Management Unit 1
Point King to Melville Point

Management Unit 1 is the first section of the harbour when running east to west from Point King, at the north-east of the study area. This section includes Port Albany and Albany and features the Albany Port and the Albany Waterfront Marina. This area has a hardened shoreline with natural rocks and coastal rock protection. The existing port and marina infrastructure comprises built coastal protection.

Recommended Adaptation Actions in Priority Order

SHORT - LONG TERM

1. Protection with existing seawalls

Protection is currently provided by various structures which while maintained are likely to continue to provide adequate protection.

There is no projected impact from inundation during the short-term for this Management nit.

2. Implementation shall focus on Monitoring

Should an unexpected inundation event occur it can be managed via Accommodate and Emergency Evacuation Plans.

MEDIUM-LONG TERM

3. Address erosion via Protection

The Management Unit 1 area is currently protected. Undertake maintenance of existing protection measures where required into the future.

Recommended Medium and Long-term pathway to address Erosion via Protection with Beach Nourishment.

4. Address Inundation via Accommodate

Accommodate development where protection measures have been undertaken in accordance with the CHRMAP and/or any other relevant assessment endorsed by a suitably qualified coastal engineer.

Future consideration of erosion protections options should consider their influence on, and capacity to provide protection from, inundation. Existing protection measures may need redevelopment to protect areas against inundation (high tidal and wave topping events).

Ongoing Implement immediately	Short - Long Term Commence implementation within next 25 years	Medium - Long Term Implementation 25-50 years, and beyond 50 years
	Address Erosion	Address Erosion
AV – Avoid locating assets in areas that will be vulnerable to coastal hazards	PR3 – Seawall Construction of a seawall usually along an entire section of shoreline. Maintain seawall into the long term.	PR1 – Beach nourishment Placement of sand within the beach profile and/or dunes to activate beach coastal processes and provide a sediment supply.
NR1 – Monitoring Involves long-term baseline monitoring and event-based monitoring following storm erosion events.	Address Inundation	
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.	AC - Accommodate Aims to use design and management strategies that render the risks from identified coastal hazards as acceptable.	
	NR4 – Emergency evacuation plans Emergency evacuation plans are important in managing the safety of community and stakeholders.	



Management Unit boundary

0 200m

	2022	2047	2072	2122
Erosion extents				
Inundation extents				

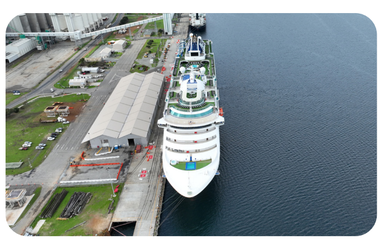


Existing built coastal protection in Management Unit 1

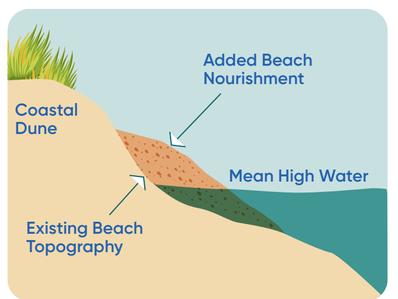




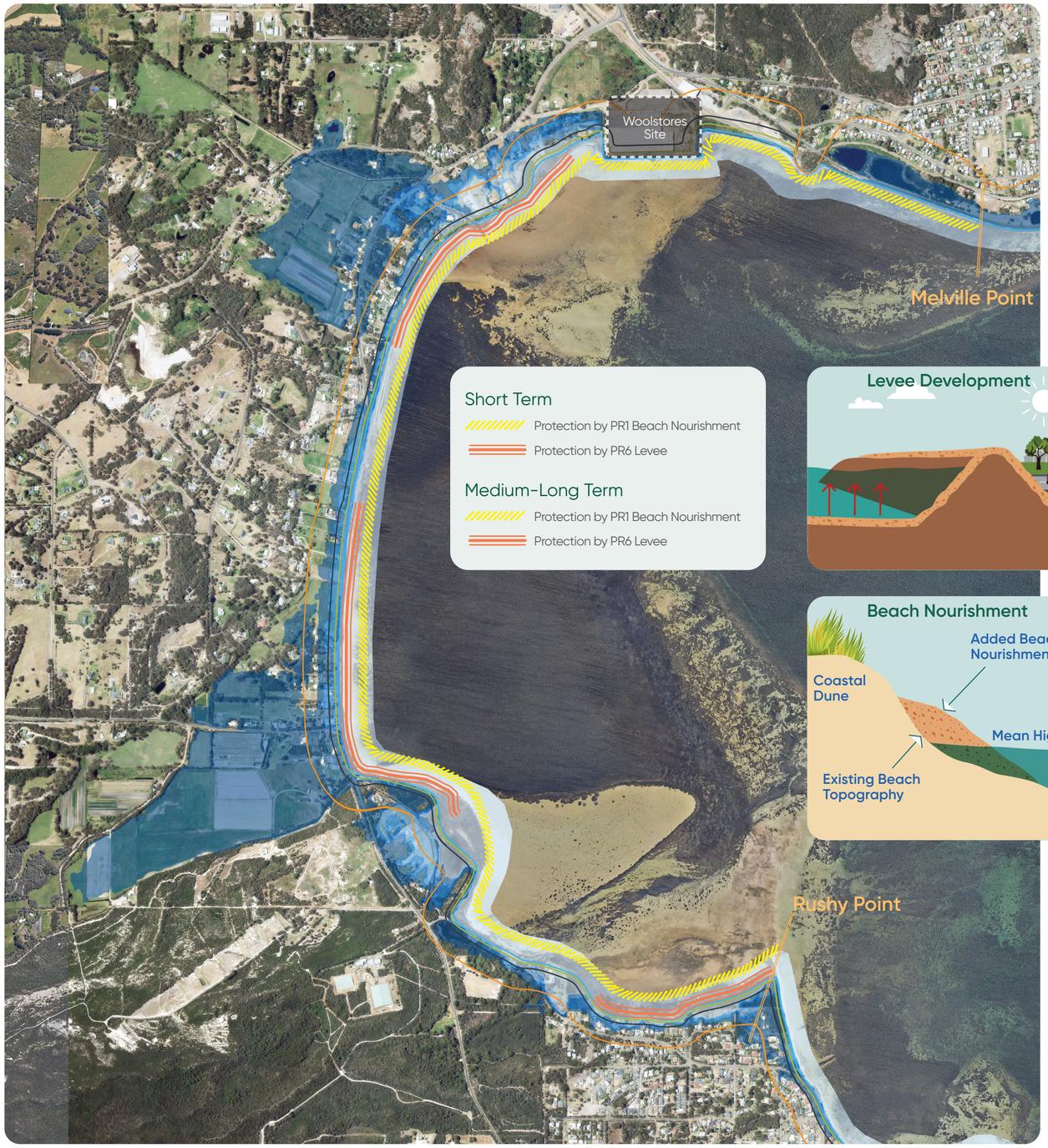




Beach Nourishment



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Management Unit boundary

0 200m

	2022	2047	2072	2122
Erosion extents				
Inundation extents				

Management Unit 2
Melville Point to Rushy Point

Management Unit 2 includes the harbour coastline from Melville Point in the north, running south-west and south-east around to Rushy Point in the south. This area includes Mount Melville, Mount Elphinestone, Robinson, Torndirrup and Little Grove. The north section of this area includes Albany Port Road and the railway; Frenchman Bay Road runs north-south along the western section. This management unit includes residential and rural-residential properties, with several paths and roads close to the shoreline. This section has a sandy coastline with intertidal flats.

Recommended Adaptation Actions in Priority Order

SHORT TERM

1. Investigate and prepare for Protection with Beach Nourishment

Beach nourishment is recommended to manage erosion.

It is noted the old Woolstores Site is currently subject to localised hard protection measures and is therefore likely to become a prioritised sub-section of this Management Unit. Any coastal protection works to this area alone, will need to address a number of requirements including those found in SPP2.6 (Clause 5.7).

2. Address Inundation as a levee

Assumes 3500m of levee required comprising three sections to protect the three areas most at risk of inundation. Other areas not at risk in the short-term.

MEDIUM-LONG TERM

3. Address Erosion via Protection with Beach Nourishment

Monitoring will determine the need for additional works beyond those recommended.

4. Address Inundation via development of a Levee

Monitoring and maintenance of infrastructure and design and performance reviews in accordance with new information and CHRMAP updates.

Secondary components may include the need for additional levees and drainage improvements as sea level rise progresses.

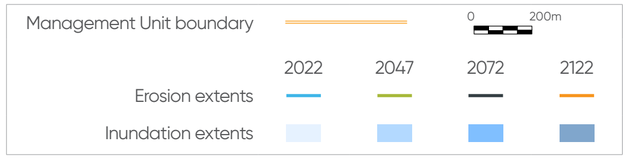
Ongoing Implement immediately	Short Term Commence implementation within next 25 years	Medium - Long Term Implementation 25-50 years, and beyond 50 years
AV – Avoid locating assets in areas that will be vulnerable to coastal hazards	Address Erosion	Address Erosion
NR1 – Monitoring Involves long-term baseline monitoring and event-based monitoring following storm erosion events.	PR1 – Beach nourishment Placement of sand within the beach profile and/or dunes to activate beach coastal processes and provide a sediment supply.	PR1 – Beach nourishment Placement of sand within the beach profile and/or dunes to activate beach coastal processes and provide a sediment supply.
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.	Address Inundation	Address Inundation
	PR6 – Levee Inundation protection to minimise inundation on low-lying land.	PR6 – Levee Replace or modify levee. Additional levee as required.

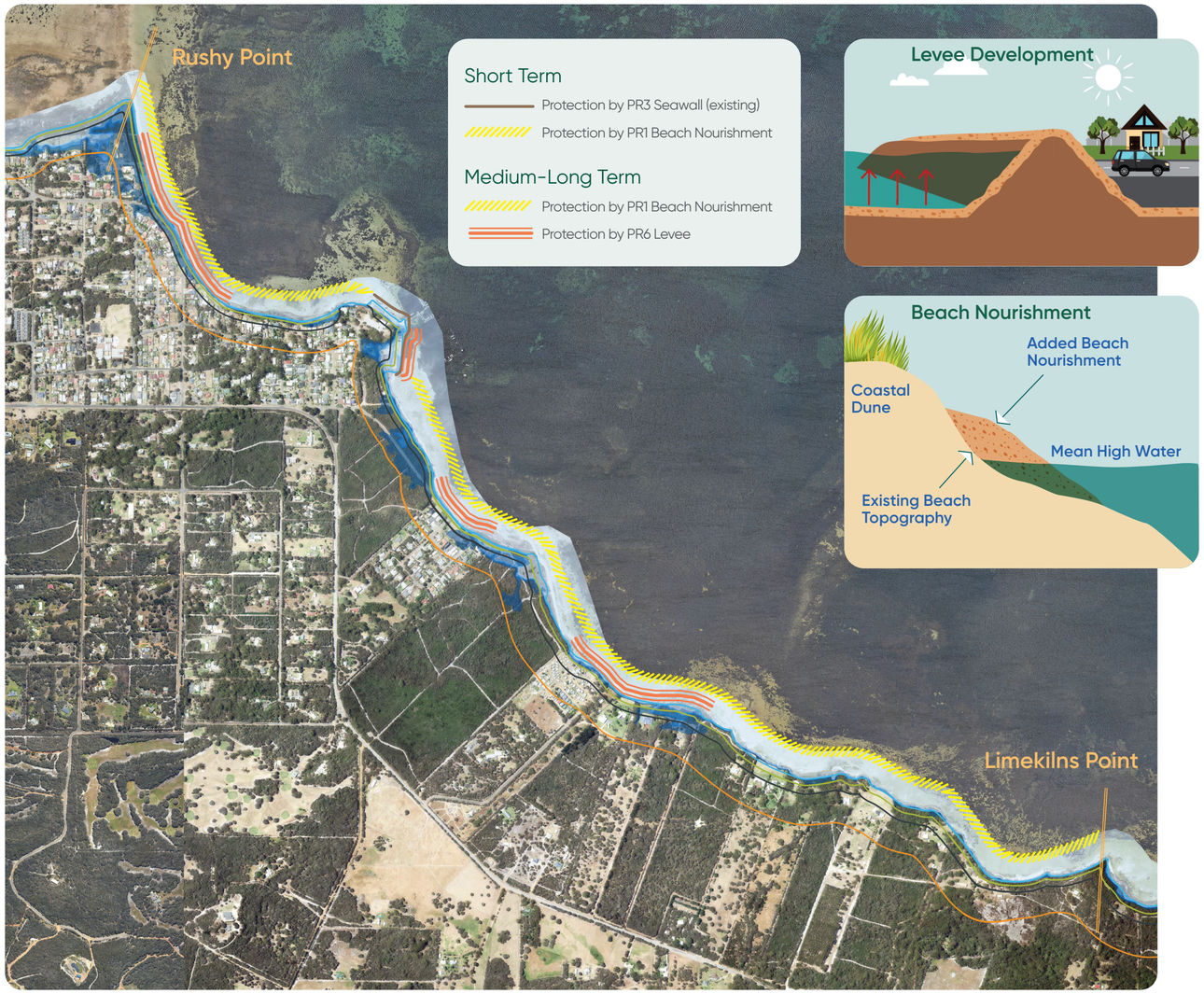
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Management Unit 3
Rushy Point to Limekilns Point

Management Unit 3 includes the harbour coastline from Rushy Point running north-east to Limekilns Point. This area includes Little Grove and Big Grove, with residential and rural-residential properties, the Princess Royal Sailing Club and paths and roads close to the shoreline. This section has a sandy and rocky coastline fronted with private properties. There is an existing seawall at the sailing club.







Recommended Adaptation Actions in Priority Order

SHORT TERM

1. Leave low value public assets unprotected to 2047

Assumes a clean-up rate following damage/loss.

No private land acquisition included.

Maintenance assumes ongoing allowance for foreshore reserve.

2. Address Erosion via investigating and preparing for Protection with Beach Nourishment

Undertake a detailed Sand Source Feasibility Study.

Currently the option assumes protection with beach nourishment at different timeframes for either side of Princess Royal Sailing Club.

1400m shoreline treated to northwest of Princess Royal Sailing Club, with present day implementation.

Assumes 3850m shoreline treated from Princess Royal Sailing Club to southeast, with 2047 implementation.

Protection by existing seawalls at the Princess Royal Sailing Club.

Assumes suitable sand source available (grain size, volume, cleanliness, proximity).

Sections of this Management Unit could be considered for further prioritised analysis.

3. Address Inundation via Monitoring, Accommodate and Emergency Evacuation Plans

There is no projected impact from inundation during the short-term for this Management Unit.

Implementation shall focus on Monitoring and should an unexpected inundation event occur it can be managed via Accommodate and Emergency Evacuation Plans.

MEDIUM-LONG TERM

4. Address Erosion via Protection with Beach Nourishment

Monitoring will determine the need for additional works beyond those recommended in the short-term.

4. Address Inundation via Levee development

Assumes 1700m of levee required split across four sections across Management Unit to protect the four areas most at risk of inundation. Other areas not at risk in the short-term.

Assumes 2072 implementation, so there are no priority actions in short-term.

Ongoing Implement immediately	Short Term Commence implementation within next 25 years	Medium - Long Term Implementation 25-50 years, and beyond 50 years
	Address Inundation	Address Erosion
AV – Avoid locating assets in areas that will be vulnerable to coastal hazards	PR3 – Seawall Construction of a seawall usually along an entire section of shoreline.	PR3 – Seawall Replace or modify seawall.
NR1 – Monitoring Involves long-term baseline monitoring and event-based monitoring following storm erosion events.	PR1 – Beach nourishment Placement of sand within the beach profile and/or dunes to activate beach coastal processes and provide a sediment supply.	PR1 – Beach nourishment Placement of sand within the beach profile and/or dunes to activate beach coastal processes and provide a sediment supply.
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.	Address Inundation	Address Inundation
	AC - Accommodate Aims to use design and management strategies that render the risks from identified coastal hazards as acceptable.	PR6 – Levee Inundation protection to minimise inundation on low-lying land.
	NR4 – Emergency evacuation plans Emergency evacuation plans are important in managing the safety of community and stakeholders.	

Management Unit 4
Limekilns Point to Geake Point

Management Unit 4 includes the harbour coastline from Limekilns Point in the south, running north-east and north-west around to Geake Point in the north. This area includes Big Grove and Vancouver Peninsula with Quaranup Road running north-south along the peninsula. This section includes residential and rural-residential properties, and conservation reserve. This section has a sandy and rocky coastline.

Recommended Adaptation Actions in Priority Order

SHORT TERM

1. Address Erosion via investigation and preparation for Planned / Managed Retreat by Voluntary Acquisition

Acquisition assumed in the same year as hazard line identifies parcels as vulnerable.

Coastal hazards impact few properties in the short term, so the focus is to manage foreshore reserves and coastal amenities, undertake coastal monitoring, and prepare for implementation in medium to long-term.

2. Address Inundation via Levee development

Assumes one 1250m section of levee required along coast near Lake Vancouver.

Assumes 2047 implementation.

MEDIUM-LONG TERM

3. Address Erosion via Planned / Managed Retreat by Voluntary Acquisition

Implement when triggers are met.

See explanation in Land Use Planning Section of CHRMAP.

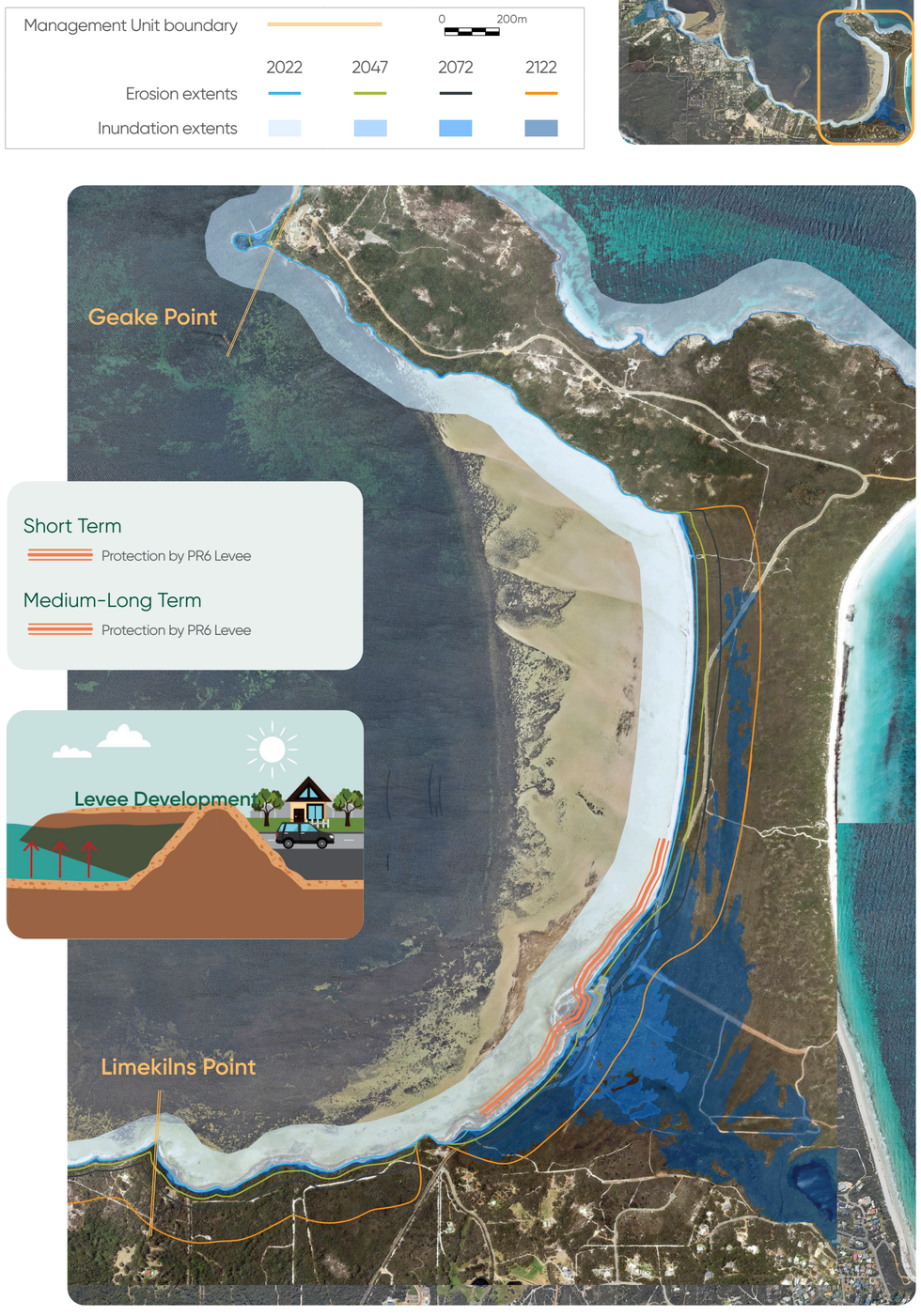
4. Address Inundation via Levee development

Monitoring and maintenance of infrastructure and design and performance reviews in accordance with new information and CHRMAP updates.

Secondary components may include the need for additional levees and drainage improvements as sea level rise progresses.

Ongoing Implement immediately	Short Term Commence implementation within next 25 years	Medium - Long Term Implementation 25-50 years, and beyond 50 years
		Address Erosion
AV – Avoid locating assets in areas that will be vulnerable to coastal hazards		PR4 - Planned and managed retreat by voluntary acquisition A very expensive option and should only be considered after thorough assessment has occurred.
NR1 – Monitoring Involves long-term baseline monitoring and event-based monitoring following storm erosion events.		
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.	Address Inundation PR6 – Levee Inundation protection to minimise inundation on low-lying land.	Address Inundation PR6 – Levee Replace or modify levee. Additional levee as required.





City of Albany

Management Unit 5
Geake Point to Uredale Point

Management Unit 5 is located at the north of the Vancourver Peninsula, from Geake Point at the south to Uredale Point at the north-east of the peninsula. This area includes conservation reserve and Camp Quaranup. This section has a sandy and rocky coastline with some existing seawalls. There are existing seawall structures at Camp Quaranup.

Recommended Adaptation Actions in Priority Order

SHORT TERM

1. Address Erosion via investigation and preparation for Protection with Beach Nourishment

CHRMAP analysis has found that the Protection Pathway is appropriate for this Management Unit with provision of a sandy beach via nourishment.

Protection of Camp Quaranup is currently provided by various structures which while maintained are likely to continue to provide adequate protection for the short-term.

- Assumes treatment of 750m beach and 150m of Camp Quaranup shoreline with 2047 implementation.
- Assumes suitable sand source available (grain size, volume, cleanliness, proximity).

2. Address Inundation via Monitoring, Accommodate and Emergency Evacuation Plans

There is no projected impact from inundation during the short-term for this Management Unit.

Implementation shall focus on Monitoring and should an unexpected inundation event occur it can be managed via Accommodate and Emergency Evacuation Plans.

MEDIUM-LONG TERM

3. Address Erosion via Protection with Beach Nourishment

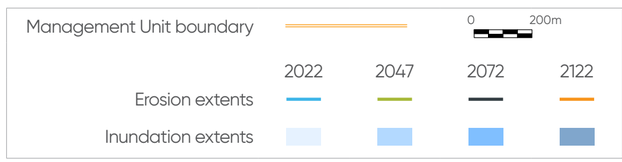
Monitoring will determine the need for additional works beyond those recommended in the short-term.

4. Address Inundation via Levee development

Assumes 300m of levee required around Camp Quaranup and 50m for depression in Isthmus.

Assumes 2072 implementation, so there are no priority actions in short-term.

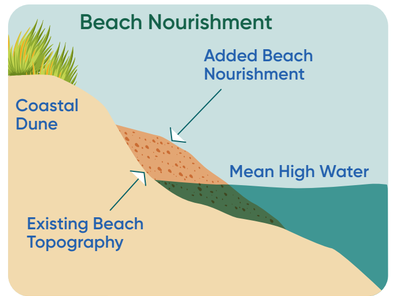






Ongoing Implement immediately	Short Term Commence implementation within next 25 years	Medium - Long Term Implementation 25-50 years, and beyond 50 years
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	NR4 – Emergency evacuation plans Emergency evacuation plans are important in managing the safety of community and stakeholders.	





Adaptation Recommendations - Pertaining to all areas

Funding

Where adaptation options are designed to protect specific sections of coastal land and assets, such as private property, it is recommended that the City progress the establishment of a specified area rate in line with the outcomes of a benefit distribution analysis.

Update online mapping tool for Management Unit areas

Ensure erosion and inundation hazard data provided in the CHRMAP is included on the City's online mapping tool. This will ensure staff and the community have access to information on any affected land and how the adaptation measures may impact on future development.

Avoid intensification of land – avoid subdivision or rezoning of land, including land proposed for protection.

The best form of risk management is to eliminate hazards, activities and exposures that can adversely affect an asset. Accordingly, the primary planning response shall be to avoid further intensification of development through rezoning or subdivision.

The Local Planning Strategy must consider the coastal hazard risks identified in this CHRMAP alongside other relevant planning matters including environmental, economic and social considerations to holistically inform and shape future expansion, as a precursor to future amendments to the City's Local Planning Scheme.

Accommodate development prone to erosion (temporary approval), subject to conditions requiring removal or relocation of the development once the Horizontal Shoreline Datum (HSD) is within a default value derived from the SPP2.6 (e.g. 40m) of the most seaward point of the development.

Development should be designed to enable removal and relocation (e.g. modular design).

Accommodate development prone to inundation provided certain design requirements can be achieved, in accordance with a Local Planning Policy.

Development should be designed to withstand inundation. Finished floor levels should be raised using methods other than fill (stumps), to withstand high inundation periods, without transferring the inundation impact elsewhere. Substantial areas of fill should be avoided - Fill may intensify inundation of adjacent areas.

Update the Local Planning Scheme 2 (LPS2), Special Control Area 16

The City's LPS 2 contains the Special Control Area 16 (SCA) which prescribes certain requirements in response to inundation and erosion along the PRH coastline. To ensure the planning response is concise and easy to interpret,
it is recommended that SCA 15 is updated to align with recommendations of the CHRMAP, this includes the SCA boundary alignment depicted on the scheme map.

Foreshore Management Planning

Prepare Foreshore Management Plans to deliver the recommendations of this CHRMAP for particular foreshore areas. Foreshore management plans can be a key tool for communication and engagement with the community as they include detailed planning for community places and facilities. Foreshore management planning provides guidance for the ongoing management of foreshore reserves, monitoring of assets and the triggers for the managed retreat of public assets and infrastructure at risk of erosion.

Undertake a review of public assets and their location and consider relocating to areas that will not be vulnerable to coastal hazards

The audit shall inform subsequent preparation of an Asset Management Plan to identify existing infrastructure and recreational facilities in the coastal erosion and inundation hazard zone.

Undertake coastal monitoring to identify the impacts of coastal hazards on recommended Options and to record the evolution of the coastal trigger points.

Define shoreline and trigger points. Use photos and drone surveys to understand sand and shoreline movement.

Put notification on property titles – warning of potential hazards

Notifications inform future land holders of the potential hazards and expectations for intensification.

Develop emergency evacuation plans

The City should prepare an emergency evacuation and response plan to ensure the safe evacuation of occupants during a severe coastal inundation event and/or severe erosion event.

Consider land leasebacks

Investigate opportunities for leaseback of land and land swaps in the context of planned and managed retreat. Seek legal advice regarding the basis of agreements with landholders and whether opt-ins can be time constrained.

Undertake an audit of any existing Protection Structures

Item cost to inspect coastal asset condition, influence on sediment transport and inundation and remaining design life on all coastal management structures.

Includes Port revetments, Tug harbour and Albany Waterfront Marina breakwaters and revetments for Frenchman Bay Road, Anzac Peace Park and Princess Royal Drive.

Undertake a sand source feasibility study

The availability of suitable sand for beach nourishment works is unfortunately not well understood in the study area. It is recommended that a sand source feasibility is undertaken to determine the capacity and cost of local sand supplies. This study should consider both land-based and marine sand sources as well as evaluate potential environmental impacts and approvals required. Cost estimates in this CHRMAP have assumed that a reliable source of sand in reasonable proximity to the study area may be available. If this assumption is incorrect, costs may increase and affect the CHRMAP recommendations.