

Capel to Leschenault CHRMAP

Chapter Report: Establish the Context

Peron Naturaliste Partnership

26 July 2021



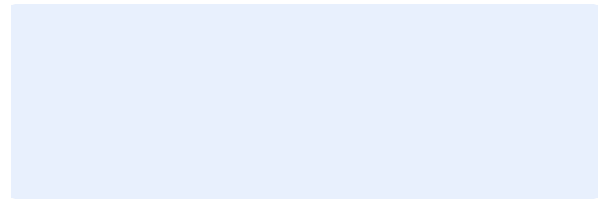


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26 July 2021

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Dear Joanne

Chapter Report: Establish the Context

We are pleased to present the Capel to Leschenault Coastal Hazard Risk Management and Adaptation Plan Chapter Report: Establish the Context. If you have any queries, please do not hesitate to contact me on (08) 6555 0105.

Yours sincerely

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EXECUTIVE SUMMARY

It is internationally recognised that the mean sea level has been rising globally since the nineteenth century and is predicted to rise at an increasing rate in the future (IPCC 2014). Rising sea levels and intensifying storm activity will increase the risk of coastal inundation (temporary coastal flooding), storm erosion and long-term shoreline recession. State governments across Australia have introduced obligations that require local governments to consider and plan for these hazards. In Western Australia (WA), the governing policy is the Western Australian Planning Commission's State Planning Policy No. 2.6: State Coastal Planning Policy (WAPC, 2013, herein referred to as "SPP2.6"). SPP2.6 recommends management authorities develop a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) for land use or development that is vulnerable to coastal hazards. Specific guidelines have been developed to assist in this process (WAPC, 2019).

One of the key objectives of SPP2.6 is to establish coastal foreshore reserves which include allowances for the protection, conservation and enhancement of coastal values across the state. 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.

The Peron Naturaliste Partnership (PNP) comprises membership of nine local government authorities. The PNP's Coastal Adaptation Pathways Project identified the coastal areas of Capel, Leschenault and Greater Bunbury as being particularly exposed to coastal hazards and climate change, which triggered the need for this CHRMAP. The aim of the present study is therefore to investigate and plan for coastal hazards which are likely to affect these regions from Capel to Leschenault.

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 2120 (100-year management time frame) and detail an implementation plan describing risk management measures to be undertaken 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 for the short-term (0-15 years), medium-term (15-30 years), and long-term (100 years).

This report outlines the key management and adaptation issues that need to be considered in the CHRMAP. It is the "Establish the Context" component of the CHRMAP process, as described in Figure 1-2 and replicated below. The Stakeholder and Community Engagement Plan has been prepared separately. A summary of these is included within this report. We note the coastal assets and community values will be identified during Stage C, which will define the success criteria.

Project Inception Meeting

- Finalise project scope, methods, deliverables, timing, data gap actions and identify key stakeholders

Stakeholder and Community Engagement Plan

- Definition of plan objectives and timelines
- Obtain inputs from key stakeholders
- Identify requirements of internal engagement and requirement of information such as existing controls, values and success criteria

Establish Context: Delineation of study area management units, desktop review of coastal hazards for gap analysis & study approach



The study area covers four Local Government Areas (LGAs) namely Shire of Harvey, City of Bunbury, Shire of Dardanup, and Shire of Capel (see Figure 1-1). Land use and management of the region involves multiple government authorities in addition to the LGAs, such as the PNP, Southern Port Authority (SPA), Department of Biodiversity, Conservation and Attractions (DBCA), Department of Water Environment and Regulation (DWER), Department of Planning Lands and Heritage (DPLH) and Department of Transport (DoT). Each of these play a management role over different sections of the shoreline. Jurisdictions are described in Section 4.

The study area contains a large array of planning documentation. As presented in Section 5 and Appendix A, most of these documents make mention of coastal hazards, or values which will provide input into the CHRMAP process. With the exception of the Shire of Harvey however, none of the existing documents contain planning instruments that can be used to adapt to coastal hazards. This CHRMAP will consider what planning controls may be appropriate as adaptation measures within each management unit. We will also consider what existing actions and controls are appropriate to maintain. Based on a review of the existing planning controls, the statutory planning mechanisms that may be available to address coastal hazards within the study area are summarised in Table 5-1.

Existing physical controls are presented in Section 6.

The management units for the CHRMAP are presented in Figure 7-1.



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1 INTRODUCTION

It is internationally recognised that the mean sea level has been rising globally since the nineteenth century and is predicted to rise at an increasing rate in the future (IPCC 2014). Rising sea levels and intensifying storm activity will increase the risk of coastal inundation (temporary coastal flooding), storm erosion and long-term shoreline recession. State governments across Australia have introduced obligations that require local governments to consider and plan for these hazards. In Western Australia (WA), the governing policy is the Western Australian Planning Commission's State Planning Policy No. 2.6: State Coastal Planning Policy (WAPC, 2013, herein referred to as "SPP2.6"). SPP2.6 recommends management authorities develop a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) for land use or development that is vulnerable to coastal hazards. Specific guidelines have been developed to assist in this process (WAPC, 2019).

One of the key objectives of SPP2.6 is to establish coastal foreshore reserves which include allowances for the protection, conservation and enhancement of coastal values across the state. 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.

The Peron Naturaliste Partnership (PNP) comprises membership of nine local government authorities. The PNP's Coastal Adaptation Pathways Project identified the coastal areas of Capel, Leschenault and Greater Bunbury as being particularly exposed to coastal hazards and climate change, which triggered the need for this CHRMAP. The aim of the present study is therefore to investigate and plan for coastal hazards which are likely to affect these regions from Capel to Leschenault – refer Figure 1-1 for locality and study area extent.

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 2120 (100-year management time frame) and detail an implementation plan describing risk management measures to be undertaken 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 for the short-term (0-15 years), medium-term (15-30 years), and long-term (100 years).

This report presents the Establish the Context Chapter Report, which outlines the key management and adaptation issues that need to be considered in the CHRMAP. The flow chart displayed in Figure 1-2 indicates where this component sits with reference to the greater study; the 'Establishing the Context' phase is the top bubble shaded in red. We note the coastal assets and community values will be identified during Stage C, which will define the success criteria.

Delivery of this project will occur over 9 stages (as summarised in Figure 1-2), each of which represents a key hold point. The staged approach is developed according to the PNP's scope and is in line with CHRMAP Guidelines (WAPC, 2019).

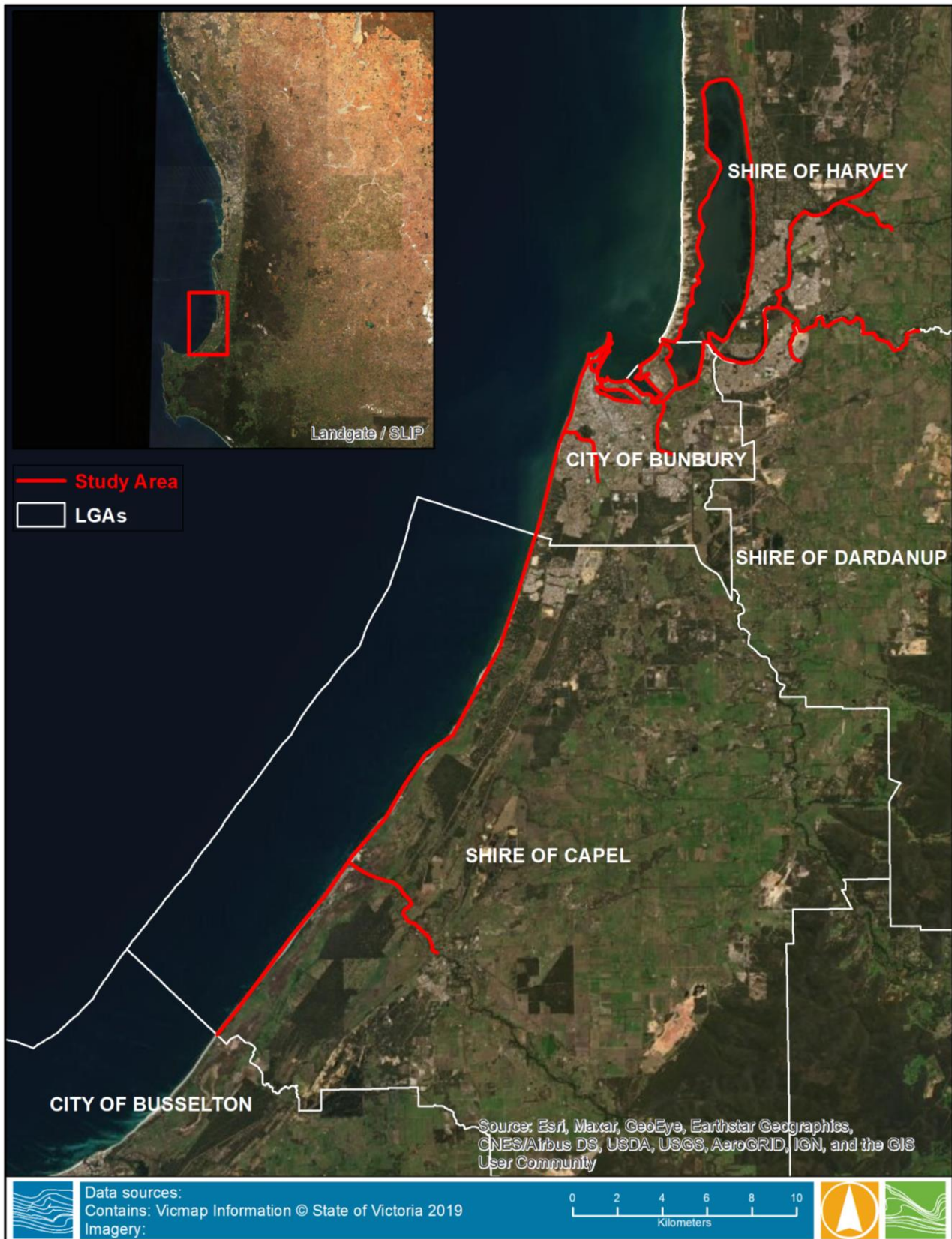


Figure 1-1 Project Area

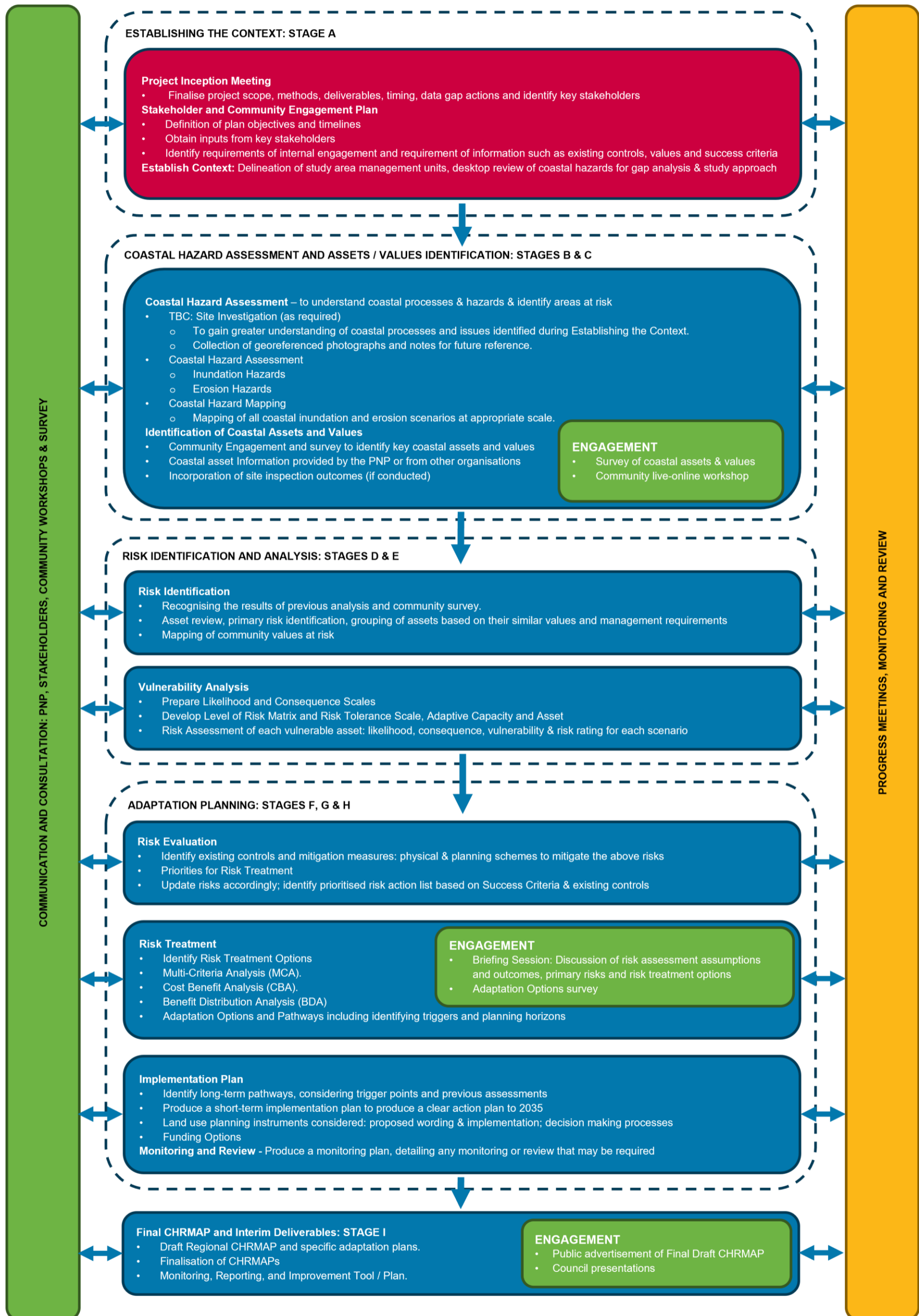


Figure 1-2 CHRMAP methodology flow chart (adapted from WAPC, 2019)



2 CHRMAP PURPOSE & OBJECTIVES

As discussed in Section 1, the CHRMAP process is a requirement of SPP2.6 (WAPC, 2013). A project Steering Group has been established to oversee preparation and completion of the CHRMAP, including review of project deliverables. The Steering Group plays an advisory role in the project and consists of various representatives. The members of project steering group and key stakeholders are summarised in Table 2-1.

Table 2-1 Steering Group members

Organisation	Role of organisation in study area
PNP	Regional facilitator and client project manager.
Shire of Capel	Local coastal land and riverine shoreline manager.
City of Bunbury	Local coastal, riverine shoreline, and estuarine/inlet land manager.
Shire of Harvey	Local coastal, riverine shoreline, and estuarine land manager.
Shire of Dardanup	Local riverine shoreline land manager.
Department of Biodiversity, Conservation & Attractions (DBCA)	Local coastal, riverine shoreline, and estuarine land manager. Data custodian.
Southern Ports, Bunbury	Local coastal land manager; data custodians.
Department of Planning, Lands & Heritage (DPLH)	Technical scoping, advice and review; data custodians, presence required by funding agreement for project
Department of Transport (DoT)	Local coastal land manager; and technical scoping, advice and review; data custodians.
Department of Water & Environmental Regulation (DWER)	Technical scoping, advice and review; data custodians.

2.1 Purpose

The purpose of this project is for the PNP to work with the Steering Group and consultant(s) to develop a CHRMAP. As per Table 2-1, the Steering Group includes the City of Bunbury, the Shires of Capel, Dardanup and Harvey, WA Department of Biodiversity, Conservation and Attractions (DBCA), and the Southern Ports Authority (SPA), with support and technical advice from Department of Water Environment and Regulation (DWER), Department of Planning Lands and Heritage (DPLH), and Department of Transport (DoT).

The purpose of the CHRMAP is to 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 (coastal erosion and inundation). Management of risks to the study area's land adjacent to the ocean coast, estuaries and rivers is very important for the social, environmental, infrastructure and economic assets and values of the local communities. Although some work on coastal hazards has been undertaken across the study area in the past, a coordinated approach which identifies areas likely to be affected to erosion and/or inundation and requiring management and adaptation to mitigate the risks will provide increased resilience to these communities.



2.2 Objectives

The overall objectives of this CHRMAP are:

- Summarise the existing policies and planning controls, existing physical controls, and jurisdiction boundaries;
- Improve understanding of existing coastal processes, features, and hazards within the study domain;
- Identify coastal assets and values 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 Multicriteria 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 specific objectives and outcomes for this CHRMAP, including:

- Delineation of management units through combination of jurisdiction boundaries and physical process boundaries;
- Assessment of inundation and erosion risk along river banks and a tidally influenced estuary and inlet;
- Benefit Distribution Analysis;
- Consideration of the extensive engineering works undertaken inside Koombana Bay, including dredging and disposal, shoreline protection structures, and port infrastructure. Produce a CHRMAP that gives suitable consideration to coastal processes, landform stability, coastal hazards and climate change
- Summarising environmental values, community requirements 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.

2.3 Scope

This CHRMAP intends to identify values and assets with intolerable risk levels to the hazards of coastal erosion and inundation within the study area. Risk management measures will be considered to reduce risks to tolerable levels. Tasks to implement the measures will be summarised to provide strategic guidance on medium and longer-term risk management but will provide more focus on short-term (<25years) management measures. The CHRMAP will focus on preserving assets and values which provide public benefit, although private at-risk assets may also be identified.



3 STUDY AREA

The study area covers four Local Government Areas (LGAs) namely Shire of Harvey, City of Bunbury, Shire of Dardanup, and Shire of Capel (see Figure 1-1). Land use and management of the region involves multiple government authorities in addition to the LGAs, such as the PNP, Southern Port Authority (SPA), Department of Biodiversity, Conservation and Attractions (DBCA), Department of Water Environment and Regulation (DWER), Department of Planning Lands and Heritage (DPLH) and Department of Transport (DoT). Each of these play a management role over different sections of the shoreline.

Primary landforms of the region include sandy (e.g., Peppermint Grove Beach) and mixed (e.g., Southern Bunbury) coasts, estuary (e.g., Leschenault estuary) and wetland (e.g., Leschenault Inlet), rivers (e.g., Collie River and Preston River), drains (e.g., Five Mile Brook Diversion Drain), urban areas, and farmlands.

3.1 Shire of Capel

The Shire of Capel (herein referred as SoC) is located between the Bunbury and Busselton LGAs, about 200km south of Perth (refer Figure 3-1). The SoC manages a 29 km long stretch of shoreline between Forrest Beach and Dalyellup, covering approximately 560 km² of land. The area was first established as the first Bunbury Road District in 1894. In 1961, it was renamed to Shire of Capel under the Local Government Act 1960. The 2016 census figures indicate the population of the SoC was over 17,000. The SoC has agricultural activities such as beef and dairy farms, light industry commercial, as well as mineral sand mining.

The study area consists of open coast and lowlands potentially impacted by coastal erosion and inundation (Figure 3-1), with particular focus on areas with valued coastal assets (e.g., residential and commercial lands, and recreational parks).

The shoreline within the SoC is partially sheltered from the predominant swell waves generated in the Southern Ocean. Much of the coastline is backed by either soft sediment or vegetated dune system. Significant areas of low-lying land and wetlands are present inland of the dune system.

The Department of Transport (DoT, 2019) recently completed an erosion hotspot assessment for the region, which identified two potential erosion watchlist locations, Peppermint Grove Beach and South Forrest Beach. The SoC does not have a history of reported erosion, likely due to limited existing coastal development and appropriate setbacks to many private assets. No existing coastal protection structures (e.g., groynes, seawalls or revetments) have been identified in this region.

The low-lying land west of Bussell Highway is often connected to the ocean through river openings such as Wonnerup inlet at Forrest Beach and Capel River at Peppermint Grove Beach. Weirs, culverts, and drainage paths have been implemented to mitigate inland flooding and to reduce the impact of surge water from the ocean entering the lowlands behind the dune. Desktop review indicates coastal flooding has been an infrequent hazard. More frequent inundation hazards are often associated with river flood events e.g., the flood at Capel River in August 2013. Nonetheless, inundation risk remains high, particularly under the impact of sea level rise (SLR).

Overall, the coast of the SoC consists of a narrow primary dune system (a few hundred metres) and large areas of lowlands connected to the ocean through various openings.

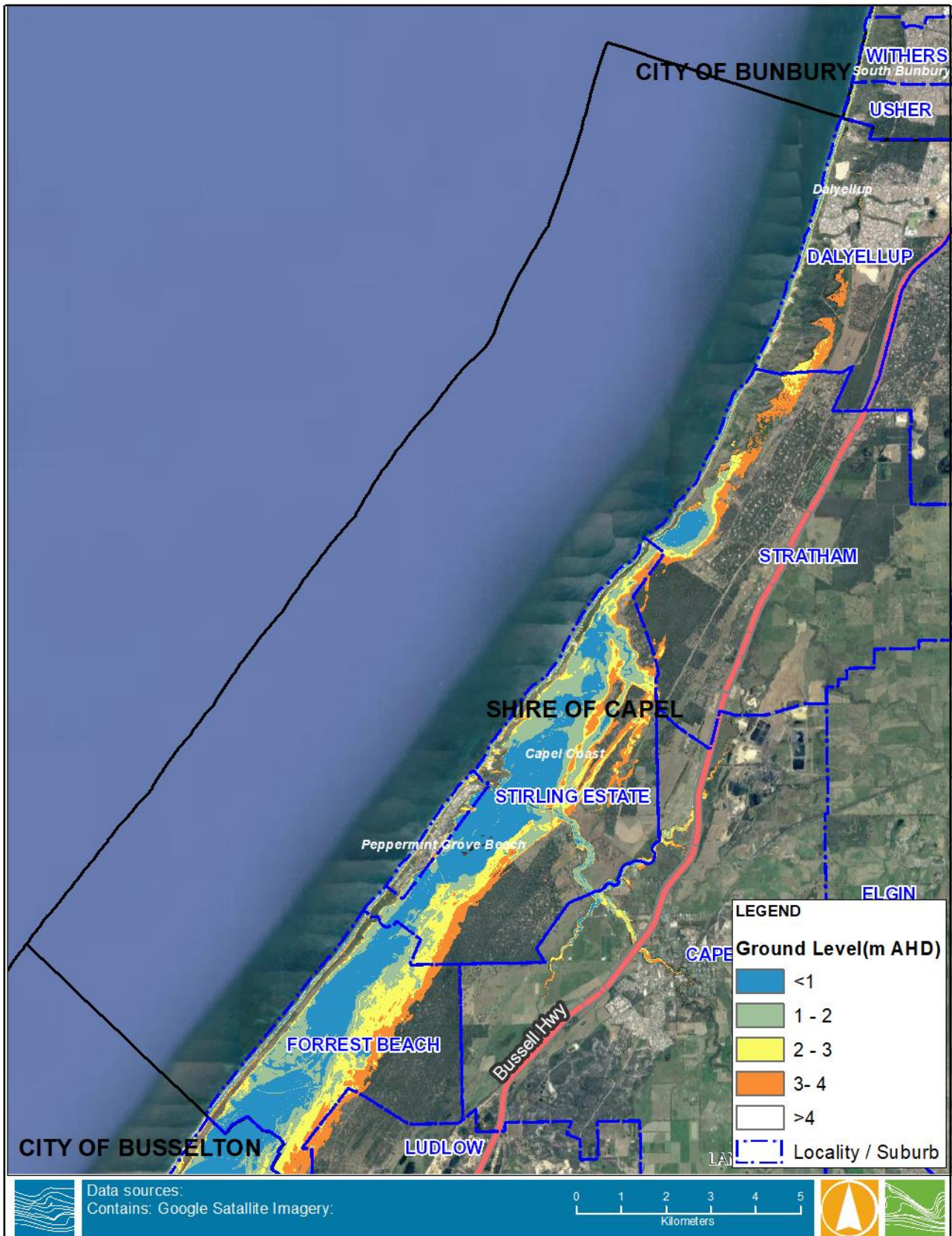


Figure 3-1 Shire of Capel Project Area (Overlaid are Suburbs & Roads and ground levels)



3.2 City of Bunbury

The City of Bunbury (herein referred as CoB) is located approximately 180 km south of Perth covering about 65 km area of coast. The area was first established as Municipality of Bunbury in 1871. In 1961, it became the Town of Bunbury under the Local Government Act 1960 and assumed its current name in Oct 1979. The 2016 census figures indicate the CoB has an established population of almost 32,000.

The study area within CoB LGA comprises of many different sections of coastline with variable shore types and degrees of development (Figure 3-2). Low-lying land is present along Five Mile Brook (e.g., the Big Swamp Wetland), surrounding Leschenault Inlet, and along Preston River. These areas are susceptible to coastal inundation. The CoB is a regional hub and has undertaken numerous developments along its coast. Infrastructure located within Koombana Bay includes shops, restaurants, Koombana Beach foreshore playground, Bunbury Port, Koombana Bay Sailing Club, Casuarina Harbour, Dolphin Discovery Centre, breakwaters, jetties, groynes, seawalls, bridges, roads, the storm surge barrier, as well as foreshore reserves etc. Consideration of the coastal hazards and adaptation constraints of these assets will be crucial for successful risk management and implementation plans.

The current shoreline of Bunbury is a result of combined effects of coastal processes and human intervention. CoB is subject to coastal erosion, despite the numerous physical controls that have been implemented.

- Koombana Beach (one of the erosion hotspots identified by DoT (2019) study) has experienced a westwards littoral drift and progressive erosion on the eastern end. The issue has been studied previously to develop a feasible adaptation option. A seawall structure has been constructed to prevent further erosion.
- A breach of the northern training wall occurred at the Cut channel into Leschenault Estuary (one of the erosion hotspots identified by DoT (2019) study) in 2012 causing erosion of a sand bar along the northern bank. Emergency remedial work (such as minor excavation of the sand bar, landward extension of the northern training wall, tie-in of the extension with existing training wall) was undertaken in 2014, however it was not built to specification due to erosion of the site access point.
- Bunbury Ocean Drive (on the watchlist of coastal erosion by DoT (2019) study). Rock outcrops are present north of Wellington St along Bunbury Ocean Drive and Baudin Terrace. These rocks in general have a low elevation backed by sandy soil. The shoreline further north is protected by the Outer Harbour breakwater and spur groyne.
- Shorelines within Koombana Bay are either modified by engineering controls e.g., breakwaters and seawall, or within the scope of large-scale developments (such as the Port). All beaches in Koombana Bay are heavily modified due to the construction of the Port's inner harbour and river diversion. Sandy beaches are also present inside the bay, e.g., within Casuarina Harbour, Koombana Beach, and near Turkey Point.
- Leschenault Inlet and surroundings have a low-lying nature and are vulnerable to present and future inundation hazards. A tidal gate (Bunbury storm surge barrier) was installed near the entrance to prevent coastal flooding.
- Five Mile Brook is one of the main drainage paths of the CoB. The surrounding areas, including the Big Swamp Reserve, have a low ground elevation. There is a physical control at the outfall location, but it is unclear how it will function during extreme ocean water levels. Water Technology recommend including this site in the (yet to be confirmed) site inspection.
- Flood plain along Preston River. Riverbank protections were built to restrict the spreading of river flood.

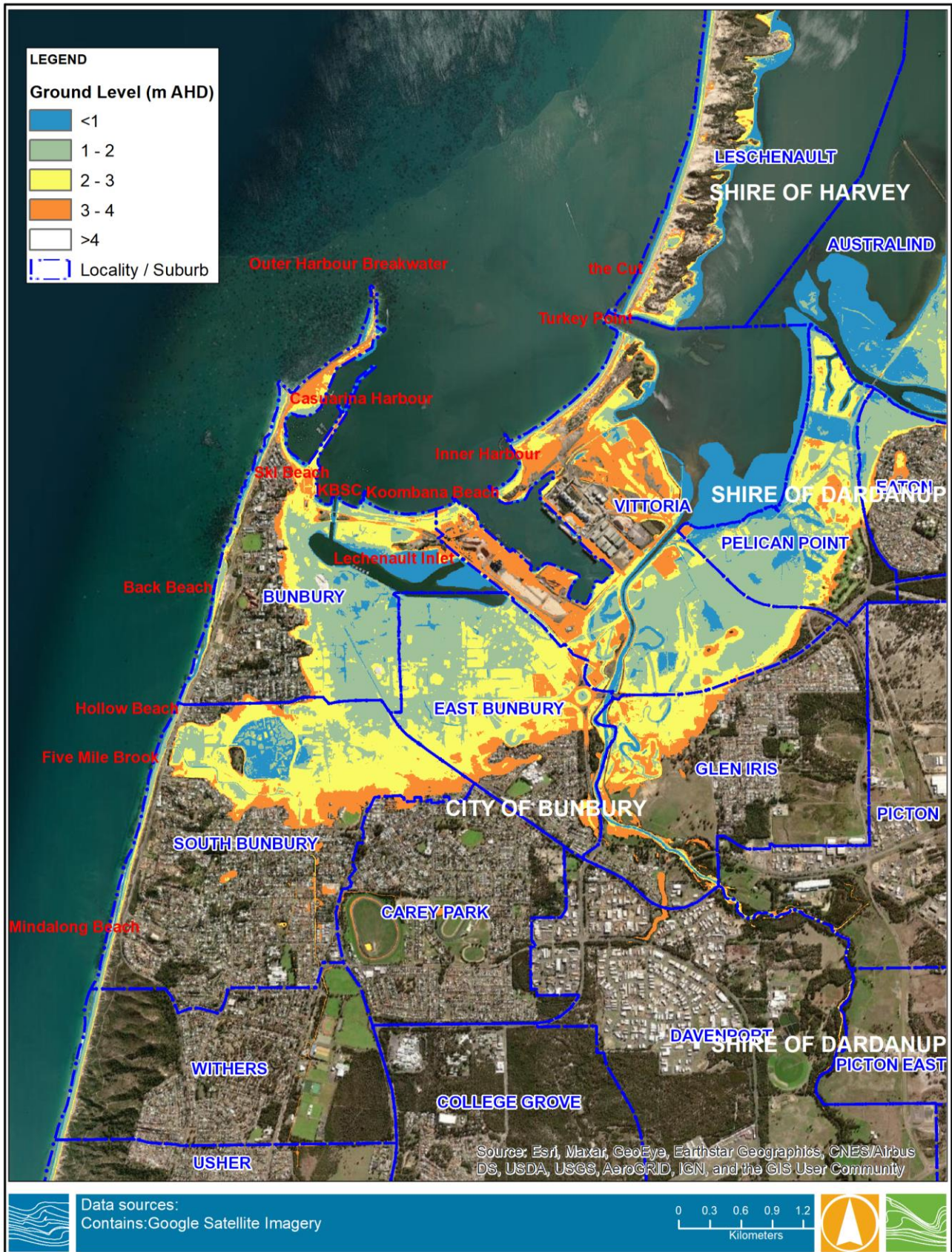


Figure 3-2 Bunbury Project Area (Overlaid are Suburbs & Roads)



3.2.1 Developments in Koombana Bay

Koombana Bay has experienced significant development since the 1900s (see Figure 3-3). The outer harbour breakwater was constructed in the early 1900s which formed the current layout of Koombana Bay. Since then, numerous coastal infrastructure projects have been implemented, including construction of the Inner Harbour and various groynes, breakwaters, and jetties to stabilise the shoreline (e.g., the Plug in 1970s, Inner Harbour in 1970s, the Cut in 1950s-1970s, Northern Breakwater Arm in 1980s). Investment in Bunbury's coastline has increased in recent years, including:

- Planned, yet to be implemented, Inner Harbour expansion (see Figure 3-4 for one of the development options) by South Ports Authority (SPA). The expansion of the inner harbour has been in discussion for at least three decades. In 2009, Bunbury Port drafted a structure plan as a policy document to guide the development and decision making of the Inner Harbour. More recently, the Port has considered to redirect the Preston River in order to gain space for this expansion.
- Bunbury waterfront development (Figure 3-5) by the Department of Transport and South West Development Commission. This includes multiple stages:
 - Koombana Foreshore Revitalisation and Dolphin Discovery Centre Redevelopment (completed);
 - Jetty Road Causeway upgrade (completed);
 - Casuarina Drive Redevelopment (underway);
 - Construction of new breakwaters for Casuarina Harbour;
 - Koombana Sailing Club Marina, (planning in progress).

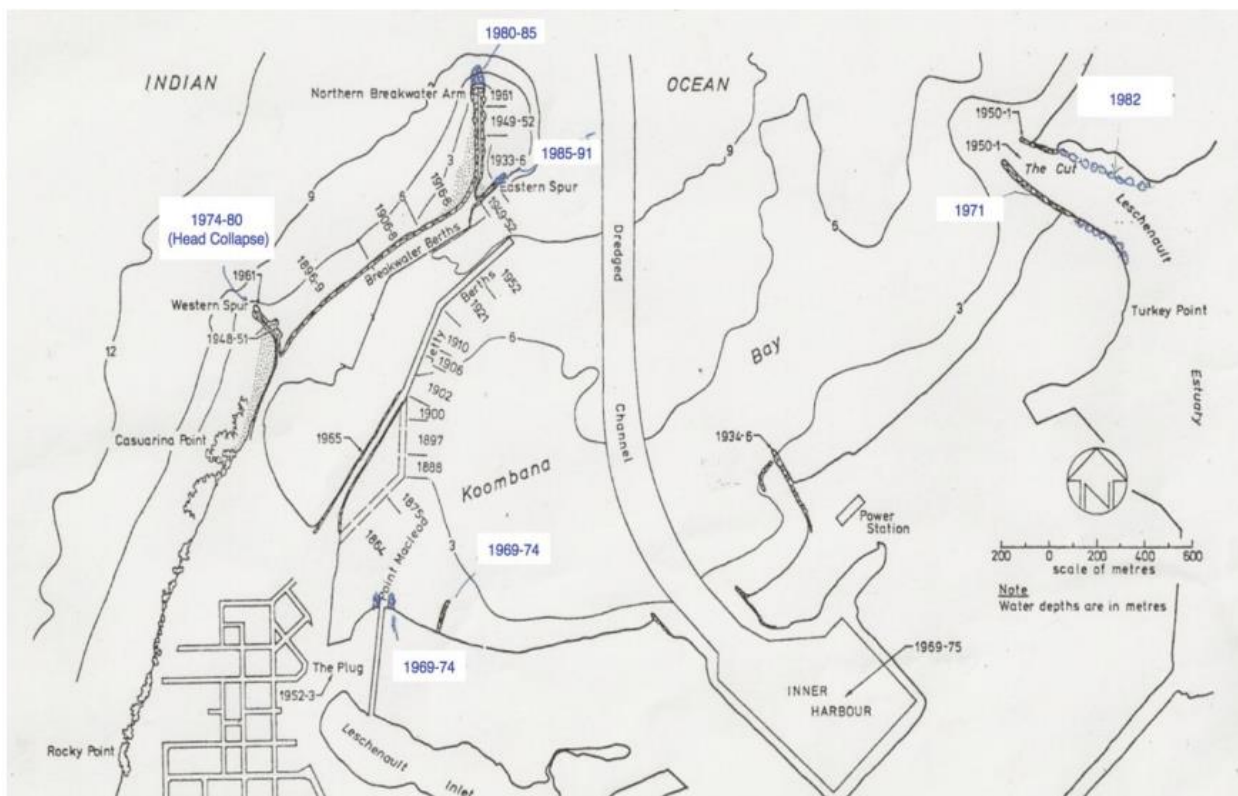


Figure 3-3 Historic Developments in Koombana Bay (until 1990s)

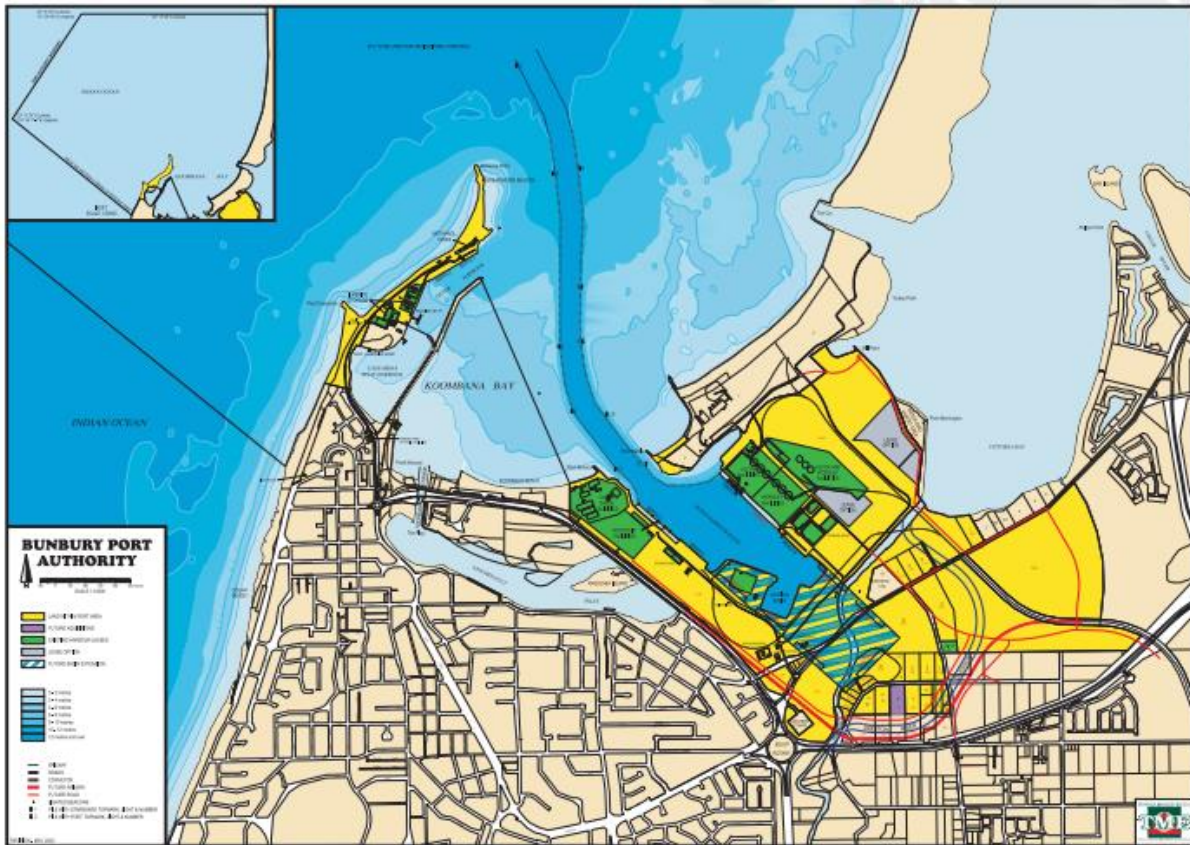


Figure 3-4 Expansion of the Inner Harbour (taken from 2009 Inner Harbour Structure Plan)



Figure 3-5 Bunbury Waterfront transformation - Marina Structures (Taken from RPS 2015)



3.2.2 Developments in Leschenault Inlet

Leschenault Inlet is a remnant of the lower section of the Leschenault Estuary, which was separated from the main water body by the construction of the Inner Harbour in the 1970s. The inlet has an area of approximately 70 hectares and is now one of the most important recreational waterfronts in Bunbury. Since the 1980s, the inlet has undergone significant development including construction of foreshore protection (seawalls), boat ramps, jetties, boat clubs, discovery park, car parks, foreshore reserves, and boardwalks.

In 2013, CoB prepared a Leschenault Inlet Master Plan to guide future development and planning for the area (Figure 3-6). The plan provided an overview of existing planning frameworks and land usage, and prioritised land developments for the future. At present, the inlet comprises a mangrove reserve, and segments of engineered shoreline protecting the foreshore area. The foreshore is backed by paved roads and urban development and has limited setback for shoreline management or additional development beyond its present extent. The Bunbury storm surge barrier is used to limit high ocean water levels impacting the inlet and surrounding lands.

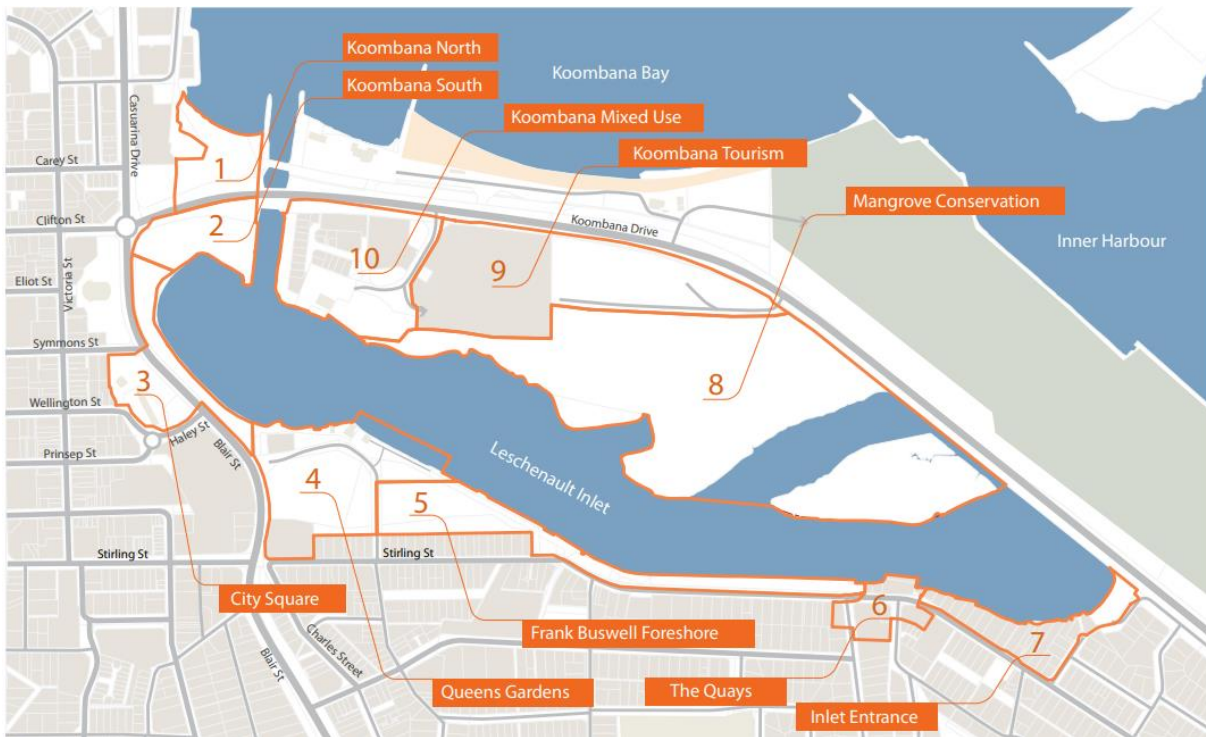


Figure 3-6 Leschenault Inlet Master Plan (City of Bunbury, 2013)



3.3 Shire of Harvey

The Shire of Harvey (herein referred to as SoH) is located immediately north of Bunbury and extends to the Shire of Waroona. SoH manages approximately 42 km of coastline covering about 1700 km² of land, but this study is restricted to the Leschenault Estuary and the tidally influenced flood plains of the Collie, Wellesley and Brunswick rivers. The open coastline west of the estuary was not considered as part of this project (coastal hazards along the open coast were previously investigated as part of the Shire of Harvey CHRMAP).

The SoH was first established as Brunswick Road District in 1894. In 1961, it became the Shire of Harvey under the Local Government Act 1960. The 2016 census indicates the Shire has an established population of about 26,000 and an annual growth rate of about 4%.

A map of the relevant project area for Harvey is shown in Figure 3-7. SoH is bounded by the Collie River and the Cut to the south. The western shore of the estuary comprises coastal dunes of varying height. Surrounding the estuary and rivers are lowlands and flood plains. These locations are expected to be most impacted by coastal hazards. While inundation is considered to present the greatest risk here, shoreline stability and erosion risk will also be assessed.

Most residential lots are located at levels beyond the reach of historic floods on the eastern side of Cathedral Ave and Old Coast Rd. The area to the west of Old Coast Rd is primarily Conservation Park with scattered residential lots and foreshore development (e.g., Ridley Place, Leschenault Waterways Discovery Centre).

Damara (2016) undertook the SoH CHRMAP coastal hazard assessment and identified three types of hazards in this region including shoreline erosion, flood inundation, and landform mobility. Key points from the study were:

- Progressive erosion has occurred on the seaside of Leschenault Peninsula (area excluded from the current study). The erosion rate varied over time and was higher during the 1970s and from 2008 to 2015. The situation may be worsened by SLR, in particular during the erosive phases. Erosion on the seaside of Leschenault Peninsula may affect the overall landform stability of the Leschenault Estuary in the long term. The northern bank of the Cut was breached in 2012 due to erosion of the ocean shoreline extending behind the back of the training wall.
- Historic reports indicate storm tide inundation has been an infrequent hazard. The most extreme storm recorded at the site was TC Alby in April 1978, which generated a storm surge level of approximately 1.8 m AHD (or 1.2 m above HAT) at Bunbury tide gauge. The impact was reduced within Leschenault Estuary due to the restricted water exchange through the Cut. For more frequent winter storms, inundation levels are expected to be much lower. Riverine flooding is identified to be the more frequent hazard for low lying land in Leschenault Estuary and along the Collie River.

Within the estuary and immediate surrounds, the primary hazard is most likely associated with coastal inundation from storm surge and catchment flooding.

Land immediately adjacent to the Leschenault Estuary is primarily public foreshore reserve. Some public and private assets are located close to the estuary in Australind near Ridley Place. A concise CHRMAP was undertaken by Damara (2020) to evaluate potential coastal hazards and adaptation options for this area. Based on this assessment, SoH prepared a foreshore management plan at Ridley Place, which proposed several new facilities including foreshore pathways, a playground, boardwalk, restaurant, kiosk, and toilets. Active vegetation management was identified as a “no regret” option for erosion control and protection of the foreshore area.

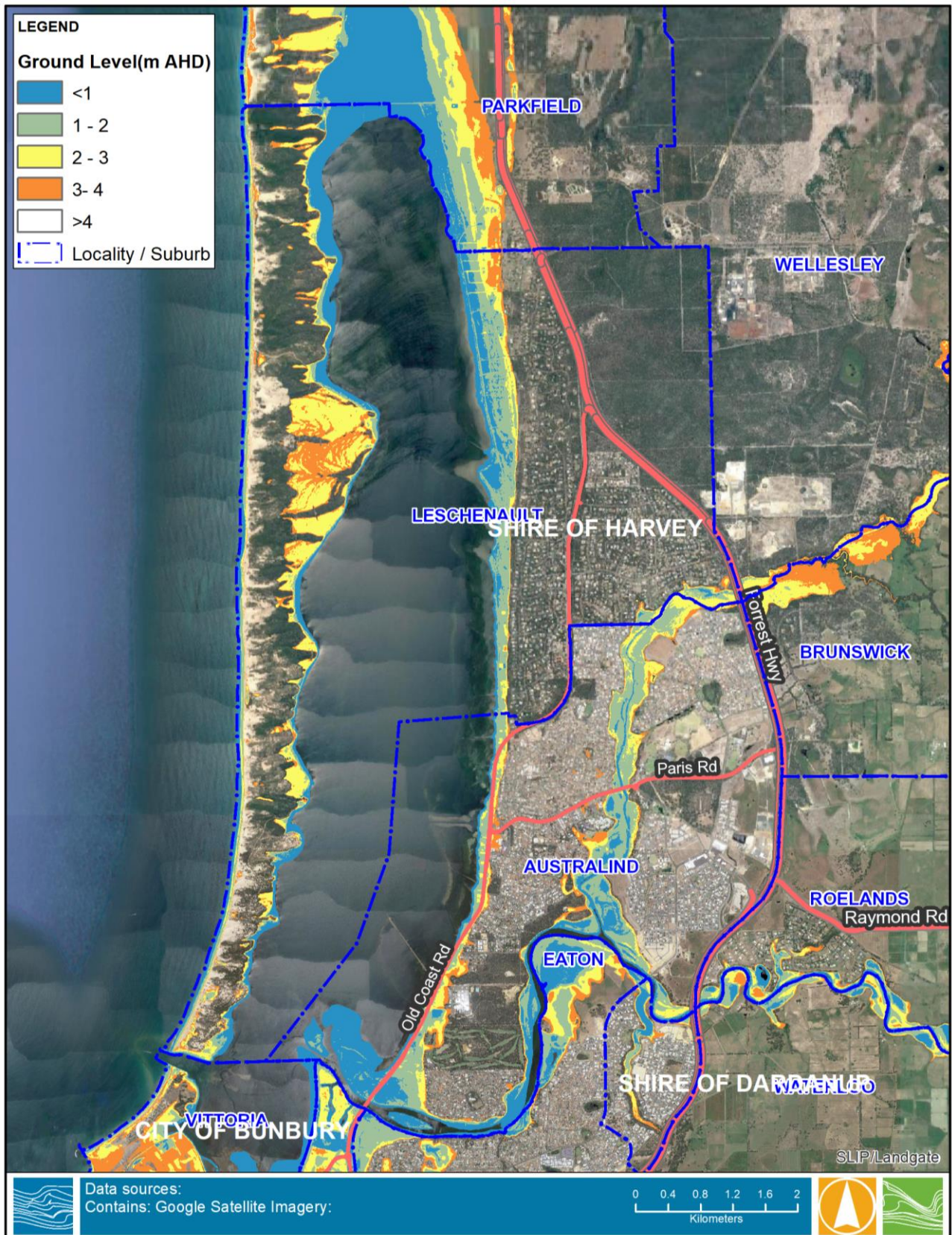


Figure 3-7 Shire of Harvey Project Area (Overlaid are Suburbs, Roads and ground levels)



3.4 Shire of Dardanup

The Shire of Dardanup (herein referred as SoD) is located immediately to the east of the CoB. It was first established as Dardanup Road District and later became the Shire in 1961 according to Local Government Act 1960. The SoD covers about 520 km² of land and has an approximate population of 14,000.

The SoD is bounded by Collie River to the north and CoB to the west. It does not have an exposed shoreline like the other three LGAs. Land vulnerable to coastal hazards is primarily located at the lower end of Collie River, which is affected by both marine (e.g., storm surge) and riverine processes (river flood) and is occasionally affected by boat wakes. It is a transitional zone from riverine to an estuary environment showing a widening and meandering channel, as well as the presence of tidal-riverine flow interaction.

Seashore (2020) investigated the riverbank erosion at the Eaton foreshore of the Collie River and noted that the existing foreshore is under moderate erosion risk. Despite a range of foreshore works undertaken, various locations along the riverbank have shown signs of erosion and require prioritised erosion controls. DWER has prepared a priority map for foreshore erosion control for the Collie River foreshore management plan (see Figure 3-8).



Figure 3-8 Priority of Foreshore Erosion Control (Image source: DWER 2018). Red = priority 1 (0-5 years), Yellow = priority 2 (5-10 years), Green = priority 3 (Greater than 10 years), Blue = no works required

Besides the riverbank erosion, the lower Collie River is also subject to the risk of river flood and coastal inundation (see Figure 3-9 for ground elevation). Much of the flood plain has a ground elevation lower than 2m AHD which are vulnerable to extreme storm surge events (e.g., Tropical Cyclone (TC) Alby). The situation may deteriorate under climate change (e.g., SLR, increasing rainfall intensity, shifting of tropical zone etc.). Roads e.g., Old Coast Rd and Australind Bypass are potential barriers to prevent the spreading of flood water.

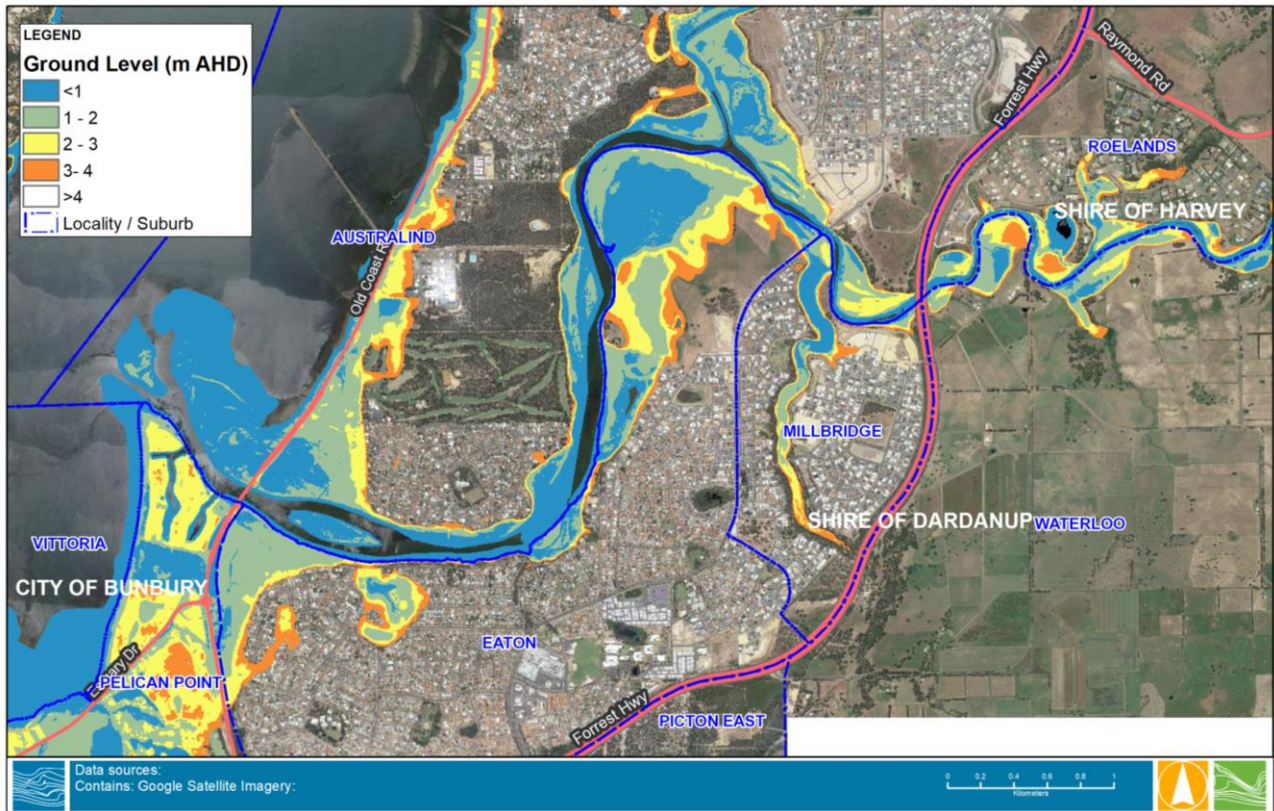


Figure 3-9 Shire of Dardanup Project Site (Overlaid are ground level map, suburbs & roads)



4 JURISDICTIONS

4.1 Boundary of LGAs and Suburbs

Refer to Section 3.

4.2 DBCA Regional Parks

While two proposed regional parks were originally embodied in the Preston River to Ocean Regional Park Establishment Plan (WAPC, 2011) and the Leschenault Regional Park Establishment Plan (WAPC, 2017a), these two proposed regional parks were indicative and subsequently a decision was made to amalgamate all parts of the two proposed parks into one regional park.

Kalgalup Regional Park Draft Management Plan (DBCA, 2020) provides for the protection and enhancement of the conservation recreation and landscape values of the Park. The plan supersedes the Leschenault Regional Park preparatory work and aims to conserve the special features of the park and sustainably manage its values and community use. The park consists of Regional Open Space identified in the Greater Bunbury Region Scheme covering over 3,000ha across three separate locations:

- East and northeast of Bunbury mainly along the foreshores of the Leschenault Estuary and Inlet and the Collie and Brunswick rivers including the lands within the Leschenault Peninsula
- South of Bunbury about 5km from the city centre and mainly within the City of Bunbury
- Southeast of Bunbury along the foreshores of the Preston River

An overview of the Kalgalup Regional Park is presented in Figure 4-1.

The indicative Preston River Link is subject to changes responding to the expansion of Bunbury Inner Harbour.

DBCA Regional Parks are likely located within the primary hazard zones affected by both erosion and inundation risks. Environmental Values are of particular importance and will be considered by this CHRMAP process. Environmental assets and values will be identified during Stage C of this project.

4.3 Bunbury Inner Harbour

The Inner Harbour (under management of South Ports Authority) was first established in 1976, followed by subsequent developments at various locations. At present the port has five berths and dockyards and associated infrastructure on the western side of Preston River. The current layout of the Inner Harbour is shown in Figure 4-2.

The overall area of the Inner Harbour is bounded by Koombana Drive and Australind Bypass to the south, Pelican Point to the East, Koombana Beach to the west and Turkish Point to the north. There is one block of residential land adjacent to the Vittoria Bay. However, most of the land within the boundary of the Inner Harbour is for industry use where shorelines are protected by physical controls.

The recent development plan has considered options to redirect the Preston River to a new entrance and this may affect the general layout of the Harbour in the future.

4.4 Casuarina Boat Harbour

- The South West Development Commission has oversight of the Transforming Bunbury's Waterfront project and has delivered the first stage.



- The Department of Transport (DoT) implemented a major component of Stage 2 - the redevelopment of the Jetty Road causeway. The value of the causeway works was approximately \$12.65 million with funds provided through Royalties for Regions.
- DevelopmentWA (previously known as LandCorp) will deliver the Stage 2 redevelopment of Casuarina Drive.
- Jurisdiction of Casuarina Boat Harbour and the foreshore is not yet clearly defined.

4.5 Rivers and Water Courses

- DWER has significant involvement in water and flood management along all major water courses including both surface and ground water.
- LGAs have direct involvement in management of lands along the river flooding zone.
- DBCA has a management role of the regional parks along the rivers and at estuary/inlet surroundings.

4.6 The Cut

There is ongoing discussion regarding the ownership of, and management responsibilities relating to the Cut:

- DoT found the primary function of the Cut is to provide drainage functions for the Collie and Preston Rivers and Leschenault Estuary.
- Small boats do use the Cut to travel between the estuary and ocean, and boat ramps are present in the estuary system.
- DoT considered the Department of Water and Environmental Regulation (DWER) to be the most appropriate agency to have ownership of the Cut training wall structures.
- DWER advised Section 3.53 of the Local Government Act 1995 states that the control and management of unvested facilities is the responsibility of the Local Government Authority, and the southern bank of the Bunbury 'Cut' may fall into this category given it is an unvested facilities on unallocated Crown land.
- There haven't been follow-up discussions with LGAs and DBCA.
- DoT has previously been tasked with repairs to the norther training wall in 2014 but is not currently managing erosion control or structure maintenance at The Cut.
- Jurisdiction of the Cut is still under discussion.

This CHRMAP will potentially identify management tasks required at the Cut. It is recommended that discussions continue in order to assign management responsibilities.

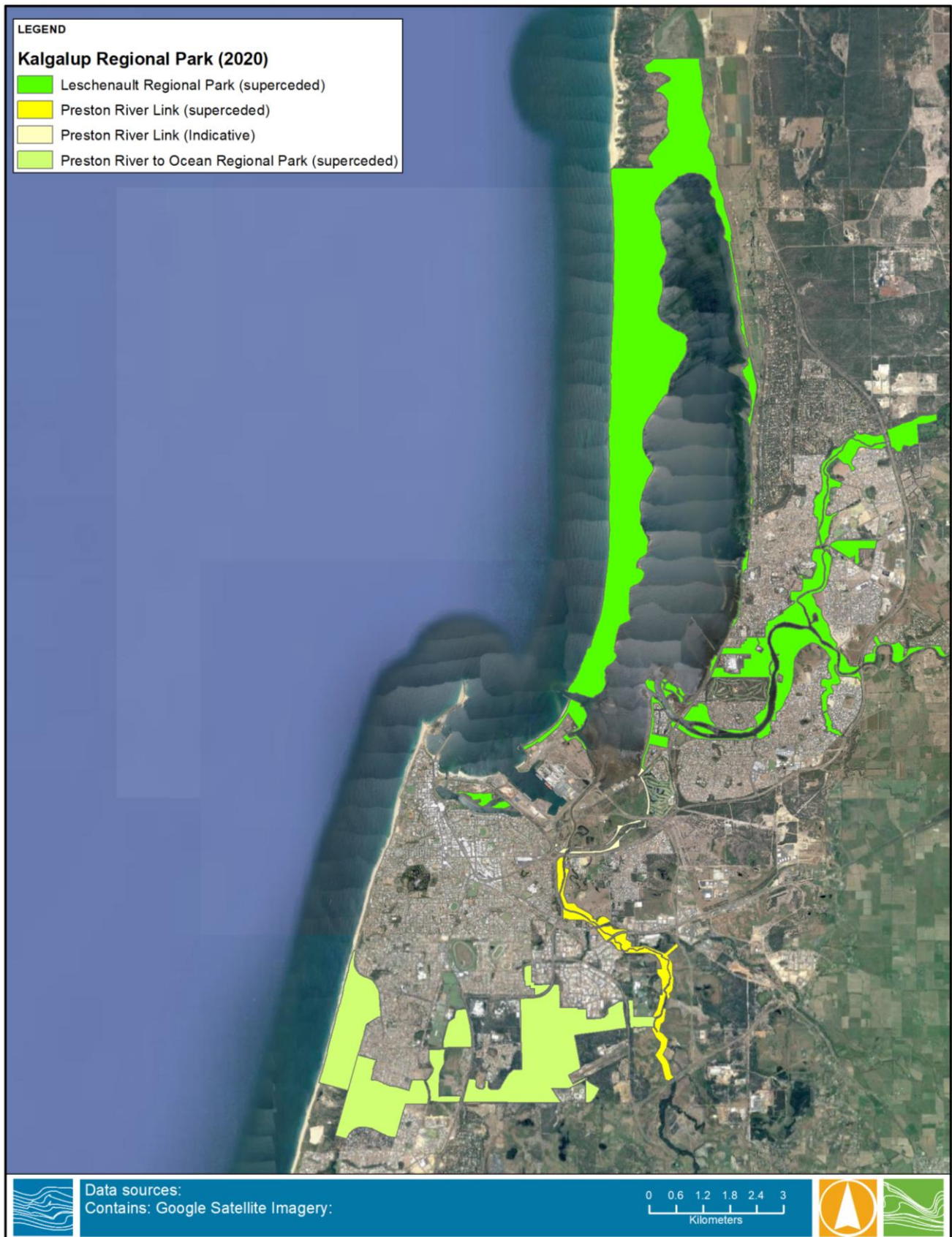


Figure 4-1 Kalgalup Regional Park Overview



Figure 4-2 Bunbury Inner Harbour Layout



5 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 5-1 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. The relationships of the various policies are presented in Figure 5-2.

This chapter reviews the planning documents within this Framework which are relevant to coastal hazard planning in the project area; additional information is provided in Appendix A. This review will help to: assess the adequacy of the existing planning documents for addressing coastal hazards; identify gaps that need to be addressed through the CHRMAP process (such as planning controls that are required, or need amending to enable implementation of CHRMAP recommendations); identify any potential planning issues that may constrain the CHRMAP process; and ensure that the adaptation plan aligns with state, regional and local planning frameworks.

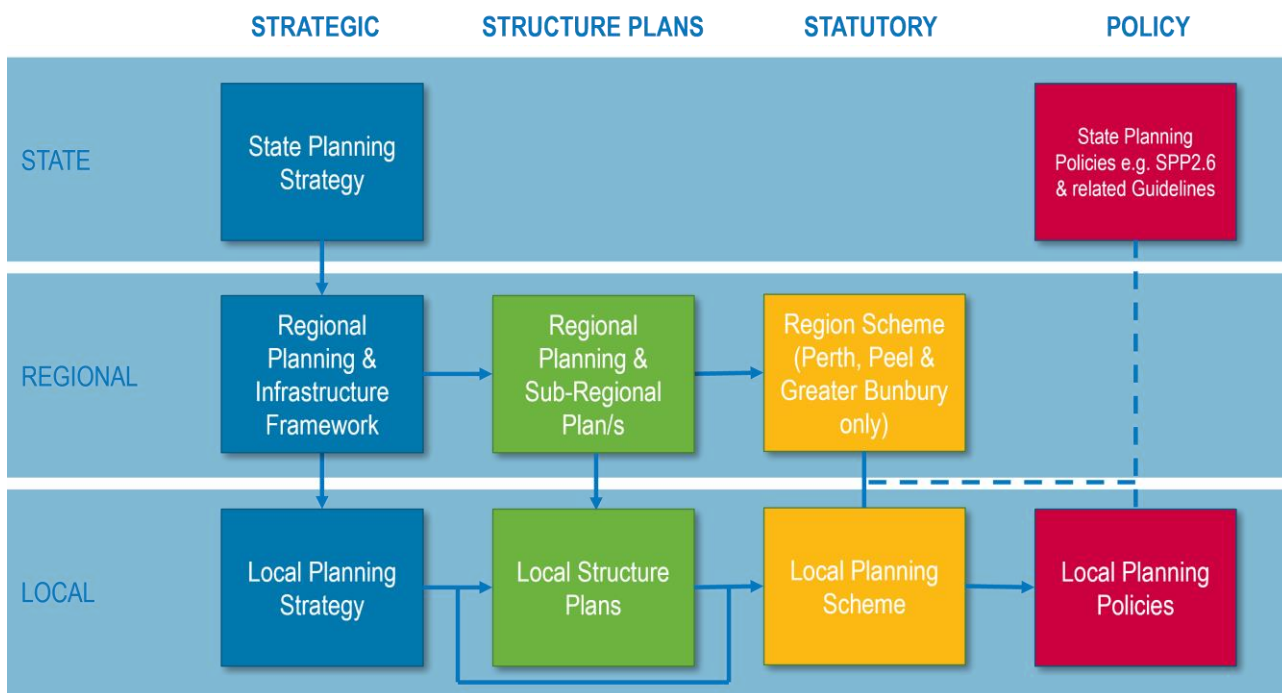


Figure 5-1 State Planning Framework for Western Australia

A summary of information from the planning documents relevant to the coast is included below and in Appendix A-3. This will all be considered as part of the development of the success criteria and adaptation options for the CHRMAP, with appropriate text included in the relevant planning documents as required.

5.1 State Planning Policies and Strategies

The following state documents have been reviewed. Information relevant to the CHRMAP has been included below and in Appendix A-1:

- State Planning Strategy 2050
- The WA Coastal Zone Strategy 2017



- State Planning Policy 2.6 – State Coastal Planning Policy, and associated Guidelines
- State Planning Policy 2.9 – Water Resources
- Coastal Hazard Risk Management and Adaptation Planning Guidelines 2019
- State Planning Policy 3.4: Natural Hazards and Disasters

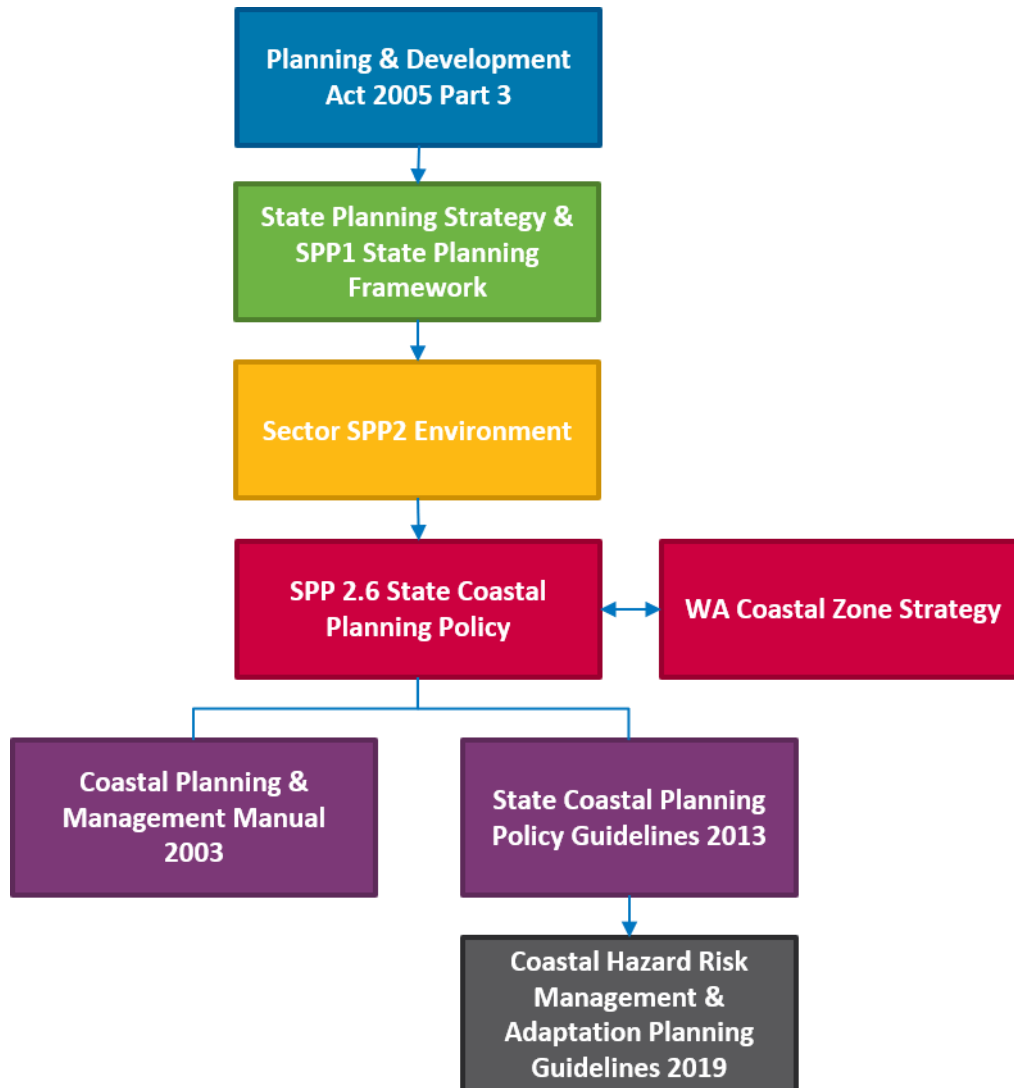


Figure 5-2 Policy Relationships

5.1.1 State Planning Strategy

The *State Planning Strategy 2050 (State Planning Strategy)* provides a strategic framework, principles, strategic goals and strategic directions for planning and development in Western Australia. The *State Planning Strategy* 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.

The *State Planning Strategy* identifies the project area coastline as being at risk of coastal landform change. Some of the aspirations listed for mitigation and adaptation planning 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 State Planning Strategy also provides that decisions about sustained growth and prosperity must strike the appropriate balance between environmental issues, economic conditions and community wellbeing.

5.1.2 WA Coastal Zone Strategy

The WA Coastal Strategy was released in 2017, in recognition of the need for a strong land-use planning framework to ensure that coastal development can be sustainable in the long term, meeting community, economic, environmental and cultural needs. It complements existing State legislation, strategies and policies, including SPP2.6. Any new Government and stakeholder strategies and policies are expected to be consistent with this strategy.

The document identifies all relevant legislation and policies related to coastal management. It outlines the key issues affecting the coast. It also defines stakeholder roles and responsibilities for coastal stewardship, making it a good overview document for a range of stakeholders.

The strategy clearly defines the roles and responsibilities for managing the coastal hazards of coastal erosion and inundation. It states that all levels of government, as well as individuals, businesses, and the community, each have important and complementary roles in adapting to coastal hazards. In particular, it outlines the following principles which have relevance to this CHRMAP:

- Private parties are responsible for managing risks to their private assets;
- Governments (i.e.: the Shire/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:
 - Develop local policies and regulations consistent with state adaptation approaches;
 - Facilitate building resilience and adaptive capacity within the local community.
 - Work in partnership with community to identify and manage risks / impacts.

The strategy then outlines its guide to how management of coastal hazards should be addressed, which will be definitive for the adaptation component of this CHRMAP. The State's coastal planning policy adaptation preferences in order of priority, as outlined in SPP 2.6, are:

Avoid > Planned or Managed Retreat > Accommodate > Protect

The state has a strong preference towards adaptation options that minimise coastal process interference and away from options that may leave legacy issues. Management strategies that preserve the natural coastline and move development away from the active coastal zone are considered ideal. As a result of this hierarchy, 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 WA Coastal Zone Strategy is a critical planning guide for any coastal community. It outlines the State Government's aims for sustainable coastal development into the future. The State Government emphasises the preference of public interests over private and industry interests and reinforces the presumption of



landholder responsibility. The State Government also reiterates earlier planning documents declaring that protection should be used only in the most exceptional circumstances.

5.1.3 State Planning Policy 2.6: State Coastal Planning Policy (SPP2.6)

The State Coastal Planning Policy (SPP2.6) is WA's policy for making decisions within the coastal zone as well as determining the coastal hazards, and strategies to manage identified hazards.

SPP2.6 provides rigorous outlines for the calculations of coastal hazards, specifically inundation and erosion. Whilst different parties may utilise different methods to assess coastal hazards, all studies must fall under the guidelines of SPP2.6.

SPP2.6 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.

SPP2.6 provides detailed information to evaluate the risk of coastal inundation and erosion and has specified the storm events to be considered for these analyses.

5.1.4 Coastal Hazard Risk Management and Adaptation Planning Guidelines

The CHRMAP Guidelines (WAPC, 2019) provide a comprehensive guideline for the process of CHRMAP development. The Guidelines detail the anticipated project scope, as well as standard approaches to undertake the hazard assessment, adaptation option development and implementation. This CHRMAP will be developed in accordance with the CHRMAP Guidelines.

5.1.4.1 Planned or Managed Retreat Framework

Appendix 4 of the CHRMAP Guidelines provides guidance on how to implement a policy of planned or 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 SPP2.6, 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 and continuing and undiminished public access to beaches.

The document details the following principles:

- To ensure land in the coastal zone is continuously 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.

Aligned with and in accordance with SPP2.6, it provides that a comprehensive CHRMAP process be undertaken to inform and enable the adoption of a planned or managed retreat policy to guide implementation. The planning mechanisms outlined to enact planned or managed retreat are:



- Structure planning – where comprehensive redevelopment of land remains an option, structure planning takes into account 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 – the LPS can be amended for the provisions of SPP2.6 to apply as if they were part of the scheme and to inform the classification of vulnerable areas as Special Control Areas (SCAs); as applicable.
- SCA – establishing an SCA enables land use and development at risk to be identified in the SPP2.6 100-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.
- Taking of land – triggers for initiating this process should be included in any policy arising from the CHRMAP process to support implementation of the planned or managed retreat.
 - The policy also speaks to the cost of taking land needing to be in agreement with the requirements under section 168 of the *Land Administration Act 1997*.

Finally, the document speaks to special circumstances for state government control. This would be enacted through mechanisms set out in the P&D Act and including the relevant Region Scheme, a Planning Control Area declaration and/or an Improvement Plan and Scheme.

5.2 Regional Planning Strategies

The following regional documents have been reviewed. Information relevant to the CHRMAP has been included below and in Appendix A-2:

- South West Regional Planning and Infrastructure Planning Framework
- Draft Bunbury-Geographe Sub-regional Strategy
- Greater Bunbury Region Scheme 2003
- Great Bunbury Strategy

5.2.1 South West Regional Planning and Infrastructure Planning Framework

The vision for this framework is “a region that generates high standards of social amenity, diverse economic activities and high-quality food, supported by effective and efficient infrastructure and at the same time preserving and enhancing the natural environment”. One of the key themes is sea level rise/storm surge.

The document outlines climate change as a major issue for the South West, and promotes adaptation as a way of preparing for a changing climate to manage the risks and maximise opportunities. The proximity of towns and cities to the coastline means they are vulnerable to the impacts of sea level rise and storm surge.

A response to this issue has been sea level rise and storm surge modelling for Bunbury by Geoscience Australia through the state planning agency.

The framework speaks to the formation of the PNP to provide a regional mechanism to facilitate effective and timely adaptation responses to climate change. Any proposed policy changes will be assessed by the Western Australian Planning Commission (WAPC) and, where considered appropriate, will be reflected through the relevant planning policies and statutory framework.

The WAPC will continue to support planning that mitigates and adapts to the probable impacts of climate change in the South West through, amongst other things, assessing the region’s coastal vulnerability to



determine the risk to coastal settlements and infrastructure from sea level rise and storm surge, and minimising potential impacts of sea level rise through planning policies and controls in vulnerable areas.

The document also speaks to natural disasters, stating that the South West is subject to a range of potential natural disasters such as flood, cyclones (though rare), storm surge, coastal erosion, severe storms, landslide and bushfires. It states that one of the most effective strategies for reducing the long-term impact of natural hazards is to integrate mitigation measures into the land use planning process.

5.3 Local Planning Strategies, Schemes and plans

The following local documents have been reviewed. Information relevant to the CHRMAP has been included in Appendix A-3:

- Shire of Capel Coastal Strategy 2005
- Shire of Capel Local Emergency Management Arrangements (2016-2021)
 - No specific coastal information
- Shire of Capel Draft Local Planning Strategy 2021
- Shire of Capel Draft Local Planning Scheme No.7 (8 is currently out for public comment)
- Peppermint Grove Beach Land Use Strategy 2013
- Peppermint Grove Beach Management Plan 2010
- City of Bunbury Local Planning Strategy 2018
- City of Bunbury Local Planning Structure Plans
- Koombana Bay and Casuarina Drive Master Plan
- Leschenault Inlet Master Plan
- Shire of Harvey Local Planning Strategy 2020
- Shire of Harvey District Planning Scheme No. 1 2019
- Shire of Harvey CHRMAP
- Ridley Place CHRMAP (summarised in Section 3.3)
- Shire of Dardanup Local Planning Strategy 2015
 - Currently no specific CHRMAP relevant information
- Collie River Erosion Management Plan 2020
 - Incorporated into coastal hazard assessment

5.4 Other Relevant Planning Documents

The following local documents have been reviewed. Information relevant to the CHRMAP has been included in Appendix A-4:

Bunbury Port Development Plan:

- Bunbury Port Development Long Term Monitoring and Management Plan
- Bunbury Inner Port Structure Plan

South West Development Commission

- Koombana Bay CHRMAP



Department of Water & Environmental Regulation Existing Plans:

- DWER Lower Collie River Master Plan

DBCA Regional Park Establishment Plan:

- Leschenault Regional Park Establishment Plan 2017
- Kalgalup Regional Park Draft Management Plan 2020

5.5 Planning Controls Summary

The study area contains a large array of planning documentation. As presented in this section and Appendix A, most of these documents make mention of coastal hazards, or values which will provide input into the CHRMAP process. With the exception of the Shire of Harvey however, none of the existing documents contain planning instruments that can be used to adapt to coastal hazards. This CHRMAP will consider what planning controls (existing or required) may be appropriate as adaptation measures within each management unit. Existing actions and controls appropriate to maintain will be identified along with required changes, updates or amendments or new controls required. The implementation plan will identify these and include proposed wording, implementation methods/process and supporting information.

Based on a review of the existing planning controls, the statutory planning mechanisms that may be available to address coastal hazards within the study area are summarised in Table 5-1.



Table 5-1 Summary of Potential Planning Controls

Planning Mechanism	Content	Comments
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	This may be an option considered in the development of the CHRMAP, in accordance with the provisions of the respective LPS.
Local Planning Scheme (LPS) amendment	LPSs can be amended for the provisions of SPP2.6 to apply as if they were part of the scheme and to inform the classification of vulnerable areas as Special Control Areas (SCAs); as required and deemed appropriate.	If an SCA is deemed an appropriate planning control for a section/s of the study area, a recommendation will be made for the relevant LPS to be amended including proposed wording, method and related information.
Special Control Area (SCA)	<p>Establishing an SCA enables land use and development at risk to be identified in the SPP2.6 100-year planning timeframe, establish intention to retreat from the area and provide the special planning instrument required to implement the approach.</p> <p>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.</p>	The use of an SCA for a portion/s of the study area will be determined as part of the CHRMAP development process. The project team will work with the PNP and relevant local governments to establish likely level of support for use of this option.
Taking of land	<p>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 or managed retreat.</p> <p>The cost of taking land needs to be in agreement with the requirements under section 168 of the Land Administration Act 1997.</p>	The use of this option will need to be discussed with the PNP, relevant local governments and state government. It will only be contemplated as an option in the event erosion or inundation hazard risks require the acquisition of such land.



6 EXISTING PHYSICAL CONTROLS

Physical controls have been implemented primarily along Casuarina Drive, inside Koombana Bay (including inner Harbour) and Leschenault Inlet. A list of physical controls has been prepared to establish the context and to progress the hazard assessment and development of adaptation options. These are presented in Table 6-1 and Figure 6-1.

Table 6-1 lists some major physical controls in Bunbury region and may not provide a complete list of physical controls over the entire study domain. The table will be updated at the completion of the coastal asset and value identification.

The influence of existing physical controls may affect the risk (consequence and/or likelihood), vulnerability, tolerance or appropriateness of risk management measures. Their ownership, available funding, design life, condition and level of management (monitoring and maintenance) will be considered throughout the CHRMAP stages. Following identification of vulnerable assets, the role of existing physical controls in influencing the level of risk and subsequent risk management measures can be considered further.



Table 6-1 Physical Controls

Location	Physical Controls	Structure Type	Material	Jurisdiction
Leschenault Inlet	Pat Usher Foreshore	Seawall	'Limestone Block and Mortar'	COB
	Rowing Club	Seawall	'Basalt and Concrete'	COB
	Queens Gardens	Seawall	'Basalt and Concrete'	COB
	Stirling Street	Seawall	'Limestone Block and Mortar'	COB
	Frank Buswell Foreshore	Seawall	'Limestone Block and Mortar'	COB
	Richmond Reserve	Seawall	'Coffee Rock and Concrete'	COB
	Koombana Boardwalk	Seawall	'Sheet Piling and Rock Armour'	COB
	Sykes Foreshore	Seawall	'Rock Armour'	COB
	Power Boat Club	Seawall	'Limestone Block'	COB
	The Plug – Les D Vorak	Seawall	'Rock and Mortar'	COB
	The Plug – Youth Precinct	Seawall	'Rock Armour'	COB
Ocean Drive	FMB outfall	unclear		TBC
	Ocean Drive Spur Groyne	Groyne	'Rock'	TBC
	Casuarina Drive Outer Harbour Breakwater	Breakwater	'Rock'	TBC
	Ocean Drive – Hungry Hollow	Revetment Wall	'Unknown'	COB
	Ocean Drive – Hayward Street	Revetment Wall	'Unknown'	COB
Koombana Bay	Jetty Road	Breakwater	'Rock'	DoT
	Marlston Waterfront	Seawall	'Rock Armour'	COB
	Ski Beach Groyne	Groyne	'Rock'	TBC



Location	Physical Controls	Structure Type	Material	Jurisdiction
	Storm surge barrier	Storm Surge Barrier		DoT
	Koombana Bay Sailing Club Groyne	Groyne	'Rock'	TBC
	Koombana Foreshore – Sailing Club	Revetment	'Unknown'	COB
	Koombana Foreshore – Dolphin Discovery	Revetment	'Unknown'	COB
	Koombana Beach Eastern Seawall	Seawall	'Rock Armour'	SPA
	Point Busaco Groyne	Groyne	'Rock'	SPA
	Point Hamilla Groynes	Groyne	'Rock'	SPA
Pelican Point	Pelican Point – Taylor Foreshore	Seawall	'Limestone Block and Mortar'	COB
Turkey Point	the Cut seawall	Seawall	'Rock Armour'	TBC
Inner Harbour	Inner Harbour Berth	Berth	Rock	SPA?
Rivers	Weirs/gates/riverbank protection			TBC

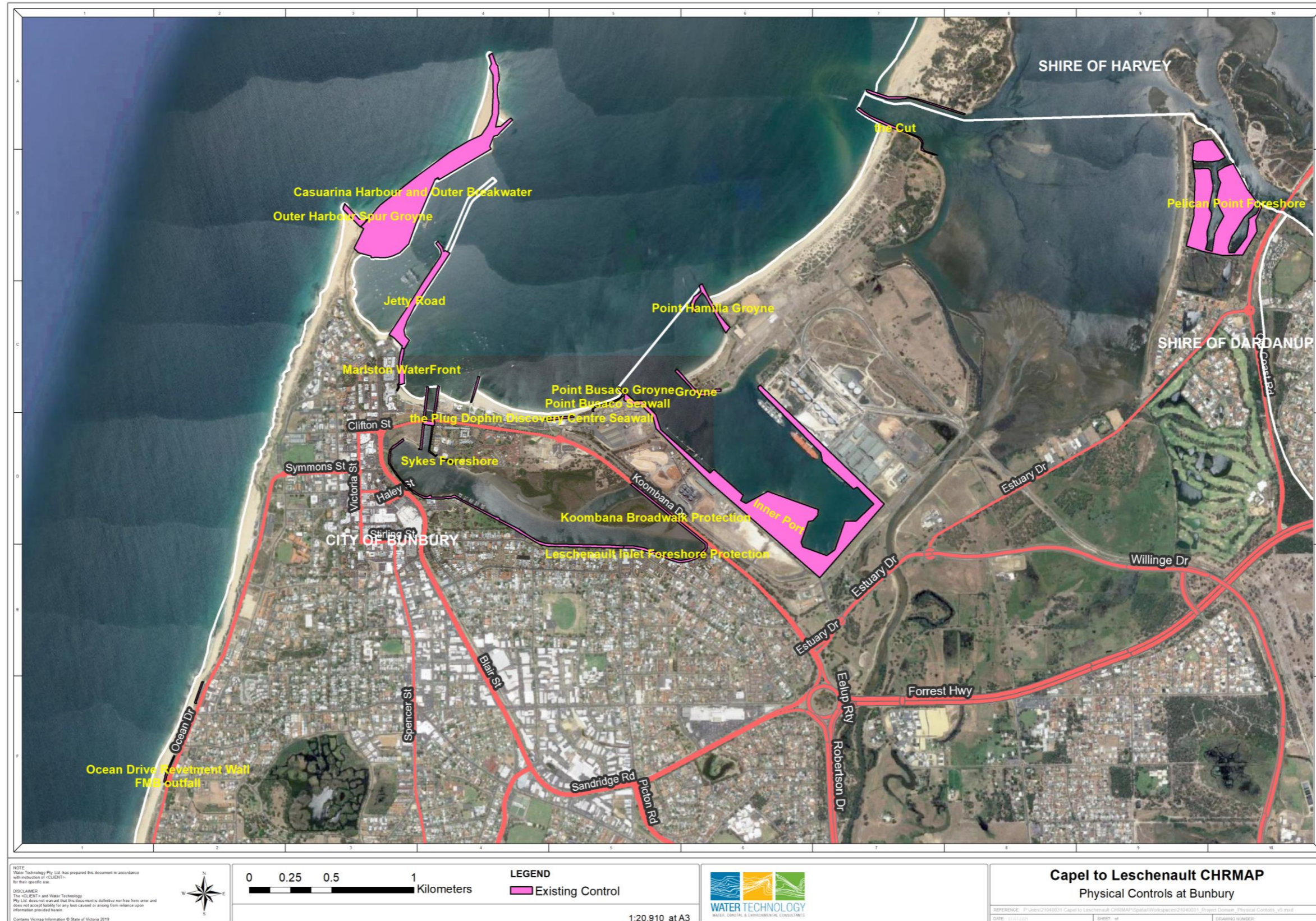


Figure 6-1 Physical Controls at Bunbury



7 MANAGEMENT UNITS

To facilitate the coastal hazard assessment and development of adaptation options, the study area is delineated into several management units which are determined according to a set of factors:

- Jurisdiction boundaries
- Presence of coastal assets and relevant stakeholders
- Coastal processes and potential hazard types.

For Shire of Capel, the shoreline can be divided into three primary management units:

- MU1 - Peppermint Grove Beach
- MU2 - Dalyellup Beach
- MU3 - Capel Coast (coastal reserve and farmland)

For City of Bunbury, the shoreline can be divided into five primary management units:

- MU4 - Bunbury S
- MU5 - Bunbury (including Five Mile Brook district, Koombana Bay, Leschenault Inlet)
- MU9 - Bunbury Inner Harbour (Bunbury Port)
- MU10 - The Cut
- MU11 – Bunbury E

Shire of Dardanup does not have an open coast. Primary hazards are potential riverbank erosion and inundation of lowlands along the Collie River. The area is defined as an individual management unit – MU7 - Collie River S.

For Shire of Harvey, the shoreline can be subdivided into two primary management units:

- MU6 - Leschenault Estuary
- MU8 - Collie River N, consisting of lands on the northern side of Collie River and along the Wellesley River and Brunswick River

Open ocean coast within Shire of Harvey is excluded from the scope of this CHRMAP.

Risk Assessment Zones have been considered for assessment of coastal erosion risks which will be discussed through consultation with Steering Group and stakeholders.



Table 7-1 Management Units with Shoreline Type(s)

Management Unit	Risk Assessment Zones	Shoreline Type	Comments
MU1- Peppermint Grove	Peppermint Grove Beach	Sandy	Town site with public assets e.g., playground, carpark, holiday park etc. Straight open coast
MU2- Capel Coast	Capel Coast including Forrest Beach, Stirling Estate (north of Capel River), Stratham Coast etc.	Sandy	Sandy beach, scattered assets, Stirling Wetlands connected to coast via Capel River and Muddy Lakes connected to coast via Five Mile Brook Diversion
MU3- Dalyellup	Dalyellup Beach	Sandy	Straight open coast, sandy beach Populated town site with public assets such as playground, lookout, beach, car parks etc.
MU4-Bunbury S	Mindalong Beach	Sandy	Straight open coast, sandy beach backed by coastal reserve (Maidens Reserve) Populated town site with public assets such as playground, lookout, car parks etc.
MU5- Bunbury	The Hollow Beach Back Beach	Sandy	Populated coast at Bunbury Straight open coast, sandy beach
	FMB & Big Swamp Wetland	Drainage Channel	Inland area with a low elevation.
	Point Casuarina	Mixed	Low rock outcrops Presence of numerous assets
	Casuarina Drive (South of the Spur Groyne)	Sandy	Backed by Casuarina Drive, sandy beach
	Casuarina Drive (outer Harbour breakwater, Casuarina Harbour)	Physical Control	Bunbury Outer Harbour Berths, breakwater and Casuarina Harbour Key protection for Koombana Bay Casuarina Harbour is currently under development
	Jetty Baths Beach Ski Beach Koombana Beach	Sandy	Protected beach backed by Casuarina Drive Small sandy beach under protection of the Plug breakwater Key public space and assets; Significant developments and recreational facilities
	Marlston Waterfront	Seawall	
	Koombana Bay Sailing Club	Sandy (potential breakwater protection)	Small sandy beach under protection of the Plug & Koombana Beach breakwater



Management Unit	Risk Assessment Zones	Shoreline Type	Comments
	Leschenault Inlet	Foreshore protection + mangrove habitats	Enclosed water Storm surge barrier Protection on southern side Shallow water
MU6-Bunbury Port	Port Area on Eastern Koombana Beach	Seawall	Presence of seawall control Port land
	Inner Port Berths	Seawall	Erosion allowances are not directly relevant.
	Point Hamilla	Sandy	Short stretch of sandy beach between two groynes
	Port Area at South of the Cut	Sandy	Short stretch of sandy beach
	Lower Preston River (North of Australind Bypass)	Riverbank	River flood plain
MU7-The Cut	Turkey Point	Sandy	Unprotected on both the seaside and estuary side
	the Cut	Seawall	Some segments are not built to the design standard
MU8-Bunbury E	Vittoria Bay	River delta	
	Pelican Point	Sandy & man-made Canal	Sandy shoreline on western side Houses connected by canal with physical protection
	Upper Preston River	Riverbank	River flood plain
MU9-Leschenault Estuary	Leschenault Peninsula Conservation Park Cathedral Ave Foreshore	Sandy, tidal flat	Sandy shoreline; No physical controls Sand foreshore backed by vegetated flat and road; No physical controls
	Australind Foreshore	Sandy	Sand foreshore backed by vegetated flat and road. Ridley Place, Leschenault Waterways Discovery Centre & Jetty Walk.
	Point Douro	River mouth	Tidal flat, sandy
MU10-Collie River S	Lower Collie River Nth (Clifton Foreshore) Upper Collie River Nth Wellesley River Brunswick River	Riverbank	River flood plain
MU11-Collie River N	Lower Collie River Sth (Eaton Foreshore) Upper Collie River Sth	Riverbank	River flood plain

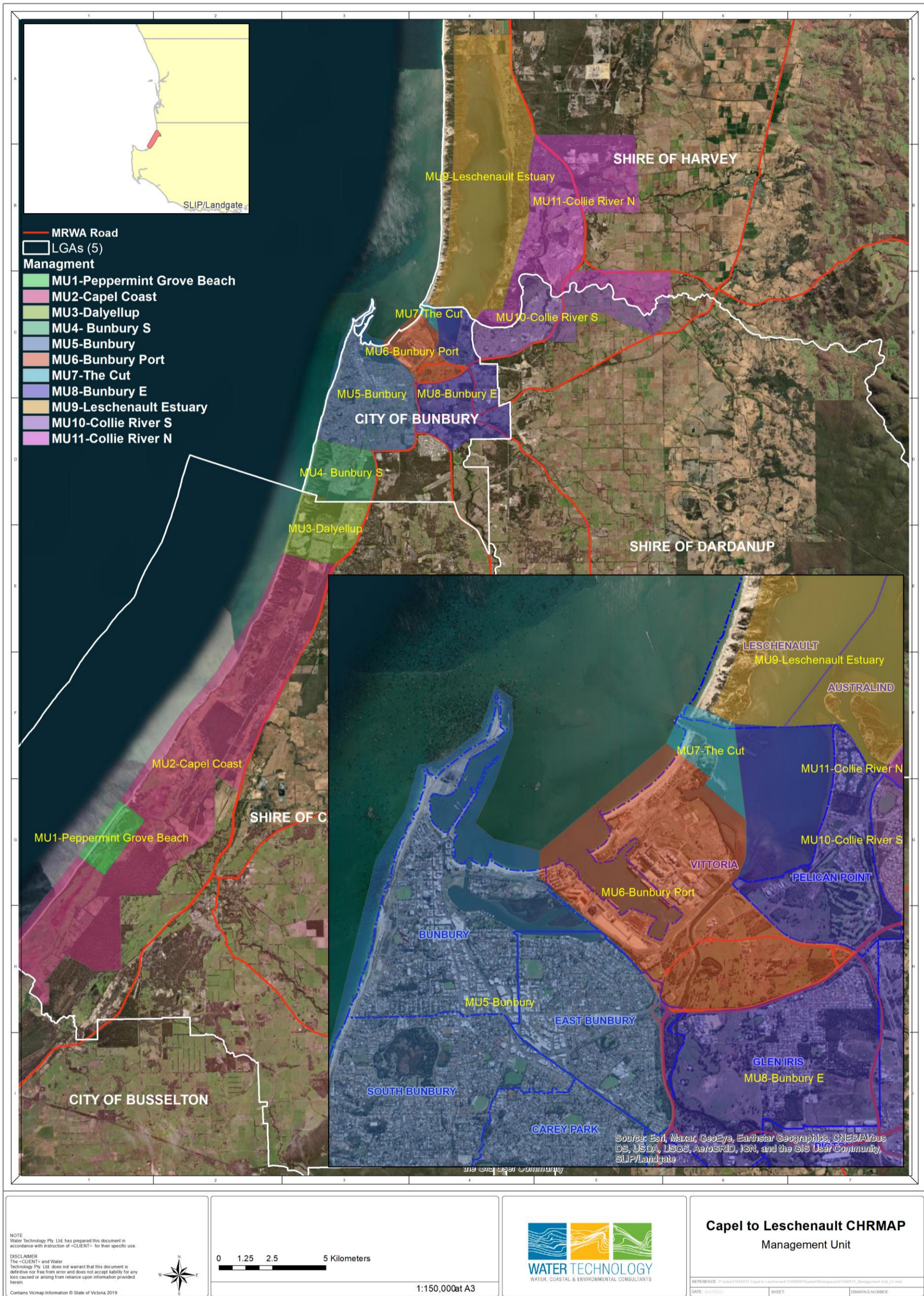


Figure 7-1 Study Area and Management Units



8 COMMUNITY AND STAKEHOLDER ENGAGEMENT

Key to the success of the CHRMAP project will be to ensure that the plan is underpinned by community and stakeholder values and knowledge. To this end, a Community and Stakeholder Engagement Plan has been developed in order to identify relevant stakeholders and determine the structure and pathways for their engagement throughout the CHRMAP process. The plan is intended to be fit-for-purpose, and commensurate with the size and scope of the CHRMAP – so as to avoid consultation fatigue within the community.

This plan has been prepared in accordance with the requirements of, and for consistency with, the following documents:

- Capel to Leschenault Communications Framework (PNP, 2020)
- The International Association of Public Participation (IAP2) documentation

The overarching objectives of the community and stakeholder engagement plan for the CHRMAP are:

- Establish strong working relationships with community networks and stakeholders which are built on mutual trust and respect.
- To ensure all stakeholders have up to date information about the CHRMAP, and the broader coastal management framework that supports the project.
- To provide the community and relevant stakeholders the opportunity to have direct input into the development and delivery of the CHRMAP.
- To understand community goals and aspirations for the coastal zone and community views on values, assets, opportunities and priorities.
- To aid in the identification of key issues and the selection of site-specific CHRMAP management actions to address them. Stakeholders on the ground will have knowledge of the site developed over years of interaction. This provides invaluable information that can be applied to generate innovative CHRMAP measures.
- Increased community and stakeholder understanding of, and support for, actions and priorities in the CHRMAP.

The engagement plan activities for the CHRMAP are outlined below in Table 8-1. The community values and success criteria will be developed during Stage C of the project. These will then be utilised to conduct the risk assessment and development of adaptation options. Additional engagement activities may be required if identified over the course of the project.



Table 8-1 Summary of Engagement Activities

CHRMAP Stage	Engagement Activity	Description	Timing
Stage C: Coastal Assets and Community Values	Prepare for launch of project	Establish Social Pinpoint mapping page for integration with PNP website portal - Social Pinpoint is a customisable community engagement platform which will be used to create a space to share information and keep the community engaged and informed. Provide tailored information for project communications (website content, media release, project information sheet, letter/email content, FAQs) Launch project – live project webpage, social media posts, launch of Coastal Assets and Values Survey to commence engagement phase of the project	29 th July 2021
Stage C: Coastal Assets and Community Values	Coastal Assets & Values Survey	Water Technology will prepare a digital survey for PNP's use, to provide the community, and stakeholders with the opportunity to identify areas / assets of value. Values will be categorised to aid the identification process.	29 th July 202
Stage C: Coastal Assets and Community Values	Community live-online workshop	Confirm the local community's values, and their perceptions of the key issues facing the study area. In this session, community members will have an opportunity to provide information regarding: <ul style="list-style-type: none"> ▪ Community uses, and areas of high social, environment and cultural value; and/or ▪ Community concerns regarding potential issues (including their priorities) to be addressed in the CHRMAP. This can also ascertain feedback regarding the current management plans and opportunities for improvement. 	2 nd September
Stage G: Risk Treatment	Adaptation Options Survey	Survey of community's adaptation preferences and tolerance to different funding alternatives.	TO BE CONFIRMED
Stage G: Risk Treatment	Briefing session	Open house style drop-in session for community members to view proposed adaptation options and confirm preferences.	TO BE CONFIRMED (at mid-point of adaptation options survey)
Stage I: Draft CHRMAP	Public Advertisements of CHRMAP Reports	Draft CHRMAP will be placed on the CHRMAP website for public comment. The document will be emailed / mailed to stakeholders identified as not having access to the CHRMAP website.	TO BE CONFIRMED ~March 2022



9 REFERENCES

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Western Australian Planning Commission (WAPC, 2013). State Planning Policy No. 2.6 – State Coastal Planning Policy, prepared under the Planning and Development Act 2005.

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APPENDIX A SUPPORTING PLANNING CONTROLS / INFORMATION





A-1 State Planning Documentation

A-1-1 State Planning Policy 3.4: Natural Hazards and Disasters (SPP3.4)

The purpose of the State Natural Hazards and Disasters Policy (SPP3.4) is to encourage local governments to adopt a systematic approach to the consideration of natural hazards and disasters when performing their statutory or advisory functions.

It considers the following hazards:

- Floods - the 100-year average recurrence interval flood should be used as the defined flood event. The floodplain of a defined flood event should be used as the area over which controls on land use and development need to recognise the impacts of flooding. All habitable, commercial and industrial buildings should have their floor levels above the level of the defined flood event.
- Severe storms and cyclones
- Storm surge - where storm surge studies have been undertaken and show that inundation may occur, new permanent buildings should be constructed to take account of the effects of storm surge (including wind and wave set-up). In areas where storm surge studies have not been undertaken, but evidence is available to demonstrate vulnerability to inundation, any development proposals should be supported by studies that demonstrate inundation will not occur.
 - SPP3.4 also makes reference to the need for hazard planning to refer to SPP2.6 for assistance in determining appropriate setbacks in coastal locations.
- Coastal erosion - development in areas affected by coastal processes, especially erosion, should take into account the requirements contained in SPP2.6.

A-2 Regional Planning Documents

A-2-1 Draft Bunbury-Geographe Sub-regional Strategy

The draft Bunbury-Geographe Sub-regional Strategy provides planning guidance for six local government areas (including the City of Bunbury and Shires of Dardanup, Capel and Harvey) and sets out a coordinated, contemporary and considered approach to future growth and development.

Two of the strategy's strategic principles are:

- Protect and enhance environmental values
 - Support the proposed creation of the Preston River to Ocean Regional Park and Leschenault Regional Park, and the protection of the greater Bunbury bushland corridor connecting the two.
 - Preserve and enhance ecological linkages, including a presumption against further fragmentation of these linkages.
- Protect people and property from natural hazards
 - Adopt a presumption against planning proposal within areas identified to be affected by coastal hazards

The strategy discusses coastal vulnerabilities, advising that settlements in close proximity to the coast are vulnerable to possible impacts from a changing climate including coastal erosion, coastal and fluvial flooding and inundation.



Increased population puts rising pressures on coastal and marine environments including those associated with:

- Tourism and recreation, including 4WD access to beaches
- Increased use of the foreshore
- Sewage disposal
- Nutrient run-off and other pollutants
- Climate change and sea level rise
- Erosion, inundation and sediment transport
- Marine debris
- Invasive species.

A-2-2 Greater Bunbury Region Scheme

The aims of the Greater Bunbury Region Scheme include to protect as regional open space the region's coastal foreshores, the foreshores of the Harvey, Brunswick, Collie, Preston and Capel Rivers, and the Leschenault Estuary and Inlet, as well as other areas of regional conservation significance and areas for regional recreational facilities.

The purpose of Reserves Waterways includes to recognise permanently inundated inland and coastal lands below the high-water mark, and existing and proposed water canals.

Schedule 3 of the scheme states that for schemes, subdivisions and developments which impact on Regional Open Space, Crown conservation or nature reserves, Environmental Management Plans may be required in accordance with specifications in Attachment 1 of the Minister for the Environment's "Statement that a Scheme may be implemented" No.000697 published on 31 October 2005, and subsequently implemented in accordance with the provisions of the Management Plan (to the satisfaction of the WAPC).

A-2-3 Greater Bunbury Strategy

One of the key challenges for the area is to protect and enhance biodiversity by:

- Identifying and protecting the health of the Greater Bunbury sub-region's rivers, wetlands, underground water sources, and the Leschenault Estuary and Inlet, and quality remnant vegetation from inappropriate development.
- Seeking and securing funding in conjunction with relevant stakeholders so that appropriate land for conservation and biodiversity can be identified, acquired and managed in the long-term.
- Effectively engaging with and resourcing community groups.
- Ensuring that development occurs in a way that safeguards and enhances the existing environmental, biodiversity and scenic assets.
- Better managing natural hazards within new developments, including flooding, coastal erosion and inundation, bushfire hazard and acid sulfate soils.

Two key delivery areas are:

- Regional open space and areas of environmental significance - Comprehensive assessment and implementation and ongoing funding and management of potential regional open space and areas of environmental significance to protect natural resources and support the growth of a compact and connected Greater Bunbury, including:



- Estuary coastal dune systems;
 - Remnant vegetation;
 - Long term management responsibilities and funding;
 - Identification of priority areas that could be considered for rehabilitation and ongoing management as part of an environmental offsets program; and
 - The finalisation of the Preston River to Ocean Regional Park and an equivalent regional park established to the north of Bunbury city.
- Coastal management - Preparation and implementation of a coastal management plan including:
- Taking into account the anticipated impacts of climate change such as rising sea levels, storm surge, effect on biodiversity; and
 - Establishing means of ongoing funding and management, especially opportunities for local community groups.

A-3 Local Planning Documents

A-3-1 Shire of Capel Coastal Strategy 2005

The Capel Coastal Strategy identifies several principles relevant to the ongoing management of the Shire's coastline. These have been based on the various coastal management policies and position statements released by the State Government over the past 20 years, culminating in the release of SPP2.6.

The principles cover issues such as environmental protection, public interest and community participation and guidelines for coastal development.

The strategy advises that an understanding of the environmental and social characteristics of the Shire's coastlines is essential for effective coastal management and provides a technical framework for the preparation of management strategies and recommendations.

Consultation with the community and relevant Government agencies provided significant input into the strategy. A range of coastal management strategies have been identified to provide a context for more detailed, location-based recommendations. The strategies provide a broad direction for coastal management over the entirety of the Shire's coastal areas. They provide guidance on issues such as coastal administration and tenure, environmental management, access and use conflict, facilities and signage/design.

Relevant recommendation strategies include:

- Support the development and implementation of an Education Strategy to focus on coastal and environmental management.
- Support the preparation of a Weed Strategy for the entire Capel Coastline.
- Consider supporting a driver education program for off-road vehicle use on the Shire's beaches.
- Evaluate and monitor the impacts of 4WD vehicles and general beach access on nesting habitats and migratory bird species in dune areas.
- Continue rehabilitation works on dunes at the main Peppermint Grove Beach.
- Maintain the pedestrian access paths at the Hardey Terrace car park.
- Fence the vehicle access track at the Hardey Terrace car park.



- Close and rehabilitate informal access tracks over the dunes, and install periodic signage directing pedestrians to formal tracks.
- Prepare a detailed Foreshore Implementation/Action Plan for the Peppermint Grove area that consolidates, updates and provides a mechanism for ongoing management of the foreshore, based on the preliminary foreshore management plan.
- Upgrade signage at Forrest Beach car park to clearly delineate zones for land uses.
- Delineate a vehicle and boat launching exclusion area along the main section of the Peppermint Grove Beach.
- Consider the closure of the vehicle access track at the main Peppermint Grove Beach as part of a future Foreshore Implementation/Action Plan for this area and following further consultation with the community. In the interim, install better signage and directions at this location to ensure that illegal vehicle use of the beach adjoining the boat launching area is reduced.

These and all other strategy recommendations will be considered as part of the development of the CHRMAP's adaptation options.

A-3-2 Shire of Capel Local Planning Strategy 2021

A few of the key land use planning issues outlined in the Shire's Local Planning Strategy relate to the CHRMAP. These are:

- Protection of environmental and coastal assets.
- Protection of the community from natural hazards such as bushfire and flooding.
- Protection and enhancement of essential infrastructure.
- Protection and enhancement of community infrastructure.
- The strategy outlines five primary objectives derived from the above, one of which is to preserve and enhance the natural and built environment.

In addition, the strategy seeks to promote measures to reduce the impact of development on climate change and promote greater resilience within communities to the effects associated with climate change such as sea level rise and water supply. An according strategy to manage coastal areas requires identified land along the coast to be reserved as Regional and Public Open Space in the local planning scheme and for CHRMAPs to inform the local planning scheme.

A-3-3 Shire of Capel Local Planning Scheme No.7 (LPS7)

The Shire's LPS7 has a Foreshore Protection Area zone and speaks to the protection of its coastal area.

Development is controlled within the Foreshore Protection Area. The Council's objectives in controlling development are to:

- Protect the foreshores of the ocean, rivers, watercourses and lakes from development which may cause land degradation, including that resulting from wind and water erosion; and
- Permit the use of land in a manner consistent with the long-term stability of the foreshore land.

This includes preserving and protecting against development which may or could destroy the existing physical characteristics and flora adjacent to the coast, except:

- a. A public road.



- b. A public footpath.
- c. A building for the use or convenience of the general public.

and for which Council approval has been given. This shall be permitted generally within 100 metres of the seaward crest of a stable sand dune, which is undisturbed by wave or wind erosion.

Notwithstanding the above, the Council may approve of a use and/or development with a greater or lesser setback where in an adopted Coastal Management Plan or Outline Development Plan approved in accordance with clause 5.10 of the Scheme text.

A-3-4 Peppermint Grove Beach Land Use Strategy 2013

Engagement undertaken in 2012 to prepare the strategy established that characteristics that are valued and considered important to the community were:

- Sleepy village character
- Seaside hamlet
- Ocean/coast views
- Quiet, uncrowded
- Connected community
- Relative isolation
- Natural environment
- Native flora and fauna
- Access to beach
- Capel River
- Boating and fishing
- Diverse built form.

The coastal values survey will confirm and update these values, and consideration of adaptation option for Peppermint Grove.

The Foreshore Precinct includes the existing foreshore conservation reserves, recreation reserves and community purpose areas between the beach and the developed residential areas. Ongoing development and population growth, combined with the popularity of the beach during the holiday period has placed increased pressures on the foreshore from land use conflicts and environmental degradation.

The impacts of informal access tracks across the vegetated dunes and feral rabbits require ongoing management to address erosion and vegetation removal.

Strategies for the precinct include:

- Improving pedestrian path connectivity to the beach, recreation areas and community focal nodes.
- Ensuring the ongoing conservation and integrity of the foreshore dunes and the beach environment generally.
- Managing and, where necessary, controlling access to the beach via informal tracks across the vegetated foreshore.
- Addressing the ongoing management of any identified fire risk on the foreshore.



- Implementing the relevant remaining actions of the Peppermint Grove Beach Management Plan subject to available funding.

The values and strategies from the document will help inform the preparation of the CHRMAP and potential adaptation options. These values and strategies will be updated as required based on community feedback.

A-3-5 City of Bunbury Draft Local Planning Strategy

The Draft Local Planning Strategy (2017) speaks to priority focus areas, one of which is the Natural Environment.

Strategies include the facilitation of planning, regulation and works to address processes that pose a threat to the condition and abundance of living native organisms in Bunbury, the promotion of ecologically sustainable development and the investigation of further opportunities to support the protection of the natural environment through land use planning.

A-3-6 Koombana Bay and Casuarina Drive Master Plan

The project has the following high level design objectives:

- Improve social spaces along the foreshores supporting the development of the marine components
- Improve the tourism appeal of Bunbury
- Create an accessible and connected waterfront
- Connect with and respond to adjacent development plans
- Assess and plan for coastal vulnerability
- Establish sustainability and resilience design principles to minimise environmental impacts
- Plan for future development through provision of services

The Koombana Master Plan sets out to create a regionally significant coastal precinct within the Greater Bunbury region. The Master Plan presents the opportunity to reinforce the existing beach character within the project areas by:

- Improving Koombana Bay's foreshore amenity areas and reducing coastal vulnerability.
- Improving Casuarina Boat Harbour beach by increasing the quality of the sandy beach.
- Strengthening the natural character of BP Beach by a natural approach to vegetation, access and landscape interventions.

A-3-7 Leschenault Inlet Master Plan

The Leschenault Inlet Master Plan provides an overarching framework and strategic direction to the development of the public space around the Leschenault Inlet (The Inlet) for the next 20 years. The Master Plan includes consideration of the impact of climate change and potential future development.

The vision for the Master Plan is:

'To plan, develop and manage the Leschenault Inlet and its environs to become an attraction of National and International quality and significant contributor to the continuous improvement of the character, amenity and economic viability of the Bunbury City Centre.'

The objectives are:



- Protect and enhance the natural attributes of the Inlet environment.
- Provide for a diverse range of accessible activity areas that promote and facilitate community engagement, active and passive recreation and civic and cultural activities.
- Promote the Inlet as a major attraction to support investment and growth of the tourism industry in particular, and City Centre business generally.

The community vision is for Leschenault Inlet to be natural, clean, accessible and fun. It is recommended as a gathering place for the community and should tell the Bunbury story. From this vision the broad objectives for the Inlet are to:

- Clean and green the Inlet and surrounds
- Improve the facilities
- Keep it low cost
- Maintain it for the public
- Provide practical solutions.

There is a desire to improve the access to and around the Inlet, stage its roll out, get community support for projects and consider multiple sources (possibly commercial) to fund it. There is a risk that the influence of climate change will impact the Leschenault Inlet and the surrounding low-lying urban area. Risks that have been identified include:

- Increased risk of inundation of urban areas through sea level rise and increased storm surge.
- Increased salinity of the Inlet through decreased rainfall.
- Reduced groundwater quality and availability.
- Decreased rainfall.

The document states that planning and management will need to be responsive into the future as knowledge improves. Consideration will need to be given to other strategies beyond coastal defences in the future.

Inundation is considered to be a threat to Bunbury due to extensive low-lying urban areas around the Leschenault Inlet. However, the risk of flooding is largely mitigated by the Bunbury storm surge barrier constructed at the western end of the of the Inlet. The CHRMAP will not model the inclusion of this barrier however, as it is modelling a “worst case” scenario from a coastal inundation perspective.

The flood mitigation management is an important aspect of Leschenault Inlet. The key aims of the management strategy are to:

- Protect the natural systems.
- Protect people and property from the potential of flooding.

The potential threat of inundation is mitigated by two factors:

- Local mitigation through a system of seawalls, levees and revetments (ranging in height from +1.5 - +1.7m AHD); and
- Management of coastal flooding through the use of Bunbury storm surge barrier within the ‘Plug’.

Based on an evaluation of the condition of the sea walls and the operation of the barrier, the following priority areas have been identified:

- Monitor barrier management to ensure it is operated to maximise the stormwater runoff holding capacity in the Inlet water body during a storm event.



- Raise the seawall/revetment/ levee around the Inlet to minimum of +1.7 AHD.
- Upgrade the stone revetment on Koombana Drive.
- Upgrade the seawall along Frank Buswell Reserve.
- Introduce a terrace behind the Waterfront Promenade seawall to achieve the +1.7m AHD levee height.
- Ensure the flood escape routes along Blair Street and Stirling Street are maintained.
- Planning and management will need to be responsive into the future as knowledge improves. Consideration will need to be given to other strategies other than the construction of sea walls.

These action recommendations will be investigated as part of the CHRMAP development.

A-3-8 Shire of Harvey Local Planning Strategy

The Shire's Local Planning Strategy recognises the issue of climate change and the potential for sea level increases as identified under SPP2.6. In this regard, the Shire commits to working with the PNP with a goal of establishing an appropriate planning framework to adequately deal with these matters into the future.

The Shire completed its CHRMAP for the entire open ocean coastline in 2016 and the CHRMAP was adopted in February 2017. Appropriate scheme provisions will be included within LPS2 to provide guidance on the best way to manage (defend or retreat) coastal infrastructure and areas of future development.

The Shire will spatially define coastal areas which are prone to sea level increases and include provisions within LPS2 to ensure development is undertaken accordingly. An SCA is to be included in LPS2 and appropriate scheme provisions are to be established for development.

The Shire also acknowledges that in certain locations within the Shire, rural land parcels possess significant environmental values which reduce their capacity to be utilised for agricultural purposes. In particular, the existence of remnant native vegetation, conservation status waterways, ecological linkages and lots in coastal areas are most affected.

A-3-9 Shire of Harvey District Planning Scheme No. 1

The Shire's District Planning Scheme objectives include to preserve and enhance places of natural beauty particularly along the coast, the rivers and inlets and the scarp, and to preserve historic buildings and objects of historical and scientific interest.

A-3-10 Shire of Harvey CHRMAP

The CHRMAP supports long-term coastal management and planning for the Shire's coastal assets. The Plan has been developed following SPP2.6 requirements and guidelines, with consideration of local attributes. The CHRMAP considers the Shire of Harvey open coast, which extends from the southern tip of Leschenault Peninsula to the northern Shire boundary, approximately 11 kilometres south of Preston Beach. The town centres at Binningup and Myalup are included.

Key coastal planning and management issues that may result from potential coastal hazards were identified through consideration of stakeholder values. Identification of values included community liaison through workshops and discussion with the project steering group, in their roles as representatives of key stakeholder interest groups.

The Plan acknowledges present-day coastal management issues faced by the Shire and considers how possible coastal change may affect town site and strategic planning over the next 100 years. Adaptation strategies are recommended to mitigate adverse consequences related to future coastal hazards.



The CHRMAP suggests that a substantially greater degree of planning assessment and dialogue with the State Government is required to develop a fully functional approach, and that further refinement of the planning approach is recommended over the next few years.

The CHRMAP recommends a two-level approach to planning, policy and tenure be adopted by the Shire.

1. Regional Planning: Regional Open Space

- a. The Regional Open Space Reservation of the Greater Bunbury Region Scheme needs to be more extensive along the Harvey coast, recognising its regional significance and the implications that actions outside the Shire can have on this section of coast. The actual extent of reservation needs to be agreed between the Shire, affected landowners and the WAPC, however it is recommended that as a minimum the mobile dune is reserved.

2. Local Planning: Local Planning Scheme

- a. The Shire has significant ability to influence land use planning at a local level. the Shires Local Planning Scheme may consider the following mechanisms to provide the appropriate planning response:
 - i. Coastal Management Zone to cover all lots with frontage to the coast.
 - ii. Coastal management Special Control Area within Binningup and Myalup to a line 150m landward of the existing coast; and
 - iii. Specific requirement for Structure Plans prepared in accordance with Scheme Provisions to consider coastal processes.

A-4 Other Relevant Planning Documents

A-4-1 Bunbury Port Inner Harbour Structure Plan

The Bunbury Port Inner Harbour Structure Plan has been developed to guide development and decision making within the Inner Harbour. It contains the Leschenault Estuary immediately north of the Port and a remnant of the estuary to the south with both these water bodies connected to Koombana Bay via man-made channels.

Technical studies undertaken for the preparation of the structure plan included flood management and hydraulic modelling, dredge management planning and oceanographic studies.

The current position of the lower Preston River channel from the Australind Bypass Bridge to the estuary is highly modified from its original alignment prior to European settlement having been excavated and realigned over the last 50 years following several serious flood events and with the construction of the Inner Harbour.

The technical study reports that the existing Preston River channel is flanked by levees on its left and right banks along its length through the Inner Harbour area. These levees are designed to contain the 100-year Average Recurrence Interval (ARI) flood event. The final one kilometre of the river channel is flanked by the Inner Harbour where land on its northern bank has been filled and raised and is considered to be resilient to a 500-year ARI flooding event.

Realignment of the Preston River is proposed to increase the capacity of conveying the 500-year ARI flow through to Vittoria Bay and reducing the flood risk to East Bunbury residents compared to current day.



Figure A-1 Bunbury Port Inner Harbour Structure Plan Area

A-4-2 Bunbury Port Development Long Term Monitoring and Management Plan

This document describes the Long-Term Monitoring and Management Plan (LTMMMP) for continued maintenance dredging and potential capital dredging programmes associated with future harbour expansion projects, for the period 2012 to 2022.

It is the intention of this LTMMMP to guide the management and monitoring of maintenance and possible capital dredging and ocean disposal activities over a period of ten years (approximately three maintenance dredging cycles). A dredging cycle may incorporate multiple dredging campaigns depending upon the availability of dredges and the size and complexity of the programme and the extent to which harbour areas are subject to sediment and sand accumulation due to seasonal variations.

A-4-3 Koombana Bay CHRMAP

The CHRMAP covers the Transforming Bunbury's Waterfront (TBW) project area, along the shorelines of southern and western Koombana Bay. The CHRMAP area is defined as the foreshore and infrastructure included in the TBW project, and is based solely on the ultimate development configuration of coastal structures at the completion of stage 3 as currently planned.

The coastal hazard assessment considers erosion and flooding hazards associated with different storm scenarios. Significant infrastructure has been delivered in the project area through urban renewal projects. This infrastructure has become key assets at risk from coastal erosion and inundation hazards.



Based on the hazard assessment and a subsequent coastal vulnerability and risk assessment, coastal erosion presents an immediate level of risk to Casuarina Drive and its associated values that is intolerable due to the access it provides to Casuarina Breakwater, the Southern Ports Authority Outer Harbour and the proposed Casuarina Harbour and mixed-use developments as part of the TBW project.

In addition, in the short-term, monitoring and ongoing maintenance are necessary to monitor and minimise the effect of coastal hazards on the key attributes that the community value. In the medium to long term, decisions regarding continued interim protection will need to be made.

The document and recommendations for coastal management will be considered in the development of the CHRMAP to establish if there have been any changes which warrant updating the coastal hazard assessment and coastal vulnerability and risk assessment components or whether the analysis undertaken in this project is still sufficient.

A-4-4 Leschenault Regional Park Establishment Plan (2017) and Kalgalup Regional Park Draft Management Plan (2020)

The Leschenault Regional Park Establishment Plan was prepared to define the land in the park, qualities of the park, propose a model for the vesting and management of the park and provide an overview of the future statutory processes applicable to the park such as vesting procedures, management plan preparation, region scheme amendments for the reservation of land to allow for additions to the park, and community consultation.

Subsequently Kalgalup Regional Park Draft Management Plan (DBCA, 2020) has been prepared and released for comment. The plan provides for the protection and enhancement of the conservation recreation and landscape values of the Park. The plan supersedes the Leschenault Regional Park preparatory work and aims to conserve the special features of the park and sustainably manage its values and community use. The park consists of Regional Open Space identified in the Greater Bunbury Region Scheme covering over 3,000ha across three separate locations:

- East and northeast of Bunbury mainly along the foreshores of the Leschenault Estuary and Inlet and the Collie and Brunswick rivers including the lands within the Leschenault Peninsula
- South of Bunbury about 5km from the city centre and mainly within the City of Bunbury
- Southeast of Bunbury along the foreshores of the Preston River

The estuary and rivers within the park provide a landscape value for the residents of Harvey, Dardanup and the surrounding region. Maintenance and careful management of the foreshore areas, which are likely to be subject to predicted future increases in storms and coastal erosion processes as a result of climate change, will assist in protection of surrounding developments.

The CHRMAP development will consider these social values and the extent of physical changes and impact on the estuary and rivers from storms and coastal processes.



Disclaimer: Stages 3a and 3b are subject to operational changes as the project develops.
Multi-club marine facility will be funded through private investment.
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Figure A-2 Koombana Bay CHRMAP Area

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