Harvey Coastal Hazard Risk Management and Adaptation Plan

Summary of Key Issues

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1 INTRODUCTION

This document provides a summary of key issues faced by the Shire of Harvey relevant to the development and definition of a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) for the Shire coast, providing context for subsequent evaluation of adaptation options.

The Shire of Harvey CHRMAP project has been presented as three documents (Figure 1-1). Information regarding forecast and potential effects of erosion, inundation and landform mobility is summarised in the Coastal Hazard Assessment. This Summary of Key Issues document provides an evaluation of the hazard receptors (people, infrastructure and environmental assets) and the planning context for coastal management within the Shire of Harvey. The CHRMAP itself has been developed as a stand-alone document, for which the Coastal Hazard Assessment and Summary of Key Issues provide reference material.

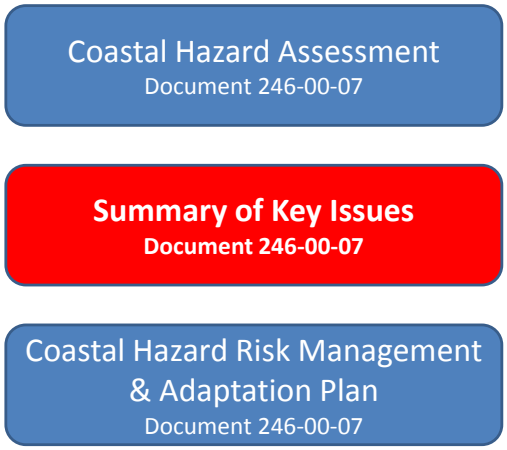

Figure 1-1: Document Context

The coast considered for the hazard assessment extends the entire length of the Shire coastline (Figure 1-2), from the southern tip of Leschenault Peninsula in the south, to the northern Shire boundary, which is approximately 11km south of Preston Beach. The landward extent of assessment varies spatially, depending on which aspect of coastal hazard or management is under consideration. The townsites of Binningup and Myalup are included in the assessment, along with Leschenault Peninsula Regional Park, which is managed by the Department of Parks and Wildlife (DPaW).

Figure 1-2: Shire of Harvey Coast

1.1 Background and Context

The Shire of Harvey is one of nine member councils of the Peron Naturaliste Partnership (PNP), a group of local governments who have adopted a regional, collaborative approach to monitoring and management of the coastal zone from Cape Peron to Cape Naturaliste in southwest Western Australia. Through the PNP a number of studies have been completed to identify areas where future impacts from coastal erosion and inundation may affect assets or planning along the PNP coast [1,2,3]. It was recognised that there is a need for scaling down or regional coastal hazard assessments to make the evaluation relevant to decision-making. The PNP identified the potential value of linking hazard assessments from both regional and local scales, particularly to support interagency decision-making regarding the consequences of adaptation actions.

Following from the regional-scale assessment of coastal hazards and adaptation pathways [3], the PNP selected the Shire of Harvey as an appropriate location to test in detail the process of stepping from regional coastal hazard assessment, through local hazard assessment, to implementation within the planning framework. The regional-scale erosion assessment indicated significant challenges for townsite planning for the Shire of Harvey coast due to erosion potential, suggesting that the coast requires management through a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) framework [4]. The Shire of Harvey has undertaken to develop a CHRMAP to assist in planning for and the management of coastal assets.

The approach to CHRMAP development has used a Source-Pathway-Receptors-Consequences framework. The Coastal Hazards Assessment focused on the sources and pathways of coastal hazard. This document principally summarises the hazard receptors and consequences, although it also describes the human and policy framework within which possible mitigation actions need to be considered. A community and stakeholder consultation process was integrated within the assessment of hazard receptors and consequences, through survey of assets and values.

In terms of the CHRMAP components recommended in the non-statutory WAPC guidelines, this document addresses coastal asset identification and the value component of the risk analysis (Section 4). The consultation process is outlined in Section 3.

Figure 1-3: Document Context Relative to WAPC Guidelines

2 EXISTING STATE OF HARVEY COAST

2.1 Description

The Shire of Harvey is located in the South-West Region between the two regional cities of Bunbury and Mandurah. The population in 2013 was estimated at 25,924 with an annual growth rate of approximately 4%.

The approximate length of the Shire's coast is 42 kilometres and comprises almost continuous sandy beach, backed by coastal dunes of varying height. It is characterised as a transgressive barrier dune system, with a history of instability that has prompted a cautious approach towards long-term coastal management. Landward of the dune system is a low-lying area, for which more than half of the Shire's coast is occupied by permanent water bodies of Lake Preston and Leschenault Estuary. The area between the two is used for intensive agriculture, with drains required to prevent seasonal water-logging. Approximately the southern third of the Harvey coast is within the Leschenault Peninsula Conservation Park, managed by the Department of Parks and Wildlife.

Urban development along the coast is primarily focussed around the coastal towns of Myalup and Binningup. Local structure planning has occurred for the longer term expansion of the Binningup urban area however to date on-ground development has not occurred. There are presently no plans to increase the urban footprint of Myalup.

Recreation (including licensed vehicles and 4WD) occurs along the coast, particularly at Myalup, Binningup and Buffalo Beach. The main activity is recreational fishing, with some surfing. Camping, 4WD and dirt-biking occur through the coastal dunes, although actively discouraged by the Shire and residents. For lots between Preston Beach and Myalup the beach provides an alternative vehicle access to Lake Preston Road, and for several lots it is the easier means of access.

Coastal infrastructure at Myalup and Binningup includes car parks, roads, pedestrian paths, limestone walls, ablution blocks, boat launching areas, a surf lifesaving club, a water sports club, children's playground and picnic areas, residential accommodation and holiday accommodation with associated services. Along the wider Harvey coast, infrastructure is sparse, with most residential accommodation set well back from the coast. Existing infrastructure is mainly fencing and beach access paths. It is anticipated that additional coastal infrastructure will be needed to service the growing population.

The Yalgorup National Park and Lake Preston are present in the northern sections of the coast and foreshore reserves are present around the beaches next to the townsites. These areas form part of the regionally significant Yalgorup-Riverdale Road-Yarloop east-west environmental linkage and a strong north-south linkage of the Yalgorup National Park recognised under the Greater Bunbury Region Scheme.

2.2 Social and Economic Characteristics

2.2.1 Population

Census 2011 data indicates that Binningup (urban area) has a resident population of 1,010 persons [5]. Myalup data covers not only the urban area, but the remaining of the Study Area and a portion of the agricultural land east of the highway. The resident population of this area as of 2011 is recorded as 399 persons [5].

2.2.2 Tenure

Land tenure within the Shire comprises a mix of freehold, various reserves and unallocated Crown Land. Tenure maps are included in Section 5 (Figure 5-2 and Figure 5-3) show that the majority of the coast is freehold, with some held to high water mark. Where they exist, coastal reserves are narrow.

The Leschenault Peninsula is subject to the *Leschenault Peninsula Management Plan 1998 – 2008* [6] and forms part of the DPaW Estate.

Between Binningup and the Leschenault Peninsula is unallocated crown land.

2.2.3 Coastal Land Use

Residential

The existing residential townsites of Myalup and Binningup are also nodal points for future urban development. South of BInningup is presently the most advanced (in a planning context) development opportunity. Existing setback distances range from 50m to the north of Binningup and 70m to the south, with a reinterpretation for the current SPP 2.6 widening this to 120m.

Industrial

Industrial assets along the Shire of Harvey Coast include:

- The Harvey Diversion Drain to the south of Myalup; and
- The Southern Seawater Desalination Plant along Taranto Road, with the outfall located north on Binningup. Associated land-based infrastructure is set back approximately 300m from the existing beach.

Recreation

Preston Beach, Myalup Beach, Binningup Beach and Buffalo Beach are the four major recreation nodes along the coast, providing access to the beach for recreational activities including:

- Pedestrian and swimming access (swimming only designations at Mylaup and Binningup);
- 4WD vehicle access;
- Camping;
- Boat trailer parking (Binningup); and
- Fishing (recreational identified as a main activity undertaken along the coast).

Rural

The Qunindalup Dune systems' general poor suitability for agricultural use, along with its inherent physical instability and environmental sensitivity, is reflected in the minimal agricultural development. The broader, low lying land behind the Dune system is currently utilised for agricultural purposes, although this area is potentially subject to water-logging, and irrigation relies on shallow aquifer groundwater extraction.

2.2.4 Heritage

Aboriginal heritage

There are four known sites within proximity of the coast:

- Belvedere Beach Burial (Ceremonial, Skeletal material/Burial, Man-Made Structure);
- Australind: Buffalo Road Burial (Ceremonial, Skeletal material/Burial);
- Collie River Waugal (Mythological); and
- Lake Preston (Artefacts/Scatter).

European heritage

There are no places listed on the State Register of Heritage Places within the study area, but the following sites appear on the Shire's Municipal Inventory:

- First Windmill Site (farming);
- Binningup Park Site (urban park);
- Binningup War Memorial;
- Depression Sustenance Worker's Camp Site (historic);
- Pead's Cottage.

2.3 Environmental Characteristics

Section 2.2.3 outlined the strip of coastal land systems set aside in part to their low capacity to support agricultural endeavours, but also due to their high environmental value, resulting in a comparatively undisturbed area of natural vegetation supporting a biodiverse floral and faunal population. These land systems include the Spearwood Dune System, the oldest system comprising the highest elevation dunes sitting a greater distance landward; the Vasse System, the intermediate system which is remnant from a large estuarine lagoon partly covered by landward migration of the coastal barrier, and; the Quindalup Dune System, a coastal barrier system that has been subject to significant landward migration over the late Holocene period. These systems interact to create an overall system of high dunes at the coastal margin, residual lagoons and swampy intermediate land, including discrete woodland areas in interdunal swales, and high parabolic and nested dunes, typically distinct from a low and narrow foredune ridge. The Lescehnault Peninsula Conservation Park to the south comprises these systems and the environmentally valuable populations they sustains, while the coastal dunes extending northward provide an environmental corridor to Yalgorup National Park. These parks, as well as the connecting dune systems, contain a number of local areas of high biodiversity, and host a number of unusual land features, including the 'Hundred Acre Wood' and the coastal sedgelands, which help to support threatened fauna.

Near-surface groundwater plays an important role supporting woodland vegetation, and as a sparse freshwater source for fauna within the coastal dunes. Sedgelands located in depressions between the linear coastal dune and the larger parabolic dunes are a surface expression of a thin freshwater lens above the coastal saline wedge. This is likely to be largely distinct from the surficial groundwater aquifer used to support agriculture in the lowlands to the east.

2.4 Historic and Existing Coastal Management

Natural barriers to the coast have provided much of the historic basis for coastal management along the Shire of Harvey coast. In particular, Lake Preston and Leschenault Estuary limit access to the coast through a relatively narrow east-west corridor, which was originally low-lying swampy land subject to inundation, most suited for agriculture. The coastal dune barrier provides only a narrow strip of dry land, with the high and steep dunes offering challenges for access and installation of services. Dune scarping through storm erosion and dune mobility through blowouts and sand drifts highlighted the coastal instability of the Harvey coast. Consequently, the coast was generally seen as of low value, with limited investment in services and land development. Two small town sites were developed at Binningup and Myalup, nestled into the high dunes.

The sediment transport pathways existing prior to European settlement were disrupted by the long breakwater at Casuarina Point, which was built through a number of stages, commencing in 1896 [7]. This structure was acknowledged as reducing the net northward sand supply by trapping sand. However, it was southward transport occurring during severe storms that prompted construction of the Power Station groyne in the 1930s, which was followed by a net southward sand supply. Acknowledgement of Bunbury Port's interruption of net sediment transport is suggested by location of the Port's dredging dump site, which is located 3km to the north of Koombana Bay. The site has been used for both maintenance and development dredging.

Two major interventions to the Harvey coast were conducted as part of schemes to reduce flood risk (in Bunbury and the lowlands east of the Yalgorup Lakes). The Harvey Diversion Drain was constructed in the 1930s, which included cutting through the dunes near Myalup. Bunbury Flood Protection Works were undertaken in the 1960s, and included diversion of Preston River, partial infilling of Leschenault Estuary and construction of a new rock-armoured ocean entrance. These features locally increased coastal mobility, but were not considered to substantially affect coastal values.

The State Government's apparent perception of low value of the Harvey Coast is evidenced by the decision to allow disposal of industrial effluent along the Leschenault Peninsula. This activity, which was sustained for nearly 30 years, caused substantial degradation to the dune vegetation system, significantly increasing dune mobility. Foredunes along the Peninsula were bulldozed to cover over pits of industrial effluent that were seen as public and environmental hazards. Substantial efforts were made towards revegetation to increase dune stability. The major driver to cease the industrial disposal was increased recognition of the environmental values of the Leschenault Estuary, Leschenault Peninsula, the Harvey coastal dunes and the nearshore coastal area.

Although development of the Harvey coast had been partly limited by the industrial activities along Leschenault Peninsula, the main reason for limited development has been the high degree of coastal mobility, including rapid rates of erosion observed between the 1950s and 1970s of up to 2m erosion per year. Considerations of possible coastal mobility, including dune movement, required that development be well set back from the coast, on what is a relative narrow area that is not prone to inundation. The result has been sparse development of residential properties outside the town sites of Binningup and Myalup, although private land ownership is almost continuous from Myalup to Preston Beach. Development has been further constrained by limited road access, with roads running along the landward side of the dunes. Strongly developed coastal management practices were collated in the Harvey Coastal Management Plan [8].

Recognition of coastal dynamics has been the major reason for providing access to the coast through east-west corridors, with north-south pathways mainly on the landward side of the dunes. The long-term practice of keeping infrastructure well back from the coast was also applied to the town sites, and until 2010 only three beach carparks were within 50m of the beach. In 2010 a section of limestone walling was constructed, locally referred to as Binningup Seawall, which retains a grassed area, paved carpark and Binningup Water Sports Club.

Recent development along Harvey coast has also included construction of the Southern Seawater Desalinisation Plant, north of Binningup. The plant itself is located landward of the coastal dunes, but incorporates intake and outflow structures in the nearshore, with the pipeline buried in a shallow trench and tunnelled under the dune. Scour observed over the pipe has required placement of additional cover material, obtained from Bunbury Port.

3 COMMUNITY VALUATION

3.1 Background

Prior to project commencement, a Stakeholder and Community Engagement Strategy (SCES) was completed to ensure that the work done to complete the Shire of Harvey CHRMAP upholds the principles and strategies relating to coastal management and community engagement of the:

- Shire of Harvey Community Strategic Plan;
- Coastal Management Strategy 2006;
- Peron-Naturaliste Partnership Community Engagement Strategy 2013-2015 (PNP Guiding Principles for Community Engagement) and;
- State Coastal Planning Policy Guidelines (State Planning Policy 2.6) [9].

In order to successfully uphold these principles and strategies, a steering group of key technical and community stakeholders from the PNP and Shire of Harvey was established; the steering group is representative of the Local and State Government, infrastructure agencies, and local stakeholders who are key to the preparation of the CHRMAP. Members of the community were invited to have input to the project via:

- One on one meetings with key groups, such as local landowners;
- Open days;
- Surveys (attitudinal); and
- Formal submissions.

Community stakeholders are considered to be private landowners, developers, local user groups and people from the broader region who use or have an interest in the Shire's coast. Engagement with this group, in the forms outlined above, has the purposes of:

- Creating a partnership with key organisations and landowners especially to get agreement in identifying and managing localised issues;
- Seeking community input to assess and rank key assets at risk from coastal hazards based on the coastal hazard assessment and the preliminary Issues Paper; and
- Developing adaptation options based on the community's advice on which options are preferred.

To ensure achievement of project objectives, specifically in relation to the outcomes of community consultation, a variety of evaluation processes were conducted throughout the project, including:

- An attitudinal survey at the beginning to establish a baseline of the community and stakeholder understanding of the values and threats to their coast;
- Feedback sheet for completion after discussions or open days to establish how well the processes worked, and whether the appropriate outcomes had been achieved; and
- Inclusion of a feedback sheet with draft documents released for public comment , seeking comments on the process and results;

3.2 Summary of Community Issues

A survey, discussion with the community and research has identified the key issues as:

- Land ownership, tenure and setbacks;
- Coastal access; and
- Coastal dynamics.

Most of Harvey's foreshore is privately owned, with some small coastal reserves. Existing freehold lots north of Binningup have coastal setbacks as low as 70m and similar setbacks are proposed for a new development south of Binningup.

Pedestrian, vehicle and boating access is provided at major recreational nodes. Uncontrolled access by campers and 4WD 'off roading' is extensive in the dunes.

The coast north of Binningup and south of Buffalo Road is prone to erosion. Through progressive processes, this trend may lead to erosion in the area that is presently more stable, although it is likely to be a slower process. Dune mobility has been affected by historical industrial dumping.

3.2.1 Attitudes and Values

A survey of community values and uses, and understanding of coastal hazards and processes shows:

- Harvey's coast is highly valued;
- The role of dunes in protecting private property is well understand and valued;
- Activities include swimming, fishing, walking and dog exercise at Myalup or Binningup beaches;
- About two thirds of respondents were aware of historic rates of erosion and that erosion is likely to get worse [a];
- Foredune management is the preferred adaptation action (fencing, revegetation, limiting 4WD access);
- Access is important but needs control to prevent damage and reduce risks for beach users, i.e. access should be provided only to specific areas.

Discussion with stakeholders and community described key coastal assets and amenity, as listed in Table 3-1.

[a] A minority of residents expressed an opinion that historic erosion and dune mobility was more strongly related to industrial waste disposal than progressive erosion.

Table 3-1. Key Coastal Assets and Amenity

Coastal Asset or Amenity	Sensitivity to Coastal Dynamics	Mechanism	Comment
Residential			
Binningup Town Site	Low-Moderate	Erosion / Dune Mobility	Moderate setbacks
Binningup Road Access	Low	Inundation	Minor flood risk
Myalup Town Site	Low-Moderate	Erosion / Dune Mobility	
Other Residential Areas	Low-Moderate	Erosion / Dune Mobility	
Industrial			
Harvey Diversion Drain	Moderate	Erosion / Dune Mobility	
Desalinisation Plant	Low-Moderate	Erosion / Dune Mobility	Pipelines affected
Recreational			
On-beach activities	High	Erosion	Beach amenity
Coastal 4WD Access Points	High	Erosion	Maintenance
Informal Launching Sites	High	Erosion	Maintenance
Binningup Seawall	Moderate-High	Erosion	Structural damage
Rural			
Agricultural Land	Moderate	Inundation / Salinity	
Heritage			
Aboriginal Heritage	Moderate	Erosion / Dune Mobility	Affected by 4WDs
European Heritage	Low-Moderate	Erosion / Dune Mobility	
Environmental			
Sedgelands	High	Dune Mobility / Salinity	Habitat loss
Dune Vegetation	Moderate-High	Dune Mobility	Sand drift
Coastal Forest	Low-Moderate	Dune Mobility	Habitat loss

3.2.2 Values and Assets Workshop

An important part of developing the CHRMAP was to consider the various land uses and gather community input on the values for land likely to be impacted. Discussions with stakeholders and community at the *values workshop* provided input to prioritise areas and assets potentially at risk. The key coastal assets and amenity identified during the workshop are outlined below:

- Protection of residential land uses at Binningup and Myalup;
- Protecting and maintaining access to coast for various recreational activities; and
- Protecting and maintaining dune vegetation, sedgeland and coastal woodlands.

3.2.3 Adaptation workshop

Not all of the values and assets identified necessarily require a response to adaptation actions. During this workshop consideration was given to what, if any values and assets required adaptation actions, and when they were likely to be required. Further to this, consideration was also given to options for adaptation and the relevant responsibilities for managing/implementation adaptation options.

3.3 Steering Group

A project Steering Group was established for the project and met three times during the development of the CHRMAP. The purpose of the Steering Group was to provide technical support and input to the CHRMAP as it progressed, and ensure that the requirement of relevant agencies and stakeholders were considered in an appropriate manner. The Steering Group comprised representatives from:

- Shire of Harvey;
- Peron-Naturaliste Partnership;
- Binningup Coastcare & Environment Group;
- Leschenault Catchment Council;
- Department of Planning;
- South West Catchment Council (SWCC);
- Department of Environment & Regulation; and
- Myalup Community Association.

4 IDENTIFIED VALUES AND ASSETS

The following values and assets, along with the assigned 'importance' have been developed by the Project Team, building on information received from the community and Steering Group as the project progressed.

4.1 Residential

There are residential nodes within the study area – the townsites of Myalup and Binningup. The *Coastal and Lakelands Planning Strategy*[10] and the *Greater Bunbury Region Scheme* both propose further urban development based around these centres. At present, the most advanced town site development opportunity is for the south side of Binningup, where plans have been prepared by Binningup Development Nominees.

Existing lots on the north side of Binningup have limited setback, with approximately 50m to West Coast Drive. A setback of 70m was previously proposed for development south of the town site [11], under a previous version of SPP 2.6 – reinterpretation for the existing policy would give a minimum of 120m setback.

Private land ownership occurs between Myalup and Preston Beach, although this area has been sparsely developed, with two small communities and a number of more isolated residences located within the dune areas. Most buildings are more than 200m landward of the existing beach, with only two sites located near to the crest of the primary dunes.

Table 4-1: Residential Values Potential Impact and Importance

Coastal Asset or Amenity	Mechanism	Impacts	Importance
Binningup Town Site	Erosion / Dune Mobility	Damage to property, infrastructure; management costs	High
Binningup Road Access	Inundation	Minor flood risk, management costs	High
Myalup Town Site	Erosion / Dune Mobility	Management costs	High
Other Residential Areas	Erosion / Dune Mobility	Management costs	Medium

Figure 4-1: Residential Values

4.2 Industrial

Harvey Diversion Drain was built on the 1930s, principally as flood mitigation infrastructure, with the secondary benefit of supporting agricultural irrigation. The latter role has declined following increased use of groundwater. The Diversion passes to the south of Myalup, with low level training walls finishing at the landward end of the existing beach. The entrance is normally closed over by beach sand, although it may open following severe runoff flooding or beach erosion.

The Southern Seawater Desalination Plant is located along Taranto Road, between Binningup and Myalup. The plant is operated by the Water Corporation, producing approximately one third of the water supplies for Perth. Land-based facilities are set back approximately 300m from the beach, with intake and outflow pipelines tunnelled under the dunes, to risers located offshore.

Table 4-2: Industrial Assets Potential Impact and Importance

Coastal Asset or Amenity	Mechanism	Impacts	Importance
Harvey Diversion Drain	Erosion / Dune Mobility	Management costs	High
Desalinisation Plant	Erosion / Dune Mobility	Management costs	Medium

(a) Landward view from the beach (b) View southwest from Diversion entrance

Figure 4-2: Harvey Diversion Drain entrance, February 2015

Figure 4-3: Industrial Assets

4.3 Beach Access and Use

Preston Beach, Myalup, Binningup and Buffalo Beach are the three major recreation nodes along the coast, providing pedestrian and 4WD vehicle access to the beach. Recreational facilities have been provided at each node, with Binningup having trailer parking to support beach boat launching. Myalup Beach and Binningup Beach have areas designated for swimming only. Recreational fishing is one of the main activities undertaken along the Harvey coast.

The limited number of access points to the beach for boat launching was previously identified by the Shire as a constraint to beach use, further limited by beach movements. Concrete ramps were incorporated to the Binningup Seawall facility to increase the ease and reliability of beach access.

The coastal dunes are extensively used for camping and 4WD 'off-roading'. Although these activities are actively discouraged by the Shire and many Lot owners, they remain largely uncontrolled on vacant lots.

The Shire of Harvey is located within a professional fishing area known as the South West Beach Seine Fishery. The fishery extends from Tims Thicket in the north to Point D'Entrecasteaux. It is believed that portions of the coast (excluding the beaches near Binningup and Myalup) are currently used by professional fishermen under licence from the Department of Fisheries.

It should be noted that the Department of Fisheries has jurisdiction only over ocean waters below the Low Water. Above the Low Water Mark it is understood that that fishermen are required to adhere to any local laws regarding coastal management.

Table 4-3: Beach Access Potential Impact and Importance

Coastal Asset or Amenity	Mechanism	Impacts	Importance
On-beach activities	Erosion	Loss of beach amenity	High
Coastal 4WD Access Points	Erosion	Management costs	High
Informal Launching Sites	Erosion	Maintenance	Low
Binningup Seawall	Erosion	Structural damage, loss of infrastructure	High
Professional fishing	Erosion	Loss of access	High

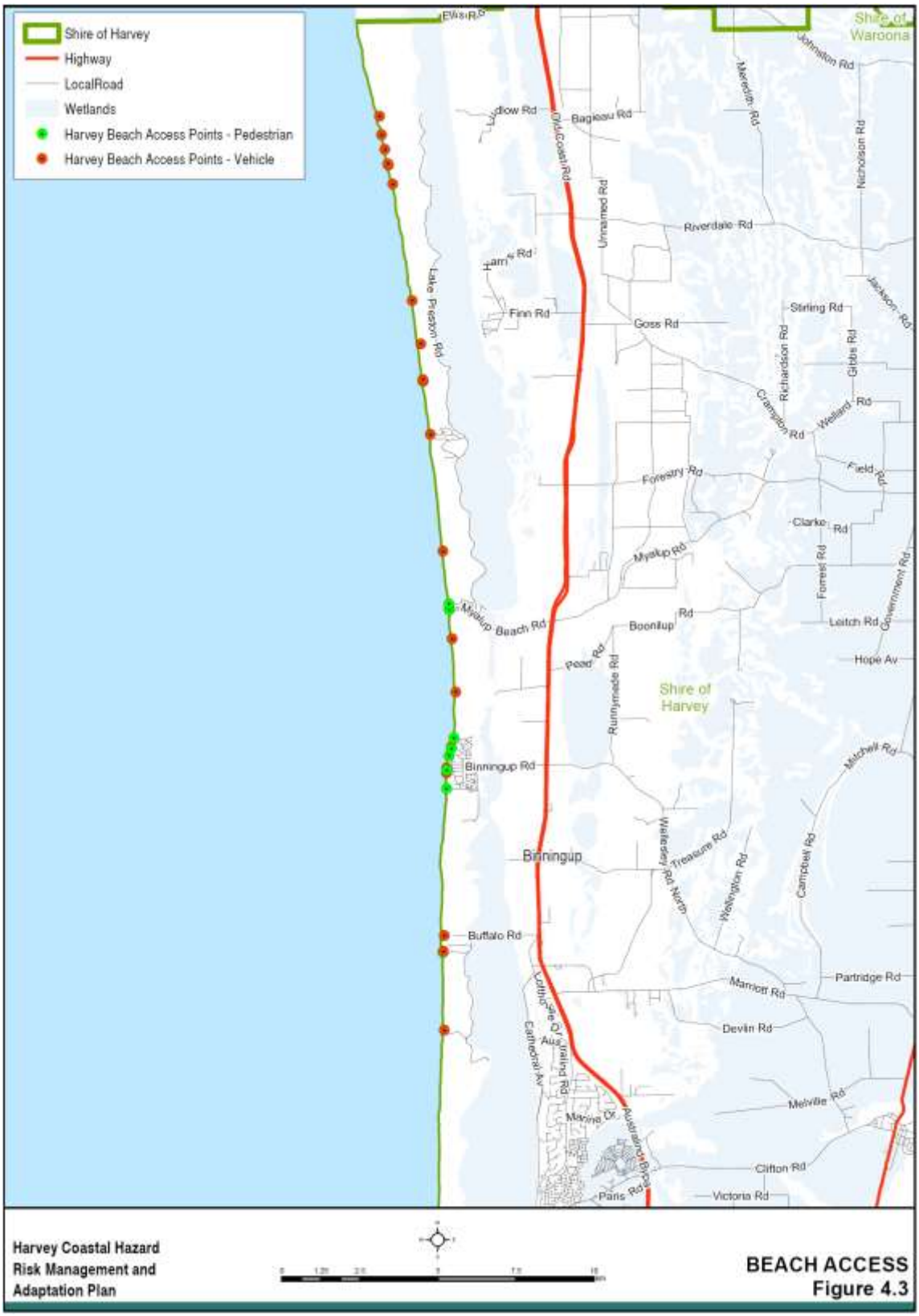

Figure 4-4: Beach Access Assets

Figure 4-5: Car Park and Existing Pedestrian Beach Access, Myalup

Figure 4-6: Car Park, Vehicle Access and Retained Playground, Binningup

Figure 4-7: Binningup Seawall, February 2015

4.4 Rural

Within the study area the majority of the Quindalup Dune system has not been developed or used for agricultural purposes. This reflects its generally poor capability to sustain use for agriculture, along with the inherently unstable and environmentally sensitive nature of these areas.

The broader areas behind the Quindalup Dune System between Buffalo Road and Myalup has been cleared and used for agricultural purposes. This area includes low-lying land that is potentially subject to water-logging, which is presently drained to the northern end of Leschenault Estuary. Irrigation for these areas relies on shallow aquifer groundwater extraction.

Table 4-4: Rural Assets Potential Impact and Importance

Coastal Asset or Amenity	Mechanism	Impacts	Importance
Agricultural Land	Inundation / Salinity	Loss of productive agricultural land	High

Figure 4-8: Rural Land Assets

4.5 Heritage

Aboriginal heritage

There are four known sites within proximity of the coast:

- Belvedere Beach Burial (Ceremonial, Skeletal material/Burial, Man-Made Structure)
- Australind: Buffalo Road Burial (Ceremonial, Skeletal material/Burial)
- Collie River Waugal (Mythological)
- Lake Preston (Artefacts/Scatter)

Development that has the potential to impact on any Aboriginal heritage site (whether discovered or not) is governed by the *Aboriginal Heritage Act 1972*. The Department of Aboriginal Affairs suggests that ethnographic and archaeological surveys are undertaken prior to any development to ensure that the provisions of the Act are not breached.

European heritage

There are no places listed on the State Register of Heritage Places within the Study Area. The following appear on the Shire's Municipal Inventory.

Table 4-5: European Heritage

Name	Use	Location	Listing Type
First Windmill site	Farming – windmill	Corner Iluka Dve & Killara St, Binningup	Municipal Inventory
Binningup Park site	Urban Park	Binningup	Municipal Inventory
Binningup War Memorial		Binningup Bowling Club	Statewide War Memorial Survey
Depression Sustenance workers' Camp site	Historic site	Corner Old Coast & Myalup Beach Rds, Myalup	Municipal Inventory
Pead's Cottage	Individual building	Pead Rd, Myalup	Municipal Inventory

Source: Heritage Council of WA database.

Table 4-6: Heritage Values Potential Impact and Importance

Coastal Asset or Amenity	Mechanism	Impacts	Importance
Aboriginal Heritage	Erosion / Dune Mobility	Affected by 4WDs	Low
European Heritage	Erosion / Dune Mobility	Management costs	Low

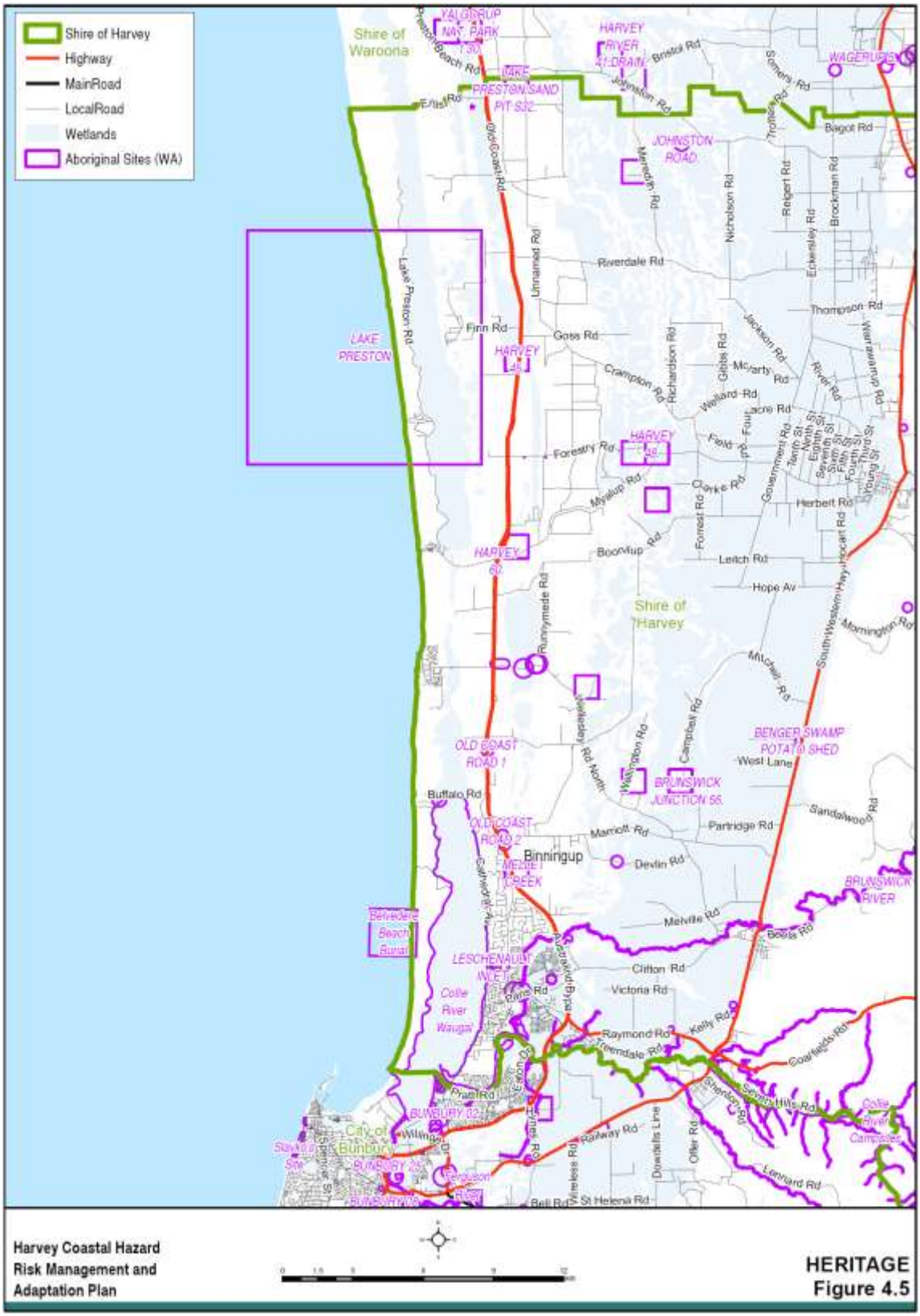

Figure 4-9: Heritage Values

4.6 Environmental

The Harvey coast has been identified as an area with high environmental value, with extensive areas of comparatively undisturbed natural vegetation. The major environmental asset is the Leschenault Peninsula Conservation Park, managed by the Department for Parks and Wildlife. However, the coastal dunes provide an environmental corridor to Yalgorup National Park and contain a number of local areas of high biodiversity and unusual land features which help to support threatened fauna. Small scale features previously identified include the 'Hundred Acre Wood' near Myalup and coastal sedgelands, mainly present between Myalup and Preston Beach.

Environmental characteristics of the Harvey coast are mainly characteristic of each of the three major land systems and their interfaces [12,13]. The land systems are briefly described:

- The Spearwood Dune System is the oldest of the three land systems, with high elevation and distance landward effectively making this the limit of present-day coastal influence;
- The Vasse System is intermediate, remnant from a large estuarine lagoon oriented north-south, which was partly covered by landward migration of the coastal barrier. This system is low-lying, occupied by residual lagoons (Lake Preston and Leschenault Estuary) and areas of swampy land, subject to waterlogging and inundation. Small woodland areas occupy somer of the inter-dunal swales where the dunes have migrated over the Vasse System; and
- Quindalup Dune System is a coastal barrier system that has been subject to significant landward migration over the last 7,000 years. The barrier is comprised of high parabolic and nested parabolic dunes, fronted by a low and narrow foredune ridge. Mobility of the dune system has been reactivated historically through widespread disturbance.

An area of particular environmental interest is the coastal sedgelands that are mainly located north of Myalup. These features are brackish seeps, intermittently holding freshwater, that occur in the depression between the linear coastal foredune and the larger aeolian primary dune. These formations develop due to dune blowouts when dry sand is pushed landward by wind, leaving the foredune (wet by the ocean) and the sedgeland (wet by groundwater). The brackish water supports coastal fauna. Present-day pressures on the sedgelands include low rainfall, landward migration of the foredunes and disturbance by 4WDs. The land adjacent to the seeps is popular for vehicles use as it is typically flat, sandy and fairly compacted. The groundwater lens is unlikely to be connected directly to the highly exploited surface aquifer located landward of Lake Preston. Existing pressures are likely to be exacerbated by sea level rise.

Table 4-7: Environmental Values Potential Impact and Importance

Coastal Asset or Amenity	Mechanism	Impacts	Importance
Sedgelands	Dune Mobility / Salinity	Habitat loss	High
Dune Vegetation	Dune Mobility	Management costs	High
Coastal Woodlands	Dune Mobility	Habitat loss	High

Figure 4-10: Sedgelands Located in Coastal Depressions.

Photograph taken from the linear coastal dune with the larger parabolic dune in background, February 2015

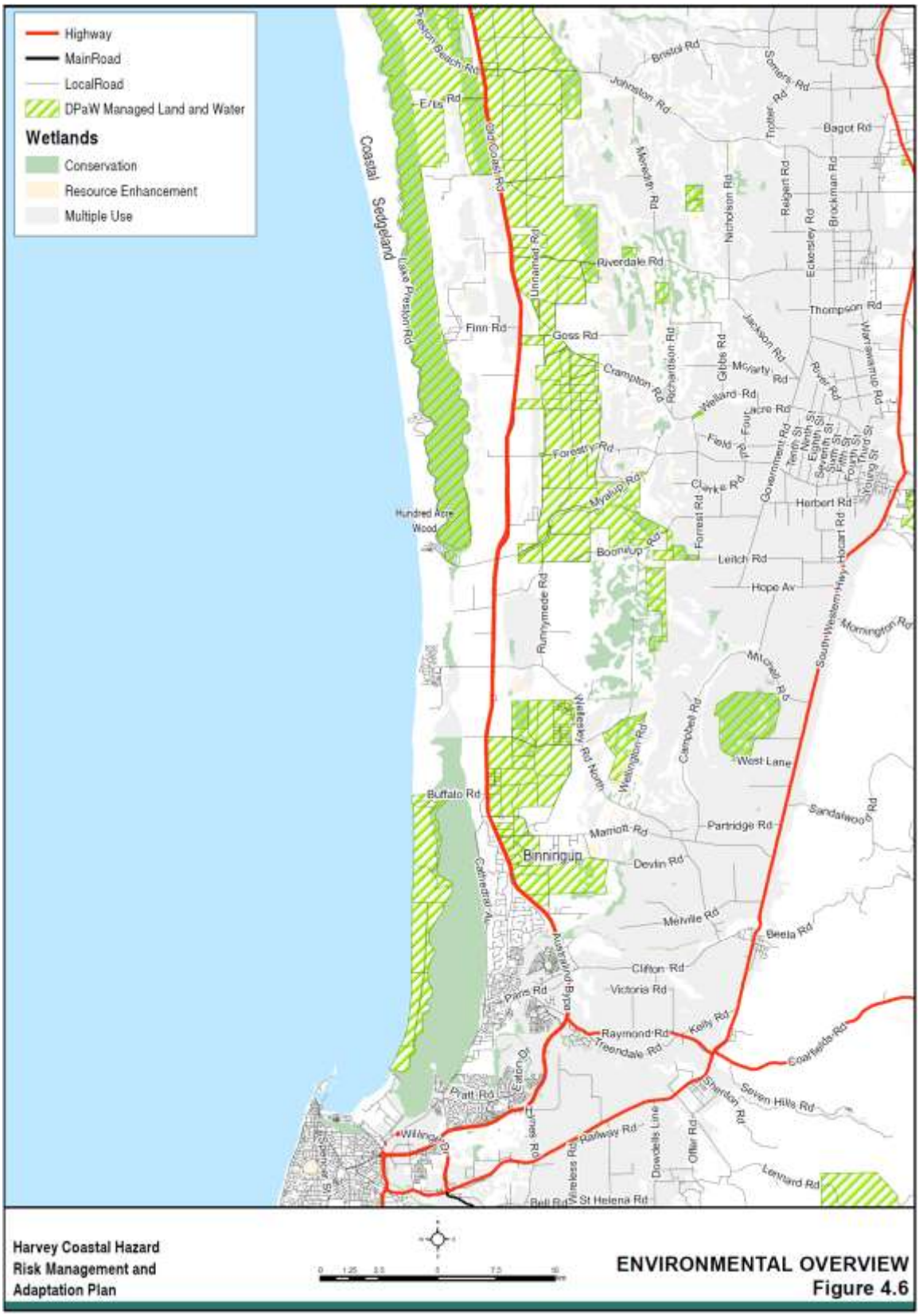

Figure 4-11: Environmental Values

4.7 Identified Threat to Assets

The level at which any of the coastal hazards (Section 7 of the Harvey CHRMAP Coastal Hazards document) may adversely affect the coastal assets and values (Section 4) has been evaluated (Table 4-8). Dune mobility and erosion are described spatially as the closest landward distance from the sand sheet or the coastal vegetation line (respectively) to the nominated asset. Thresholds for coastal inundation are less clear, with an acceptable frequency of coastal flooding for road access or agricultural land likely to vary significantly between individuals. The degree of sea level rise to cause adverse saline intrusion affecting the sedgelands is presently unknown, with a number of different pressures potentially contributing to stress, including vehicle traffic, erosion and rainfall variability.

Table 4-8: Coastal Assets and Identified Threats

Coastal Asset or Amenity	Threat	Threshold	Outcome when threshold reached
(A) Residential			
Binningup Town Site	Dune Mobility	>30m	Road smothering, then houses
	Erosion	>50m	Loss of road
Binningup Road Access	Inundation	>0.5m	Town access restricted once/year
Myalup Town Site	Dune Mobility	Any	Caravan park or houses smothered
	Erosion	>170m	Caravan park lost
Other Residential Areas	Dune Mobility	>10m	Isolated residences smothered
	Erosion	>200m	Isolated residences lost
(B) Industrial			
Harvey Diversion Drain	Dune Mobility	>70m	Blocking of Diversion ocean entrance
	Erosion	>30m	Increased wind drift blocks entrance
Desalinisation Plant	Dune Mobility	>150m	Smothering of building
	Erosion	>280m	Loss of building
(C) Recreational			
On-beach activities	Erosion	>15m	Loss of amenity
Coastal 4WD Access Points	Erosion	>20m	Reduced accessibility
Informal Launching Sites	Erosion	>20m	Reduced accessibility
Binningup Beach Ramp	Erosion	>15m	Loss of accessibility
(D) Rural			
Agricultural Land	Inundation	>0.3m	Salt water flooding once/decade
(E) Heritage			
Aboriginal Heritage	Dune Mobility	Not Identified	
	Erosion		
European Heritage	Dune Mobility	Not Identified	
	Erosion		
(F) Environmental			
Sedgelands	Erosion	>10m	Marine incursion to sedgelands
	Inundation	Unknown	Saline intrusion
Dune Vegetation	Dune Mobility	Any	Reduced dune vegetation
	Erosion	>20m	Reduced dune vegetation
Coastal Woodlands	Dune Mobility	>40m	Reduced woodland area
	Erosion	>70m	Reduced woodland area

5 POLICY AND HUMAN FRAMEWORK

5.1 Policy Frameworks

Planning instruments are generally very good at setting a direction and acting as assessment and management tools on a day-to-day basis. In some sense, their use as a long-term tool may be questioned given the long (100 year plus) timeframe of this document as the statutory planning framework in place today may look very different in 20, 50 or 100 years.

Nevertheless, the planning and development process administered by the Shire of Harvey and Department of Planning can provide an effective mechanism to management and ongoing adaptation, particularly by establishing and adopting a broad direction that can be subsequently incorporated into statutory processes. The challenge relates to ensuring that the planning and policy response is flexible enough to cater to changing conditions over time and that appropriate review mechanisms are in place to ensure that the planning and policy framework responds is regularly updated to reflect current requirements.

5.1.1 Policies Relevant to Coastal Management

Policy documents relevant to how the Harvey Coast should be managed include:

- State Planning Strategy 2050 [14]
- Coastal Zone Management Policy for Western Australia [15]
- State Coastal Planning Policy SPP 2.6, Policy and Guidelines [9]
- Coastal Hazard Risk Management and Adaptation Planning Guidelines [4]
- Greater Bunbury Region Scheme [16]
- Shire of Harvey Strategic Community Plan
- Coastal and Lakelands Planning Strategy
- Myalup-Binningup District Structure Plan [17]
- Shire of Harvey Local Planning Strategy [18]
- Leschenault Peninsula Management Plan 1998-2008 [6]
- Yalgorup National Park Management Plan 1995-2005 [19]

These documents range from broad-scale strategic information down to site-specific implementation plans.

The following diagram outlines the present planning and policy hierarchy within the Shire relevant to the adaption options outlined in this project, beginning with the broad-scale Greater Bunbury Region Scheme document [16]. Consideration of each element is provided in Appendix A.

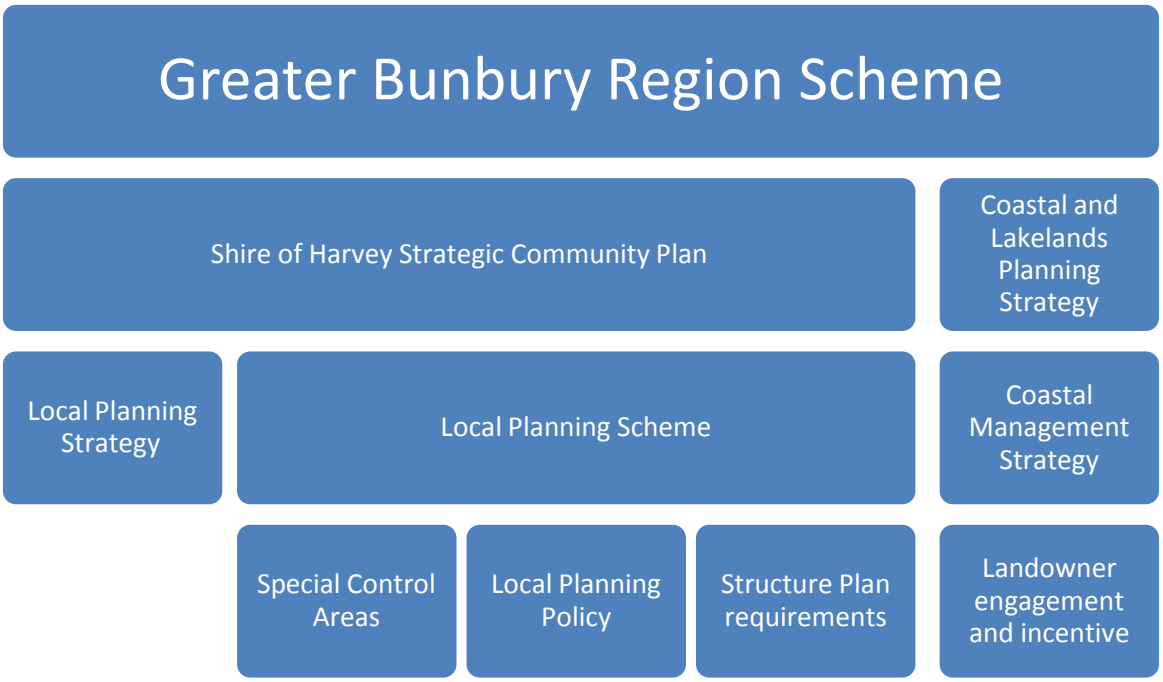

Figure 5-1: Present Planning and Policy Hierarchy within the Shire of Harvey

None of the planning instruments described in this section provides a perfect framework for dealing with coastal hazards and adaptation options over a long timeframe. It may be that a suite of options is required, and that these are regularly reviewed as the statutory environment of the planning framework changes over time.

Table 5-1 provides a summary of each of the planning instruments to assist the Shire in identifying the best options future consideration and implementation.

Table 5-1: Shire of Harvey Planning Instruments Summary

Planning Instrument	Opportunity	Constraints
Greater Bunbury Region Scheme	Signals importance of coastal management, hazards and adaptation at a regional level	Will require State Government support. May result in claims for compensation
Strategic Community Plan	Identifies high-level strategic direction for Council and a basis for longer-term financial planning	Does not provide any specific detail
Coastal and Lakelands Planning Policy	Regional level document that provides guidance on coastal matters across local government boundaries where issues are likely to be similar	Document requires review and updating Coastal process information outdated SPP 2.6 requirements not considered
Local Planning Strategy	Provides a strategic context and direction Allows the establishment of a planning framework	The framework will not be detailed enough for day-to-day use
Local Planning Scheme		
Local Reserves	Signals importance of coastal management, hazards and adaptation at a local level	May result in claims for compensation
Coastal Management Zone	Allows land to remain in private ownership. Can include zone objectives in the scheme that have statutory basis	
Special Control Area	Allows flexibility in base zone. Allows specific issues to be considered across multiple cadastral boundaries Can possibly be broader in extent than a local zone.	
Local Planning Policy	Provides specific information and requirements. Has the Statutory framework of the scheme.	
Coastal Management Strategy	Sets a strategic policy direction in relation to coastal management for the Shire. Provides on-ground and short to medium term actions.	

5.1.2 WAPC Adaptation Hierarchy

The *State Planning Policy* ***Error! Bookmark not defined.*** acknowledges the potential need to adapt coastal use to changing conditions, particularly those caused by sea level rise. However, it strongly identifies a preference for avoiding coastal hazards through use of coastal setbacks where this is

practical. A preferential hierarchy for adaptation of Avoid / Retreat / Accommodate / Protect is defined.

Development to support present-day coastal use (a coastal node) may be accepted with limited coastal setback, but this should have a minimal footprint and a limited service life. Ideally, facilities located at a coastal node should be low cost or easily relocated, to facilitate retreat when necessary.

5.1.3 Shire Coastal Management

Existing private tenure largely constrains Shire coastal management to the use of the development approvals process, with practices of dune restoration and access management limited to Shire land. Historic management has resulted in large coastal setbacks for the majority of the Harvey coast. This provides a strong basis for continued practice of avoiding coastal hazards.

Active dune stabilisation and access management along the Shire of Harvey coast and that managed by DPaW has been successful, and provides a good basis for future practice. Practice by private land owners is highly variable, with some areas well managed by communities.

Coastal nodes at Myalup and Buffalo Road have been developed with low value infrastructure that is easily relocated. At Myalup, the most shoreward land is occupied by a privately owned caravan park. Development at Binningup includes substantially higher value infrastructure and has housing development in comparatively close proximity to the coast.

5.2 Existing Infrastructure and Tenure

Large portions of the coastal dunes are held in private ownership or State Government stewardship (Section 2.2.2), which constrains Shire management of these areas. Apart from the Binningup and Myalup town sites, the majority of the coastal areas are privately owned to high water mark, or comprise areas of Conservation Park with management being undertaken by DPaW. The Greater Bunbury Region Scheme does not provide for future reservation and acquisition of significant coastal foreshore reserves within the Shire. This is particularly apparent north of Myalup where, for the purposes of coastal management, the GBRS reserves are inadequate and affect only land comprising mainly UCL. Where existing lots extend to high water mark the GBRS reserve is particularly thin, covering beaches only.

The lack of GBRS reserves limits the ability of the Shire to seek management orders for coastal areas and effectively manage these areas via the region scheme provisions. Alternative mechanisms will need to be found.

The privately owned land proposed for Regional Open Space in the GBRS has the option to be acquired by the State Government. Should this occur, the land will be vested in the Crown and the details of the vesting in relation to its management will be clarified at that stage. Typically, coastal foreshore areas under existing Region Schemes are managed by the relevant Local Government, with management funded through State Government grants. Unfortunately, the GBRS does not propose Regional Open Space reserves over many coastal dune areas, and thus an opportunity for future acquisition and management of these areas may have been lost. The GBRS does, however, propose the inclusion of all beach areas within a Regional Open Space reserve.

When subdivision abutting the coast is proposed, a portion of the coastal land is allocated as foreshore reserve and can be ceded to the Crown free of cost if included as a condition of subdivision approval. This is likely to occur as part of any future subdivision proposals along the Shire's coastal areas, however at present it is understood that the Shire's draft Local Planning Strategy is only promoting future development of land south of Binningup which is subject to Structure Plan provisions in the local planning scheme. As part of finalising the Structure Plan for this area, foreshore reserves of appropriate widths should be investigated and ideally incorporated into either regional or local reserves. Localised Foreshore Management Plans are generally prepared in these circumstances and this practice should continue.

South of Buffalo Road, the Department for Parks and Wildlife implement management plans for Leschenault Peninsula and Yalgorup National Park [6,19]. DPaW is continuing to implement the 1998 management plan for ongoing management and rehabilitation of this area. The Department are also continuing to implement the Yalgorup National Park Management Plan (CALM, 1995) for areas affected by that Plan, including Lake Preston. The Shire should seek to support the work being undertaken by DPaW and consider assisting in specific management proposals where there would be a shared gain, such as the cost-sharing arrangement to upgrade and bituminise the Buffalo Beach access road.

Management of coastal flooding risk, particularly through the lowlands between Leschenault Estuary and Lake Preston requires consideration of existing drainage and road infrastructure and its longer-term maintenance. Road reserves for Buffalo Rd, Binnigup Road and Taranto Road cross the lowlands, and therefore provide possible locations for flood barriers and culverts, which would optimally be installed when the roads are subject to major maintenance. Raising of Old Coast Road may provides an opportunity for partially reducing flood hazard for Australind, although there are more than 40 properties west of the road reserve which would not be protected.

The existing drainage network through the Leschenault-Preston lowlands, which occurs on private agricultural land, is expected to require modification whether flood barriers are installed or not. Its present objective, which is to drain excess runoff to prevent water-logging, is likely to be challenged with increased tidal intrusion.

Harvey Diversion Drain is managed by the Water Corporation. Existing levels of the dykes that contain the drain are presently considered sufficient, but may require review when the facility is next maintained.

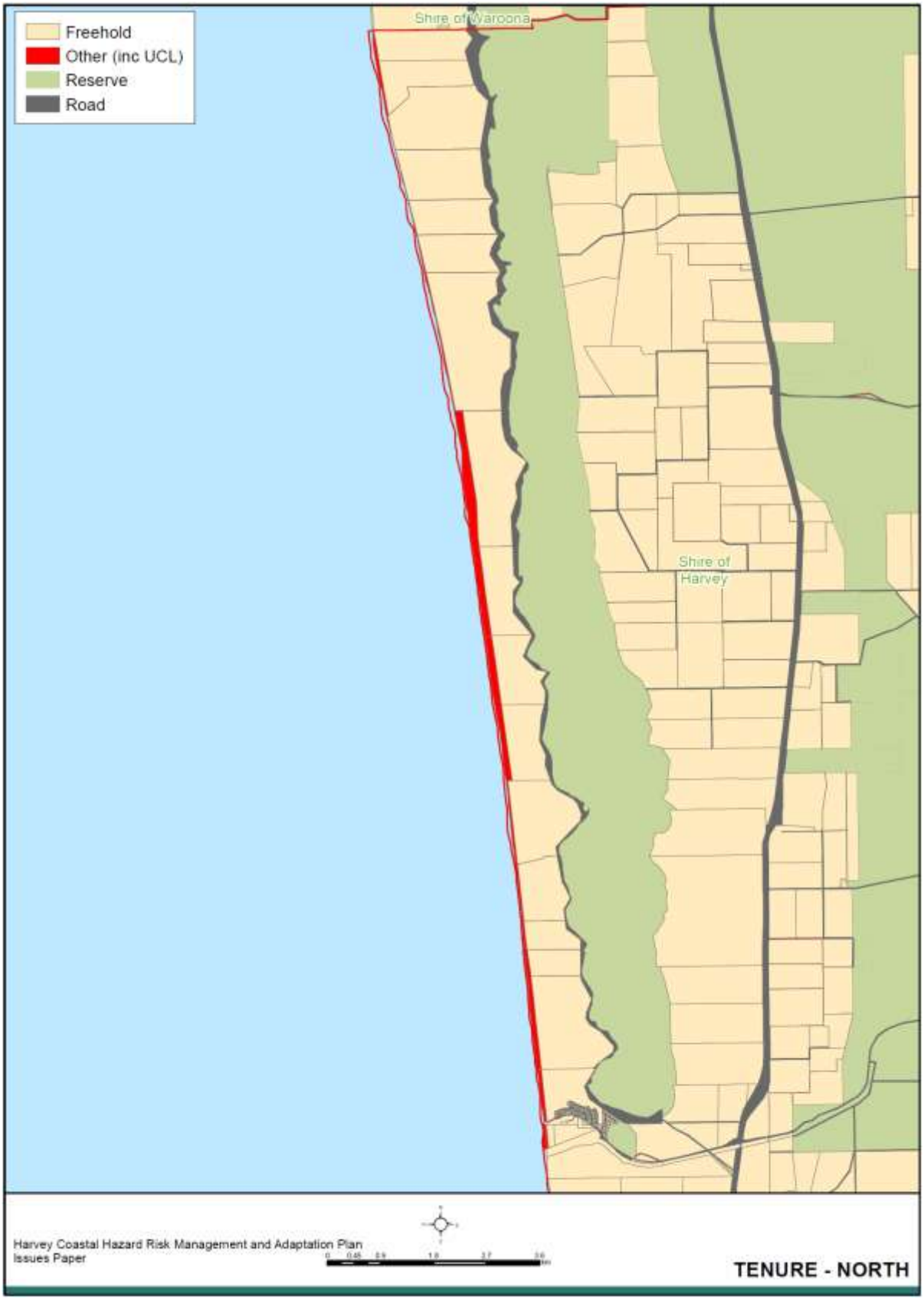

Figure 5-2: Tenure along Northern Harvey Coast

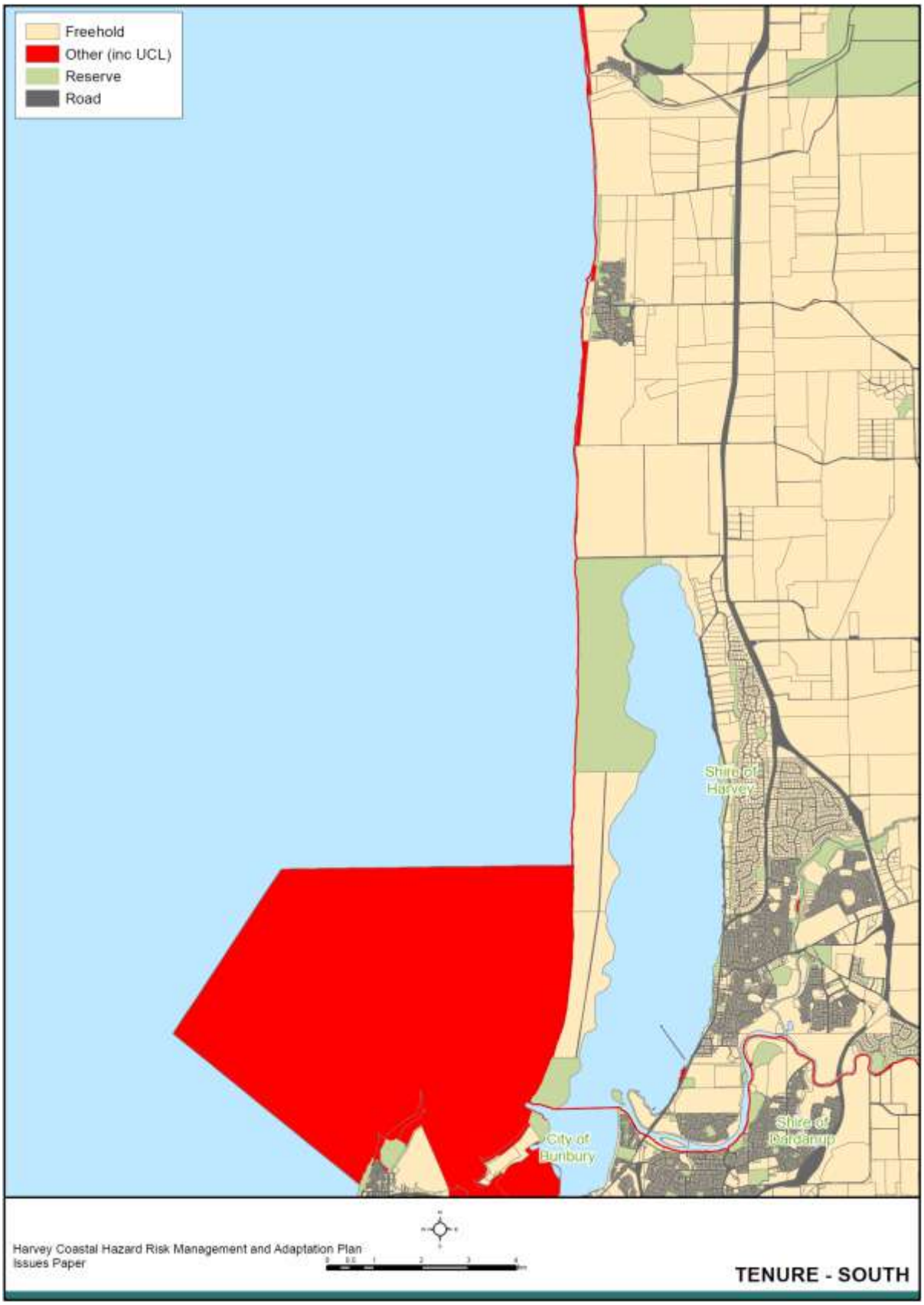

Figure 5-3: Tenure along Southern Harvey Coast

5.3 Community Attitudes

A series of community based surveys and workshops were conducted to ensure that views of the Shire's constituents, as important stakeholders related to the proposed CHRMAP, were evaluated and taken account of. Outcomes of these workshops illustrated that the community displays a strong sense of value and interest in the coast, with a willingness of community members to participate in dune restoration and monitoring. Community representatives indicated desires to retain or improve existing levels of beach access and to maintain the ecological values of the Harvey coast.

The strong interest in improved beach access is further displayed by community support when the beach ramps at Binningup Seawall were proposed. This facility directly addressed the difficulties of beach access, improving the speed and reliability of 4WD access to the beach for small boat launching.

5.4 Financial Considerations

The scale of options for future adaptation requires careful consideration of financial viability. The coastal communities of Binningup and Myalup, serviced by the Shire and its workforce, have a small population [b] to support any form of significant adaptation infrastructure or ongoing coastal management.

Costs for coastal management are presently incurred by:

- Maintenance of Binningup Seawall and launching ramp;
- Maintenance of Myalup carpark and beach access;
- Dune restoration; and
- Beach access tracks.

[b] In turn leading to lower funding levels, relative to Shire's with larger communities inhabiting its boundaries.

6 SUMMARY

6.1 Summary of Key Coastal Management Values and Issues

Local representatives from Binningup and Myalup have demonstrated that the community places high value on the Harvey coast, its environmental values and the amenities provided by almost continuous beach access along approximately 40km of coast. The community has identified a number of problems related to uncontrolled access and misuse of the coastal dunes. These issues require consideration in any coastal management or adaptation undertaken for the Shire of Harvey coast.

Coastal erosion has been a long-term coastal hazard for the Shire of Harvey. It will continue to occur and likely accelerate over the next 100 years. The presence of coastal rock potentially offers greater local stability south of Binningup, which deserves investigation using geophysical methods. For other parts of the coast, erosion and consequent dune mobility should be recognised as a major coastal management issue.

The existing dune structure is sensitive to episodic coastal erosion during phases of severe storminess. A capacity to undertake dune stabilisation (funding and logistics) should be established now, with increased commitment anticipated over time.

Erosion in the order of 20-40m is sufficient to dislocate existing along-beach access. This will increase pressure on dune stability and challenge the existing practice of restricted formal beach access only at Myalup, Binningup and Buffalo Road.

The small population and consequent low available budget, along with the relatively low investment in coastal infrastructure and land tenure constraints, suggest that the overall strategy of avoiding coastal hazard should be maintained. This is in keeping with the State Coastal Planning Policy SPP 2.6. Application of coastal setbacks is therefore appropriate for coastal developments. However, the method outlined generally produces setbacks that are narrower than the area of dune mobility. This implies that use of SPP 2.6 setback allowances may infer a commitment by the Shire to dune stabilisation.

There are several sites along the Shire coast that were established when less stringent conditions were applied to the calculation of coastal setbacks. These sites may imply a commitment by the Shire to defence (perhaps funded by the land owner) under a situation of severe erosion, projected no earlier than 40 years ahead. The implications for 'infill' development based upon these sites should be understood by the Shire and a clear policy position developed.

The effects of foreshore structures upon adjacent coastal setbacks should be identified and incorporated into long-term planning. Major structures whose management is likely to influence setbacks include training walls at Leschenault Estuary and the coastal facilities at Binningup.

The Shire's ability to manage the coast is constrained by land tenure and presently inadequate foreshore reserves. However, development practices have been largely based on dune mobility and therefore provide adequate setback allowance for erosion.

Coastal inundation is generally a low to moderate hazard in the Shire of Harvey, with extreme flooding potentially affecting the western margin of Australind and the low-lying land between Leschenault Estuary and Lake Preston. Existing roads provide a potential means of creating flood defence, although there is a cost for re-engineering.

6.2 Implications for CHRMAP Development

Guidelines for CHRMAP development have been prepared by the WAPC and Department of Planning [4]. These guidelines are non-statutory and include wide scope for flexible application to a range of situations. However, the guidelines stipulate the minimum expected components of the CHRMAP (Figure 6-1), which strongly infers the need to use a consequences-likelihood risk analysis framework to prioritise management actions.

Figure 6-1: CHRMAP Components Recommended by WAPC

The relative value of a risk-analysis is diluted in this case by several factors:

- Community-based valuation gave strong values for the majority of assets, making it non-discriminatory on a consequence-likelihood basis;
- There are few trade-offs between assets which are likely to occur due to management, meaning adaptation paths can be assessed discretely for each asset rather than in combination;
- Coastal hazards of erosion and inundation are both expected to progressively amplify over time, and there are large elements of uncertainty in their forecast. Consequently, a CHRMAP that provides triggers to management actions along the hazard continuum effectively offsets the importance of establishing hazard likelihood.

The community expressed a strong interest in the use of existing management techniques, which are considered to be practical and effective for the immediate planning horizon (<20 years). Low interest was placed on longer-term planning horizons for which alternate techniques may be necessary.

7 REFERENCES

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[17] Edge Planning & Property. (2011) *Binningup-Myalup District Structure Plan*.

[18] [Shire of Harvey Local Planning Strategy]

[19] Department of Conservation and Land Management: CALM. (1994) *Yalgorup National Park Management Plan 1995-2005*.

APPENDIX A

1 Greater Bunbury Region Scheme

The 'Regional Open Space' reserve of the Greater Bunbury Region Scheme (GBRS) would be an effective mechanism to highlight and protect coastal areas susceptible to impact. The reservation of land under the GBRS essentially signals the intent of the State Government (via the Western Australian Planning Commission) to acquire the reserved land at some point due to its regional significant as a public resource. In the interim, development activities can be restricted.

With the exception of land already managed by the Department of Parks and Wildlife, the Regional Open Space reserve along the coast of the Shire is very narrow, particularly north of Myalup where many properties extend over the coastal dunes.

Increasing the width of the reservation along the coast to take into account the potential hazards as outlined in this document would provide a clear mechanism to assist the Shire in avoiding any pressures for development in these locations. Any reservation would, however, need to be initiated by the Western Australian Planning Commission.

2 Shire of Harvey Strategic Community Plan

The Shire's recognition and approach to 'climate change' is outlined at a high level in the Strategic Community Plan (SCP). The SCP was prepared following engagement with the community and reflects an agreed vision for the future, with supporting *objectives* and *outcomes*.

The SCP specifically states:

> *Outcome 2.8 Activities to mitigate the impacts of climate change are supported. Key Partners*
>
> 2.8.1 Implement the International Council for Local Environmental Initiatives (ICLEI) sustainability principles.
>
> **2.8.2 Maintain the Shire's involvement with the Peron Naturaliste partnership, in relation to risk management of coast line impacts** [c].
>
> 2.8.3 Undertake energy audits and investigate alternative energy programs for use on major Shire infrastructure.

The specific inclusion of Outcome 2.8.2 provides Council with an agreed basis to proceed with relevant actions to manage coastal risk, including the provision of relevant items in the Shire's operating budgets and long term financial plan.

[c] Bold added for emphasis

3 Coastal and Lakelands Planning Policy

The policy extends from Buffalo Road north to the City of Mandurah. The policy provisions relating to the Harvey Coast include the *Other Reserves* and *Coastal* categories. The *Other Reserves* category has been largely adopted as the extent of Regional Open Space in the Greater Bunbury Region Scheme. A *coastal hazard line* is also incorporated into the policy, however would now be obsolete in regards to the work undertaken as part of this project. The policy was prepared in 1999, however even at that time the instability of the dunes was recognised.

4 Local Planning Strategy

The Shire is currently preparing a Local Planning Strategy (LPS). It is likely that the final LPS will limit further urban development growth areas along the coast (in accordance with the GBRS and Myalup-Binningup District Structure Plan).

The LPS should identify coastal hazards as a significant and valid planning consideration to be considered as part of the Shire's broad planning framework. As such, the Local Planning Strategy should outline both short and longer term hazards and issues likely to affect the coast and the preferred response to dealing with these.

5 Local Planning Scheme

The Shire's Local Planning Scheme ("the scheme") was first gazetted in 1996. It has been subject to 112 amendments since gazettal and will be reviewed once the Local Planning Strategy is finalised.

The scheme zones the vast majority of near-coastal areas *General Farming*. The exceptions are existing Regional Open Space reserves under the Greater Bunbury Region Scheme, the townsite areas of Myalup and Binningup, and the *Residential Development* zone immediately south of Binningup.

The scheme establishes various *Precinct Areas* across the Shire. Two are relevant to the coastal areas:

- Precinct 1 – Leschenault
- Precinct 10 – Preston Coastal Strip.

The areas of relevance to this document within Precinct 1 are reserved under the Greater Bunbury Region Scheme as *Regional Open Space* (refer to section 6.4.1 for further details).

Precinct 10, however, is largely zoned *General Farming*, with a wide range of land uses able to be considered within this zone. The provisions of the zoned are modified by the *Precinct Policy Area Statements* as follows:

- *This area should be retained as a low intensity rural land use area in broad acre holdings. Its limited access, fragile soils, and proximity to Lake Preston which is vulnerable to pollution and foreshore degradation requires that it be conservatively managed.*
- *The area is not suitable for rural residential purposes. For these reasons it is a natural area to be considered for the future extension of Yalgorup National Park which adjoins it.*
- *At the same time the area has a high amenity value and would be suitable for low intensity non-commercial tourist and recreational use. Such uses would require comprehensive environmental impact statements and management plans prior to receiving approval.*

- *Council controls beach access. Such access should be restricted to the more stable areas and be subject to management and policing in consultation with the Department of Conservation and Land Management.*

The *General Farming* zone is not the most appropriate zone for the near-coastal areas of the Shire. While the policy statements of Precinct 10 do provide some further context, the statements do not adequately address the requirements for this project.

The review of the scheme following the finalisation of the LPS provides an excellent opportunity to specifically address the potential coastal hazards and adaptation options as outlined in this report. Options that could be considered include:

- Reserving appropriate areas as a local reserve under the Local Planning Scheme
- Creating a new *Coastal Management* zone
- Implementing a Special Control Area
- Developing supporting Local Planning Policies, addressing development and implications of dune mobility over time
- Incorporating requirements for non-statutory Structure Plans that consider coastal hazards and dune mobility.

6 Coastal Management Strategy

The Shire's existing Coastal Management Plan addresses largely immediate on-ground issues to be considered by Council and provides a framework for their implementation over a period of 1-10 years. The Strategies in the plan provide broad guidance to Council on coastal management issues as they arise, while the actions provide details of matters to be specifically addressed.

The Coastal Management Plan requires review to address the matters outlined in this document. The Strategies in the plan can adopt and expand the broad principles of adaptation outlined in this document, and consider mechanisms to deliver these outcomes on the ground. Importantly, the Coastal Management Plan can include mechanisms to assist and support private landowners in managing their susceptible areas of coastal land.

7 Assessment of planning instruments

None of the planning instruments described in this section provides a perfect framework for dealing with coastal hazards and adaptation options over a long timeframe. It may be that a suite of options is required, and that these are regularly reviewed as the statutory environment of the planning framework changes over time.

Table A-1 provides a summary of each of the planning instruments described in this section to assist in future consideration and implementation.

Table A-1 Summary of Planning Instruments

Planning Instrument	Benefits	Constraints
Greater Bunbury Region Scheme	Signals importance of coastal management, hazards and adaptation at a regional level	Will require State Government support. May result in claims for compensation
Strategic Community Plan	Identifies high-level strategic direction for Council and a basis for longer-term financial planning	Does not provide any specific detail
Coastal and Lakelands Planning Policy	Regional level document that provides guidance on coastal matters across local government boundaries where issues are likely to be similar	Document requires review and updating
Local Planning Strategy	Provides a strategic context and direction Allows the establishment of a planning framework	The framework will not be detailed enough for day-to-day use
Local Planning Scheme		
Local Reserves	Signals importance of coastal management, hazards and adaptation at a local level	May result in claims for compensation
Coastal Management Zone	Allows land to remain in private ownership. Can include zone objectives in the scheme that have statutory basis	
Special Control Area	Allows flexibility in base zone. Allows specific issues to be considered across multiple cadastral boundaries Can possibly be broader in extent than a local zone.	
Local Planning Policy	Provides specific information and requirements. Has the Statutory framework of the scheme.	
Coastal Management Strategy	Sets a strategic policy direction in relation to coastal management for the Shire. Provides on-ground and short to medium term actions.	