Stormwater & Drainage Assets					$120,567	
Council Rates			$222,238			
Retail Expenditure				$441,593		
Beach Utility					$6,649,757	$8,051,234
Stamp Duty		$707,041				
Total	**$21,556,427**	**$707,041**	**$222,238**	**$441,593**	**$15,899,910**	**$12,003,240**
Proportion Owing	**42.4%**	**1.4%**	**0.4%**	**0.9%**	**31.3%**	**23.6%**

Source: Pracsys 2025

The local community is a major beneficiary of risk treatment at MU5 – Rakoa (Figure 34). The local community can be considered households who would not have to give up their property by 2075 but who access MU5 as their closest beach, and use the associated infrastructure and amenities. Approximately 41% of the benefit of implementing risk treatment options can be attributed to the local community.

Figure 34. MU5 – Rakoa Benefit Distribution

Benefits	Private Land Holders	State Government	Local Government	Industry & Businesses	Local Community	Broader Community
Land	$8,454,405				$6,791,443	
Buildings						
Open Space Assets					$68,149	$17,037
Transport Assets					$317,834	$79,459
Stormwater & Drainage Assets					$40,852	
Council Rates			$222,238			
Retail Expenditure				$441,593		
Beach Utility					$6,649,757	$8,051,234
Stamp Duty		$707,041				
Total	**$8,454,405**	**$376,501**	**$209,694**	**$335,639**	**$10,523,624**	**$6,006,612**
Proportion Owing	**32.6%**	**1.5%**	**0.8%**	**1.3%**	**40.6%**	**23.2%**

Source: Pracsys 2025

The local community is a major beneficiary of the implementation of risk treatment options at MU6 – Falcon Bay (Figure 35). The relatively smaller size, and reduced extent of vulnerability of MU6 – Falcon Bay results in smaller proportion of the benefit owing to the broader community and private land holders.

Figure 35. MU6 – Falcon Bay Benefit Distribution

Benefits	Private Land Holders	State Government	Local Government	Industry & Businesses	Local Community	Broader Community
Land	$1,002,062			$161,711	$1,138,943	$21,179
Buildings					$25,641	$6,410
Open Space Assets					$18,708	$4,677
Transport Assets					$17,698	$4,424
Stormwater & Drainage Assets					$7,314	
Council Rates			$21,934			
Retail Expenditure				$25,663		
Beach Utility					$248,518	$582,013
Stamp Duty		$65,583				
Total	**$1,002,062**	**$65,583**	**$21,934**	**$187,374**	**$1,456,821**	**$618,704**
Proportion Owing	**29.9%**	**2.0%**	**0.7%**	**5.6%**	**43.5%**	**18.5%**

Source: Pracsys 2025

The broader community is the largest beneficiaries of the implementation of risk treatment options at MU7 – Gearies-Avalon (Figure 36). The broader community includes households in the City of Mandurah that are not directly impacted by coastal hazards, and do not live between Mandurah Traffic Bridge and Port Bouvard Bridge. MU7 provides relatively limited benefits to other stakeholders because it is protected from erosion and inundation to a greater extent than other Management Units. Almost half (47%) of benefits can be attributed to the broader community.

Figure 36. MU7 – Gearies-Avalon Benefit Distribution

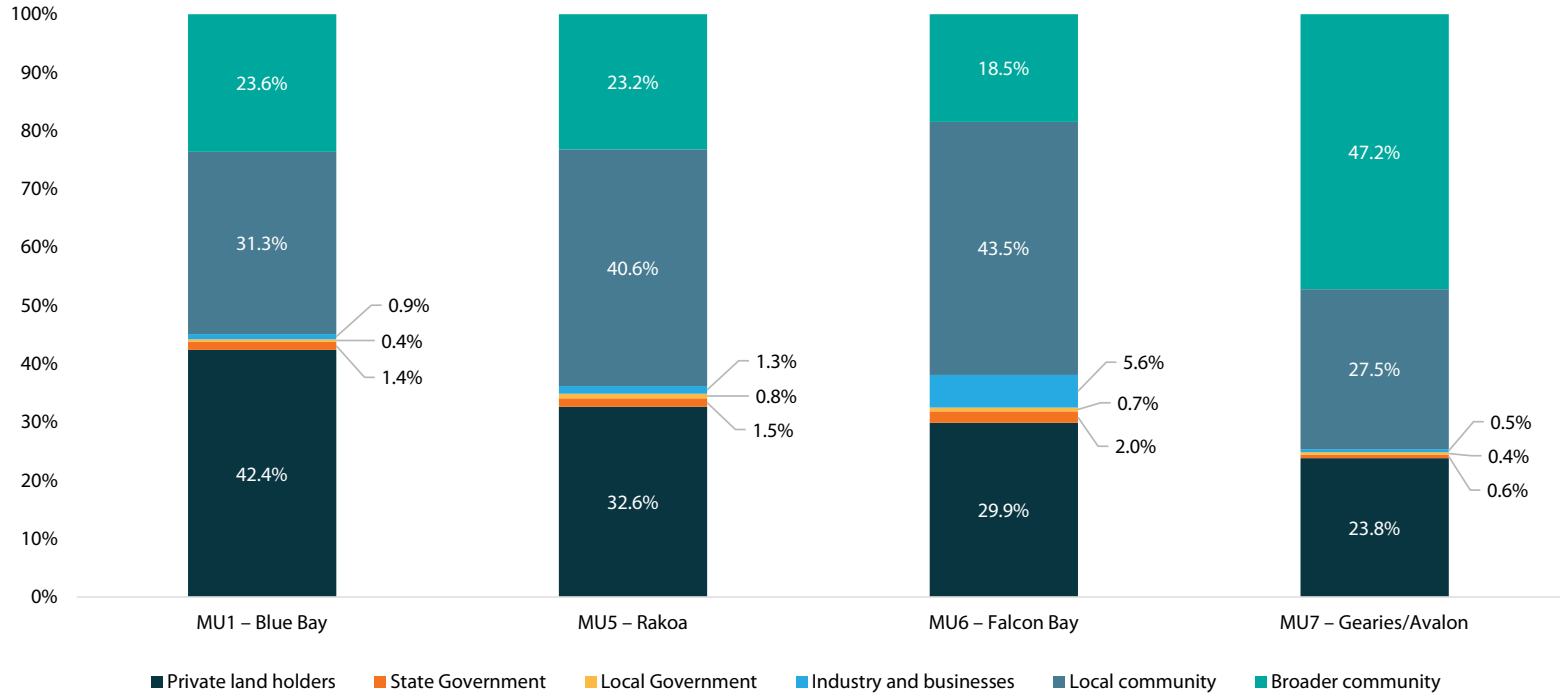
Benefits	Private Land Holders	State Government	Local Government	Industry & Businesses	Local Community	Broader Community
Land	$3,431,954				$2,375,582	
Buildings					$16,374	$4,093
Open Space Assets					$86,454	$21,614
Transport Assets					$341,190	$85,297
Stormwater & Drainage Assets					$15,171	
Council Rates			$60,609			
Retail Expenditure				$73,988		
Beach Utility					$1,126,455	$6,684,384
Stamp Duty		$85,421				
Total	**$3,431,954**	**$85,421**	**$60,609**	**$73,988**	**$3,961,226**	**$6,795,389**
Proportion Owing	**23.8%**	**0.6%**	**0.4%**	**0.5%**	**27.5%**	**47.2%**

Source: Pracsys 2025

8.1 Summary

The following graph details the proportion owing to identified beneficiaries for each assessed Management Unit (Figure 37).

Figure 37. Benefit Distribution Analysis by Management Unit



Source: Pracsys 2025

9 CONCLUSION

The Cost Benefit Analysis (CBA) and Benefit Distribution Analysis (BDA) have been prepared to inform a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) undertaken by Shape Urban for the City of Mandurah's southern beaches.

This CBA and BDA have been conducted according to SPP2.6, CHRMAP Guidelines, and CoastWA's information sheet for BDAs. The CBA supports the initial selection of risk treatment options for relevant beaches/management units and values benefits and costs for the BDA. The BDA provides guidance for the implementation of the risk treatment options by depicting who benefits from an adaptation investment, how much they benefit, when they benefit and for how long. The BDA aligns with the beneficiary pays principal (BPP). Beneficiaries identified in the BDA include private land holders, the State Government, the Local Government, industry and businesses, local community, and broader community.

CBA and BDA results for each Management unit have been summarised:

MU1 – Blue Bay: Option 1 – Beach Nourishment is the recommended treatment option as it generates a significant, positive net outcome across all discount rates in the sensitivity analysis. The top five beneficiaries in descending order include private land holders (42%), the local community (31%), the broader community (24%), and businesses (1%).

MU5 – Rakoa: Option 1 – Beach Nourishment is the recommended treatment option as it generates a positive net outcome across all discount rates in the sensitivity analysis. The top five beneficiaries in descending order include the local community (41%), private land holders (33%), the broader community (23%), and the State Government (1%).

MU6 – Falcon Bay: Option 1 – Beach Nourishment and Option 2 – Seawall provide a similar positive net outcome across all discount rates in the sensitivity analysis. The top five beneficiaries in descending order include the local community (44%), private land holders (30%), the broader community (19%), businesses (6%).

MU7 – Gearies-Avalon: Planned/managed retreat and voluntary acquisition is recommended as Option 1 – Beach Nourishment and Option 2 – Seawall do not generate a positive net outcome at a 7% discount rate. The top five beneficiaries of protecting MU7 – Gearies-Avalon in descending order include the broader community (47%), the local community (28%), private land holders (24%), and the State Government (1%).

APPENDIX 1: RISK TREATMENT OPTIONS

The following table summarises the major risk treatment option by category, name, code and function. The glossary has been adapted from DPLH's CHRMAP Guidelines (2019) (Figure 38).

Figure 38. Risk Treatment Option Summary

Category	Name	Code	Function
Avoid	Locating assets in areas that will not be vulnerable to coastal hazards	AV	Assets are strategically located outside of 100-year risk zone
Planned and Managed Retreat	Leaving assets unprotected	PMR1	Accept loss following hazard event. Only implement repairs to maintain public safety
	Demolition / removal / relocation of assets from inside hazard area	PMR2	Leave small scale assets in place until they reach end of useful life or are affected by coastal hazards, then relocate or replace them to an area with no risk
	Prevention of further development/prohibit expansion of existing use rights	PMR3	Allow current use to continue operating until such time that they cannot due to coastal hazards
	Voluntary acquisition	PMR4	Purchase private assets to put affected areas into public ownership on a voluntary basis at asset value, allowing for coastal retreat and use of coast for management and public access
Accommodate	Design assets to withstand impacts	AC1	Proactively or retroactively adapt assets that are vulnerable to withstand coastal hazards
Protect	Beach nourishment or replenishment	PR1	Add sand to the beach to re-establish sediment supply, generally used for reserves and beaches that are high-use and valued by community
	Groynes	PR2	Groynes trap sand and slow erosion but are generally considered to be unappealing.
	Seawalls	PR3	Build a wall along the coast to protect the land next to the coast, sand nourishment is required to maintain the beach
	Artificial reef	PR4	Building an offshore reef to dissipate wave energy also has the potential to deliver environmental and ecological benefits
	Off-shore breakwater	PR5	Construction of an emergent offshore barrier that blocks wave energy by absorbing wave impact on their seaward side
No regrets	Monitoring	NR1	Long term monitoring of erosion to identify when triggers for other options are achieved
	Protection Structure Audit	NR2	Review of existing risk management options to see understand their effectiveness and identify triggers for renewal or options

Category	Name	Code	Function
	Notification on title	NR3	Makes current and future owners aware of risks, so they can make decisions.
	Emergency evacuation plan	NR4	Makes community and stakeholders aware of the process when a hazard event occurs.
Do Nothing	Do nothing	DN1	You do nothing and let erosion/hazards occur.

Source: Pracsys 2025, DPLH CHRMAP Guidelines 2019

APPENDIX 2: COSTING METHODOLOGY

Protection – Beach Nourishment (PR1)

The cost estimates for this option have been determined using the following steps:

- Calculation of a sand nourishment volume, based on the length of coast requiring protection and a recession volume estimate per lineal metre for each MU based off the available hazard analysis. The reference value used is 132 m^3/m with an assumed 10-year useful life.
- Estimation of a sand volume that could be delivered each day – considering location and access.
- Estimation of the number of mobile plant required to place the sand.
- Calculation of the initial nourishment cost.
- Inclusion of a factor of 25% for preliminaries, project management, design, mobilisation and demobilisation. A contingency of 30% has been included for uncertainties in budget estimating.
- Several key assumptions have been necessary to prepare the PR1 cost estimates, as follows:
- The adaptation option has been planned to provide similar levels of beach and foreshore amenity as the present day, as presented in the Southern Beaches CHRMAP.
- There is a suitable sand source in the sub-region that can supply adequate quality, particle size and volume of sand over the project timeframe.
- A unit cost of \$32/m^3 to supply and transport sand to each MU.
- An average day rate of \$1,500 per piece of mobile plant.
- No maintenance cost is anticipated as the works are to be repeated every 10 years.

Rock Structure Options – Groynes (PR2) and Seawall (PR3)

The cost estimates for this option have been determined using the following steps:

- Scoping of the structural option using information from the existing CHRMAP reports and design drawings of existing similar structures in combination with estimations for any unavailable information.
- Estimation of an appropriate structure geometry: crest level, toe depth, structure length, structure slope.
- Calculation of bulk material quantities: rock (tonnes), sand (m3), geofabric (m2).
- Estimation of costs based on recent / historical projects to calculate initial costs of material purchase and installation.
- Inclusion of a factor of 25% for preliminaries, project management, design, mobilisation and demobilisation. A contingency of 30% has been included for uncertainties in cost estimation of groynes and of 40% for seawalls (because these need to interface with any infrastructure crossing the shoreline).
- Inclusion of an annual maintenance cost of 2%.
- Several key assumptions have been necessary to prepare these cost estimates, as follows:

- Replacement of the rock structures is anticipated to be required after 50 years and could be assumed to be 100% of the capital cost.
- Rock armour sizes are available locally within the region and quarry production rates are suitable to supply adequate volume of required sizes.
- Unit rates for rock armour are $135/tonne, core of $90/tonne and Geofabric of $30/m2.
- Groynes are assumed to be two-sided revetments. Complex features have been approximated by modifying characteristics of cross-sections.
- High level assumptions regarding the structure shape and construction style.
- For the PR2 Groynes option the beach and foreshore amenity is expected to be broadly similar to current levels.
- The PR3 Seawall option will likely result in the loss of a usable sandy beach – no allowance for sand nourishment has been included.

APPENDIX 3: ASSET VALUATION

Land Assets

Land assets identified by GIS PRO were valued using $/m^2$ estimates from key industry sources. The majority of values are uniform across the relevant Management Units excluding residential land (Figure 39).

Figure 39. Land Asset Valuation by Management Unit

Asset	MU1	MU5	MU6	MU7
Regional Open Space	16 $/m^2			
Residential	2,208 $/m^2	1,370 $/m^2	1,514 $/m^2	1,669 $/m^2
Local Road	1,040 $/m^2			
Local Distributor Road	725 $/m^2			
Public Open Space	16 $/m^2			
Local Centre	8,500 $/m^2			

Source: Rawlinsons 2024, Colliers 2017, Realestate.com 2025

Regional open space, public open space, and roads lost were valued utilising Rawlinsons Australian Construction Handbook 2024.[24] Residential land was valued utilising a range of lots sold within the area affected by erosion in the last five years for each Management Unit and their size and sale price. The commercial land impacted was valued using floorspace productivity benchmarks for 'Dine Out Food'.[25]

Buildings

Buildings assets were identified and valued by the City of Mandurah. The following table contains a range of buildings and their individual costs by Management Unit (Figure 40).

Figure 40. Building Asset Valuation by Management Unit

Asset	MU1	MU5	MU6	MU7
Public Toilet	$144,000	-	$174,150	$209,728

Source: City of Mandurah 2025

Open Space Assets

Open space assets were identified and valued by the City of Mandurah. The following table contains a select range of open space assets and their average individual cost in a Management Unit, other include outdoor showers, surf breaks and more (Figure 41).

Figure 41. Select Average Open Space Asset Valuation by Management Unit

Asset	MU1	MU5	MU6	MU7
Sign	$377	$369	$1,137	$455

[24] Rawlinsons provides average value/unit estimates by State for a variety of components that comprise a building or asset.
[25] Escalated from Colliers 2017, Dine Out Food includes shops such as restaurants, cafés and food food.

Asset	MU1	MU5	MU6	MU7
Fencing	$3,035	$5,174	$1,548	$5,164
Staircase	$19,638	$47,271	$99,858	$25,411
Memorial	$900	$900	$900	$900
Water Tap	$335	-	-	-
Retaining Wall	$15,627	$16,302	$11,418	$6,784
Park	$2,494	$2,494	$2,824	$2,560
Shade Sail	-	$1,745	$1,660	-
Services	$2,575	-	-	-
Controller	$5,620	-	$5,620	$5,620
Bike Rack	$7,271	-	$3,124	$2,824
Pump	$9,300	-	-	-
Picnic Setting	$6,733	$2,494	$6,733	$6,733
Drinking Fountain	-	-	-	-
Bollards	$408	$1,802	-	$826
Viewing Platform	$7,058	-	-	$30,869
Gate	--	$400	$2,609	$1,186
Barbecue	-	$8,130	$11,165	$11,165

Source: City of Mandurah 2025

Transport Assets

Transport assets were identified and valued by the City of Mandurah. The following table outlines average individual cost in a Management Unit by asset sub-type (Figure 42).

Figure 42. Average Transport Asset Valuation by Management Unit

Asset	MU1	MU5	MU6	MU7
Pavement	$41,023	$46,774	$86,832	$47,786
Surface Seal	$12,750	$7,578	$18,860	$20,816
Lighting	$2,079	-	$2,957	$4,336
Pathways	$18,267	$24,624	$8,567	$16,930
Steps	$50,727	-	$19,931	$39,311

Source: City of Mandurah 2025

Stormwater and Drainage

Stormwater and drainage assets were identified and valued by the City of Mandurah. The following table outlines average individual cost in a Management Unit by asset sub-type (Figure 43).

Figure 43. Average Stormwater and Drainage Asset Valuation by Management Unit

Asset	MU1	MU5	MU6	MU7
Stormwater	$22,238	-	$37,936	-
Stormwater/Pit	$3,287	$3,132	$3,101	$3,436
Stormwater/Pipe	$1,776	$4,962	$2,273	$4,100

Source: City of Mandurah 2025

Subject: 19.2 Adoption of Revised Public Art Policy POL-RCS 06

Summary

This report presents a revised Public Art Policy (Policy) intended to establish a clear, contemporary framework for the commissioning, delivery and stewardship of public art across the City. The Policy has been developed through a rigorous review process and provides a solid foundation for consistent decision-making, improved outcomes, and greater community value. Its adoption will support high-quality public art that reflects local identity, enhances public places, and delivers lasting cultural and social benefit.

Disclosure of Interest

Nil

Confidentiality

Nil

Previous Relevant Documentation

G.24/12/14	16 December 2014	Endorsement of the original Public Art Policy POL-RCS 06
G.35/2/15	24 February 2015	Policy Review
G.21/10/17	10 October 2017	Policy Review
G.12/7/19	23 July 2019	Policy Review
G.13/08/23	22 August 2023	Endorsement of Arts and Culture Strategy 2023-2028

Background

The City values its public art collection as a conduit to tell local stories, foster a collective identity and attract visitors to Mandurah to enjoy a unique and interesting destination. Public art is a reflection of the health and prosperity of Mandurah's environment and community, encouraging civic pride and promoting safer, brighter public spaces.

This review of the Public Art Policy delivers on an action of the City's Arts and Culture Strategy 2023–2028, supporting Goal 3: Creative Places and Spaces through a strategic review of public art collections, associated policies, and future opportunities.

Council endorsed its first Public Art Policy in 2014. The Policy aimed to reduce the previously ad-hoc nature of art commissions, as well as offer guidelines, purpose, and comprehensive operational planning. The inaugural Policy introduced a basic process for commissioning and managing public art, provided some design guidance, and established a high-level framework for decommissioning.

Mandurah has grown into Western Australia's largest regional city. This growth has brought rising expectations for public art across both the built and natural environment. More developers, City teams, community groups and businesses are now commissioning public art, creating a need for greater rigour in the City's position, governance and management of public art and associated stakeholders.

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Comment

This policy review has resulted in significant changes, and the revised Public Art Policy is presented for Council's consideration as per Attachment 1. To inform the revised Policy, City officers undertook a thorough review of the City's public art management, the existing Policy as per Attachment 2, and the objectives for public art, including alignment with the City's strategic vision.

Key elements of the existing Public Art Policy (endorsed in 2014) have been updated to better reflect current strategies and plans at the local, state and national levels. The revised objectives align with the Arts and Culture Strategy 2023–2028 and the Strategic Community Plan 2024–2044.

The revised draft Public Art Policy is strengthened in the following main areas:

- Defines what constitutes 'public art' and a 'professional artist';
- Clarifies when the Policy applies;
- Sets out guiding principles and decision-making criteria for acquiring or commissioning public art;
- Outlines the City of Mandurah's role in different commissioning and delivery circumstances;
- Introduces an internal process to support decisions about commissioning, maintenance and decommissioning; and
- Outlines resourcing requirements for the delivery and ongoing maintenance of public art.

Over the next 12–24 months, further work will consider whether relevant statutory provisions should be included in the Local Planning Framework, including options to deliver public art through private development or via cash-in-lieu. This work would be supported by a Public Art Framework to guide commissioning for both internal and external commissioners. The Framework will identify sites, outline objectives, describe the local social, cultural, environmental and economic context, and set expectations for stakeholder and community engagement.

This Policy, together with subsequent developments in managing artwork in the public realm, will celebrate Mandurah's growing community, encourage visitation, complement the environment, and showcase Mandurah's beauty and status as a city worthy of investment.

Youth Advisory Group Comment

The YAG appreciates the opportunity to contribute to the review of the Public Art Policy. The YAG emphasises the City's responsibility to ensure public art spaces are accessible, suggests considering youth specific art grants or opportunities, and notes the importance of activating blank wall spaces and avoiding hostile infrastructure.

Consultation

Extensive research has informed this policy review. Other local government authorities were consulted to learn about their experiences in public art policy, and research was undertaken to explore contemporary best practice. Internal teams also contributed expertise across governance, planning, economic, environmental and community considerations. Lessons from working with artists and stakeholders involved in managing public art in Mandurah have been documented and have guided the direction of the Policy. Relevant state and federal policies, guidelines and protocols were also considered.

Statutory Environment

Nil

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Policy Implications

Adoption of a robust Public Art Policy and supporting plans will guide the City's investment in high-quality public art in Mandurah, provide clear direction to commissioners, and set a consistent strategic approach to commissioning, management and stewardship.

By embedding these principles, the City can strengthen collaboration with artists, local businesses, developers and Aboriginal communities, supporting a more inclusive and dynamic cultural landscape. This will enhance the vibrancy of public spaces and support local economic development and tourism, helping to ensure Mandurah's public art remains relevant, accessible and valued by residents and visitors into the future.

Financial Implications

The Policy will set standards for quality and sustainability in Mandurah's public art, including investment levels, material durability, fabrication requirements and whole-of-life maintenance costs. Ongoing evaluation will help ensure projects meet strategic objectives and deliver value for money. Clear processes for procurement and asset lifecycle management will also support financial accountability, whole-of-life considerations and appropriate stakeholder involvement.

Economic Implications

Public art positively influences investment and visitor dwell time in Mandurah—whether visitors come specifically to experience artworks or the works contribute more broadly to perceptions of pride, uniqueness and care in the City. By positioning public art as an integral component of urban development, the City enhances its appeal for new investment and tourism, supporting Mandurah's ongoing prosperity and vibrancy.

Environmental Implications

The natural environment is a popular theme for artists, and the City has several pieces that showcase natural environments, flora and fauna. Public art can affect the environment both visually and through impacts associated with installation, visitation (foot traffic) and eventual decommissioning. As artworks are located in the public realm, impacts on the community who live, work and visit nearby should be carefully considered. This Policy provides guidance to help ensure environmental impacts are understood, positive where possible, and appropriately managed.

Risk Implications

Without a revised policy, the City faces reputational risk through negative public perception, unclear roles and responsibilities, and complaints regarding investment in, and management of, public art. Financial risks include inappropriate investment levels, unclear responsibility for maintenance and quality, and unplanned costs arising from insufficient resourcing. Safety risks may result from inadequate guidance and processes, leading to poorly maintained artworks that could endanger the public, as well as insufficient cultural awareness and site identification when commissioning or decommissioning. Accessibility risks also arise if artworks and sites do not accommodate people with disability, limiting engagement and inclusivity. Collectively, these risks could undermine public trust, strain resources and compromise community outcomes, reinforcing the need for a current and comprehensive policy framework.

Strategic Implications

The following strategies from the City of Mandurah Strategic Community Plan 2024-2044 are relevant to this report:

<u>Economy</u>
- Well-planned, sustainable urban development

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- A thriving city that residents are proud to call home and people want to visit

Community
- An enriched, creative, and empowered community that values culture, heritage and life-long learning

Environment
- Our built environment is clean, accessible and sustainable

Leadership
- Well-maintained assets and facilities that meet the needs of our community

Conclusion

This Policy and subsequent developments in managing artwork in the public realm will celebrate Mandurah's growing community, encourage visitation, complement the environment, and showcase Mandurah's beauty and status as a city worthy of investment.

Officer Recommendation

That Council:

1. Endorses and adopts the revised Public Art Policy POL-RCS 06, as per Attachment 1.

Attachments

1. Public Art Policy POL-RCS 06 (proposed) [**19.2.1** - 6 pages]
2. Public Art Policy POL-RCS 06 (current) [**19.2.3** - 4 pages]

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Public Art Policy
POL-RCS 06

Objective

Public art plays an important role to express the unique identity, culture, and values of Mandurah, creating a sense of place, inspiration and belonging.

The Public Art Policy (Policy) provides a framework for supporting, encouraging, and investing in high quality, suitable public art across Mandurah. It aims to guide the City when making decisions regarding works of art in public and private spaces, including optimising the integration of artwork into the built and natural environment. The Policy also serves to assist the City when responding to enquiries from community and the private sector regarding public art proposals and selecting works of art for public spaces. The Policy provides guidance for decision making throughout the lifecycle of an artwork, from initial concept to the maintenance and decommissioning of artworks.

Applicability

This Policy applies to existing and future works of art in public and private spaces. These include City of Mandurah commissioned artworks, community arts projects, public and private sector public art within infrastructure development projects including both integrated and stand-alone.

This Policy pertains to artworks on/in City of Mandurah land, buildings or facilities such as, recreational spaces, streetscapes, pedestrian spaces, parks and reserves, foreshores, or proposed works of art in public space within Mandurah that impact on the public realm.
It is also applicable to artwork commissioned on private land or within developments that will later be managed by the City, and the artwork accessioned into the City's collection.

Requirements/Statement

Policy Statement

The City is committed to ensuring that the management and delivery of public art supports innovation, creative ideas and a thriving cultural industry. The City prides itself in responding to the community's cultural needs through transparent consultation, facilitation and engagement.

The City is committed to access and inclusion and promoting resilience, connection and empowerment while accessing arts and culture in the public realm. It understands that community health and wellbeing is supported through sharing a nurtured environment that communicates collective values and stories that celebrate identity.

The City commends the installation and management of public art that enhances Mandurah's built and natural environment, whether the artwork is commissioned by the City, managed by a private entity and/or installed on public or private property. Art installed in the public realm affects the whole community, its safety and the functionality of adjacent facilities and services.

Definitions

Public Art
Public art is defined as artworks in public space or on private land that are visible to the public, created by a professional artist or artistic team.

For the purposes of this Policy, public art may be considered as permanent and/or temporary/ephemeral:

- **Permanent Public Art -** is designed and built to last over a term of 10 years or more. The anticipated lifespan of a permanent artwork is identified in the development stages of the work.

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The materials will respond to the expected longevity of the artworks and site conditions. The artwork may be integrated into a development or building, or it may stand-alone. The work must be designed and delivered by a professional artist or artists' team.

• **Temporary/Ephemeral Public Art -** is specifically designed and built to last over a short term and has a limited life that may last for hours, days, weeks, months or up to 10 years. A temporary/ephemeral artwork may sometimes be further developed into a permanent commission. It may also go on to become part of the City's collection if deemed sustainable. The work must be designed and delivered by a professional artist or artists' team.

For the purposes of this Policy, the artwork may take on a variety of forms including, but not limited to;

- paintings and murals covering outdoor walls, floors, footpaths or other elements in the build environment;
- installations and sculptures that are freestanding or are integrated design;
- lighting, digital media and soundscapes;
- landscaping enhancements designed by a professional artist that are both aesthetic and functional, such as seating, walkways, shade or pathways.

For the purposes of this Policy, Public Art does not include:

- busking, art markets, pop-up galleries;
- community arts programs;
- commercial promotions in any form including business logos or brands, or artworks commissioned in alignment with branding style guides;
- directional/way-finding elements such as super-graphics, signage or colour coding;
- artworks that are mass-produced or reproduced;
- landscaping features such as poles, fences, walls or architectural elements not produced or commissioned by a professional artist;
- memorial plaques, roadside memorials, temporary memorials or memorial landscaping features. These are managed under the Memorials Policy POL-CMR 12;
- Spontaneous or temporary artworks, such as unauthorised graffiti or street art, not sanctioned by the community or City;
- most art reproductions;
- services or utilities necessary to operate or maintain artworks.

Artist

'Professional Artist' is a self- referencing term that meets two or more of the following criteria:

- has a minimum tertiary qualification equivalent to three years full time study in visual arts, or when the brief calls for it, other art forms such as multi-media, or equivalent experience;
- has an established exhibition history through reputable art galleries that exhibit and sell the work of professional artists;
- has had work purchased by major public and private collections;
- has had worked commissioned by mid-large organisations;
- earns more than 50 percent of their income from arts related activities, such as teaching art or design, selling artwork or undertaking public art commissions; and
- can produce a referenced folio of works that is of high quality and relevant to the commission.

In certain circumstances, at the discretion of the Chief Executive Officer, this definition may be relaxed and discretion may be applied to these criteria for specific projects.

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Guiding Principles

The following principles will guide works of art in public spaces in the City of Mandurah and/or on private sites viewable from public realm:

- the site's First Nations heritage and its cultural significance to First Nations people are considered from the initial planning phase through to project completion;
- the implementation process of all public artworks is transparent, equitable and accessible to the public;

The artwork;

- is designed and created by a Professional Artist/artists' team;
- reflects the unique character and diverse identity of the local community;
- is place-sensitive to the surrounding built and natural environment;
- is inclusive and accessible to all members of the community;
- contributes to cultural tourism and creative economy;
- meets durability, safety and maintenance obligations.

The City of Mandurah's Role in Public Art Management

Various teams within the City play a role in acquiring and overseeing public art to ensure excellence in concept, design, fabrication, safety, relevance, maintenance, and decommissioning when necessary. This comprehensive approach across all departments reinforces the City of Mandurah's commitment to best practices in managing public art throughout the community.

Resourcing

The City is committed to resourcing the delivery and maintenance of public art through an annual budget allocation determined during the annual budgeting process and the Longterm Financial Plan.

Contributions towards delivering public art may be from the following sources:

• **City of Mandurah Funding**

The City manages a Public Art Reserve fund which provides for the resourcing of City-led public art commissions.
The City manages an annual commissioning and maintenance fund to ensure artwork is kept in good condition.

• **Capital Works**

The City will identify appropriate capital projects that will have a public art element and budget accordingly, in proportion to the size and scope of the project.

• **Contributions by Developers or Third Parties**

The City will provide guidance and may collaborate with private developers and third parties to facilitate the provision of public art, or a financial contribution in lieu. This can include developers who consider and provide these contributions as part of the development approval process.

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Governance

City officers will be responsible for establishing procedures and implementation of this Policy.
In some circumstances, the City may also seek independent advice from a suitably qualified professional(s) or expert(s) in the field to assist decision-making, particularly for privately initiated public art projects.

Acquisition and Commissioning of Public Art

Works of art may be acquired by commission, donation, bequest, purchase, gift, or transfer. The acquisition process for public art projects will be in alignment with the City's procurement process and policy.

Commissioning methodologies shall be guided by City officers, industry best practice and project suitability and managed by the CEO or delegate.

Public art acquisitions and commissions will be assessed against the following criteria:

- consistency with the Guiding Principles and intentions set out in the Policy;
- consistency with current City of Mandurah strategies, plans and procedures;
- alignment with the objectives set out in the City's Arts and Culture Strategy;
- alignment with a specific theme or objectives for the particular commissioning;
- compliance with Local Laws, Work Health and Safety and public access requirements;
- demonstrated originality of the artwork and high standard of artistic excellence;
- designed to be place-sensitive to the surrounding environment;
- estimated economic impact of the proposed artwork;
- fit-for-purpose, safely installed and reasonable maintenance requirements for the duration of its lifespan within adequate budget and resources;
- community consultation carried out where appropriate; and
- adequate budget and resources for artwork delivery.

Proposals for public art from property developers, private enterprise, individuals, community groups, associations, businesses and/or other third parties must be submitted to the City for assessment and approval prior to commencement, if the proposed artwork is on land or premises under the care and control of the City.

Maintenance

The City is responsible for the maintenance of all City commissioned and/or acquired works of art. Maintenance and repair are to be funded through the City's annual budget allocation. The artworks will be recorded in the City's Asset Register and managed in accordance with relevant asset management plans, policies and procedures.

At the time of procurement and commissioning, the artist must specify the intended longevity, consider minimising maintenance requirements through robust design, the selection of materials and finishes suitable for the site's environmental conditions. The artist will be required to estimate the projected annual maintenance activities and estimate costs.

At the completion of the commission, the artist is to provide the City with a maintenance manual and cost estimate to assist in conserving and maintaining the public art.

Where public art is located on privately owned land and facilities, the landowner is responsible for cleaning, maintenance, repairs and removal of the artwork.

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Decommissioning

Works of art may be decommissioned for a variety of reasons. The following criteria may be considered when decommissioning, relocating or disposing an artwork.

The artwork is:

- no longer relevant or valued by the community;
- irreparably damaged, high conservation or requires an excessive amount of maintenance to a point where restoration is not practical;
- unsafe or is affected by changes in health and safety regulations;
- compromised of its original form or materials;
- at the end of its intended lifespan;
- stolen or otherwise missing beyond hope of recovery;
- no longer functional or aesthetically appealing;
- on a site or location that is being re-developed, re-purposed or no longer suitable;
- is proven to be obstructive, offensive or no longer reflects the values of the City.

In the absence of an Artist Agreement, the City retains the authority to decommission artwork due to safety concerns or the compromise of its original form or materials.

As per *Copyright Act 1968 (Cth)*, the City will provide the artist with three weeks' notice in writing before decommissioning a work to allow them time to document their work.

Intellectual Property

The City acknowledges the importance of *Copyright Act 1968* that protects the rights of attribution and integrity belonging to authors of artistic works, and the moral rights of individual artists in accordance with the *Copyright Amendment (Moral Rights) Act 2000* requirements.

Legislative Context

Local Government Act 1995
Copyright Act (Commonwealth) 1968
Copyright Amendment (Moral Rights) Act 2000

Review

At a minimum this Council Policy will be reviewed every two years.

Related Documents

These documents are mandatory and required to give effect to this policy:

Organisational:
The City of Mandurah Strategic Community Plan 2020 – 2040
The City of Mandurah Arts and Culture Strategy 2023 – 2028
The City of Mandurah Access and Inclusion Plan 2021-2026
The City of Mandurah Subdivision Development Guidelines
Aboriginal Connection to Country (Land) Policy POL-CMR 08
Vandalism Management Policy POL-CNP 02

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Supporting Documents

The City of Mandurah Place Enrichment Strategy 2023 – 2027
The City of Mandurah Youth Strategy 2021 – 2026
The City of Mandurah Reconciliation Action Plan 2019 – 2022
The City of Mandurah Access and Inclusion Plan 2021-2026
Memorials Policy POL-CMR 12
Community Initiated Infrastructure Policy POL-CNP 08
The National Association for the Visual Arts – Code of Practice
Protocols for using First Nation Cultural and Intellectual Property in the Arts, Australia Council for the Arts
Council Community Initiated Infrastructure Policy POL-CNP 08
Buildings and Community Facilities Infrastructure Asset Management Plan Roads and Transport Infrastructure Asset Management Plan Parks
Open Space Infrastructure Asset Management Plan

Responsible Directorate: Place and Community

Responsible Department: Community Services

Reviewer: Executive Manager, Community Services

Creation date and reference: G.24/12/14, 16 December 2014

Last Review: 23 July 2019, G.12/7/19

Amendments			
Version #	**Council Approval Date, Reference**	**Date Document In force**	**Date Document Ceased**
2	Minute G.35/2/15	25/02/2015	10/10/2017
3	Minute G.21/10/17	11/10/2017	23/07/2019
4	Policy Manual Review, Minute G.12/7/19	24/07/2019	-
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Public Art Policy
POL-RCS 06

Objective

To:

1) provide a process for the commissioning, creation, installation and maintenance of all permanent or temporary public and mural art commissioned by the City or through developer or other schemes that have an art outcome;
2) guide and encourage private and other public sector bodies to create works that complement the built and/ or natural environment;
3) provide a decommissioning framework.

Statement

Mandurah's rich cultural heritage is deeply embedded in its Bindjareb Noongar, settler, maritime, industrial and holidaying heritage. Contemporary Mandurah retains the heart of a village whilst aspiring to be a forward thinking, welcoming, multicultural city. Residents and visitors are drawn to the natural environment and they are conscious of living in the land rather than on it.

Public art in Mandurah:

- creates a distinct sense of place and collective identity;
- tells the stories of Mandurah's people, places and aspirations for the future;
- encourages the celebration of diversity, healing and reconciliation;
- encourages public dialogue and civic pride;
- provides a platform for community to respond to and highlight local and broader issues;
- supports local artists and creatives by commissioning works and offering professional development opportunities.

Public artworks are:

- flexible in their presentation;
- relevant to site, creating visual connections across the city;
- bold, sophisticated and engaging.

Definitions

Public Art

Artworks in public places or private property that are open or visible to the public and designed and created by an artist. This includes any visual or multi-disciplinary art form including tangible sculpture, intangible/ephemeral works, painting (including murals), crafts, film and video, sound, light, performance, internet, radio, and print projects.

Artist/s

Refers to a singular artist, a team of artists or group of creative people working on a given project. Artist/s should comply with one of the following:

- Hold a university degree or minimum three year full time TAFE diploma in visual or fine arts, or other art forms such as multi-media, graphic design/ illustration, animation, as appropriate, or have commensurate level of relevant work experience;
- Have a proven track record of exhibiting artwork at reputable art galleries or have undertaken projects of a similar scale/ type.

On occasion, it will be appropriate to be more flexible and seek emerging artists and non-professional practitioners to undertake commissions, for example, when engaging young, emerging and Indigenous artists or students.

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Commission

A new artwork financed or presented by an individual, group, or organisation to a brief.

Conservation

The guardianship or protection of an art object in a collection. This includes documentation, examination, and long term care of each object to keep it as close to its original condition as possible.

Decommission

The formal process to remove art through sale, donation or disposal/destruction.

Parameters for commissioning or purchasing public artwork

In commissioning, approving or purchasing public art, the City will consider works that:

- reflect, articulate and honour the City's:
  - built and/ or diverse natural environments;
  - Bindjareb heritage and culture, ensuring appropriate consultation with the local Bindjareb community;
  - settler, maritime, industrial or holidaying heritage;
  - a particular event or aspect of the community;
  - community values;
  - identity as a multi-cultural, welcoming community;
- Foster innovation and promote artistic excellence, quality and skill;
- Contribute to cultural tourism;
- Include community consultation and/or engagement, where applicable and practicable;
- Addresses universal accessibility;
- Consider public safety and public access to the space;
- Address safety, maintenance and conservation issues;

Other considerations include:

- The context and location in which the artwork will be placed;
- Design and creativity/ originality of concept or mode of execution;
- The appropriateness of materials to ensure the work remains robust and low maintenance in diverse weather conditions;
- The work's lifespan;
- The artist/s' experience in undertaking works of a similar type and scope;
- The artistic team's proven project management experience;
- Cost of work and whole of life costs of proposed work.

The City will **not** consider works that:

- Are offensive, are seen to promote anti-social behaviour or attitudes, depict illegal activities, violence or threatening images;
- Glorify or encourage smoking, drug or alcohol consumption;
- Include tags or words with a 'hidden' meaning.

The following are not regarded by the City as public art:

- Decorative, ornamental or functional elements designed by an architect or other design consultants;

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- Elements considered to be components of landscape architectural design including vegetative materials, pool(s), paths, benches, receptacles, fixtures, planters, which are designed by an architect, landscape architect or other design professional;
- Art objects which are mass produced, ordered from a catalogue or of a standard design, such as playground sculpture or fountains;
- Directional or other functional elements, such as signage, colour coding or maps, not designed by an artist;
- Walls, bases, footings, pools, lighting or other architectural elements on or in which the artworks are placed or affixed, or mechanical elements and utilities needed to activate the artwork;

Public art maintenance

Any public art is deemed an asset of the City and will be maintained in accordance with the public art asset register.

Decommissioning public art

Considerations for decommissioning a public artwork include but are not limited to:

- The site for which a site-integrated artwork was specifically created is structurally or otherwise altered and can no longer accommodate the work, is made publicly inaccessible as a result of new construction or demolition, or has the surrounding environment altered in a way which significantly impacts the art;
- Threat to public safety/ does not adhere to safety and health regulations;
- The works is at the end of its intended life span;
- Maintenance and repair obligations and costs have become excessive in relation to the value and age of the artwork;
- There is irreparable damage through vandalism, decay or accident;
- There is a significant threat of damage of the work if left in its current location;
- The work is no longer relevant or appropriate, and the commissioner wishes to commission a new work for the site.

Financial limitations and procurement process

Up to $149,999 (excluding GST)

Art projects with a budget/financial estimate within this range will be managed by the City and must be made in accordance with the City's Approved Operating Practice relating to the Purchasing of Goods and Services and any other associated purchasing thresholds. Records of quotations must be maintained.

$150,000 (excluding GST) or greater.

Art projects with a budget/financial estimate within this range will be managed by the Public Art Committee and must be made in accordance with the Local Government (Functions and General) Regulations 1996 and the Public Art Committee's Terms of Reference.

Art procurement processes must have a Probity and Evaluation Plan which further details the:

- Procurement style (expression of interest, public tender, panel arrangement);
- Specific roles and responsibilities of both the Committee and the City;
- Timeframes;
- Probity requirements including but not limited to management of conflict of interests, confidentiality, security, communications, fairness, objectivity and impartiality, transparency and accountability; and

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- Evaluation process including selection criteria, weightings, scoring methods and evaluation tools.

Records of all activities must be in accordance with all normal procurement procedures of the City.

Related Documents

AOP-CPM 01 Purchasing of Goods and Services
Public Art Committee Terms of Reference
Arts, Heritage and Culture Strategy
Public art decommissioning template
Curating Landscapes Interpretation Plan
Social Infrastructure Plan
Youth Development Strategy
Mandurah Planning Strategy
Subdivision Guidelines –clauses 50-55

Responsible Directorate: Place and Community

Responsible Department: Community

Reviewer: Executive Manager Community

Creation date and reference: G.24/12/14, 16 December 2014

Last Review: 23 July 2019, G.12/7/19

Amendments			
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3	Minute G.21/10/17	11/10/2017	23/07/2019
4	Policy Manual Review, Minute G.12/7/19	24/07/2019	-

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Subject: 19.3 Local Law Review

Summary

The *Local Government Act 1995* (the Act) enables Western Australian local governments to make local laws considered necessary for the good government of their districts.

Under section 3.16 of the Act, these local laws must be reviewed periodically by local governments to determine whether they should be retained, amended, or repealed (Section 3.16 Review).

While the reforms to the Act provide that local laws are to be reviewed every 15 years, the transitional obligations apply requiring all local laws that are currently more than 8 years old to be reviewed by local governments, by December 2026. In response, the City of Mandurah (City) has a suite of local laws which are currently being reviewed as part of an ongoing Local Law Review Program (Review Program) to meet these statutory transitional obligations under the Act.

Under the City's phased Local Law Review Program, City officers recommend that Council initiate reviews of the following local laws which are now due for review:

- City of Mandurah Jetties, Waterways and Marina Local Law 2010 refer Attachment 1
- City of Mandurah Cemeteries Local Law 2010 refer Attachment 2

Council is requested to resolve that these local laws be advertised in accordance with section 3.16(2) of the Act, commencing the statutory review process (Stage One), and note that engagement with Elected Members will be ongoing.

Disclosure of Interest

Nil

Previous Relevant Documentation

G.23/8/18	28 August 2018	2018 Amendment Local Law, final adoption (*Cemeteries Local Law*)
G.18/2/19	26 February 2019	Cemeteries Amendment Local Law 2019, Final Adoption (Undertaking)
G.27/4/19	30 April 2019	2018 Amendment Local Law, final adoption *(Jetties Waterways and Marina Local Law)*

Background

Section 3.5 of the Act provides local government with the power to make local laws to help perform their functions. The City's suite of local laws help regulate, manage and control activities throughout the district.

The Local Government Reform has introduced significant changes to the Section 3.16 Review process, including the extension of the local law review period from 8 years to 15 years. Under the amended Act, any local law not reviewed within 15 years will automatically lapse.

The amended local law provisions under the Act came into effect on 7 December 2024 and triggered a two-year transitional period for local governments to complete reviews of any overdue local laws. Accordingly, the City must review and report on all overdue local laws by December 2026 to ensure they remain valid and enforceable.

The table below shows all City local laws and their current section 3.16 review status, including both completed and outstanding reviews:

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Local Law	Status
Animals, Environment and Nuisance Local Law	Complete
Waste Local Law	Complete
Local Government Property and Public Places Local Law	Complete
Bush Fire Brigades Local Law	Complete (March Council resolution – amendments to follow)
Parking and Parking Facilities Local Law	Complete (March Council resolution – amendments to follow)
Fencing Local Law	Complete (March Council resolution – amendments to follow)
Cemeteries Local Law	*Current report
Jetties, Waterways and Marina Local Law	*Current report
Standing Orders Local Law	Outstanding
Health Local Law	Outstanding
Dog Local Law	Outstanding
Cat Local Law	To be reviewed prior to 2034

The Cemeteries Local Law and Jetties, Waterways and Marina Local Law were adopted more than eight years ago and have not yet undergone a Section 3.16 Review. They therefore fall within the transitional requirement and are now due for review.

Comment

Local Law Review Program

Currently, all local law reviews are considered a priority due to the limited time remaining within the statutory review period. To manage this effectively, the City has implemented a tiered Review Program that enables the structured prioritisation of the Section 3.16 Reviews. This approach allows the City to allocate resources efficiently across the available timeframe while ensuring compliance with legislative obligations.

This prioritisation process considers factors such as legislative changes (current or proposed), urgency, data from historical monitoring of local laws, and the potential risks to the community and the City such as financial, reputational, and legislative compliance impacts. Based on this assessment, City officers have identified the next round of local laws to progress through the Review Program.

With respect to the Cemeteries Local Law, the City had anticipated further detail on the proposed reforms to the *Cemeteries Act 1986* and associated Regulations. However, no indication has been provided as to when these reforms will be progressed or completed. Given the absence of a confirmed timeframe, it is no longer practical to delay the City's Section 3.16 Review of this Local Law.

Of the remaining local laws due for review, the Dog Local Law and Health Local Law were previously linked to legislative reforms which were anticipated for 2026. However, no further Dog Regulations are currently timetabled and the timing of the implementation of stage 5 of the *Public Health Act* remains uncertain.

Noting the scale and complexity of amendments likely required to the Health Local Law, City officers propose to progress a review of the Dog and Health Local Laws in the final round of the staged Review Program, anticipated to commence in July 2026 to meet the December 2026 statutory deadline.

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Current Local Law Process

During the public consultation phase of the Section 3.16 Review, relevant City officers and external stakeholders will be consulted in relation to identify any issues or opportunities for improvement in the City's current Local Laws. Elected Members will also be invited to participate and provide input throughout the consultation process.

Following the consultation period, a report will be prepared summarising the feedback received and presenting recommendations for Council's determination on whether the Local Laws should be amended, repealed or remain unchanged. It is anticipated that a report on the Section 3.16 Review will be presented to Council in August 2026 to finalise Stage One.

Following consideration of submissions and depending on the nature and extent of submissions received, City officers may undertake further research to determine whether amendments to the Local Laws are appropriate and can be processed in accordance with the Act and the decisions of the Parliamentary Joint Standing Committee on Delegated Legislation (JSCDL). This determination will depend on the outcomes of the consultation phase.

Should amendments be required, City officers will prepare an Amendment Local Law for Council's consideration to initiate Stage Two of the City's local law-making process in accordance with section 3.12 of the Act.

Consultation

Local public notice will advertise the Section 3.16 Review inviting public comment.

The City will notify all relevant stakeholders of its intention to undertake the Section 3.16 Review and invite their feedback. Stakeholders identified for the Jetties, Marina and Waterways Local Law include, but are not limited to, the Mandurah Environmental Advisory Group, local businesses and tourism operators, local boating and marine user groups, marina tenants and berth holders, and the Department of Water and Environmental Regulation (DWER).

For the Cemeteries Local Law, stakeholders include, but are not limited to, the Access and Inclusion Advisory Group, Metropolitan Cemeteries Board, funeral directors, monumental masons, and religious and cultural organisations, with experience using cemetery services.

Elected Members will also be engaged throughout the review process to contribute to the development of the City's local laws. It is recommended that a workshop be held with Elected Members following the conclusion of the initial public advertising period to facilitate discussion and gather input prior to progressing to the next stage of the local law-making process.

Statutory Environment

Local Government Act 1995

Section 3.16 - Periodic Review of Local Laws:

(2) The local government is to give local public notice stating that —

(a) the local government proposes to review the local law; and

(b) a copy of the local law may be inspected or obtained at any place specified in the notice; and

(c) submissions about the local law may be made to the local government before a day to be specified in the notice, being a day that is not less than 6 weeks after the notice is given.

(3) After the last day for submissions, the local government is to consider any submissions made and cause a report of the review to be prepared and submitted to its council.

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(4) After the report has been submitted to its council, the local government must determine (absolute majority is required) whether it considers that the local law should be repealed, be amended or remain unchanged.*

Policy Implications

Nil

Financial Implications

A budget of $20,000 has been allocated for the local law reviews. Whilst the majority of drafting will be undertaken internally, the City will incur legals fees for final review of the draft, public advertising costs and publishing in the Government Gazette.

Risk Implications

The proposed Section 3.16 Review will ensure legal compliance with the Act. In addition, the review of the local laws is a risk analysis tool to consider whether amendment is required to prevent risk to reputation, health and environment. It will improve efficiency, without creating undue or unacceptable risk to the City.

In the event that Council do not proceed with the review of the City's local laws by the December 2026 deadline, the laws will lapse, and there will be no operative local law on those matters until a new local law is made in accordance with the Act and adopted by Council.

Strategic Implications

The following strategies from the City of Mandurah Strategic Community Plan 2024-2044 are relevant to this report:

<u>Economy</u>
- A diversified economy that supports growth sectors
- A thriving city that residents are proud to call home and people want to visit
- A supportive business environment where investment is encouraged, and entrepreneurship prospers

<u>Community</u>
- Access to support services that enhance opportunities for everyone
- Safe and connected communities
- Inclusive and welcoming places, spaces and neighbourhoods

<u>Environment</u>
- Nature has a voice in all decision-making
- A shared responsibility for our environment with a focus on engagement, education and respect
- Our natural environment is celebrated, protected and restored for generations to come
- Our built environment is clean, accessible and sustainable
- Our coast and waterways are healthy and celebrated

<u>Leadership</u>
- Sound decisions based on evidence and meaningful engagement
- Effective advocacy focused on the needs of the community and strong relationships with key stakeholders
- Well-maintained assets and facilities that meet the needs of our community
- Responsible, transparent, value for money delivery of well planned, sustainable, projects, programs and services.

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Conclusion

In accordance with Section 3.16(1) of the *Local Government Act 1995*, Council is required to undertake a formal review of the *City of Mandurah Cemeteries Local Law and City of Mandurah Jetties, Waterways and Marina Local Law.*

Council is requested to approve the commencement of the statutory review process by endorsing the advertising of these Local Laws. A report on the outcomes of the review process will be presented to Council following the six-week advertising period.

Officer Recommendation

That Council:

1. In accordance with section 3.16 of the *Local Government Act 1995* determines to undertake a review of the following local laws:

1.1 City of Mandurah *Jetties, Waterways and Marina Local Law 2010* as per Attachment 1.

1.2 City of Mandurah *Cemeteries Local Law 2010* as per Attachment 2.

2. Determines that the City undertakes local public notice stating that the City proposes to review the following local laws for the purposes of inviting submissions:

2.1 City of Mandurah *Jetties, Waterways and Marina Local Law 2010* as per Attachment 1.

2.2 City of Mandurah *Cemeteries Local Law Local Law 2010* as per Attachment 2.

3 Notes that submissions about the local laws may be made to the City of Mandurah before a day to be specified in the notice, being a day that is not less than six weeks after the notice is given.

4 Notes that the results of the above advertising be presented to Council for consideration of any submissions received.

Attachments

1. Jetties, Waterways and Marina Local Law 2010 [**19.3.1** - 28 pages]
2. Cemeteries Local Law 2010 [**19.3.2** - 21 pages]

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CONSOLIDATED LOCAL LAW

CITY OF MANDURAH

CITY OF MANDURAH

JETTIES, WATERWAYS AND MARINA LOCAL LAW 2010

(Principle Local Law)

Gazette Number 53. 4 April 2011

JETTIES, WATERWAYS AND MARINA AMENDMENT LOCAL LAW 2011

Gazette Number 6. 10 January 2012

JETTIES, WATERWAYS AND MARINA AMENDMENT LOCAL LAW 2018

Gazette Number 64. 10 May 2019

This Local Law is approved to apply outside the district see Government Gazette: 51, 18 April 2019:

LOCAL GOVERNMENT ACT 1995
City of Mandurah
EXTENSION OF AREA OF APPLICATION OF LOCAL LAW
Department of Local Government, Sport and Cultural Industries.

DLGSC: MH7-47

It is hereby noted for public information that the Governor has approved under section 3.6 of the *Local Government Act 1995* of the making of the *City of Mandurah Jetties, Waterways and Marina Amendment Local Law 2018* to the extent that it will apply outside the district of the City of Mandurah.
DUNCAN ORD, Director General.

PLEASE NOTE:
This version of the City of Mandurah Jetties, Waterways and Marina Local Law 2010 combines the:

- Principle
  - City of Mandurah Jetties, Waterways and Marina Local Law 2010; and
- Amendment:
  - City of Mandurah Jetties, Waterways and Marina Amendment Local Law 2011;
  - City of Mandurah Jetties, Waterways and Marina Amendment Local Law 2018.

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LOCAL GOVERNMENT ACT 1995

CITY OF MANDURAH

JETTIES, WATERWAYS AND MARINA LOCAL LAW 2010

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LOCAL GOVERNMENT ACT 1995

CITY OF MANDURAH

JETTIES, WATERWAYS AND MARINA LOCAL LAW 2010

Under the powers conferred by the *Local Government Act 1995* and under all other powers, the Council of the City of Mandurah resolved on 22 March 2011 and subsequently amended on 14 December 2011 and 30 April 2019 to adopt the following local law.

PART 1—PRELIMINARY

1.1 Citation

This local law may be cited as the *City of Mandurah* Jetties, Waterways and Marina Local Law 2010.

1.2 Interpretation

In this local law unless the context otherwise requires—

Act means the *Local Government Act 1995*;

animal means any animal other than a dog;

AS/NZS 1158 means the standard called “Lighting for roads and public spaces” published by Standards Australia;

AS/NZS 1163 means “Cold-formed structural steel hollow sections” published by Standards Australia;

AS/NZS 2159 means the standard called “Piling—Design and installation” published by Standards Australia;

AS/NZS 3004 means the standard called “Electrical installations—Marinas and Recreational Boats” published by Standards Australia;

AS/NZS 3191 means the standard called “Electric flexible cords” published by Standards Australia;

AS/NZS 3962 means the standard called “Guidelines for design of marinas” published by Standards Australia;

AS/NZS 3678 means “Structural Steel—Hot-rolled plates, floorplates and slabs” published by Standards Australia;

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AS/NZS 3679.1 means the standard called "Structural steel—Hot-rolled bars and sections" published by Standards Australia;

AS/NZS 3679.2 means "Structural steel—Welded I sections" published by Standards Australia;

authorised person means a person appointed by the Council under section 9.10 of the Act to perform any of the functions of an authorised person under this local law;

bait means food, or some substance, used as a lure in fishing;

boat lifter means any mechanical or electrical device used to lift a boat out of the water;

boat ramp means a place where vehicles equipped with trailers launch and retrieve recreational vessels;

CEO means the Chief Executive Officer of the City of Mandurah;

commercial vessel has the meaning given to it by the *Western Australian Marine Act 1982*;

complying drop net means a drop net that—

(a) is not more than 1.5 metres at its widest point; and

(b) is so constructed so that when set—

(i) its side or sides collapse so that its netting lies flat on the ground; and

(ii) its netting is not capable of ensnaring or entangling a fish;

cost of the City includes its administrative costs;

district means the district of the City of Mandurah;

fish has the meaning given to it by section 4 of the *Fish Resources Management Act 1994*;

fishing has the meaning given to it by section 4 of the *Fish Resources Management Act 1994*

fishing net means any fishing net other than a—

(a) hand scoop or hand dip net;

(b) prawn hand trawl net; or

(c) complying drop net;

gangway means a structure including a removable ladder, ramp or footway that provides pedestrian access between a fixed jetty or the shore and a pontoon, floating jetty or a vessel;

jetty means—

(a) any jetty, pier, wharf, quay, walkway, grid, slip, landing place, stage, platform (other than a platform that is a vessel for the purposes of the Western Australian Marine Act 1982) over any waters, and

(b) any ramp or supporting structure for the launching, landing or retrieving of a vessel;

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jetty or pontoon envelope means the area designated by the local government within a waterway lot within which the construction of a jetty or pontoon and associated gangway is permissible;

local government means the City of Mandurah;

litter has the meaning given to it by the *Litter Act 1979*;

marina means a complex of interconnecting pens, and all jetties and walkways, together with any adjoining waterway, which are under the care, control or management of the local government;

moor means to secure a vessel to a mooring;

mooring means something to which a vessel may be moored and includes an anchor, stake or mooring pile;

mooring envelope means the area of a waterway lot designated for the mooring of vessels;

mooring pile means any pile used or capable of being used to secure a vessel;

nuisance means—

(a) an activity or condition which is harmful or annoying and which gives rise to legal liability in the tort of public or private nuisance at law; or

(b) an unreasonable interference with the use and enjoyment by a person of his or her ownership or occupation of land; or

(c) interference which causes material damage to land or other property on the land affected by the interference;

owner in relation to any vessel, vehicle, cargo, property or other chattel, means the person who is the lawful owner of the person entitled to possession of the same if that is not the lawful owner;

pen means a specific area within a marina for the mooring of a vessel and does not include any adjacent jetty and walkway;

pollutant means any noxious, polluting or offensive material whether solid or liquid including but not limited to non-biodegradable chemicals or cleaning agents, rubbish, dirt, black water, sewage, oil, oily bilge water, sullage, fuel or the content of brine tanks, fish products including fish carcasses (but excluding bait), shells, offal or litter;

pontoon means a floating platform or similar structure providing landing, docking or mooring facilities;

private jetty means any jetty other than a public jetty;

public jetty means any jetty under the care, control or management of the local government;

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reasonable notice in regard to intended entry, means notice containing the purpose or purposes for which entry is required and giving a notice period of not less than 24 hours in accordance with section 3.32 of the Act;

Regulations mean the *Local Government (Functions and General) Regulations 1996;*

sign includes any notice, mark, structure or device on which may be shown words, numbers, expressions, colours or symbols;

State Authority means the relevant Statutory Authority responsible for the designation of mooring envelopes;

vessel means any kind of vessel, whether licensed or unlicensed, used or capable of being used in navigation by water, however propelled or moved, and without limiting the generality of the foregoing includes—

(a) a barge, lighter, floating restaurant, dinghy, commercial vessel, tender vessel or other floating structure; and

(b) an air-cushion vehicle, or other similar craft, used wholly or primarily in navigation by water,

but does not include structures used only for the purpose of a jetty or for storage;

waterway means any area of water under the care, control and management of the local government or a person authorised by the local government to undertake such care, control or management on behalf of the local government;

waterway-edge wall means any revetment wall separating the land filled part of a lot adjoining a waterway from the submerged part of such a lot together with any associated retaining wall; and

waterway lot means any privately owned land or lot adjoining a waterway.

[Clause 1.2 amended by Government Gazette No. 6 of 2012 and No.64 of 2019]

1.3 Repeal

Division 5 of Part III of the City of Mandurah Consolidated Local Laws published in the Government Gazette of 13 February 1998 is repealed.

1.4 Application

This local law applies throughout the district.

1.5 Commencement

This local law comes into operation 14 days after the date of its publication in the *Government Gazette*.

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PART 2—USE OF WATERWAYS

2.1 Swimming in waterway

(1) No person shall swim in a waterway so as to cause a nuisance.

(2) Notwithstanding subclause (1) a person—

(a) may swim in that portion of a waterway that is within 25 metres of a beach or foreshore provided the beach or foreshore has not been designated or set aside as a locality where swimming or bathing is prohibited;

(b) may swim in any area of a waterway that has been designated or set aside by the local government by signs or otherwise as a swimming area; and

(c) may swim in any waterway with the written consent of an authorised person.

2.2 Fishing in waterways

A person shall not—

(a) fish in a waterway from a vessel;

(b) use a net for the purpose of fishing in a waterway;

(c) use a gidgee or speargun; or

(d) fish from a private jetty or private land, so as to cause a nuisance.

2.3 Users of waterway not to cause a nuisance

No person shall moor their vessel or otherwise use a waterway in such a manner as to cause a nuisance to other users of the waterway.

2.4 Maintenance of vessels

A person shall not clean, repair or maintain a vessel moored in a waterway, pen, jetty or mooring envelope in such a manner as to cause a nuisance to other users of the waterway.

2.5 Storage of fuels

A person shall not store fuel—

(a) on a jetty;

(b) on any other structure built on or over the water and that is attached to the land; or

(c) otherwise within 20 metres of the high watermark,

except in a fuel storage facility constructed with the approval of an authorised person.

[Clause 2.5 amended by Government Gazette No.64 of 2019]

2.6 Pollution of waterway

A person shall not deposit or release or permit to be deposited or released any pollutant into a waterway whether from a vessel, jetty, bridge, pen or private land.

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2.7 Restrictions on vessel anti-fouling paint

Any vessel that is coated with anti-fouling paint containing any substance or additive compound that has been altered or is applied at variance with manufacturers or government specification, which is known to bio-accumulate toxins or contain residual chemicals that risk being harmful to the marine environment, is prohibited from using the waterways or entering a marina.

2.8 Application of signs

(1) A sign that—

(a) was erected by the local government or a person authorised by the local government prior to the coming into operation of this local law; and

(b) relates to the use of a waterway, jetty or marina,

shall be deemed for the purposes of this local law to have been erected by the local government under the authority of this local law and shall have effect as such.

(2) Where the use of a vessel in a waterway is regulated by a sign, then the sign shall for the purposes of this local law apply to that part of the waterway which—

(a) lies beyond the sign; and

(b) lies between the sign and the next related sign beyond that sign.

(3) No person shall use a vessel in a waterway contrary to a sign.

[Clause 2.8 amended by Government Gazette No.64 of 2019]

PART 3—MOORING OF VESSELS

3.1 Application of part

This Part applies to the mooring of any vessel whether on a waterway, pen, jetty or within a marina.

3.2 Vessels moored within mooring envelope

Where a vessel is moored within a mooring envelope it must be wholly contained within the length and width of that mooring envelope.

3.3 Mooring lines

The owner of a vessel must—

(a) provide, use and adequately maintain mooring lines sufficient to ensure the safe mooring of the vessel, and which shall not be less than the sizes listed below—

Length of vessel	Mooring line diameter
Up to 5 m	Not less than 12 mm
5 m to 8 m	Not less than 16 mm

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8 m to 12 m	Not less than 20 mm
12 m to 15 m	Not less than 24 mm; and

(b) periodically inspect the mooring lines and replace any mooring line which is unfit for its intended purpose so as to ensure compliance with the requirements set out in this clause.

[Clause 3.3 amended by Government Gazette No.64 of 2019]

3.4 Inspection of mooring lines by authorised person

Where an authorised person considers the mooring line of a vessel may be faulty, or not compliant with the requirements of clause 3.3(a), the authorised person may issue a written direction to the owner of the vessel requiring within a specified time frame—

(a) the replacement of any mooring line; or

(b) the testing and certification of any mooring line as suitable for its purpose by a marine engineer or equivalent and the provision of such certification to the local government.

[Clause 3.4 amended by Government Gazette No.64 of 2019]

3.5 Connection of moored vessels to electrical power supply

The owner of a moored vessel must not connect or permit the connection of the vessel to the mains power supply of a dwelling unless—

(a) the power supply of the vessel complies with AS/NZS 3004;

(b) the power cords used to connect the power supply of the vessel to the mains power supply of the dwelling comply with AS/NZS 3191; and

(c) the power cords or leads used to connect the vessel to the mains power supply of the dwelling do not enter the water and do not otherwise create a hazard for those in the vicinity of the vessel.

[Clause 3.5 amended by Government Gazette No.64 of 2019]

3.6 Mooring in waterway

(1) No person shall not moor or anchor a vessel in a waterway so as to —

(a) obstruct the waterway; or

(b) cause a nuisance to other users of the waterway.

(2) A person shall not moor or anchor a vessel in a waterway for more than four hours in any seven day period if and while the vessel is moored or anchored to a public foreshore.

[Clause 3.6 amended by Government Gazette No.64 of 2019]

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PART 4—USE OF PUBLIC JETTIES

4.1 Use of a public jetty

(1) A person shall not land at, use or enter a public jetty except in accordance with this local law.

(2) A person shall not land at, use or enter a public jetty which is—

(a) under construction or repair; or

(b) closed under section 6 of the *Jetties Act 1926* or any other written law,

unless that person is engaged in the construction or repair of that public jetty in accordance with the written authorisation of an authorised person.

[Clause 4.1 amended by Government Gazette No.64 of 2019]

4.2 Mooring of vessels

(1) A person shall not moor or fasten a vessel to a public jetty or allow a vessel to remain alongside or so that any part of the vessel is within 3 metres of the public jetty, unless—

(a) the vessel is in distress such that repairs are required and then only to effect the minimum repairs necessary to enable the vessel to be moved elsewhere;

(b) it is for recreational purposes, and then not for a continuous period exceeding 4 hours without the prior written consent of an authorised person;

(c) where the vessel is being used for commercial purposes, the person has first obtained the approval of an authorised person and paid any required fee to the local government for such mooring or making fast; or

(d) the mooring of the vessel is authorised or permitted by the local government either by way of a sign affixed by the local government to the public jetty or by written consent of an authorised person.

(2) A person shall not—

(a) moor or fasten a vessel to a public jetty or any part of the jetty except to such mooring piles, ring bolts or other fastenings as are provided;

(b) permit a vessel to remain alongside a public jetty unless the vessel is so moored or fastened; or

(c) moor or fasten a vessel to a public jetty whilst the vessel is under any means of propulsion.

(3) For the purpose of this clause 4.2, a vessel is considered to remain alongside or adjacent to a public jetty if any part of the vessel remains within 3 metres of the jetty for more than two hours in any 24 hour period.

[Clause 4.2 amended by Government Gazette No.64 of 2019]

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4.3 Authorised person may order removal of vessel

Notwithstanding anything to the contrary in this local law, a person shall immediately remove a vessel moored or fastened to or standing alongside a public jetty, upon being directed to do so by an authorised person.

4.4 Vehicles on public jetties

A person shall not—

(a) drive or allow a vehicle to remain on a public jetty (other than a boat ramp) without the prior written consent of an authorised person; or

(b) ride a bicycle, or allow a bicycle to remain, on a public jetty;

except for an emergency vehicle responding to an emergency

[Clause 4.4 amended by Government Gazette No.64 of 2019]

4.5 Fishing from public jetties and bridges

A person shall not—

(a) fish from a public jetty or bridge so as to obstruct or interfere with the free movement of a vessel approaching, passing or leaving the jetty or bridge or so as to cause a nuisance on or near the public jetty or bridge; or

(b) hang or spread a fishing net from, on or over any part of a public jetty or bridge.

4.6 Prohibited activities on vessels, public jetties or bridges

A person shall not—

(a) without the prior written consent of an authorised person offer for sale or sell goods or services from a vessel, public jetty or bridge;

(b) use any loud speaking or sound amplifying device on a vessel, public jetty or bridge without the prior written consent of an authorised person;

(c) interfere with the free movement of others entering or leaving a public jetty or bridge; or

(d) jump or dive from a public jetty or bridge; or

(e) use a fire hose on a public jetty or bridge, except in case of an emergency.

[Clause 4.6 amended by Government Gazette No.64 of 2019]

4.7 Material not to be removed

A person shall not remove or cause to be removed from a public jetty or from its approaches any gravel, stone, timber, tree, shrub or grass or other material without the prior written permission of an authorised person.

[Clause 4.7 amended by Government Gazette No.64 of 2019]

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4.8 Damage to public jetty, boat ramp or bridge

(1) A person shall not cause damage to a public jetty, boat ramp or bridge.

(2) Where damage is caused to a public jetty, boat ramp or bridge, the local government may repair the damage and the costs of the repair shall be a debt due to the local government recoverable in a court of competent jurisdiction.

(3) The debt referred to in clause 4.8(2) is payable—

(a) where the damage is caused by the use of a vessel or vehicle, by the person in control of the vessel or vehicle at the time the damage occurs;

(b) where the damage is not caused by the use of a vessel or vehicle, by the person or persons who caused the damage; or

(c) where the damage is caused by the use of a vessel or a vehicle while under the control of an agent or employee of the owner of the vessel or vehicle, but without prejudice to the liability of any person arising under this or any other clause of the Local Law.

[Clause 4.8 amended by Government Gazette No.64 of 2019]

4.9 Obstruction of public jetty or bridge

(1) A person shall not, without the written consent of an authorised person, cause any obstruction on a public jetty or bridge or impede the free passage of other persons to, from or on a public jetty or bridge.

(2) A person shall not obstruct or hinder any authorised person, or worker engaged in the construction or repair of any public jetty or bridge.

4.10 Littering on a public jetty or bridge

A person shall not—

(a) discard or deposit anything, including fish or bait, on to a public jetty or bridge so as to litter or cause pollution; or

(b) deposit any offensive rubbish or offal into any rubbish bin located on a public jetty or bridge.

4.11 Launching of vessels

A person shall not launch or permit the launching of a vessel from or over any public jetty (other than a boat ramp) unless he or she has—

(a) applied to, and obtained the written consent of, the local government in the form (if any) prescribed by the local government for any purpose; and

(b) paid to the local government any fee set by the local government from time to time for the purpose.

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4.12 Miscellaneous prohibitions

No person shall on any public jetty or bridge—

(a) light, place or keep a fire upon or so near as to endanger the jetty or bridge;

(b) throw or impel any stone, or other missile onto or there from, except for the express purpose of fishing and then only in accordance with clause 4.5;

(c) permit an animal to remain thereon, except with the written consent of an authorised person;

(d) be in a state of intoxication or in possession of any intoxicating substance unless such intoxicating substance is cargo or medical supply carried for lawful purpose;

(e) fix or place any receptacle capable of holding water and providing a breeding site for mosquitoes or other insects;

(f) land, place or handle explosives without the prior written consent of an authorised person; or

(g) loiter, lounge, camp or sleep or erect a tent, camp or fly a model aeroplane.

[Clause 4.12 amended by Government Gazette No. 6 of 2012 and No. 64 of 2019]

4.13 Application for consent

(1) Where a person is required to obtain the written consent of the local government under this local law, the person is to apply for that consent in the manner required by the local government.

(2) The local government may, in accordance with sections 6.16 to 6.19 of the Act, determine and impose a fee for receipt of an application for consent made under clause 4.13(1).

(3) If an application for consent is not made in the manner required by the local government or the fee, if any, which is charged to accompany that application is not paid, the local government may refuse to consider the application for consent.

(4) The local government shall give its decision on an application for consent, in writing to the person who applied for that consent.

4.14 Local government may close jetties or regulate activities

The local government may—

(a) Close or cause to be closed any jetty or any part thereof;

(b) Regulate, prohibit or restrict access to any jetty or any part thereof; and

(c) Direct persons to leave the jetty or any part thereof, for the purposes of—

(i) a function or public convenience at or on the jetty;

(ii) repair, maintenance or construction of the jetty;

(iii) public safety; or

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(iv) other operational reasons.

[Clause 4.14 amended by Government Gazette No. 64 of 2019]

PART 5—PRIVATE JETTIES AND WATERWAYS LOTS

5.1 Activities prohibited on a private jetty

A person shall not on a private jetty without the prior written consent of an authorised person—

(a) offer for sale or sell goods or services;

(b) display any sign or advertisement other than those authorised by the local government;

(c) use any loud speaking or sound amplifying device; or

(d) interfere with the free movement of others on any waterway adjoining the private jetty.

[Clause 5.1 amended by Government Gazette No. 64 of 2019]

5.2 Mooring of vessels

A person shall not—

(a) moor or permit the mooring of a commercial vessel at a private jetty without the prior approval of the local government; or

(b) moor or permit the mooring of a vessel at a private jetty without the consent of the owner of the jetty.

[Clause 5.2 amended by Government Gazette No. 64 of 2019]

5.3 Private jetties and pontoons

(1) A person shall not construct a jetty or pontoon—

(a) in such a manner as to damage a waterway-edge wall underlying or adjoining the jetty or pontoon;

(b) in such a manner as to impose any additional load upon a waterway edge wall, unless approved by the local government; or

(c) other than within the jetty or pontoon envelope designated by the local government.

(2) The installation of sewage and sullage or fuel storage facilities is prohibited on any private jetty or pontoon.

(3) An owner may with the permission of the local government and in accordance with AS1158 install lighting on a private jetty.

(4) The owner of a private jetty or pontoon must maintain the jetty or pontoon so as to avoid it becoming dilapidated, unsightly, unsafe or otherwise unfit for its purpose, and

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must comply with any notice given by the local government in that regard within 28 days or such longer period as may be stipulated in the notice.

(5) A person shall not construct a gangway—

(a) other than in accordance with AS 3962;

(b) in such a manner as to damage or impose any additional load upon a waterway-edge wall;

(c) other than within the jetty or pontoon envelope; or

(d) that is permanently attached or fixed to a waterway-edge wall;

(e) that is in excess of 2 metres in width to a jetty or pontoon.

[Clause 5.3 amended by Government Gazette No. 64 of 2019]

5.4 Design of mooring piles

(1) A person shall not construct a mooring pile other than—

(a) in accordance with AS 2159;

(b) where steel piles are installed, in accordance with AS 3679.1, AS 3679.2, AS 1163 and AS 3678 as applicable.

(2) A person must not construct, position or place a mooring pile, pole or other structure for the purpose of mooring a vessel within a waterway without the written consent of the local government.

[Clause 5.4 amended by Government Gazette No. 64 of 2019]

PART 6—MAINTENANCE OF WATERWAY EDGE WALLS

6.1 Maintenance of waterway-edge walls

(1) An owner of property must maintain any waterway-edge wall within their property so as to avoid it becoming dilapidated, unsightly, unsafe or otherwise unfit for its purpose, and must comply with any notice given by the local government in that regard within 28 days or such longer period as may be stipulated in the notice; and

(2) A person must not drill, cut, alter or remove a waterway-edge wall without the written consent of the local government.

(3) An owner of property containing a waterway-edge wall shall maintain a depression on the dry side of the owner's lot behind the top of the retaining wall edge for drainage purposes.

[Clause 6.1 amended by Government Gazette No. 64 of 2019]

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PART 7—USE OF MARINA

7.1 Requirement for licence

A person must not, without first obtaining a licence from the local government, moor or anchor or cause any vessel to be moored or anchored, within a marina.

[Clause 7.1 amended by Government Gazette No. 64 of 2019]

7.2 Application for licence and application fee

(1) Where a person is required to obtain a licence under this Part, that person shall apply for the licence in the form in Schedule 2.

(2) The local government may, in accordance with sections 6.16 to 6.19 of the Act, determine and impose an application fee for a licence under clause 7.1

(3) The application for a licence must be made by—

(a) the owner of the vessel; or

(b) the owner's agent who has the written authority to sign the application on behalf of the owner of the vessel.

(4) The licence is to be issued in the name of the owner of the vessel.

(5) If an application is not made in the manner required by the local government or the fee, if any, which is charged in respect of the application is not paid, the local government may refuse to consider the application for a licence.

[Clause 7.2 amended by Government Gazette No. 64 of 2019]

7.3 Obligations of licensee

(1) During the term of the licence, the licensee must—

(a) keep and maintain the vessel in a state of good and substantial repair and in a clean, tidy, orderly and seaworthy condition;

(b) keep and maintain the pen in which the licensee's vessel is moored and any adjacent jetty or walkway in a clean, tidy and orderly condition;

(c) ensure that, except during entry into and exit from the pen, no portion of the vessel moored in the pen shall extend beyond the boundaries of the pen;

(d) ensure that the vessel does not at any time interfere with, obstruct or impede the movement of any other vessel within a marina;

(e) ensure that the vessel does not at any time interfere with, obstruct or impede the movement of any materials, goods or equipment along or over any jetty or walkway forming part of a marina;

(f) ensure that any vessel under the control of the licensee, or the licensee's agent or licensee or employee, when approaching, using or leaving the pen is

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controlled in a cautious and seamanlike manner and does not cause a nuisance or damage to any other vessel, property or persons;

(g) ensure that hose pipes or electricity leads or similar projections from a vessel do not obstruct or create a hazard to persons walking or otherwise travelling within a marina;

(h) without the prior written consent of the local government, carry out or permit to be carried out any major structural work to the vessel in a pen or marina;

(i) hold a third party insurance policy for the vessel housed in the pen or pen system;

(j) use power points and water taps provided within the pen system only with the appropriate connections and for the purpose of minor maintenance, and ensure all power cords are in good order and repair, and not placed in the water;

(k) comply with all conditions attaching to the licence.

(2) During the term of the licence, the licensee must not—

(a) permit any vessel other than the one described in the licence to use or to occupy the pen without the prior written consent of the local government;

(b) store or keep, or permit to be stored or kept, on or in any vessel in the pen, or the pen system, any inflammable substance except that which is contained in tanks or lines which either form a permanent part of a vessel or which comply with the *Uniform Shipping Laws Code 1981* (Cth) and the relevant regulations created under the *Western Australian Marine Act 1982* (WA);

(c) do or leave undone, or cause or permit to be done or left undone, in or upon the pen any act or thing which may cause damage or become a nuisance, annoyance or inconvenience, to other users of a marina;

(d) cause any entrance gate to a marina to be held open by any manner whatsoever;

(e) permit any animal to stray in or on any part of a marina;

(f) without the prior written consent of the local government, make any alteration or addition to the pen or any part thereof;

(g) without the prior written consent of the local government, affix or exhibit, or cause or permit to be affixed or exhibited, on any part of the pen or vessel any poster, sign or advertisement other than a vessel's registration numbers and name;

(h) without the prior written consent of the local government, carry out or permit to be carried out any major structural work to the vessel in a pen or marina;

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(i) operate or permit to be operated any noisy, noxious or objectionable engine, radio or other apparatus or machinery within the pen, so as to cause any nuisance or annoyance to another user of a marina;

(j) provide any person with the key (or any copy, duplicate or replica of the key) giving access to a marina;

(k) leave the vessel unattended in such a manner as to prevent the movement of another vessel in or out of its pen, or obstruct the movement of vessels in a marina;

(l) engage a vessel's propulsion system while secured to a pen or pen system except when alighting (leaving/arriving) from the pen or carrying out mechanical repairs or testing;

(m) live on board a vessel without the prior written authorisation of an authorised person;

(n) install a vessel lifting device without the prior written authorisation of an authorised person;

(o) bring, deposit or release or permit to be brought, deposited or released any black water, raw sewerage, oil or fuel, fish products including fish carcasses (but excluding bait), shells and offal, whether solid or liquid, and regardless of whether or not it is dangerous, polluting or noxious in nature, into or within the pen or the waters surrounding the pen;

(p) do or leave undone, or cause or permit to be done or left undone, in or upon the pen any act or thing which may—

(i) cause damage; or

(ii) become a nuisance, annoyance or inconvenience;

to other users of the pen system; or

(q) use a fire hose, where no emergency exists.

(3) A licensee or a person under the charge of the licensee, subject to subclause (2)(o), may—

(a) wash down their vessel, the pen, or the adjacent jetty or walkway, provided no non- biodegradable chemicals or cleaning agents are used;

(b) clean fish on board their vessel or at any designated area for cleaning fish within the pen system; or

(c) bring fuel in approved containers onto or within a pen system for the purposes of refuelling.

[Clause 7.3 amended by Government Gazette No. 64 of 2019]

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7.4 General prohibitions

(1) A person shall not perform underwater repairs or hull cleaning in a marina without having first obtained written consent from the local government and provided the activity is only undertaken within the licensee's pen.

(2) A person shall not without obtaining the prior written consent of the local government use —

(a) a power point for longer than 3 hours; or

(b) a water tap for longer than 30 minutes,

in a 24-hour period commencing at midnight of the previous day.

(3) A person who has obtained the written authorisation of the local government to live on board a vessel may connect to power for longer periods but must not in doing so restrict power to other pen holders required for the purpose of minor maintenance.

[Clause 7.4 amended by Government Gazette No. 64 of 2019]

7.5 Right of entry and execution of repairs

(1) An authorised person may, at any reasonable time on reasonable notice during the term of a licence, enter upon and view the condition of the relevant pen, the vessel and any buoys and lines or any part thereof within or attached to the pen.

(2) An authorised person may give to the licensee a notice in writing requiring the licensee to execute any repairs and works within a stipulated time period that, in the reasonable opinion of the authorised person, are necessary for the proper maintenance of any of the things referred to in subclause (1).

(3) The licensee must execute all repairs and works required to be done within any reasonable time period stipulated by written notice given by an authorised person.

(4) If the licensee does not, within the time specified in any notice issued under this clause, complete the repairs and works required in the notice, an authorised person may enter the mooring pen and complete the repairs and works required in the notice.

(5) The cost of any repairs and works undertaken by the local government under subclause (4) shall be a debt due to the local government payable by the licensee.

(6) An authorised person may, at any reasonable time on reasonable notice enter a pen for the purpose of making surveys or carrying out any works the local government may deem to be necessary without paying to the licensee any compensation, although any work shall be carried out with the least inconvenience possible to the licensee.

(7) An authorised person may enter a pen or a vessel, at any time when, in the reasonable discretion of the authorised person, an emergency exists.

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[Clause 7.5 amended by Government Gazette No. 64 of 2019]

7.6 Removal of vessel

An authorised person may, in any of the circumstances mentioned in clause 7.5, move or cause to be moved any vessel located within a pen. The cost of moving a vessel under this clause shall be a debt due to the local government, payable by the licensee and recoverable in a Court of competent jurisdiction.

[Clause 7.6 amended by Government Gazette No. 64 of 2019]

7.7 Termination of licence

(1) The local government may, on 30 days written notice to the licensee, terminate a licence granted under clause 7.2 in the event of—

(a) the annual service fee or any part thereof, payable by a licensee being in arrears for one calendar month after becoming due and payable; or

(b) any default by a licensee in the due observance and performance of any of the requirements contained in this local law or any condition of the licence.

(2) Termination of a licence pursuant to this clause will not prejudice the local government's rights, powers and remedies in relation to any fee or other monies owed as a debt due to the local government under this local law or in relation to penalties for breach of this local law.

(3) Upon the expiration or earlier termination of a licence granted under clause 7.2, the licensee shall remove the vessel from the pen within 7 days. If the licensee fails to remove the vessel within 7 days the local government may remove and store the vessel and the costs of removing and storing the vessel shall be a debt due to the local government payable by the licensee and recoverable in a Court or competent jurisdiction.

(4) In the event of a licensee discontinuing the use of the pen he or she shall not be entitled to a refund of that part of any fee paid by the licensee in respect of a licence, the service fee or any other fees that may apply from time to time.

[Clause 7.7 amended by Government Gazette No. 64 of 2019]

7.8 Breach of licence

In the event of a breach by the licensee of any of the provisions of this local law, the licensee's vessel may be removed, impounded and disposed of in accordance with Part 3, Division 3, Subdivision 4 of the Act.

[Clause 7.8 inserted by Government Gazette No. 64 of 2019]

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PART 8—GENERAL PROVISIONS

8.1 Objections and appeals

When the local government makes a decision as to whether it will—

(a) grant a person a licence under this local law; or

(b) renew, vary, or cancel a licence that a person has under this local law,

the provisions of Division 1 of Part 9 of the Act and regulation 33 of the Regulations shall apply to that decision.

8.2 Notice of breach

(1) Where a breach of any provision of this local law has occurred, the local government may give a notice in writing to the person alleged to be responsible for such breach.

(2) A notice issued pursuant to subclause (1) shall—

(a) specify the provision of this local law which has been breached;

(b) specify the particulars of the breach; and

(c) state the manner in which the recipient is required to remedy the breach to the satisfaction of the local government within a time period stipulated in the notice which shall be not less than 14 days from the giving of the notice, except as provided in subclause (3).

(3) Where the breach of a notice involves or includes the treatment or use of a vessel for a limited period of time, the breach will occur if the vessel is treated or used in the manner complained of for more than the limited or stipulated time.; and

(4) It is an offence to fail to comply with a notice issued by the local government pursuant to subclause (1).

[Clause 8.2 amended by Government Gazette No. 64 of 2019]

8.3 Offences and penalties

(1) A person who—

(a) fails to do anything required or directed to be done under this local law;

(b) fails to comply with the requirements of a notice issued under this local law by the local government or by an authorised person; or

(c) does anything which under this local law that person is prohibited from doing;

commits an offence.

(2) Where, under this local law, an act is required to be done or forbidden to be done in relation to any land or premises, the owner or occupier of the land or premises has the duty of causing to be done the act so required to be done, or of preventing from being done the act forbidden to be done.

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(3) A person who commits an offence under this local law is liable to a maximum penalty of $5,000 and a maximum daily penalty of $500 in respect of each day or part of a day during which the offence has continued.

(4) Any person who fails to comply with a direction issued by an authorised person commits an offence.

(5) Any person who obstructs an authorised person in the course of the authorised person's duties under this local law commits an offence.

[Clause 8.3 amended by Government Gazette No. 64 of 2019]

8.4 Prescribed offences

(1) An offence against a clause specified in Schedule 1 is a prescribed offence for the purposes of section 9.16(1) of the Act.

(2) The amount of the modified penalty for a prescribed offence is that specified adjacent to the clause in Schedule 1-

(a) in the case of a first offence the modified penalty will be that prescribed in column 4 of Schedule 1; and

(b) in the case of a subsequent offence the modified penalty will be that prescribed in column 5 of Schedule 1.

(3) An authorised person, before giving an infringement notice to a person in respect of the commission of a prescribed offence, must be satisfied that—

(a) the prescribed offence is a relatively minor matter; and

(a) only straightforward issues of law and fact are involved in determining whether the prescribed offence was committed, and the facts in issue are readily ascertainable.

[Clause 8.4 amended by Government Gazette No. 64 of 2019]

8.5 Forms of infringement notices

For the purposes of this local law—

(a) where a vehicle is involved in the commission of an offence, the form of the notice referred to in section 9.13 of the Act is that of Form 1 of the Regulations;

(b) the form of the infringement notice given under section 9.16 of the Act is that of Form 2 in Schedule 1 of the Regulations; and

(c) the form of the notice given under section 9.20 of the Act withdrawing an infringement notice is that of Form 3 in Schedule 1 of the Regulations.

8.6 Fees and charges

Fees and charges may be imposed by the local government for the purposes of this local law in accordance with the requirements of Part 6, Division 5, Subdivision 2 of the Act.

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8.7 Costs of repair

Any person who causes damage to a jetty, bridge or pen under the care, control and management of the local government, whether or not they are committing an offence under this local law, shall pay the costs of repairing any damage caused to the local government and the local government may recover the cost as a debt due in a Court of competent jurisdiction.

[Clause 8.7 amended by Government Gazette No. 64 of 2019]

Schedule 1

Prescribed offences

[cl 8.4(1)&(2)]

City of Mandurah

Jetties, Waterways and Marina Local Law 2010

OFFENCES AND MODIFIED PENALTIES

Item No	Clause	Nature of offence	Modified penalty first offence	Modified penalty subsequent offence
1	2.1(1)	Swimming in a waterway so as to cause a nuisance in a waterway so as to cause a nuisance	$50	$100
2	2.2(a)	Fishing in a waterway from a vessel so as to cause a nuisance	$100	$200
3	2.2(b)	Using a net to fish in a waterway so as to cause a nuisance	$100	$200
4	2.2(c)	Using a gidgee or speargun to fish in a waterway so as to cause a nuisance	$100	$200
5	2.2(d)	Fishing from a private jetty or private land so as to cause a nuisance	$100	$200
6	2.3	Using a waterway so as to cause a nuisance	$100	$200
7	2.4	Maintaining a vessel so as to cause a nuisance	$100	$200

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8	2.6	Depositing or releasing pollutant into waterway	$250	$500
9	2.8(3)	Using a vessel in a waterway contrary to a sign	$100	$200
10	3.2	Mooring a vessel other than wholly within a mooring envelope	$100	$200
11	3.3	Mooring a vessel with faulty or inadequate mooring lines	$100	$200
12	3.6	Mooring or anchoring in a waterway to cause obstruction or cause a nuisance	$150	$300
13	4.2	Unauthorised mooring of a vessel at a public jetty	$100	$200
14	4.5(a)	Fishing from a public jetty or bridge so as to cause obstruction or nuisance	$100	$200
15	4.5(b)	Using a fishing net on a public jetty or bridge	$100	$200
16	4.6(a)	Selling goods or services from a vessel, public jetty or bridge	$100	$200
17	4.6(b)	Using a loud speaking device on a public jetty or bridge	$100	$200
18	4.6(c)	Interfering with the free movement of others entering or leaving a public jetty or bridge	$100	$200
19	4.6(d)	Jumping or diving from a public jetty or bridge	$100	$200
20	4.6 (e)	Use of fire hose where no emergency exists	$500	
21	4.8(1)	Causing damage to a public jetty or bridge	$200	$400
22	4.9	Causing an obstruction of a public jetty or bridge	$100	$200
23	4.10	Littering on a public jetty or bridge	$100	$200
24	4.12	Miscellaneous prohibitions	$100	$200
25	5.1	Prohibited activities on a private jetty	$100	$200
26	5.2(a)	Mooring of a commercial vessel on a private jetty	$100	$200
28	5.2(b)	Mooring of a vessel on a private jetty without consent of owner	$100	$200
29	5.3 (1)	Unsatisfactory construction of jetty or pontoon	$100	$200
30	5.3(4)	Failing to maintain private jetty or pontoon	$100	$200
31	6.1(1)	Failing to maintain waterway-edge wall	$100	$200
32	6.1(2)	Damaging a waterway-edge wall	$200	$400
33	7.1	Mooring or anchoring a vessel in a marina without a licence	$100	$200
34	7.3(2)(q)	Use of a fire hose where no emergency exists	$500	
35	8.2(4)	Failure to comply with notice	$100	$200
36	8.3(1)	Other offence not specified	$100	$200

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37	8.3(4)	Failure to comply with a direction by an authorised person	$100	$200

[Schedule 1 amended by Government Gazette No. 64 of 2019]

Schedule 2

Form 1

City of Mandurah [cl 7.2]

Jetties, Waterways and Marina Local Law 2010

APPLICATION FOR LICENCE TO MOOR VESSEL IN MARINA

I hereby apply for the allocation of boat pen accommodation at the Mandurah Ocean Marina Recreational Jetty and acknowledge that the lodgment of this application is subject to approval and payment of pen fee before occupying the pen allocated to my vessel.

Marina Selection

Mandurah Ocean Marina Recreational Berth ◯
Mandurah Ocean Marina Brokers Berth ◯
Mary Street Lagoon—Halls Head ◯
Mandurah Ocean Marina Commercial Berth ◯
South Harbour Mini Marina ◯
Dolphin Pool Recreational Berth (10 meter) ◯

Applicants Details

Applicant Name

Company Name (If invoice is to be addressed to Company Name)

Address

Postal Address (if different to above):

Home Tel:

Mobile Tel No:

Fax

Business Tel:

Email:

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Emergency Contact Name (Not Self)

Emergency Tel:

Vessel Details

Vessel Name:

Vessel Type:

Registration Number:

Insurance Company, Policy Number and Expiry and Expiry Date:

Length (m) (including extremes bowspirit and davits):

Beam(m):

Current Insurance Certificate of Currency **Attached:**

Draft(m):

Current Boat Registration/Certificate of Survey Paper **Attached**—
(Expiry Date:_____)

Commercial Operator Details

Please only answer the following questions if you are applying for a commercial berth

Commercial Activity (eg Lobster,prawn,charter))

If Fishing, company that you fish for:

I acknowledge by signing this Pen Licence Application that I have received the following documents and will comply with the terms, conditions and policies contained within these documents throughout the initial and any extended term. Should I disagree with any of the clauses within the documents I will respond in writing to the Marina Manger within 7 days from the date on this application whereby I will be entitled to a refund minus the applicable daily charge and application fees.

Marina Pen Agreement Terms and Conditions

Applicants Signature:

Date:

Approved by Marina Management:

Date:

Office Use Only
Licence from:
Licence to:
Keys Issued:
Pen Number Allocated:

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Dated 23 March 2011.

The Common Seal of the City of Mandurah was affixed by authority of a resolution of the Council in the presence of—

PATRICIA M. CREEVEY, *OAM*, Mayor.

MARK R. NEWMAN, Chief Executive Officer.

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CONSOLIDATED LOCAL LAW

CITY OF MANDURAH

CITY OF MANDURAH

LOCAL GOVERNMENT ACT 1995

CEMETERIES ACT 1986

CEMETERIES LOCAL LAW 2010

(Principle Local Law)

Gazette Number 84. 20 May 2011

CEMETERIES AMENDMENT LOCAL LAW 2018

Gazette Number 134. 7 September 2018

CEMETERIES AMENDMENT LOCAL LAW 2019

Gazette Number 32. 12 March 2019

LOCAL GOVERNMENT AMENDMENT (INFRINGEMENT NOTICES) LOCAL LAW 2021

Gazette Number 212. 17 December 2021

- PLEASE NOTE:
- This version of the City of Mandurah Cemeteries Local Law 2010 combines the:

- Principle
  - City of Mandurah Cemeteries Local Law 2010; and
- Amendment:
  - City of Mandurah Cemeteries Local Law Amendment Local Law 2018;
  - City of Mandurah Cemeteries Local Law Amendment Local Law 2019;
  - Local Government Amendment (Infringement Notices) Local Law 2021.

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LOCAL GOVERNMENT ACT 1995
CEMETERIES ACT 1986

CITY OF MANDURAH

CEMETERIES LOCAL LAW 2010

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LOCAL GOVERNMENT ACT 1995
CEMETERIES ACT 1986

CITY OF MANDURAH

CEMETERIES LOCAL LAW 2010

Under the powers conferred by the *Cemeteries Act 1986, Local Government Act 1995* and under all other powers enabling it, the Council of the City of Mandurah resolved on 27 April 2011 and subsequently amended on 28 August 2018 and 26 February 2019 to make the following local law.

PART 1—PRELIMINARY

1.1 Citation

This local law may be cited as the *City of Mandurah Cemeteries Local Law 2010*.

1.2 Interpretation

In this local law unless the context otherwise requires—

Act means the *Cemeteries Act 1986*;

ashes means so much of the remains of a dead body after the due processes of cremation as may be contained in a standard sized ashes container;

authorised person means a person -

(a) authorised by the Council, under section 9.10 of the *Local Government Act 1995* to perform all or any of the functions conferred on an authorised person under this local law; or

(b) appointed by the CEO of the Board under section 64 of the Act to issue infringement notices in accordance with section 63 of the Act;

Board means the City of Mandurah;

Cemetery means the Lakes Lawn Cemetery and the Old Mandurah Cemetery which the Governor by order has vested under the care, control and management of the Board;

CEO means the chief executive officer for the time being, of the Board;

coffin means a coffin or receptacle used for the transportation of a dead body to the grave;

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funeral includes the burial of a dead body and all associated processions and ceremonials but does not include so much of a ceremonial that is solely a religious right;

funeral director means a person holding a current funeral director's licence;

funeral director's Licence means a licence issued by the Board in accordance with part 4 which entitles the holder to conduct funerals at the Cemetery;

ground niche means a specified area of the Cemetery for the placement of ashes not being a wall niche or a grave;

memorial means a memorial plaque as described in clause 7.5, a memorial as described in clause 9.1 or as otherwise approved by the Board;

monumental mason means a person holding a current monumental mason's licence;

niche wall means a building or construction wholly above ground level so constructed as to allow the disposition of ashes into a compartment in the wall or floor and being sealed from view;

personal representative means the administrator or executor of an estate of a deceased person;

set fee refers to fees and charges set by a resolution of the Board and published in the Government Gazette, under section 53 of the Act;

single funeral permit means a permit issued by the Board under section 20 or 21 of the Act which entitles the holder to conduct at the cemetery a funeral of a person named in the permit;

standard grave means a grave which does not exceed any of the following dimensions: 2 metres long, 1.2 metres wide and 2.1 metres deep; and

vehicle has the same meaning as described in the *Road Traffic (Administration) Act 2008.*

[Clause 1.2 amended by Government Gazette; 134 of 2018 and 32 of 2019]

1.3 Repeal

Part VII of the City of Mandurah Consolidated Local Laws relating to Cemeteries as published in the *Government Gazette* of 13 February 1998 is repealed.

1.4 Application

This local law applies to the Lakes Lawn Cemetery and the Old Mandurah Cemetery located in the district of the City of Mandurah.

1.5 Commencement

This local law comes into operation 14 days after the date of its publication in the *Government Gazette*.

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PART 2—ADMINISTRATION

2.1 Powers and functions of Chief Executive Officer.

Subject to any directions given by the Board, the CEO shall exercise all the powers and functions of the Board in respect of the cemetery.

PART 3—APPLICATION FOR FUNERALS

3.1 Application for burial

(1) A person may apply for approval to bury a dead body in the cemetery in the form determined by the Board from time to time.

(2) An application under subclause (1) is to be accompanied by the set fee.

3.2 Applications to be accompanied by certificates etc

All applications referred to in clauses 3.1 shall be accompanied by either a medical certificate of death or a Coroner's order of burial, and a certificate issued under clause 3.3, in respect of the body.

3.3 Certificate of identification

(1) After a dead body is placed in a coffin and prior to a dead body being removed to the cemetery a person who personally knew the deceased shall identify the dead body and shall complete a certificate of identification in the form determined by the Board from time to time, unless—

(a) in the opinion of the Funeral Director, the dead body is not in a fit state to be viewed; or

(b) after reasonable effort the Funeral Director is unable to arrange for a person to identify the dead body.

(2) Where—

(a) in the opinion of the Funeral Director, the dead body is not in a fit state to be viewed; or

(b) after reasonable effort the Funeral Director is unable to arrange for a person to identify the dead body,

then the Funeral Director shall complete a certificate dispensing with identification in the form determined by the Board from time to time.

3.4 Minimum notice required

All bookings to hold a funeral shall be made with the Board at least 48 hours prior to the time proposed for burial on the application, otherwise an extra charge may be made.

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[Clause 3.4 amended by Government Gazette 134 of 2018]

PART 4—FUNERAL DIRECTORS

4.1 Funeral director's licence expiry

(1) A funeral director's licence shall expire on 30 June in each year.

(2) A funeral director's licence is not transferable.

4.2 Responsibilities of funeral directors

(1) The Board may upon receipt of an application in writing by any person and upon payment of the set fee issue to the applicant a funeral directors licence.

(2) The holder of a funeral director's licence shall be responsible for the compliance by every person purporting to be authorised to direct a funeral within a cemetery pursuant to that licence with—

(a) all the requirements of—

(i) the licence;

(ii) this local law; and

(iii) the Act; and

(b) any conditions imposed by the Board in respect of that licence.

4.3 Single funeral permits

Every application for a single funeral permit made under section 20 or 21 of the Act shall include coffin specifications and details of the vehicle transporting the dead body to the gravesite.

4.4 Application refusal

The Board may refuse an application for a single funeral permit if, in the opinion of the Board, either the coffin specifications or the details of the vehicle transporting the dead body to the gravesite are not structurally sound or are otherwise inadequate or inappropriate, or on any other grounds.

[Clause 4.4 amended by Government Gazette 134 of 2018]

PART 5—FUNERALS

Division 1—General

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5.1 Receipt of an application for a funeral

Upon receipt of a properly completed application form, in the form determined by the Board from time to time, and the satisfaction of all other requirements of this local law, the Board may—

(a) fix a time for the funeral; and

(b) dig or re-open any grave that is required.

5.2 Fixing times for a funeral

The time fixed for a funeral is at the discretion of the Board but subject to this Part will be as near as possible to the time requested by the applicant.

5.3 Times for burials

(1) A person shall not carry out a burial—

(a) on Christmas Day;

(b) on Good Friday; or

(c) at any time other than during the following days and hours—

(i) Monday—Friday; 9:00 a.m. to 2.30 p.m.

(ii) Saturdays, Sundays and Public Holidays; 8:30 a.m. to 11:00 a.m. except with the written permission of the Board or its authorised person.

(2) The Board may, by notice displayed at the Board's Office and at the cemetery at least one week before a Public Holiday, close the Cemetery on that Public Holiday and where a cemetery is so closed no funeral may take place within it, except with the written permission of the Board.

[Clause 5.3 amended by Government Gazette 134 of 2018]

5.4 Requirements for funerals and coffins

A person shall not bring a dead body into the cemetery unless—

(a) the Board has approved an application for the burial of that dead body in accordance with Part 3 of this local law; and

(b) it is enclosed in a coffin which in the opinion of the Board is structurally sound and bears the name of the deceased person indelibly inscribed in legible characters on a plate on the coffin's lid;

(i) under the plate referred to in subclause (b); and

(ii) there is a substantive lead strip bearing the surname of the deceased person stamped in legible characters, each character being not less than 10 mm in height.

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5.5 Funeral processions

The time fixed by the Board for any burial shall be the time at which the funeral procession is to arrive at the cemetery gates, and, if not punctually observed, then the applicant who applied to hold the funeral under clause 3.1 shall pay the set fee for being late.

5.6 Vehicle entry restricted

(1) Subject to subclause (2), every funeral procession shall enter by the principal entrance, and no vehicle except the hearse, and official mourning coaches, shall be permitted to enter the cemetery.

(2) This clause shall not apply to persons using wheelchairs or motorised wheelchairs.

5.7 Vehicle access and speed limitation

(1) A person shall drive a vehicle on a vehicular access way or the constructed roadway or other areas designated for the use of vehicles within the cemetery, unless otherwise authorised by the Chief Executive Officer.

(2) A person driving a vehicle, within a cemetery, shall not exceed the speed limit of 5 km per hour, and shall comply with the signs and directions in the cemetery.

[Clause 5.7 amended by Government Gazette 134 of 2018]

5.8 Offenders may be ordered to leave

(1) A person committing an offence under clause 5.7 may be ordered to leave the cemetery by the CEO or an authorised person.

(2) A person who has been ordered to leave the cemetery by the CEO or an authorised person is to leave immediately in a peaceful manner and not cause a disruption or be a nuisance to the funeral congregation or ceremony in procession.

5.9 Conduct of funeral by board

When conducting a funeral under section 22 of the Act the Board may—

(a) require a written request for it to conduct a funeral to be lodged with it;

(b) in its absolute discretion, charge any person requesting it to conduct a funeral the set fee for the conduct of that funeral by it;

(c) where no fee or a reduced fee has been charged by it for the conduct of the funeral, determine the manner in which the funeral shall be conducted;

(d) bury a dead body only when a permit to bury has been obtained for that body;

(e) specify an area in the cemetery where the dead body is to be buried or the ashes placed;

(f) conduct the funeral notwithstanding the failure of a person to make any application or to obtain any consent required under this local law;

(g) do or require anything which it considers is necessary or convenient for the

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conduct of a funeral by it.

Division 2—Placement of Ashes

5.10 Disposal of ashes

(1) The personal representative of a deceased person whose body has been cremated may apply, in an application under clause 3.1 or otherwise, for permission to dispose of the ashes in the cemetery and upon payment of the set fee the Board may grant permission for the ashes to be disposed of by one of the following methods—
  (a) niche wall
  (b) ground niche
  (c) family grave
  (d) scattering to the winds
  (e) other memorials approved by the Board

(2) Subject to subclauses (3) and (4), a person shall not place the ashes of a deceased person in the cemetery.

(3) An authorised person may place the ashes of a deceased person in a cemetery in accordance with the Board approval provided—
  (a) the person requesting the placement of the ashes has the permission of the Board; and
  (b) the ashes are placed within an area set aside for that purpose by the Board.

(4) An authorised person may place the ashes of a deceased person within a grave in accordance with the Board approval, provided the person requesting the placement of the ashes has the written permission of the Board and the approval of the holder of the right of burial of the grave.

PART 6—BURIALS

6.1 Depth of graves

(1) A person shall not bury a coffin within the cemetery so that the distance from the top of the coffin to the original surface of the ground is—
  (a) subject to paragraph (b), less than 750 mm, unless that person has the permission of an authorised person; or
  (b) in any circumstances less than 600 mm.

(2) The permission of the authorised person in subclause (1)(a) will only be granted where in the opinion of the authorised person exceptional circumstances require granting of that permission.

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6.2 Dimensions of graves

(1) A person shall not bury a dead body in a cemetery other than in a standard grave, unless that person has the permission of an authorised person.

(2) The permission of the authorised person in subclause (1) shall not be granted unless in the opinion of the authorised person, exceptional circumstances require granting of that permission.

[Clause 6.2 inserted by Government Gazette 134 of 2018]

6.3 Preparation of graves

A person shall not dig or prepare a grave or fill a grave, unless that person has the permission of an authorised person.

[Clause 6.3 inserted by Government Gazette 134 of 2018]

PART 7—MEMORIALS AND OTHER WORK

Division 1—General

7.1 Use of wood

No wooden fence, railing, cross, other wooden erection or temporary marker shall be allowed on or around any grave.

7.2 Plants and trees

No plants, trees or shrubs shall be placed on any grave or within the cemetery except such as shall be approved by the Chief Executive Officer.

[Clause 7.2 amended by Government Gazette 134 of 2018]

7.3 Supervision

All workers, whether employed by the Board or by any other person, shall at all times whilst within the boundaries of the cemetery be subject to the supervision of the CEO or an authorised person and shall obey such directions as the CEO or an authorised person may give.

7.4 Australian War Graves

Notwithstanding anything in this local law to the contrary, the Office of Australian War Graves—

(a) may place a memorial on a military grave;

(b) is not required to pay the set fee for any memorial that is placed upon a military grave; and

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(c) is still required to notify the Board of intending Australian War Grave and may be required to complete application for monumental works.

[Clause 7.4 amended by Government Gazette 134 of 2018]

Division 2—Memorial Plaque Section

7.5 Requirements of a memorial plaque

(1) All memorial plaques placed in a memorial plaque section of the cemetery shall—

(a) be made of admiralty bronze;

(b) not be less than the dimensions 380 mm x 280 mm,

(c) not more than 560 mm x 305 mm;

(d) not exceed 20 mm in thickness; and

(e) be placed upon a base mounting approved by the Board.

(2) Nothing, whether transparent or otherwise, shall be placed over a memorial plaque.

(3) A person shall not display any trade names or marks upon any monument erected within the lawn section of the cemetery.

[Clause 7.5 amended by Government Gazette 134 of 2018]

PART 8—GENERAL

8.1 Animals

Subject to clause 8.2, a person shall not bring an animal into or permit an animal to enter or remain in the cemetery, other than with the approval of the CEO or an authorised person.

8.2 Dogs

Dogs are permitted to be walked in the cemetery provided—

(a) they are restrained by the means of a leash or chain no longer than 2 m in length and under the control of a person capable of controlling the dog at all times; and

(b) the person responsible for the dog whilst in the cemetery removes any excreta in accordance with the *City of Mandurah Dogs Local Law* 2010 and disposes of such excreta in an appropriate waste receptacle.

[Clause 8.2 amended by Government Gazette 134 of 2018]

8.3 Prohibited activities

Unless the prior written approval of the Board or an authorised person has been obtained a person shall not—

(a) swim or wade in or remove fish or wildlife from lakes, tanks or other water features;

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(b) camp; or

(c) light a fire; within the Cemetery.

8.4 Recording

A person shall not record or film a funeral or memorial within the cemetery without the prior approval of the next of kin of the deceased person whose funeral or memorial is being held.

8.5 Damaging and removing of objects

Subject to clause 8.6, a person shall not damage, remove or pick any tree, plant, shrub or flower in the cemetery or any other object or thing on any grave or memorial or which is the property of the Board without the permission of the Board.

8.6 Withered flowers

A person may remove withered flowers from a grave or memorial and these are to be placed in a waste receptacle provided by the Board for that purpose.

[Clause 8.6 amended by Government Gazette 134 of 2018]

8.7 Littering and vandalism

A person shall not—

(a) break or cause to be broken any glass, ceramic or other material in or upon the cemetery;

(b) discard, deposit, leave or cause to be discarded, deposited or left any refuse or litter in or upon the cemetery other than in a waste receptacle provided for that purpose; or

(c) mark, scribe or write on a plinth or memorial.

[Clause 8.7 amended by Government Gazette 134 of 2018]

8.8 Advertising

(1) A person shall not advertise or carry on any trade, business or profession within the cemetery without the prior written approval of the Board.

(2) The Board may consider and grant approval subject to such conditions as the Board thinks fit.

8.9 Obeying signs and directions

A person shall obey all signs displayed, marked, placed or erected by the Board within the cemetery and any other lawful direction by the CEO or an authorised person.

8.10 Removal from the cemetery

Any person failing to comply with any provisions of this local law or behaving in a manner that in the opinion of the Board, the CEO or an authorised person is inappropriate in the

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cemetery may in addition to any penalty provided by this local law be ordered by the Board, the CEO or an authorised person to leave the cemetery for a period of not less than 12 hours.

PART 9—LAKES LAWN CEMETERY

This Part applies to the Lakes Lawn Cemetery only.

9.1 Flowers and memorials

(1) The Cemetery is a lawn cemetery and all flowers must be placed wholly within receptacles provided.

(2) An authorised person will remove all withered flowers on Monday of each week and all faded and unsightly plastic or artificial flowers and memorials on the last Monday of each calendar month.

(3) No person shall place or affix by any method any wooden, metal, plastic or stone memorials or vases, statues or photographs, pots or other memorials within the Cemetery or on the concrete plinth..

[Clause 9.1 amended by Government Gazette 134 of 2018]

PART 10—OLD MANDURAH CEMETERY

This Part applies to the Old Mandurah Cemetery only.

Division 1—Memorial Plaques

10.1 Application for monumental work

A Board may require the written consent of the holder of the right of burial of the grave to accompany an application under section 30 of the Act.

10.2 Placement of monumental work

(1) Every memorial shall be placed on proper and substantial foundations.

(2) A person shall not display any trade names or marks upon any monument erected within the cemetery.

(3) An admiralty bronze memorial plaque may be attached to a monument erected or being erected the cemetery.

10.3 Removal of rubbish

All refuse, rubbish or surplus material remaining after memorial works are completed under a permit issued under section 30 of the Act shall be immediately removed from the cemetery by the person carrying out the works.

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10.4 Operation of work

All material required in the erection and completion of any work shall, as far as practicable, be prepared before being taken to the cemetery, and all materials required by persons carrying out the works shall be admitted at such entrance as the CEO or an authorised person shall direct.

10.5 Removal of sand, soil or loam

No sand, earth or other material shall be taken from any part of the cemetery for use in the erection of any memorial or work except with the written approval of the Board.

10.6 Hours of work

Persons shall not be permitted to carry out memorial or other work on graves within the cemetery other than between the hours of 8:15 a.m. and 4:00 p.m. on weekdays or 8:15 a.m. and noon on Saturdays without the written permission of the Board.

10.7 Unfinished work

Should any work by masons or others be not completed before 4:00 p.m. on weekdays or noon on Saturdays, they shall be required to leave the work in a neat and safe condition to the satisfaction of the CEO or an authorised person.

Division 2—Licensing of Monumental Masons

10.8 Monumental mason's licence expiry

(1) A monumental mason's licence shall, subject to clause 10.12, expire on 30 June in each year.

(2) A monumental mason's licence is not transferable.

10.9 Monumental mason's licence

(1) The Board may upon receipt of an application in writing by any person and upon payment of the set fee issue to the applicant a monumental mason's licence.

(2) A licence issued under subclause (1) authorises the holder to carry out monumental works within the cemetery subject to the provisions of this local law and such conditions as the Board shall specify upon the issue of that licence.

10.10 Carrying out monumental work

(1) A person shall not carry out monumental work within the cemetery unless that person—

(a) is the holder of a current monumental mason's licence issued pursuant to clause 10.9; or

(b) is an employee of a person who holds such a licence; or

(b) is authorised by the Board to do so.

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10.11 Responsibilities of the holder of a monumental mason's licence

The holder of a monumental mason's licence shall be responsible for the compliance by every person purporting to be authorised to carry out monumental works within the cemetery pursuant to that licence this local law and any other written law which may affect the carrying out of monumental works.

10.12 Cancellation of a monumental mason's licence

(1) The Board may by notice in writing to the holder of a monumental mason's licence terminate the licence on any of the following grounds—
   (a) that the holder of the licence has committed a breach of this local law or any other written law which may affect the carrying out of monumental works; or
   (b) that the holder of the licence has purported to transfer the licence issued to that holder to another person.

(2) Upon the termination of a monumental mason's licence under this clause no part of any fee paid for the issue of that licence is refundable by the Board.

PART 11—OFFENCES AND MODIFIED PENALTIES

11.1 General

A person who commits a breach of any provision of this local law commits an offence and shall on conviction be liable to a penalty not exceeding $500.00 and if the offence is a continuing one to a further penalty not exceeding $20.00 for every day or part of a day during which the offence has continued.

11.2 Modified penalties

(1.) The offences specified in the Schedule 1 are offences which may be dealt with under section 63 of the Act.

(2.) The modified penalty payable in respect of an offence specified in the Schedule 1 is set out in the fourth column of the Schedule 1.

(3.) The prescribed form of the infringement notice referred to in section 63(1) of the Act is set out in the Schedule 2.

(4.) The prescribed form of the notice withdrawing an infringement notice referred to in section 63(3) of the Act is set out in the Schedule 3.

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Schedule 1
Local Government Act 1995 Cemeteries Act 1986
City of Mandurah Cemeteries Local Law 2010
MODIFIED PENALTIES

Item No.	Clause	Nature of offence	Modified penalty
1	5.6	Unauthorised vehicle in cemetery	$50.00
2	5.7	Driving in excess of 5kph in cemetery	$50.00
3	8.1	Unauthorised animal in cemetery	$50.00
4	8.3	Prohibited activity without approval	$50.00
5	8.4	Recording a funeral or memorial without approval	$50.00
6	8.5	Damage or removal of objects	$50.00
7	8.7	Littering and vandalism within the cemetery	$50.00
8	8.8	Unauthorised advertising, and/or trading within the cemetery	$50.00
9	8.9	Disobeying sign or lawful direction	$50.00
10	9.1(3)	Unauthorised placement of memorials, vases, statues, photographs or pots	$50.00
11	10.3	Placement and non-removal of rubbish and surplus materials	$50.00
12	10.5	Unauthorised use of earth or other material taken from another part of the cemetery	$50.00
13	10.7	Leaving uncompleted works in an untidy or unsafe condition	$50.00

[Schedule 1 amended by Government Gazette 134 of 2018]

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Schedule 2
Local Government Act 1995 Cemeteries Act 1986
City of Mandurah Cemeteries Local Law 2010
INFRINGEMENT NOTICE
FORM—NOTICE OF INFRINGEMENT

[clause 11.2(3)]

To:_____
(name)

_____
(address)

It is alleged that at_____:_____hours on_____day of 20_____at_____

_____

you committed the offence indicated below by an (x) in breach of clause ..... of the *City of Mandurah Cemeteries Local Law 2010*

_____
(Authorised Person)

Offence

- ❑ Unauthorised vehicle in cemetery
- ❑ Driving in excess of 5kph in cemetery
- ❑ Unauthorised animal in cemetery
- ❑ Prohibited activity without approval
- ❑ Recording a funeral or memorial without approval
- ❑ Damage or removal of objects
- ❑ Littering and vandalism within the cemetery
- ❑ Unauthorised advertising, and/or trading within the cemetery
- ❑ Disobeying sign or lawful direction
- ❑ Unauthorised placement of memorials, vases, statues, photographs or pots
- ❑ Placement and non removal of rubbish and surplus materials
- ❑ Unauthorised use of earth or other material taken from another part of the cemetery
- ❑ Leaving uncompleted works in an untidy or unsafe condition

Other Offence _____

$ _____

Subject to the right of the Board to refrain from accepting the modified penalty, you may dispose of the alleged offence either;

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(a) by the payment of the modified penalty shown, within 28 days of the date of the notice to the Cashier, Administration Centre, City of Mandurah, 3 Peel Street (PO Box 210), Mandurah WA 6210, or

(b) by having it dealt with by a Court.

If this modified penalty is not paid within the time specified, court proceedings may be taken against you under the *Fines, Penalties and Infringement Notice Enforcement Act 1994*.

1. INFRINGEMENT NOTICES SERVED PERSONALLY

If you take no action you may be prosecuted or enforcement action may be taken under the *Fines, Penalties and Infringement Notices Enforcement Act 1994*. Under that Act, some or all of the following actions may be taken — your driver's licence may be suspended, your vehicle licence may be suspended or cancelled, you may be disqualified from holding or obtaining a driver's licence or vehicle licence, your vehicle may be immobilised or have its number plates removed, your details may be published on a website, your earnings or bank accounts may be garnished, and your property may be seized and sold. If you change address it is important that you advise us immediately. Failure to do so may result in your Driver's Licence or any vehicle licence you hold being suspended without your knowledge.

2. INFRINGEMENT NOTICES SERVICED BY POST

If you take no action you may be prosecuted or enforcement action may be taken under the *Fines, Penalties and Infringement Notices Enforcement Act 1994*. Under that Act, some or all of the following actions may be taken — your driver's licence may be suspended, your vehicle licence may be suspended or cancelled, you may be disqualified from holding or obtaining a driver's licence or vehicle licence, your vehicle may be immobilised or have its number plates removed, your details may be published on a website, your earnings or bank accounts may be garnished, and your property may be seized and sold. If the above address is not your current address, or if you change address, it is important that you advise us immediately. Failure to do so may result in your Driver's Licence or any vehicle licence you hold being suspended without your knowledge.

PLEASE PRESENT THIS NOTICE INTACT WHEN MAKING PAYMENT. COUNCIL OFFICES TELEPHONE: 9550 3777 FACSIMILE: 9550 3888

[Schedule 2 amended by Government Gazette 134 of 2018]
[Schedule 2 amended by Gazette Number 212. 17 December 2021]

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Schedule 3

Local Government Act 1995 Cemeteries Act 1986

City of Mandurah Cemeteries Local Law 2010

WITHDRAWAL OF INFRINGEMENT NOTICE
FORM—WITHDRAWAL OF INFRINGEMENT

[clause 11.2(4)]

No._____

_____Date __/ _____ / _____

To [1] _____

Infringement Notice No _____dated __/ _____ / _____ for the alleged offence of [2]

Penalty [3] _____ is withdrawn

(Delete whichever does not apply)

* No further action will be taken.

* It is proposed to institute court proceedings for the alleged offence.

---

[1] Insert name and address of alleged offender.

[2] Insert short particulars of offence alleged.

[3] Insert amount of penalty prescribed.

_____

(Authorised Person)

_____

Dated 9 May 2011.
The Common Seal of the City of Mandurah was affixed by authority of a resolution of the Council in the presence of—

DARREN GEORGE LEE, Deputy Mayor.
Acting for the Mayor pursuant to section 5.34 of the Local Government Act 1995 (as amended)

MARK ROBERT NEWMAN, Chief Executive Officer.

_____

17

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Subject: 19.4 Monthly Financial Report - March 2026

Summary

The Financial Report for March 2026 together with associated commentaries, notes on investments, balance sheet information, schedule of accounts and the tenders awarded under the delegation by the Chief Executive Officer are presented for Elected Members' consideration.

Disclosure of Interest

Nil

Previous Relevant Documentation

G.5/6/25	25/06/2025	Budget Adoption 2025/2026
OCM 26/24	24/03/2026	Budget Review 2025/2026

Background

Nil

Comment

The Financial Report for March 2026 shows an actual surplus for this period of $40.4 million. The current surplus ensures the City has sufficient liquidity to continue meeting its operational and financial obligations through to 30 June 2026, including payment of suppliers, delivery of service levels, and progress of approved capital works.

In July each year the City issues invoices for Rates and Refuse, leading to a substantial surplus at the beginning of the financial year. As the year progresses, this surplus gradually diminishes reduces due to the City's budgetary expenditures. The Financial Report for March 2026 shows that as of March 2026, $101.48 million (93.6%) of the rates have been received, which demonstrates that the City is on track to meet its target

A summary of the financial position for March 2026 is detailed in the table below:

	Current Budget	YTD Budget (a)	YTD Actual (b)	Var. (b)-(a)	Var.% (b)-(a)/(a)
	$ 000s	$ 000s	$ 000s	$ 000s	%
Opening Funding Surplus / (Deficit)	**894**	**894**	**894**	**-**	**0%**
Revenue					
Revenue from operating activities	157,076	148,595	154,530	5,935	4%
Capital revenue, grants and Contribution	21,751	16,313	10,858	(5,455)	-33%
	178,827	**164,908**	**165,388**	**480**	
Expenditure					
Operating Expenditure	(175,306)	(129,361)	(119,333)	10,028	-8%
Capital Expenditure	(41,522)	(32,956)	(17,055)	15,920	-48%
	(216,828)	**(162,337)**	**(136,388)**	**25,948**	
Non-cash amounts excluded from operating activities	35,710	26,782	20,648	(6,134)	-23%
Non-cash amounts excluded from investing activities	(1,089)	(1,089)	2,850	3,939	-362%
Other Capital Movements	2,487	(3,900)	(13,005)	(9,105)	233%
Closing Funding Surplus / (Deficit)	**-**	**25,258**	**40,386**	**15,127**	**60%**

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The following table highlights the status of the City's key capital projects for the 2025/2026 financial year:

Project	2025/26 Actuals Incl. CMT $`000s	2025/26 Annual Budget $`000s	On Time / On Budget	Asset Classification	Comment
Mandurah Performing Arts Centre – HVAC Renewal	127	110	The project schedule is being reviewed taking into account the operational requirements of the ManPAC. The proposed construction program will be prepared as part of the detailed design phase, expected to be completed by May 2026. The project is expected to be delivered within budget.	*Buildings*	Detailed design is progressing and expected to be completed by May 2026. The final timetable for the construction works is being developed as part of the detailed design phase. Project delivery has been deferred to 2026/2027.
Coodanup Foreshore	1,337	647	Stages 1, 2 and 3 are complete. Stage 4 is expected to be delivered this financial year within budget.	*Parks*	Stages 1 and 2 were completed in December 2023. Stage 3 was completed in October 2025. Stage 4 construction works are expected to commence in April 2026.

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Falcon Coastal Shared Path	412	96	Funding received via the Australian Government Active Transport Fund. The project is expected to be completed by 2028 within budget.	*Roads*	The detailed design will be updated to incorporate the outcomes of the community consultation process and the design review. Completion of the updated detailed design is now anticipated by May 2026. Onsite construction works are expected to commence in late 2026.
Pinjarra - Anstruther Road Intersection Upgrade	600	85	The project is expected to be delivered this financial year within budget.	*Roads*	Traffic signal improvements have been approved by Main Roads WA. Construction works commenced in November 2025 with anticipated completion date in early June 2026.
Yalgorup National Park	315	76	*The Yalgorup National Park project is a 10-year economic and tourism initiative.* *The Quail Road extension construction will commence following the City receiving EBCA approval.*	*Roads*	Quail Road design is being finalised following the Department of Biodiversity, Conservation and Attractions (DBCA) and adjacent landowner consultation. The Federal Government has advised that no further assessment or approval is required under the Environmental Protection and Biodiversity Conservation (EPBC) Act. The State Government Environmental approval will proceed as a stand-alone application.

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2025/26 Budget Variations

Lakelands Park Dugout Project

The Lakelands Park Dugout project is a fully funded State election commitment of $82,000 to provide permanent player dugouts at Lakelands Park for the North Mandurah Football Club and the North Mandurah Junior Football Club.

The City is currently consulting with key stakeholders, including WA Football, to confirm the most appropriate location for the dugouts. As the football season has already commenced, construction cannot be undertaken within the current financial year.

It is therefore recommended that the $82,000 capital expenditure budget and the corresponding grant revenue be deferred to the 2026/27 financial year to align with the revised project delivery timeframe.

Mustangs Storage – Lakelands Park

The Mandurah Mustangs Football and Netball Club is relocating to Lakelands Park for the 2026 season and requires dedicated storage infrastructure to support its operational needs. The approved solution involves the installation of storage containers funded by the club and delivered through the Community Initiated Infrastructure Process.

The City's financial contribution is limited to site preparation, minor access improvements and fencing, to safely support the installation and ongoing use of the storage containers. These works are estimated to cost $25,000. Ongoing maintenance, renewal and operational responsibilities will remain with the Club under a licence arrangement. This is a cost-effective investment that improves facility functionality and reduces the risk of future operational issues within the compound.

It is proposed that this new $25,000 capital budget be funded from savings achieved in the Meadow Springs Sport Facility External Painting capital project.

Regional Road Group (RRG) Funded Projects

Following a review of the 2025/26 Regional Road Group (RRG) funded capital roads program, Main Roads WA approved scope and/or funding variations for the following projects:

- Renew – Tims Thicket Road
- Upgrade – Tims Thicket Road
- Pinjarra Road
- Preservation RRG – Coolibah Avenue

These scope variations and associated funding reallocations will enable additional priority works to be delivered, made possible by cost savings achieved within the original scopes. The changes are reallocations only and do not alter the total RRG funding or the City of Mandurah's overall contribution.

The following table summarises the proposed expenditure budget variations:

Project	Current Expenditure Budget	Proposed Expenditure Budget	Variance
Renew – Tims Thicket Road	$595,767	$492,546	-$103,221
Upgrade – Tims Thicket Road	$1,233,742	$1,336,963	$103,221

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Pinjarra Road	$2,553,754	$2,209,445	-$344,309
Preservation RRG – Coolibah Avenue	$532,000	$876,309	$344,309
Total	**$4,915,263**	**$4,915,263**	**$0**

The following table details the proposed funding budget variations:

Project	Current RRG Funding	Current CoM Funding	Proposed RRG Funding	Proposed CoM Funding	Overall Funding Variance
Renew – Tims Thicket Road	$400,000	$195,767	$331,186	$161,360	-$103,221
Upgrade – Tims Thicket Road	$800,000	$433,742	$868,814	$468,149	$103,221
Pinjarra Road	$1,672,659	$881,095	$1,443,120	$766,325	-$344,309
Preservation RRG – Coolibah Avenue	$354,667	$177,333	$584,206	$292,103	$344,309
Total	**$3,227,326**	**$1,687,937**	**$3,227,326**	**$1,687,937**	**$0**

To fully utilise the RRG funding and deliver the revised scope of works, it is requested that the revenue and expenditure budgets be amended as set out in the tables above.

Black Spot Funded Projects

Clarice Street Traffic Management

The Clarice Street Traffic Management Capital Project was undertaken to deliver pedestrian refuge islands at the Thomson Street intersection, improving the safety and functionality of north–south pedestrian movements at this key crossing between the sporting complex and the shopping centre.

The project was funded through the Black Spot Program, developed in the 2024/25 financial year, and was delivered concurrently with the Clarice Street road renewal works in 2025/26. Coordinating the delivery of both projects generated efficiencies and cost savings through shared mobilisation and construction activities.

As the project has now been completed, it is proposed that the expenditure budget be reduced by $143,569, from $191,460 to $47,890, to reflect actual costs incurred. In line with this adjustment, the grant funding budget is to be reduced by $95,713 to align with the Black Spot funding received, with a corresponding reduction of $47,856 in reserve funding.

Lynda Street and Baroy Street

The intersection of Lynda Street and Baroy Street, Falcon, has been identified as a high-risk Black Spot following analysis of recent crash data. In response to the identified safety concerns, it is proposed to upgrade the intersection by replacing the existing four-way configuration with a roundabout. This treatment is expected to improve overall intersection safety and reduce both the frequency and severity of crashes for all road users.

Funding for the project was allocated in the 2024/25 financial year, however, finalisation of the design was delayed due to an extended community engagement process. The original budget approved to deliver the scope of works was $406,641. Following completion of the detailed design, the revised cost estimate has increased to $825,800. The increase is primarily attributable to the inclusion of a

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traffic management allowance, updated road surfacing contract rates, and additional costs associated with extending pavement profiling across the full road width to remove the longitudinal joint and achieve a consistent pavement finish. Accordingly, it is requested that the expenditure budget be increased by $419,159, from $406,641 to $825,800, to enable delivery of the approved scope of works.

Main Roads Western Australia has endorsed the revised cost estimate and approved an increase in Black Spot Program funding of $288,558, in accordance with the two-thirds/one-third funding arrangement. It is therefore requested that the grant funding budget be increased from $256,367 to $544,925 to reflect the approved funding contribution.

As the City is required to fund one third of the total project cost for Black Spot projects, it is requested that the City's contribution be increased by $130,601. This increase will be accommodated through the reallocation of savings of $47,856 from the completed Clarice Street Traffic Management project above and $82,745 from savings identified in the recently completed Resurface – Canterbury & Surrounds capital project.

Statutory Environment

Local Government Act 1995 Section 6.4 Financial Report
Local Government (Financial Management) Regulations 1996 Part 4 Financial Reports
Local Government (Audit) Regulations 1996

Policy Implications

Nil

Financial Implications

Any material variances that have an impact on the outcome of the budgeted surplus position are explained in the Monthly Financial Report, as detailed in Attachment 1.

Economic Implications

Nil

Environmental Implications

Nil

Risk Implications

The Financial Report and its attachments are utilised as a key indicator to monitor against the strategic risks.

Strategic Implications

The following strategies from the City of Mandurah Strategic Community Plan 2024-2044 is relevant to this report:

Leadership
- Responsible, transparent, value for money delivery of well planned, sustainable, projects, programs and services

Conclusion
The City strives to manage its finances adequately and maintain expenditure within budget to ensure services that have been approved through the budget process are fully funded.

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It is recommended that Council receive the Monthly Financial Report and the Schedule of Accounts.

Officer Recommendation

That Council:

1. Receives the Financial Report for March 2026 as detailed in Attachment 1 of the report.

2. Receives the Schedule of Accounts for the following amounts as detailed in Attachment 2 of the report:

Total Municipal Fund	**$**	**9,327,180.09**
Total Trust Fund	**$**	**0.00**
	$	**9,327,180.09**

3 Approves the following budget variations for 2025/26 annual budget:

3.1 Decrease in capital expenditure of $82,000 for the Lakelands Park Dugout Project
- **$82,000 be transferred into the Asset Management Reserve**

3.2 New capital expenditure of $25,000 for the Mustangs Storage – Lakelands Park
- **To be funded from a decrease in capital expenditure of $25,000 from the Meadow Springs Sport Facility External Painting capital project**

3.3 Reallocation of Regional Road Group (RRG) Capital Expenditure Budgets as follows:
- **Decrease of $103,221 from Renew – Tims Thicket Road**
- **Increase of $103,221 to Upgrade – Tims Thicket Road**
- **Decrease of $344,309 from Pinjarra Road**
- **Increase of $344,309 to Preservation RRG – Coolibah Avenue**

3.4 Decrease in capital expenditure of $143,569 for the Clarice Street Traffic Management project
- **Funded by Decrease in Black Spot Program grant revenue of $95,713 and decrease in asset management reserve transfer out of $47,856**

3.5 Increase in capital expenditure of $419,159 for Lynda Street and Baroy Street Intersection project funded by:
- **Increase in Black Spot grant revenue of $288,558**
- **Increase in transfer out of asset management reserve of $47,856**
- **Decrease in Resurface – Canterbury & Surrounds capital project of $82,745**

Absolute Majority

Attachments

1. Financial Report - March 2026 [19.4.1 - 25 pages]
2. Schedule of Accounts - March 2026 (electronic copy only)

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City of Mandurah
March 2026

$0K

Estimated deficit at 30 June 2026 with proposed budget amendments

$40.4M ▼

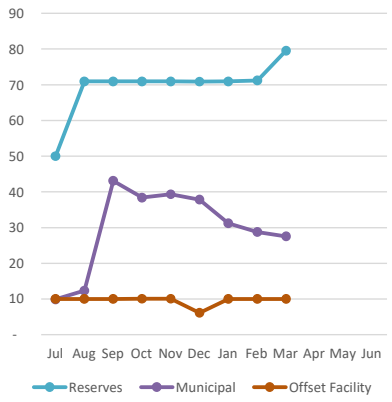
Year to Date Actual Surplus

Executive Summary

- Actual Rates Raised $104.4M
- Actual Rates Received $101.5M (93.6% collected)
- Actual Operating Revenue $154.5M
- Actual Capital Revenue $3.6M
- Actual Operating Expenditure $119.3M
- Actual Capital Expenditure $17.1M
- Actual Proceeds from Sale of Assets $7.3M

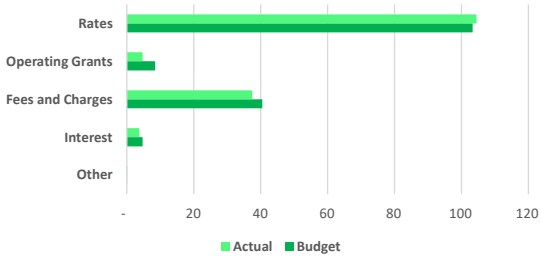
Investments

$ Millions

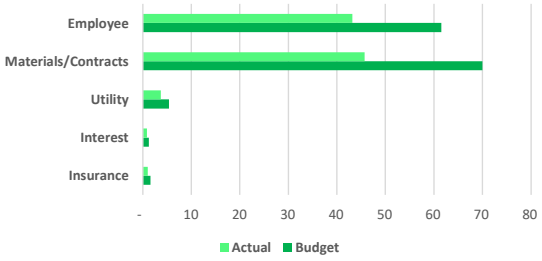


Year to Date Revenue Actuals Compared to Annual Budget

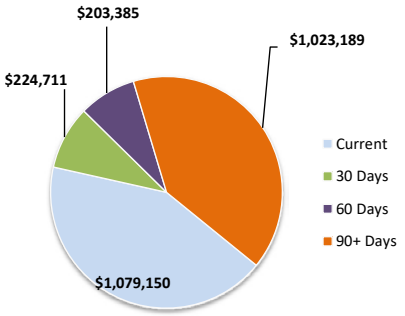
$ Millions



Year to Date Expenditure Actuals Compared to Annual Budget $ Millions



Sundry Debtors Outstanding



Rates Outstanding

41	Properties with >$10K outstanding ▼
522	Properties $3K to $10K outstanding ▼
2	Properties commenced legal action in 25/26 ▲
$2.34M	Estimated Value of Rates Exemptions =

Grants Received in 25/26 year

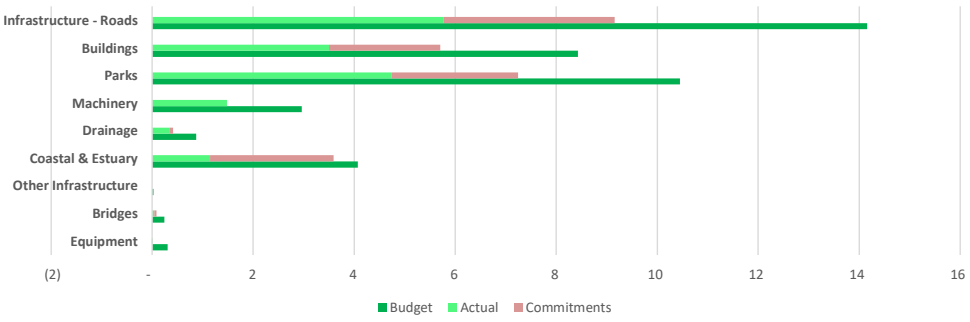
41.49% Grants received - Accrual Basis

CEO Delegation Tenders

Nil Tenders accepted/rejected during the month through CEO delegation

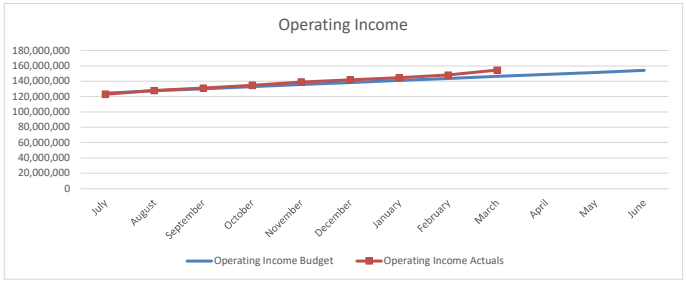
Year to Date Capital Actuals Compared to Annual Budget*

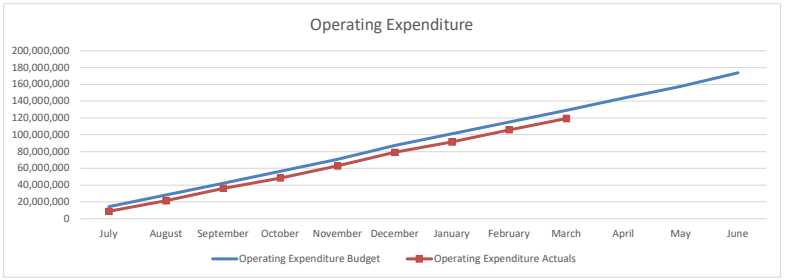
$ Millions

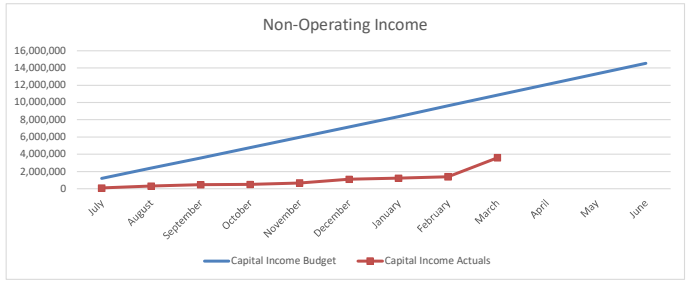


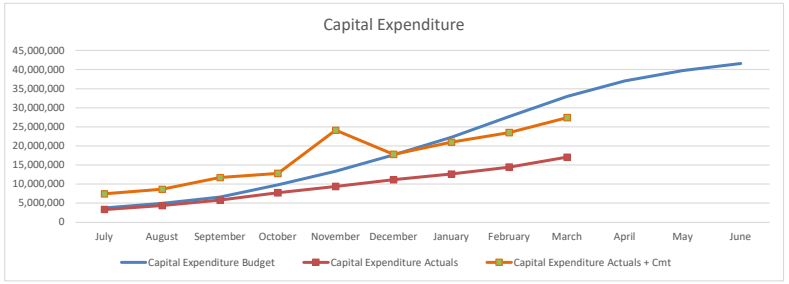
*Commitments are raised based on contract amounts. Contracts may span multiple financial years causing commitments to display over the total budget for the year.

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CITY OF MANDURAH

MONTHLY FINANCIAL REPORT
For the Period Ended 31 March 2026

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STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

BY NATURE OR TYPE

	Ref Note	Annual Budget	YTD Budget (a)	YTD Actual (b)	Var. $ (b)-(a)	Var. % (b)-(a)/(a)	Var.
		$	$	$	$	%	
Opening Funding Surplus / (Deficit)		893,701	893,701	**893,701**	0	0.00%	
Revenue from operating activities							
Rates		103,315,184	103,315,184	**104,414,318**	1,099,134	1.06%	
Operating grants, subsidies and contributions		8,428,247	6,423,525	**4,692,496**	(1,731,029)	(26.95%)	▼
Fees and charges		40,509,205	35,238,684	**37,522,335**	2,283,651	6.48%	
Interest earnings		4,750,824	3,563,118	**3,744,606**	181,488	5.09%	
Other revenue		72,731	54,548	**202,090**	147,542	270.48%	▲
Profit on disposal of assets		-	-	**3,953,953**	3,953,953	100.00%	▲
		157,076,191	**148,595,059**	**154,529,798**	5,934,739	3.99%	
Expenditure from operating activities							
Employee costs		(61,504,572)	(44,202,122)	**(43,196,202)**	1,005,920	2.28%	
Materials and contracts		(69,951,776)	(52,232,932)	**(45,713,179)**	6,519,753	12.48%	▲
Utility charges		(5,354,483)	(4,015,861)	**(3,688,428)**	327,433	8.15%	
Depreciation on non-current assets		(35,498,636)	(26,623,977)	**(24,726,713)**	1,897,264	7.13%	
Interest expenses		(1,225,753)	(919,315)	**(889,085)**	30,230	3.29%	
Insurance expenses		(1,615,556)	(1,211,667)	**(1,022,250)**	189,417	15.63%	▲
Other expenditure		(155,279)	(155,279)	**(53,135)**	102,144	65.78%	▲
Loss on disposal of assets	1(a) & 4	-	-	**(43,985)**	(43,985)	100.00%	▼
		(175,306,055)	**(129,361,153)**	**(119,332,977)**	10,028,176	7.75%	
Non-cash amounts excluded from operating activities	1(a)	35,709,803	26,782,353	**20,648,135**	(6,134,217)	(22.90%)	
Amount attributable to operating activities		**17,479,939**	**46,016,259**	**55,844,956**	9,828,697	(21.36%)	
Investing activities							
Non-operating grants, subsidies and contributions		11,562,826	8,672,120	**3,601,523**	(5,070,596)	(58.47%)	▼
Proceeds from disposal of assets	4	10,187,935	7,640,951	**7,256,442**	(384,509)	(5.03%)	
Payments for property, plant and equipment	6	(41,521,843)	(32,975,509)	**(17,055,471)**	15,920,038	48.28%	▲
Amount attributable to investing activities		**(19,771,083)**	**(16,662,438)**	**(6,197,506)**	10,464,933	62.81%	
Non-cash amounts excluded from investing activities	1(b)	(1,089,126)	(1,089,126)	**2,849,522**	3,938,648	(361.63%)	
Amount attributable to investing activities		**(20,860,209)**	**(17,751,564)**	**(3,347,984)**	14,403,581	81.14%	
Financing Activities							
Proceeds from new debentures	7	3,720,871	-	-	0	0.00%	
Unspent Loans Utilised		554,758	-	-	0	0.00%	
Repayment of debentures	7	(4,946,758)	(3,710,069)	**(3,887,697)**	(177,629)	(4.79%)	
Payment of lease liability		(239,178)	(179,383)	**(120,514)**	58,869	32.82%	▲
Principal elements of interest earning liability		(998,927)	(749,195)	**(741,816)**	7,379	0.98%	
Transfer from reserves	8	20,801,108	8,993,570	-	(8,993,570)	(100.00%)	▼
Transfer to reserves	8	(16,405,306)	(8,255,126)	**(8,255,126)**	0	0.00%	
Amount attributable to financing activities		**2,486,569**	**(3,900,202)**	**(13,005,153)**	(9,104,950)	(233.45%)	
Closing Funding Surplus / (Deficit)	1(d)	-	**25,258,193**	**40,385,521**	15,127,328	59.89%	

KEY INFORMATION

▲▼ Indicates a variance between Year to Date (YTD) Actual and YTD Budget data as per the adopted materiality threshold.
Refer to Note 13 for an explanation of the reasons for the variance.
This statement is to be read in conjunction with the accompanying Financial Statements and Notes.

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

NOTE 1
STATEMENT OF FINANCIAL ACTIVITY INFORMATION

(a) Non-cash items excluded from operating activities

The following non-cash revenue and expenditure has been excluded from operating activities within the Statement of Financial Activity in accordance with Local Government (Financial Management) Regulation 1996.

Non-cash items excluded from operating activities	Notes	Annual Budget	YTD Budget (a)	YTD Actual (b)
		$	$	$
Adjustments to operating activities				
Less: Profit on asset disposals	4	-	-	(3,953,953)
Less: Non-cash movement in assets		106,000	79,500	0
Movement in liabilities associated with restricted cash		105,167	78,875	228,677
Movement in pensioner deferred rates (non-current)		-	-	(215,943)
Movement in employee benefit provisions (non-current)		-	-	(175,219)
Movement in Liabilities		-	-	(6,125)
Add: Loss on asset disposals	4	-	-	43,985
Add: Depreciation on assets		35,498,636	26,623,977	24,726,713
Total non-cash items excluded from operating activities		**35,709,803**	**26,782,353**	**20,648,135**

(b) Non-cash items excluded from investing activities

The following non-cash revenue and expenditure has been excluded from investing activities within the Statement of Financial Activity in accordance with Financial Management Regulation 32.

Adjustments to investing activities				
Movement in non current liabilities for transfers to acquire or construct non-financial assets to be controlled by the entity				
Movement in current liabilities for transfers to acquire or construct non-financial assets to be controlled by the entity associated with restricted cash		(1,089,126)	(816,845)	2,849,522
Total non-cash amounts excluded from investing activities		**(1,089,126)**	**(816,845)**	**2,849,522**

(c) Adjustments to net current assets in the Statement of Financial Activity

The following current assets and liabilities have been excluded from the net current assets used in the Statement of Financial Activity in accordance with regulation 32 of the Local Government (Financial Management) Regulations 1996 to agree to the surplus/(deficit) after imposition of general rates.

		Actual Closing 30 Jun 2025	Budget Closing 30 Jun 2026	Year to Date 31 Mar 2026
Adjustments to net current assets				
Less: Reserves - restricted cash		(65,678,157)	(63,912,022)	(73,933,283)
Less: - Financial assets at amortised cost - self supporting loans		(47,106)	-	0
Less: Unspent loans		(625,629)	-	(625,629)
Less: Inventory - Land Held for Resale		(445,000)	(445,000)	(445,000)
Less: Clearing accounts		-	-	13,189
Add: Borrowings	7	6,509,258	3,408,759	1,617,970
Add: Other liabilities		1,866,747	-	5,637,024
Add: Lease liability		173,812	1,023,531	195,985
Add: Provisions - employee		4,509,712	806,283	4,195,252
Add: Loan Facility offset		-	-	10,000,000
Total adjustments to net current assets		**(53,736,363)**	**(59,118,449)**	**(53,344,491)**

(d) Net current assets used in the Statement of Financial Activity

Current assets				
Cash and cash equivalents	2	61,810,975	81,166,308	106,058,553
Rates receivables	3	5,061,263	3,055,524	7,576,852
Receivables	3	3,522,190	2,607,617	5,579,499
Other current assets		24,648,414	2,273,976	1,302,205
Less: Current liabilities				
Payables		(21,969,391)	(14,511,115)	(10,460,137)
Borrowings	7	(6,509,258)	(3,408,759)	(1,617,970)
Interest earning liabilities		-	-	(257,111)
Unspent non-operating grant, subsidies and contributions liability		(1,866,747)	(2,461,785)	(4,944,944)
Lease liabilities		(173,812)	(1,023,531)	(195,985)
Provisions		(9,893,570)	(8,579,786)	(9,310,951)
Less: Total adjustments to net current assets	1(c)	(53,736,363)	(59,118,449)	(53,344,491)
Closing Funding Surplus / (Deficit)		**893,701**	**(0)**	**40,385,520**

CURRENT AND NON-CURRENT CLASSIFICATION

In the determination of whether an asset or liability is current or non-current, consideration is given to the time when each asset or liability is expected to be settled. Unless otherwise stated assets or liabilities are classified as current if expected to be settled within the next 12 months, being the Council's operational cycle.

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

OPERATING ACTIVITIES
NOTE 2
CASH AND INVESTMENTS

	Total Amount	Interest rate	Total Interest Earnings at Maturity Date	S&P rating	Deposit Date	Maturity Date	Term days
	$	$	$				
Cash on hand	**25,389,484**			**AA-**			
Municipal Bank Account (inc. Bonds Investments & Notice Savers)	25,389,484	Variable			NA	NA	
ANZ	**32,894**		**242**	**AA-**			
ANZ TD 10	32,894	3.00%	242		1/01/2026	1/04/2026	90
NAB	**35,670,684**		**396,608**	**AA-**			
NAB TD 114	3,232,909	4.45%	46,616		4/02/2026	4/06/2026	120
NAB TD 115	3,208,335	4.40%	34,056		17/02/2026	17/05/2026	89
NAB TD 125	3,097,177	4.60%	35,499		9/03/2026	9/06/2026	92
NAB TD 126	3,097,177	4.60%	35,499		9/03/2026	9/06/2026	92
NAB TD 127	3,097,177	4.60%	35,499		9/03/2026	9/06/2026	92
NAB TD 133	3,072,799	4.25%	31,867		30/01/2026	30/04/2026	90
NAB TD 131	3,072,922	4.20%	31,497		25/01/2026	25/04/2026	90
NAB TD 134	3,072,799	4.25%	31,867		30/01/2026	30/04/2026	90
NAB TD 42 - 36-976-7906	3,584,837	4.40%	38,476		10/02/2026	11/05/2026	90
Reserve 44 - 70-586-3025	3,569,838	4.40%	37,893		18/02/2026	18/05/2026	89
Reserve 45 - 70-568-6989	3,564,714	4.40%	37,839		18/02/2026	18/05/2026	89
Westpac	**34,186,635**		**494,504**	**AA-**			
WBC TD 102	3,273,298	4.93%	40,176		21/03/2026	21/06/2026	92
WBC TD 110	3,224,370	4.27%	111,085		2/07/2025	2/05/2026	304
WBC TD 119	3,080,117	4.93%	37,805		20/03/2026	20/06/2026	92
WBC TD 120	3,080,117	4.93%	37,805		20/03/2026	20/06/2026	92
WBC TD 121	3,080,117	4.93%	37,805		20/03/2026	20/06/2026	92
WBC TD 122	3,074,423	4.31%	43,308		2/12/2025	2/04/2026	121
WBC TD 123	3,074,423	4.31%	43,308		2/12/2025	2/04/2026	121
WBC TD 124	3,074,423	4.31%	43,308		2/12/2025	2/04/2026	121
WBC TD 128	3,075,116	4.44%	33,302		24/01/2026	24/04/2026	90
WBC TD 129	3,075,116	4.44%	33,302		24/01/2026	24/04/2026	90
WBC TD 130	3,075,116	4.44%	33,302		24/01/2026	24/04/2026	90
CBA	**11,795,987**		**125,776**	**AA-**			
CBA TD 47 - B33713404	4,727,684	4.42%	50,409		11/02/2026	11/05/2026	89
CBA TD 48 - B33713404	7,068,303	4.42%	75,367		11/02/2026	11/05/2026	89
Total Municipal and Reserve Funds	**107,075,683**		**1,017,130.28**				

Interest revenue	
Investment Interest Accrued	578,355
Investment Interest Matured	2,364,316
Rates Interest	801,935
	3,744,606

Municipal Cash	Total Restricted Cash
$37.51 M	**$79.56 M**

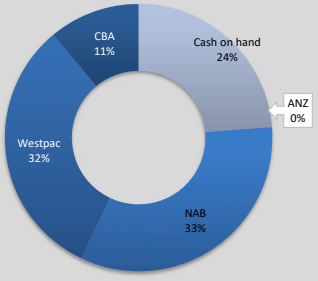
Loan Offset Facility	**Amount**	**Interest rate on loans**	**Monthly Interest Saved**	**YTD Interest Saved**
Westpac	10,000,000	5.58%	13,714	127,738

KEY INFORMATION

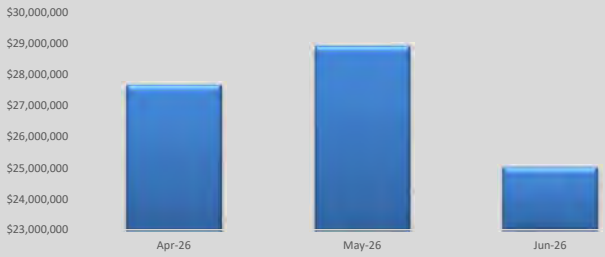
Cash and cash equivalents include cash on hand, cash at bank, deposits available on demand with banks and other short term highly liquid investments highly liquid investments with original maturities of twelve months or less that are readily convertible to known amounts of cash and which are subject to an insignificant risk of changes in value and bank overdrafts. Bank overdrafts are reported as short term borrowings in current liabilities in the statement of net current assets.

The local government classifies financial assets at amortised cost if both of the following criteria are met:
- the asset is held within a business model whose objective is to collect the contractual cashflows, and
- the contractual terms give rise to cash flows that are solely payments of principal and interest.

% of Investments with each institution



Invested Funds Maturing Timeline



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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY

FOR THE PERIOD ENDED 31 MARCH 2026

OPERATING ACTIVITIES
NOTE 3
RECEIVABLES

Rates Receivable	30-Jun-25	31-Mar-25	31 Mar 26
	$		$
Opening Arrears Previous Years	3,721,461	3,721,461	3,963,715
Rates levied	98,363,858	98,174,002	104,414,318
Less - Collections to date	(98,121,604)	(92,249,681)	(101,480,275)
Equals Current Outstanding	**3,963,715**	**9,645,782**	**6,897,759**
Net Rates Collectable	**3,963,715**	**9,645,782**	**6,897,759**
% Collected	96.1%	90.5%	93.6%

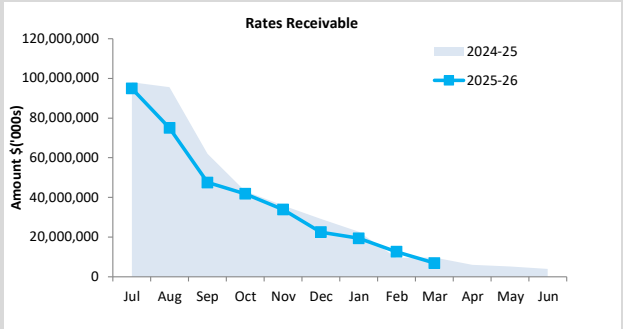
	31 Mar 25	31 Mar 26
- No. of Legal Proceedings Commenced for the financial year	0	2
- No. of properties > $10,000 outstanding	54	41
- No. of properties between $3,000 and $10,000 outstanding	416	522
- Value of Rates Concession	49,247	51,256
- Estimated Value of Rates Exemptions	2,243,551	2,335,088

Receivables - General	31-Mar-25	Current	30 Days	60 Days	90+ Days	31 Mar 26
	$	$	$	$	$	$
Balance per Trial Balance						
Sundry receivable	1,859,536	975,797	167,033	159,339	551,253	1,853,422
Recreation Centres	51,906	0	25,443	10,200	18,969	54,612
Mandurah Ocean Marina	74,645	161,028	0	0	0	161,028
GST receivable	389,147	(74,598)	0	0	0	(74,598)
Allowance for impairment of receivables	(215,611)	0	0	0	(269,893)	(269,893)
Infringements	1,180,636	16,923	32,235	33,846	722,860	805,864
Total Receivables General Outstanding	**3,340,259**	**1,079,150**	**224,711**	**203,385**	**1,023,189**	**2,530,434**
Percentage		42.6%	8.9%	8%	40.4%	

Other Receivables	31-Mar-25	Current	30 Days	60 Days	90+ Days	31 Mar 26
	$	$	$	$	$	$
Balance per Trial Balance						
Pensioners rates and ESL deferred	3,958,784	0	0	0	2,907,075	2,907,075
Other Receivables	592,296	0	0	0	767,530	767,530
Total Other Receivables Outstanding	**4,551,080**	**0**	**0**	**0**	**3,674,605**	**3,674,605**
Percentage		0%	0%	0%	100%	

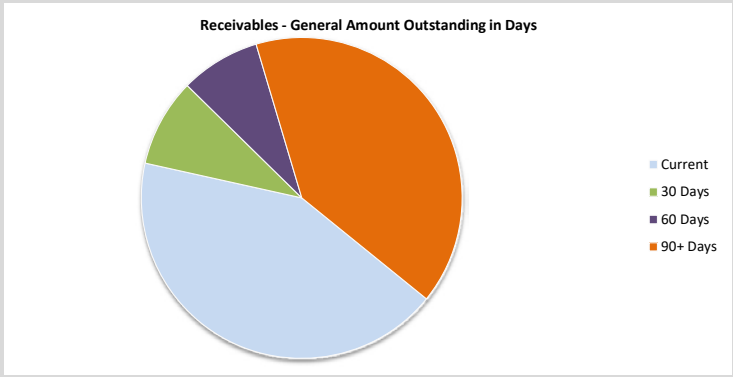
KEY INFORMATION

Rates and other receivables include amounts due from ratepayers for unpaid rates and service charges and other amounts due from third parties for goods sold and services performed in the ordinary course of business. Receivables expected to be collected within 12 months of the end of the reporting period are classified as current assets. All other receivables are classified as non-current assets. Collectability of rates and other receivables is reviewed on an ongoing basis. Other receivables that are known to be uncollectible are written off when identified. An allowance for doubtful debts is raised when there is objective evidence that they will not be collectible.



Total investments

Collected	Rates Due
93.6%	$6,897,759



Debtors Due
$2,530,434

Over 30 Days
57%

Over 90 Days
40%

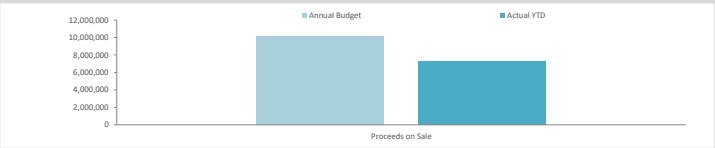
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OTES TO THE STATEMENT OF FINANCIAL ACTIVITY
R THE PERIOD ENDED 31 MARCH 2026

OPERATING ACTIVITIES
NOTE 4
DISPOSAL OF ASSETS

Asset	Asset ID	Directorate	Budget Net Book Value	Budget Proceeds	Budget Profit	Budget (Loss)	YTD Actual Net Book Value	YTD Actual Proceeds	YTD Actual Profit	YTD Actual (Loss)
			$	$	$	$	$	$	$	$
Land										
Land			8,954,091	8,954,091	0	0	2,833,788	6,608,498	3,774,710	0
Light Passenger Vehicles - Replacement										
TOYOTA RAV4 MH3305B	C03720	Built & Natural Enviroment	13,967	23,384	9,417	0	16,020	23,384	7,364	0
TOYOTA RAV4 MH3303B	C04520	Built & Natural Enviroment	13,732	13,732	0	0	15,748	24,787	9,039	0
SUBARU IMPREZA MH3596B	C07220	Built & Natural Enviroment	9,707	9,707	0	0	10,660	17,742	7,082	0
SUBARU G-5X MH3595B	C04920	Built & Natural Enviroment	13,365	16,605	3,241	0	14,568	16,605	2,037	0
MAZDA CX-5B MH3898B	C05220	Built & Natural Enviroment	16,708	16,708	0	0	0	0	0	0
TOYOTA RAV4 MH3968B	C00320	Built & Natural Enviroment	16,429	16,429	0	0	0	0	0	0
MAZDA CX-5 MH3442B	C02820	Built & Natural Enviroment	16,277	14,333	0	(1,944)	17,460	14,333	0	(3,127)
TOYOTA RAV 4 MH4237B	C07720	Built & Natural Enviroment	15,531	15,531	0	0	0	0	0	0
MAZDA CX-5 MH4179B	C01020	Built & Natural Enviroment	15,784	21,338	5,554	0	17,000	21,338	4,338	0
SUBARU XV MH4100B	C07320	Built & Natural Enviroment	18,559	18,559	0	0	19,900	22,378	2,478	0
NISSAN X-TRAIL MH4678B	C00821	Built & Natural Enviroment	19,352	19,352	0	0	0	0	0	0
NISSAN X-TRAIL MH4677B	C05321	Built & Natural Enviroment	19,352	19,352	0	0	0	0	0	0
TOYOTA RAV4 MH5185B	C04221	Built & Natural Enviroment	16,906	16,906	0	0	17,700	26,833	9,133	0
MH8697B - MAZDA CX-5B	C00623		0	0	0	0	18,573	0	0	(18,573)
Light Commercial Vehicles - Replacement										
DMax 21MY SX MH3592B	U00920	Built & Natural Enviroment	15,048	15,048	0	0	0	0	0	0
FORD RANGER MH3198B	U00120	Built & Natural Enviroment	24,776	24,776	0	0	0	0	0	0
ISUZU D-MAX 21MY SX CREW C/C HI-RIDE 4X2 3.0L MH3535	U07020	Built & Natural Enviroment	16,903	16,903	0	0	18,245	24,039	5,794	0
NAVARA NAVDP2YA4RX MH3219B	U05620	Built & Natural Enviroment	18,398	18,398	0	0	0	0	0	0
FORD RANGER MH3008B	U06320	Built & Natural Enviroment	24,455	24,455	0	0	0	0	0	0
DMax 21MY SX MH4104B	U01421	Built & Natural Enviroment	20,273	20,273	0	0	0	0	0	0
DMax 21MY SX MH4106B	U03721	Built & Natural Enviroment	20,475	20,475	0	0	0	0	0	0
ISUZU D-MAX 21MY SX CREW 4X2 MH4408B	U06420	Built & Natural Enviroment	17,618	17,618	0	0	0	0	0	0
NISSAN NAVARA RX MH4406B	U00520	Built & Natural Enviroment	13,434	13,434	0	0	0	0	0	0
ISUZU D'MAX MH4431B	U02121	Built & Natural Enviroment	21,009	21,009	0	0	0	0	0	0
ISUZU D-MAX SX 4X2 MH4650B	U06221	Built & Natural Enviroment	23,928	23,928	0	0	0	0	0	0
FORD RANGER MH4394B	U01121	Built & Natural Enviroment	28,129	28,129	0	0	0	0	0	0
FORD RANGER MH4802B	U03021	Built & Natural Enviroment	20,047	20,047	0	0	0	0	0	0
ISUZU MU-X MH5376B	C08121	Built & Natural Enviroment	32,758	30,931	0	(1,827)	34,300	30,931	0	(3,369)
FORD RANGER MH4395B	U08221	Built & Natural Enviroment	28,153	23,611	0	(4,542)	29,700	23,611	0	(6,089)
ISUZU D'MAX MH5382B	U08321	Built & Natural Enviroment	19,818	34,293	14,474	0	21,000	34,293	13,293	0
FORD RANGER MH5032B	U04421	Built & Natural Enviroment	16,518	19,065	2,548	0	17,425	19,065	1,640	0
ISUZU DMAX MH5225B	U01821	Built & Natural Enviroment	25,429	25,429	0	0	0	0	0	0
ISUZU 21 MY SX MH5229B	U06121	Built & Natural Enviroment	29,216	29,216	0	0	0	0	0	0
FORD TRANSIT CUSTOM MH3933B	U01520	Built & Natural Enviroment	16,940	16,940	0	0	18,475	30,242	11,767	0
MH5451B-ISUZU D'MAX SX	U00221	Built & Natural Enviroment	0	0	0	0	25,500	20,242	0	(5,258)
Trucks & Buses Replacements										
HINO 1124 MH0562A	T01615	Built & Natural Enviroment	0	0	0	0	0	0	0	0
HINO 917 MH1429A	T03016	Built & Natural Enviroment	0	0	0	0	0	0	0	0
HINO 917 MH1627A	T03716	Built & Natural Enviroment	0	0	0	0	0	0	0	0
HINO 917 MH1625A	T04016	Built & Natural Enviroment	0	0	0	0	0	0	0	0
HINO SCARAB MISTRAL HINO 1426 1GWL205	T05019	Built & Natural Enviroment	0	0	0	0	0	0	0	0
Trailers										
JETWAVE DRAIN CLEANER MH90408	V02917	Built & Natural Enviroment	5,041	5,041	0	0	0	0	0	0
SOUTHWEST CARGO	V04116	Built & Natural Enviroment	3,784	3,784	0	0	0	0	0	0
SOUTHWEST BOX/TRADE	V042	Built & Natural Enviroment	0	0	0	0	0	0	0	0
SOUTHWEST CARGO	V04316	Built & Natural Enviroment	0	0	0	0	0	0	0	0
PARK BODY BOXTOP	V06316	Built & Natural Enviroment	3,960	3,960	0	0	3,781	3,209	0	(572)
Parks & Mowers										
KUBOTA RTV UTILITY MH2715	U10819	Built & Natural Enviroment	7,282	7,282	0	0	0	0	0	0
RAZORBACK CMX2302 RAZORBA	M00521	Built & Natural Enviroment	5,673	5,673	0	0	4,500	9,436	4,936	0
Toro Groundsmaster-3310 MH6372B	M01521	Built & Natural Enviroment	26,730	26,730	0	0	0	0	0	0
TORO GROUNDMASTER 7200 MH6373B	M01921	Built & Natural Enviroment	10,582	10,582	0	0	0	0	0	0
TORO REELMASTER 1HOG168	M02522	Built & Natural Enviroment	39,162	39,162	0	0	0	0	0	0
MH761X-NEW HOLLAND -3050 TRACTOR	P602		0	15,427	15,427	0	15,907	15,427	0	(480)
Miscellaneous Equipment										
SILVAN SQUATPAK SPRAY N/A	P156	Built & Natural Enviroment	0	0	0	0	0	0	0	0
OTHER ASSES		Built & Natural Enviroment	0	24,008	0	0	0	0	0	0
Carryovers - Miscellaneous										
GENELITE GENERATOR PLG-CM550S	P63820	Recreation Services	91,287	91,287	0	0	0	0	0	0
Carryovers - Trucks and Buses										
MITSUBISHI CANTER MH380Y	T017	Parks Central	26,320	26,320	0	0	21,149	31,252	10,103	0
HINO 917 MH958Y	T036	Parks North	29,606	29,606	0	0	0	0	0	0
ISUZU FVR 1000 MH954Y	T009	Civil Construction	65,907	65,907	0	0	51,215	84,624	33,409	0
HINO 1426 MH200W	T022	Civil Maintenance	36,504	36,504	0	0	42,000	45,899	3,899	0
HINO GH1728 MH637Y	T038	Civil Construction	68,383	68,383	0	0	0	0	0	0
HINO 921 MH1428A	T03916	City Traffic	0	52,191	52,191	0	21,921	52,191	30,270	0
Carryovers - Parks and Mowers										
Tractor	P603	Parks and Mowers - Replacement	25,461	27,325	1,864	0	23,554	27,325	3,771	0
RTV Utility	U10519	Parks and Mowers - Replacement	5,010	13,719	8,709	0	4,935	13,719	8,784	0
RTV Utility	U10619	Parks and Mowers - Replacement	5,010	15,041	10,031	0	4,935	15,041	10,106	0
Carryovers - Trailers										
SOUTHWEST 8x5 BOXTOP MH92151	V03420	Civil Construction	0	0	0	0	6,517	0	0	(6,517)
					0	0			0	0
			10,048,784	**10,187,935**	**123,455**	**(8,312)**	**3,346,476**	**7,256,442**	**3,953,953**	**(43,985)**

KEY INFORMATION



Proceeds on Sale		
Annual Budget	YTD Actual	%
$10,187,935	$7,256,442	71%

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

NOTE 5
TENDERS/QUOTES AWARDED FOR THE MONTH

CEO delegation – accepted/rejected tenders during the month
Awarded under Financial Authorisation $250,000 and above

Tender code	Tender Description	Company Awarded to	Contract Term	Contract Amount
Nil	Nil	Nil	Nil	Nil

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

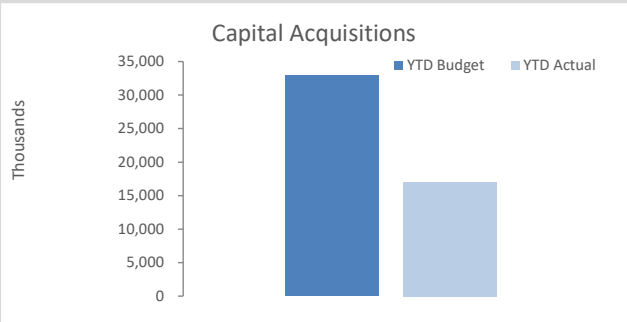
INVESTING ACTIVITIES
NOTE 6
CAPITAL ACQUISITIONS

Capital Acquisitions	Adopted Budget	Annual Budget	YTD Budget	YTD Actual	YTD Actual Variance
	$		$	$	$
Buildings	8,378,595	8,433,316	5,848,186	3,500,572	(2,347,614)
Equipment	200,000	305,652	257,017	12,732	(244,285)
Machinery	2,891,120	2,960,939	2,220,704	1,482,139	(738,564)
Infrastructure - Roads	13,832,059	14,158,013	11,229,120	5,772,536	(5,456,584)
Bridges	444,678	241,517	154,913	44,678	(110,235)
Parks	8,969,470	10,450,187	8,929,357	4,747,736	(4,181,622)
Drainage	586,146	871,176	722,418	338,471	(383,947)
Coastal & Estuary	5,015,819	4,076,043	3,595,043	1,144,075	(2,450,968)
Other Infrastructure	150,000	25,000	18,750	-	(18,750)
Capital Expenditure Totals	**40,467,886**	**41,521,843**	**32,975,509**	**17,042,939**	**(15,932,570)**
Capital Acquisitions Funded By:					
	$		$	$	$
City of Mandurah Contribution	**14,465,162**	**13,062,876**	**11,646,952**	**12,793,472**	1,146,520
Capital grants and contributions	**12,052,916**	**11,512,826**	**8,618,951**	**3,601,523**	(5,017,428)
Borrowings	**7,510,655**	**3,720,871**	**2,790,653**	-	(2,790,653)
Other (Disposals & C/Fwd)	**989,153**	**1,233,844**	**925,383**	**647,944**	(277,439)
Cash Backed Reserves					
Asset Management Reserve	**5,300,000**	**9,691,073**	**7,268,305**	-	(7,268,305)
Sustainability Reserve	**57,500**	**57,500**	**43,125**	-	(43,125)
Sanitation Reserve	**92,500**	**1,109,589**	**832,192**	-	(832,192)
Major Public Artworks	-	**125,000**	**93,750**	-	(93,750)
Specified Area Rates - Mandurah Quay Canals	-	**49,152**	**36,864**	-	(36,864)
Plant Reserve	-	**959,112**	**719,334**	-	(719,334)
Capital Funding Total	**40,467,886**	**41,521,843**	**32,256,174**	**17,042,939**	**(15,932,570)**

SIGNIFICANT ACCOUNTING POLICIES

All assets are initially recognised at cost. Cost is determined as the fair value of the assets given as consideration plus costs incidental to the acquisition. For assets acquired at no cost or for nominal consideration, cost is determined as fair value at the date of acquisition. The cost of non-current assets constructed by the local government includes the cost of all materials used in the construction, direct labour on the project and an appropriate proportion of variable and fixed overhead. Certain asset classes may be revalued on a regular basis such that the carrying values are not materially different from fair value. Assets carried at fair value are to be revalued with sufficient regularity to ensure the carrying amount does not differ materially from that determined using fair value at reporting date.

KEY INFORMATION



Acquisitions	Annual Budget	YTD Actual	% Spent
	$41.52 M	$17.04 M	41%

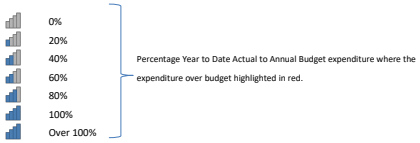
Capital Grant	Annual Budget	YTD Actual	% Received
	$11.51 M	$3.6 M	31%

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

INVESTING ACTIVITIES
NOTE 6
CAPITAL ACQUISITIONS (CONTINUED)

Capital Expenditure Total
Level of Completion Indicators



Level of completion indicator, please see table at the end of this note for further detail.

	Account Description	Adopted Budget	Annual Budget	YTD Budget	YTD Actual	Remaining Unspent Funds	Comment
	Land						
	Buildings						
750736	Operations Centre Redevelopment	500,000	271,283	221,283	90,183	181,100	Consultant work underway
750756	MPAC HVAC Renewal (Design)	4,705,157	110,197	110,197	127,097	(16,900)	Project amalgamated into the new BLD - MPAC Renewal project
750776	Minor City Maintenance Capital Renewals	100,000	786,767	590,076	784,385	2,382	Ongoing Program
750790	New - MARC Sports Court Upgrade	326,373	177,998	133,498	63,079	114,919	Procurement underway
750789	New - Falcon Men's Shed	692,957	51,207	229,507	49,707	1,500	Concept Only
750827	NEW - Peelwood Reserve Oval Storage	202,232	52,232	30,010	4,431	47,801	Design 90% complete
750788	BLD - Community Shed (Dower St)	245,678	245,678	245,678	172,419	73,259	Concept Only
750799	BLD - Meadow Springs Sport Fac Ext Paint	163,244	163,244	18,244	16,444	146,800	Construction 10% complete
750813	BLD - Southern Estuary Hall Demolition	123,244	123,244	123,244	13,244	110,000	Procurement underway
750805	BLD - MARC Indoor Door & Reception Imp	113,244	98,244	113,244	68,212	30,032	Project amalgamated into the new BLD - MPAC Renewal project
750800	BLD - MARC Squash Court Glass Walls	103,244	103,244	97,619	84,854	18,390	Construction complete. Finances to be finalised
750806	BLD - Mandurah Bowl Club Floorcovering	104,984	95,484	95,484	95,484	0	Complete
750820	BLD - Renew - Falcon Bay Ablution Roof	83,244	201,244	124,789	16,024	185,220	Construction to commence Q4
750804	BLD - South Mand Football Cl Sewer Conv	83,244	83,244	83,244	13,244	70,000	Construction to commence Q4
750784	BLD - CASM workshop upgrade	60,386	60,386	60,386	11,136	49,250	Design Only
750824	BLD - 25-26 - Site Main Switchboard	75,007	167,537	131,905	34,144	133,393	Ongoing Program
750825	NEW - Town Beach SLS Storage	35,437	35,437	35,437	8,312	27,125	Design 50% complete
750819	BLD - South Mand Tennis Club Roof Repl	64,984	64,984	64,984	24,984	40,000	Design Only
750786	BLD - Antenna Mast Removal	50,244	50,244	46,933	13,244	37,000	Procurement underway
750798	BLD - Port Bouvard SLC HVAC	50,020	50,020	50,020	15,020	35,000	Design Only
750809	BLD - Mandurah Family & CC Roof Cover	59,984	59,984	59,984	30,664	29,320	Design Only
750796	BLD - South Dist BF Ops Demolition	48,244	58,244	22,244	13,244	45,000	Procurement underway
750787	Basketball half court noise mitigation	35,354	35,354	10,354	2,581	32,774	Construction to commence Q4
750785	New - HHRC Basketball Backboard Winches	39,748	39,748	30,998	31,069	8,680	Complete
750823	NEW - Falcon Pavilion New Bin Storage	35,917	35,917	35,917	2,517	33,400	Construction to commence Q4
750801	BLD - Sth Mand FC Stormwater	54,984	54,984	54,984	24,984	30,000	Construction to commence Q4
750810	BLD - Coodanup Comm Centre Roof Repairs	54,984	54,984	39,984	40,209	14,775	Construction complete. Finances to be finalised
750802	BLD - MARC Indoor Pirate Playground	49,984	79,984	64,984	24,984	55,000	Design Only
750816	BLD - Madora Bay South Ablution	38,244	73,244	41,880	24,294	48,950	Construction complete. Finances to be finalised
750807	BLD - Mandurah Museum Roof Replacement	44,984	44,984	44,984	24,984	20,000	Design Only
750792	BLD - MARC Café/Squash Thoroughfare	33,244	13,244	18,244	13,244	(0)	Project cancelled
750695	Waste Management Centre Upgrade Fire Fighting Infrastructure	0	647,872	482,495	260,715	387,157	Construction 40% complete
750660	Waste Management Centre Tipping Shed	0	214,145	148,460	214,145	0	Complete
750783	WMC - safety improvement projects	0	106,476	76,286	75,996	30,480	Construction 80% complete
750770	MPAC Entry Door Renewal	0	(0)	(0)	0	(0)	Project amalgamated into the new BLD - MPAC Renewal project
750769	MPAC Access and Operational Safety Upgrd	0	(0)	(0)	0	(0)	Project amalgamated into the new BLD - MPAC Renewal project
750771	MPAC Fire Detection and Protec Sys Upgrd	0	45,150	45,150	45,150	0	Project amalgamated into the new BLD - MPAC Renewal project
750741	Avalon Foreshore Ablution Renewal	0	221,556	146,964	221,556	0	Complete
750732	Dawesville Community Centre	0	1,677,262	1,257,946	487,495	1,189,767	Landscape construction works 10% complete.
750763	Asbestos Removal Program	0	30,000	22,500	0	30,000	Ongoing Program
750773	Rushton Park Kiosk Lower Level Tiling Repairs	0	62,800	47,100	0	62,800	Construction to commence Q4

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Level of completion indicator, please see table at the end of this note for further detail.

	Account	Account Description	Adopted Budget	Annual Budget	YTD Budget	YTD Actual	Remaining Unspent Funds	Comment
	750828	BLD - Admin Building FIP Replacement	0	25,851	19,388	0	25,851	Construction complete. Finances to be finalised
	750687	LED Buildings Plan	0	12,609	6,373	12,609	0	Ongoing Program
	750754	Administration Centre Refurbishment	0	0	0	0	0	Commitments to be investigated
	750689	Works & Services Building Refurb	0	306,258	229,693	54,496	251,762	Construction 90% complete
	750761	Administration Centre Facade Renewal	0	156,005	117,004	154,757	1,249	Construction complete. Finances to be finalised
	750681	MARC Roof Repairs	0	19,525	14,644	0	19,525	Construction complete. Finances to be finalised
	750733	Cinema HVAC Replacement	0	57,562	43,171	27,762	29,800	Construction complete. Finances to be finalised
	750753	Site Main Switchboard Program	0	7,470	5,603	7,470	0	Ongoing Program
	750829	BLD - Falcon Library CU-3 Replacement	0	250,000	142,857	0	250,000	Procurement underway
	750830	NEW - Canopus Display Shed	0	100,000	41,071	0	100,000	Construction to commence Q3
	750831	BLD - MPAC Renewal	0	712,684	712,684	0	712,684	Refer to Financial Report, Key Capital Projects table.
	750832	SES - Training Roof Facility and Screen	0	50,000	37,500	0	50,000	Construction to commence Q4
	750833	Port Bouv Rec Club Tank Upgr & Mach Shed Demolition	0	25,000	6,250	0	25,000	In progress
	750835	BLD Mandurah Ocean Marina Chalet Renewal	0	162,500	121,875	0	162,500	In progress
	750836	Dudley Park Bowling Club - Storage Extension	0	0	0	0	0	Contribution only
	Bridges							
	880017	BRG Fathom Turn Footbridge Maintenance	283,849	33,849	33,849	33,849	0	Procurement underway
	880018	BRG - 2025-26 Level Three Inspections	160,829	160,829	150,777	10,829	150,000	Procurement underway
	880012	Lakelands Madora Bay Pedestrian Bridge	0	46,839	32,787	0	46,839	Design 80% complete
	Parks							
	700619	Dawesville SE Foreshore	866,168	972,217	945,704	529,959	442,258	Construction 60% complete
	700627	Roy Tuckey Reserve BMX Pump Track Renewal	227,483	227,483	208,594	97,792	129,691	Construction 40% complete
	700629	Eastern Foreshore Boardwalk Renewal	361,978	404,593	393,939	145,553	259,040	Design 20% complete
	700575	Coodanup Foreshore Park Upgrade	717,890	1,336,910	1,019,655	646,592	690,318	Refer to Financial Report, Key Capital Projects table.
	700635	Norwich Reserve Upgrade	533,514	533,514	504,139	287,507	246,007	Construction 80% complete
	700639	Peel Hockey Association Surface Renewal	877,642	877,642	617,642	422,335	455,307	Construction 80% complete
	700516	Yalgorup National Park	914,533	314,533	167,533	76,100	238,434	Refer to Financial Report, Key Capital Projects table.
	700683	New - Regional Multi-use Facility	468,670	296,258	302,047	88,989	207,269	Procurement underway
	700659	PRK 25-26 Boardwlk and Beach Access Rnwl	734,210	722,210	654,413	44,834	677,376	Procurement underway
	700662	PRK 25-26 Merlin Res Sport Light Renewal	401,656	81,656	89,156	3,156	78,500	Design 40% complete
	700658	PRK Mississippi Res Playground Upgrade	459,877	459,877	415,432	186,043	273,834	Construction 50% complete
	700656	PRK 25-26 Playground Renewal	338,682	338,682	268,057	280,468	58,214	Construction 90% complete
	700680	PRK 25-26 Fencing Renewal	256,708	202,008	202,008	195,508	6,500	Complete
	700666	PRK 25-26 Parks Furniture Renewal	164,728	164,728	127,728	104,553	60,175	Complete
	700672	PRK 25-26 Park Fixtures New	120,354	123,620	93,620	123,620	(0)	Complete
	700654	PRK 25-26 Shade Sails New	116,728	113,463	113,463	74,579	38,884	Design 80% complete
	700671	PRK 25-26 Hermitage Bore Renewal	90,354	90,354	140,304	55,929	34,425	Construction 30% complete
	700655	PRK 25-26 Softfall Rubber Renewal	65,275	51,861	51,861	51,861	(0)	Complete
	700664	PRK 25-26 Signage Renewal	60,354	60,354	45,354	44,901	15,453	Ongoing Program
	700684	NEW - Lakelands Youth Park	68,980	68,980	63,425	18,980	50,000	Procurement underway
	930050	Caddadup Recycled Water Supply (MAR)	188,881	188,881	170,547	23,881	165,000	Feasibility study in progress
	700653	25-26 Res Elect Meter Replacement	50,354	50,354	37,854	354	50,000	Ongoing Program
	700681	PRK 25-26 Bin Enclosures Upgrade	66,728	56,329	43,829	56,612	(284)	Complete
	700667	PRK Sports Court Renewal	42,354	42,354	39,707	41,954	400	Complete
	700673	PRK 25-26 Signage New	40,354	40,354	30,354	30,328	10,026	Ongoing Program
	700677	PRK 25-26 Retaining Wall	21,131	33,131	19,132	35,297	(2,166)	Construction complete. Finances to be finalised
	700678	NEW - Bortolo Goal Compound	17,232	22,788	17,649	22,788	(0)	Complete
	700657	PRK Bardoc Reserve Upgrade	67,483	67,483	62,483	58,909	8,574	Design Only
	700670	NEW - Playground, Kardan Loop, Falcon	15,520	15,520	15,520	5,761	9,759	Design Only
	700628	24-25 Boardwalk and Beach Access Renewal	0	511,848	383,886	258,456	253,393	Construction 20% complete
	700586	BW Warrungup Spring Reserve Boardwalk	0	119,162	89,371	27,783	91,378	Construction 90% complete
	700634	MARC Double Sided Digital Sign Renewal	0	119,736	84,958	119,736	(0)	Complete
	700650	Lakes Lawn Cemetary Recovery	0	149,189	111,892	112,319	36,869	Construction 90% complete
	700633	MARC Outdoor Shade Structures New	0	99,882	76,503	99,882	0	Complete
	700652	Pinjarra Rd Tuart Tree Support System	0	66,055	49,541	0	66,055	Construction to commence Q4
	700685	PRK - Rushton North Lighting	0	338,022	253,517	0	338,022	Construction to commence Q4
	700577	Merlin Street Reserve Activation Plan	0	0	0	(12,532)	12,532	Construction complete. Finances to be finalised
	700637	Shade Structures Renewal Program	0	10,067	5,839	10,066	0	Ongoing Program

Level of completion indicator, please see table at the end of this note for further detail.

	Account	Account Description	Adopted Budget	Annual Budget	YTD Budget	YTD Actual	Remaining Unspent Funds	Comment
	700614	Reserve Meter Renewal Program	0	0	0	0	0	Project amalgamated into the BLD - 25-26 - Site Main Switchboard project.
	700686	Meadow Springs Cricket Nets	0	50,000	37,500	0	50,000	Construction to commence Q3
	700687	Lakelands Dugouts	0	82,000	61,500	0	82,000	Consultant work underway
	700688	Peel Hockey Water Tanks	0	50,000	37,500	0	50,000	In progress
	930045	Major Public Artworks	0	125,000	93,750	35,523	89,477	Ongoing Program
	Roads							
	501192	Falcon Coastal Shared Path	658,902	412,448	304,643	95,939	316,510	Refer to Financial Report, Key Capital Projects table.
	501264	Lakes Road - Murdoch Drive Blackspot	125,457	0	0	0	0	Withdrawn project
	501265	Lynda Street and Baroy Street Blackspot	382,478	382,478	382,478	16,533	365,945	Construction to commence Q4
	501267	Wanjeep Street Blackspot	614,883	0	0	0	0	Withdrawn project
	501291	Pinjarra Road	1,844,765	2,553,754	2,137,401	1,126,503	1,427,251	Construction 80% complete
	501294	Decorative Streetlighting Renewal Project Design	608,181	478,181	541,038	28,328	449,853	Ongoing project
	501331	RDS - Renew - Clarice St	1,234,062	1,234,062	1,234,062	977,637	256,425	Construction 90% complete
	501304	RDS - Upgrade - Tims Thicket Road	1,233,742	1,233,742	433,742	53,258	1,180,484	Construction 70% complete
	501339	RDS - Resurface - Karinga & Surrounds	659,716	162,943	162,943	164,587	(1,644)	Complete
	501308	TMP - BS - Tuckey Street	645,545	645,545	372,725	40,264	605,281	Design 85% complete
	501313	TMP - BS Pinjarra-Anstruther Rd Intersct	599,616	599,616	456,720	84,674	514,941	Refer to Financial Report, Key Capital Projects table.
	501309	RDS - Renew - Tims Thicket Road	595,767	595,767	24,204	375,723	220,044	Construction 80% complete
	501336	RDS - Resurface - St Annes & Surrounds	528,209	390,268	390,268	395,588	(5,320)	Complete
	501334	RDS - Resurface - Kookaburra & Surrounds	497,786	446,475	446,475	442,536	3,939	Complete
	501329	RDS - Resurface - Canterbury & Surrounds	484,509	484,509	484,509	118,672	365,837	Construction complete. Finances to be finalised
	501306	RDS - Resurface - Elmore Way	305,027	222,972	222,972	222,427	544	Complete
	501311	TMP - LATM - Oakmont Avenue	284,171	284,171	82,345	12,345	271,826	Design Complete
	501338	RDS - Resurface - Angalore Road	262,049	243,456	243,456	243,456	(0)	Complete
	501333	RDS - Resurface - La Grange & Augusta	241,945	169,521	169,521	169,520	0	Complete
	501332	RDS - Resurface - McLarty Road	229,452	229,452	229,452	71,574	157,878	Construction 30% complete
	501335	RDS - Resurface - Carnoustie Gardens	202,818	155,363	155,363	156,320	(957)	Complete
	501341	RDS - Resurface - Hestia Way	179,637	148,385	148,385	148,385	0	Complete
	501326	PTH - Renewal - Old Coast Road Bypass	135,738	135,738	135,738	2,570	133,168	Construction to commence Q4
	501320	PTH - Renew - Mandurah Road	132,170	132,170	123,909	2,570	129,600	Consultant work underway
	501337	RDS - Resurface - Cuvier Place	116,948	9,608	53,490	9,608	0	Withdrawn project
	501330	CPK - City Centre Parking Plan Delivery	107,819	57,819	8,263	2,819	55,000	Ongoing Project
	501318	TMP - LATM - Glencoe Parade	104,855	104,855	104,855	10,719	94,137	Design 85% complete
	501321	PTH - Renew - Caddadup Reserve	101,570	101,570	101,570	2,570	99,000	Deferred project
	501322	RDS - Resurface - Waste Mgmt Centre	107,749	140,199	140,199	140,199	0	Complete
	501328	RDS - Resurface - Blossom Place	93,960	93,960	93,960	83,545	10,415	Construction complete. Finances to be finalised
	501317	TMP - Dandaragan Drive	55,718	55,718	55,718	2,718	53,000	Consultant work underway
	501344	SLF - 25-26 Street Furniture Renewal	46,650	46,650	35,525	7,225	39,425	Ongoing Program
	501343	SLF - 25-26 Street Furniture New	42,150	42,150	32,150	2,150	40,000	Ongoing Program
	501319	TMP - Westview Parade, Wannanup	39,470	39,470	39,470	4,433	35,037	Design 80% complete
	501316	TMP - Cossack Way	36,984	36,984	36,984	1,896	35,088	Consultant work underway
	501325	PTH - Realign - Lively Place	37,570	37,570	37,570	15,966	21,604	Construction complete. Finances to be finalised
	501345	SLF - City Centre Lighting Audit	37,150	37,150	37,150	2,150	35,000	Ongoing Project
	501303	RDS - Renew - The Glen	58,111	58,111	43,111	33,111	25,000	Design Only
	501312	TMP - Arramall Trail	21,844	21,844	21,844	1,213	20,631	Construction to commence Q4
	501327	PTH - Renew - Estuary Road	17,570	0	2,652	2,570	(2,570)	Design Only
	501324	PTH - Renewal - Old Coast Road	16,737	16,737	16,737	2,570	14,167	Construction to commence Q4
	501340	RDS - Renew - Finistere Island Retreat	38,111	38,111	38,111	33,111	5,000	Design Only
	501314	CPK Merlin St Carpark Renewal	9,290	9,290	9,290	4,290	5,000	Design 85% complete
	501310	CPK Doddies Beach Carpark Renewal	9,498	9,498	9,498	4,498	5,000	Design Only
	501307	RDS - Renew - Grafton Drive	38,111	38,111	33,111	41,412	(3,301)	Design Only
	501305	PTH - Tanjinn Street, Dawesvillle PAW	7,570	7,570	7,570	2,570	5,000	Concept complete
	501193	23-24 TM Clarice St	0	191,460	143,595	47,890	143,569	Construction complete. Finances to be finalised
	501129	Trails Project	0	406,159	304,619	26,457	379,702	Design complete
	501194	TM Mandurah Tce/Adonis Rd	0	0	19,795	0	0	Withdrawn project
	501235	RC Peel Street Stage 4	0	70,000	177,551	71,351	(1,351)	Construction complete. Finances to be finalised
	501175	24-25 TM Discretional Traffic Management	0	148,953	111,715	21,464	127,489	Ongoing Program
	501292	New Street Furniture and Minor Works	0	44,190	33,143	7,698	36,492	Ongoing Program

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Level of completion indicator, please see table at the end of this note for further detail.

	Account Description		Adopted Budget	Annual Budget	YTD Budget	YTD Actual	Remaining Unspent Funds	Comment
	501293	PTH 24-25 Shared Path Renewal Program	0	287,794	215,846	295,866	(8,071)	Construction 60% complete. Budget variation for overspend to be processed in April 2026 Financial Report.
	501260	Mewburn Centre Carpark Upgrade	0	26,128	22,806	22,129	3,999	Design Only
	501346	RDS - Preservation RRG - Coolibah Ave	0	532,000	304,000	85,097	446,903	Construction 20% complete
	501347	RDS - Resurface - Cyprus Gardens	0	107,340	63,458	7,307	100,033	Construction 10% complete
	Drainage							
	600226	DRG - Parkview Street	176,238	176,238	98,738	11,238	165,000	Construction to commence Q4
	600207	DRG - Cygni Street	156,238	156,238	156,238	143,007	13,232	Construction 90% complete
	600211	DRG - Tara Street	101,238	101,238	101,238	20,558	80,680	Construction 20% complete
	600220	DRG - Durham Crescent	71,238	71,238	71,238	15,627	55,612	Construction 20% complete
	600225	DRG - Mississippi Drive	16,238	16,238	16,238	11,238	5,000	Design Only
	600209	DRG - Portmarnock Circle	16,238	16,238	16,238	11,238	5,000	Design Only
	600213	DRG - Scenic Dr and Philante St Int	16,238	16,238	16,238	11,238	5,000	Design Only
	600208	DRG - Mandurah Gardens Est	16,238	16,238	16,238	12,419	3,820	Design Only
	600219	DRG - Lyelta Street	16,238	16,238	16,238	11,238	5,000	Design Only
	600198	DR Mary Street Drainage Renewal	0	285,030	213,773	90,669	194,362	Construction 30% complete
	Coastal & Estuary							
	911008	Mandurah Quay Seawall Repair	1,768,134	1,889,352	1,709,048	711,361	1,177,991	Construction 30% complete
	911014	C&M - 25-26 Town Beach Seawall Renewal	1,217,856	1,217,856	1,217,856	152,447	1,065,409	Construction 50% complete
	911020	C&M - 25-26 Birchley Rd Boat Ramp Upgr	957,013	82,013	68,679	72,366	9,647	Deferred project
	911016	C&M - 25-26 Waterside Foreshore seawall	325,761	40,761	40,761	12,438	28,323	Consultant work underway
	911018	C&M - 25-26 Memorial Park Seawall	278,010	58,010	58,010	29,688	28,323	Consultant work underway
	911019	C&M - 25-26Darwin Tce Public Jetty Renew	30,237	30,237	30,237	10,237	20,000	Consultant work underway
	911015	C&M - 25-26 Doddis Beach Protection	191,882	191,882	191,882	69,078	122,804	Design 50% complete
	911013	C&M - Mandjar Bay Concept Planning	155,575	0	18,750	0	0	Withdrawn project
	911017	C&M - 25-26 Breakwater Pde Entry Seawall	91,351	91,351	61,351	21,370	69,981	Consultant work underway
	911021	In-Water Floating Pontoon	0	62,146	46,610	62,146	0	Procurement underway
	911022	C&M - Western Foreshore Coastal Protection	0	200,000	50,000	0	200,000	Procurement underway
	911007	Donnelly Gardens Seawall Repair	0	212,435	151,859	2,944	209,491	Construction 60% complete
	Equipment							
	930043	Christmas Decorations Program	200,000	210,612	185,737	0	210,612	Ongoing Program
	820185	All Terrain Wheelchair	0	6,040	4,530	6,040	0	Complete
	820195	Furniture & Equipment	0	12,000	9,000	0	12,000	Procurement underway
	820198	CCTV Storage	0	77,000	57,750	0	77,000	Procurement underway
	Plant & Machinery							
	770001	Replacement Light Passenger Vehicles	455,000	346,646	259,985	173,442	173,204	Ongoing Program
	770002	Replacement Light Commercial Vehicles	884,000	740,053	555,040	180,562	559,491	Ongoing Program
	770006	Trucks and Buses	1,130,500	1,104,019	828,015	891,350	212,669	Ongoing Program
	770009	Parks and Mowers	283,000	340,847	255,635	157,441	183,406	Ongoing Program
	770010	New - Heavy Vehicles Plant and Equipment	40,000	39,460	29,595	39,460	0	Ongoing Program
	770011	Miscellaneous Equipment	17,500	70,519	52,889	17,519	53,000	Ongoing Program
	770007	Trailers	81,120	82,785	62,089	22,365	60,420	Ongoing Program
	770012	New - Vehicle and Small Plant Program	0	236,610	177,457	0	236,610	Ongoing Program
	Other Infrastructure							
	930048	LTFP Program - CSRFF	150,000	25,000	18,750	0	25,000	Ongoing Program
	700055	Waterfront Project	0	555,443	416,582	182,404	373,039	Construction 90% complete
	700665	New - Western Foreshore Leisure Precinct	613,647	215,647	315,869	165,647	50,000	Design Only
	Grand Total		**40,467,886**	**41,521,843**	**33,953,760**	**17,216,412**	**24,305,431**	

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
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FINANCING ACTIVITIES
NOTE 7
BORROWINGS

Repayments - Borrowings

Information on Borrowings		New Loans		Principal Repayments		Principal Outstanding		Interest Repayments	
Particulars	1 July 2025	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget
	$	$	$	$	$	$	$	$	$
Law, order, public safety									
Bortolo Fire Track Water Infrastructure	32,250	-	-	2,653	5,055	29,598	7,217	1,379	423
Community amenities									
Halls Head Recycled Water 2019/20	116,439	-	-	15,095	19,256	101,344	94,533	4,335	6,455
Ablutions 2021/22	178,490	-	-	24,831	31,209	153,660	141,396	634	3,248
Waste Water Reuse [349]	34,182	-	-	18,190	22,692	15,992	11,694	1,025	2,864
Halls Head Ablution Block [350]	22,843	-	-	12,122	15,121	10,721	7,855	685	1,912
Recreation and culture									
Falcon Seawall	449,687	-	-	89,148	113,909	360,539	319,182	3,616	15,713
Mandjar Square Stage 3 and 4	251,679	-	-	40,712	49,977	210,967	192,753	8,382	16,306
Novara Foreshore Stage 3	101,343	-	-	16,393	20,613	84,950	76,982	3,424	5,517
Falcon Skate Park Upgrade	65,726	-	-	8,943	11,042	56,783	54,222	2,438	4,358
Falcon Bay Foreshore Stage 3 of 4	163,970	-	-	23,429	28,505	140,542	130,912	5,574	10,702
Mandjar Square Final Stage	164,078	-	-	23,358	29,040	140,719	130,962	5,670	9,610
Westbury Way North side POS Stage 3	117,537	-	-	15,034	18670	102,504	95,728	4,379	7618
Smart Street Mall Upgrade 2019/20	248,071	-	-	38,300	46006	209,771	202,043	8,117	16700
Smart Street Mall 2020/21	710,247	-	-	101,336	110305	608,912	598,366	6,162	22998
Enclosed Dog Park	14,508	-	-	1,461	1817	13,047	14,865	551	918
Falcon Bay Upgrade - Stage 4 of 5	176,793	-	-	24,179	32768	152,614	137,459	2,769	5625
Novara Foreshore Stage 4	69,844	-	-	7,733	9421	62,111	58,217	2,236	4196
Bortolo Reserve - Shared Use Parking and Fire Track Facility	190,419	-	-	28,006	34251	162,413	149,366	1,487	6856
South Harbour Paving Upgrade Stage 2	35,612	-	-	3,633	4520	31,979	30,024	1,353	2255
Eastern/ Western Foreshore 2020/21	671,687	-	-	102,631	129194	569,056	537,058	5,952	4915
Falcon Skate Park Upgrade 2020/21	53,033	-	-	6,034	6810	47,000	44,659	1,454	3363
Eastern/ Western Foreshore 2021/22	1,057,173	-	-	141,813	201616	915,360	818,949	11,653	7488
Parks and Reserves Upgrades 2021/22	344,126	-	-	47,850	64453	296,276	268,007	1,876	3213
Mandurah Library Re Roofing Project	83,629	-	-	8,832	13175	74,797	68,186	2,948	2790
Enclosed Dog Park 2021/22	129,152	-	-	17,187	22540	111,965	102,566	1,214	2178
Falcon Bay Upgrade - Stage 4 of 5 2021/22	51,152	-	-	5,898	9435	45,254	40,224	1,461	516
Novara Foreshore Stage 4 2021/22	162,736	-	-	22,513	29261	140,223	128,340	720	2164
Smart Street Mall 2021/22	437,105	-	-	59,499	82018	377,606	340,378	3,775	4148
Falcon Reserve Activation Plan Stage 3	297,787	-	-	38,494	51993	259,293	246,073	1,808	2620
2022/23 Parks and Reserves Upgrades	290,167	-	-	37,810	51179	252,357	239,018	1,484	2058
Kangaroo Paw Park	229,309	-	-	29,855	40177	199,454	189,149	1,114	2024
Seascapes Boardwalk	149,003	-	-	19,650	25991	129,353	123,131	501	1315
Bruce Cresswell Reserve	146,040	-	-	18,746	25655	127,295	120,465	1,000	1100
Falcon Bay Stage 5 of 5	108,679	-	-	14,138	18262	94,540	90,527	469	1545
Mandurah Community Museum Roof and Gutters	96,899	-	-	12,679	17068	84,220	79,655	425	686
2022/23 South Harbour Upgrades	76,835	-	-	9,997	12221	66,838	64,911	281	1494
Pleasant Grove Foreshore	44,383	-	-	4,060	7386	40,323	37,036	1,889	682
Smart Street Mall Upgrade	44,138	-	-	4,043	7367	40,095	36,808	1,879	665
Parks & Reserves Program	3,177,416			223,739	272557	2,953,676	2,909,917	114,355	191749
Parks & Reserves Upgrade 24-25	1,180,902	-	-	69,612	99244	1,111,290	1,081,604	42,757	59339
Parks & Reserves Upgrade 25-26			1,520,000		0		2,000,000		0
Halls Head Bowling Club upgrade [331]	129,500	-	-	31,669	43,842	97,832	82,304	3,675	3,447
MARC Redevelopment Stage 1 [340]	91,169	-	-	66,491	86,974	24,679	-	1,988	2,744
MARC Redevelopment Stage 2 [341]	162,227	-	-	174,575	163,038	-12,348	-	1,141	4,607
Eastern Foreshore Wall [344]	126,209	-	-	111,094	127,115	15,115	-	2,684	4,188
MARC Stage 2 [345]	198,052	-	-	161,354	198,437	36,698	-	2,329	3,597
Falcon Bay Seawall [351]	54,668	-	-	30,509	40,795	24,159	14,162	1,612	1,880
MARC Solar Plan [353]	75,077	-	-	17,906	23,560	57,170	48,788	1,946	3,566
Novara Foreshore Development [355]	140,551	-	-	39,317	52,139	101,235	82,287	1,177	2,553
Falcon Bay Foreshore Upgrades [356]	144,895	-	-	36,664	53,201	108,231	85,262	3,901	1,173
Mandjar Square Development [358]	175,056	-	-	48,217	64,221	126,839	105,329	1,004	1,872
Lakelands DOS [360]	792,519	-	-	245,494	329,814	547,024	463,103	6,848	8,743
Transport									

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

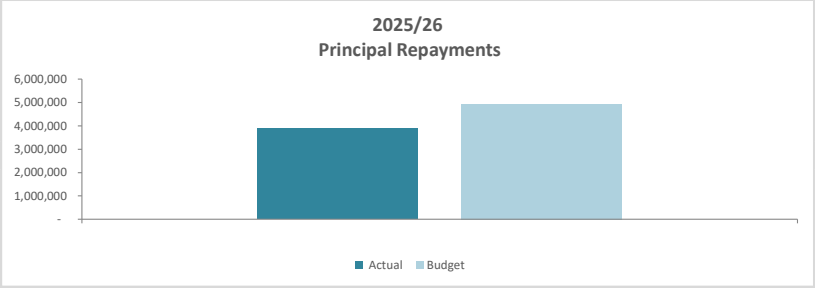
FINANCING ACTIVITIES
NOTE 7
BORROWINGS

Repayments - Borrowings

Information on Borrowings		New Loans		Principal Repayments		Principal Outstanding		Interest Repayments	
Particulars	1 July 2025	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget
New Road Construction 2018/19	744,243	-	-	146,457	177,241	597,786	550,176	6,882	24,473
New Boardwalks 18/19	252,515	-	-	45,769	51359	206,746	192,273	3,611	14117
Pinjarra Road Carpark	101,343	-	-	16,339	20613	85,004	76,982	3,478	5517
Coodanup Drive - Road Rehabilitation	51,166	-	-	8,022	10017	43,145	39,023	1,879	3336
South Harbour Upgrade 2019/20	134,200	-	-	17,824	22075	116,376	108,978	4,536	7604
New Road Construction 2019/20	404,120	-	-	80,177	99842	323,943	301,056	1,831	14874
New Roads 2020/21	366,177	-	-	54,898	62140	311,279	297,550	2,409	12573
Carryover Roads 2020/21	354,133	-	-	48,636	65568	305,497	275,822	2,216	3178
Roads 2021/22	179,941	-	-	24,823	31611	155,118	141,800	717	2719
Carparks 2021/22	118,730	-	-	16,157	20752	102,574	94,159	770	2152
Cambria Island Abutment Wall	42,183	-	-	4,909	7706	37,274	33,354	1,165	508
RC Pinjarra Road Stage 3	371,737	-	-	47,592	66212	324,145	305,562	2,781	2257
RC Pinjarra Road Stage 4	371,752	-	-	47,591	66211	324,161	305,578	2,782	2258
Cambria Island Abutment Walls Repair	199,791	-	-	25,110	34813	174,680	165,151	1,935	1837
SP Halls Head PSP	149,003	-	-	19,650	25991	129,353	123,131	501	1315
RC Peel Street	84,018	-	-	10,868	12950	73,150	71,380	319	2008
Torcello Mews Canal PAW Renewal	75,295	-	-	9,809	12061	65,486	63,528	271	1384
Halls Head Pde Beach Central CP Stage 2	73,473	-	-	9,564	11819	63,910	61,880	237	1247
Halls Head Parade Car Park Stage 2a	39,191	-	-	3,367	6555	35,824	32,395	1,673	281
Senior Citizens Carpark	10,258	-	-	775	935	9,483	9,331	440	728
Roads & Drainage Program	2,184,422			153,817	187379	2,030,605	2,000,517	78,617	131824
Roads & Drainage Program 24-25	2,200,048	-	-	129,626	184898	2,070,422	2,015,102	81,966	110553
Roads & Drainage Program 25-26			550,871		0		2,500,000		0
New Road Construction [342]	104,503	-	-	85,856	102,550	18,647	-	2,179	2,788
WMC Tims Thicket [343]	21,316	-	-	13,945	17,503	7,371	2,158	591	1,796
Road Construction [346]	84,706	-	-	48,291	65,514	36,416	19,064	2,298	1,672
MARC Carpark [347]	65,448	-	-	36,586	48,269	28,863	17,544	1,844	2,795
MPAC Forecourt [348]	28,517	-	-	15,156	18,906	13,361	9,781	855	2,388
Mandurah Marina [352]	75,063	-	-	17,934	23,597	57,129	48,706	1,945	3,564
MARC Carpark [354]	109,431	-	-	26,662	37,865	82,769	68,092	3,157	2,019
Mandurah Foreshore Boardwalk Renewal [357]	160,058	-	-	44,394	58,832	115,664	95,096	808	1,883
New Road Construction [359]	423,719	-	-	124,948	166656	298,771	257,332	2,573	4215
Smoke Bush Retreat Footpath [361]	38,379	-	-	8,705	10,681	29,674	26,599	1,220	2,627
Economic services									
Mandurah Ocean Marina Chalets Refurbishment	106,292	-	-	14,854	19,399	91,438	83,511	448	1,294
Other property and services									
Civic Building - Tuckey Room Extension	252,716	-	-	41,111	51,184	211,605	192,182	8,207	14,182
Building Renewal & Upgrades Program	1,301,276			91,632	111,628	1,209,644	1,191,715	46,833	78,528
Mandurah Quay Seawall Repair	0		1,650,000	-	-	0	1,650,000	0	0
Building Renewal & Upgrades Program 24-25	720,736	-	0	42,923	60,512	677,812	659,488	26,074	36,180
25-26 Building Renewal & Upgrades			0				1,000,000		
	26,064,892	0	3,720,871	3,887,697	4,946,758	22,177,195	27,987,672	591,590	981,370
Total	26,064,892	0	3,720,871	3,887,697	4,946,758	22,177,195	27,987,672	591,590	981,370
Current borrowings	4,946,758		3,720,871	3,887,697	4,946,758	1,617,970	4,946,758	591,590	981,370
Non-current borrowings	21,118,134					20,559,225	23,040,914		
	26,064,892					22,177,195	27,987,672		

All debenture repayments were financed by general purpose revenue.

KEY INFORMATION
All loans and borrowings are initially recognised at the fair value of the consideration received less directly attributable transaction costs. After initial recognition, interest-bearing loans and borrowings are subsequently measured at amortised cost using the effective interest method. Fees paid on the establishment of loan facilities that are yield related are included as part of the carrying amount of the loans and borrowings.



Principal Repayments
$3,887,697

Interest Expense
$591,590

Loans Due
$22.18 M

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
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OPERATING ACTIVITIES
NOTE 8
CASH RESERVES

Cash Backed Reserve

Reserve Name	Opening Balance	Budget Interest Earned	Actual Interest Earned	Budget Transfers In (+)	Actual Transfers In (+)	Budget Transfers Out (-)	Actual Transfers Out (-)	Budget Closing Balance	Actual YTD Closing Balance
	$	$	$	$	$	$	$	$	$
Building	1,617,101	252,918	347,243	8,954,091	6,608,498	0	0	10,824,110	8,572,842
Parking	529,269	13,801	17,422	0	0	0	0	543,070	546,691
Asset Management	26,970,114	555,920	595,686	2,099,804	0	(9,244,900)	0	20,380,938	27,565,800
Cultural Centre	493	0	0	0	0	0	0	493	493
Sustainability	296,619	7,734	7,919	0	0	(57,500)	0	246,853	304,538
Waste Facilities Reserve Fund	10,715,277	198,278	223,957	0	0	(3,320,781)	0	7,592,774	10,939,234
Interest Free Loans	191,704	0	0	0	0	0	0	191,704	191,704
CLAG	1,415	37	688	15,788	0	0	0	17,240	2,103
Mandurah Ocean Marina	195,681	5,102	6,441	0	0	0	0	200,783	202,122
Waterways	625,392	15,688	4,711	0	0	(494,238)	0	146,842	630,103
Port Mandurah Canals Stage 2 Maintenance	102,363	2,669	3,369	0	0	0	0	105,032	105,732
Mariners Cove Canals	93,266	2,432	3,070	0	0	0	0	95,698	96,336
Port Bouvard Canal Maintenance Contributions	293,559	7,654	9,663	0	0	0	0	301,213	303,222
Unspent Grants & Contributions	4,242,098	0	0	2,328,579	0	(3,297,056)	0	3,273,620	4,242,098
Long Service Leave	3,396,631	92,787	89,450	0	0	(701,115)	0	2,788,302	3,486,081
Bushland and Environmental Protection	1,866,955	43,217	61,279	0	0	0	0	1,910,172	1,928,234
Coastal Storm Contingency	284,175	7,410	9,354	0	0	0	0	291,585	293,529
Digital Futures	62,516	1,630	2,058	0	0	0	0	64,146	64,574
Decked Carparking	1,108,828	28,912	36,499	0	0	0	0	1,137,740	1,145,327
Specified Area Rates - Waterside Canals	115,404	5,535	0	0	0	(2,942)	0	117,997	115,404
Specified Area Rates - Port Mandurah Canals	200,290	6,270	6,887	64,900	0	(142,556)	0	128,904	207,177
Specified Area Rates - Mandurah Quay Canals	313,859	16,614	16,654	27,019	0	(49,152)	0	308,340	330,513
Specified Area Rates - Mandurah Ocean Marina	1,144,422	35,484	0	149,815	0	0	0	1,329,721	1,144,422
Specified Area Rate - Port Bouvard Canals	173,219	9,836	8,465	0	0	0	0	183,055	181,684
Specified Area Rate - Mariners Cove	5,927	487	487	260	0	0	0	6,674	6,414
Specified Area Rate - Eastport	67,024	2,824	2,824	962	0	0	0	70,810	69,848
Sportclubs Maintenance Levy	449,570	10,183	14,749	0	0	0	0	459,753	464,319
City Centre Land Acquisition Reserve	2,131,064	55,567	70,148	0	0	0	0	2,186,631	2,201,212
Lakelands Community Infrastructure Reserve	1,211,619	31,593	39,883	0	0	0	0	1,243,212	1,251,502
Plant Reserve	1,911,487	48,694	32,115	1,133,984	0	(959,112)	0	2,135,053	1,943,602
Workers Compensation Reserve	329,536	8,593	10,847	0	0	0	0	338,129	340,383
Restricted Cash Reserve	4,104,069	47,864	0	0	0	(2,351,907)	0	1,800,027	4,104,069
Community Safety	492,213	12,834	14,443	0	0	(54,848)	0	450,199	506,656
Public Art Reserve	434,996	11,537	10,315	90,000	0	(125,000)	0	411,533	445,311
Large-Scale Arts and Culture Attraction Reserve	0	0	0	0	0	0	0	0	0
	65,678,155	**1,540,105**	**1,646,627**	**14,865,201**	**6,608,498**	**(20,801,108)**	**0**	**61,282,353**	**73,933,281**

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

NOTE 9
OPERATING GRANTS AND CONTRIBUTIONS

Provider	Unspent Operating Grant, Subsidies and Contributions Liability				Operating Grants, Subsidies and Contributions Revenue			
	Liability 1-Jul	Increase in Liability	Liability Reduction (As revenue)	Liability 30-Jun	Adopted Budget	Budget Variations	Annual Budget	YTD Revenue Actual
	$	$	$	$	$	$	$	$
Operating Grants and Subsidies								
General purpose funding								
2025-26 Financial Assistance Grant - Local Roads	0	0	0	0	2,399,744	0	2,399,744	1,668,917
2025-26 Financial Assistance Grant - General Roads	0	0	0	0	1,638,400	0	1,638,400	0
Law, order, public safety								
Southern Districts Bush Fire Brigade LGGS: DFES	0	0	0	0	35,000	0	35,000	42,243
Bushfire Mitigation: DFES	0	0	0	0	20,660	0	20,660	0
SES LGGS: 2025/26 DFES	0	0	0	0	51,000	0	51,000	78,147
Bushfire Risk Mitigation Coordinator Grant: City of Cockburn	7,075	20,737	(19,712)	8,101	0	0	0	19,712
Bushfire Risk Mitigation Coordinator Grant: DFES	14,151	77,223	(39,423)	51,950	82,948	0	82,948	39,423
CoM Housing Needs Analysis - DPIRD	50,000	0	0	50,000	0	50,000	50,000	0
Stronger Suburbs Cocooning Project	34,303	84,851	(64,184)	54,970	115,850	34,303	150,153	64,184
Education and welfare								0
Waterwise Verge Grant: Water Corp	0	0	0	0	10,000	0	10,000	0
Paint the Town REaD: Department of Communities	33,673	0	(33,673)	0	30,526	33,673	64,199	33,673
Suicide Prevention Grant: WA Mental Health Commission	0	17,500	0	17,500	0	17,500	17,500	0
WA Bike Month 25	0	2,000	(2,000)	0	0	0	0	2,000
International Day of People with Disability Grant	0	1,000	(1,000)	0	0	1,000	1,000	1,000
Community amenities								0
Bus Shelter Maintenance Assistance Scheme: PTA	0	0	0	0	18,623	0	18,623	0
Direct Grant	0	0	0	0	503,803	0	503,803	479,187
Recreation and culture								
Crabfest: Tourism WA 2026	0	0	0	0	140,000	0	140,000	0
Crab Fest: Galati Group - Spud Shed	0	20,000	(20,000)	0	0	0	0	20,000
Crab Fest: WA Return Recycle Renew Limited	0	6,000		6,000	0	0	0	0
Christmas Pageant	0	20,000	0	20,000	0	0	0	0
Christmas Light Trails	0	50,000	0	50,000	0	0	0	0
Christmas Carols	0	50,000	0	50,000	0	0	0	0
Christmas: Tourism WA	0	7,000	(7,000)	0	0	0	0	7,000
Every Club Funding 2026: DLGSC	0	0	0	0	20,480	0	20,480	0
Every Club Funding 2025: DLGSC	37,908	0	0	37,908	0	37,908	37,908	0
Gnoonie Youth Football Cup: Healthway	0	0	0	0	3,072	0	3,072	10,700
Southern Beaches CHRMAP: DPLH	98,000	28,000	0	126,000	0	140,000	140,000	0
Mandurah Estuarine CHRMAP - DPLH	0	100,000	0	100,000	0	0	0	0
Community Action Plan: Alcohol and Drug Foundation	13,639	0	(13,639)	0	16,925	19,764	36,689	13,639
CASM Signage	18,730	0	(18,730)	0	0	18,730	18,730	18,730
Australia Day 2026 Community Events Grant Program	0	12,000	0	12,000	15,000	0	15,000	0
CASM Art in Residency - DLGSCI	42,000	0	0	42,000	0	42,000	42,000	0
Better Beginnings Community Garden Storytime – Let's Grow Together!	30,000	0	(8,273)	21,727	0	30,000	30,000	8,273
Gnoonie Cup	0	10,000	(10,000)	0	0	0	0	10,000
Community Gardens Grant Program	10,000	0	0	10,000	0	10,000	10,000	0
Other property and services								
Urban Greening Round Two Funding	40,000	0	(40,000)	0	0	40,000	40,000	40,000
	429,479	**506,311**	**(277,634)**	**658,156**	**5,102,031**	**474,878**	**5,576,908**	**2,556,828**
TOTALS	**429,479**	**506,311**	**(277,634)**	**658,156**	**5,102,031**	**474,878**	**5,576,908**	**2,556,828**

* The Note 9 above relates to Operating Grants, Subsidies and Contributions with contract liability

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

NOTE 10
NON-OPERATING GRANTS AND CONTRIBUTIONS

		Unspent Non Operating Grants, Subsidies and Contributions Liability				Non Operating Grants, Subsidies and Contributions Revenue			
Provider		Liability 1-Jul	Increase in Liability	Liability Reduction (As revenue)	Liability 30-Jun	Adopted Budget Revenue	Budget Variations	Annual Budget	YTD Revenue Actual (b)
		$	$	$	$	$	$	$	$
Non-Operating Grants and Subsidies									
Community amenities									
750741	Avalon Foreshore Ablution Renewal	-	-	-	0	-	95,599	95,599	0
911014	C&M - 25-26 Town Beach Seawall Renewal	-	462,000	(34,591)	427,409	1,100,000	-	1,100,000	34,591
911015	C&M - 25-26 Doddis Beach Protection	-	-	-	0	75,000	-	75,000	0
Recreation and culture									
750790	New - MARC Sports Court Upgrade	-	-	-	0	298,375	(148,375)	150,000	0
750789	New - Falcon Men's Shed	-	-	-	0	446,750	(446,750)	-	0
750827	NEW - Peelwood Reserve Oval Storage	-	-	-	0	200,000	(150,000)	50,000	0
750800	BLD - MARC Squash Court Glass Walls	-	-	-	0	30,000	-	30,000	0
750732	Dawesville Community Centre	-	1,737,167	(487,495)	1,249,672	-	1,677,262	1,677,262	487,495
700683	New - Regional Multi-use Facility	-	-	-	0	414,762	(172,412)	242,350	0
700639	Peel Hockey Association Surface Renewal	-	72,000	(72,000)	0	340,000	-	340,000	72,000
700662	PRK 25-26 Merlin Res Sport Light Renewal	-	-	-	0	400,000	(320,000)	80,000	0
700685	PRK - Rushton North Lighting - State Government	-	100,000	-	100,000	-	100,000	100,000	0
700685	PRK - Rushton North Lighting - Club Night Lights Program	-	112,674	-	112,674	-	112,674	112,674	0
700686	Meadow Springs Cricket Nets	-	50,000	-	50,000	-	50,000	50,000	0
700687	Lakelands Dugouts	-	-	-	0	-	82,000	82,000	0
750825	NEW - Town Beach SLS Storage	-	30,000	(2,875)	27,125	-	30,000	30,000	2,875
750830	Canopus Display Shed	-	-	-	0	-	50,000	50,000	0
Transport									
880017	BRG Fathom Turn Footbridge Maintenance	-	-	-	0	167,000	(167,000)	-	0
501291	Pinjarra Road	-	1,338,127	(1,080,994)	257,133	1,200,000	472,659	1,672,659	1,080,994
501331	RDS - Renew - Clarice St	-	550,000	(550,000)	0	1,000,000	(450,000)	550,000	550,000
501304	RDS - Upgrade - Tims Thicket Road	-	320,000	(19,516)	300,484	800,000	-	800,000	19,516
501192	Falcon Coastal Shared Path	-	-	-	0	298,500	23,546	322,046	0
501339	RDS - Resurface - Karinga & Surrounds	-	-	-	0	200,000	(200,000)	0	0
501308	TMP - BS - Tuckey Street	-	164,170	(10,358)	153,812	410,426	-	410,426	10,358
501267	Wanjeep Street Blackspot	-	-	-	0	409,667	(409,667)	-	0
501313	TMP - BS Pinjarra-Anstruther Rd Intersct	-	228,633	(56,641)	171,992	381,055	190,527	571,582	56,641
501309	RDS - Renew - Tims Thicket Road	-	160,000	(160,000)	0	400,000	-	400,000	160,000
501336	RDS - Resurface - St Annes & Surrounds	-	285,707	(285,707)	0	400,000	(114,293)	285,707	285,707
501334	RDS - Resurface - Kookaburra & Surrounds	-	420,000	(420,000)	0	279,615	140,385	420,000	420,000
501329	RDS - Resurface - Canterbury & Surrounds	-	-	-	0	400,000	(400,000)	0	0
501346	Preservation - Coolibah Ave	-	141,867	(85,097)	56,770	-	354,667	354,667	85,097
501265	Lynda Street and Baroy Street Blackspot	100,924	-	-	100,924	256,367	-	256,367	0
501306	RDS - Resurface - Elmore Way	-	200,000	(200,000)	0	200,000	-	200,000	200,000
501311	TMP - LATM - Oakmont Avenue	-	30,706	-	30,706	181,217	-	181,217	0
501264	Lakes Road - Murdoch Drive Blackspot	-	-	-	0	98,666	(98,666)	-	0
501330	CPK - City Centre Parking Plan Delivery	-	-	-	0	50,000	(50,000)	0	0
501318	TMP - LATM - Glencoe Parade	-	26,706	(6,013)	20,693	66,766	-	66,766	6,013
501343	SLF - 25-26 Street Furniture New	-	-	-	0	20,000	-	20,000	0
501193	23-24 TM Clarice St	68,659	-	(8,032)	60,627	-	103,745	103,745	8,032
501129	Trails Project	195,452	-	(26,457)	168,995	-	231,294	231,294	26,457
501194	TM Mandurah Tce/Adonis Rd	21,535	-	-	21,535	-	-	-	0
700516	Yalgorup National Park	1,046,527	-	(11,567)	1,034,960	850,000	(599,999)	250,001	11,567
911020	C&M - 25-26 Birchley Rd Boat Ramp Upgr	-	-	-	0	678,750	(678,750)	-	0
501213	23-24 RS Charon Rd	1,906	-	-	1,906	-	-	-	0
501196	23-24 TM Wanjeep St	2,265	-	(2,265)	(0)	-	-	-	2,265
501235	RC Peel Street Stage 4	-	-	-	0	-	20,573	20,573	20,573
		1,437,267	**6,429,757**	**(3,519,609)**	**4,347,415**	**12,052,916**	**(670,981)**	**11,381,934**	**3,540,182**
Non-Operating Contributions									
Recreation and culture									
700639	Peel Hockey Association Surface Renewal	-	-	-	0	-	-	-	50,000
Transport									
700650	Lakes Lawn Cemetary Recovery	-	-	-	0	-	173,235	173,235	0
Other property and services									
750828	BLD - Admin Building FIP Replacement	-	-	-	0	-	25,851	25,851	0
770007	Trailers	-	-	-	0	-	-	-	8,566
820185	All Terrain Wheelchair	-	-	-	0	-	-	-	5,040
		0	**0**	**0**	**0**	**0**	**199,086**	**199,086**	**63,606**
Total Non-operating grants, subsidies and contributions		**1,437,267**	**6,429,757**	**(3,519,609)**	**4,347,415**	**12,052,916**	**(471,895)**	**11,581,020**	**3,603,788**

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

NOTE 11
PROPOSED BUDGET VARIATIONS FOR COUNCIL APPROVAL

The following are for consideration for Council to approve as budget variations

GL Code	Description	Council Resolution	Classification	Non Cash Adjustment	Increase in Available Cash	Decrease in Available Cash	Amended Budget Running Balance
				$	$	$	$
							0
700687-xxxx-xxxx-xxxxx	Lakelands Park Dugout Project		Capital Expenses		82,000		82,000
	Asset Management Reserve		Other: Transfer Into Reserve			(82,000)	0
TBC	Mustangs Storage - Lakelands Park		Capital Expenses			(25,000)	(25,000)
750799-xxxx-xxxx-xxxxx	Meadow Springs Sport Facility External Painting		Capital Expenses		25,000		0
501309-xxxx-xxxx-xxxxx	Renew – Tims Thicket Road		Capital Expenses		103,221		103,221
501304-xxxx-xxxx-xxxxx	Upgrade – Tims Thicket Road		Capital Expenses			(103,221)	0
501291-xxxx-xxxx-xxxxx	Pinjarra Road		Capital Expenses		344,309		344,309
501346-xxxx-xxxx-xxxxx	Preservation RRG – Coolibah Avenue		Capital Expenses			(344,309)	0
501193-xxxx-xxxx-xxxxx	Clarice Street Traffic Management		Capital Expenses		143,569		143,569
TBC	Black Spot Program grant revenue		Capital Revenue			(95,713)	47,856
	Asset Management Reserve		Other: Transfer Out of Reserve			(47,856)	0
501265-xxxx-xxxx-xxxxx	Lynda Street and Baroy Street Intersection		Capital Expenses			(419,159)	(419,159)
TBC	Black Spot Program grant revenue		Capital Revenue		288,558		(130,601)
	Asset Management Reserve		Other: Transfer Out of Reserve		47,856		(82,745)
501329-xxxx-xxxx-xxxxx	Canterbury & Surrounds		Capital Expenses		82,745		0
				0	**1,117,258**	**(1,117,258)**	**0**

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 31 MARCH 2026

NOTE 12
BUDGET AMENDMENTS APPROVED

Amendments to original budget since budget adoption. Surplus/(Deficit)
A positive number in the amended budget running balance represents an estimated closing surplus.
A negative number in the amended budget running balance represents an estimated closing deficit

GL Code	Description	Council Resolution	Classification	Non Cash Adjustment	Increase in Available Cash	Decrease in Available Cash	Amended Budget Running Balance
				$	$	$	$
							(504,792)
	2024/25 Capital Carryover - Capital adjustment	**June OCM G. 11/06/25**	Capital Expenses			(4,989,906)	(5,494,698)
	2024/25 Capital Carryover - Loan adjustment	**June OCM G. 11/06/25**	Other: Unutilised Loans		144,577		(5,350,121)
	2024/25 Capital Carryover - Reserve adjustment	**June OCM G. 11/06/25**	Other: Transfer Out of Reserve		3,034,995		(2,315,126)
	2024/25 Capital Carryover - Proceeds adjustment	**June OCM G. 11/06/25**	Capital Revenue		35,481		(2,279,645)
	2024/25 Capital Carryover - Grants and contributions adjustments	**June OCM G. 11/06/25**	Capital Revenue		1,774,853		(504,792)
	2024/25 Capital Carryover - Grants and contributions adjustments	**June OCM G. 11/06/25**	Other: Transfer Out of Reserve		225,117		(279,675)
	2024/25 Capital Carryover - Contract Liability	**June OCM G. 11/06/25**	Non Cash Item	(225,117)			(504,792)
	Operating Carryovers - Reduction in Contracts and Materials	**June OCM G. 11/06/25**	Operating Expenses			(1,882,385)	(2,387,177)
	Operating Carryovers - Unspent Grant Reserve	**June OCM G. 11/06/25**	Other: Transfer Out of Reserve		156,680		(2,230,497)
	Operating Carryovers - Restricted Cash Reserve	**June OCM G. 11/06/25**	Other: Transfer Out of Reserve		1,725,705		(504,792)
	Operating Carryovers - Increase in Operating Revenue	**June OCM G. 11/06/25**	Operating Revenue		152,135		(352,657)
	Operating Carryovers - Contract Liability	**June OCM G. 11/06/25**	Non Cash Item	(152,135)			(504,792)
	2024/25 Mid-Year Budget Review Budget Reinstatement - Capital adjustment	**June OCM G. 11/06/25**	Capital Expenses			(3,692,843)	(4,197,635)
	2024/25 Mid-Year Budget Review Budget Reinstatement - Loan adjustment	**June OCM G. 11/06/25**	Other: Unutilised Loans		65,848		(4,131,787)
	2024/25 Mid-Year Budget Review Budget Reinstatement - Proceeds adjustment	**June OCM G. 11/06/25**	Capital Revenue		318,007		(3,813,780)
	2024/25 Mid-Year Budget Review Budget Reinstatement - Grants and contributions adjustment	**June OCM G. 11/06/25**	Capital Revenue		486,647		(3,327,133)
	2024/25 Mid-Year Budget Review Budget Reinstatement - Reserve adjustment	**June OCM G. 11/06/25**	Other: Transfer Out of Reserve		2,822,341		(504,792)
	2024/25 Mid-Year Budget Review Budget Reinstatement - Unspent Grants Reserve adjustment	**June OCM G. 11/06/25**	Other: Transfer Out of Reserve		140,719		(364,073)
	2024/25 Mid-Year Budget Review Budget Reinstatement - Contract Liability	**June OCM G. 11/06/25**	Non Cash Item	(140,719)			(504,792)
700685-6600-1001-61129	Rushton North Lighting	**June OCM G. 11/06/25**	Capital Expenses			(338,022)	(842,814)
700685-6600-1263-41403	Rushton North Lighting - State Election Promise Grant	**June OCM G. 11/06/25**	Capital Revenue		100,000		(742,814)
700685-6600-1263-41403	Rushton North Lighting - Club Night Lights Program Grant	**June OCM G. 11/06/25**	Capital Revenue		112,674		(630,140)
930044-6600-1001-61129	CSRFF Small Grant Program	**June OCM G. 11/06/25**	Capital Expenses		100,000		(530,140)
930048-6500-1001-61129	LTFP Program - CSRFF	**June OCM G. 11/06/25**	Capital Expenses		25,348		(504,792)
100010-4390-1267-61001	Administration - Health Promotion - Grant Expenditure	**Aug OCM G. 17/08/25**	Operating Expenses			(17,500)	(522,292)
100010-4390-1263-41400	Suicide Prevention Grant - WA Mental Health Commission	**Aug OCM G. 17/08/25**	Operating Revenue		17,500		(504,792)
100170-4200-1263-61129	CASM Artist in Residency and Mentorship Program	**Aug OCM G. 17/08/25**	Operating Expenses			(42,000)	(546,792)
100170-4200-1263-41400	CASM Artist in Residency and Mentorship Program Grant - LGSCI	**Aug OCM G. 17/08/25**	Operating Revenue		42,000		(504,792)
100010-4120-1169-61001	Administration - Strategic Planning - Corporate Projects	**Aug OCM G. 17/08/25**	Operating Expenses			(50,000)	(554,792)
100010-4120-1263-41400	Administration - Strategic Planning -Operating Grants - PDC	**Aug OCM G. 17/08/25**	Operating Revenue		50,000		(504,792)
100010-1110-1001-61129	Administration - Economic Development - CoM Project Management Projects	**Aug OCM G. 17/08/25**	Operating Expenses			(200,000)	(704,792)
750695-6100-1001-61129	Waste Management Centre Upgrade Fire Fighting Infrastructure	**Aug OCM G. 17/08/25**	Capital Expenses			(150,000)	(854,792)
	Waste Facilities Reserve	**Aug OCM G. 17/08/25**	Other: Transfer Out of Reserve		150,000		(704,792)
750828-6100-1001-61129	BLD - Admin Building FIP Replacement	**Aug OCM G. 17/08/25**	Capital Expenses			(25,851)	(730,643)
750828-6100-1305-41452	Insurance Claim Proceeds - Contributions - Non-Operating	**Aug OCM G. 17/08/25**	Capital Revenue		25,851		(704,792)
930045-6600-1001-61129	Major Public Artworks	**Aug OCM G. 17/08/25**	Capital Expenses			(125,000)	(829,792)
	Public Art Reserve	**Aug OCM G. 17/08/25**	Other: Transfer Out of Reserve		125,000		(704,792)
124012-5850-2150-61129	Mandurah Estuary Bridge Duplication - Fishing Platform project	**Aug OCM G. 17/08/25**	Operating Expenses			(160,000)	(864,792)
	Restricted Cash Reserve	**Aug OCM G. 17/08/25**	Other: Transfer Out of Reserve		160,000		(704,792)
100010-5410-1738-41130	Administration - Design and Development - Works in City Managed Reserves Permit - Fees and Charges	**Aug OCM G. 19/08/25**	Operating Revenue		300,000		(404,792)

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NOTE 12
BUDGET AMENDMENTS APPROVED

Amendments to original budget since budget adoption. Surplus/(Deficit)
A positive number in the amended budget running balance represents an estimated closing surplus.
A negative number in the amended budget running balance represents an estimated closing deficit

GL Code	Description	Council Resolution	Classification	Non Cash Adjustment	Increase in Available Cash	Decrease in Available Cash	Amended Budget Running Balance
100004-5410-1001-60001	Payroll Services - Design and Development - Salaries and Wages	**Aug OCM G. 19/08/25**	Operating Expenses			(300,000)	(704,792)
	2024-25 Operating Carryover Adjustment - Increase in Materials/Contracts	**Sept OCM G. 3/10/25**	Operating Expenses			(385,484)	(1,090,276)
	2024-25 Operating Carryovers - Restricted Cash Reserve	**Sept OCM G. 3/10/25**	Other: Transfer Out of Reserve		316,303		(773,973)
	2024-25 Operating Carryovers - Unspent Grant Reserve	**Sept OCM G. 3/10/25**	Other: Transfer Out of Reserve		21,056		(752,917)
	2024-25 Operating Carryover Adjustment - Increase in Grants/Contributions	**Sept OCM G. 3/10/25**	Operating Revenue		212,243		(540,674)
	2024-25 Operating Carryover Adjustment - Non Cash Grant Movements	**Sept OCM G. 3/10/25**	Non Cash Item	(164,118)			(704,792)
	Capital Carryover - Capital adjustment	**Sept OCM G. 3/10/25**	Capital Expenses			(2,631,032)	(3,335,824)
	Capital Carryover - Loan adjustment	**Sept OCM G. 3/10/25**	Other: Unutilised Loans		54,548		(3,281,276)
	Capital Carryover - Net Reserve adjustment	**Sept OCM G. 3/10/25**	Other: Transfer Out of Reserve		1,882,642		(1,398,634)
	Capital Carryover - Proceeds adjustment	**Sept OCM G. 3/10/25**	Other: Proceeds From Sale of Assets		24,008		(1,374,626)
	Capital Carryover - Grants adjustments	**Sept OCM G. 3/10/25**	Capital Revenue		669,834		(704,792)
	Capital Carryover - Unspent Grant Reserve adjustment	**Sept OCM G. 3/10/25**	Other: Transfer Out of Reserve		1,067,260		362,468
	Capital Carryovers - Contract Liability	**Sept OCM G. 3/10/25**		(1,067,260)			(704,792)
700686-6600-1001-61001	Meadow Springs Cricket Nets	**Sept OCM G. 3/10/25**	Capital Expenses			(50,000)	(754,792)
700686-6600-1001-41403	Meadow Springs Cricket Nets - State Election Grant Funding	**Sept OCM G. 3/10/25**	Capital Revenue		50,000		(704,792)
101012-4505-1263-41400	International Day for People with Disability	**Oct OCM G. 8/11/25**	Operating Revenue		1,000		(703,792)
101012-4505-1263-61001	International Day for People with Disability	**Oct OCM G. 8/11/25**	Operating Expenses			(1,000)	(704,792)
700687-6600-1001-41403	Lakelands Dugouts - State Election Grant Funding	**Oct OCM G. 8/11/25**	Capital Revenue		82,000		(622,792)
700687-6600-1001-61001	Lakelands Dugouts	**Oct OCM G. 8/11/25**	Capital Expenses			(82,000)	(704,792)
700633-6600-1001-61129	MARC Shadesails	**Oct OCM G. 8/11/25**	Capital Expenses			(20,000)	(724,792)
750792-6100-1001-61129	MARC Café/Squash Thoroughfare	**Oct OCM G. 8/11/25**	Capital Expenses		20,000		(704,792)
	Waste	**Oct OCM G. 8/11/25**	Other: Transfer Out of Reserve		20,000		(684,792)
750783-6100-1001-61129	Waste - Safety Improvement Projects	**Oct OCM G. 8/11/25**	Capital Expenses			(20,000)	(704,792)
131007-5410-1263-61129	Waltham Street Design and Development	**Oct OCM G. 8/11/25**	Operating Expenses			(149,899)	(854,691)
	2024-25 Operating Carryovers - Restricted Cash Reserve	**Oct OCM G. 8/11/25**	Other: Transfer Out of Reserve		149,899		(704,792)
163046-4000-1263-41400	Canopus Restoration Project	**Oct OCM G. 8/11/25**	Operating Revenue		50,000		(654,792)
163046-4000-1263-61001	Canopus Restoration Project	**Oct OCM G. 8/11/25**	Operating Expenses			(50,000)	(704,792)
100010-1000-1169-61001	Administration Chief Executive Corporate Project	**Oct OCM G. 8/11/25**	Operating Expenses		55,850		(648,942)
911021-6400-1001-61001	In-water floating pontoon	**Oct OCM G. 8/11/25**	Capital Expenses			(55,850)	(704,792)
700662-6600-1001-61129	PRK 25-26 Merlin Reserve Renewal	**Nov OCM G. 6/12/25**	Capital Expenses		200,000		(504,792)
700662-6600-1263-41403	PRK 25-26 Merlin Reserve Renewal - State Election Commitment Grant	**Nov OCM G. 6/12/25**	Capital Revenue			(200,000)	(704,792)
501264-6250-1001-XXXXX	Lakes Road - Murdoch Drive	**Nov OCM G. 6/12/25**	Capital Expenses		125,457		(579,335)
XXXXXX-XXXX-XXXX-60206	Lakes Road - Murdoch Drive design and management OH	**Nov OCM G. 6/12/25**	Capital Expenses			(5,590)	(584,925)
501264-6250-1263-41403	Lakes Road - Murdoch Drive Blackspot Grant	**Nov OCM G. 6/12/25**	Capital Revenue			(98,666)	(683,591)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Into Reserve			(21,201)	(704,792)
501194-6250-1001-61001	23-24 TM Mandurah Tce/Adonis Rd	**Nov OCM G. 6/12/25**	Capital Expenses		110,853		(593,939)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve			(31,917)	(625,856)
501194-6250-1263-41403	23-24 TM Mandurah Tce/Adonis Rd Grant	**Nov OCM G. 6/12/25**	Capital Revenue			(78,936)	(704,792)
501267-6250-1001-61001	Wanjeep Street Blackspot	**Nov OCM G. 6/12/25**	Capital Expenses		614,883		(89,909)
XXXXXX-XXXX-XXXX-60206	Wanjeep Street Blackspot design & management OH	**Nov OCM G. 6/12/25**	Capital Expenses			(26,338)	(116,247)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve			(178,878)	(295,125)

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NOTE 12
BUDGET AMENDMENTS APPROVED

Amendments to original budget since budget adoption. Surplus/(Deficit)
A positive number in the amended budget running balance represents an estimated closing surplus.
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GL Code	Description	Council Resolution	Classification	Non Cash Adjustment	Increase in Available Cash	Decrease in Available Cash	Amended Budget Running Balance
501267-6250-1263-41403	Wanjeep Street Blackspot Grant	**Nov OCM G. 6/12/25**	Capital Revenue			(409,667)	(704,792)
501235-6250-1001-61129	RC Peel Street Stage 4	**Nov OCM G. 6/12/25**	Capital Expenses		700,284		(4,508)
501235-6250-1263-41403	RC Peel Street Stage 4 Regional Road Group Grant	**Nov OCM G. 6/12/25**	Capital Revenue			(164,150)	(168,658)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Into Reserve			(536,134)	(704,792)
501291-6250-1001-6XXXX	Pinjarra Rd	**Nov OCM G. 6/12/25**	Capital Expenses			(708,989)	(1,413,781)
501291-6250-1263-41403	Pinjarra Rd - Regional Road Group Grant	**Nov OCM G. 6/12/25**	Capital Revenue		472,659		(941,122)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve		236,330		(704,792)
New-6250-1001-61129	Preservation - Coolibah Ave	**Nov OCM G. 6/12/25**	Capital Expenses			(532,000)	(1,236,792)
New-6250-1263-41403	Coolibah Ave - Regional Road Group Grant	**Nov OCM G. 6/12/25**	Capital Revenue		354,667		(882,125)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve		177,333		(704,792)
501337-6250-1001-6XXXX	RDS - Resurface - Cuvier Place	**Nov OCM G. 6/12/25**	Capital Expenses		107,340		(597,451)
New-6250-1001-6XXXX	RDS - Resurface - Cyprus Gardens	**Nov OCM G. 6/12/25**	Capital Expenses			(107,340)	(704,792)
750789-6100-1001-61129	Falcon Men's Shed	**Nov OCM G. 6/12/25**	Capital Expenses		641,750		(63,042)
750789-6100-1263-41403	Falcon Men's Shed Grant	**Nov OCM G. 6/12/25**	Capital Revenue			(446,750)	(509,792)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Into Reserve			(195,000)	(704,792)
911020-6400-1001-61129	Birchley Rd Boat Ramp Upgrade	**Nov OCM G. 6/12/25**	Capital Expenses		875,000		170,208
911020-6400-1263-41403	Birchley Rd Boat Ramp Upgrade - Grant	**Nov OCM G. 6/12/25**	Capital Revenue			(678,750)	(508,542)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve			(196,250)	(704,792)
501192-6250-1001-61129	New - Falcon Coastal Shared Path	**Nov OCM G. 6/12/25**	Capital Expenses		300,000		(404,792)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve			(94,392)	(499,184)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Into Reserve			(205,608)	(704,792)
750736-6100-1001-61129	Operations Centre Redevelopment	**Nov OCM G. 6/12/25**	Capital Expenses		428,717		(276,075)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve			(200,000)	(476,075)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Into Reserve			(228,717)	(704,792)
880017-6150-1001-61129	BRG Fathom Turn Footbridge Maintenance	**Nov OCM G. 6/12/25**	Capital Expenses		250,000		(454,792)
880017-6150-1263-41403	BRG Fathom Turn Footbridge Maintenance	**Nov OCM G. 6/12/25**	Capital Revenue			(167,000)	(621,792)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Into Reserve			(83,000)	(704,792)
911018-6400-1001-61129	C&M - 25-26 Memorial Park Seawall	**Nov OCM G. 6/12/25**	Capital Expenses		220,000		(484,792)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve			(220,000)	(704,792)
911016-6400-1001-61129	C&M - 25-26 Waterside Foreshore seawall	**Nov OCM G. 6/12/25**	Capital Expenses		285,000		(419,792)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve			(285,000)	(704,792)
501294-6250-1001-61129	Decorative Street Lighting Renewal	**Nov OCM G. 6/12/25**	Capital Expenses		380,000		(324,792)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve			(380,000)	(704,792)
700516-6600-1001-61129	Yalgorup National Park	**Nov OCM G. 6/12/25**	Capital Expenses		810,223		105,431
700516-6600-1263-41403	Yalgorup National Park - DPIRD Grant	**Nov OCM G. 6/12/25**	Capital Revenue			(810,223)	(704,792)
	Unspent Grant Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve			(810,223)	(1,515,015)
	Capital Revenue Adjustment - Contract Liability	**Nov OCM G. 6/12/25**	Non Cash Item	810,223			(704,792)
New-6100-1001-61129	Falcon Library Compressor Unit Replacement	**Nov OCM G. 6/12/25**	Capital Expenses			(250,000)	(954,792)
	Asset Management Reserve	**Nov OCM G. 6/12/25**	Other: Transfer Out of Reserve		250,000		(704,792)
New-6100-1001-61129	Canopus Display Shed	**Nov OCM G. 6/12/25**	Capital Expenses			(50,000)	(754,792)
163046-4000-1263-61001	Place & Community Projects- Operating Expenditure	**Nov OCM G. 6/12/25**	Operating Expenses		50,000		(704,792)
New-6100-1001-61129	Canopus Display Shed	**Nov OCM G. 6/12/25**	Capital Revenue		50,000		(654,792)
163046-4000-1263-41400	Canopus Display Shed operating	**Nov OCM G. 6/12/25**	Operating Revenue			(50,000)	(704,792)

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NOTE 12
BUDGET AMENDMENTS APPROVED

Amendments to original budget since budget adoption. Surplus/(Deficit)
A positive number in the amended budget running balance represents an estimated closing surplus.
A negative number in the amended budget running balance represents an estimated closing deficit

GL Code	Description	Council Resolution	Classification	Non Cash Adjustment	Increase in Available Cash	Decrease in Available Cash	Amended Budget Running Balance
New	CCTV - Storage Server Upgrade	**Nov OCM G. 6/12/25**	Capital Expenses			(70,000)	(774,792)
100004-3310-1650-60053	Organisational Training and Development	**Nov OCM G. 6/12/25**	Operating Expenses		70,000		(704,792)
100145-3400-1733-61129	2025 Christmas In Mandurah	**Feb OCM 26/23**	Operating Expenses			(141,259)	(846,051)
100145-3400-1263-41400	2025 Christmas In Mandurah - Grant Revenue	**Feb OCM 26/23**	Operating Revenue		130,000		(716,051)
100145-3400-1263-41130	2025 Christamas in Mandurah - Fees and charges	**Feb OCM 26/23**	Operating Revenue		11,259		(704,792)
750833-6100-1001-61129	Port Bouv Rec Club Tank Upgr	**Feb OCM 26/23**	Capital Expenses			(25,000)	(729,792)
	Asset Management Reserve	**Feb OCM 26/23**	Other: Transfer Out of Reserve		25,000		(704,792)
750835-6100-1001-61129	BLD - Mandurah Ocean Marina Chalet Renewal	**Feb OCM 26/23**	Capital Expenses			(162,500)	(867,292)
100010-5820-1263-41130	Administration Chalets General Operati Revenue FeesandCharges	**Feb OCM 26/23**	Operating Revenue		162,500		(704,792)
750802-6100-1001-61129	BLD - MARC Indoor Pirate Playground	**Feb OCM 26/23**	Capital Expenses			(15,000)	(719,792)
750805-6100-1001-61129	BLD - MARC Indoor Door & Reception Imp	**Feb OCM 26/23**	Capital Expenses		15,000		(704,792)
XXXXXX-6600-1001-61129	Peel Hockey Water Tanks	**Feb OCM 26/23**	Capital Expenses			(50,000)	(754,792)
XXXXXX-6600-1263-41403	Peel Hockey Water Tanks Grant Revenue - State Election Commitment	**Feb OCM 26/23**	Capital Revenue		50,000		(704,792)
	BR2026 Adjustments Surplus/(Deficit)	**Feb OCM 26/24**	Opening Surplus/(Deficit)		293,701		(411,091)
	BR2026 Adjustments Revenue from Operating Activities	**Feb OCM 26/24**	Operating Revenue		1,942,842		1,531,751
	BR2026 Adjustments Non-cash amounts excluded from operating activities	**Feb OCM 26/24**	Non Cash Item			(8,228)	1,523,524
	BR2026 Adjustments Expenditure from Operating Activities	**Feb OCM 26/24**	Operating Expenses			(53,641)	1,469,882
	BR2026 Adjustments Investing Activities	**Feb OCM 26/24**	Capital Expenses		5,089,583		6,559,465
	BR2026 Adjustments Financing Activities	**Feb OCM 26/24**	Other: Financing Activities			(3,003,784)	3,555,681
	BR2026 Adjustments Transfer to Reserve	**Feb OCM 26/24**	Other: Transfer Into Reserve			(4,914,631)	(1,358,950)
	BR2026 Adjustments Transfer from Reserve	**Feb OCM 26/24**	Other: Transfer Out of Reserve		1,358,950		(0)
				(939,126)	**33,757,451**	**(32,313,533)**	**(0)**

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NOTES TO THE STATEMENT OF FINANCIAL ACTIVITY

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NOTE 13
EXPLANATION OF MATERIAL VARIANCES

The material variance thresholds are adopted annually by Council as an indicator of whether the actual expenditure or revenue varies from the year to date Actual materially.
The material variance adopted by Council for the 2025-26 year is 10.00%

Reporting Program	Var. $	Var. %	Timing/ Permanent	Explanation of Variance
	$	%		
Revenue from operating activities				
Operating grants, subsidies and contributions	(1,731,029)	(26.95%)	▼ Timing	Variance primarily due to budgeted grants/contributions not yet received. Will be monitored throughout the remainder of the year.
Other revenue	147,542	270.48%	▲ Timing	Variance primarily due to containers deposit scheme & Fuel Tax Credit rebate received.
Profit on disposal of assets	3,953,953	100.00%	▲ Permanent	Favourable non-cash variance due to asset disposals. At budget it was projected disposal proceeds would equal book value. Actual disposals have been more favourable for some fleet assets. Refer to note 4 for the asset disposals.
Expenditure from operating activities				
Materials and contracts	6,519,753	12.48%	▲ Timing	Variance in expenditure due to timing of projects.
Insurance expenses	189,417	15.63%	▲ Timing	Variance mainly due to timing of insurance claims, will be monitored during the year
Other expenditure	102,144	65.78%	▲ Permanent	Variance relates to accounting adjustment made throughout the year.
Loss on disposal of assets	(43,985)	100.00%	▼ Permanent	Non-cash variance due to assets sales. At budget it was projected disposal proceeds would equal book value. Actual disposals have been less favourable for some fleet assets. Refer to note 4 for details of assets disposals.
Investing Activities				
Non-operating Grants, Subsidies and Contributions	(5,070,596)	(58.47%)	▼ Timing	Capital grants are recognised in line with capital expenditure.
Capital Acquisitions	15,920,038	48.28%	▲ Timing	Variance due timing of capital projects. Refer to note 6 for further details.
Financing Activities				
Payment of lease liability	58,869	32.82%	▲ Timing	Varying repayment terms on lease agreements and new take up of IT leases occurring within the year
Transfer from reserves	(8,993,570)	(100.00%)	▼ Timing	Will be accounted for as part of year end financial process.

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20 MOTIONS OF WHICH NOTICE HAS BEEN GIVEN

Nil

21 NOTICE OF MOTIONS FOR CONSIDERATION AT THE FOLLOWING MEETING

Nil

22 LATE AND URGENT BUSINESS ITEMS

23 CONFIDENTIAL ITEMS

24 CLOSE OF MEETING

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