



City of
Joondalup

Draft Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) 2023–2033

Purpose of this presentation



This presentation will include information regarding the following aspects of the draft CHRMAP:

- Purpose and objectives
- Proposed adaptation pathways
- Recommended management actions



Why have a CHRMAP?



- State Coastal Planning Policy 2.6 requires local governments to develop a CHRMAP.
- The City's coastline is highly valued by the community.
- The City's coastal zone is already affected by coastal hazards.
- Impacts of coastal hazards are likely to worsen into the future.
- The estimated value of assets within the City's coastal zone is approximately \$222 million.
- The value of beaches is approximately \$17 million per year.
- Increased funding opportunities.



What is a CHRMAP?



A CHRMAP:

- is a strategic long-term plan to inform the City and community about the expected coastal hazards over the next 100 years
- defines areas of the coastline which could be vulnerable to coastal hazards
- considers potential risks to assets, infrastructure and community values
- provides options, triggers and pathways to adapt to coastal hazards.



Purpose of a CHRMAP



The main purpose of the CHRMAP is to identify current and future coastal hazard risks and provide a framework for adapting to coastal hazards over a **100-year timeframe**.



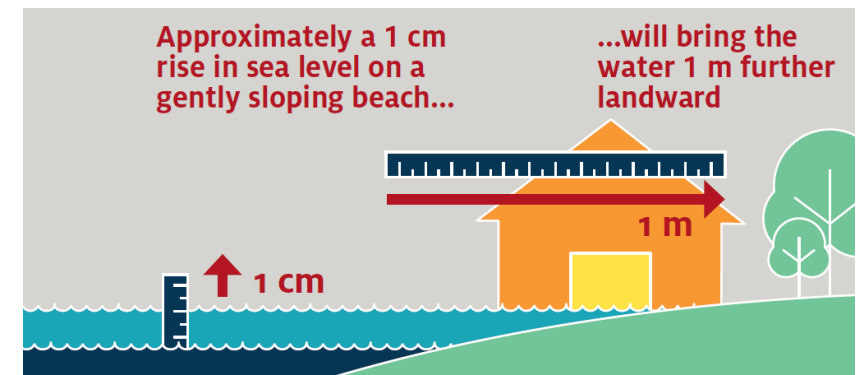
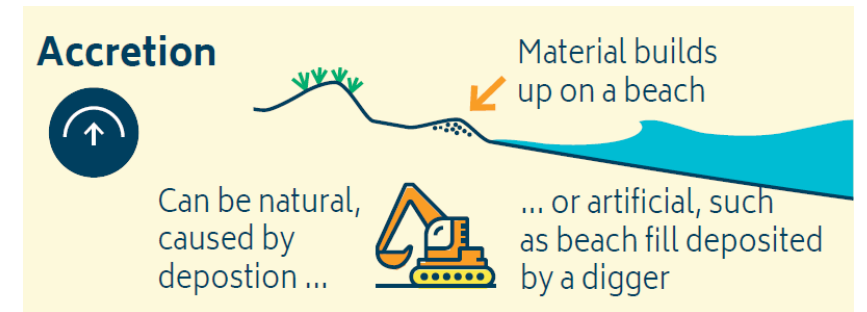
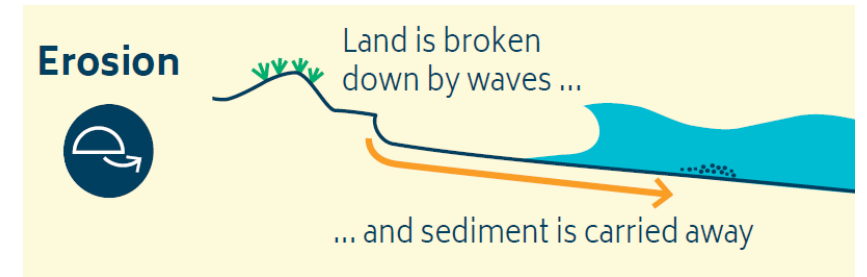
What is a coastal hazard?



The State Coastal Planning Policy 2.6 defines coastal hazards as:

“the consequence of coastal processes that affect the environment and safety of people.”

- Coastal hazards can include erosion, accretion and inundation (flooding).
- On the City’s coastline, erosion hazards are the most critical.
- Coastal hazards are likely to increase into the future, with potential sea level rise.



CHRMAP objectives:



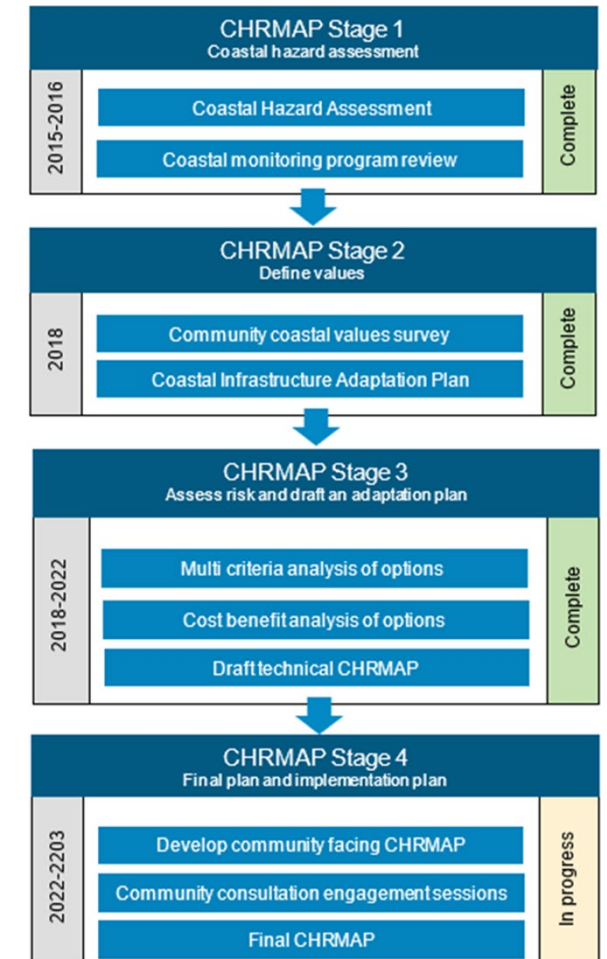
- Protect, conserve, and enhance coastal zone values, including environmental, social, cultural significance and economic values.
- Identify the coastal hazard risks over the next 100 years.
- Develop and prioritise adaptation pathways and options to help mitigate coastal hazard risks, where necessary, over the 100-year planning timeframe.
- Engage stakeholders and the community in the coastal hazard planning and decision-making process.



Stages of CHRMAP development



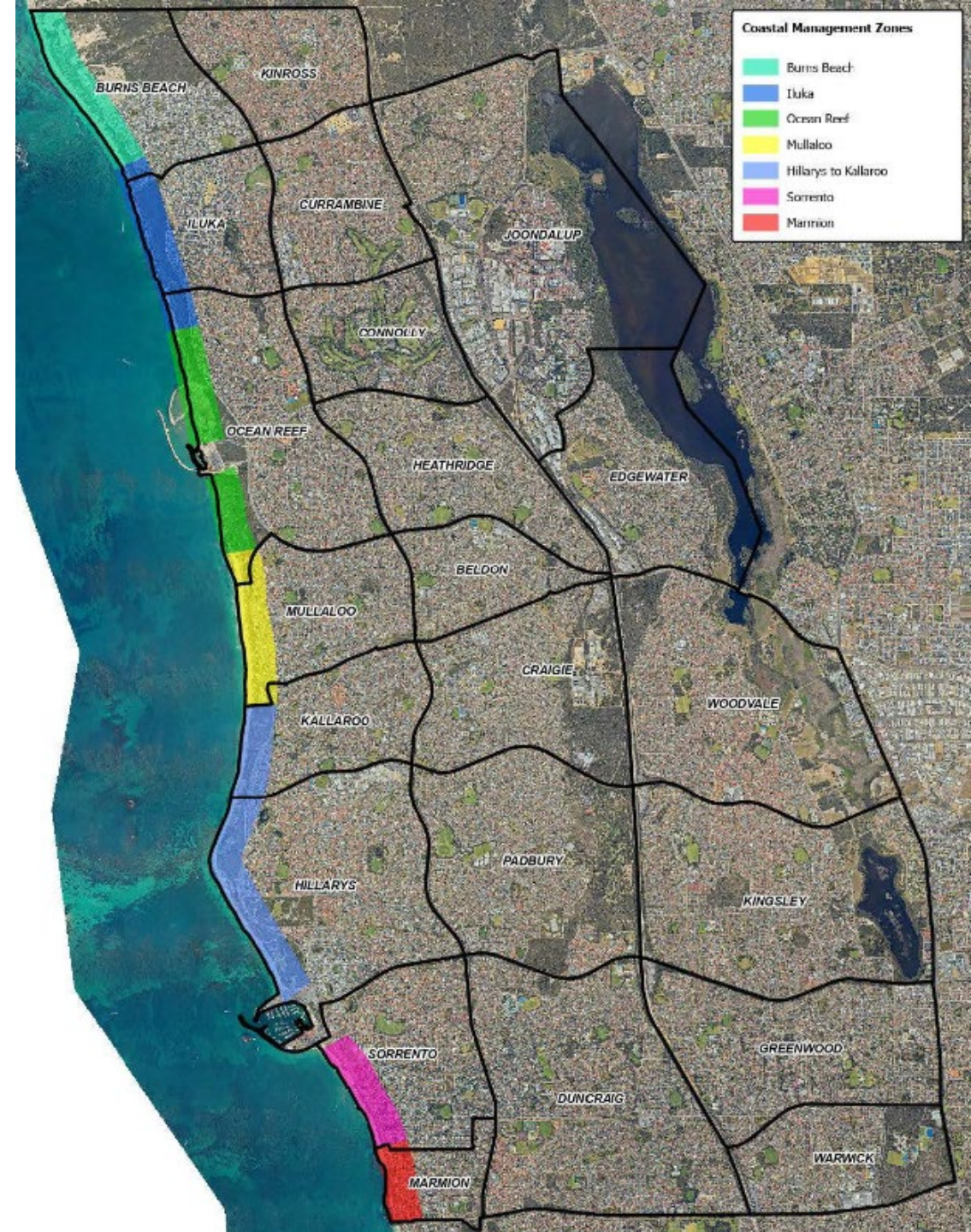
- **Stage 1** (complete) — Coastal Hazard Assessment
- **Stage 2** (complete) — defined the City's coastal values through a community survey
- **Stage 3** (complete) — developed a technical CHRMAP
- **Stage 4** (in progress) — development of a community facing CHRMAP



Study area and coastal management zones



- The CHRMAP applies to the entire City coastal zone
- The coastal zone has been split into 7 management zones:
 1. Marmion
 2. Sorrento
 3. Hillarys-Kallaroo
 4. Mullaloo
 5. Ocean Reef
 6. Iluka
 7. Burns Beach



Determination of coastal hazards

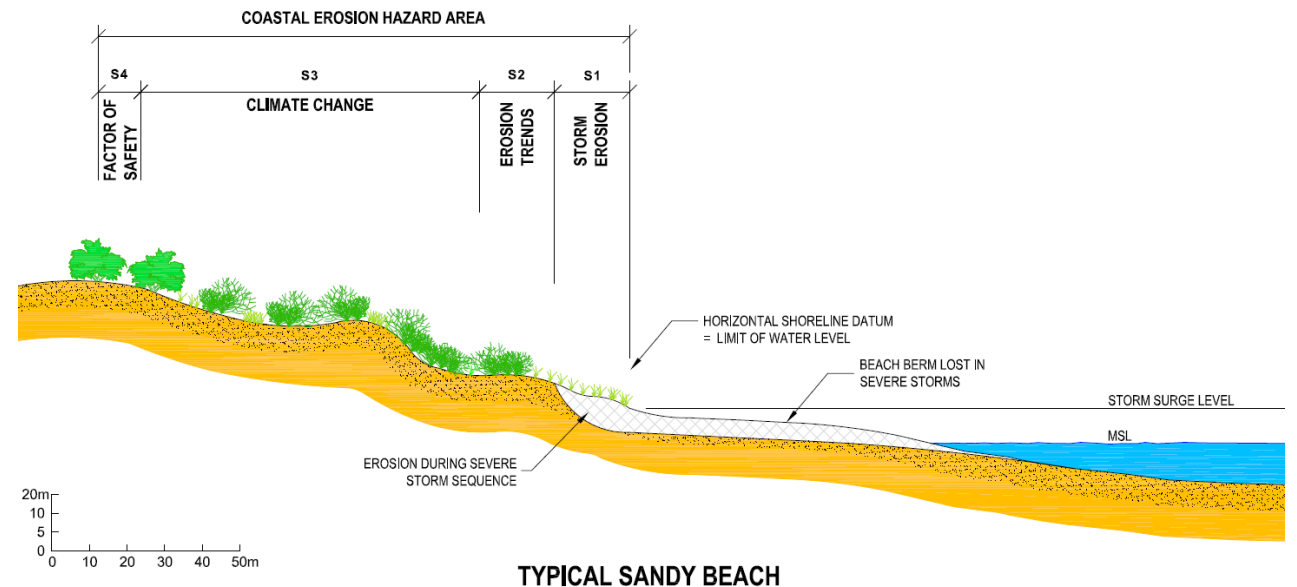


The State Coastal Planning Policy 2.6 provides a framework for determining coastal erosion hazards, including allowances for:

- Severe storm erosion
- Historic shoreline movement trends
- Erosion due to potential sea level rise
- Factor of safety.

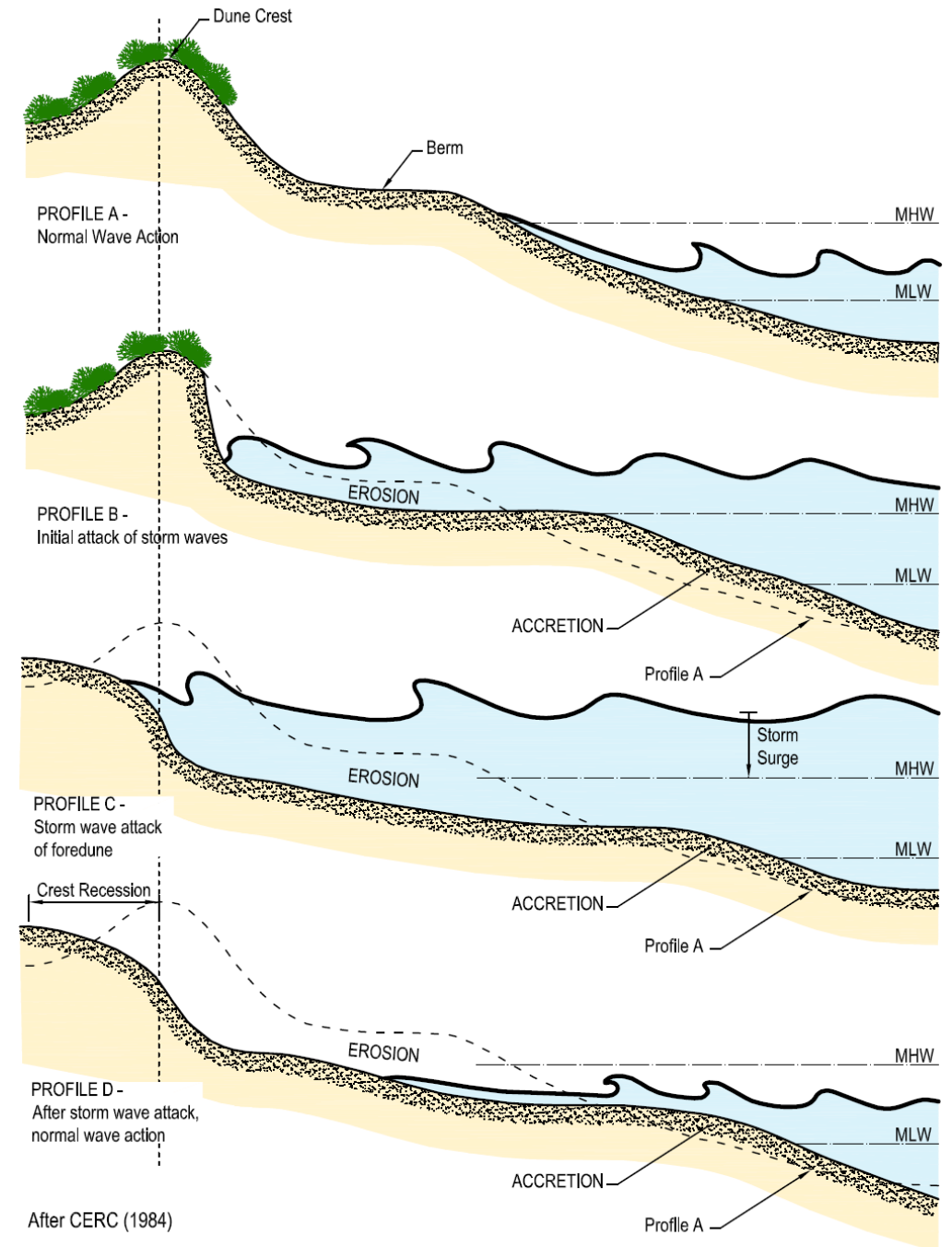
Summing these factors provides the coastal erosion hazard areas.

The City's coastal monitoring data provides valuable input to the assessment of hazards.



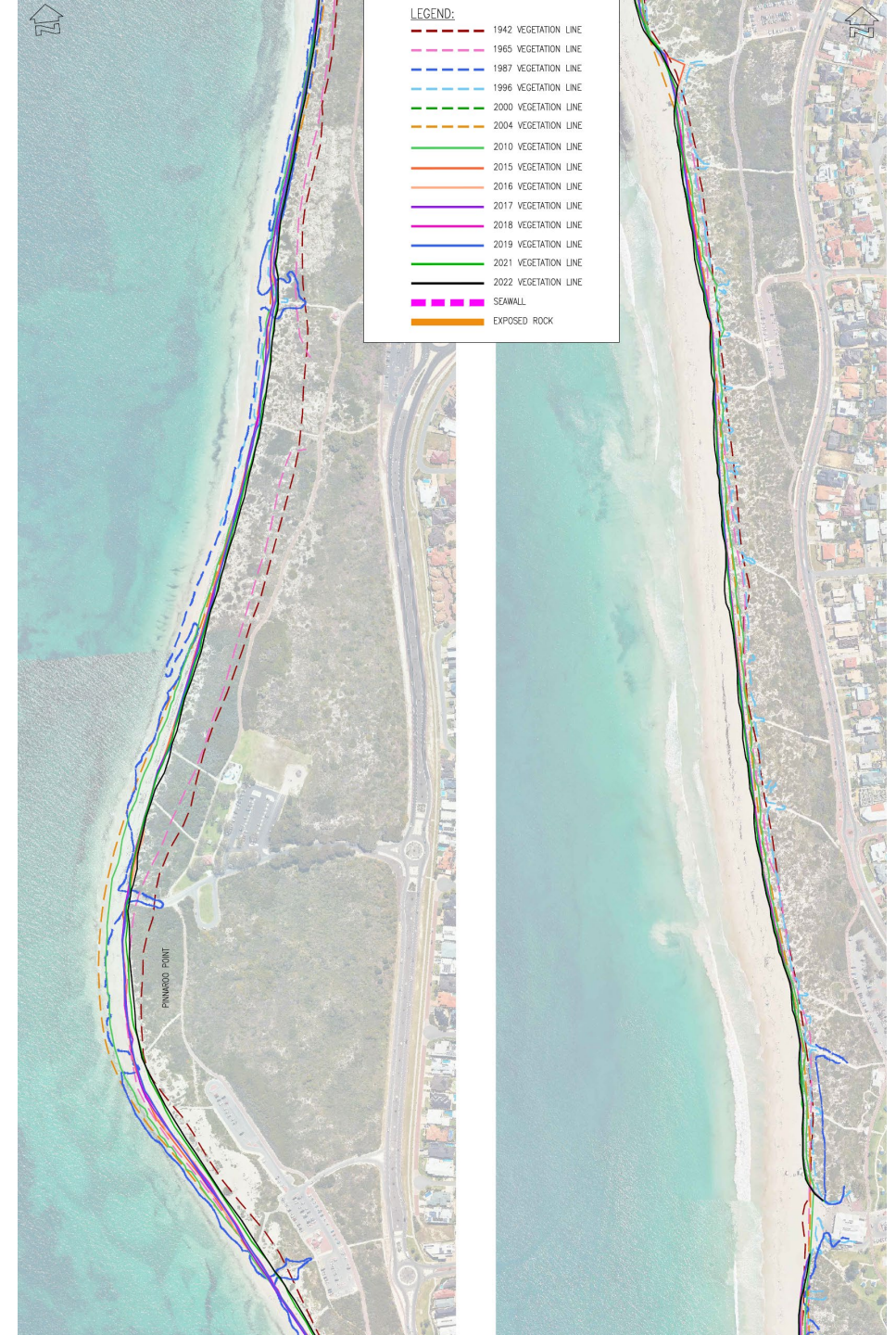
Storm erosion

- Estimated from a 100-year Average Recurrence Interval erosion storm event.
- Measured behind the Horizontal Shoreline Datum.
- The City monitors storm erosion under their Coastal Monitoring Program.

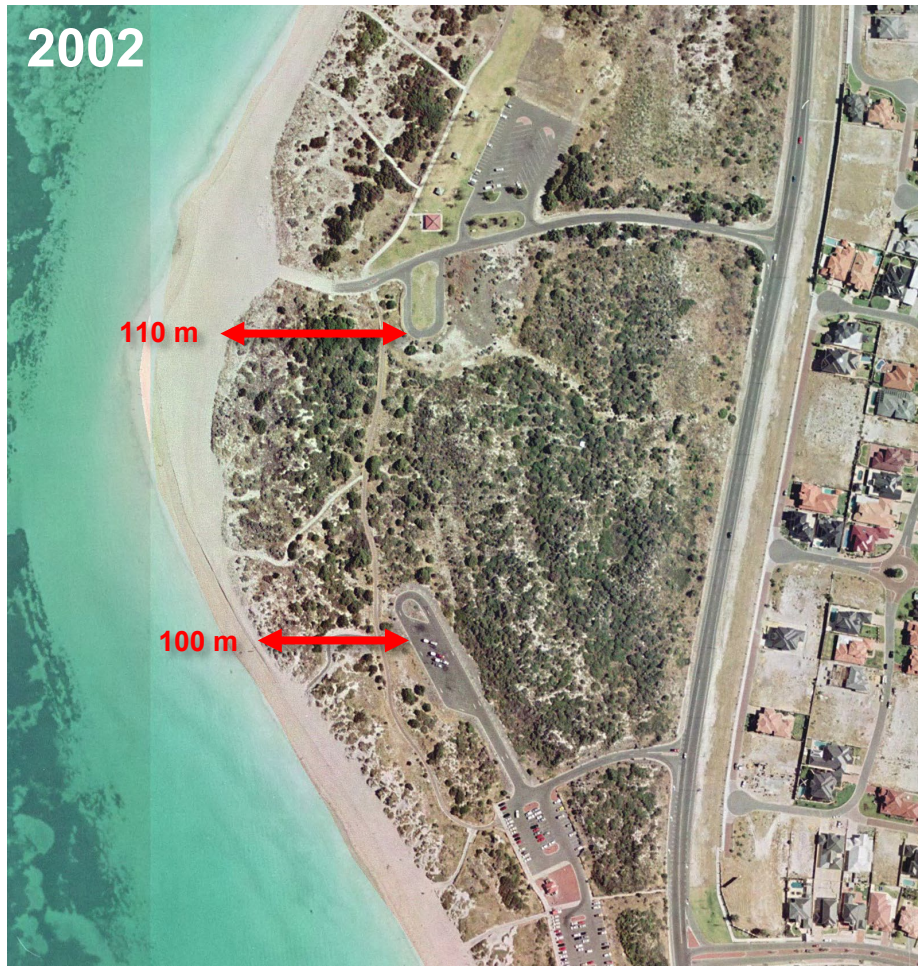


Shoreline movement trends

- Various authorities map the long-term shoreline movement via vegetation lines.
- The City completes more detailed mapping under their Coastal Monitoring Program.
- Allows determination of longer-term shoreline movement trends such as:
 - Erosion at Pinnaroo Point
 - Accretion at Mullaloo Foreshore



Shoreline movement — Pinnaroo Point



Previous consultation: Community Coastal Values Survey



- Community Coastal Values Survey completed in 2018.
- Key survey findings:
 - City's coastline is extremely popular.
 - Most valued: natural assets — beach, dunes and vegetation.
 - Supported adaptation options:
 - Softer adaptation options, such as dune stabilisation and revegetation.
 - Preventing or limiting further development in vulnerable areas.
 - Retention of sandy beaches were strongly supported.
 - The community were strongly opposed to 'doing nothing'.



Selecting adaptation options



- Step 1 — Multi-Criteria Analysis (MCA) was used to identify suitable and unsuitable adaptation options
- Step 2 — Cost Benefit Analysis (CBA) was then used to assess the viability of the options proposed by the MCA
- Step 3 — Recommended preferred adaptation options and pathways for each zone

Preferred adaptation options after MCA and CBA:

Coastal Management Zone	Preferred adaptation option
Marmion	Beach nourishment
Sorrento	Groynes
Hillarys to Kallaroo	Groynes
Mullaloo	Groynes
Ocean Reef	Do nothing
Iluka	Beach nourishment
Burns Beach	Retreat (public only)

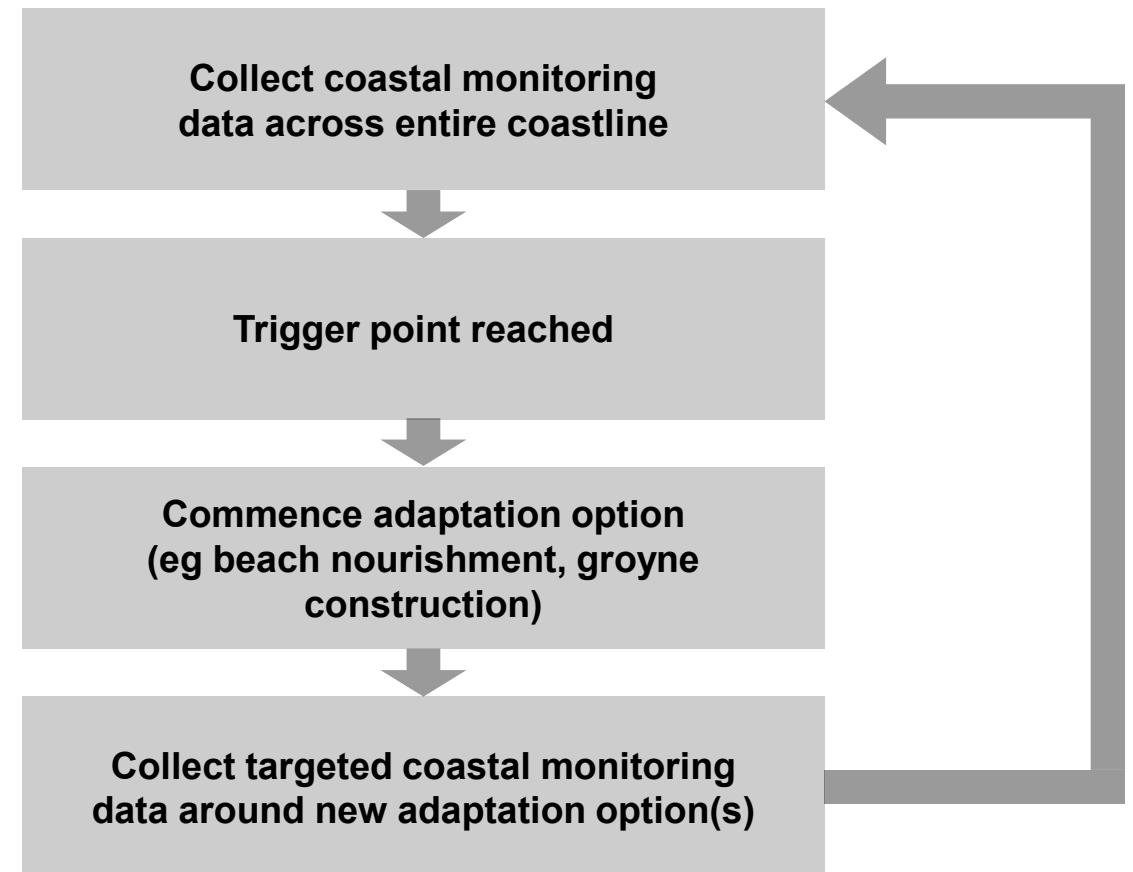
Adaptation pathways



As per State Government Guidelines, adaptation options include to Protect, Accommodate, Avoid and/or a Managed Retreat.

- Adaptation pathways have been proposed for each coastal management zone.
- Adaptation pathways include adaptation options, trigger points and monitoring.
- Pathways are subject to detailed design, the latest coastal hazard information, and community consultation, where required.

Adaptation pathway overview:

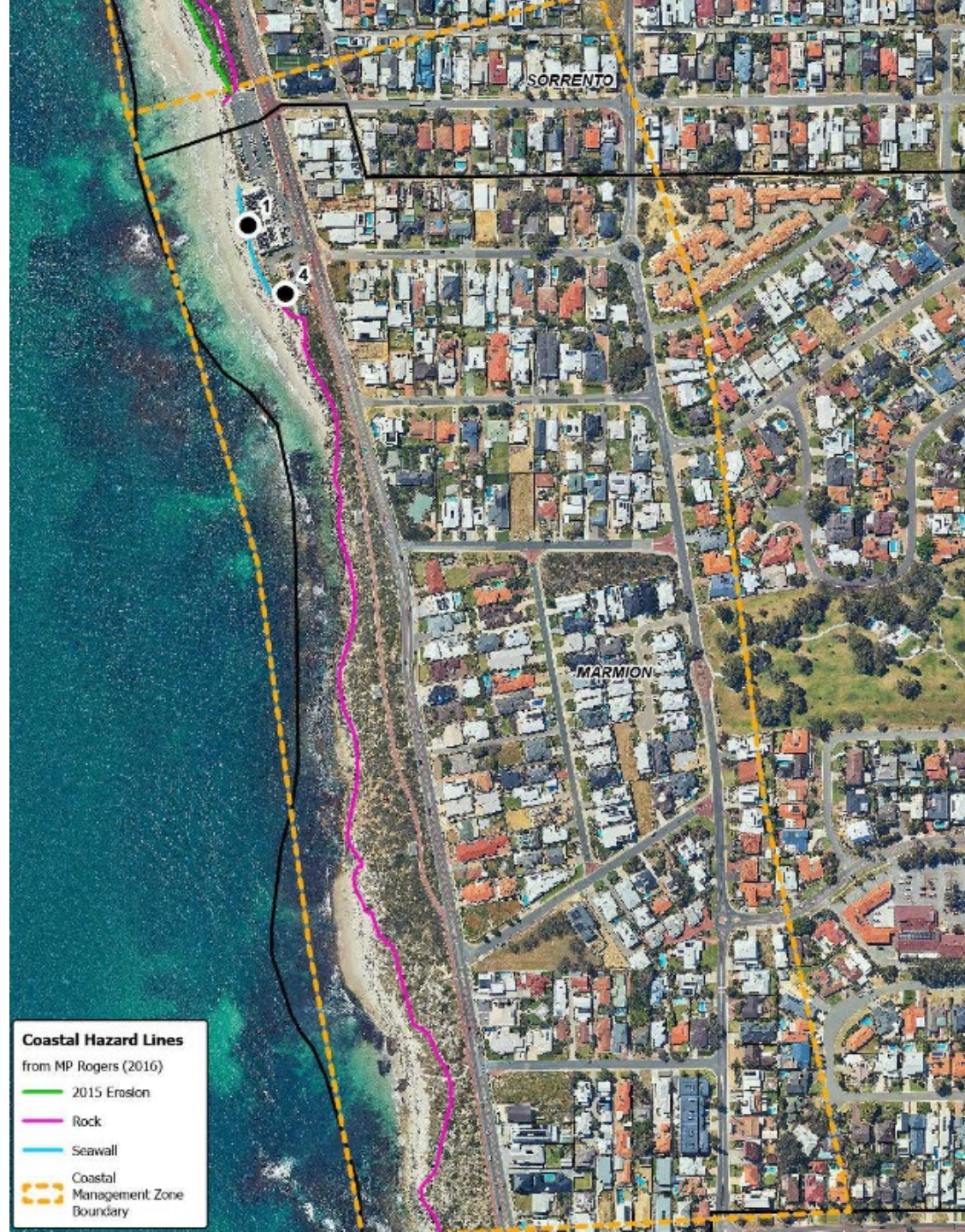


Management Zone 1: Marmion coastal vulnerability

Vulnerability to coastal erosion:

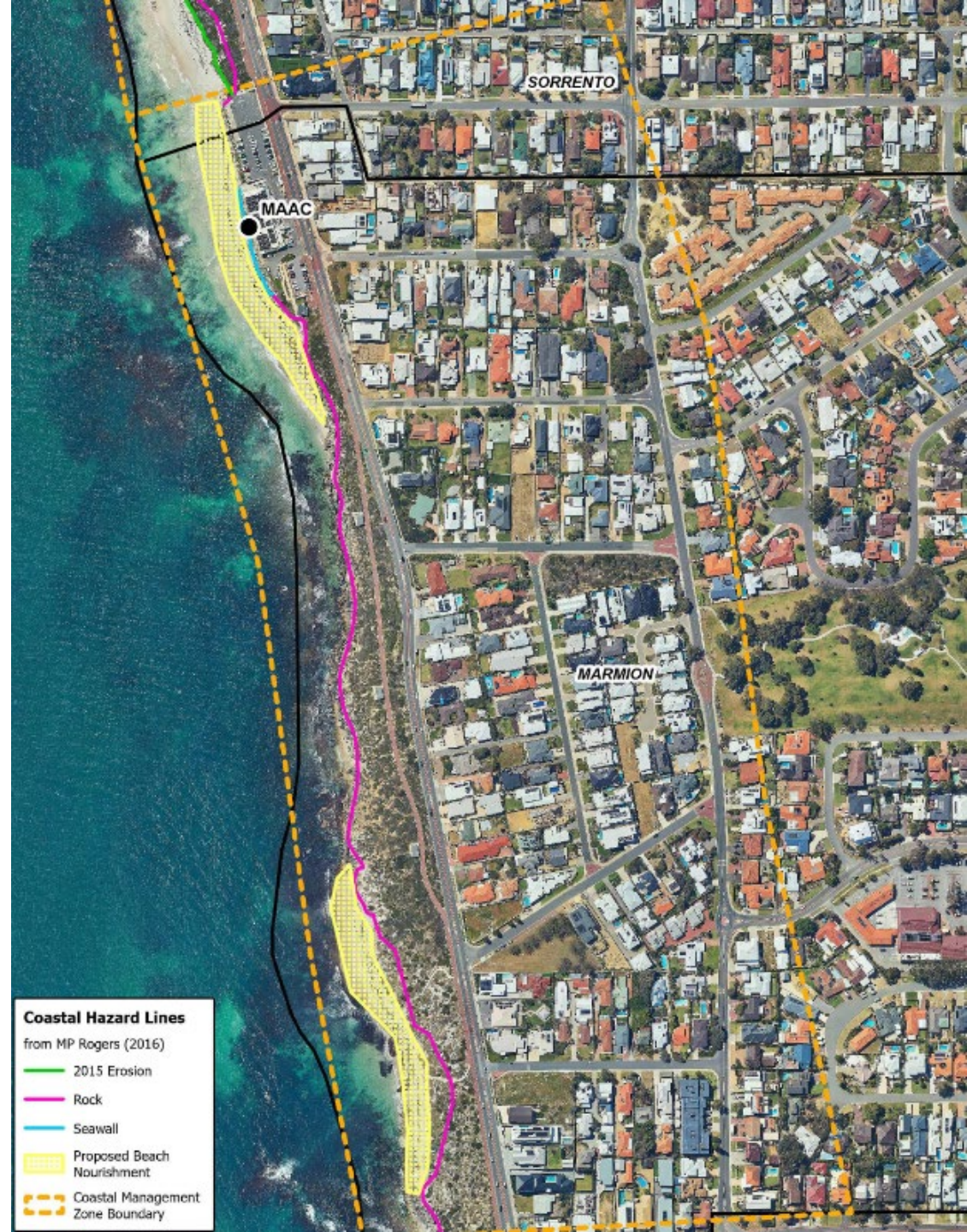
	2015	2065	2115
1 MAAC — Marmion Angling and Aquatic Club	●	●	●
2 Beach	●	●	●
3 Beach accessways	●	●	●
4 MAAC car parks	●	●	●

● Low ● Medium ● High ● Very high



Management Zone 1: Marmion proposed adaptation pathway

- Adaptation pathway — **beach nourishment**.
- Trigger — commence beach nourishment when:
 - the bank below the MAAC car park has receded to 5 m or less, and/or
 - the beach in front of the MAAC car park has reduced to 5 m or less.
- Timeline — every 5 years.
- Estimated cost — \$5M from 2025–2115.
- Estimated value of vulnerable assets — \$8.9M.



Management Zone 2: Sorrento coastal vulnerability

Vulnerability to coastal erosion:

	2015	2065	2115
1 Road — West Coast Drive	●	●	●
2 Beach	●	●	●
3 Coastal dunes and vegetation	●	●	●
4 Beach accessways	●	●	●
5 Residences	●	●	●
6 Commercial premises	●	●	●
7 Sorrento Surf Life Saving Club	●	●	●
8 Sorrento Beach South car park	●	●	●
9 West Coast Drive buildings car parks	●	●	●
10 Roads — The Plaza, Raleigh Rd, Robin Ave	●	●	●
11 Residences	●	●	●
12 Commercial premises	●	●	●
13 Sorrento Beach North car park, toilets and change rooms	●	●	●
14 Coastal pathway	●	●	●
15 Sorrento Beach Foreshore park	●	●	●

● Low ● Medium ● High ● Very high



Management Zone 2: Sorrento proposed adaptation pathway

- Adaptation pathway — **replace existing groynes.**
- Trigger — existing groynes reach the end of their design life, likely ~2030.
- Timeline:
 - 2030 — replace 3 groynes.
 - Every 10–20 years — monitoring and groyne maintenance.
 - 2080 — replace 3 groynes.
- Estimated cost — \$16.3M from 2025–2115.
- Estimated value of vulnerable assets — \$62.7M.



Management Zone 3: Hillarys-Kallaroo coastal vulnerability

Vulnerability to coastal erosion:

	2015	2065	2115
1 Road — John Wilkie Turn	●	●	●
2 Pinnaroo Point Animal Beach car parks	●	●	●
3 Hillarys Beach change rooms and toilets	●	●	●
4 Roads — Northshore Drive and Whitfords Avenue	●	●	●
5 Hillarys Beach car park	●	●	●
6 Coastal pathway	●	●	●
7 Residences	●	●	●
8 Pinnaroo Point Foreshore park	●	●	●
9 Hillarys Beach Park	●	●	●
10 Hillarys Beach North toilets	●	●	●
11 Pinnaroo Point car park and toilets	●	●	●
12 Whitfords Nodes toilets and change rooms	●	●	●
13 Northshore Drive car park	●	●	●
14 Roads — Killarney Heights, Brookevale Rise, Founders Lane, Flinders Avenue, Quayside Mews	●	●	●
15 Residences	●	●	●
16 Beach	●	●	●
17 Coastal dunes and significant flora and fauna	●	●	●
18 Beach accessways	●	●	●
19 Ern Halliday Recreation Camp (State Gov owned)	●	●	●

● Low ● Medium ● High ● Very high



Management Zone 3: Hillarys-Kallaroo proposed adaptation pathway

- Adaptation pathway — **construct 11 new groynes.**
- Trigger — when the shoreline has receded to within 20 m of a significant asset.
- Timeline: construct in stages
 - 2025 — construct 4 groynes.
 - 2040 — construct 3 groynes.
 - 2060 — construct 4 groynes.
 - 2075 — replace 4 groynes.
 - 2090 — replace 3 groynes.
- Estimated cost — \$50.5M from 2025–2115.
- Estimated value of vulnerable assets — \$76M.



Management Zone 3: Hillarys-Kallaroo proposed adaptation pathway

- Potentially 4 groynes total by 2025 if trigger points are reached.
- Groynes are to protect the beach and vegetation from further erosion.
- Subject to the latest coastal hazard information, modelling, detailed design, and community consultation, as required.



Management Zone 3: Hillarys-Kallaroo proposed adaptation pathway

- Potentially 7 total groyne total by 2050 if trigger points are reached.
- Groynes are to protect the beach and vegetation from further erosion.
- Subject to the latest coastal hazard information, modelling, detailed design, and community consultation, as required.



Management Zone 3: Hillarys-Kallaroo proposed adaptation pathway

- Potentially 11 groynes total by 2070 if trigger points are reached.
- Groynes are to protect the beach and vegetation from further erosion.
- Subject to the latest coastal hazard information, modelling, detailed design, and community consultation, as required.



Management Zone 4: Mullaloo coastal vulnerability

Vulnerability to coastal erosion:

	2015	2065	2115
1 Beach	●	●	●
2 Coastal dunes and significant flora and fauna	●	●	●
3 Mullaloo Surf Life Saving Club	●	●	●
4 Beach accessways	●	●	●
5 Road — Oceanside Promenade	●	●	●
6 Residences	●	●	●
7 Mullaloo Beach South toilets and change rooms	●	●	●
8 Road — Merryfield Place	●	●	●
9 Car parks — West View Boulevard and Oceanside Promenade street parking	●	●	●
10 Residences	●	●	●
11 Roads — Korella Street and Warren Way	●	●	●
12 Mullaloo Beach car park, north toilets and change rooms	●	●	●
13 Tom Simpson Park car park	●	●	●
14 Tom Simpson Park	●	●	●

● Low ● Medium ● High ● Very high



Management Zone 4: Mullaloo proposed adaptation pathway

- Adaptation pathway — **construct 6 groynes.**
- Trigger — shoreline has receded to within 20 m of a significant asset.
- Timeline — construct in stages:
 - 2025 — construct 1 groyne.
 - 2050 — construct 2 groynes.
 - 2060 — construct 1 groyne.
 - 2070 — construct 2 groynes.
 - 2075 — replace 1 groyne.
 - 2100 — replace 2 groynes.
 - 2110 — replace 1 groyne.
- Estimated cost — \$21M from 2025–2115.
- Estimated value of vulnerable assets — \$49.1M.



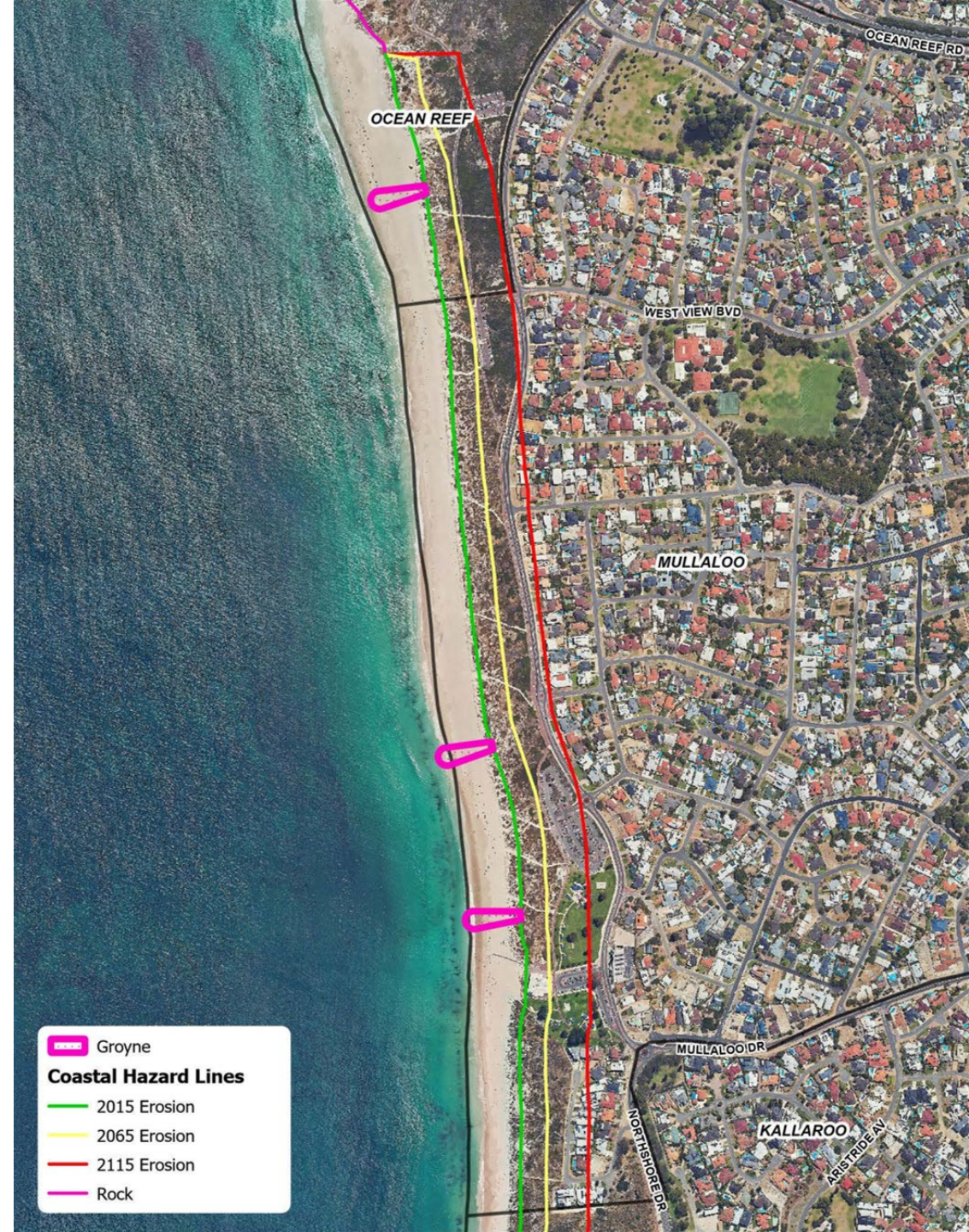
Management Zone 4: Mullaloo proposed adaptation pathway

- Potentially 1 groyne by 2025 if trigger points are reached.
- Groynes are to protect the beach and vegetation from further erosion.
- Subject to the latest coastal hazard information, modelling, detailed design and community consultation as required.



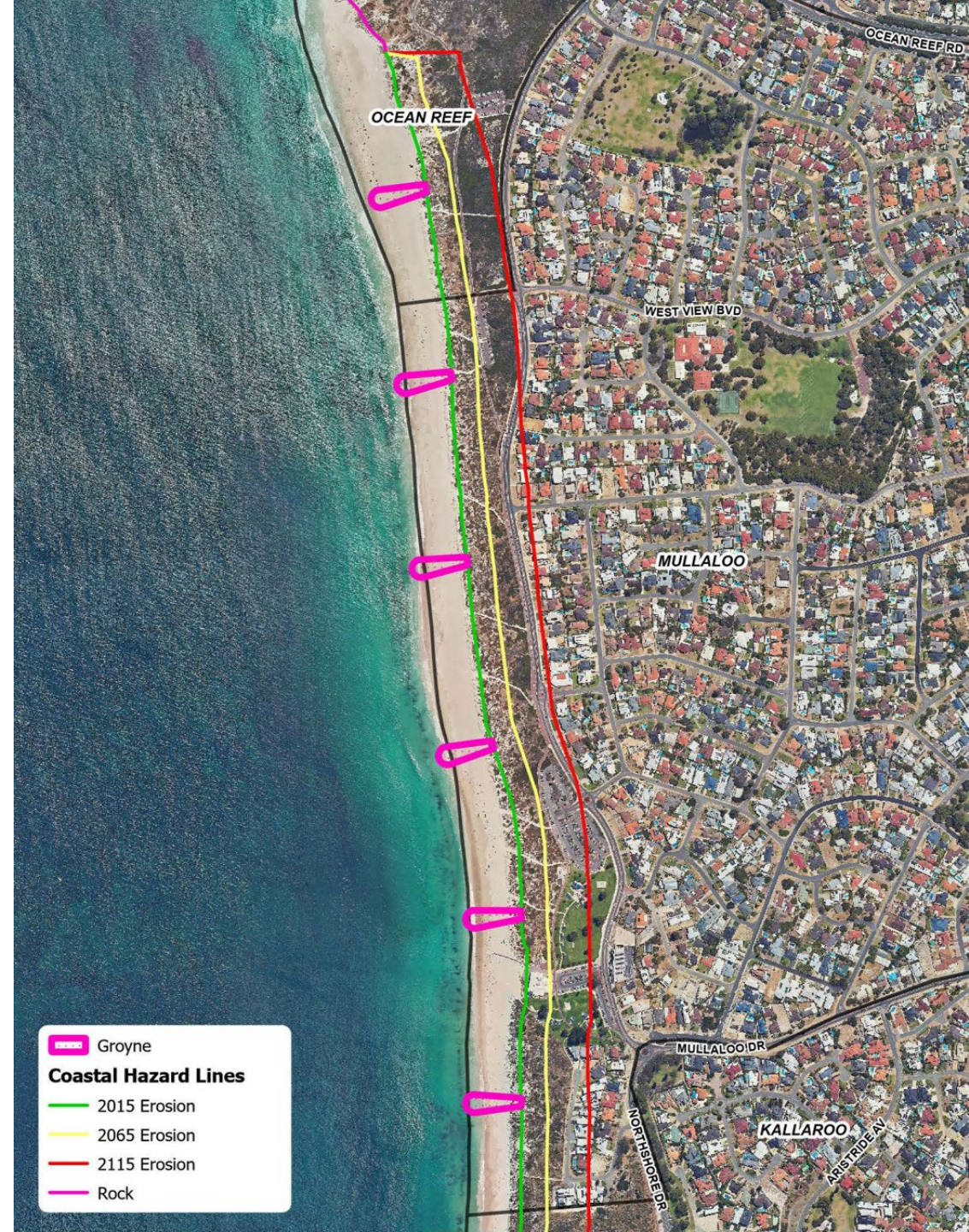
Management Zone 4: Mullaloo proposed adaptation pathway

- Potentially 3 groynes total by 2050 if trigger points are reached.
- Groynes are to protect the beach and vegetation from further beach erosion.
- Subject to the latest coastal hazard information, modelling, detailed design, and community consultation, as required.



Management Zone 4: Mullaloo proposed adaptation pathway

- Potentially 6 groynes total by 2070 if trigger points are reached.
- Groynes are to protect the beach and vegetation from further beach erosion.
- Subject to the latest coastal hazard information, modelling, detailed design, and community consultation, as required.



Management Zone 5: Ocean Reef coastal vulnerability

Vulnerability to coastal erosion:

	2015	2065	2115
1 Whitfords Volunteer Sea Rescue Group buildings	●	●	●
2 Whitfords Volunteer Sea Rescue Group car park	●	●	●
3 Ocean Reef Sea Sports Club park area	●	●	●
4 Road — Boat Harbour Quay	●	●	●
5 Beach	●	●	●
6 Coastal dunes and significant flora and fauna	●	●	●

● Low ● Medium ● High ● Very high

No adaptation options have been proposed for the Ocean Reef management zone.



Management Zone 6: Iluka coastal vulnerability

Vulnerability to coastal erosion:

	2015	2065	2115
1 Coastal pathway	●	●	●
2 Beach accessways	●	●	●
3 Burns Beach car park	●	●	●
4 Beach	●	●	●
5 Coastal dunes and significant flora and fauna	●	●	●
6 Iluka Beach Foreshore park	●	●	●

● Low ● Medium ● High ● Very high



Management Zone 6: Iluka proposed adaptation pathway

- Adaptation pathway — **beach nourishment**.
- Trigger — the beach is reduced to a 5 m width or less, likely ~2025–2030.
- Timeline — likely to begin in 2025–2030, with works repeated around every 5 years.
- Estimated cost — \$8.5M from 2025–2115.
- Estimated value of vulnerable assets — \$5.6M.

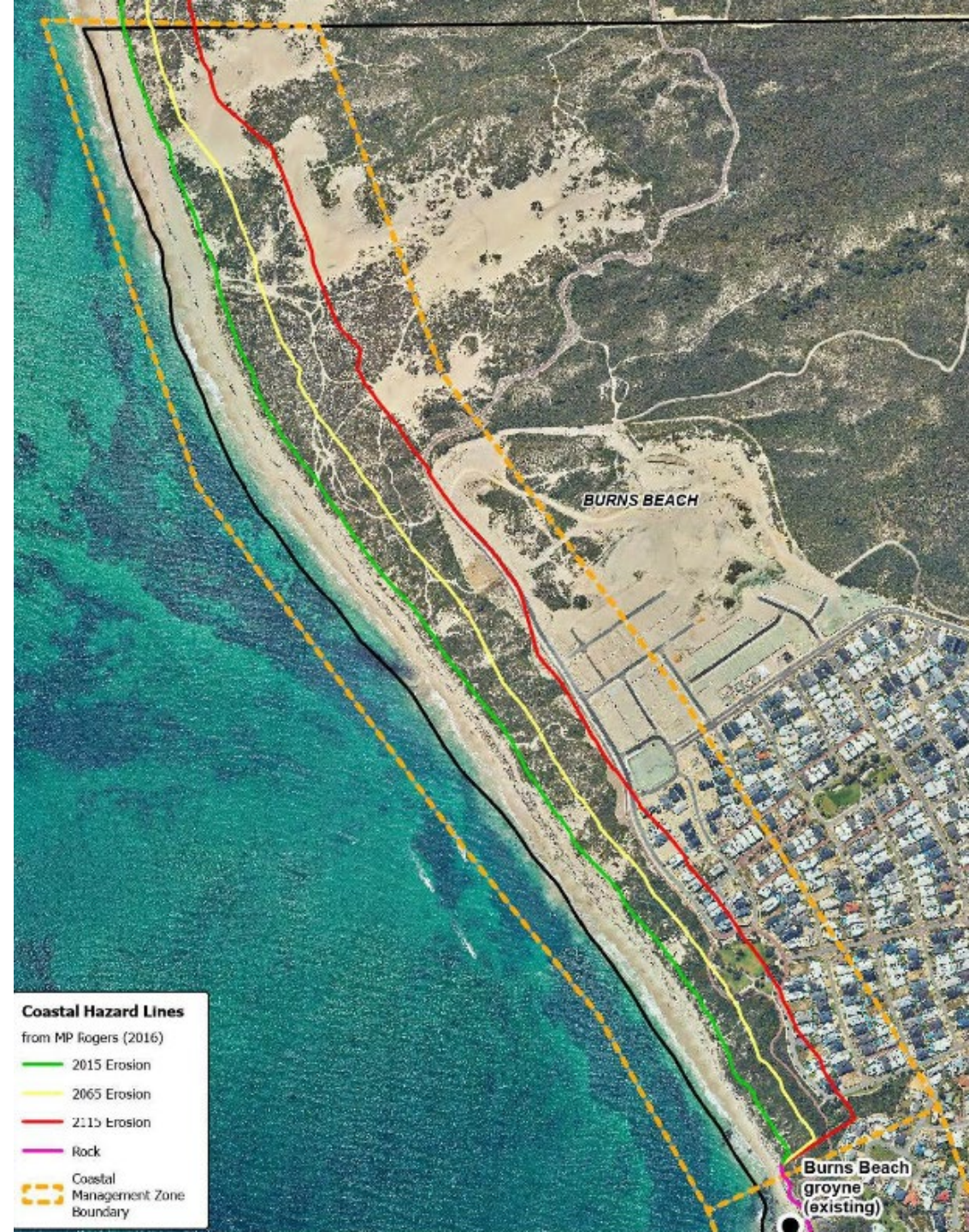


Management Zone 7: Burns Beach coastal vulnerability

Vulnerability to coastal erosion:

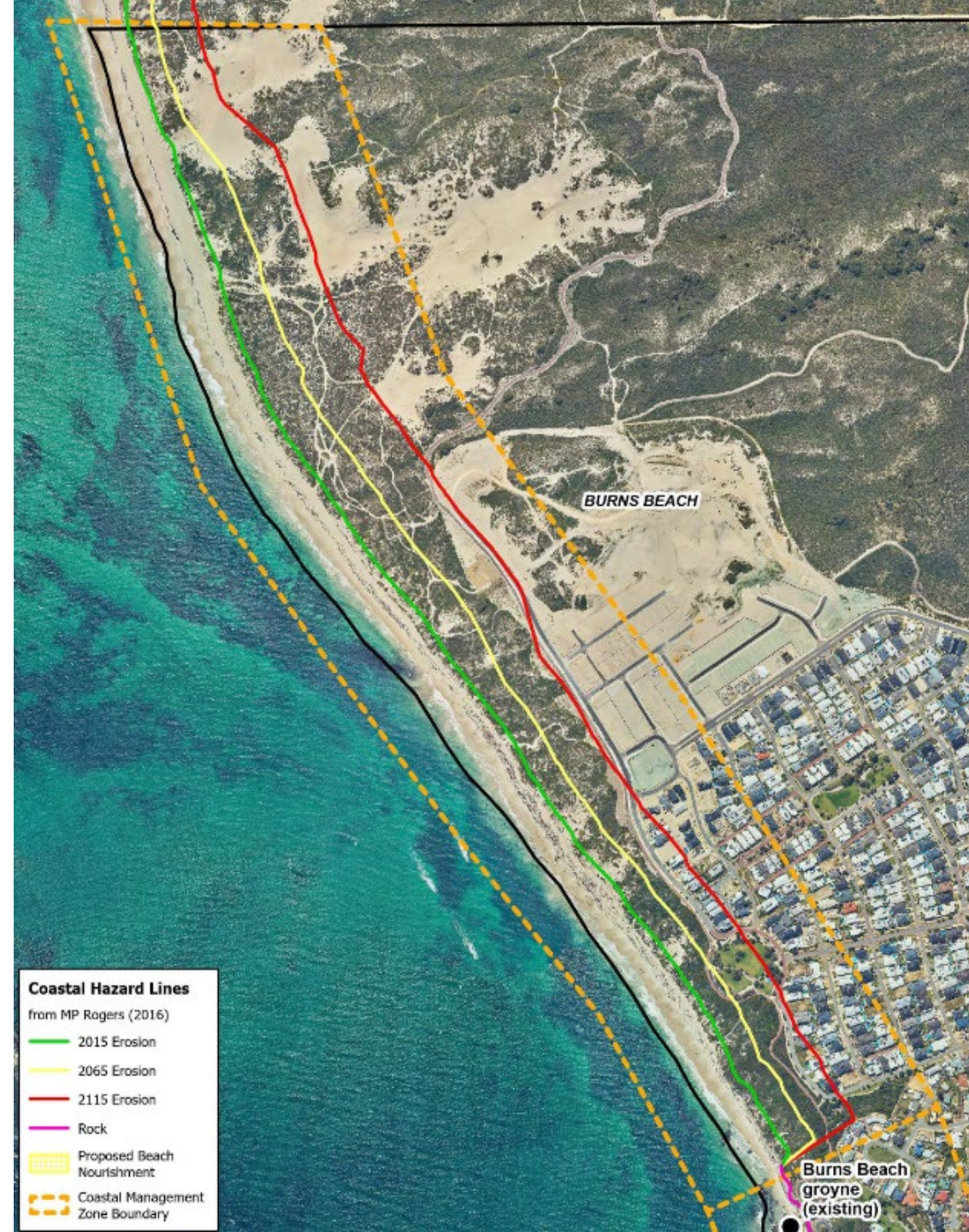
	2015	2065	2115
1 Beach	●	●	●
2 Coastal dunes and significant flora and fauna	●	●	●
3 Beach accessways	●	●	●
4 Beachside Drive — road, street car parks, pathways	●	●	●
5 Residences	●	●	●
6 Coastal pathways	●	●	●

● Low ● Medium ● High ● Very high

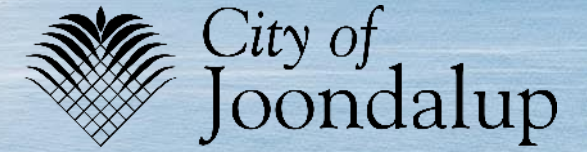


Management Zone 7: Burns Beach proposed adaptation pathway

- Adaptation pathway — **managed retreat of public assets.**
- Trigger — the shoreline has receded to within 20 m of a significant asset.
- Timeline — commence planning for retreat of public infrastructure once trigger is met.
- Estimated cost — \$26.3M from 2025–2115.
- Estimated value of vulnerable assets — \$19.3M.



Business Case



A Business Case will:

- be developed after CHRMAP is endorsed by Council
- outline current funding sources
- present the estimated funding required every 10 to 20 years until 2115.



Funding support



Funding through State and Federal grants includes:

- Coastal Adaptation and Protection Grants
- Hotspot Erosion Coastal Adaptation and Protection Grants (requires completed CHRMAP)
- Coastal Management Plan Assistance Program
- Coastwest Grants
- Disaster Ready Fund
- Coastal and Estuarine Risk Mitigation Program



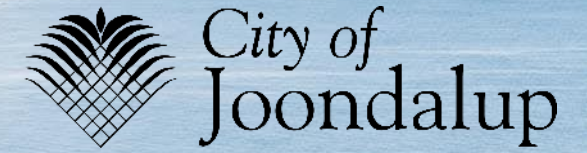
Recommendations



- Implement proposed adaptation subject to detailed design, the latest coastal hazard information and community consultation, where required.
- Liaise with local and State Governments to identify suitable sand sources.
- Investigate amending the Local Planning Scheme to create Special Control Areas.
- Investigate the establishment of strategic coastal management partnership.
- Investigate funding options for coastal protection and adaptation works.
- Advocate to State and Federal Government regarding coastal adaptation funding.



Recommendations



Continue existing coastal protection activities including:

- Coastal Monitoring Program
- Coastal protection assets condition inspections
- Coastal Hazard Assessment
- Coastal hazard risk planning controls
- Participate in WALGA CHRMAP Forum
- Monitor and maintain seawalls and groyne at Burns Beach
- Sand Bypassing Program
- Stabilise sand in coastal foreshore reserves



Next steps



- Community consultation closes **31 July 2023**.
- Aim to finalise CHRMAP and present to Council for endorsement in December 2023.
- Further consultation may be undertaken with the community prior to undertaking adaptation options, in accordance with the City's Community Consultation Policy.

