ORDINARY COUNCIL MEETING

25 August 2020

Attachment Booklet – Draft Coastal Management Plan – August 2020

ATTACHMENT: RS03

Shire of Irwin Coastal Management Plan

Attachment 1
Draft Coastal Management Plan

SHIRE OF IRWIN
DONGARA-PORT DENISON
A BRILLIANT BLEND

COASTAL MANAGEMENT PLAN

SHIRE OF IRWIN



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DRAFT FOR ADVERTISING - AUGUST 2020

Shire of Irwin Coastal Management Plan

Prepared for the
Shire of Irwin

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acknowledgments

The preparation of this report was a collaborative process which included input from the Shire of Irwin, the Steering Group and members of the community who gave up their time to provide comments, attend meetings and to show project team various sites.

The recommendations and background information from the Shire of Irwin Coastal Development Strategy 2000 (Shire of Irwin and Landvision, 2000) provided valuable input into this report as well as other resources prepared by the Shire of Irwin, Department of Planning, Lands and Heritage, NACC and various other agencies.

definitions and abbreviations

DEFINITIONS

Amenity – those factors which combine to form the present character and likely future character of an area.

Biodiversity – the variety of life: the different plants, animals and microorganisms and the ecosystems of which they are a part.

Coastal foreshore reserve – the area of land on the coast set aside in public ownership to allow for coastal processes and provide protection of ecological values, landscape, visual landscape, indigenous and cultural heritage, and public access, recreation and safety.

Conservation – the protection, management, sustainable use and enhancement of the natural environment.

Development – any change to land use, including housing, any demolition, erection, construction, alteration of or addition to any building or structure on the land and any excavation or other works.

Dieback – the common name given to the pathogen Phytophthora cinnamomi which is a soil borne water mould that invades and destroys the root systems of many native flora species in WA.

Ecological linkage – a series of (both contiguous and non-contiguous) natural areas that, within a landscape context, connect larger natural areas by forming stepping stones of habitat that allow the movement of organisms and genetic material between these larger natural areas.

Ecology – study of the relationships of animals and plants, particularly of animal and plant communities, to their surroundings, living and non-living.

Ecosystem – a term used to describe a specific environment to include all the biological, chemical and physical resources and the inter-relationships and dependencies that occur between those resources.

Landscape values – natural and/or cultural landscape features that are highly valued, as defined by documented research.

Off-road vehicle – an un-registered vehicle that has the ability to be used off road (e.g. quad bike, dune buggy, trail bike).

Remnant vegetation – stands of remaining native vegetation indigenous to a locality.

Reserves – may be either land classified in local planning schemes for public purposes or areas of Crown land reserved for public purposes as determined by the Land Act 1933 and the Land Administration Act 1997.

Road Registered Vehicle – A licensed, road registered vehicle that has the ability to be used off road (e.g. 4WD, motor bike, licensed quad bike).

Sustainability – meeting the needs of current and future generations through the integration of environmental protection, social advancement and economic prosperity.

Threatened Ecological Community – communities which consist of native vegetation which are poorly represented and in danger of extinction and protected under the Biodiversity Conservation Act 2016.

Threatened Flora – Rare and priority flora protected under the Biodiversity Conservation Act 2016.

Threatened Fauna – Fauna protected under the Biodiversity Conservation Act 2016.

Vehicle – A vehicle is propelled by an engine or other mechanical source of power.

ABBREVIATIONS

2WD	Two Wheel Drive
4WD	Four Wheel Drive
CMP	Coastal Management Plan
CHRMAP	Coastal Hazard Risk Management and Adaptation Plan
DBCA	Department of Biodiversity, Conservation and Attractions
DoAWE	Department of Agriculture, Water and the Environment
DPLH	Department of Planning, Lands and Heritage
DPIRD	Department of Primary Industries and Regional Development
DoT	Department of Transport
DWER	Department of Water and Environmental Regulation
EPBC	Environmental Protection and Biodiversity Conservation
NACC	Northern Agricultural Catchments Council
ORV	Off Road Vehicle
RRV	Road Registered Vehicle
SoI	Shire of Irwin
SPP	State Planning Policy
LPS	Local Planning Scheme
UCL	Unallocated Crown Land
WAPC	Western Australian Planning Commission
WONS	Weeds of National Significance
YMAC	Yamatji Marpla Aboriginal Corporation

Priorities have been classified as follows:

- S: Short term – within the next 2 financial years
- M: Medium term – within the next 5 years
- L: Long term – 5+ years
- O: Ongoing – as required

1.0 introduction

1.1 BACKGROUND

The Shire of Irwin Coastal Development Strategy was prepared in 2000 (Shire of Irwin and Landvision). Coastal strategies and plans are typically reviewed every 10 years to address new issues and changing social, economic and environmental factors within an area. There is a need to review and update the 2000 Strategy to reflect current State and Local policies, environmental changes (such as coastal hazards) and changing social and economic pressures. The updated Coastal Management Plan will also be expanded to not only include the sites south of Port Denison (as the 2000 Strategy did) but to include the entire Shire coastline (excluding Beekeepers Nature Reserve).

The Coastal Management Plan focuses on existing coastal sites used for recreation. The areas between the sites are largely undisturbed. Future use and development should utilise existing sites and tracks to conserve areas of undisturbed coast.

1.2 PURPOSE

This document presents the Coastal Management Plan (CMP) for the Shire of Irwin coastline. The CMP will provide actions for the management of the Shire's coastal areas for the next 10 years, with a focus on areas with issues such as coastal hazards and land use pressures. The preparation of the CMP involved consultation with the community and stakeholders, a review of new State and Local policies, a review of relevant literature and site assessments to determine relevant actions.

The following broad steps were taken during the preparation of this document:



Figure 1.1 - CMP Review Process

This CMP identifies the specific actions needed, as well as their timing and responsibilities, to ensure the various assets and values identified by the community and stakeholders of this highly valued coastline are secured for the long term. The implementation section of this report provides further details regarding responsibilities, monitoring, timeframes and funding options.

1.3 STUDY AREA

The study area includes the entire Shire of Irwin coastline, excluding the Beekeepers Nature Reserve. The length of the study area is approximately 75 kilometres. The study area extends inland as required at each site to include the areas most commonly used for recreational pursuits along the coastline. A context plan is provided at Plan 1.1 and the extent of the study area is provided at Plan 1.2. Tenure along the study area is a mixture of freehold, Unallocated Crown Land (UCL) and reserves.

1.4 DOCUMENT STRUCTURE

The document provides actions addressing a range of coastal management issues, followed by more focused consideration of coastal sites located within one of three sectors:

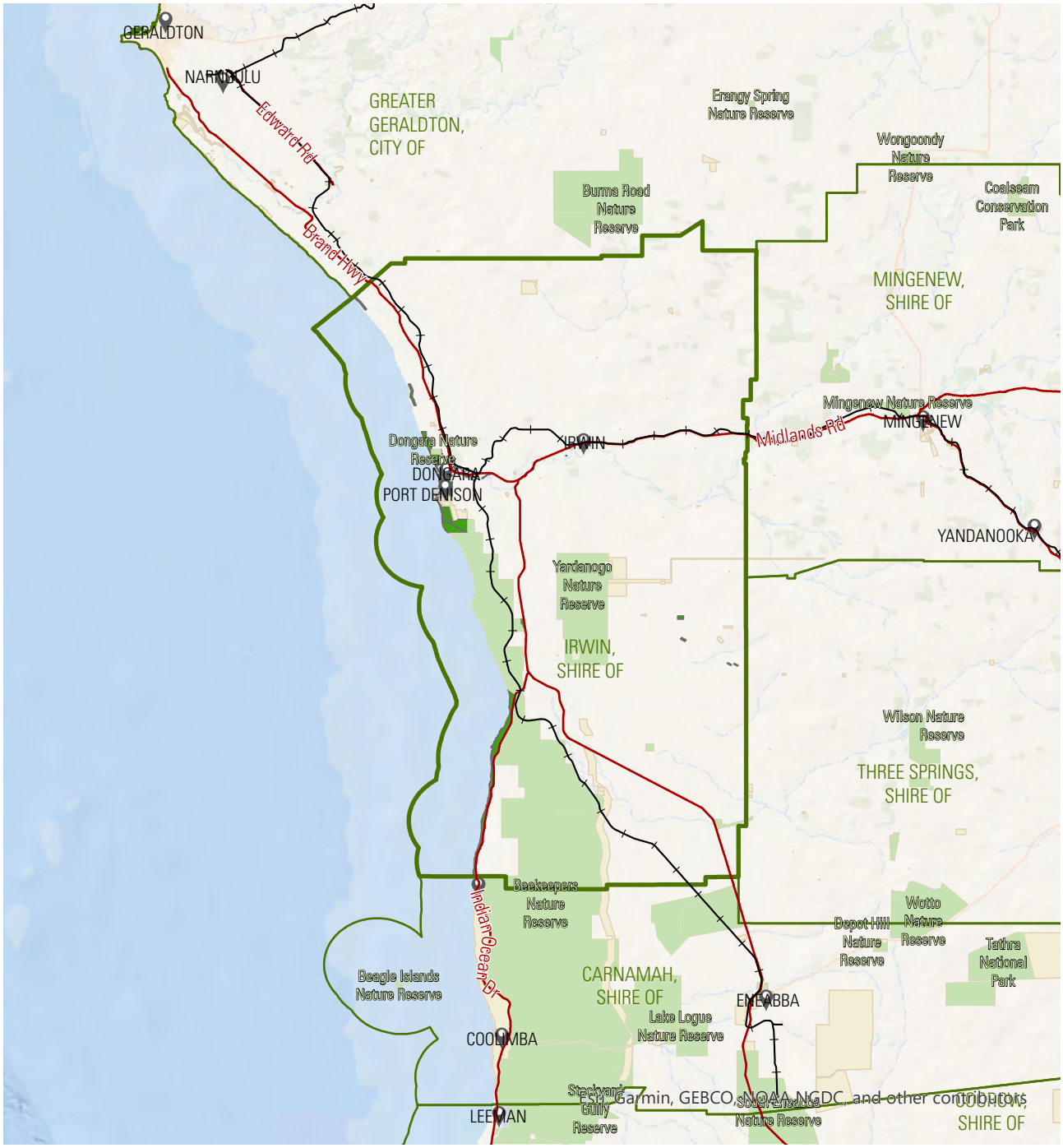
- Sector 1 – The northern coastline from the Shire's northern boundary to Reserve no. 43544 north of Dongara (includes the coastal sites of Bookara Beach and Seven Mile Beach).
- Sector 2 – The Dongara and Port Denison coastline from north of the Dongara townsite (Reserve no. 43544 north of Sunset Cove) to the south of Port Denison (south of South Beach and Reserve no. 137) (includes the coastal sites of Sunset Cove, Seaspray Beach, Irwin River Mouth, Nuns Pool, Surf Beach, Grannies Beach, Port Denison Foreshore and South Beach).
- Sector 3 – From Reserve No. 137 to the southern boundary of the Shire (includes North Cliff Head, Cliff Head, South Cliff Head, Bee Hollow, Freshwater Point, Little Freshwater, North Knobby Head, Knobby Head, South Knobby Head and Little Mexico).

The sectors are shown on Plan 1.3. A list of actions is provided for each sector, focussing on the coastal sites listed above. Each action is provided with a number (for easy reference and identification on the plan) as well as an indication of responsibility and priority. Further information on implementation, including a discussion on responsibilities, priorities and funding, is provided in Chapter 6.

There is additional focus on certain camping nodes in the southern portion of the Shire. A Concept Plan is provided for each of these sites which is a diagrammatic representation of proposed actions. Priority sites comprise the following:

- Knobby Head
- Freshwater Point
- South Cliff Head/Cliff Head/North Cliff Head.

Recommendations are formulated after considering the range of issues at each site, community feedback, stakeholder comments, future demand analysis and Shire resources.



Base data provided by SLIP

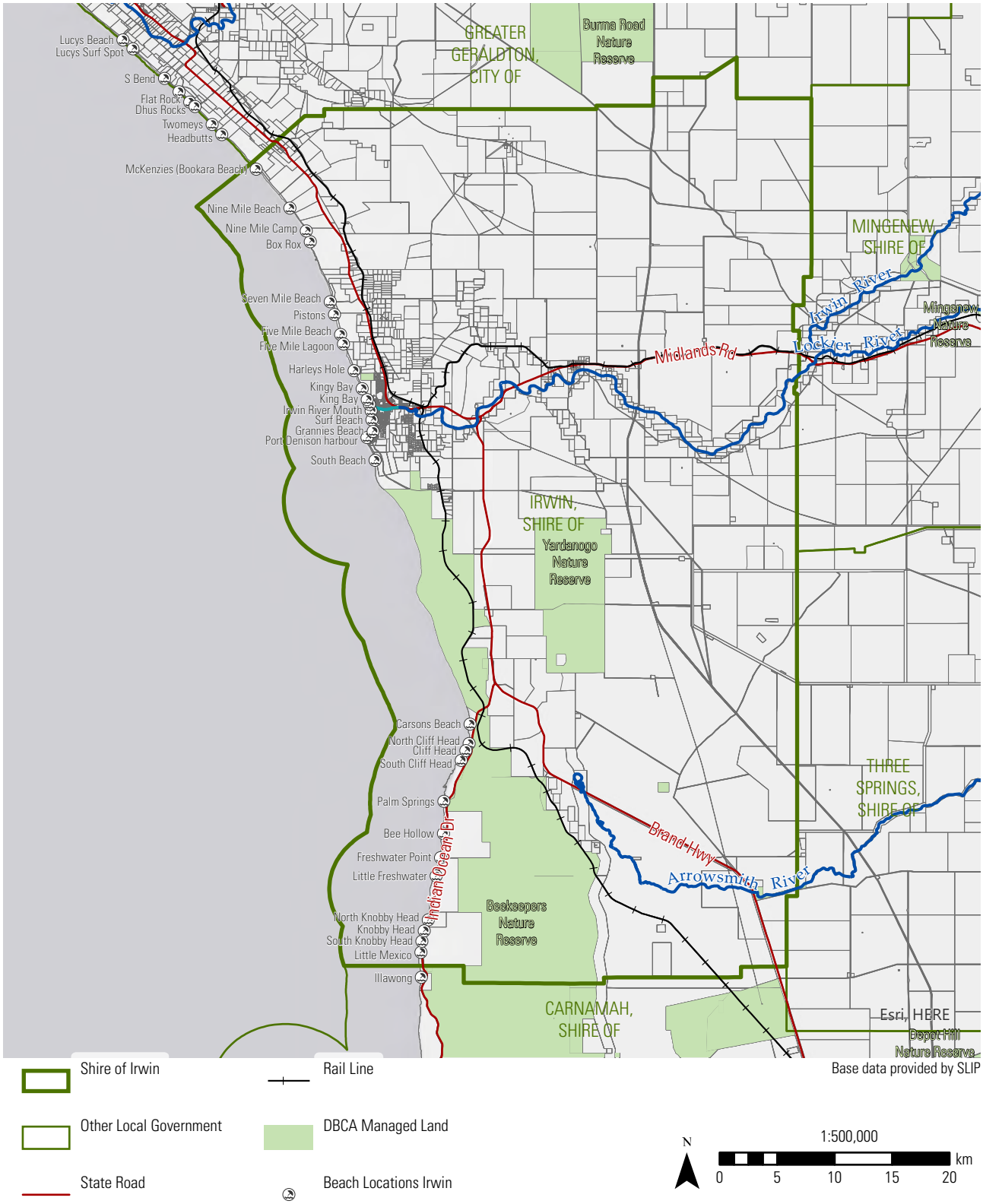
Shire of Irwin
Other Local Government
State Road
Rail Line
Townsite
DBCA Managed Land
Shire of Irwin Reserve
Other Reserves

N

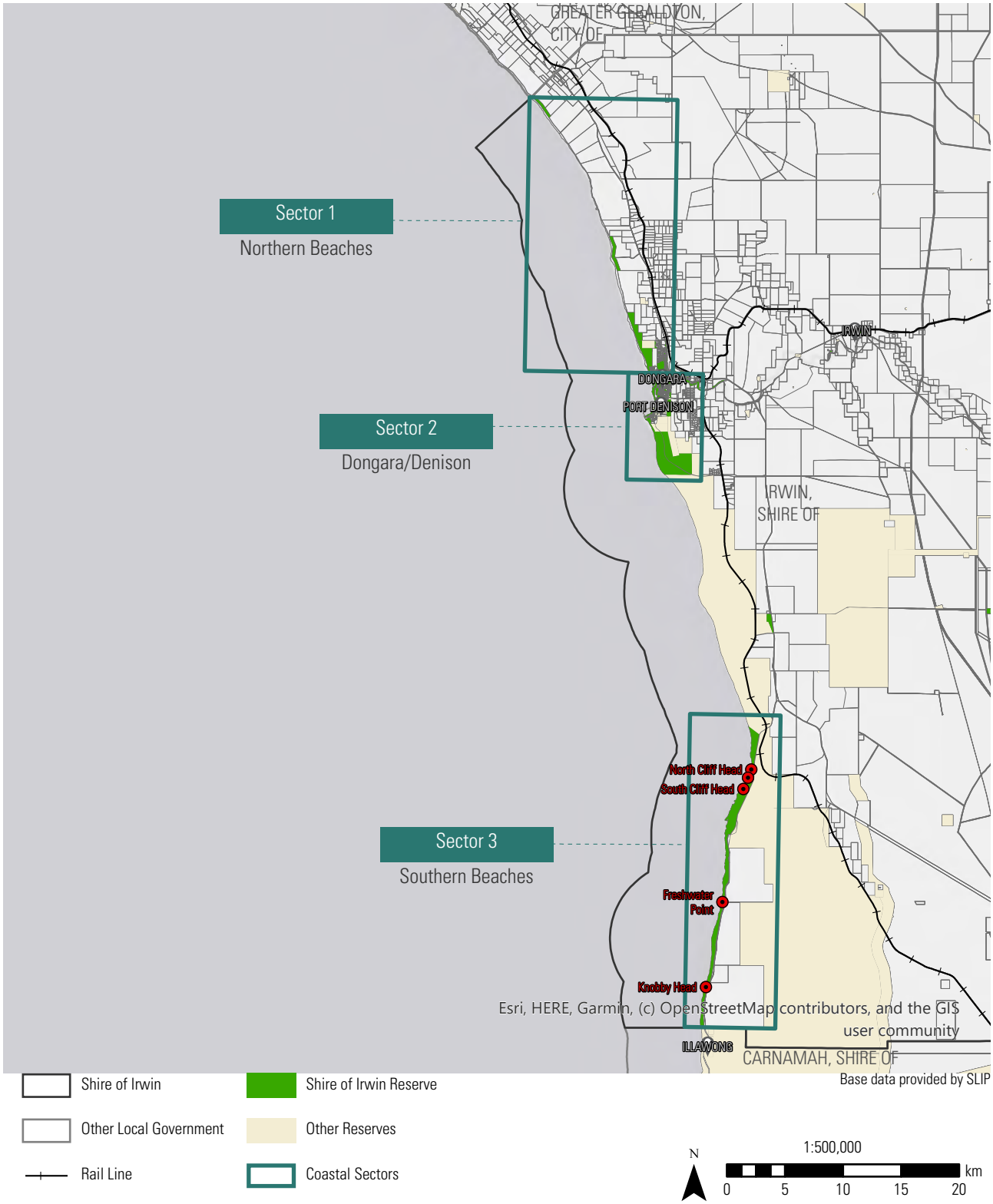
1:750,000

0 7.5 15 22.5 30 km

Plan 1.1: Shire Context



Plan 1.2: Shire Overview



Plan 1.3: Coastal Sectors & Priority Sites

1.5 CONSULTATION MECHANISMS

A consultation program has been undertaken in mid 2019 to ascertain the views of coastal users and to seek comment from relevant Government agencies, based on a Stakeholder and Community Engagement Plan previously endorsed by Council. Specific consultation periods included:

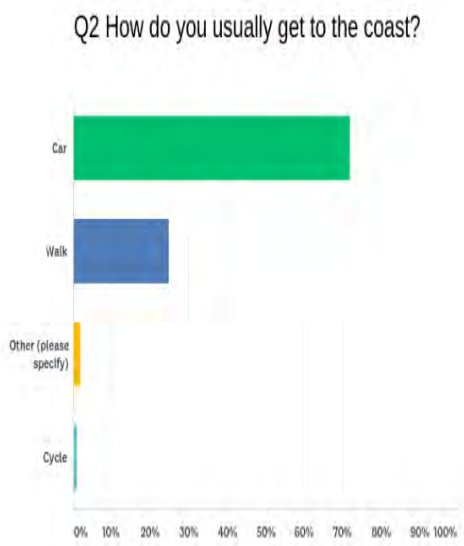
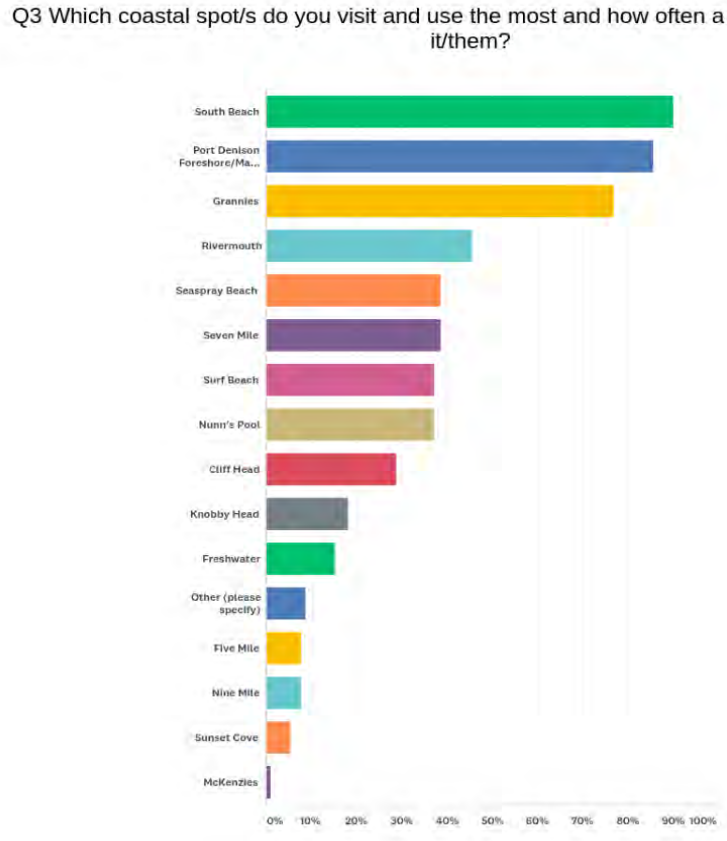
- Beach-user questionnaire and invitation to provide written comments at the commencement of the project
- Seeking comments and input relevant Government agencies and community groups to assist in identifying relevant issues and policy implications
- Advertising the commencement of the Study, the availability of a beach-user questionnaire and an invitation to the community workshop locally and online
- A community workshop held in October 2019 at Dongara to obtain input to the coastal management plan
- Release of the draft plan for public comment
- A community information evening at Dongara where the community could seek clarification on the plan prior to making a formal submission or comment.

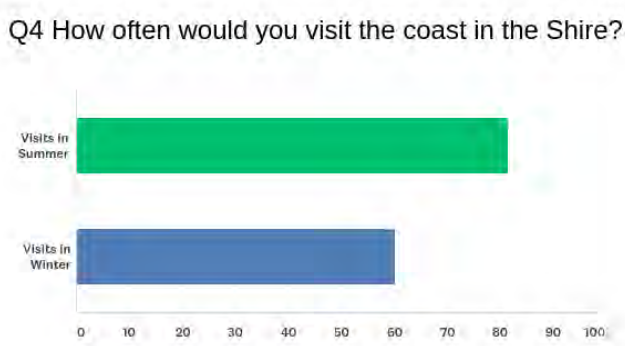
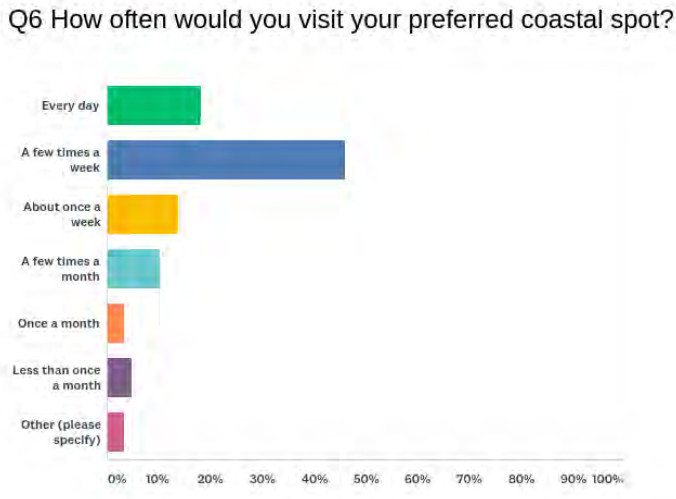
QUESTIONNAIRE

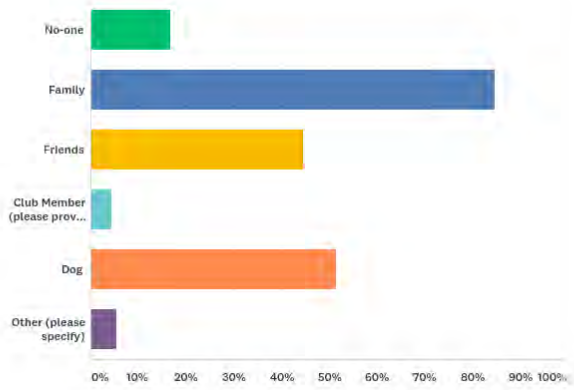
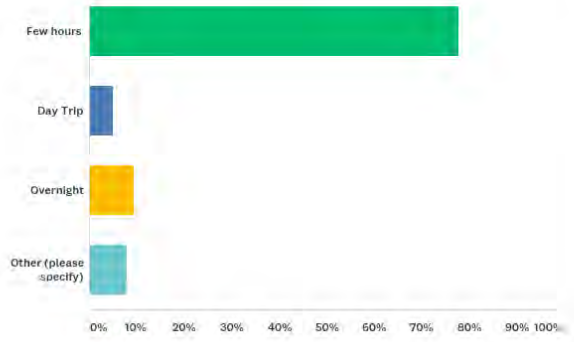
A coastal user survey was prepared and provided in both hard-copy paper form, and online. Over 200 responses were returned online, with approximately another 50 hard copies returned. A summary of responses received are provided in Table 1.1.

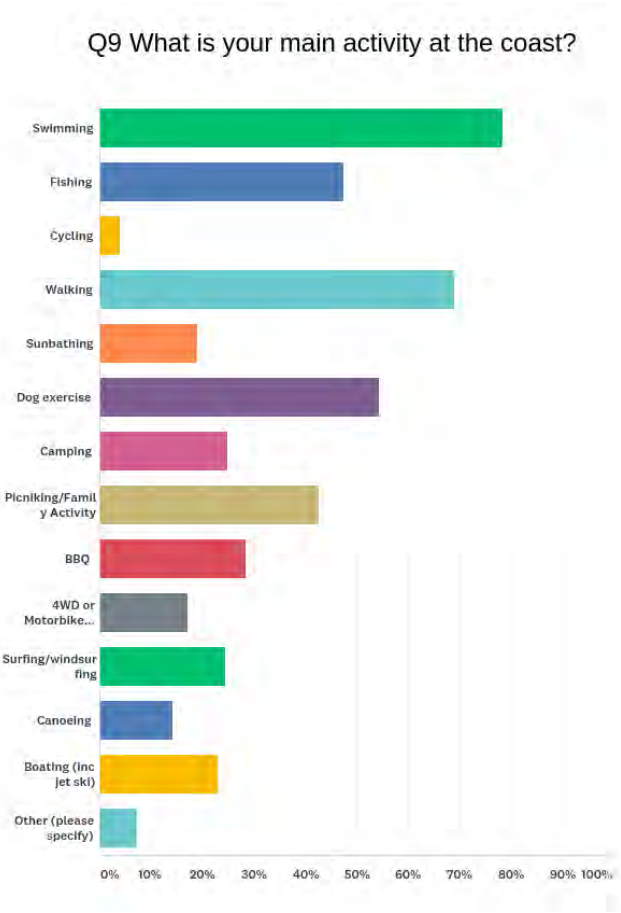
Table 1.1– Questionnaire summary

Question	Summary of Responses
Q1 What is the locality in which you permanently live?	

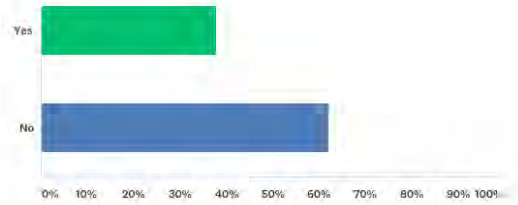
Question	Summary of Responses
Q2 How do you usually get to the coast?	
Q3 Which coastal spot/s do you visit and use the most?	

Question	Summary of Responses
Q4 How often would you visit the coast in the Shire?	
Q5 What are your preferred coastal spots (list up to 5, with the first coastal spot being the most preferred)?	
Q6 How often would you visit your preferred coastal spot??	

Question	Summary of Responses
Q7 Do you normally visit the coast with?	Q7 Do you normally visit the coast with: 
Q8 How long would you normally stay at your preferred coastal spot??	Q8 How long would you normally stay at your preferred coastal spot? 

Question	Summary of Responses
Q9 What is your main activity at the coast?	
Q10 What do you like about your preferred coastal spot? (i.e. why do you choose this spot over others?)?	

Question	Summary of Responses
Q11 What do you dislike about your preferred coastal spot?	
Q12 Is there anything you'd like to change about your preferred coastal spot?	
Q13 Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?	The majority of responses to this question were concerned about the changing coastline, and a range of suggestions were put forward. Detailed Responses to this question are provided at Appendix A.

Question	Summary of Responses
Q14 Are you aware that the Shire has already prepared a Coastal Hazard Risk Management and Adaptation Plan?	Q14 Are you aware that the Shire has already prepared a Coastal Hazard Risk Management and Adaptation Plan? 
Q15 Dongara and Port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?	A range of suggestions were made. Detailed Responses to this question are provided at Appendix A.
Q16 Do you have any other suggestions or ideas for improving coastal management within the Shire?	A range of suggestions were made. Detailed Responses to this question are provided at Appendix A.
Q17 Do you have any comments about any other coastal spots in the Shire?	A range of suggestions were made. Detailed Responses to this question are provided at Appendix A.

COMMUNITY WORKSHOP

The Community Workshop for the Shire of Irwin's Coastal Management Plan was held on 14 October 2019, with twenty participants working together to address four key questions.

A total of 299 comments were generated and these have been collated and analysed to identify the key themes to emerge from the responses to each question which are highlighted below.

A separate report was produced summarising the outcomes of the workshop. This is attached at Appendix A.

COMMUNITY AND GOVERNMENT

Community and Government organisations will be invited to provide input to the Plan during the public advertising period.

PUBLIC REVIEW AND INFORMATION EVENINGS

The draft Plan will be released for public review, with written comments invited. A public information evening will also be held during the public review period.





2.0 management considerations

Key management considerations relate to general matters which frequently apply to the entire Shire of Irwin coastline. They have been identified from comments received from community consultation, meetings with the Shire, a review of literature and from site visits. Consideration of these issues is addressed in more detail throughout the document and form the basis for the development of management responses.

2.1 COASTAL TENURE AND OWNERSHIP

Fragmented land ownership can result in difficulties in achieving coastal management objectives and actions. While there are significant areas of the coast located within Shire-managed reserves, there are also significant areas of UCL and freehold land, interspersed with Reserves managed by State Government agencies. Fragmented and varied ownership can make coastal management difficult without agreement and cohesive decision making between all parties.

2.2 COASTAL HAZARDS

State Planning Policy 2.6 – State Coastal Planning Policy (WAPC, 2013) has been prepared since the 2000 Strategy and the Shire's CHRMAP was prepared in 2016, identifying sites with high risk coastal inundation and erosion and priority actions. Coastal sites which have been identified in the CHRMAP as high risk include Grannies Beach, Surf Beach and South Beach.

The CMP will include a framework to guide implementation of future on-ground management options at Grannies Beach and Surf Beach, including maintenance regimes and potential modification of assets to help achieve priority actions from the CHRMAP. The coastal hazard assessment will also review the flood modelling for the Irwin River and consider potential future risks at the Irwin River mouth.

2.3 ENVIRONMENTAL MANAGEMENT

Coastal environments are fragile and susceptible to damage from uncontrolled use. Degradation to the environment spoils the natural beauty valued by the community in these areas. It is important to ensure appropriate management of recreational land uses to reduce and mitigate environmental degradation. This is a particular issue if coastal use increases over time due to population growth and increased visitation.

Environmental degradation through uncontrolled access and vegetation destruction is not a significant issue within the Shire. Nevertheless, uncontrolled access, dune degradation and removal of vegetation should be discouraged and prevented where possible.

Coastal Erosion north of Grannies Beach

Photo by Land Insights, May 2019



2.4 ACCESS

Coastal access includes provision and maintenance of both vehicle and pedestrian access. It is important that access to the coast is provided (where appropriate) for professional and recreational pursuits. However, this needs to be balanced with the environmental protection of dunes and vegetation. Having more than one access track leading to and from the same site can lead to unnecessary disturbance to dunes, which can eventually lead to erosion and dune blowouts. This can be a particular issue during peak/busy times. One example is the informal dune access north of South Beach which provides access from Kailis Drive/George Street to White Tops Drive, essentially duplicating the bitumen road access already provided at this site.

Most vehicle access tracks along the Shire's coastline are well established and it doesn't appear that the duplicate or additional tracks are a particular issue (with the exception of the dune access track north of South Beach). Uncontrolled access and duplicate tracks should be discouraged where possible.

Pedestrian access to the coast is provided at the coastal sites within the town sites. Access at the low-key coastal sites north and south of the towns is provided through dedicated pedestrian and/or vehicle access tracks to the beach.

2.5 4WDS AND OFF-ROAD VEHICLES

There are two types of vehicles that drive on the beach, Road Registered Vehicles (RRV) and Off-Road Vehicles (ORV). RRVs are licensed vehicles which have the ability to be used off road. ORVs are unlicensed vehicles which can be used off road (such as quad bikes, dune buggies etc.). The Control of Vehicles (Off Road Areas) Act 1978 applies to land owned by the State of WA and areas designated by Local Government Local Laws for off road vehicles (unregistered) only. Registered Road Vehicles are managed under the Road Traffic Act 1978 and Local Government Local Laws. There are no official 'off-road areas' located in the Shire. This was investigated by the NACC and the findings are located in Off-Road Vehicle Areas in the Northern Agricultural Region of WA Feasibility Study). No off-road vehicle areas were identified in the Shire of Irwin. This is discussed further in literature review located in Appendix B.

Environmental damage occurs when vehicles are driven over the dunes and through vegetation without following designated or existing tracks. This leads to erosion and dune blowouts. The issue is exacerbated when multiple tracks are created and drivers leave their tyres at full pressure. It is a significant challenge managing vehicle use within coastal areas, particularly when driver behaviour differs. Other issues include the spread of dieback, disturbance to heritage sites and safety risks where other beach users are present. It is important that tracks are rationalised, drivers are educated and vehicle tracks avoid Aboriginal cultural heritage sites and historic heritage places.

ORV use does not seem to be a particular issue in the Shire of Irwin. Many of the ORV tracks are well established and uncontrolled access is not common. In addition, there are no mobile dunes within the study area, which are usually common locations for ORV use. The only dunes are located within Beekeepers Nature Reserve and this area is not included in this CMP study area.

Beach Access at Seaspray Beach

Photo by Land Insights, May 2019



2.6 POPULATION GROWTH AND DEMAND

Population growth and improved access to coastal sites can lead to increased visitor numbers and overnight stays. This in turn leads to greater demand for facilities and for management of impacts.

Population growth in the Mid-west region has intensified the demand for accessible coastal opportunities and leads to further growth in demand for recreational experiences. The construction of the Indian Ocean Drive helped to make much of the Irwin coastline (especially south of town) readily accessible to the general public. Anticipated pressures will be from recreational activities and overnight stays such as camping. In addition, the Shire is in close proximity to Geraldton and provides a regional escape without having to drive long distances.

2.7 PROVISION OF FACILITIES

Facilities can be provided at coastal sites where demand or management pressure warrants it. The types of facilities depend on the land use, but they generally relate to camping/caravanning and day use. Facilities such as shelters, picnic benches, BBQ areas, toilets, rubbish bins, wastewater dump points, etc. are common at coastal sites, depending on the level of use and demand.

Camping/caravanning is a popular activity in the Shire, particularly during peak holiday periods. The formal camping areas are located at North Knobby Head, Little Freshwater and South Cliff Head/Cliff Head/North Cliff Head. Day use sites are more common around the Port Denison and Dongara townsites. It is also noted that the Shire manages overflow camping at the Town Oval during peak periods when the caravan parks are full.

Some facilities are already provided at these locations. This will be reviewed as part of the CMP recommendations.

2.8 COASTAL SHACKS

Coastal shacks were once relatively common along the WA coastline. They largely served as accommodation for professional fishermen and were also constructed and used by people for recreational use. Coastal shacks still remain along the Irwin coastline south of Port Denison.

The State Government Squatter Policy, adopted in 1989, recognised that squatter shacks had been established in various (mainly coastal) locations around Western Australia. In summary, the policy:

- prevented the development of new illegal squatter shacks on reserved or Vacant Crown Land0F
- provided a 6-year grace period for existing shack owners/users to remain prior to their removal
- recognised that professional fishers would largely be exempt from the policy.

It was estimated that there were up to 130 coastal shacks across the Shire, whereas now only approximately 37 coastal shacks remain along Irwin's southern coastline (note that this number changes as shacks fall into disrepair or fall into the sea). These are used by professional fishermen.

Issues relating to coastal shacks include Shire liability (as they are located on Shire-manage reserves), clean up responsibility and costs (which also lie with the Shire) and equality of use (as they are located on publicly reserved land). It is the Shire's intention to have shacks removed in the longer term. Recommendations to this effect are provided in this CMP.

2.9 RUBBISH AND WASTE

Rubbish and waste (including human waste) is a common problem along the coast. If rubbish bins are not provided it is expected that coastal users take rubbish home with them and if bins are provided that they are used. Human waste is also an issue, especially where camping occurs, and no toilets are provided.

The Shire provides rubbish bins at popular coastal sites south of the towns and toilet facilities are also located at a number of sites. Coastal sites within the townsite are also equipped with rubbish bins and toilet facilities. The disposal of rubbish from bins is an ongoing cost to Council. Further provision of rubbish bins and toilets is considered as part of this CMP.



Waste Management at Camping Node

Photo by Land Insights, May 2019

2.10 MANAGEMENT OF CAMPING NODES

Camp managers can help ensure that vehicles remain on access tracks, manage where people camp, how many nights people stay, collection of fees (where required), control rubbish and creation of campfires (especially during prohibited periods).

There is an increasing requirement for camp managers at popular coastal sites around the State, especially in recent years after completion of the Indian Ocean Drive and the increasing population of the Mid-west. Currently the coastal camping sites south of town are managed by the Shire Community Ranger who visits these sites on an occasional basis. The Shire has also recently advertised for EOI for Patrol Officers.

2.11 HERITAGE

Coastal management will need to have regard for Aboriginal Cultural Heritage Sites and Historic Heritage Places identified by the Department of Planning, Lands and Heritage.

Registered Aboriginal Heritage Sites have been identified at the Irwin River. Other Heritage Sites have been located south of the Shire from the southern boundary to Cliff Head. There may be other non-registered Aboriginal Heritage Sites in the study area which can be identified through an Aboriginal heritage survey (if required).

2.12 COMMUNITY INVOLVEMENT

There is a need to continue and enhance community involvement in coastal management, particularly coastal landowners as well as user groups and community groups with an interest in coastal management issues. Involvement of the local community in coastal management will help lead to a greater sense of ownership and care of the coast. There are opportunities to create community coastal care groups and ways to involve the community more in its management.

While there are currently no active community groups or friends of groups dedicated to coastal management in the Shire, there is an opportunity to create groups, if the interest exists. There may be an opportunity to work with regional groups (such as NACC) in this regard.



Irwin River Mouth - Aboriginal Heritage Site

Photo by Land Insights, May 2019

3.0 strategic vision and objectives

The strategic vision for the study area is as follows:

> ***To manage the unique social, environmental and economic resources of the study area taking into account risk from coastal hazards, sea levels, bushfire and land use degradation.***

The objectives of the Coastal Management Plan are below. These have been developed through consideration of issues, opportunities, values and trends derived from consultation and the literature review.

- **Objective 1 – Identify current land uses, values and issues of the Shire's coastal land which may impact upon coastal management for the next 10 years.**
- **Objective 2 – To manage the environmental and recreational values of the coastline in order to retain the broad range of recreational opportunities, environmental values and sense of isolation unique to the area.**
- **Objective 3 – Consider risks, actions and recommendations from existing Shire plans and strategies.**
- **Objective 4 – To ensure management and protection of the Shire's coastline is undertaken in a sustainable manner.**
- **Objective 5 – To ensure adequate consideration of coastal hazards is undertaken and ensure management is undertaken in accordance with SPP 2.6 and associated guidelines.**
- **Objective 6 – To adequately consider future urban growth and tourism and the effects (both positive and negative) this may have on recreational use of the study area).**
- **Objective 7 – To retain, protect and enhance areas of historic value, places of cultural heritage significance within the study area.**
- **Objective 8 – To increase community awareness and participation in coastal management and maintain successful relationships between stakeholders and coastal users.**
- **Objective 9 – Provide an implementation plan that identifies management actions and sets priorities.**

4.0 land management and tenure

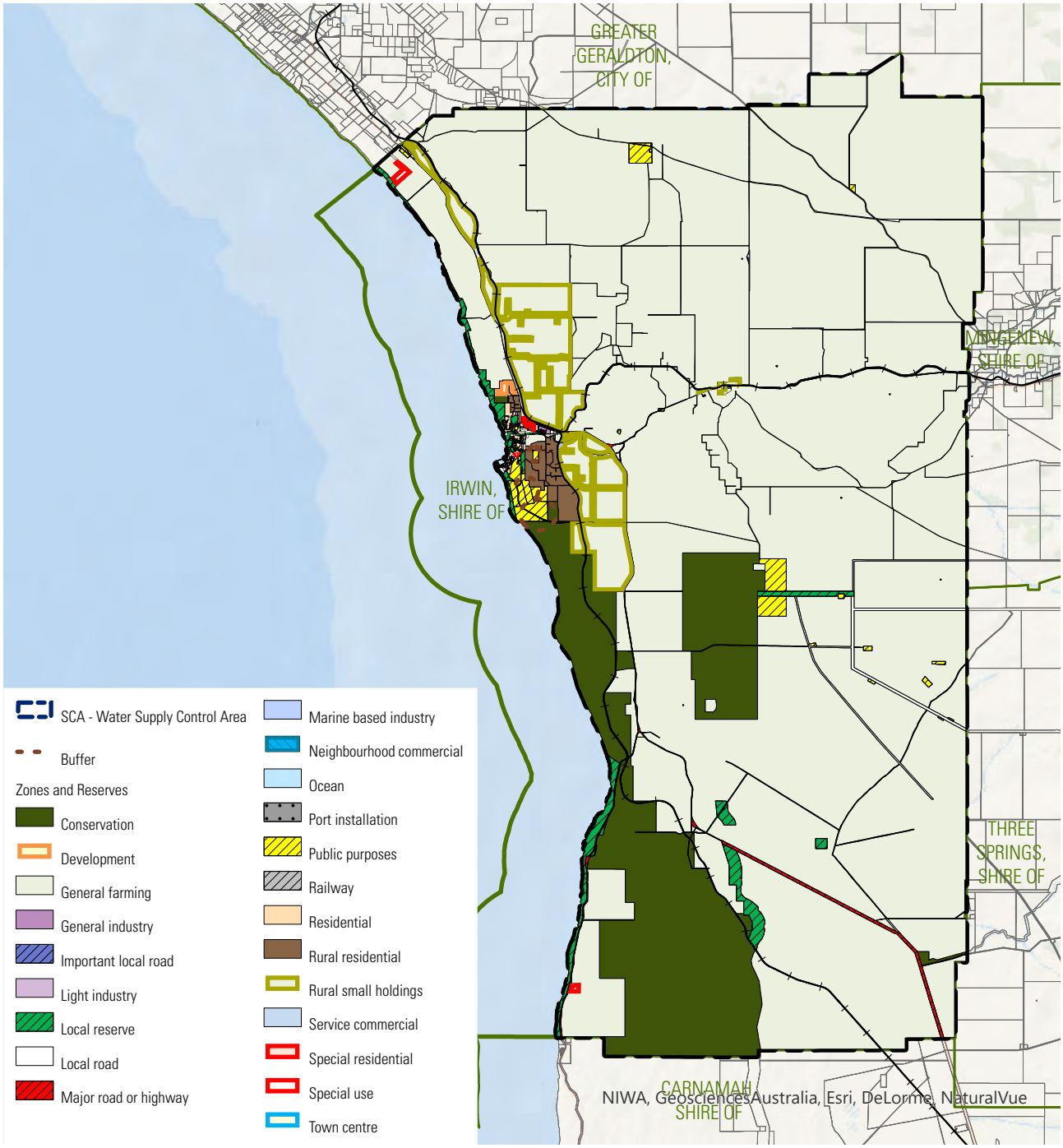
4.1 LOCAL PLANNING SCHEME

The Shire of Irwin Local Planning Scheme No. 5 (WAPC, 2008) identifies the following zones and reserves along the Shire's coastal areas.

Table 4.1 - Local Planning Scheme summary

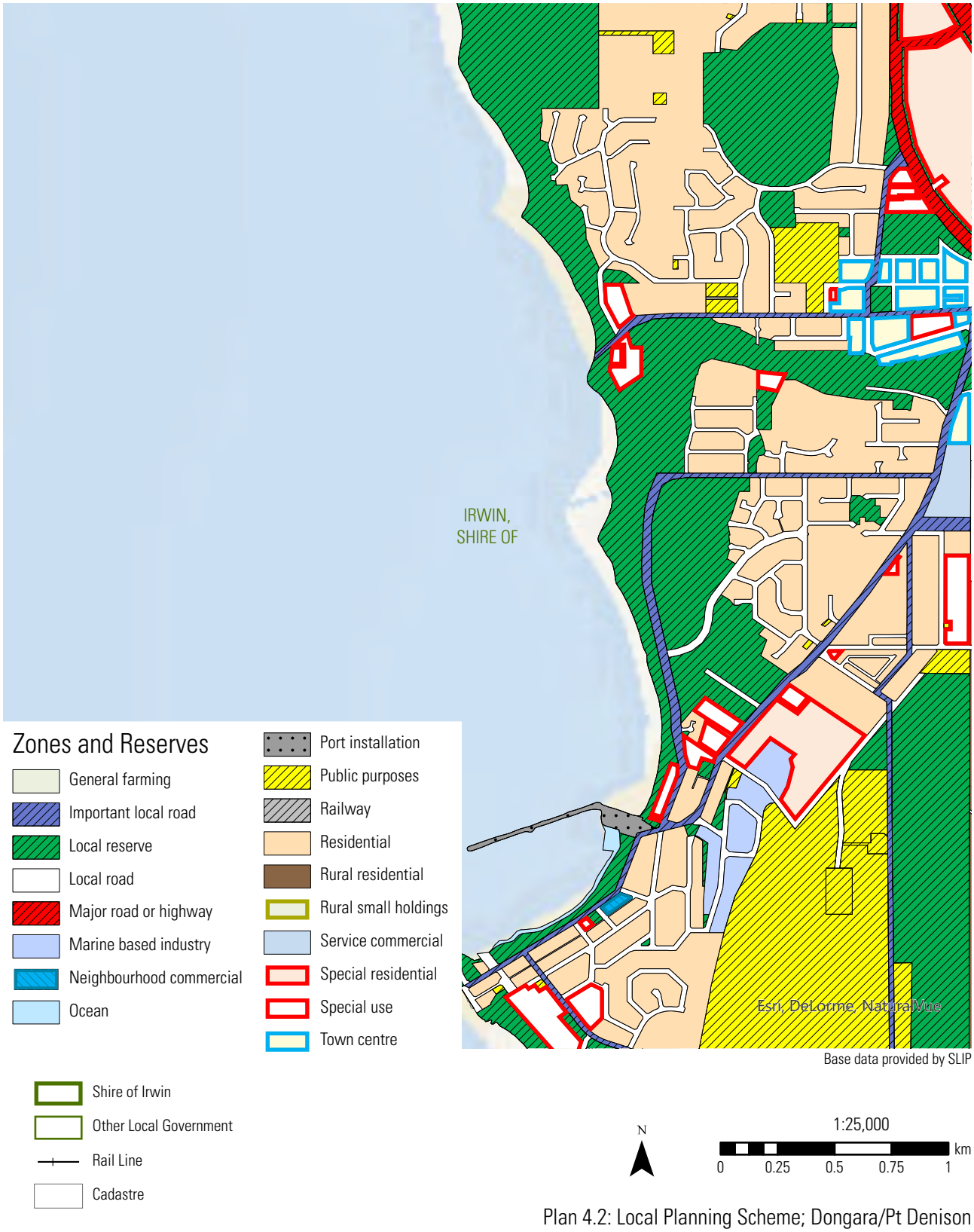
LOCATION	ZONE/RESERVE
Northern boundary to the Dongara townsite.	Coastal area is reserved as Local Reserve. Inland from the reserve the land is zoned General Farming.
Dongara and Port Denison townsite	Coastal area is reserved as Local Reserve. Directly south of Port Denison the coastal area is reserved as Local Reserve. Inland from the Local Reserve the land is reserved for Public Purposes (Airport and Common).
South of Port Denison to North Cliff Head	Reserved as Conservation for Beekeepers Nature Reserve.
North Cliff Head to the Shire's southern boundary	Coastal area is reserved as Local Reserve.

In addition to the above zones and reserves, the Scheme also designates some *Special Use* zones adjacent to the coastal areas which can impact on future use and management. These are listed in the table below. There are several areas zoned *Special Use* which allows for holiday accommodation and tourist uses and developments. Many are located in the Dongara and Port Denison townsite and two (SU1 and SU29) are located north and south along the coast respectively. It is noted that many of the *Special Use* zones will transition to *Tourism* zones as the new Local Planning Scheme is prepared.



Base data provided by SLIP

Plan 4-1: Local Planning Scheme



Base data provided by SLIP

Plan 4.2: Local Planning Scheme; Dongara/Pt Denison

Table 4.2 – Special Use Zones

LOCATION	NUMBER	SPECIAL USE PERMITTED USES
Wakeford Road, Bookara. Adjoining the northern boundary of the Shire.	Special Use 1	• Tourism and Recreation Resort compromising: • Resort Centre/Hotel/ Motel Accommodation (Licensed) • Clubhouse • Mediterranean (Seaside) Villas • Holiday Villas and Lake • Resort Shopping • Camping Area • Caravan Park • Horse Riding Farm • Dormitories • Function and Convention Centre • Resort Community Facilities • 18-hole Golf Course • Model Tourist Farm • Rural Pursuits • Incidental uses to the permitted uses.
Strata Lot 1, Church Street, Dongara	Special Use 6	• Caravan/Chalet Park • Camping Ground • Holiday Accommodation • Incidental uses to the permitted uses.
Lot 94 (reserve No. 25412) Church Street, Dongara	Special Use 7	• Holiday Accommodation • Incidental uses to the permitted uses.
Pt Sub Lot 48, Point Leander Drive, Port Denison	Special Use 12	• Public Restaurant • Holiday Accommodation • Tavern: provided it is incidental to the other permitted uses • Incidental uses to the permitted uses
Pt Sub Lot 49, Point Leander Drive, Port Denison	Special Use 13	• Caravan/Chalet Park • Incidental uses to the permitted uses.
Lot 915, (reserve no. 37184), Ocean Drive and Point Leander Drive, Port Denison	Special Use 14	• Aged persons village
Lot 946 (reserve no. 25826), Ocean Drive, Port Denison	Special Use 15	• Caravan/Chalet Park • Camping Ground • Incidental uses to the permitted uses.
Lot 947, Hampton Street, Port Denison	Special Use 16	• Eating House • Incidental uses to the permitted uses.
Lot 3000 (reserve no. 32182) Corner George and Carnarvon Street, Port Denison	Special Use 17	• Caravan/Chalet Park • Camping Ground • Incidental uses to the permitted uses
Lot 742, Corner Fletcher and George Street Port Denison	Special Use 18	• Aged persons village
Lots 53 and 54, Point Leander Drive, Port Denison	Special Use 28	• Hotel • Motel • Restaurant • Eating House
Portion of Lot 55, Indian Ocean Drive, Arrowsmith. Opposite North Knobby head, inland on Indian Ocean Drive	Special Use SU29	• Tourist Site, comprising: • Caravan Park • Chalet Park • Camping Area • Single House • Workforce Accommodation • Convenience Store • Restaurant • Incidental uses to the permitted uses

4.2 RESERVES

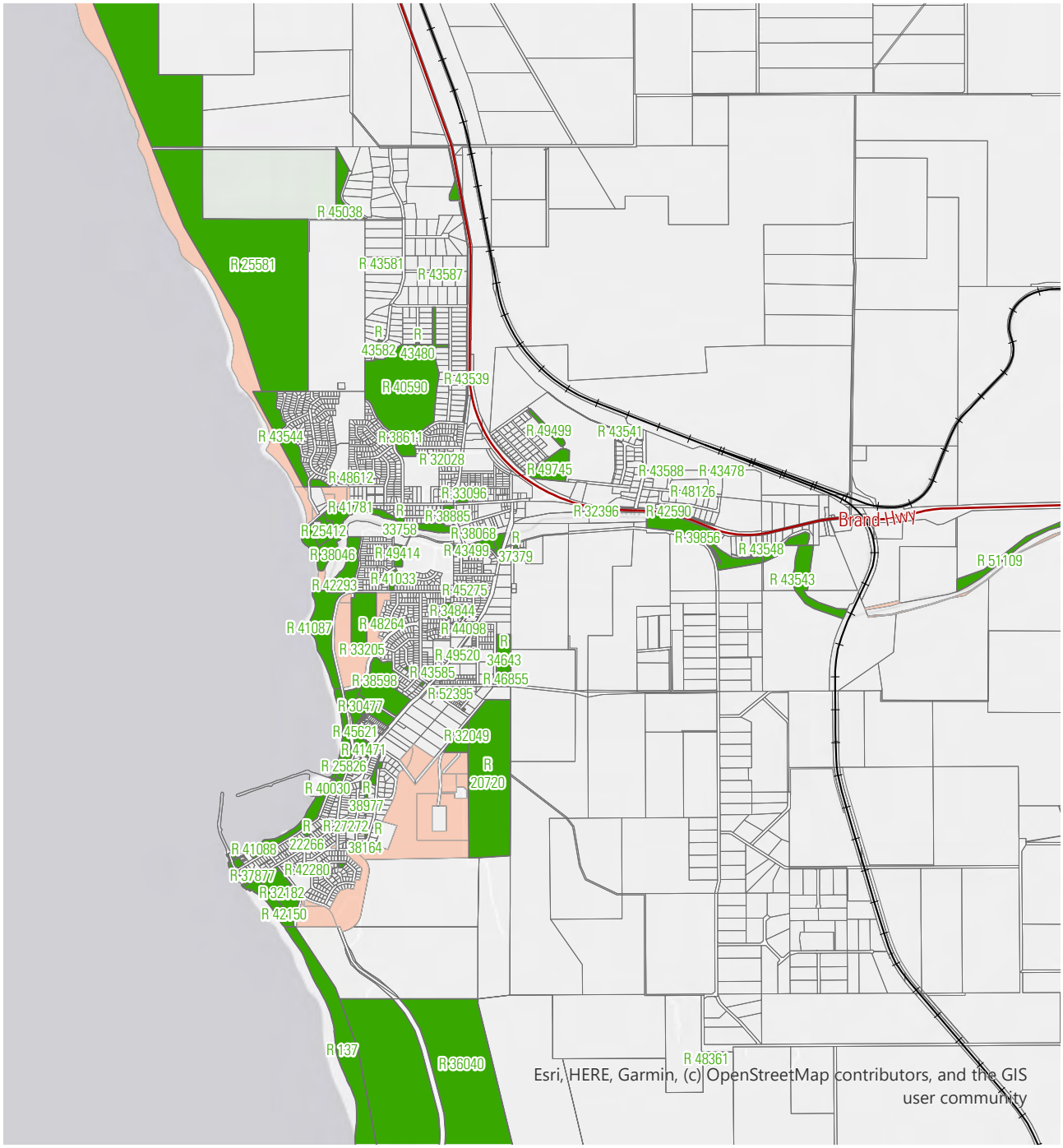
A reserve is Crown land that has been set aside for a public purpose as identified in a local planning scheme or reserved for public purposes as determined by the Land Act 1933 and the Land Administration Act 1997. It is a form of tenure of Crown land and is not an interest in land[1].

A description of all reserves along the coast is provided in the table below and a summary depicted on Plan 4.3. These are distant and separate from land reserved in the Shire's Local Planning Scheme as outlined in the previous section.

The Management Order attached to a reserve identifies the entity responsible for its management.



1 https://www0.landgate.wa.gov.au/for-individuals/Land-Transactions-toolkit/land-titles-registration-policy-and-procedure-guides/practice-manual/crown-land/res-01-crown-reserves



Base data provided by SLIP

State Road
Rail Line
UCL
Shire of Irwin Reserve
Cadastre

N

1:50,000

0 0.5 1 1.5 2 km

Plan 4.3: Reserves Overview - Dongara/Pt Denison

Table 43 - Reserves

RESERVE NO.	LOT NO.	PLAN NO.	LOCATION	PURPOSE	MANAGEMENT ORDER
43078	11982	P243167	Little Mexico to North Cliff Head	Parkland recreation and the letting of cottages existing thereon on 14/2/1994 ().	Shire of Irwin
39270	11560	187025	South of Freshwater Point	Navigation Beacon Site	Minister for Transport
24496	12174	P039607	Beekeepers Reserve	Protection of Flora	National Parks and Nature Conservation Authority
137	650	P401935	South of Port Denison	Common	Shire of Irwin
36040	12126	P219524	South of Port Denison – inland	Aerial landing ground (with power to lease for any term not exceeding 21 years subject to the consent of the Minister for Lands).	Shire of Irwin
42150	924	P190555	Port Denison	Recreation	Shire of Irwin
32182	3000	P46591	Port Denison	Camping and caravan park (with power to lease for any term not exceeding 50 years subject to the consent of the Minister for Lands).	Shire of Irwin
37877	917	P189498	Port Denison	Dune Protection	Shire of Irwin
41089	546	P216836	Port Denison – jetty	Harbour Purposes	Minister for Transport
41088	305	P042170	Port Denison	Recreation (with power to lease for any term not exceeding 21 years subject to the consent of the Minister for Lands).	Shire of Irwin
41088	307	P042170	Port Denison		Shire of Irwin
40029	581	P186882	Port Denison	Navigation Beacon Site	Minister for Transport
41088	306	P042170	Port Denison	Recreation (with power to lease for any term not exceeding 21 years subject to the consent of the Minister for Lands).	Shire of Irwin
41088	954	P036803	Port Denison		
41088	945	P221338	Port Denison		
41089	953	P036803	Port Denison	Harbour Purposes	Minister for Transport
40030	950	P221338	Port Denison	Foreshore Management	Shire of Irwin
40030	949	P221338	Port Denison		

RESERVE NO.	LOT NO.	PLAN NO.	LOCATION	PURPOSE	MANAGEMENT ORDER
46561	948	P221338	Port Denison	Recreation (with power to lease for any term not exceeding 5 years subject to the consent of the Minister for Lands).	Shire of Irwin
46561	947	P221338	Port Denison		
25826	946	P122138	Port Denison	Recreation camping and caravan park (with power to lease for any term not exceeding 30 years subject to the consent of the Minister for Lands).	Shire of Irwin
41087	590	P216835	Port Denison	Foreshore Management	Shire of Irwin
38046	300	P050241	Dongara	Recreation and foreshore management	Shire of Irwin
25412	94	P191394	Dongara	Caravan park (with power to lease for any term not exceeding 30 years subject to the consent of the Minister for Lands).	Shire of Irwin
43544	12053	P018271	Dongara	Public recreation	Shire of Irwin
43544	12053	P018955	Dongara		
43544	12361	P023156	Dongara		
43544	12815	P039794	Dongara		
43544	619	P053786	Dongara		
25581	2838	P109847	Dongara	Recreation	Shire of Irwin
25581	2838	P109847	North of Dongara		
25581	5949	P082780	North of Dongara		
39959	11735	P105495	Southern side of 7 Mile Beach	Public recreation	Shire of Irwin
39959	11735	P015495	Northern side of 7 Mile Beach		
34675	11222	D047687	Northern boundary of the Shire.	Public recreation	Shire of Irwin

4.3 UNALLOCATED CROWN LAND

Unallocated Crown land is not subject to any interest (apart from Native Title). It is not reserved and the Shire of Irwin (or other agencies) would hold a Management Order for the land.

There are large areas of Unallocated Crown Land (UCL) within the Shire. For the purposes of the Coastal Management Plan, the majority of this UCL is located in and around the coastal areas of Dongara and extends north along the beach to the Shire's boundary. The inclusion of beaches, often to a designated high-water mark, is common in Western Australia. Within the Shire, however, there are some areas where the UCL extends further inland over coastal dunes, and within Dongara there are several parcels of land that are within UCL.

There are a few parcels of UCL north of Seaspray Beach which will be committed under the Yamatji Nation Agreement to the Yamatji Land Estate. This process will take place over the next five years.

It should be noted that DPaW is responsible for the management (limited to fire, weeds and ferals) of unallocated Crown Land and un-managed reserves outside of gazetted townsites.

4.4 ACTIONS – LAND MANAGEMENT & TENURE

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
Relevant Objectives: • **Objective 1 – Identify current land uses, values and issues of the Shire's coastal land which may impact upon future coastal management for the next 10 years.** • **Objective 3 - Consider risks, actions and recommendations from existing Shire plans and strategies** • **Objective 6 – To adequately consider future urban growth and tourism and the effects this may have on recreational use of the study area**			
LMT1	Consider acquiring management orders for portions of UCL currently being used for recreation, such as the UCL at Seven Mile Beach (discussed in Chapter 9) and a portion of UCL at the Irwin River mouth (discussed in more detail in Chapter 10).	S-M	Shire of Irwin
LMT2	Undertake a Land Rationalisation Strategy to review freehold (Shire-owned), reserved land (Shire Management Order) and UCL to ensure appropriate land is set aside for coastal reserves, with appropriate purposes and options for leasing as required.	M-L	Shire of Irwin
LMT3	Update the Shire's Local Planning Framework to reflect contemporary coastal management requirements, ensuring that public access to beach/foreshores is maintained, appropriate coastal setbacks are implemented, and appropriate development controls are in place.	O	Shire of Irwin
LM4	Investigate opportunities for more formal disabled access when facilities are provided. Ensure universal access and inclusion planning is considered when designing and implementing the actions recommended in this Strategy and that the Shire's Access and Inclusion Plan (2012-2017) is referred to.	O	Shire of Irwin

5.0 heritage

5.1 ABORIGINAL CULTURAL HERITAGE SITES

The Irwin area boasts natural resource assets that are of high cultural and environmental value to Aboriginal people. These values must be recognised and appreciated for the effective management of the country. The aspirations, issues and needs of indigenous people for managing sea and country need to be considered. These vary between cultural groups in accordance with traditional Aboriginal lore and customs and therefore all relevant groups must be effectively engaged in any works arising from this plan.

Land use or development that may impact upon a heritage site is required to obtain the consent of the Minister under section 18 of the Aboriginal Heritage Act 1972. The Section 18 process involves giving notice to the Aboriginal Cultural Material Committee (ACMC) accompanied by the information as to the intended use of the land and Sites on the land. The Aboriginal Heritage Directorate recommends that developers undertaking activities within the study area take into consideration the DPLH's Aboriginal Heritage Due Diligence Guidelines (DPLH, 2013) when planning. The guidelines have been developed to assist proponents to identify any risks to Aboriginal heritage and to mitigate risks where heritage sites may be present. Due diligence may involve one or more of the following actions (note that the below list is an excerpt from the Due Diligence Guidelines):

a) *assessing the landscape where an activity is to take place*
b) *assessing the proposed activity and the potential impact on the landscape*
c) *searching the Register of Aboriginal Sites and the Aboriginal Heritage Inquiry System*
d) *consulting with the relevant Aboriginal people*
e) *agreeing to an Aboriginal heritage survey*
f) *other heritage management strategies.*

A search was undertaken of the Aboriginal Heritage Inquiry System for Registered Heritage Sites, Other Heritage Sites and Heritage Surveys throughout the study area (DPLH, 2019a). No Registered Aboriginal Sites are listed north or south of Port Denison/Dongara. Three Registered Heritage Sites are mapped along the Dongara coast. The details are provided in the table below. Heritage sites in Dongara/Port Denison are shown on Plan 5.1.

Table 5.1 - Registered Heritages Sites

SITE NAME	ID	SITE TYPE	LOCATION
Leander Point Denison	5280	Artefacts/scatter, midden/scatter	Southern side of the Irwin River, adjacent to Grannies Beach and Surf Beach.
Dongara	5632	Man-made structure	Northern side of the Irwin River – not located along the coast.
Irwin River (SC04)	18907	Historical, mythological, camp, natural feature, water source	Irwin River and surrounds.

A search was also undertaken for Other Heritage Places along the Irwin coast. Other Heritage Places in the Shire are listed in the table below.

Table 5.2 – Other Heritage Places

SITE NAME	ID	SITE TYPE	LOCATION
Irwin River	5918	Skeletal Material/ Burial	Along the Irwin River, inland from the coast.
Cliff Head	5574	Skeletal Material/ Burial	South of Cliff Head
Eneabba West	15297	Ceremonial, fish trap, camp, water source, other: track	Includes the coastal area from Cliff Head to the Leeman (south of the Shire).

The Other Heritage Place 15297 (Eneabba West) acknowledges the opportunity for Aboriginal heritage to be found along this stretch of the coast. Any development within this part of the coastline will need to undertake further investigations and consultation in accordance with the *Aboriginal Heritage Act 1972*.

NATIVE TITLE CLAIMS

It is also noted that the study area is subject to Native Title claims with the *Southern Yamatji* claim was registered with the National Native Title Tribunal in October 2017. The Yamatji Nation Agreement will establish a Yamatji Land Estate, which will consist primarily of existing unallocated Crown land (UCL) and unmanaged reserves that will be transferred to the Yamatji people over approximately the next five years. The Shire of Irwin is wholly within the Yamatji Nation Agreement Area. It should be noted that in February 2020, the Federal Court made a determination of Native Title. The Yamatji Nation Agreement outlines how Native Title rights and interests will be dealt within the Agreement Area. The determination will take effect upon the conclusive registration of the Yamatji Nation Agreement which will occur in the near future. The effect of the determination is that native title will be recognised and then surrendered over the majority of the Agreement Area.

It will be necessary to consult with relevant Native Title claim groups and their representative body (YMAC) to ensure appropriate consideration is given to the rights and interests of Traditional Custodians, including heritage matters. Compliance with the procedural obligations of the Native Title Act 1993 (Commonwealth) shall be required.

The implications of the Agreement on the Shire's Coast are still being reviewed and will be considered by the Shire as further information becomes available.



State Heritage Register: Two Obelisks and Commemorative Plaques

Photo by Land Insights, May 2019

5.2 HERITAGE PLACES

A search of the Heritage Places database was undertaken and the results are listed in the table below (DPLH, 2019b). Some sites are outside of the study area but located in close proximity to coastal areas. A majority of the historic heritage places are located within Dongara and Port Denison. No historic heritage places are listed along the remainder of the coastline, except for a few farmhouses located further inland.

Only one historic heritage place (the Obelisk and Commemorative Plaque) is listed on the State Register. The remainder of the places are listed on the Shire Local Heritage List. The Shire is currently in the process of reviewing the Local Heritage List. It is anticipated that this will be finalised in the near future. Heritage sites in Dongara/Port Denison are shown on Plan 5.1.

Table 5.3 - Historic Heritage Places

SITE NAME	PLACE NUMBER	DESCRIPTION	LISTING	LOCATION
Nhargo Farmhouse	01220	Nhargo Farmhouse has historic significance given its connection to the settlement of the Irwin District and the Waldeck family.	Register of National Estate Municipal Inventory – Category 2	South of Seven Mile Beach
M. G. Kailis Crayfish Factory	11831	The Kailis Crayfish processing plant was built in 1959-60 by Yama Pty Ltd. The original brick and asbestos building was demolished in 1996. The factory has several gable roofed buildings. The office is a single storey building, painted grey with fibro infill to the gable end and the corporate logo. The factory consists of two adjoining gable buildings with a loading dock to the north. Significant in contributing to local character.	Municipal Inventory – Category 5	4 Bradley Street, Dongara. East of Seaspray Beach.

SITE NAME	PLACE NUMBER	DESCRIPTION	LISTING	LOCATION
Irwin River Mouth	12480	Sited between the townsites of Dongara to the north and Port Denison to the south, the Irwin River Mouth is an attractive location. The Irwin River Mouth has high historic significance, given its connection to the establishment of the first port and harbourmaster's house dating from the early 1850's and the wreck of the Albatross. The area has high aesthetic significance, and as such makes a high contribution to the character of the area. The area has high social significance given its aesthetic qualities and the high use of the walk trails for recreation by the community.	Municipal Inventory – Category 1B	Irwin River and river mouth.
Arurine Bay	11866	Arurine Bay has high historic significance given it contains several shipwrecks. The place also has high aesthetic significance for its beaches, adjacent reserves and reefs. Its pristine condition and high biodiversity gives the place high scientific significance.	Municipal Inventory – Category 5	Port Denison harbour
Irwin District Recreation Centre	11876	The Irwin Recreation Centre has social significance given its role as a centre of sports and social activities in the district.	Municipal Inventory – Category 5	Adjacent to Surf Beach
Denison Bowling Club	11870	The Denison Bowling Club has social significance given its role as a centre of sport and entertainment in the district.	Municipal Inventory – Category 5	Adjacent to Surf Beach
Denison Caravan Park	11864	The Denison Caravan Park has social significance for its use as a holiday destination since 1961.	Municipal Inventory – Category 5	Adjacent to Grannies Beach
Fishing Boat Harbour	11863	The Port Denison Fishing Boat Harbour has high historic significance given its connection to the development of sea transport and the cray fishing industry. Further, the place has social significance given its use as a place of recreation and its recognition as a landmark. The place also has high scientific significance given its high biodiversity.	Municipal Inventory – Category 5	Port Denison Harbour

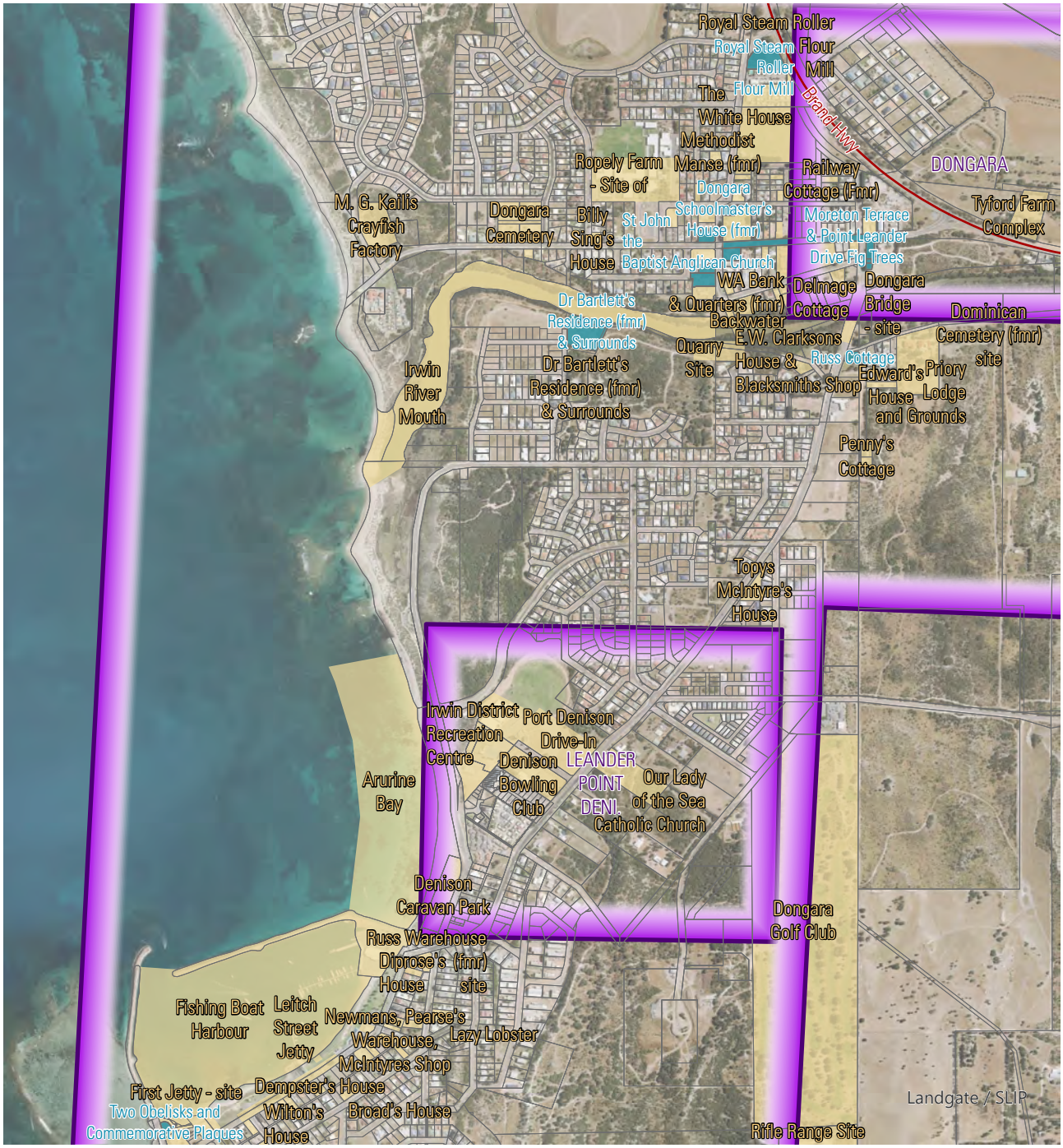
SITE NAME	PLACE NUMBER	DESCRIPTION	LISTING	LOCATION
Leitch Street Jetty	11858	This jetty was built in 1959 in conjunction with the opening of the first Dongara crayfish processing plant. The Leitch Street jetty had historic significance given its connection to the development of the cray fishing industry in the district and the other jetties.	Municipal Inventory – Category 4	Port Denison Harbour
Port Denison and Old Irwin Jetty	01241	The William Street jetty has historic significance given its connection to the development of sea transport in Port Denison and the other jetties. All that remains of this jetty are some pylons and cross members.	Register of National Estate Municipal Inventory – Category 2	Port Denison Harbour
Russ Warehouse	11842	A small cottage built in 1888. It was destroyed in the floods of 1971. The place has historic significance for its connection to the Absolom Russ a noted ship owner of the district.	Municipal Inventory – no category	Port Denison Harbour
Diprose's House	11843	This house was built by W. H. Linthorne in c.1920s for use as a holiday house. This house has historic significance for its connection to W. H. Linthorne, a local builder, however it has been considerably altered.	Municipal Inventory – Category 5	Port Denison Harbour
Lighthouse Keepers Cottage	11845	This house was built for the harbour master and lighthouse keeper, John Smyth just before his death in 1886. The site of the Lighthouse Keeper's Cottage has historic significance given its connection to the establishment of the harbour, and its association with harbourmaster Hughes and early sea transport in the Irwin District.	Municipal Inventory – Category 4	Port Denison Harbour
Site of the Fishermen's Hall	04046	The former Custom and Excise Shed (Bond Store) was built in 1894 of timber frame and corrugated iron cladding. The former Bond Store has historic significance given its connection to the development of sea transport in the district, especially the remnants of the nearby second jetty. It also has social significance for its connection to the Dongara Professional Fishermen's Association.	Municipal Inventory – Category 4	Port Denison Harbour

SITE NAME	PLACE NUMBER	DESCRIPTION	LISTING	LOCATION
Foster's House	11844	This cottage, which was known as "Linga Longa", was built by E. Fields in c.1930. The house known as Linga Longa has historic significance for its connection to the Fields family. It is a good example of a holiday house used in Port Denison prior to World War II.	Municipal Inventory – Category 4	Port Denison Harbour
Newmans, Pearse's Warehouse, McIntyres Shop	11846	Originally this was the site of Edward Newman's and Francis Pearse's Warehouse, a weather board and shingle building constructed in 1868. Has historic significance for its connection to the development of Port Denison as a port and later as a holiday destination.	Municipal Inventory – Category 4	Port Denison Harbour
Knowler's House	11848	This house was built in the 1930s by George Knowler. The house known as Knowler's has historic significance for its connection to the Knowler family who were well known in Port Denison and contributes to the local character.	Municipal Inventory – Category 5	Port Denison Harbour
The Port Store	11847	This large limestone building was built in 1868 as a warehouse for S. F. Moore. Has historic significance given its connection to Port Denison as a port and a later as a holiday destination.	Municipal Inventory – Category 4	Port Denison Harbour
Moreton Bay Fig Trees, site of Tennis Courts and Bush Shelter	18093	The eastern boundary of the harbour is lined with 14 Moreton Bay Fig trees. Has historic significance given the connection to the development of Port Denison as a holiday destination from the 1920s and the use of the area for public bathing from 1911.	Municipal Inventory – Category 3	Port Denison Harbour
Dempster's House	11851	Has historic significance for its connection to the Dempster family. The place was a good example of a simple fibro cottage of its era. Demolished in 2003.	Municipal Inventory – Category 4	Port Denison Harbour
Leitch's House	11852	Two semi-detached houses were built by Alec Leitch in the c.1930s for rental in the summer holidays.	Municipal Inventory – Category 5	Port Denison Harbour
Newton's House	11853	This cottage has been divided into two units. It was built c.1930s as a holiday home for Newtons, a farming family.	Municipal Inventory – Category 5	Port Denison Harbour
Money's House	11855	This house was built for Frank Money, fisherman, c.1930s of corrugated iron and cement brick.	Municipal Inventory – Category 5	Port Denison Harbour

SITE NAME	PLACE NUMBER	DESCRIPTION	LISTING	LOCATION
First Jetty – site	11857	The first jetty was built in 1865 by Ben Mason and was sited at the end of Herbert Street. Has historic significance given its connection to the development of sea transport in Port Denison and the later jetties.	Municipal Inventory – Category 4	Port Denison Harbour
Two Obelisks and Commemorative Plaques	01242	Situated on a small hill there is an obelisk of random rubble construction with a concrete render on a stone plinth, that together stands approximately 6.8 metres; four plaques fixed to the west, north and south sides of the obelisk; and, a plaque attached on a separate random limestone structure indicating the location of several ship wrecks. the site has historical significance for its association with the early development of sea transport at Port Denison and is a rare historical component dating from the early days of the settlement at the Irwin River (c.1860s)	Register of the National Estate. Municipal Inventory – Category 1A.	Port Denison Harbour
Dominican Retreat	11856	Built in the c.1930s as a coastal retreat for the Dominican Nuns who were working inland and in the Goldfields region. Has historic significance for its connection with the Dominican Order in Dongara.	Municipal Inventory – Category 5	Port Denison Harbour

The shacks located south of Dongara/Port Denison are not currently listed as historic sites. There may be an opportunity for the Shire to recognise the history of the coastal nodes at some point.

It is noted that the Shire is currently reviewing its herlitage list, which may result in changes to the content of Table 5.2 once adopoted.



Base data provided by SLIP

State Road

State Heritage Register

Municipal Inventory

Registered Aboriginal Heritage Site

Cadastre

N

1:20,000

0 250 500 750 1,000 m

Plan 5.1: Heritage Overview; Dongara & Pt Denison

5.3 ACTIONS – HERITAGE

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
Relevant Objective: • **Objective 1 – Identify current land uses, values and issues of the Shire's coastal land which may impact upon future coastal management for the next 10 years.** • **Objective 7 – To retain, protect and enhance areas of historic value and places of cultural heritage significance within the study area**			
H1	Continue to liaise with local Aboriginal representatives to ensure a culturally sensitive approach to recreational activities and the provision of visitor amenities within the study area.	O	Shire of Irwin, DPLH, YMAC, Native Title claim groups
H2	Encourage involvement of Aboriginal persons in coastal management through engagement, consultation and employment /volunteering where possible.	O	Shire of Irwin, DPLH, YMAC, Native Title claim groups
H3	Consult with relevant Native Title claim groups and the Yamatji Marpla Aboriginal Corporation to ensure appropriate recognition and protection is given to relevant heritage sites.	O	Shire of Irwin, DPLH, YMAC, Native Title claim groups
H4	Establish interpretative signage at culturally/historically significant sites. Consult with Native Title claim groups and the Yamatji Marpla Aboriginal Corporation in preparing informative information.		Shire of Irwin, DPLH, YMAC, Native Title claim groups
H5	Undertake Aboriginal heritage surveys and assessments as required under the Aboriginal Heritage Act 1972, including but not limited to Section 18 assessment where required.	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)

6.0 community involvement

6.1 COASTAL EDUCATION AND AWARENESS

Community involvement in coastal issues and management is beneficial as it creates a sense of ownership and helps to achieve better management outcomes. The Shire should work with other coastal land managers and adjoining landowners to support and encourage greater involvement in coastal management. Involvement of the wider community can also help to increase community knowledge of the coastal environment, and achieve community level behavioural change, which can result in increased care for the environment and a reduction in harmful activities.

Options that may assist in raising public awareness of coastal issues include:

- Support programs that involve the community such as beach clean-up days and school participation programs.
- Coastal Community Support Program – encourage and support voluntary individuals and groups who manage coastal areas.
- Coastal Training Programs – run short courses on coastal management through training organisations to educate a number of interested people on coastal issues and management.

6.2 COASTAL INFORMATION

Increasing the information available on the coastal environment will be beneficial in determining the scale of impacts and what should be done to manage the coast. The information which can be gathered includes visitor numbers, activities undertaken and nights staying/camping along the coast. More valuable information can be gathered over a greater period of time as further monitoring and research is undertaken.

The demographics of people visiting coastal sites is important in order to determine the scale of use and how much management is required to reduce impacts. The Shire should continue to monitor visitor numbers at North Knobby Head, Little Freshwater and South Cliff Head/Cliff Head/ North Cliff Head. It can also be beneficial to provide surveys or questionnaires to coastal users to help determine their expectations and experiences. In due course, this will help the Shire and other land managers plan for expected visitor numbers, provide suitable facilities and make appropriate decisions regarding management of coastal sites.

6.3 ACTIONS – COMMUNITY INVOLVEMENT

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
Relevant Objectives: • **Objective 4 – To ensure management and protection of the Shire's coastline is undertaken in a sustainable manner** • **Objective 5 – To ensure adequate consideration of coastal hazards is undertaken and ensure management is undertaken in accordance with SPP 2.6 and associated Guidelines** • **Objective 8 – To increase community awareness and participation in coastal management and maintain successful relationships between stakeholders and coastal users.**			
CI1	Support programs that actively engage the local community in managing coastal reserves e.g. school education programs, beach clean-up days.	O	Shire of Irwin
CI2	Provide opportunities for the community to be involved in rehabilitation, monitoring, facility and access management etc.	O	Shire of Irwin
CI3	Assist and encourage the community with forming "Friends of" groups.	S	Shire of Irwin
CI4	Liaise with land managers in the study area, (including DPLH and Native Claim groups and private landholders) to discuss and determine a level of commitment towards community involvement and education.	O	Shire of Irwin, DPLH, Native Title claim groups
CI5	Support an off-road and 4WD driver education program that focuses on providing information relating to safe off-road driving.	M-L	Shire of Irwin
CI6	Provide surveys and continue to communicate with the public and visitors to the Shire's camping areas and day-use sites in order to gauge visitor expectations and to help plan for provision of facilities and services.	O	Shire of Irwin

7.0 environment and landscape

7.1 CONTEXT

Coastal environments are highly dynamic and valuable ecosystems. They have significant biological value for the unique environments they provide for a range of native species. They also have economic value in terms of residential, tourism and recreational land uses. From a social perspective, coastal areas act as meeting places for families and friends and provide an opportunity for a range of recreational activities. It is important that environmental values are protected to ultimately cater for biological, social and economic values of the coast.

This chapter includes a discussion and summary of the environmental features and values within the study area including climate, coastal geomorphology, coastal processes, water resources, vegetation and fauna. The information is sourced from a variety of references including (but not limited to) the Shire of Irwin Coastal Development Strategy (Shire of Irwin and Landvision, 2000), Irwin River Estuary Management Plan (Land Insights, 2014) and the Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) (Shire of Irwin, 2016).

This Strategy aims to address the requirements of State Planning Policy 2.0 (SPP2) Environmental and Natural Resource Policy (WAPC, 2003) through the recommendations and strategies included below. The objectives of SPP2 and how the Strategy aims to address these objectives is addressed in the table below.

Table 7.1 – State Planning Policy 2 Response to Objectives

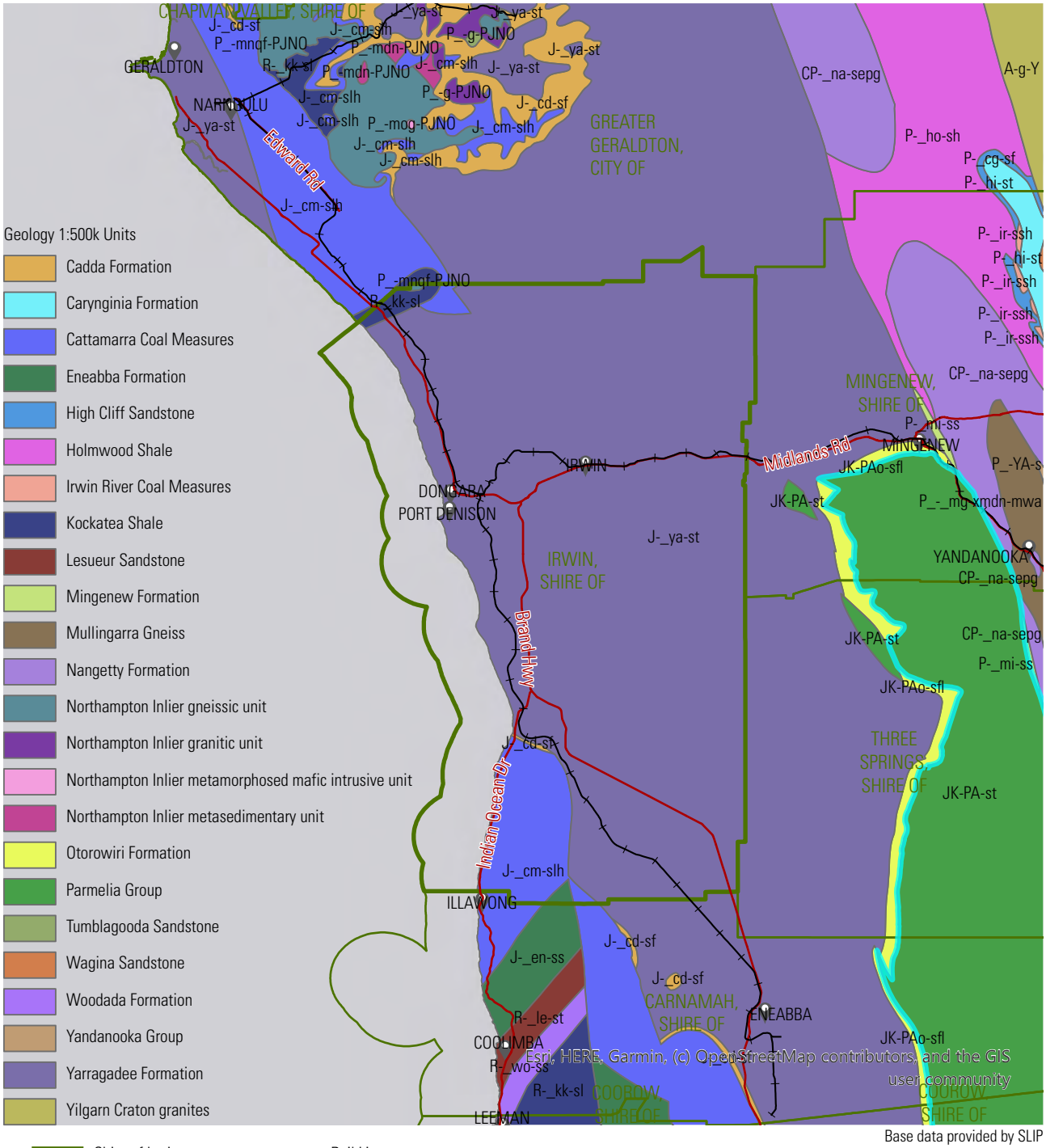
OBJECTIVE	RESPONSE
To integrate environment and natural resource management with broader land use planning and decision-making.	The strategies recommended in this Chapter consider protection, conservation and enhancement of the study area's natural resources and should be considered by decision-makers in future projects and actions along the coast.
To protect, conserve and enhance the natural environment.	The strategies recommended in this Chapter consider protection, conservation and enhancement of the study area's natural resources.
To promote and assist in the wise and sustainable use and management of natural resources.	Protection of the study area's natural resources through implementation of the strategies recommended in this chapter will assist with the sustainable use of the coast.

7.2 GEOLOGY AND SOILS

Tamala Limestone dominates the coast south of Cliff Head. The 1:2500000 state interpreted bedrock geology (DMIRS, 2019) describes the geology as *sandstone, minor siltstone and conglomerate; limestone in upper part; dominantly fluvial with marine transgression at top* (J-sz-PH). It is described by the 1:500 000 state interpreted bedrock geology (DMIRS, 2019) as *Cattamarra Coal Measures* (J-_cm-slh) *carbonaceous siltstone, shale, claystone, coal, sandstone* and a small area as Cadda Formation (J-_cd-sf) *grey shale, siltstone and sandstone; scattered carbonate lenses*.

The remainder of the coast is dominated by Quindalup sands which form extensive beach ridge deposits and fields of parabolic dunes which may overlie the beach ridges (Shire of Irwin and Landvision, 2000). The 1:2500000 state interpreted bedrock geology (DMIRS, 2019) describes the geology as *sandstone and siltstone, lesser limestone* (J-st-PH). It is described by the 1:500000 state interpreted bedrock geology (DMIRS, 2019) as *Yarragadee Formation* (J-_ya-st) *fine- to coarse-grained sandstone, thin shale interbeds*.

Geology is shown on Plan 7.1.



Plan 7.1: Geology Overview

7.3 LANDSCAPE

The natural landscape and topography enhance the natural beauty and contribute to the biological value of the coast. The landscape also provides an opportunity for recreational use and enjoyment of the coast. The varied landscape features along the coast include limestone hills and headlands, embayments and quiet low-lying sandy bays and parabolic dunes. The natural beauty of the coastline has encouraged access for day use activities and camping nodes.

Significant landscape features south of Beekeepers Nature Reserve include limestone hills and headlands (such as those at Knobby Head, Cliff Head and Freshwater Point) and embayments (such as those at Bee Hollow and Freshwater point). High parabolic dunes north of Cliff Head provide a striking landform feature (Shire of Irwin and Landvision, 2000).

The landscape and visual features of the coastline from north of Dongara to the northern boundary of the Shire is assessed as part of the *Dongara to Cape Burney Visual Landscape Assessment* prepared by Ecoscape in 2011. The study notes that the area lies within the *Geraldton Plain landscape character type* which is characterised by *rocky shorelines, exposed mobile dunes and shrub covered dunes across open alluvial flats and steep flat-topped ranges to the east.*

The dune system along the section of the coast from Dongara to Nine Mile Beach is described in the Assessment (Ecoscape, 2011) as having *no exposed sand areas on the dunes and a thick cover of coastal vegetation*. Some tracks and firebreaks are evident along fencelines of lots throughout the area. The coastal plain unit (inland from the dune system) from Wakeford Road to Dongara is described as generally being of rural character with some natural elements due to greater diversity in landform and natural vegetation. This section of the coast is within the Tamala South System which is *characterised by lowhills and rises with some limestone outcropping. As a result, the terrain of this landscape character unit is varied with several gently contoured basins or swales. These gentle swales are interspersed with areas that are undulating or contain low dunes and/or patches of remnant vegetation*.

7.4 CLIMATIC SUMMARY

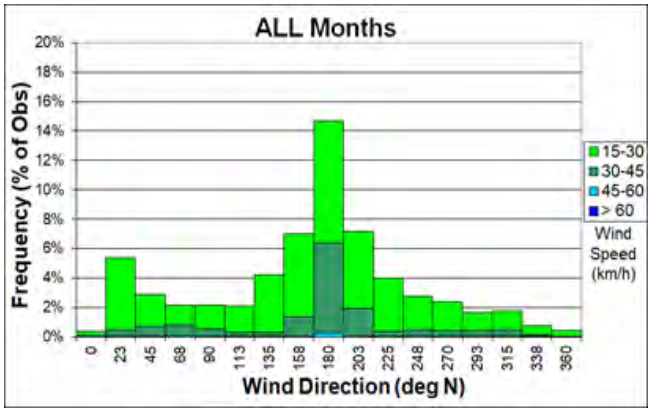
Information on climate was obtained from the Bureau of Meteorology from the nearest stations including Dongara (rainfall) and Geraldton Airport (temperature and winds). The average annual rainfall is 456.10 mm with most of the rainfall falling between May and August. Tropical cyclones occasionally bring heavy rains to the area. The average minimum and maximum temperatures throughout the year range from 13°C to 25.7°C. The coldest months are June to September and can reach 7.3°C and the warmest months are December to March and can reach 35.6°C (Bureau of Meteorology, 2019a).

Hot summers and extended periods of fine weather enhance the appeal of coastal living and recreation along the Irwin coastline. The mid-west coastline is also known for the intensity of sea breezes at this time of year..

The nearest automatic weather station from Geraldton airport (AWS 8315) has been used to provide an indication of winds (Figure 7.1). However, it is acknowledged that the station is located 8km inland, which will provide local modulation of regional winds. Specifically, inland stations tend to record lower peak wind speeds, with damping of onshore winds and typically a slight deviation of modal southwest and easterly wind directions. These biases vary within 30-60km of the coast, particularly due to the relative influence of land and sea breezes. e.g. from the coast to landward, the sea breeze declines within 5-15km, with the land breeze becoming increasingly dominant, but declining in strength further inland.

Without correction for the biases introduced by Geraldton Airport AWS's inland location, the wind record confirms a strongly southerly wind climate. This supports development of southwest wind waves and encourages northward wind-blown sand drift. The strongest observed winds typically occur from the west, associated with mid-latitude winter storms.

Figure 7.1 - Geraldton Airport AWS Wind Distribution (2011-2018)

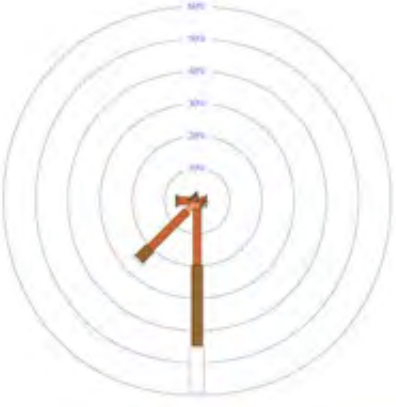


Wind roses for Geraldton Airport for summer and winter (am and pm) are provided below (Bureau of Meteorology, 2019b)

Figure 7.2 - Wind Roses



Geraldton - Summer am



Geraldton - Summer pm



Geraldton - Winter am



Geraldton - Winter pm

These wind roses have been constructed in the following way:

- The percentage of calm conditions is represented by the size of the centre circle - the bigger the circle, the higher is the frequency of calm conditions.
- Each branch of the rose represents wind coming from that direction, with north to the top of the diagram. Eight directions are used.
- The branches are divided into segments of different thickness and colour, which represent wind speed ranges from that direction. Speed ranges of 10km/h are used in these wind roses. The length of each segment within a branch is proportional to the frequency of winds blowing within the corresponding range of speeds from that direction.

(Source: http://www.bom.gov.au/climate/averages/wind/wind_rose.shtml)

7.5 VEGETATION AND FLORA

TERRESTRIAL VEGETATION

Coastal vegetation is an integral part of the coastal ecology and has an important biological function – it provides habitat for native fauna, stabilises dune and reduces erosion. Plant communities within the coastal environment are important as the vegetation reduces sand mobility and increases surface roughness, reducing wind velocities close to the ground and binding sand particles together (Peter Hammond and Associates, 2000). In general, a majority of the Shire coastline is well-vegetated and vegetation degradation is limited to areas of high use. At these sites, the focus of vegetation management is on reducing erosion and improving dune stability.

The vegetation and flora within the study area can be described from a variety of sources including the Shire of Irwin Coastal Development Strategy (Shire of Irwin and Landvision, 2000) and the Irwin River Estuary Coastal Management Plan (ATA Environmental and Shire of Irwin, 2005).

The Shire of Irwin coastline is located within the Geraldton Sandplains (GES) IBRA bioregion (Interim Biogeographic Regionalisation of Australia). The IBRA is a national planning framework used for spatial mapping of vegetation communities throughout the country. This bioregion is not listed as underrepresented in the National Reserve System (Department of Environment and Energy, 2019).

At a more local scale, pre-European vegetation mapping by Shepherd et al., 2002 (and mapped online by the DPIRD (2019)) shows a number of vegetation associations along the Irwin coastline as listed in the table below.

Table 7.2 – Pre-European vegetation system associations

LOCATION	NAME	STRUCTURE	DESCRIPTION
Beach areas south of North Cliff Head	Cliff Head_1026	Scrub-heath/ thicket	No description available.
Southern boundary to Freshwater Point	Cliff Head_432	Thicket	Wattle, casuarina and teatree Acacia-allocasuarina-Melaleuca alliance
Between Freshwater point and North Cliff Head	Cliff Head_255	Mallee	Eucalypt shrubland Eucalyptus eremophila, E. redunca, E. spp
North Cliff Head to Port Denison	Cliff Head_772	Heath	Low shrubs of mixed composition
Port Denison and Dongara	Greenough_17	Thicket	Wattle, casuarina and teatree Acacia-allocasuarina-Melaleuca alliance
North of Dongara to the northern boundary	Greenough_431	Scrub, open scrub or sparse scrub	Wattle, teatree and other species Acacia spp. Melaleuca spp.

Pre-European vegetation is shown on Plan 7.2.

Further detailed vegetation descriptions are provided in a number of other sources for certain areas along the coast. The vegetation along the southern coastal areas are described in the *Shire of Irwin Coastal Development Strategy* (Shire of Irwin and Landvision, 2000). The vegetation at the Irwin River Mouth is described by ATA Environmental and Shire of Irwin in the *Irwin River Estuary Coastal Management Plan* (2005).

SHIRE OF IRWIN COASTAL DEVELOPMENT STRATEGY

Vegetation between Little Mexico (southern end of the Shire) to North Cliff Head (south of Beekeepers Nature Reserve) is described in the Shire of Irwin Coastal Development Strategy (Shire of Irwin and Landvision, 2000). This description is below.

> *Vegetation communities can be broadly divided into three categories: strandline and foredune vegetation (growing immediately behind the beach), frontal dune and coastal heath of secondary dunes and the limestone ridge to the east.*
>
> *Vegetation of the foredune is dominated by the ephemeral species Cakile maritama and Salsola kali. These are the first species to colonise recently deposited sand at the back of the beach. These two species are found again on the frontal dune or the low beach ridge behind the foredune. Here, however, the perennials Spinifex longifolius, Tetragonia decumbens and Atriplex cinerea are generally dominant, with Nitraria billardieri also prominent in some locations. Other species noted here include Atriplex isatidea, Carpobrotus virescens, Spinifex hirsutus and Calocephalus brownii.*
>
> *Moving back into the western edge of the coastal heath, the shrubs Acacia rostellifera, Scaevola crassifolia and Olearia axillaris become prominent.*
>
> *Progressing further inland towards and onto secondary dunes and the limestone backslope, a wide range of secondary species are evident. This includes the species already mentioned together with the groundcovers and low-growing herbs Acanthocarpus preissii, Hemiandra pungens, Conostylis acculeata, Threlkeldia diffusa and Eremophila glabra, the shrubs Acacia cyclops, Anthcercis littorea, Myoporum insulare, Rhagodia baccata, Spyridium globulosum, Exocarpos sparteus, Melelauca huegelii, Melaleuca acerosa, Alyxia buxifolia and Templetonia retusa and the climbers Hardenbergia comptoniana, Clematis sp and Cassytha racemosa.*
>
> *On top of and immediately inland from the coastal escarpment from Bee Hollow northwards the endemic trees Eucalyptus obtusiflora and E. erythrocorys are prominent. These limestone endemics and their associated understorey are considered to be particularly significant, representing the only mallee formation outside of the mallee region of the south-east of the state.*
>
> *There are a number of introduced trees in the existing coastal sites. The most prominent are E. gomphocephala and Tamarix aphylla. E. platypus, E. camaldulensis, Callitris preissii and Olea europaea are also present.*
>
> *Between Cliff Head and Denison the vegetation of the foredune and frontal dune is similar to that to the south. Tetragonia decumbens, Cakile maritima and Salsola kali dominate the foredune while Spinifex longifolius, Tetragonia decumbens and Atriplex isatidea are prominent on the foredune.*

IRWIN RIVER ESTUARY COASTAL MANAGEMENT PLAN (IRECMP)

A Flora Survey was undertaken by ATA Environmental for the Irwin River Estuary Coastal Management Plan (ATA Environmental and Shire of Irwin, 2005). The Survey identified a number of different vegetation types along the river. Those located along the Irwin River mouth include the following:

- OaSILS – *Olearia axillaris and Spinifex longifolius (Beach Spinifex) Low Shrubland over Carpobrotus edulis with Tetragonia decumbens, Rhagodia baccata (Berry Saltbush) and Lycium ferocissimum (African Boxthorn) on sandy soils.*
- *AiHhLCS – Atriplex isatidea and Halosarcia halocnemoides (Shrubby Samphire) dominated Low Closed Shrubland on sandy soils.*
- *MPs – Persicaria decipiens over Sedgeland of Mesomelaena pseudostygia over Digitaria ciliaris (Summer grass) and Cynodon dactylon (Couch) with scattered Casuarina obesa (Swamp Sheoak) on clayey sandy soils.*
- *SuLCS – Suaeda australis Low Closed Shrubland with scattered Scaevola crassifolia, Tetragonia decumbens, Digitaria ciliaris (Summer grass) and Anthoceris littorea on sandy soils.*

The vegetation condition around the Irwin River Mouth was rated as 'Excellent' and 'Very Good' with an area on the southern side of the river classified as 'Degraded'. The reason for the degraded condition is due to the varying density of weeds throughout the area, which includes some of the more aggressive weeds such as African Boxthorn (ATA Environmental and Shire of Irwin, 2005).

Vegetation condition mapping is based on the criteria developed by Keighery (1994) and described in Bush Forever (Western Australian Planning Commission, 2000). The

descriptions are provided in the table below.

Table 7.3 - Vegetation condition criteria

CONDITION	DESCRIPTION
Pristine	No obvious signs of disturbance.
Excellent	Vegetation structure intact; disturbance affecting individual species and weeds are non-aggressive.
Very Good	Vegetation structure altered; obvious signs of disturbance.
Good	Vegetation structure significantly altered by obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration of vegetation structure, but not to a state approaching 'good' condition without intensive management.
Completely degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

IRWIN ESTUARY WEED MANAGEMENT PLAN (IEWMP)

The Irwin Estuary Weed Management Plan (IEWMP) (NACC, 2013) identifies the following vegetation communities at the Irwin River Mouth:

- Spinifex longifolius grassland
- Acacia rostellifera open heath
- Atriplex conerea and Tecticornia halocnemoides open low heath

The vegetation on the northern side of the river out is classified as 'Very Good' condition and the vegetation on the southern side of the river mouth as 'Excellent-Very Good' condition (refer to the Keighery vegetation condition table above).

The IEWMP identifies weed species and prevalence at the Irwin river mouth. South of Seaspray Caravan Park the plan identifies Pyp Grass, Wild Oats, Fountain Grass and Rhizomatous Grass. On the southern side of the river mouth the Plan identifies Rhizomatous Grass at a few locations along the estuary. These species are identified as high priority weeds and recommendations for removal are provided in the IEWMP.

MARINE VEGETATION

The Shire of Irwin Coastal Development Strategy (Shire of Irwin and Landvision, 2000) provides some comment on the marine vegetation. It states that in the near-shore waters adjoining the coast, there are a wide range of seagrass and marine algal communities which provide habitat and food resource for recreational and commercial fish stocks. Marine vegetation is also an integral part of the marine ecology and services an important biological function. Seagrass species include Possidonia sinuosa, P. australis, Amphibolus Antarctica, Eclonia radiata and Sargassum sp.

The following description is adapted from Peter Hammond and Associates, 2000 (Draft Irwin Coastal Plan Environmental Assessment and Management Recommendations).

There is a wide range of seagrass and macroaglal communities in the nearshore zone, ranging from stands of seagrass on sandy floor, through to mixed communities on rocky pavement interspread with sand patches, to algal communities on the reef. Seagrass meadows are protected by the offshore reef. Species along the Central Coast are listed below:

- Posidonia sinuosa
- Amphibolis spp
- Heterozostera tasmanic
- Ecklonia radiata
- Sargassum spp.

Seagrass meadows provide food and shelter for a variety of marine organisms including fish, crustacea and molluscs. They also provide a host for a variety of epiphytes and epizoa that are grazed extensively and are important for the protection they provide for juvenile fish and crustacea. This includes rock lobster which feeds and develops for approximately 4-5 years following hatching in seagrass and reef areas.

Detrital material from the macrophytes accumulates as drift rafts in the inshore waters and banks of wrack on the beaches. Wrack are found on many sheltered sandy beaches along the coast such as Cliff Head and south of Port Denison. It decays on the beach and can create an unpleasant smell for beach users. However, wrack has an important ecological role to play in the marine environment and in sustaining commercial and recreational fisheries. There is an important relationship between fish such as cobbler and the drifting rafts of macrophytes in the inshore waters. There is a direct correlation between the abundance of surf zone fishes and the volume of drift macrophytes in the inshore waters. Breakdown of wrack banks with changing tide and energy conditions triggers the release of nutrient and food to fish and other animals in the inshore waters.

Seagrass in the nearshore waters acts by slowing the water movement and trapping and binding sediments within the

seagrass meadows. Sediment trapping and growth of the seagrass banks thus contributes to wave attenuation and protects the shoreline.

THREATENED AND PRIORITY FLORA

The Biodiversity Conservation Act 2016 provides for species of native flora to be listed as Specially Protected, Threatened (Critically Endangered, Endangered or Vulnerable) or Extinct in Western Australia (DBCA, 2019a). The DBCA database currently records three occurrences of Priority 4 Flora along the Irwin coastline.

THREATENED COMMUNITIES

The DBCA (2019b) defines a Threatened Ecological Community (TEC) as an ecological community that is a naturally occurring group of plants, animals and other organisms interacting in a unique habitat. The Biodiversity Conservation Act 2016 provides for the listing of threatened ecological communities that need protection as Critically Endangered, Endangered, Vulnerable or Presumed Totally Destroyed in Western Australia (DBCA, 2019b). Additional ecological communities with insufficient information available to be considered a TEC, or which are rare but not currently threatened are placed on the Priority Ecological Community (PEC) list.

There are some TECs located along the Dongara coastline, at the Irwin River Mouth. A number of PECs are located along the northern coastline. No TECs or PECs are identified south of Port Denison.

7.6 FAUNA AND HABITAT

Peter Hammond and Associates (2000) states that there are 17 species of terrestrial mammals in the area including several species of Dunnart. The Western Grey Kangaroo, Honey Possum, Southern Bush Rat and Ash-Grey Mouse are all common. The bird life is rich and diverse. The heath vegetation provides habitats for fairy-wrens and honeyeaters. The salt lakes and wetlands are important summer refuge areas for waterbirds including Shelduck and the Banded Stilt. Reptiles in the area include tortoises, geckos, lizards, skinks and snakes.

THREATENED FAUNA

The *Biodiversity Conservation Act 2016* provides for species, subspecies or populations of native fauna to be listed as Specially Protected, Threatened (Critically Endangered, Endangered or Vulnerable) or Extinct in Western Australia (DBCA, 2019c). The DBCA database records Threatened Fauna along the Irwin coastline as follows:

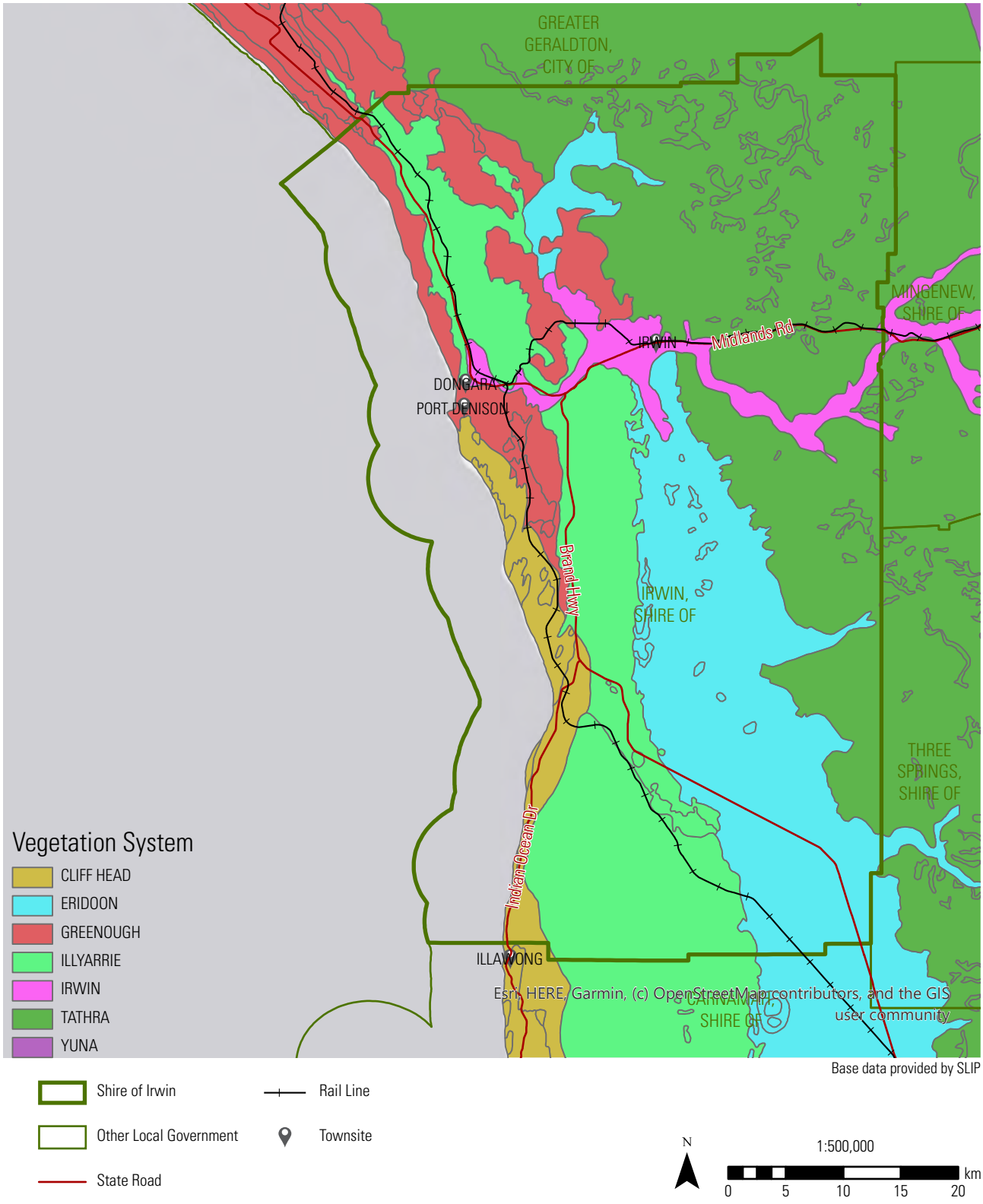
- Six records of *Threatened – Vulnerable*
- *Two records of Priority.*

Consideration of any potential impact on habitat will need to be considered if disturbing vegetation.

FERAL ANIMALS

Feral animals such as rabbits, foxes, goats and cats can cause general disturbance to coastal areas including dune erosion, destruction of native vegetation and the spread of weeds. They also compete with native fauna for habitat and resources. Control of rabbits, foxes, rats and feral cats can be achieved through baiting, trapping and poisoning. The Shire and other coastal landowners (particularly north of Dongara) should work with the Department of Primary Industries and Regional Development to undertake feral animal control where necessary.

Introduced honeybees can also be considered as a feral animal and may compete with native bees for pollen and nectar (Peter Hammond and Associates, 2000).



Plan 7.2: Pre European Vegetation Systems

7.7 DIEBACK

Dieback is the name given to a fungal disease that affects over 2300 native plant species. *Phytophthora cinnamomi* is the most common form of dieback. Vehicles, pedestrians and animals are the main transporters that spread the dieback fungi spores. Certain plant families such as Proteaceae and Epacridaceae are particularly susceptible.

While there is no evidence of dieback occurring within the study area, landowners and the Shire should be vigilant of this issue and should any signs of dieback occur appropriate action should be taken. Signs which should be looked for include browning and chlorosis of the leaves and branch death.

The Dieback Working Group has a number of publications available such as *Managing Phytophthora Dieback in Bushland* (2015) which can be referred to if signs of dieback become evident. The best course of action is to prevent the spread from infected areas to non-infected areas so they should be blocked from access if possible, to prevent the spread of soil particles and drainage managed appropriately to prevent its spread in water.

7.8 HYDROLOGY

GROUNDWATER

The Coastal Development Strategy (Shire of Irwin and Landvision, 2000) states that *shallow superficial aquifers are likely to be found in the Quindalup sands and the Tamala limestone immediately behind the foreshore*. According to the Strategy, superficial aquifers in the Quaternary strata may be potential sources of fresh water, although available quantities could be limited.

Deeper aquifers located further inland could have larger quantities of groundwater available. Sandstones within the Yaragadee Formation yield large quantities of groundwater that is often suitable for domestic use (Shire of Irwin and Landvision, 2000).

Groundwater salinity statewide mapping (SLIP, 2019) indicates that the salinity levels along the coast are between 3,000 – 7,000 mg/L of Total Dissolved Solids.

The entire coastal area is located within the 'Arrowsmith' Proclaimed Groundwater Area under the *Rights in Water and Irrigation Act 1914*. The coastal area is also entirely located within the 'Dongara' sub-area.

SURFACE WATER

Surface drainage in the Shire of Irwin is seasonal, with highly variable flows which are generally highest between July and August. The Irwin Drainage Basin dominates the surface hydrology in the Shire. It is bound by the Greenough River basin to the north and the Arrowsmith Basin to the south (Peter Hammond and Associates, 2000).

Surface water mapping for the Irwin coastline is summarised as follows:

- Hydrographic Catchment Basin – 'Greenough River' and south of Beekeepers Nature Reserve is 'Moore-Hill Rivers'
- Hydrographic Catchments – 'Coastal'
- Hydrographic Sub-catchments – 'Greenough River, Tributaries and Catchment' (northern), 'Irwin River' (central), 'Eneabba Coastal Tributaries' (southern)
- Surface water management area – 'Greenough River, Tributaries and Catchment' (northern), 'Irwin River' (central), 'Eneabba Coastal Tributaries' (southern)

The Irwin coastline is not located within a Proclaimed Surface Water Area under the *Rights in Water and Irrigation Act 1914*.

IRWIN RIVER

The Irwin River is the only drainage line that flows into the Indian Ocean. It originates near Mullewa and Tardun and flows in a south-westerly direction to the Shire of Irwin and eventually discharges into Arurine Bay when floods are sufficient to break through the sand bar at the river mouth. Flooding of the Irwin River has occurred at multiple times since European settlement. The river is approximately 140 kilometres long and has a catchment area of 6,145km^2 (Hydrologia, 2017). It is classified as a perennial water course and can experience flash flooding following rainfall within the catchment, although flows are typically low (ATA Environmental, 2005)).

Flooding from the Irwin River has a long and well-documented history since European settlement in the area in 1851. The following information is from Hydrologia (2017). The bridge connecting Dongara to Port Denison was first constructed in 1888-89 and was overtopped by floodwaters in 1889, 1917, 1945 and 1964. A new bridge was constructed in 1964 and was damaged in the 1999 flood. Flooding has also occurred in the following years: 1864, 1871, 1872, 1914, 1932, 1942, 1951, 1971, 1972, 1988, 1999. Significant flooding occurred during the 1971, 1988 and 1999 flood events.

The Irwin River Flood Study was commissioned by the Shire of Irwin and prepared by Hydrologia in 2017. The objective of the study was to provide updated hydraulic modelling and mapping to inform decision-making and mitigation strategies regarding use of flood prone land, with consideration of the effects of climate change. The purpose of this is to guide future land use planning and development decision making, emergency response planning and increase community awareness of flood risk. The Study provides outcomes of the hydraulic modelling and floodplain mapping for 1 in 10 AEP (Annual Exceedance Probability), 1 in 100 AEP, 1 in 2000 AEP and probable maximum flood. The study does not have a particular focus on the Irwin River Mouth or coastal area,

however it includes historical information and photographs from previous floods at the river mouth and the hydraulic modelling and floodplain mapping shows the areas potentially at risk. It is noted that the River mouth frequently breaks with rainfall events and high tides.

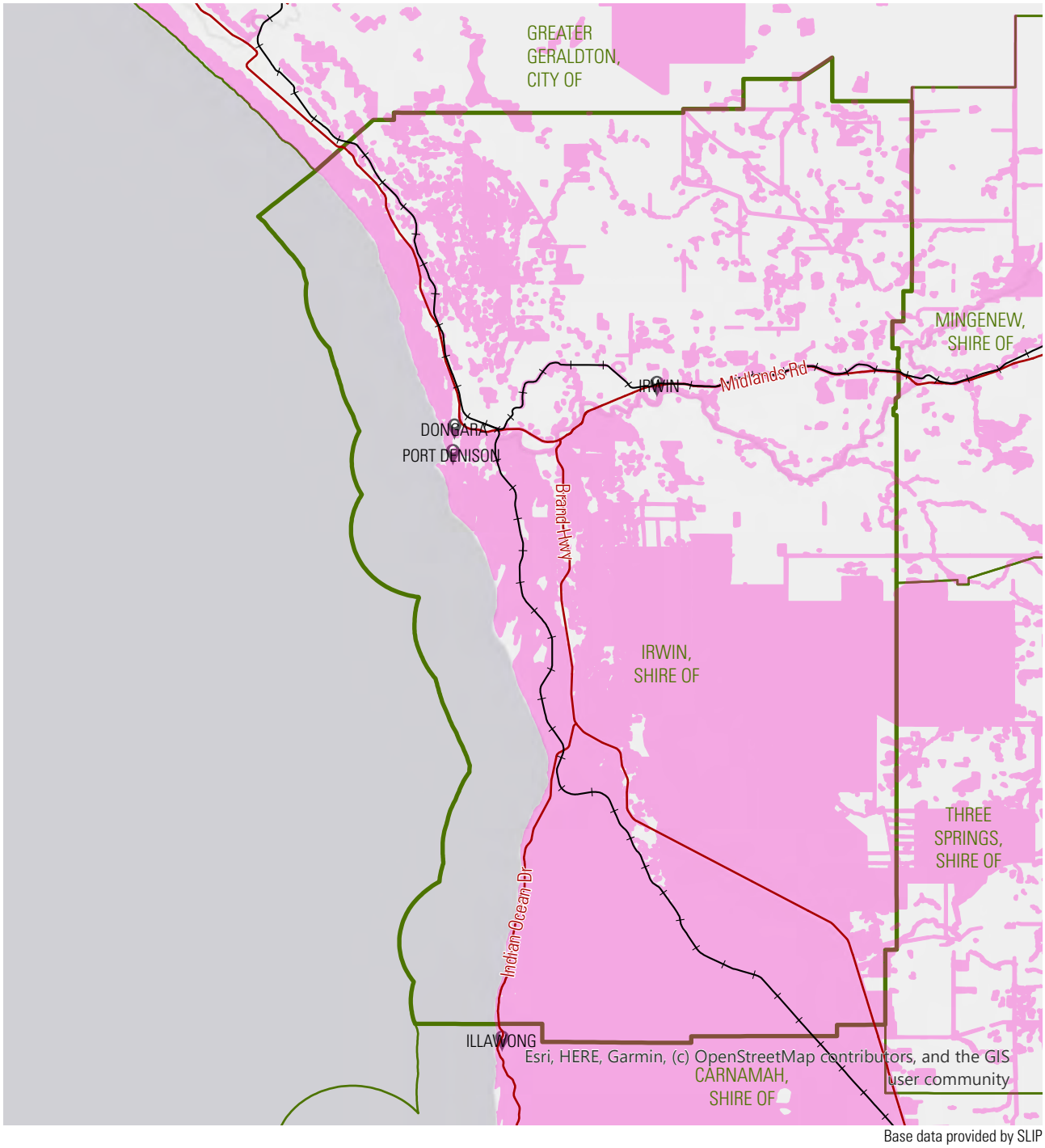
7.9 BUSHFIRE

Fire is a natural phenomenon in Australia which is largely caused or influenced by summer droughts, lightning storms, campfires or are deliberately lit. Bushfire management is important as a means to reduce risk to human lives and property and to reduce significant destruction to native vegetation. Fire management procedures in coastal reserves commonly include:

- Prescribed burning
- Strategic firebreaks
- Use of barbeques rather than open campfires
- Prohibited burning period
- Adequate signage at coastal sites
- Bushfire risk assessments
- Bushfire Management Plans.

It is essential that any new development proposals along the coast adequately consider fire management in accordance with the WAPC guidelines, specifically *SPP 3.7 Planning for Bushfire Management* (WAPC, 2015) and the *Australian Standards AS 3959* (Standards Australia, 2009). This is particularly important in areas recognised as having a significant or high bush fire risk. Responsible land managers along the coast should have appropriate fire management procedures in place. The Shire should have bushfire safety measures in place for their coastal reserves, including evacuation procedures.

Bushfire Prone Areas are shown on Plan 7.3.



Plan 7.3: Bushfire Prone Areas (2019)

7.10 ACTIONS – ENVIRONMENT & LANDSCAPE

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
Relevant Objectives: • **Objective 1 – Identify current land uses, values and issues of the Shire's coastal land which may impact upon future coastal management for the next 10 years.** • **Objective 2 – Manage the environmental and recreational values of the coastline in order to retain the broad range of recreational opportunities, environmental values and sense of isolation unique to the area.** • **Objective 4 – To ensure management and protection of the Shire's coastline is undertaken in a sustainable manner.**			
EL1	Visual Landscape Planning in WA: A manual for evaluation, assessment, siting and design, (WAPC, 2007) should be referred to during visual assessments and planning for recreational elements along the Shire's coastline.	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
EL2	Design of new coastal car parks, roads and buildings should minimise the visual impact on the surrounding environment and to prevent impact from sand drift (e.g. avoid use of straight pathways, roads; take into account prevailing wind and sand movement etc).	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
EL3	Encourage access to the coast along formal tracks and pathways through the use of fencing and signage where dune degradation is an issue.	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
EL4	Monitor dunes located around camping areas and high use sites for signs of degradation. Close and rehabilitate informal tracks as they occur and in accordance with the programme of works developed by the responsible landowner. Rehabilitation should be undertaken using the most appropriate means for the particular site which could include brushing, revegetation etc	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
EL5	Encourage local nurseries to grow coastal plants suitable for dune rehabilitation.	O	Shire of Irwin
EL6	Undertake seed collection to retain the local provenance of species, possibly as a community project.	M-L	Shire of Irwin
EL7	Should signs of dieback be detected in the study area, establish a dieback monitoring program to monitor and manage areas susceptible to the spread of dieback for signs of infection.	S	Shire of Irwin
EL8	Follow the Managing Pytophthora Dieback in Bushland by the Dieback Working Group (2015) in the event that dieback is detected.	O	Shire of Irwin

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
EL9	Seek assistance from the Department of Primary Industries and Regional Development for the eradication of feral rabbits, foxes and cats from the study area. Encourage the eradication of rabbits, foxes and feral cats by private landholders.	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
EL10	Ensure that good and responsible planning is undertaken with consideration of the principles and objectives of SPP2 and factor coastal planning requirements during preparation of the Shire's new Local Planning Scheme.	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
EL11	Support efforts by the local community and NACC with weed control efforts (particularly African Boxthorn, Verbesina and other weeds along coastal areas), dune rehabilitation and rubbish clean ups.	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
EL12	Prepare a Signage Strategy to provide a coordinated and consistent approach to providing and maintaining signage throughout the Shire's coastal area. The Strategy should also note where signs may need to be shifted annually due to sand drift.	M-L	Shire of Irwin
EL13	Ensure appropriate signs are provided at coastal sites, including hazard and warning signs identifying evacuation procedures in the event of inundation or fire, interpretative and historic information, educational, locational information, safety information, directions and identification of land use permissions and prohibitions.	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
EL14	Encourage access to the coast along formal tracks and pathways through the use of fencing and signage where dune degradation is an issue.	O	Shire of Irwin

8.0 coastal processes

Regional descriptions of coastal morphology (Eliot et al. 2012) and coastal hazards (Land Insights & Damara WA 2015) are available. Information presented here provides more local description of coastal processes, specific to the Shire of Irwin.

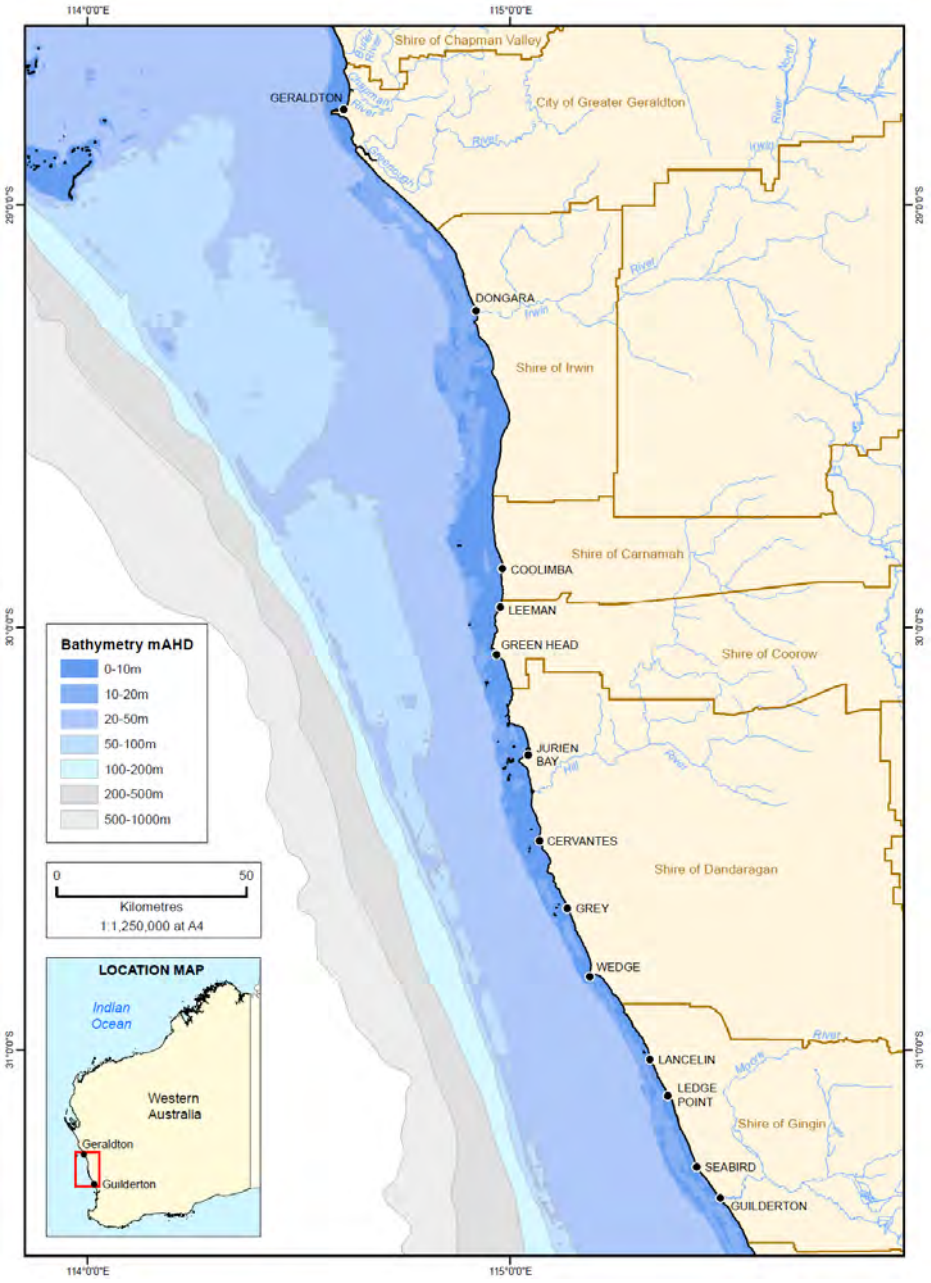


Figure 8.1: Regional Bathymetry

Extracts from the regional description (Land Insights & Damara WA 2015) relevant to the Shire include:

The Midwest is located towards the northern end of the temperate region, which means coastal hazards are predominantly associated with mid-latitude storm systems. Additionally, very rare tropical storms have provided severe conditions in the past, notably through southward travelling tropical cyclones. The region is subject to heat-driven winds, including regular strong sea-breezes, northerly thunderstorms and pre-frontal troughs.

Tides of the region are microtidal and mainly diurnal, which determines that storm surges and other water level phenomena such as those caused by the Leeuwin Current have a strong influence upon inundation. The largest surges measured along the coast have been associated with southward travelling cyclones, capable of producing surge and shelf waves simultaneously. However, the most severe conditions are more commonly associated with mid-latitude storms, as their frequency and persistence allows greater opportunity for interaction with high winter tide levels.

The coast is exposed to large Indian Ocean swell waves, although nearshore reef systems commonly present may provide considerable wave damping before they reach the shore. Wind waves occur frequently along the coast, and generally peak on a daily basis with strong afternoon sea breezes.

Coastal processes, including erosion and inundation hazards, are strongly influenced by the coastal morphology present along the Midwest coast. Along the whole coastline, rock features have important influences upon coastal behaviour, whether headlands acting as controls to beach position, reef systems providing wave sheltering or rock platforms providing a foundation for perched dunes. These natural structures typically influence present-day coastal mobility, but commonly increase coastal susceptibility to erosion associated with changing conditions (including sea level rise) or the transfer of erosive stress when efforts are made to stabilise a small section of coast. This highlights the need to consider the coastal system at a larger scale than any immediate coastal management issue.

Cliff Head to south of Geraldton has active dune fields along the majority of its coast, with furrows and sand sheets suggesting active mobility due to wind-blown sediment movement. Seaward of these dune fields, coastal dunes with shore parallel ridges are intermittently present, indicating some variation in coastal dynamics. Occasional rock features provide headland control between Cliff Head and Dongara. From Dongara to south of Geraldton, a semi-continuous limestone reef runs almost parallel to the existing coastline. This provides wave sheltering, except south of Greenough, where the rock forms a coastal platform. The coastal dune structure is loosely linked to rock headlands, with wider coastal dune fields often present on the northern side, suggesting either downdrift erosion, or gross coastal realignment in response to changing wave conditions over longer time scales. The coastal dunes are high and limit inundation hazard.

8.1 METEOROLOGICAL AND OCEANOGRAPHIC DATASETS

Meteorological and oceanographic conditions influencing coastal dynamics at Dongara include winds, waves and water levels, with rainfall runoff occasionally influencing the mouth of the Irwin River (Irwin Flood Study, 2017). There is limited available information directly available from Dongara, with the majority of relevant data sets being collected at Geraldton, as part of port and airport activities.

There is no long-term weather station at Dongara. Consequently, the nearest automatic weather station from Geraldton airport (AWS 8315) has been used to provide an indication of winds (Figure 8.2). However, it is acknowledged that the station is located 8km inland, which will provide local modulation of regional winds. Specifically, inland stations tend to record lower peak wind speeds, with damping of onshore winds and typically a slight deviation of modal southwest and easterly wind directions. These biases vary within 30-60km of the coast, particularly due to the relative influence of land and sea breezes. For example, from the coast to landward, the sea breeze declines within 5 – 15km, with the land breeze becoming increasingly dominant, but declining in strength further inland.

Without correction for the biases introduced by Geraldton Airport AWS's inland location, the wind record confirms a strongly southerly wind climate. This supports development of southwest wind waves and encourages northward wind-blown sand drift. The strongest observed winds typically occur from the west, associated with mid-latitude winter storms.

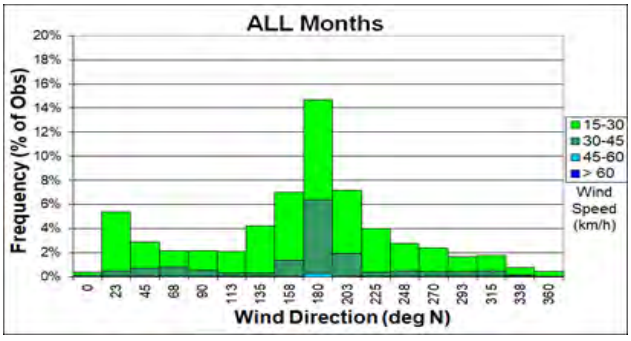


Figure 8.2: Geraldton Airport AWS Wind Distribution (2011-2018)

Midwest Ports undertake ongoing wave monitoring in the region, which provides a basis for description of the regional wave climate (Wandres et al. 2016). However, it is noted that the waverider buoy is located at a comparatively nearshore location, resulting in moderate peak wave heights.

There is highly seasonal variation in wave conditions (Figure 8.3). It is noted that local wave measurements were undertaken offshore from Leander Point in 1976-1977 (PWD 1976), however, this data set precedes the longer-term measurements and therefore cannot be correlated to provide a locally relevant characterisation of varying wave conditions.

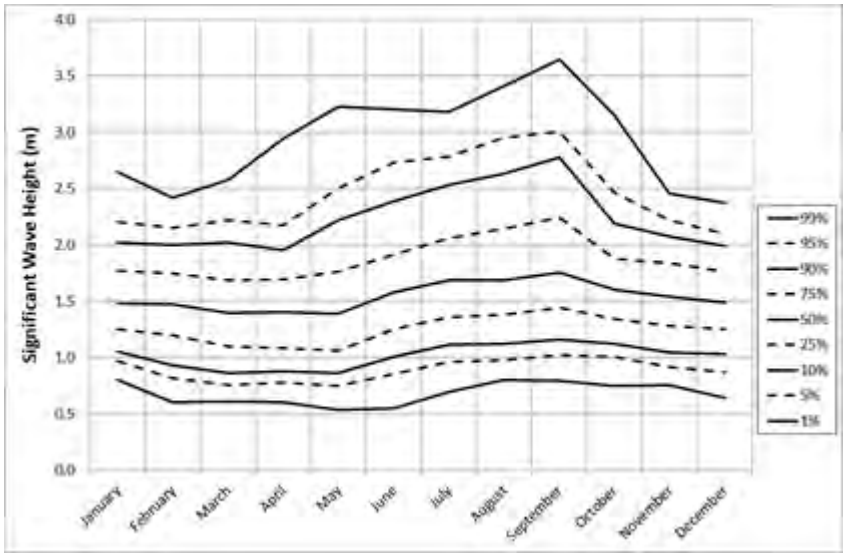


Figure 8.3: Geraldton Seasonal Wave Variation

Sea level variations are more directly relevant, as water level processes display a relatively high coherence along the Midwest coast, between Geraldton, Jurien and Fremantle permanent tide stations (Eliot, 2018). The region experiences microtidal, mainly diurnal conditions, which determines that there is greater influence from surges and mean sea level processes (Figure 8.4).

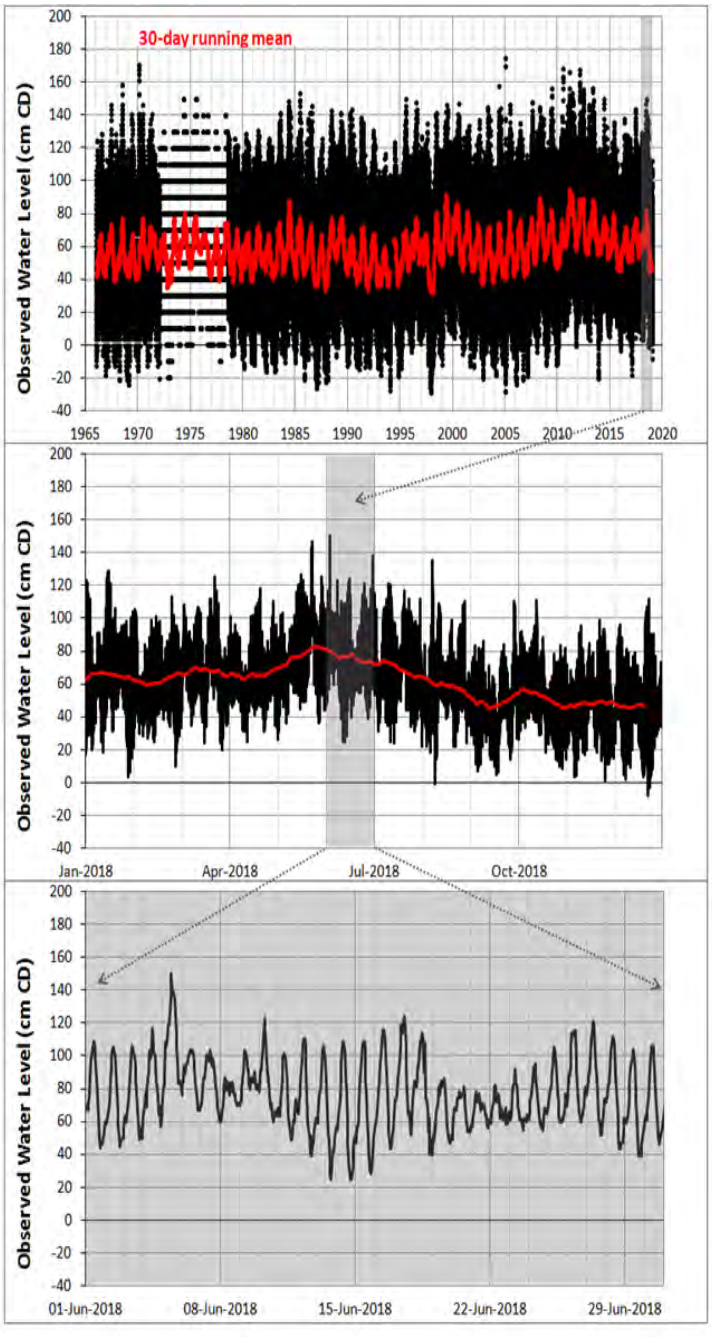


Figure 8.4: Geraldton Water Level Cascade

Evaluation of extreme water levels for Geraldton (Damara WA 2012) has previously identified that tropical cyclones are the most likely cause of extreme sea level events (above 20 year recurrence), although mid-latitude storms provide more frequent incidence of high water levels and will more commonly be the dominant cause of sea levels influencing coastal behaviour. Update of the tide gauge data set analysis has been undertaken (Figure 8.5), confirming a continuation of the previously reported behaviour. Small increases in the 100-year recurrence estimates are noted, which reflect the occurrence of high mean sea levels over the last decade.

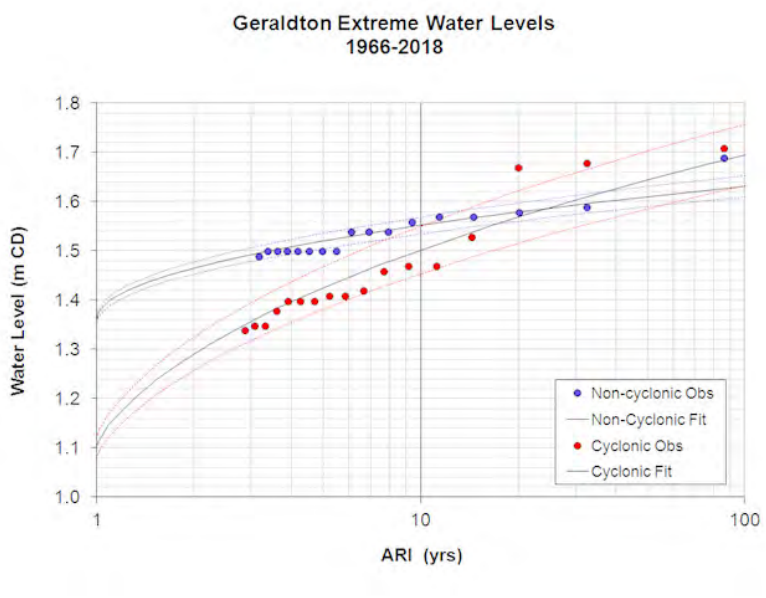


Figure 8.5: Geraldton Extreme Water Levels (1966-2018)

8.2 COASTAL DYNAMICS

Dongara lies in the northern part of the Geraldton-Bunbury region, which is characterised by a mainly west-facing coast, with moderate continental shelf width. Sediments are mostly calcareous, supporting development of limestone ridges through coastal lithification (Gozzard, 2011). These ridges buffer the effects of long-term fluctuations in sea level, whether acting as an erosion-resistant shore, or providing nearshore wave damping. Increased coastal stability enables dune development, with successive phases of dune deposition being identified (McArthur and Bettenay, 1974). Previous shorelines occur as limestone reefs, nearshore rock platforms or as ridges to landward, typically underlying modern dunes. The existing coastal dune structure is typically a large coastal barrier dune in the order of 200 – 300m width, with aeolian dunes to landward. With the notable exception of longitudinal dunes in Beekeeper's Reserve, the coastal dunes generally exhibit low mobility and can be consider relict structures, with formation during the late Holocene highstand, when mean sea level was approximately 1 – 2m higher than the present day (James et al., 2004).

The tidal regime of the Geraldton-Bunbury region is micro-tidal with mainly diurnal tides (Easton, 1970; NTF, 2000; Eliot, 2018). Wave conditions are generally energetic through the influence of frequent strong winds, as well as Indian Ocean swell (Lemm et al. 1999; Wandres et al. 2016). Storms are mainly winter mid-latitude depressions (20 – 40 years) associated with westerly onshore winds (Steedman & Associates 1982); with very occasional (1 – 2 decades) tropical cyclones passing close enough to produce gale force winds, the majority of which are experiencing extra-tropical transition (Hetzel et al. 2015). The diurnal land-sea breeze cycle is prevalent along the coastal margin, and particularly evident during summer months, with bimodal conditions developed through morning easterlies due to land breeze conditions and southerly afternoon winds due to sea breeze conditions.

The strong tendency for northwards sediment transport due to both waves and winds provide an almost unidirectional alongshore transfer of sediment. However, this is modified by shoreline orientation, as well as local effects of variations in elevation and discontinuities in the limestone reefs and platforms. This determines that each shoreline segment can respond slightly differently to either individual weather events, seasonal variation, or inter-annual fluctuations of meteorological and oceanographic drivers. As a consequence, alongshore sediment supply is typically sporadic, with erosion events providing 'slugs' of sediment to the adjacent (northern) coastal segment, which can propagate and distribute along the segment's beaches and are then either transferred further alongshore or into the coastal dunes. This process can contribute to cyclic behaviour, or be a mechanism for progressive accumulation of features, if there is an extended period between events causing coastal disturbance.

Formation of the beach and dune structure (Figure 8.6) is related to the relative balance of the processes of alongshore sediment supply and cross-shore sediment exchange between the beach and dune (Pye et al., 2007). Short-term beach movements are largely constrained to the beach face. Seasonal and event-driven fluctuations are largely contained within the beach flat, which can be supplied or supplemented by alongshore sediment transport. The dune position is generally developed through a balance of occasional storm erosion events and landward wind-blown transfer of sediments from the beach flat. The episodic nature of storm events and the interaction between dunes, vegetation and sediment transfer often develop impermanent foredune features seaward of the larger, primary dune.

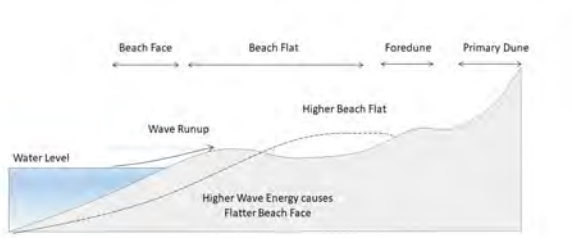


Figure 8.6: Beach Components

Beach behaviour responds to individual storm events, with short-term cross-shore fluctuations, typically flattening rapidly during high wave energy conditions and gradually steepening during calmer conditions. Beach rotation may occur if storm waves come from unusual directions, particularly the northwest, as it differs from prevailing southwest swell. In most cases, these short-term sediment movements are local, and there is limited transfer between adjacent coastal segments. Beach volume change may occur when there is a longer-term adjustment of the beach profile, such as through seasonal and inter-annual variation of waves (Figure 8.3) and water levels (Figure 8.7). In recent decades, there has been significant change in mean sea levels, affecting the Western Australian coast, with reducing incidence of El Nino (low water level) conditions and increased incidence of La Nina (high water level) conditions (Feng & Myers, 2004; BOM, 2012). The very high mean sea levels during 2011 – 2013 produced widespread disturbance of the coast, and for much of Western Australia caused erosion, with recovery taking a number of years.

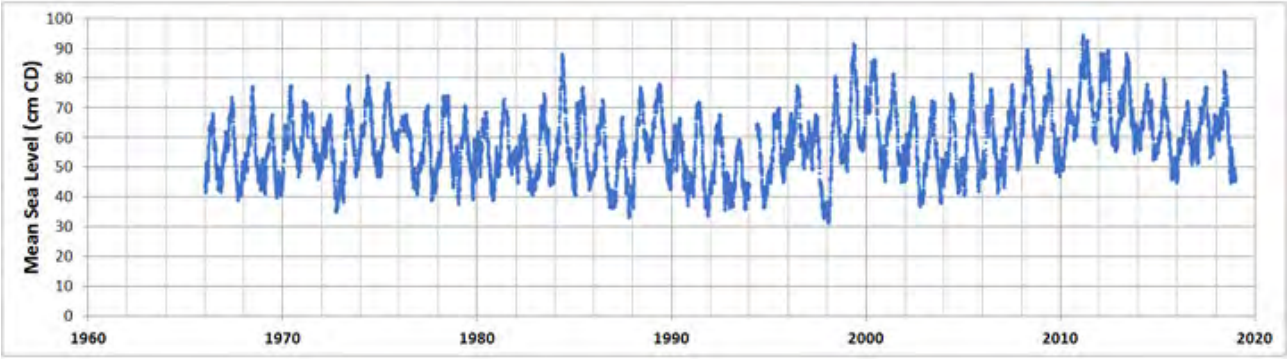


Figure 8.7: Geraldton Mean Sea Level (1966-2018)

Information available to describe historic coastal dynamics is limited:

- Vegetation line mapping by Department of Transport covers from 1944 – 2016 (imagery from 1944, 1965, 1978, 1980, 1988, 1993, 1999, 2004, 2008, 2010 and 2016) for town site areas from Kingy Bay to South Beach, and has been prepared for the remainder of the Shire coast based on 2000, 2008 and 2016 aerial imagery; and
- Satellite derived shoreline position at 500m intervals from 1984 – 2016, through Deltares' Shoreline Monitor (Luijendijk et al., 2018).

Both data sets require interpretation, as they are both proxies for changes in coastal sediment volume (Figure 8.8). The vegetation lines are spatially continuous but have long gaps between successive images. The shoreline time series are widely spaced and may be influenced by short-term cross-shore fluctuations, particularly response to storm events or seasonal fluctuation, depending on the set of satellite images considered for each year.

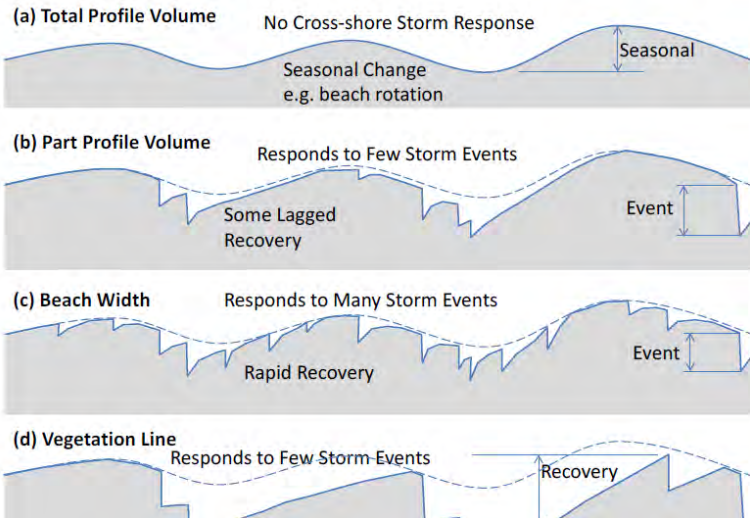


Figure 8.8: Proxy Influences for Different Beach Measurements (Damara 2015)

The two data sets overlap meaningfully around Dongara and Port Denison town sites, where they suggest reasonable correspondence, partly obscured by the influence of seasonal beach movement (Figure 8.9).

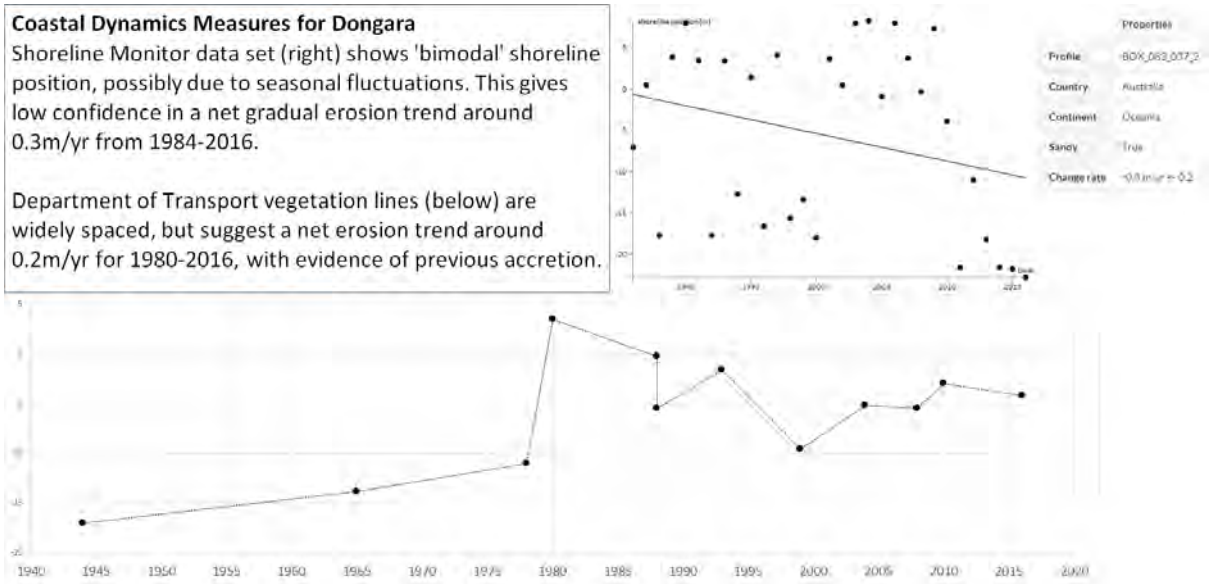


Figure 8.9: Comparison of Shoreline and Vegetation Line Positions for Dongara Beach

A generalised interpretation of the two data sets is that there was a longer-term tendency for accretion between 1944 and 1980, with a subsequent decline toward an intermediate position. However, there is considerable local variation, with some areas showing continuing accretion since 1980 (Figure 8.10) and others illustrating substantial loss over the period 2008-2016 (Figure 8.11).

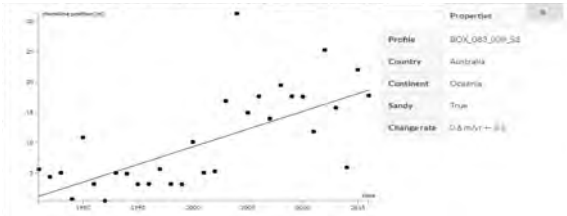


Figure 8.10: Shoreline Position North of Kingy Bay (Shoreline Monitor)

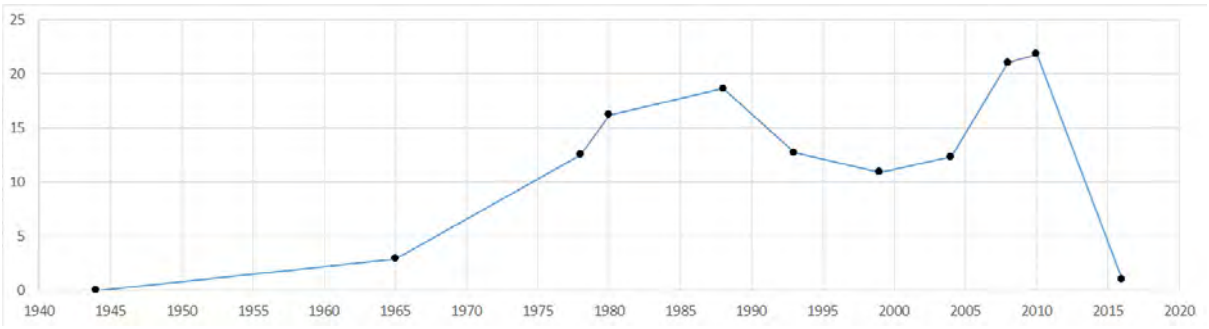


Figure 8.11: Vegetation Line Position South of Seaspray Caravan Park Relative to 1944

Local variation at the specific sites of planning interest is outlined in the table below:

Table 8.1 - Coastal Dynamics Local Variation

Location	Interpreted Coastal Dynamics
McKenzies	Demonstrates a history of net coastal accretion
Seven Mile Beach	Marginal retreat of the beach to the north identified over 1984-2016, mainly occurring in 2008-2013, although there was limited corresponding vegetation line change The shoreline to the south generally remained relatively stable
Kingy Bay	The nearshore reef and salient provides a separation in behaviour, with the beach to the north accreting, and the beach to the south eroding over 2010-2018
Seaspray	High erosion occurred from 2010-2016, such that the shoreline is near to the most landward (eroded) position on record
Grannies Beach	Long-term pattern of gradual erosion (1m/yr) accelerated from 2008 onward, and it is presently at its most landward (eroded) position on record
South Beach	Has experienced substantial ongoing accretion since 1978. Vegetation line retreat from 1944-1978 is opposite the general pattern
Denison Airstrip	High erosion (~30m) occurred from 2010-2016, such that the shoreline and vegetation lines are at the most landward (eroded) positions on record
White Point	Ongoing growth trend of ~1m/yr. Extreme erosion (~100m) occurred from 2010-2016, such that the shoreline and vegetation lines are at the most landward (eroded) positions on record. Substantial accretion of a foredune has occurred on the north side of the point, averaging ~3m/yr, with ~60m accumulation from 2010-2016
Cliff Head	Localised deposition of 350m long sand lobe near the rocky head of up to 70m width 2010-2016. Corresponding erosion of 800m length to the south with up to 30m retreat. Local erosion at North Cliff Head was ~10m, but located at pinch point between shore and rock outcrop, affecting track
Freshwater Point	High erosion (~30-40m) occurred from 2012-2016 downdrift of the rock headland, affecting the camping site Area to south has experienced approximately 1.5m/yr accumulation, including foredune development
Knobby Head	Mild erosion (~10m) occurred from 2008-2012

8.3 DUNE DYNAMICS

A modified version of the United States Army Corps of Engineers (USACE) method for assessing aeolian beach and dune sediment transport has been developed. This is a simplified model of dune physics, which does not include effects of wind funnelling, local sheltering, or vegetation establishment and growth (Bagnold, 1941). Due to these simplifications and assumptions required, model estimates indicate relative behaviour and should not be considered exact.

Typical rates of landward sediment transfer from the beach to the dune are in the range of 2.5-7.5 m3/m/yr, although higher rates have been observed with effective application of sand fencing and revegetation works (USACE, 2003). No equivalent

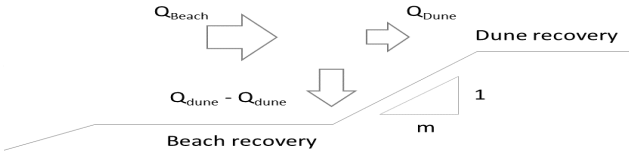


Figure 8.12: Schematic of Beach-Dune Sediment Transfer Model

Natural dune faces in the Midwest tend towards a limiting steepness of 1 in 3. From the beach-dune model, this conveys approximately 35% of the onshore beach supply. Blowouts and foredune swales, have flatter gradients, allowing transfer of 50-75% of beach drift, and consequently supporting higher rates of dune rebuilding. However, for blowouts connected to a landward sand sheet, this may result in high rates of loss from the leeward side of the dune, effectively resulting in a material drain from the dune and amplifying beach erosion (WAPC, 2002).

Application of the model to different dune orientations provides a simple means of comparing the tendency for beach-dune sediment transfer along the Shire of Irwin coast (Figure 8.13). This evaluation highlights the high potential for onshore sediment transfer along Beekeeper's Reserve and South Beach, which displays active longitudinal dunes, and north of Nine Mile Beach, where the coastal dunes are marginally active, with a few local blowouts. Low rates of onshore sediment transfer occur along the southern Irwin coast, suggesting a tendency for limited development of mostly low dunes and beach sediments tending to move alongshore. This variation suggests a need for differences in coastal management effort – for the active dune areas, dune recovery after erosion is high, but there is high potential for blowouts to expand into sand sheets; whereas for the southern areas, dune recovery after storm erosion will tend to be slow, potentially producing scarps and associated beach access issues.



Figure 8.13: Simplified Model of Onshore Sand Transport

8.4 SEDIMENT CELLS AND GEOMORPHIC FRAMEWORKS

The Shire of Irwin mainly occupies two primary sediment cells (Stul et al., 2014), identified on the basis of changes to coastal alignment and morphology (Table 8.2), with Leander Point (and the mouth of the Irwin River) providing a fixed cell boundary that separates alongshore sediment transport between the two cells. Connectivity between the two cells is expected to occur mainly offshore, outside the discontinuous inner shelf (nearshore) limestone reefs. The northern and southern boundaries of the two Irwin primary cells are near Phillips Road and South Illawong respectively; both of which are defined by substantial changes in coastal morphology, although not associated with substantial barriers to alongshore sediment transport.

At finer scales, the two primary cells subdivide into four secondary cells and eight tertiary cells, of which six are in the Shire of Irwin (Figure 8.14), with the two northern cells in the City of Geraldton / Shire of Greenough. Apart from Leander Point, only White Point represents a major structural feature, with the other boundaries all indicative of changes in conditions influencing sediment transport, such as variation in nearshore reef configuration. Adjacent cells that are distinguished by more subtle structural boundaries are expected have higher sediment transport connectivity than those defined by major structural forms.

Table 8.2: Shire of Irwin Sediment Cells

Region	Primary	Secondary	Tertiary
R07. Mid-West Region from Moore River to Glenfield	E. Leander Point to Phillips Road Coast	12. Nine Mile Beach to Phillips Road Coast	b. Headbutts to Phillips Road Coast
			a. Nine Mile Beach to Headbutts
		11. Leander Point to Nine Mile Beach	c. Seven Mile Beach to Nine Mile Beach
			b. Harleys Hole to Seven Mile Beach
			a. Leander Point to Harleys Hole
	D. South Illawong to Leander Point	10. Cliff Head to Leander Point	b. White Point to Leander Point
			a. Cliff Head to White Point
		9. South Illawong to Cliff Head	a. South Illawong to Cliff Head
	C. Middle Head to South Illawong	8. Fisherman Islands to South Illawong	d. Coolimba to South Illawong
			Other Tertiary Cells
		7. Middle Head to Fisherman Islands	Other Tertiary Cells

High resolution LIDAR bathymetry collected from Hillarys to Northampton in 2016 provides an opportunity to develop more detailed interpretation of coastal dynamics (Table 8.3):

At a tertiary sediment cell scale, high resolution bathymetry shows the presence, elevation and continuity of nearshore limestone formations. This supports interpretation of how

the rock may influence coastal dynamics, specifically for the beach and dune systems to landward; and

At a finer scale, the bathymetric surface texture supports distinction between sand and rock seabed, with sandy seabed features including bars, ridges and gullies indicating hydrodynamic forcing, and potentially displaying sediment transport pathways.

Extracts from the LIDAR bathymetry are shown to illustrate these features.

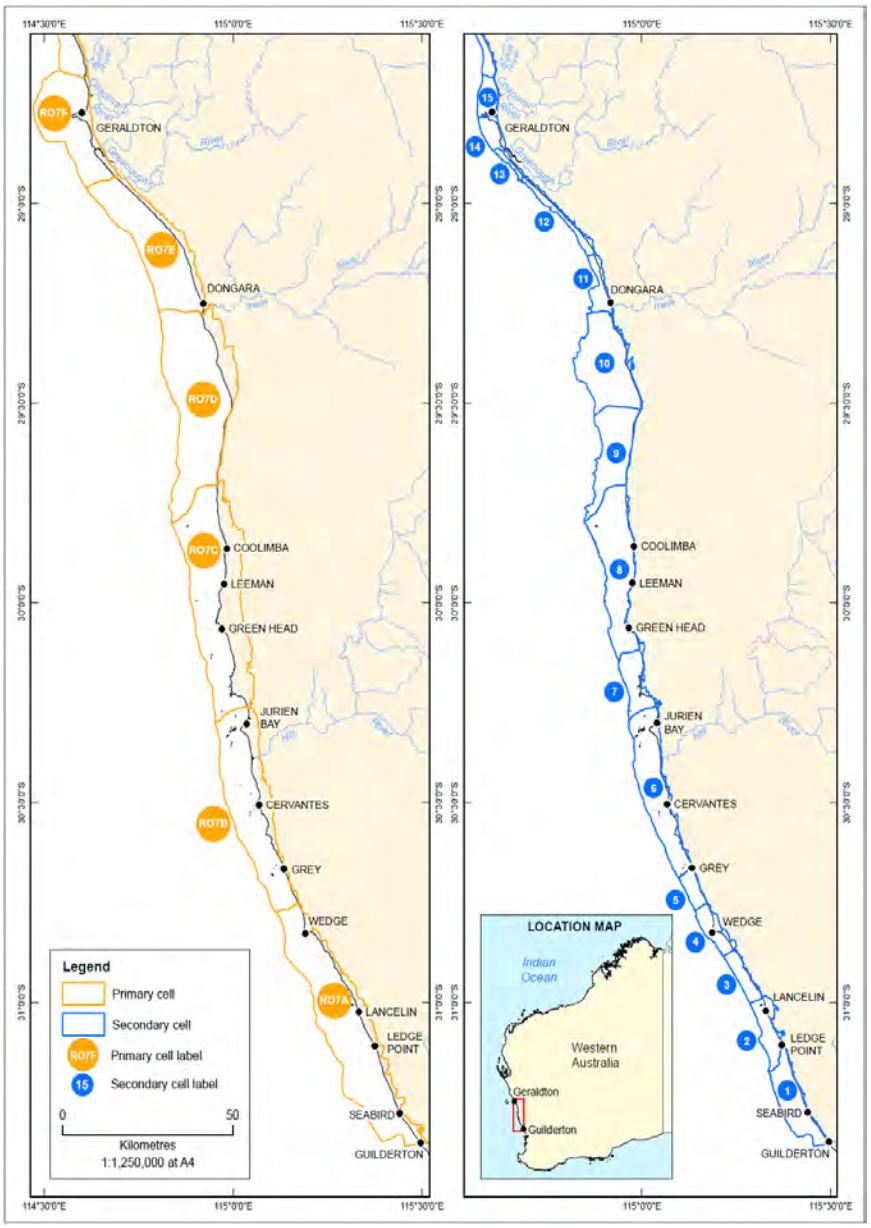


Figure 8.14: Primary and Secondary Sediment Cells for the Midwest (Stul et al. 2014).

Table 8.3: Generalised Morphology for each Tertiary Sediment Cell

TERTIARY SEDIMENT CELL	GEOMORPHIC DESCRIPTION
R07.E.12a. Nine Mile Beach to Headbutts (Figure 9.1)	Discontinuous narrow offshore limestone reef Deep coastal lagoon Multiple nearshore reefs with narrow (~50m) coastal rock platform Active dune with extensive blowouts
R07.E.11c. Seven Mile Beach to Nine Mile Beach (Figure 9.1)	Almost continuous narrow offshore limestone reef Deep coastal lagoon Multiple nearshore reefs providing sheltered coast with narrow (~50m) coastal rock platform Degraded primary dune with some foredune development. Dunes to landward have partly vegetated scarps, with relict mobility
R07.E.11b. Harleys Hole to Seven Mile Beach (Figure 9.1)	Continuous narrow offshore limestone reef, wide area to south Deep coastal lagoon, pinched to south Multiple nearshore reefs providing sheltered coast Multiple linear coastal dunes seaward of relict parabolic dunes
R07.E.11a. Leander Point to Harleys Hole (Figure 10.1)	Discontinuous wide offshore limestone reef Moderate depth coastal lagoon (relict Irwin River basin) Multiple nearshore reefs Degraded dunes with limited foredune rebuilding
R07.D.10b. White Point to Leander Point (Figure 10.1)	Wide but discrete reef areas (Irwin Reef; Jack Reef / White Tops; Long Reef / White Point Reef) Coastal lagoon infilled by salient (i.e. sandy bed) Wide area of nearshore rock platform (Leander Point) Active dune with extensive nearshore blowouts
R07.D.10a. Cliff Head to White Point (Figure 10.1)	Isolated offshore reef areas Wide, shallow, coastal lagoon with seagrass coverage Limited areas of nearshore reef Narrow linear coastal dunes seaward of large relict parabolic dunes

R07.D.09a. South Illawong to Cliff Head (Figure 11.2 & Figure 11.3)	Discontinuous offshore reef areas Shallow coastal lagoon with seagrass coverage Wide area of nearshore rock platform Isolated areas of dune development as foredune ridges landward of nearshore reef sections, with irregular disturbance and migration

The importance of the morphology at a tertiary sediment cell scale is the corresponding variation in active processes and responses to different coastal drivers.

8.5 ACTIONS – COASTAL PROCESSES

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
Relevant objectives: • **Objective 2 – To manage the environmental and recreational values of the coastline in order to retain the broad range of recreational opportunities, environmental values and sense of isolation unique to the area.** • **Objective 3 – Consider risks, actions and recommendations from existing Shire plans and strategies.** • **Objective 4 – To ensure management and protection of the Shire's coastline is undertaken in a sustainable manner.** • **Objective 5 – To ensure adequate consideration of coastal hazards is undertaken and ensure management is undertaken in accordance with SPP 2.6 and associated Guidelines**			
CP1	Give due regard to SPP 2.6 for the planning of any coastal facilities or development following the management and adaptation hierarchy of avoid-retreat-accommodate-protect. The location of coastal facilities and development should consider: • coastal processes, • appropriate coastal setbacks are implemented • any fixed infrastructure is built to the appropriate standard over an appropriate planning timeframe and can accommodate the anticipated range of beach and dune variability. It is recommended most assets on this coast are placed with consideration of how to accommodate the variability in beach position and dunes and allow for retreat where feasible. This is particularly relevant for recreational assets with finite lifespans and coastally dependent and easily relocatable assets noted in Sections 7.1 and 7.2 of SPP2.6 respectively.	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
CP2	Conduct regular monitoring of infrastructure and recreational facilities along the beach within Shire-managed reserves.	O	Shire of Irwin
CP3	Ensure coastal users are adequately informed of natural hazards and risk such as flooding and inundation through the use of signs.	O	Shire of Irwin (Shire reserves) Landowners (Freehold) DPLH (UCL)
CP4	Implement actions from the Shire of Irwin CHRMAP (Shire of Irwin, 2016).		Shire of Irwin
CP5	Give due regard to SPP 2.6 which provides for public access to foreshore areas and apply when considering future options for access. Avoid straight line access and locations that may lead to dune destabilisation.	O	Shire of Irwin

9.0 sector 1 – northern beaches

9.1 DESCRIPTION

LOCATION

Sector one extends from the northern boundary of the Shire to north of Dongara (Reserve number 43544 north of Sunset Cove). It includes the following coastal sites:

- McKenzies Beach
- Seven Mile Beach.

A number of minor coastal sites are dotted along this sector including:

- Nine Mile Beach
- Box Rox
- Pistons
- Five Mile Lagoon
- Harleys Hole
- Kingy Bay
- King Bay.

Sector 1 is shown on Plan 9.1.

PLANNING AND TENURE

The Shire of Irwin Local Planning Scheme No. 5 (WAPC, 2008) identifies the following zones and reserves within Sector 2.

Table 9.1 - Sector 1 zoning

LOCATION	ZONE/RESERVE
Northern boundary to the Dongara townsite.	Coastal area is reserved as Local Reserve. Inland from the reserve the land is zoned General Farming.

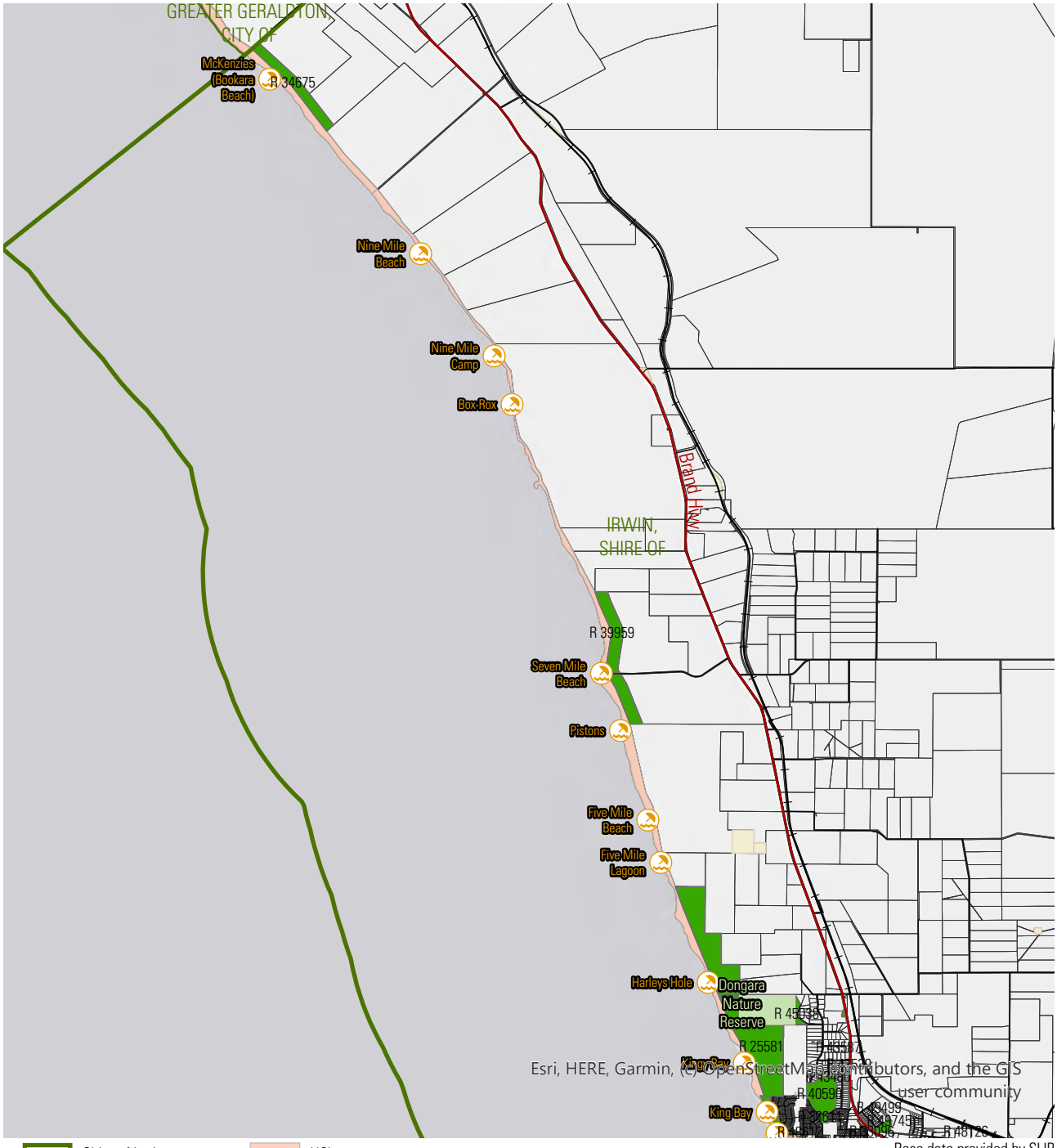
Tenure within Sector 1 comprises a mixture of freehold, Shire-managed reserve and unallocated crown land (UCL). A majority of the coastal dune systems are located on private property. A thin strip of UCL stretches along the beach. Shire-managed reserves are located at Seven Mile Beach (Reserve number 39959) and at McKenzies Beach (reserve number 34675). Tenure is shown in Figure 2.1.

A description of the reserves within Sector 1 is provided in the table below.



Seven Mile Beach

Photo by Land Insights, May 2019



Plan 9.1: Sector 1 Overview

Table 9.2 - Sector 1 Reserve Details

RESERVE NO.	LOT NO.	PLAN NO.	LOCATION	PURPOSE	MANAGEMENT ORDER
25581	2838	P109847	Dongara	Recreation	Shire of Irwin
25581	2838	P109847	North of Dongara		
25581	5949	P082780	North of Dongara		
39959	11735	P105495	Southern side of 7 Mile Beach	Public recreation	Shire of Irwin
39959	11735	P015495	Northern side of 7 Mile Beach		
34675	11222	D047687	Northern boundary of the Shire.	Public recreation	Shire of Irwin

9.2 COASTAL PROCESSES

For the northern Irwin coast, the narrow offshore reef system provides partial sheltering from offshore waves, with greater wave energy able to transfer through any breaks in the reef. As a consequence, the coast north of Nine Mile Beach can be subject to more severe wave attack under extreme conditions, but ambient wave conditions are likely to be observed from Five Mile Beach northwards.

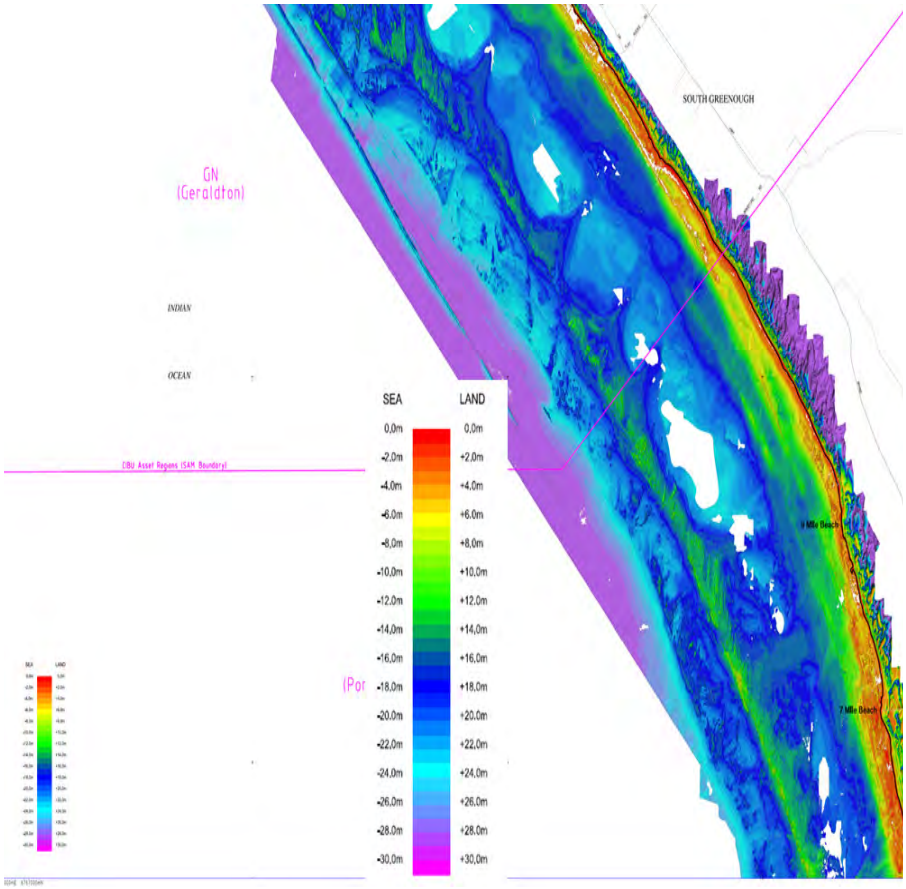


Figure 9.1: North Shire of Irwin Coast

The importance of the nearshore rock platform is indicated by the difference in dune structure, with the lower elevation rock platform north of Nine Mile Beach being directly connected to unstable coastal dunes. The wider and higher nearshore reef system has historically provided greater dune stability north of Headbutts, and south of Nine Mile Beach, with the southern section also supported by the more west-facing shore orientation. The areas with high rock platform are typically resistant to storm erosion under ambient conditions, with erosion mainly occurring during severe events, particularly those causing high water levels. Refer to Figure 9.1 which shows the sea and land elevations for the northern sector.

A continuous coastal track runs between Seven Mile Beach and Nine Mile Beach, with several shacks. Mild dune degradation is present due to vehicle and pedestrian tracks, however, dune mobility is moderate. The position of the shoreline has remained generally stable, however, a retreated position from 2013-2016 followed after the phase of high mean sea level and may reflect reduced sediment availability (Figure 9.2).

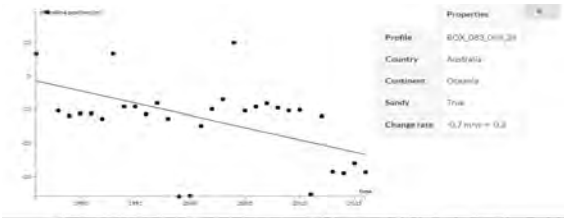


Figure 9.2: Shoreline Position south of Seven Mile Beach (from Shoreline Monitor)

9.3 SOCIAL, RECREATIONAL AND LAND USE

There are only two coastal sites in this sector which have reserves with management orders with the Shire of Irwin:

- McKenzies Beach
- Seven Mile Beach

Owing to the difficulty in accessing the coast north of Dongara, the remainder of the sites are low-key in nature.

McKenzies Beach and Seven Mile Beach can be accessed via gazetted roads. Seven Mile Beach is accessed via Seven Mile Road and McKenzies Beach can be accessed via Wakeford Road. However, unlike Seven Mile Road and despite there being a road reserve from Indian Ocean Drive to the beach, Wakefield Road stops approximately halfway and turns into a couple of ORV access tracks. As a result of this difficult access, McKenzies Beach is a low-key coastal site with no facilities.

Seven Mile Beach comprises a fairly large gravel car park, however no facilities are provided. Overnight camping is permitted within the car park area only. South of Seven Mile Beach is 'closed waters' for research purposes by the Department of Fisheries (DPIRD) and the taking of rock lobsters is prohibited. Pedestrian and vehicle access are provided to the beach.

It should also be noted that although there is a Shire-managed reserve at Seven Mile Beach (reserve 39959) the car park and beach access is located primarily within the UCL.

Other minor coastal sites are also scattered along this section of the coast. Informal access to these sites is provided through tracks which pass through private property. No facilities are provided at these coastal sites. They are located within UCL or private property and therefore not under the control or management of the Shire.

9.4 ENVIRONMENT

The coastal environment along this sector is relatively undisturbed due to the difficulty in access and the low level of use. Apart from off-road vehicle tracks providing access to the beach, the vegetation is relatively undisturbed. It appears that these tracks are relatively well-established and there doesn't seem to be much evidence of duplicate tracks or new tracks being formed, with the exception of tracks near Seven Mile Beach which are causing some minor localised dune degradation. As the tracks are primarily located within freehold land and UCL, they are outside the management of the Shire.

9.5 SECTOR 1 – ISSUES AND OPPORTUNITIES

A review of all issues and opportunities and how they have helped form the recommendations is provided below.

Issues and opportunities for Sector 1 is provided in the table below.

Table 9.3 - Sector 1 Issues and Opportunities

ISSUES	OPPORTUNITIES
TENURE	
A majority of the coastline north of Dongara is Unallocated Crown Land. Inland from UCL to Indian Ocean Drive is largely freehold. A few Shire-managed reserves are located in this sector. One is directly north of Dongara (R25581), one is at Seven Mile Beach R39959) and the last is at McKenzies Beach (R34675). The reserves at Seven Mile Beach and McKenzies Beach are setback from the beach. The car park, coastal tracks, camping areas and beach access at Seven Mile Beach is located on UCL. No development is located at R34675 at McKenzies Beach. Access to this site is not currently well-established and is unlikely to be formalised in the near future.	There is an opportunity to extract a portion of the UCL at Seven Mile Beach and transfer this to Shire-managed reserve. The reserve can include the car park, camping area, coastal tracks and beach access.
ACCESS	
As a majority of the coast north of Dongara is located on UCL or private property, access is not readily available to the public. There are some well-established access tracks leading from Indian Ocean Drive through private property to the beach and access tracks also lead north from Dongara. These tracks are most likely only used by locals. They are all only accessible by 4WD (except for the access road to Seven Mile Beach). A road to McKenzies Beach (Wakeford Road) is only established for half of the length. The remainder of the access track to McKenzies Beach is a 4WD track through the dunes. Wakeford Road is also located in a road reserve which is within the City of Greater Geraldton.	The access restrictions north of Dongara act as a form of self-management for the northern coastline as most areas are only accessible by locals or people who know the area and can gain access to private property. Access to Seven Mile Beach is well-established for 2WD and should be maintained. Boat launching occurs at Seven Mile Beach, however is problematic at the time of site visits due to the vertical separation distance between the beach and the car park. No upgrades are recommended for Wakeford Road and access to McKenzies Beach should remain low-key.

ISSUES	OPPORTUNITIES
FACILITIES	
There are limited facilities available at the coastal sites within Sector 3. This is largely due to the low-key nature of these sites and the low visitation due to difficult access. A majority of the sector is UCL or freehold and not the responsibility of the Shire. Seven Mile Beach is the only site with a formal car park. Camping is allowed within the car park but is not permitted in the dunes north of the site. Campers should be fully self-contained as no toilet facilities are provided. One skip bin is located in the car park.	Due to the low-key nature of the sites north of Dongara and the issues around tenure and management, there are no recommendations to provide additional facilities in this Sector. No additional facilities are recommended at Seven Mile Beach. This is due to the low-key nature of this site and the availability of Shire resources to manage facilities.
SIGNAGE	
There is some signage at Seven Mile Beach. One is regarding the closed waters for rock lobster fishing to the south of the beach and the other signs advise of the dune conservation area to the north of the car park and that no camping is permitted in the dunes.	As the only coastal site north of Dongara, which is managed by the Shire, there is an opportunity to provide some additional signage regarding safety and emergency, as well as educational and interpretative signage.
COASTAL PROCESSES	
The coast north of Nine Mile Beach can be subject to more severe wave attack under extreme conditions, but ambient wave conditions are likely to be observed from Five Mile Beach northwards. There is mild dune degradation from Nine Mile Beach to Seven Mile Beach, however, dune mobility is moderate. The position of the shoreline has remained generally stable with some reduced s	There are generally no requirements to respond to the coastal processes in this sector as it is generally undeveloped. Coastal processes should be managed at Seven Mile Beach by discouraging vehicle access and camping north of the car park to reduce erosion and blowouts. This can be achieved through clear signage, ranger monitoring etc.



Seven Mile Beach

Photo by Land Insights, May 2019

9.6 SECTOR 1 – RECOMMENDED ACTIONS

OBJECTIVES

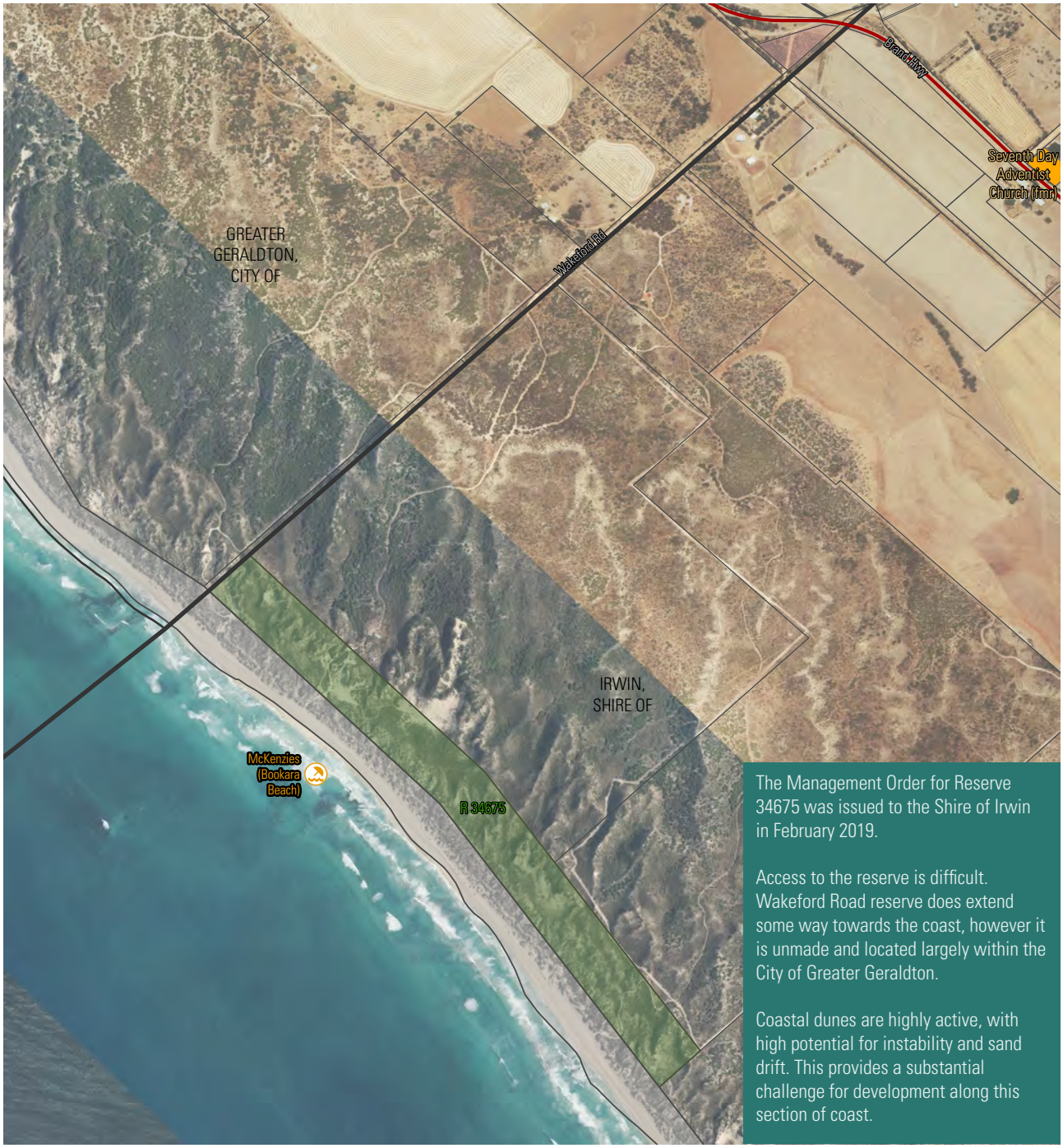
To maintain the low-key recreational nature of this sector and to focus on Seven Mile Beach as the main Shire-managed coastal site in this sector for camping and day use.

ACTIONS

The recommended actions for Sector 1 are listed in the table below and shown on Plans 9.2 and 9.3.

Table 9.4 - Sector 1 Actions

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
S1	Maintain Seven-Mile Beach as an unserviced and self-contained site to limit the likelihood of the site being used for overnight camping.	O	Shire of Irwin
S2	Improve signage at Seven Mile Beach, specifically outlining the remoteness of the site in case of emergency, and that (as at the time of writing) no mobile phone coverage is provided.	S	Shire of Irwin
S3	Reinstate the 'no camping' signs for the area immediately north of the Seven Mile car park.	S	Shire of Irwin
S4	Local dune instability due to vehicle and pedestrian access should be managed periodically (2-5 years) through track closure, brushing and revegetation.	S-M	Shire of Irwin
S5	Consider provision of minor improvements to informal boat ramp, including surface drainage diversion and seasonal placement/removal of beach matting and/or possible NW/SE alignment.	S-M	Shire of Irwin
S6	Review the interface boundary between the Shire Reserve (R39959) and adjoining UCL to incorporate the car park into the Reserve.	S	Shire of Irwin



The Management Order for Reserve 34675 was issued to the Shire of Irwin in February 2019.

Access to the reserve is difficult. Wakeford Road reserve does extend some way towards the coast, however it is unmade and located largely within the City of Greater Geraldton.

Coastal dunes are highly active, with high potential for instability and sand drift. This provides a substantial challenge for development along this section of coast.

State Road
Cadastre
UCL
Reserve - Shire of Irwin
Other Reserves
Heritage - State Register

Base data provided by SLIP

N

1:20,000

0 250 500 750 1,000 m

Plan 9.2: McKenzies Beach (Overview)
Sector 1

RECOMMENDATIONS:

1. Maintain Seven-Mile Beach as an un-serviced and self-contained site to limit the likelihood of the site being used for overnight camping.

2. Improve signage at the site, specifically outlining the remoteness of the site in case of emergency, and that (as at the time of writing) no mobile phone coverage is provided.

3. Reinstate the 'no camping' signs for the area immediately north of the car park.

4. Local dune instability due to vehicle and pedestrian access should be managed periodically (2-5 years) through track closure, brushing and revegetation.

5. Consider provision of minor improvements to informal boat ramp, including surface drainage diversion and seasonal placement/removal of beach matting and/or possible NW/SE alignment.

6. Review the interface boundary between the Shire Reserve (R39959) and adjoining UCL to incorporate the car park into the Reserve.



Cadastre
UCL
Reserve - Shire of Irwin

N

1:10,000

0 125 250 375 500 m

Plan 9.3: Seven Mile Beach (Overview)
Sector 1

10.0 sector 2 – Dongara/Port Denison

10.1 DESCRIPTION

LOCATION

This sector stretches from north of the Dongara townsite (Reserve number 43544 north of Sunset Cove) to the south of Port Denison (south of South Beach and Reserve Number 137). It includes the following coastal sites:

- Sunset Cove
- Seaspray Beach
- Irwin River Mouth
- Nuns Pool
- Surf Beach
- Grannies Beach
- Port Denison foreshore
- South Beach.

The extent of sector 2 is shown on Plan 10.1



PLANNING AND TENURE

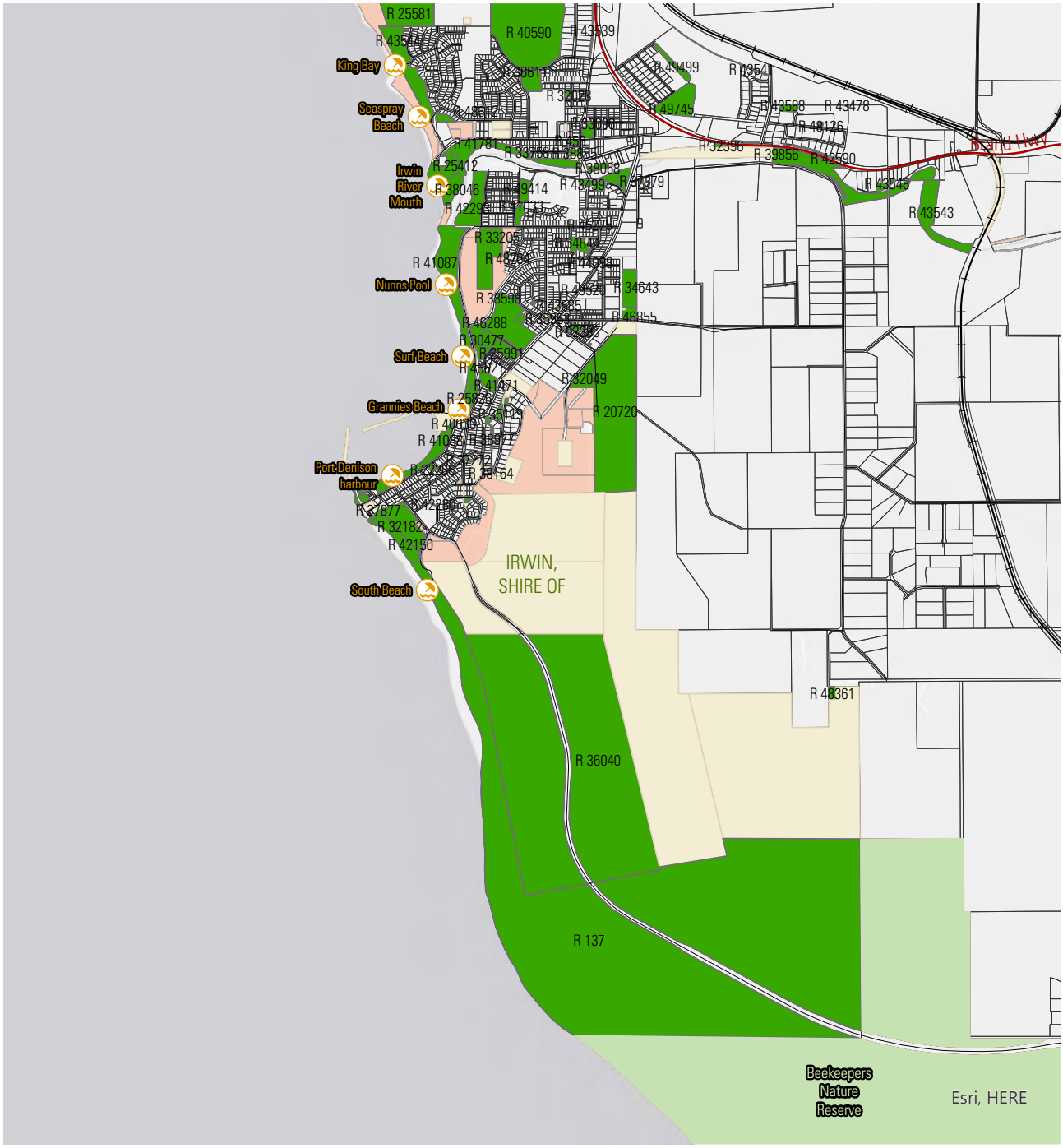
The Shire of Irwin Local Planning Scheme No. 5 (WAPC, 2008) identifies the following zones and reserves within Sector 2.

Table 10.1 - Sector 2 zoning

LOCATION	ZONE/RESERVE
Dongara and Port Denison townsite	Coastal area is reserved as Local Reserve. Directly south of Port Denison the coastal area is reserved as Local Reserve. Inland from the Local Reserve the land is reserved for Public Purposes (Airport and Common).

A majority of the coastal area within the Port Denison and Dongara townsite is located within local reserves managed by the Shire (with the exception of the coastal area north of the Irwin River which is UCL).

A list of all reserves within Sector 2, including purpose of the reserve and management orders, is provided in the table below.



Plan 10.1: Sector 2 Overview

Table 10.2 - Sector 2 Reserves

RESERVE NO.	LOT NO.	PLAN NO.	LOCATION	PURPOSE	MANAGEMENT ORDER
137	650	P401935	South of Port Denison	Common	Shire of Irwin
24829	12124	DP219523	South of Port Denison	Lime deposit	N/A
36040	12126	P219524	South of Port Denison – inland	Aerial landing ground (with power to lease for any term not exceeding 21 years subject to the consent of the Minister for Lands).	Shire of Irwin
42150	924	P190555	Port Denison	Recreation	Shire of Irwin
32182	3000	P46591	Port Denison	Camping and caravan park (with power to lease for any term not exceeding 50 years subject to the consent of the Minister for Lands).	Shire of Irwin
37877	917	P189498	Port Denison	Dune Protection	Shire of Irwin
41089	546	P216836	Port Denison – jetty	Harbour Purposes	Minister for Transport
41088	305	P042170	Port Denison	Recreation (with power to lease for any term not exceeding 21 years subject to the consent of the Minister for Lands).	Shire of Irwin
41088	307	P042170	Port Denison		Shire of Irwin
40029	581	P186882	Port Denison	Navigation Beacon Site	Minister for Transport
41088	306	P042170	Port Denison	Recreation (with power to lease for any term not exceeding 21 years subject to the consent of the Minister for Lands).	Shire of Irwin
41088	954	P036803	Port Denison		
41088	945	P221338	Port Denison		
41089	953	P036803	Port Denison	Harbour Purposes	Minister for Transport
40030	950	P221338	Port Denison	Foreshore Management	Shire of Irwin
40030	949	P221338	Port Denison		
46561	948	P221338	Port Denison	Recreation (with power to lease for any term not exceeding 5 years subject to the consent of the Minister for Lands).	Shire of Irwin
46561	947	P221338	Port Denison		

RESERVE NO.	LOT NO.	PLAN NO.	LOCATION	PURPOSE	MANAGEMENT ORDER
25826	946	P122138	Port Denison	Recreation camping and caravan park (with power to lease for any term not exceeding 30 years subject to the consent of the Minister for Lands).	Shire of Irwin
41087	590	P216835	Port Denison	Foreshore Management	Shire of Irwin
38046	300	P050241	Dongara	Recreation and foreshore management	Shire of Irwin
25412	94	P191394	Dongara	Caravan park (with power to lease for any term not exceeding 30 years subject to the consent of the Minister for Lands).	Shire of Irwin
43544	12053	P018271	Dongara	Public recreation	Shire of Irwin
43544	12053	P018955	Dongara		
43544	12361	P023156	Dongara		
43544	12815	P039794	Dongara		
43544	619	P053786	Dongara		



Pt Denison - Grannies Beach and Marina

Photo by Land Insights, May 2019

10.2 COASTAL PROCESSES

The North-Central Shire of Irwin coast, which includes the town sites of Dongara and Port Denison, is morphologically complex, largely due to the influence of the Irwin River. During phases of lower sea level, the river has supported a coastal lagoon, with remnant river channels still evident in the high resolution bathymetry (Figure 10.1).

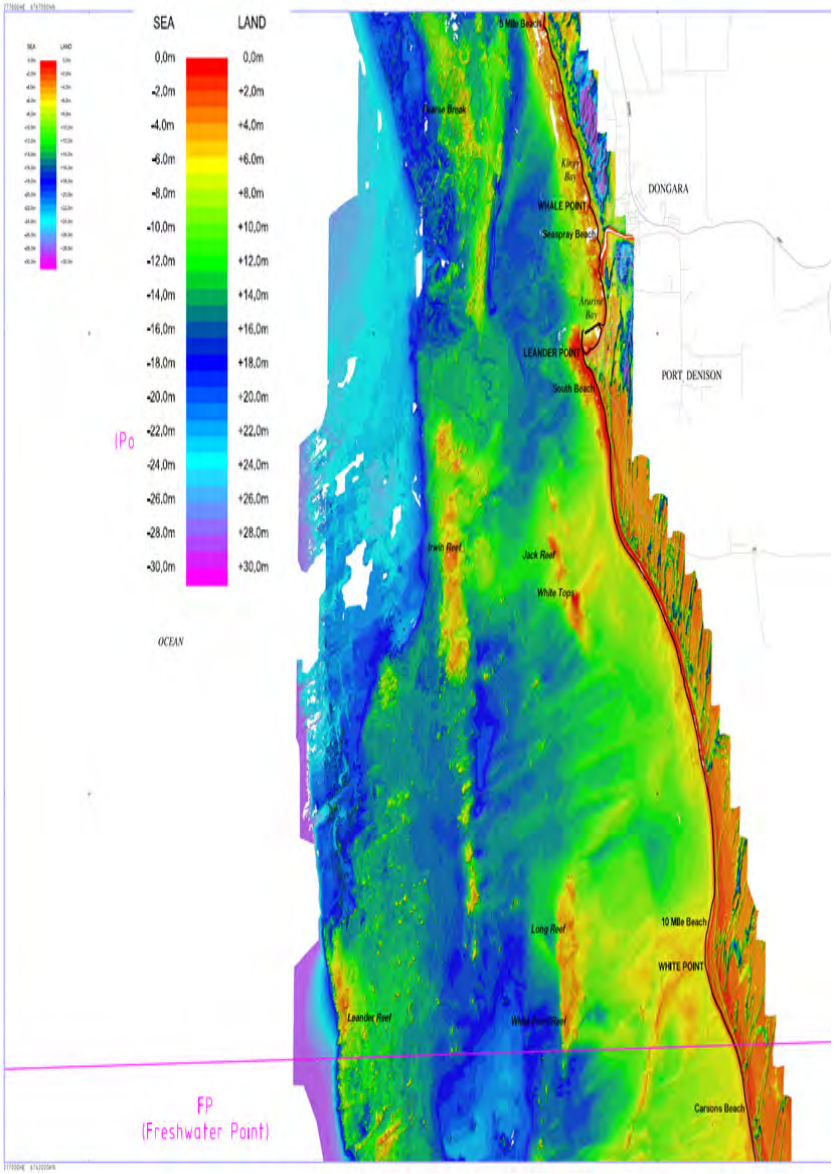


Figure 10.1: North Central Shire of Irwin Coast

Patches of offshore reef actively modify the nearshore wave climate. The resulting areas of shelter have supported accumulation of sand salients or tombola (Sanderson & Eliot 1996), as well as helping to preserve inshore reef

ridges, such as the sequence between Leander Reef and White Point (Figure 17). Reef sheltered areas are typically subject to a wider range of disturbing processes than the adjacent coast, particularly due to unusual storm directions, or periods of elevated sea level (Seashore Engineering 2018); however, the sheltering also encourages subsequent recovery, producing a locally dynamic coastline. The relative sensitivity of salients to sea level variation is demonstrated by rapid erosion of the coast near Denison Airstrip (Figure 10.2) which provides a cautionary warning for response to projected sea level rise.

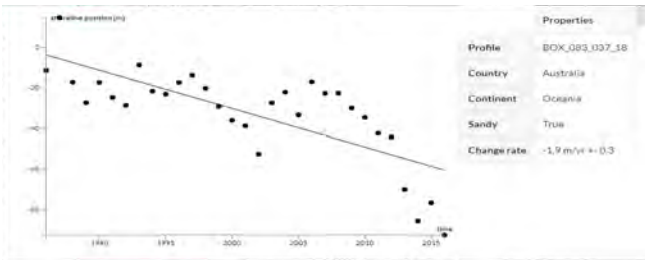


Figure 10.2: Shoreline Position near Denison Airstrip (from Shoreline Monitor)

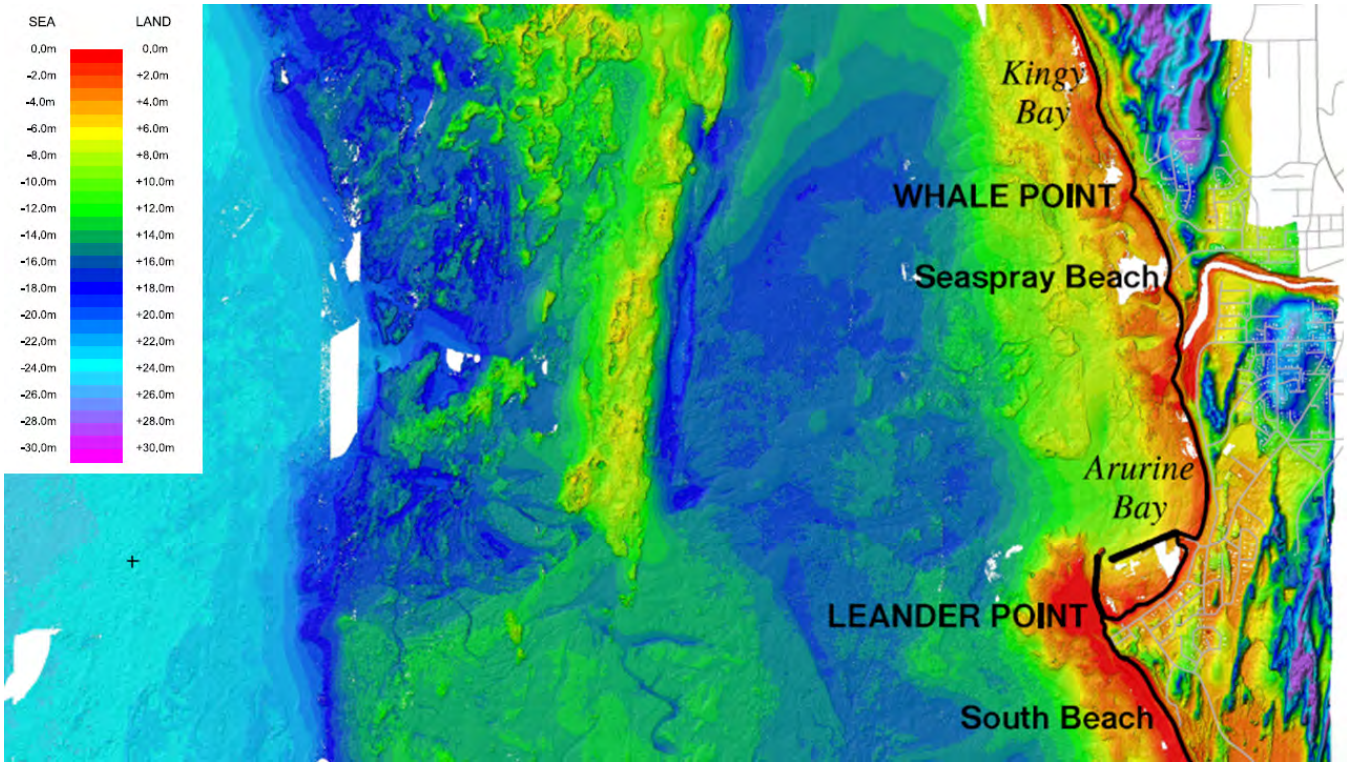


Figure 10.3: Localised Bathymetric Features in the Vicinity of Dongara-Port Denison

The effective barrier to alongshore sediment transport provided by Leander Point is suggested by the sandy accumulation behind Irwin Reef and corresponding absence inshore of Pearse Bank to the north; the alongshore barrier provided by the rock platform at Leander Point; and the high onshore sediment supply suggested by the active dunes between South Beach and White Point. This area has generally exhibited accretion over recent decades, however, the substantial influence of reef sheltering and its absence during high water level conditions is apparent at White Point (Figure 10.4), with the released material apparently supporting foredune growth to the north.

The beach between South Beach and White Point is comparatively exposed to wave action, with broken offshore reefs. This provides highly variable wave conditions, with associated cross-shore beach movement. Combined with the high potential for onshore sediment supply from wind drift, there is opportunity for cyclic dune formation and destruction, evidenced by frequent formation of scarps along this section of coast. In consequence, interventions on this section of coast, including beach access points, will have limited effective life (Figure 10.4).

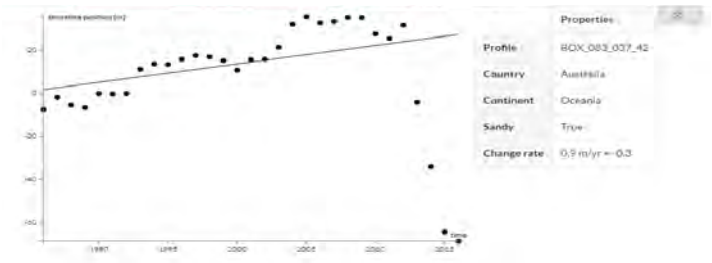


Figure 10.4: Shoreline Position at White Point (from Shoreline Monitor)

10.3 COASTAL PROCESSES AND MANAGEMENT SPECIFIC TO GRANNIES BEACH

Since construction of Port Denison Boat Harbour, ongoing erosion has occurred at Grannies Beach, Port Denison. From 1980-2010, loss was relatively gradual, with seasonal fluctuations in beach width. The erosion issue was exacerbated following construction of a revetment in front of the Holiday Parks caravan park in 2011. Erosion now threatens Ocean Drive and has forced closure of a section of dual use path.

Grannies Beach is located on the eastern side of Port Denison Boat Harbour, which was constructed in the lee of Leander Point, on the southern side of Arurine Bay (Figure 10.5). Leander Point naturally provides a substantial barrier to alongshore sediment transport and therefore this section of coast is subject to minimal sediment supply from offshore, or through irregular release of sediments from the river mouth. The natural coast developed as a 'stable' zeta-form bay on the downdrift side of Leander Point, and therefore the beach curvature relates to the pattern of wave sheltering and diffraction, characteristically with near zero sediment supply or loss (Hsu & Silvester 1996).

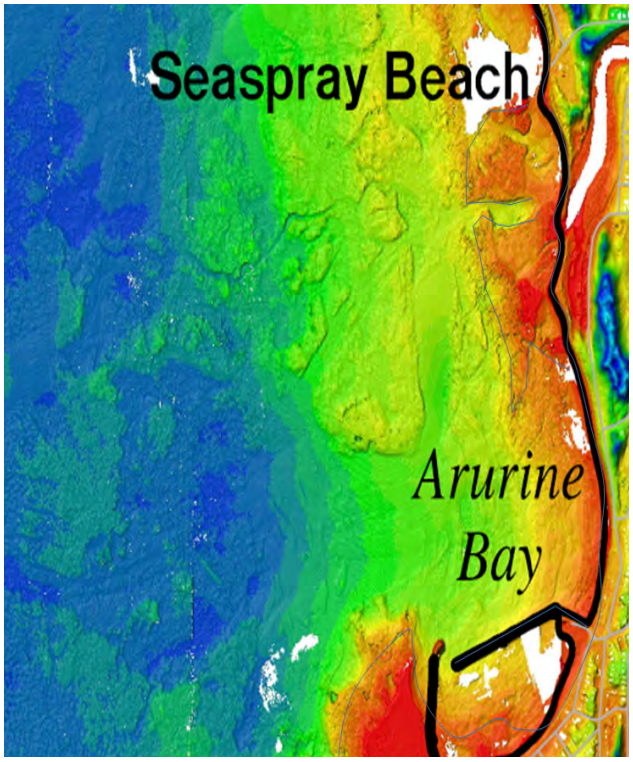


Figure 10.5: Extract from High Resolution Bathymetry

Alignment of the main harbour breakwater was designed to be within the lee of Leander Point from prevailing swell, and therefore minimise impact on the Arurine Bay coast (PWD 1976). It was recognised that some alteration of bay structure would be expected, to the modified wave climate, however, it was anticipated that a new stable bay shape would develop. A new bay shape was not predicted at the time, however, the expected response to Port Denison breakwaters can be inferred from application of zeta-form bay geometry, using MEPBay software which relates wave angle and headland control points to bay shape (Klein et al. 2003). Indicative curvature suggests that the original bay shape corresponded reasonably well to a zeta-bay form, and that construction of the main breakwater was likely to have created erosion pressure on Grannies Beach and Ocean Drive (Figure 10.6).

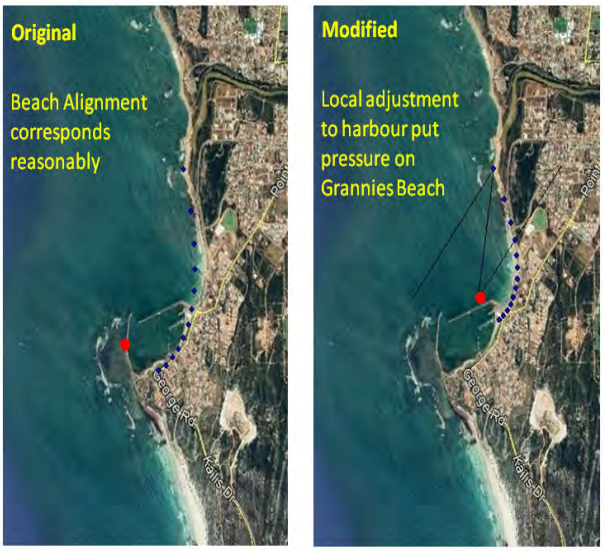


Figure 10.6: Expected Beach Response to Port Denison Breakwaters

Although this general pattern was observed, in the longer term, there was limited indication of declining erosion over 30 years, suggesting that a new 'stable' beach was not being established.

Continuation of unusual behaviour occurred after installation of the revetment in front of the Holiday Parks caravan park in 2011, designed to be in the lee of Port Denison main breakwater. Unlike the original harbour construction, this structure does not create a new point of diffraction, and therefore, following the theory behind zeta-form bays, would not modify the bay shape. However, subsequent behaviour has demonstrated an accelerated rate of erosion.

An alternative explanation for the erosion along Grannies Beach and Ocean Drive has been developed through the geomorphic frameworks approach (French & Burningham 2009), with consideration of the dynamic concepts of sediment transfer and storage. This interpretation suggests that coastal change within Arurine Bay has resulted from a combination of human actions and natural processes.

Prior to coastal engineering works, Arurine Bay was able

to achieve a measure of stability by balancing seasonally alternating northward and southward sediment transport. Variation in wave direction was accommodated by the presence of two sediment storage areas (Figure 10.7), with the southern storage area being in the lee of Leander Point and the northern storage area being behind the shelter of nearshore reefs, near to the present day Irwin River mouth (Figure 10.5).

For longer term coastal stability (relative) to occur in this coastal segment, there needed to be an approximate balance of seasonal sediment transport, which is largely determined by beach angle. In addition, to cater for seasonal dynamics, storage areas at either end need to be able to hold the seasonal volume of sediment exchange. As a headland, Leander Point had a very large storage capacity, whereas the reef controlled salient provided a much smaller storage volume. Consequently, extreme southward conditions would result in beach accretion, whereas extreme northward conditions would cause sediment to bypass the reef and effectively be lost from the beach segment. This framework provides the basis for an approximate balance of sediment volumes (Figure 10.7).

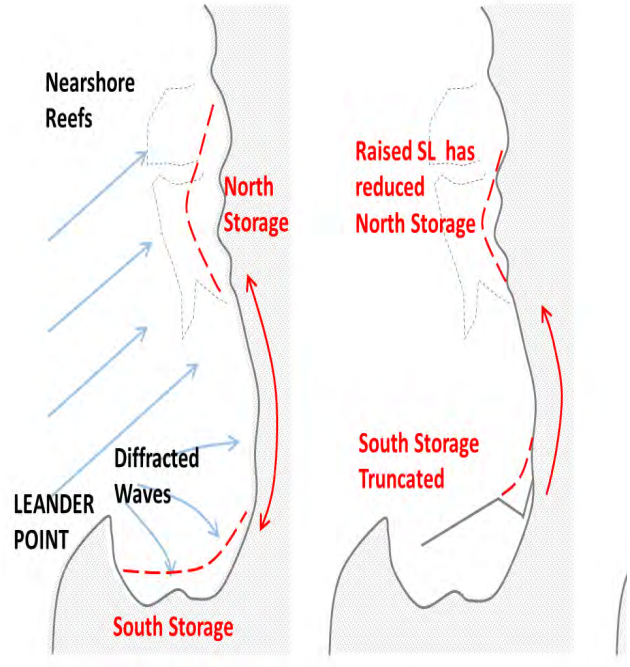


Figure 10.7: Original Controls for Arurine Bay and Subsequent Modifications

Construction of Port Denison Boat Harbour truncated the south storage area, reducing the effective beach length by 600m, but caused limited change to the alongshore seasonal sediment transport (Figure 10.7). This has the effect of reducing the capacity of the southern storage area to capture sediment during stronger southerly transport, and although there has been negligible change to sediment transfers under ambient conditions, a net loss was developed (Figure 10.8). The consequent response has been progressive erosion of the beach, which is greater toward the south (Figure 10.9).

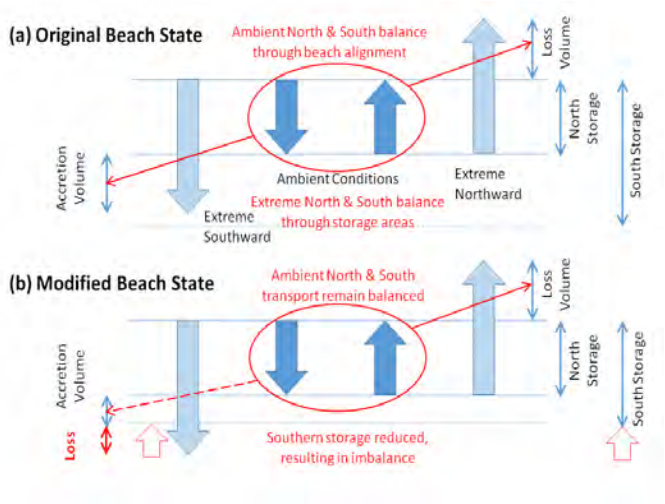


Figure 10.8: Conceptual Model of Beach Dynamics

Subsequent pressures to the beach have included:

- From 2011-2013, very high mean sea levels occurred during La Nina conditions, reducing the effective sheltering provided by the nearshore reefs and reducing the northern storage volume. As the effective storage capacity is determined by the proximity of the reef to the shore, associated beach retreat contributed to longer-term storage loss; and
- Construction of a 300m long revetment in front of Holiday Parks caravan park, which increased wave reflection and further truncated the beach length. These changes will have further reduced the effective southern storage volume.

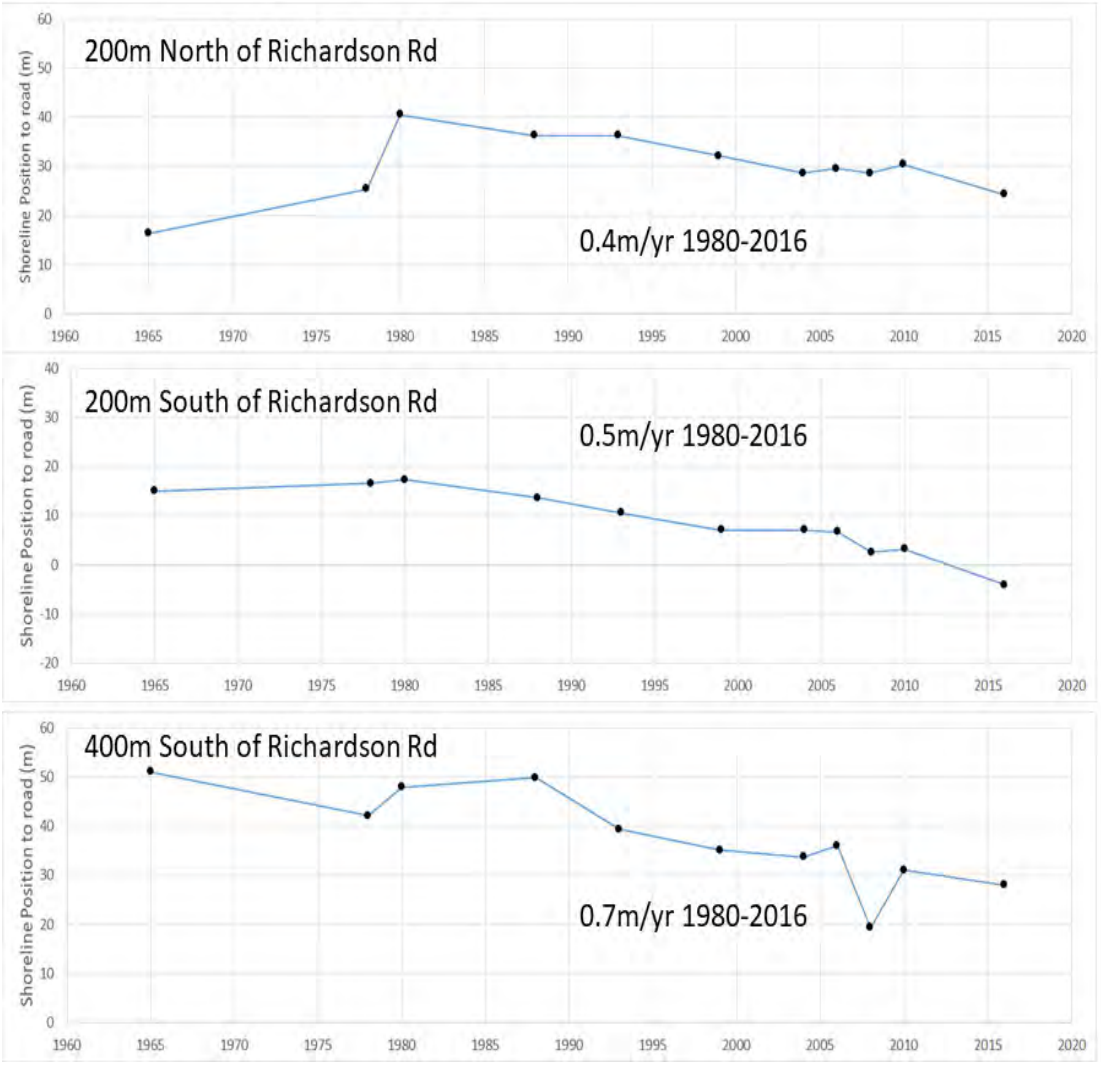


Figure 10.9: Vegetation Line Time Series for Grannies Beach

There is an immediate need to address the progressive erosion problem, as it is already impacting on Ocean Drive. Potential alternatives to be considered include:

- Relocation of Ocean Drive
- Ongoing renourishment
- Construction of a revetment along the affected foreshore
- Renourishment, with supporting reinforcement of the reef point structures to improve the longevity of placed material. This may involve enhancing the storages areas at either end of the beach, or construction of a groyne field (Figure 10.10). A preliminary indication of relative effectiveness of these three options has been developed using MEPBay, which suggests that groynes

may be required to address both pressure points at Grannies Beach and Ocean Drive.

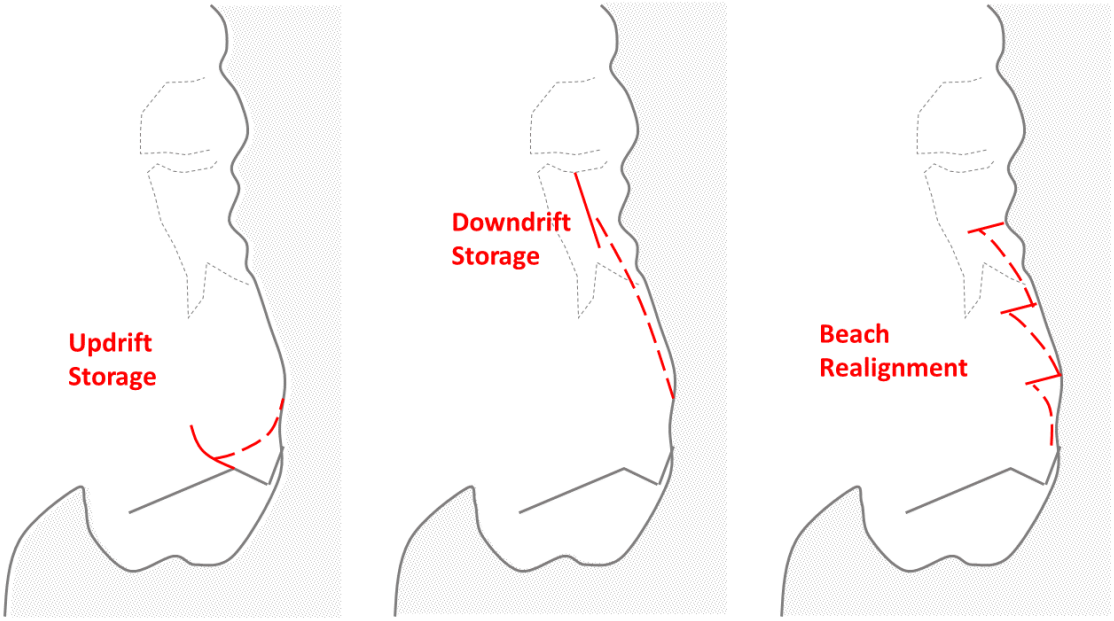


Figure 10.10: Generalised Coastal Engineering Options with Beach Amenity

Preliminary cost estimates have been prepared for all coastal engineering interventions (i.e. excluding relocation of Ocean Drive). It is noted that construction of a revetment along the length of Ocean Drive would effectively remove beach amenity.

Table 10.3 – Grannies Beach Engineering Options

	Option	Description	Annual Cost
Option 1	Relocate Ocean Drive		Not costed
Option 2	Ongoing Renourishment	18,000m3 per 5 years	$180,000
Option 3	900m long Revetment	900m long, 30-year life	$150,000
Option 4	Southern Storage	300m breakwater, 9,000m3 / 5 years	$240,000
Option 5	Northern Storage	200m breakwater, 18,000m3 / 5 years	$260,000
Option 6	Groyne Field	3x80m groynes, 9,000m3 / 5 years	$170,000



Figure 10.11: Preliminary MEPBay Check on Options



Rock Walling at Grannies Beach

Photo by Land Insights, May 2019

10.4 SOCIAL, RECREATION AND LAND USE

Sector 2 comprises beach locations located within the Dongara and Port Denison townsite and are primarily adjacent to residential areas or tourist sites (such as caravan parks). A description of each site is provided below.

SUNSET COVE

This existing Sunset Cove coastal location was created between 2001 and 2006, presumably in association with the housing development adjacent to this site. Previous to this, a sandy pedestrian access track existed to the south of the current car park.

A relatively large bitumen car park is located at this site which is surrounded by a grassed area to the south and east. A children's playground and picnic bench are located to the east of the carpark on the grassed area. A pedestrian track provides access to the beach. The pathway has bollards on either side to control movement of pedestrians (and to prevent disturbance to the adjacent dune system), however the pathway and bollards are now almost completely covered with sand.

The car park, grassed area and the start of the pedestrian track are located within Reserve 43544 which is a Shire-managed reserve for the purpose of public recreation.

Sandy pedestrian tracks also provide access to the beach from Sea View and Brady Road, just south of Sunset Cove.

SEASPRAY BEACH

Seaspray Beach is located adjacent to the Seaspray Beach Holiday Site. Pedestrian access is provided from the holiday site direct to the beach.

The Seaspray Beach Holiday Site comprises chalets, apartments, cabins, villas and powered sites for caravans. The northern part of the site is freehold property (Lot 502 on strata plan 31704), however a majority of the holiday site is located on reserve 25412 which has managed orders with the Shire of Irwin for the purpose of caravan park (with power to lease for any term not exceeding 30 years subject to the consent of the Minister for Lands).

The foreshore and beach area are reserved with the Shire of Irwin (reserve number 38046) for the purpose of recreation and foreshore management.

A well-established pedestrian pathway provides access from the holiday site to the beach. The pathway has bollards on either side to delineate the access track and to reduce dune disturbance. Some unsuccessful dune revegetation has taken place either side of the pedestrian track which can be attempted again at an appropriate time of the year.

A fish cleaning station and a sheltered BBQ and picnic area is provided at the top end of the pedestrian pathway.

To the north of the caravan park is a public car park, public amenities and a grassed area for recreation. Pedestrian access tracks lead from the car park to the beach. It should be noted that these facilities are entirely located on UCL, although they are managed by the Shire. This area of UCL has been committed under the Yamatji Nation Agreement to the Yamatji Land Estate. As the Shire currently manages this land and the Shire assets are located on this land there should be further discussion between the Shire and the native title claimants on the future management of this area.

IRWIN RIVER MOUTH

Irwin River Mouth comprises Reserve 38046 (northern side of the river mouth), UCL (through the centre of the river mouth) and Reserve 41087 (southern end of the river mouth). Both reserves have management orders with the Shire of Irwin. The purpose of Reserve 38046 is recreation and foreshore management and Reserve 41087 is foreshore management.

No facilities are provided at the Irwin River Mouth. Some pedestrian tracks cross through the dunes on the northern side of the river mouth. The southern side of the river mouth comprises the estuary on reserve 41087. A timber boardwalk is runs along the perimeter of the estuary to provide for bird watching and for enjoying the scenery. The boardwalk also provides pedestrian access to the beach.

Management of the Irwin River and estuary is provided in the Irwin River Estuary Management Plan (Land Insights and Shire of Irwin, 2014) and the Irwin Estuary Weed Management Plan (NACC, 2013).



Sunset Cove Beach Access

Photo by Land Insights, May 2019

NUNS POOL

Nuns Pool is a low-key coastal site located just south of the Irwin River mouth. It comprises a small bitumen car park. Some informal pedestrian tracks provide access to the beach. The car park and beach are located within Reserve 41087. This reserve has management orders with the Shire of Irwin for the purpose of foreshore management.

SURF BEACH

Surf Beach is located to the north of the BIG4 Dongara Denison Beach Holiday Park located along Ocean Drive. It comprises a small bitumen car park and pedestrian access to a small beach. No camping is permitted at Surfs Beach.

Surfs Beach is located within Reserve 41088 which has management orders with the Shire of Irwin for the purpose of Recreation (with power to lease for any term not exceeding 21 years subject to the consent of the Minister for Lands).

Reserve 25826 has management orders with the Shire of Irwin for the purpose of recreation camping and caravan park (with power to lease for any term not exceeding 30 years subject to the consent of the Minister for Lands).

GRANNIES BEACH

Grannies Beach is located adjacent to the BIG4 Dongara Denison Beach Holiday Park, just north of the Port Denison foreshore. It comprises a small sandy beach with a rock sea wall to the north. The sea wall was constructed in 2011 to allow for the development of additional chalets at the Holiday Park. Inland from the beach is a grassed area for picnics and a children's playground. No camping is permitted at Grannies Beach.

Grannies Beach is located within Reserve 41088 which has management orders with the Shire of Irwin for the purpose of Recreation (with power to lease for any term not exceeding 21 years subject to the consent of the Minister for Lands). A small section of the grassed area is within Reserve 40030 which has management orders with the Shire of Irwin for the purpose of Foreshore Management. The car park and grassed area next to the holiday park is located in Reserve 46561 which has management orders with the Shire of Irwin for the purpose of recreation (with power to lease for any term not exceeding 5 years subject to the consent of the Minister for Lands).

The BIG4 Dongara Denison Beach Holiday Park is located within Reserve 25826 which has management orders with the Shire of Irwin for the purpose of recreation camping and caravan park (with power to lease for any term not exceeding 30 years subject to the consent of the Minister for Lands).

PORT DENISON FORESHORE

The Port Denison foreshore includes the area within the fishing boat harbour. The foreshore largely comprises of grassed areas, narrow beaches and bitumen car parks. Future development and management for the foreshore area is addressed by the Port Denison Foreshore Masterplan (Shire of Irwin and RPS, 2013). The Master Plan proposes new car parking, new amenities block, creation of sandy beach areas, children's play area, new fig and pine trees and construction of footpaths.

The Port Denison foreshore is located on Reserve 41088 which has management orders with the Shire of Irwin for the purpose of Recreation (with power to lease for any term not exceeding 21 years subject to the consent of the Minister for Lands).

SOUTH BEACH

South Beach is located south of the Port Denison Harbour and the Dongara Tourist Park. It is accessed via White Tops Drive which leads to a bitumen car park. The car park comprises a shelter, picnic benches and bins.

Vehicular and pedestrian access is provided to the beach. Vehicles are permitted to drive to the south (left turn at the entrance) but not to the north. Dogs are permitted both on-lead and off-lead in certain locations along South Beach.

The Dongara Denison Surf Life Saving Club and the Starfish Café are located at South Beach. Their respective buildings are situated next to each other to the south of the bitumen car park. There are toilets located within the café, however these are not open to the public when the café is closed.

South Beach is located on Reserve 137 which has management orders with the Shire of Irwin for the purpose of Common.

The reserve adjoining to the north of South Beach has some limited pedestrian access from Dongara Tourist Park. This section leads to a rocky cliff rather than a sandy beach area, although pedestrians can continue south to South Beach. It is located on Reserve 42150 which has management orders with the Shire of Irwin for the purpose of Recreation. Although management orders are with the Shire, a majority of the pedestrian access maintenance is undertaken by the Dongara Tourist Park.

10.5 ENVIRONMENT

Sector 2 comprises the Port Denison and Dongara townsites and has been developed with a harbour, caravan parks, commercial buildings, recreational buildings and housing. As a result of this development, the coastal environment in Sector 2 has been modified through the removal of vegetation and modification of landscape in certain places. The coastal sites within Sector 2 are also more highly used than sites further along the coast. This higher level of use can also result in increased disturbance to the coastal environment without careful management.

Coastal vegetation has been modified along the Point Denison Foreshore and from Grannies Beach to Surf Beach. South Beach from Dongara Tourism Park to the southern end of Reserve 137 has been partially degraded from use, however, there has been no large-scale clearing for development. Vegetation north of Surf Beach is relatively undisturbed. Seaspray Beach is another popular coastal site which has some evidence of degradation, however, is largely undeveloped.

Vegetation disturbance occurs from the creation of new pedestrian tracks and by driving vehicles through the dunes. The most effective way of managing vegetation disturbance is to encourage pedestrians to use designated pathways, to prevent vehicles driving through the dunes and by closing new tracks as soon as they form (employing appropriate methods such as brushing, physical barriers, signage etc).

Coastal vegetation has not been formally assessed in Sector 2 apart from the vegetation around the Irwin River Mouth. This assessment was undertaken by ATA Environmental in 2005. Further information on the environment is provided in Chapter 7.

The only surface water feature in this Sector is the Irwin River which discharges into the Indian Ocean when flooding is significant enough to break through the river mouth sandbar. The river mouth is a highly valued ecological area for vegetation and birdlife. It also contributes to the aesthetics of the town. The river mouth is undeveloped except for some pathways/boardwalks and bird hides.



South Beach

Photo by Land Insights, May 2019

10.6 SECTOR 2 – ISSUES AND OPPORTUNITIES

A review of all issues and opportunities and how they have helped form the recommendations is provided below.

Table 10.4 - Sector 2 Issues and Opportunities

ISSUES	OPPORTUNITIES
TENURE	
A majority of the coastal land within Sector 2 is located within reserves with management orders with the Shire of Irwin. A few parcels of UCL exist which are currently used for coastal recreation. One small parcel is located at the Irwin River Mouth. A few parcels of UCL are located at Seaspray Beach. These parcels are currently developed with a car park, toilets and beach access. An area allocated as 'road reserve' is located south of Port Denison Harbour at the end of Point Leander Drive and Coles Way. This road reserve is not developed as a road and is currently vegetated and used for coastal access.	The areas of UCL are currently already used for coastal recreation and, in the case of Seaspray Beach, have been developed with coastal facilities and are already managed by the Shire. The parcel of UCL at the Irwin River Mouth is also managed by the Shire and a bird hide already exists in this location. It is therefore recommended that these areas of UCL are transferred to a reserve for recreation purposes with management orders with the Shire. The road reserve located at the end of Point Leander Drive and Coles Way could also be transferred to a coastal reserve with management orders with the Shire.
Seaspray Beach Holiday Site is located partially within freehold property (Lot 502 on strata plan 31704), and the remainder is on reserve 25412 which has management orders with the Shire of Irwin. The coastal area adjoining the caravan park is within reserve 38046 which has management orders with the Shire of Irwin. There is pedestrian access from the caravan park to the beach, however the access track, the fish cleaning station and picnic shelter are completely located on the Shire reserve. The pedestrian access is currently from the freehold lot.	There is an opportunity for the Shire to work with the Holiday Site owners with regards to management of the access and facilities located within the Shire reserve. Should there be any changes to ownership of the freehold lot and the access point is removed it may be necessary to shift the access slightly so that it is from reserve 25412.

VEHICLE ACCESS	
Vehicle access to coastal sites within Sector 2 is generally good as each site has access from a gazetted road. Car parking areas are provided at most of the coastal sites. Some off-road vehicle tracks are created through the dunes in some places, such as at South Beach. The vehicle access at South Beach is problematic as it faces the prevailing winds which results in sand being blown and deposited on the access. The sand needs to be periodically moved by the Shire. Realignment of the vehicle access is also an issue as curving the access away from the prevailing winds will result in a cured road which could have sight problems. Moving the access will also cause dune disturbance.	Duplicate and unnecessary off-road vehicle tracks through the dunes should be closed, especially where vehicle access is already provided via a gazetted road. The vehicle track from George Street/Kailis Drive through the dunes to White Tops Drive should be closed as a gazetted road already provides access to South Beach. The vehicle access to the beach at South Beach will most likely need to stay with its current alignment. The Shire may be required to move sand from the track periodically. A Clearing Permit has been submitted to allow the Shire to manage sand drift in this location.
PEDESTRIAN ACCESS	
Pedestrian access tracks have been created where necessary through the dunes from car park areas or from the road. It is important that a minimal number or tracks are provided to result in the least amount of vegetation and dune disturbance. On the whole, there does not appear to be many duplicate or unnecessary pedestrian tracks through the dunes. Nevertheless, it is important for the Shire to close and rehabilitate any duplicate tracks as soon as they form. Ad-hoc tracks are located through the dunes north of the river mouth on Reserve 38046. The pedestrian access at Sunset Cove was originally constructed with bollards on either side of the track. Since construction the dunes have moved slightly and sand has covered the track so that the bollards are partially or completely covered and may create a tripping hazard.	The Shire should monitor pedestrian tracks and close any new or duplicate tracks as soon as they form. The ad-hoc tracks through Reserve 38046 should be closed and rehabilitated. It is recommended that the bollards on the Sunset Cove pedestrian track are either removed or replaced.
FACILITIES	
Many of the coastal sites within Sector 2 are already provided with facilities such as playgrounds (Sunset Cove and Grannies Beach), picnic benches, shelters, rubbish bins and grassed areas. Some facilities are beginning to show some age (such as the shelter and picnic bench at South Beach car park), but most are in good condition.	Some coastal sites would benefit from having a few additional facilities such as additional shelters (for example at Sunset Cove, South Beach and Grannies Beach). The need for these can be determined based on demand and budget. A toilet or amenities block could also be considered at some sites.

SIGNAGE	
Signage is provided at most sites, however it is not consistent, and some sites do not have any signage.	The Shire should employ a coastal signage strategy which provides for the use of consistent signage at coastal sites. Most importantly, the signage should include standard symbols to communicate warnings and regulations. Signage can also include educational and interpretative information, locational, directional and other information as considered relevant to each site.
COASTAL PROCESSES	
Continuous erosion at Grannies Beach, Surf Beach and the coastline north of the beach is now encroaching onto Ocean Drive. Erosion control work at Grannies Beach has been ongoing for many years. The beach between South Beach and White Point is comparatively exposed to wave action and has high potential for onshore sediment supply from wind drift. As a result, any developments such as beach access points will have a limited life.	There are some options to address erosion at Grannies Beach and Ocean Drive: • Relocation of Ocean Drive • Ongoing renourishment • Construction of a revetment along the affected foreshore • Renourishment, with supporting structures to improve the longevity of placed material. Management of areas with high sediment movement such as at South Beach will need to consider the need to provide new access points as the coast changes and to relocate buildings such as the Surf Life Saving Club if required.



Uncontrolled Beach Access from Kailis Drive, South Beach

Photo by Land Insights, May 2019



Limestone Walling, Grannies Beach

Photo by Land Insights, October 2019

10.7 SECTOR 2 – RECOMMENDED ACTIONS

OBJECTIVES

To consider opportunities to enhance and improve management of the coastal sites within Sector 2 as significant recreational nodes through the provision of low impact day use facilities, access and ongoing management of impact from use.

ACTIONS

The recommended actions for Sector 2 are listed in the table below. Recommendations are shown on Plans 10.2 to 10.7.

Table 10.5 - Sector 2 Actions

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
SUNSET COVE			
S1	Monitor and manage the access track from the car park to the beach to ensure ongoing ease of access, protection/separation of the pathway and adjoining dunes. Consider the use of log and chain steps rather than fixed infrastructure.	O	Shire of Irwin
S2	Undertake an annual review of sand drift at the beach access. If required, replace the existing path with a NW facing segment to reduce sand drift.	O	Shire of Irwin
S3	Manage the narrow, mobile dunes in this area (and to the north) following guidance (for activities such as repairing blowouts, brushing, revegetation, stabilisation etc) in the WAPC (2003) Coastal Management Manual.	O	Shire of Irwin
SEASPRAY BEACH			
S4	Review tenure north of Church Street to include within R43544.	S	Shire of Irwin
S5	Manage the pedestrian pathways across the dunes to the beach from Sea View and Brady Road in accordance with the Coastal Management Manual (WAPC, 2003).	O	Shire of Irwin
S6	Review arrangements related to the use of private parking and grassed area on Reserve 38046 to ensure that public use of these areas is maintained.	S	Shire of Irwin
S7	Undertake improved dune management, in accordance with WAPC (2002) Coastal Management Manual, to limit pedestrian damage and reduce sand drift.	O	Shire of Irwin
S8	Undertake an annual review of existing dunes, to confirm recovery from recent disturbance. If there is no substantial recovery within 5 years, undertake dune restoration works.	O	Shire of Irwin
S9	Determine a trigger for planned retreat or relocation of Seaspray Caravan Park via the current LDP process.	M	Shire of Irwin
S10	Review tenure at the Irwin River Mouth to include within R41087 or R38046.	S-M	Shire of Irwin
S11	Continue to implement the recommendations of the Irwin River Estuary Management Plan (Shire of Irwin and Land Insights, 2014).	O	Shire of Irwin

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
SURF BEACH & GRANNIES BEACH			
S12	Truncate the north-west corner of the car park subject to erosion on Ocean Drive.	S	Shire of Irwin
S13	Close the northern access of this car park and create a new access point.	M	Shire of Irwin
S14	Continued erosion is expected along Grannies/Surf Beach and will require road and carpark relocation in the longer-term.	M	Shire of Irwin
S15	Interim options to defer road relocation should be evaluated, including reinforcement of existing nearshore reef control point/ construction of Groyne field (refer to Table 10.3)	M – 10 years	Shire of Irwin
PORT DENISON FORESHORE & DENISON SOUTH			
S16	Refer to the 'Port Denison Foreshore Master Plan' (Shire of Irwin and RPS, 2013) for the development and management of the Port Denison Foreshore.	O	Shire of Irwin
S17	Close the road reserve located between Reserve 37877 and Reserve 41088 and place in a reserve with management orders with the Shire for the purpose of 'foreshore protection'.	S-M	Shire of Irwin
S18	Refer to the 'Local Development Plan and Foreshore Management Plan Dongara Tourist Park' (Halsall and Associates, 2016) for management of Reserve 42150.	O	Shire of Irwin
SOUTH BEACH			
S19	Close and rehabilitate vehicle track located between White Tops Drive and George Street.	S	Shire of Irwin
S20	Undertake improved dune management, in accordance with WAPC (2003) Coastal Management Manual, to limit pedestrian damage and reduce sand drift.	O	Shire of Irwin
S21	Progressive coastal dune growth is likely to occur. Dune growth should be monitored, with a trigger for relocation of Surf Life Saving Club and toilet facilities identified.	O	Shire of Irwin

RECOMMENDATIONS:

1. Monitor and manage the access track from the car park to the beach to ensure ongoing ease of access, protection/ separation of the pathway and adjoining dunes. Consider the use of log and chain steps rather than fixed infrastructure.

2. Undertake an annual review of sand drift at the beach access. If required, replace the existing path with a NW facing segment to reduce sand drift.

3. Manage the narrow, mobile dunes in this area (and to the north) following guidance (for activities such as repairing blowouts, revegetation, stabilisation etc) in the WAPC (2002) Coastal Management Manual.



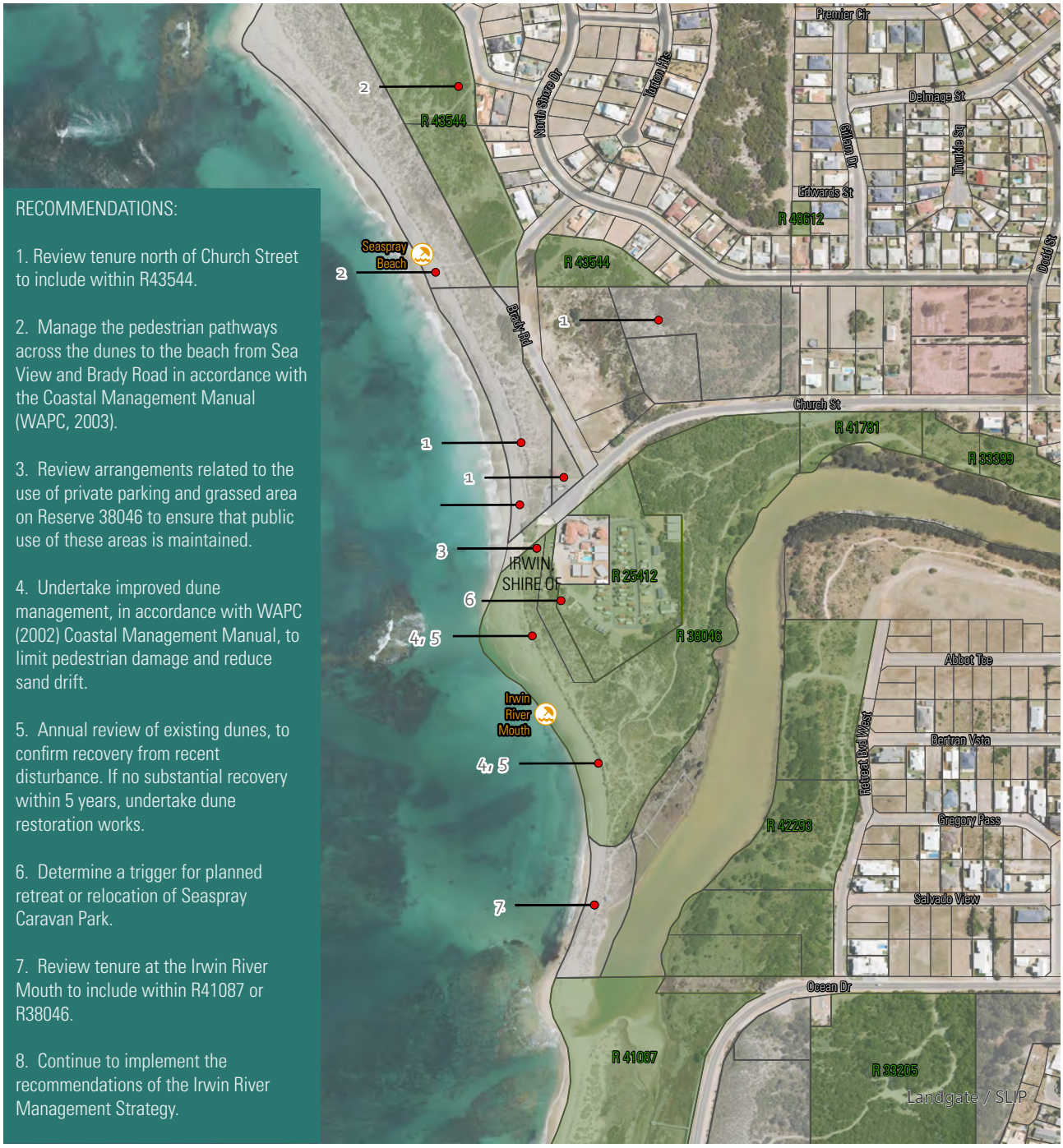
Cadastre
UCL
Reserve - Shire of Irwin

N

1:2,500

0 25 50 75 100 m

Plan 10.2: King Bay / Sunset Cove (Sector 2)



Plan 10.3: Seaspray Beach (Overview)
Sector 2

RECOMMENDATIONS:

1. Truncate the north-west corner of the car park subject to erosion on Ocean Drive.

2. Close the northern access of this car park and create a new access point.

3. Continued erosion is expected along Grannies/Surf Beach, and will require road and carpark relocation in the longer-term.

4. Interim options to defer road relocation should be evaluated, including reinforcement of existing nearshore reef control point.



Cadastre
UCL
Reserve - Shire of Irwin
Other Reserves

N

1:7,500

0 50 100 150 200 m

Plan 10.4: Surf Beach and Grannies Beach (Overview)
Sector 2

RECOMMENDATIONS:

1. Refer to the 'Port Denison Foreshore Master Plan' (Shire of Irwin and RPS, 2013) for the development and management of the Port Denison Foreshore.



Cadastre
UCL
Reserve - Shire of Irwin
Other Reserves
Heritage - State Register

N

1:7,500

0 75 150 225 300 m

Plan 10.5: Boat Harbour & Port Denison Foreshore (Overview) Sector 2



RECOMMENDATIONS:

1. Close the road reserve located between Reserve 37877 and Reserve 41088 and place in a reserve with management orders with the Shire for the purpose of 'foreshore protection'.

2. Refer to the 'Local Development Plan and Foreshore Management Plan Dongara Tourist Park (Halsall and Associates, 2016) for management of Reserve 42150.

Cadastre
UCL
Reserve - Shire of Irwin
Other Reserves
Freehold - Shire of Irwin
Heritage - State Register

N

1:5,000

0 50 100 150 200 m

Plan 10.6: Denison South (Overview)
Sector 2



RECOMMENDATIONS:

1. Close and rehabilitate vehicle track located between White Tops Drive and George Street.

2. Undertake improved dune management, in accordance with WAPC (2002) Coastal Management Manual, to limit pedestrian damage and reduce sand drift.

3. Progressive coastal dune growth is likely to occur. Dune growth should be monitored, with a trigger for relocation of SLSC and toilet facilities identified

4. Encourage pedestrians to use the existing access tracks.

5. Close and rehabilitate new pedestrian tracks as soon as they form.

Cadastre
UCL
Reserve - Shire of Irwin
Other Reserves
Mining Tenement

N

1:5,000

0 50 100 150 200 m

Plan 10.7: South Beach (Overview)
Sector 2

11.0 sector 3 – southern nodes

11.1 DESCRIPTION

LOCATION

Sector 3 extends from South Beach to the southern boundary of the Shire. It includes the following key coastal sites:

- North Cliff Head
- Cliff Head
- South Cliff Head
- Freshwater Point
- North Knobby Head
- Knobby Head

Concept Plans are provided for these key nodes. There are a range of other sites also located within this Sector where standard management will apply. These sites are shown in Appendix C.

The extent of sector 3 is shown on Plan 11.1.



Cliff Head Camping Node

Photo by Land Insights, May 2019

PLANNING AND TENURE

The Shire of Irwin Local Planning Scheme No. 5 (WAPC, 2008) identifies the following zones and reserves within Sector 3.

Table 11.1 - Sector 2 zoning

LOCATION	ZONE/RESERVE
South of Port Denison to North Cliff Head	Reserved as Conservation for Beekeepers Nature Reserve.
North Cliff Head to the Shire's southern boundary	Coastal area is reserved as Local Reserve.

Sector 3 is entirely located within reserves. These are managed by the Shire except for Reserve 24496 which is managed by the DBCA. A description of all reserves along the coast is provided in the table below.



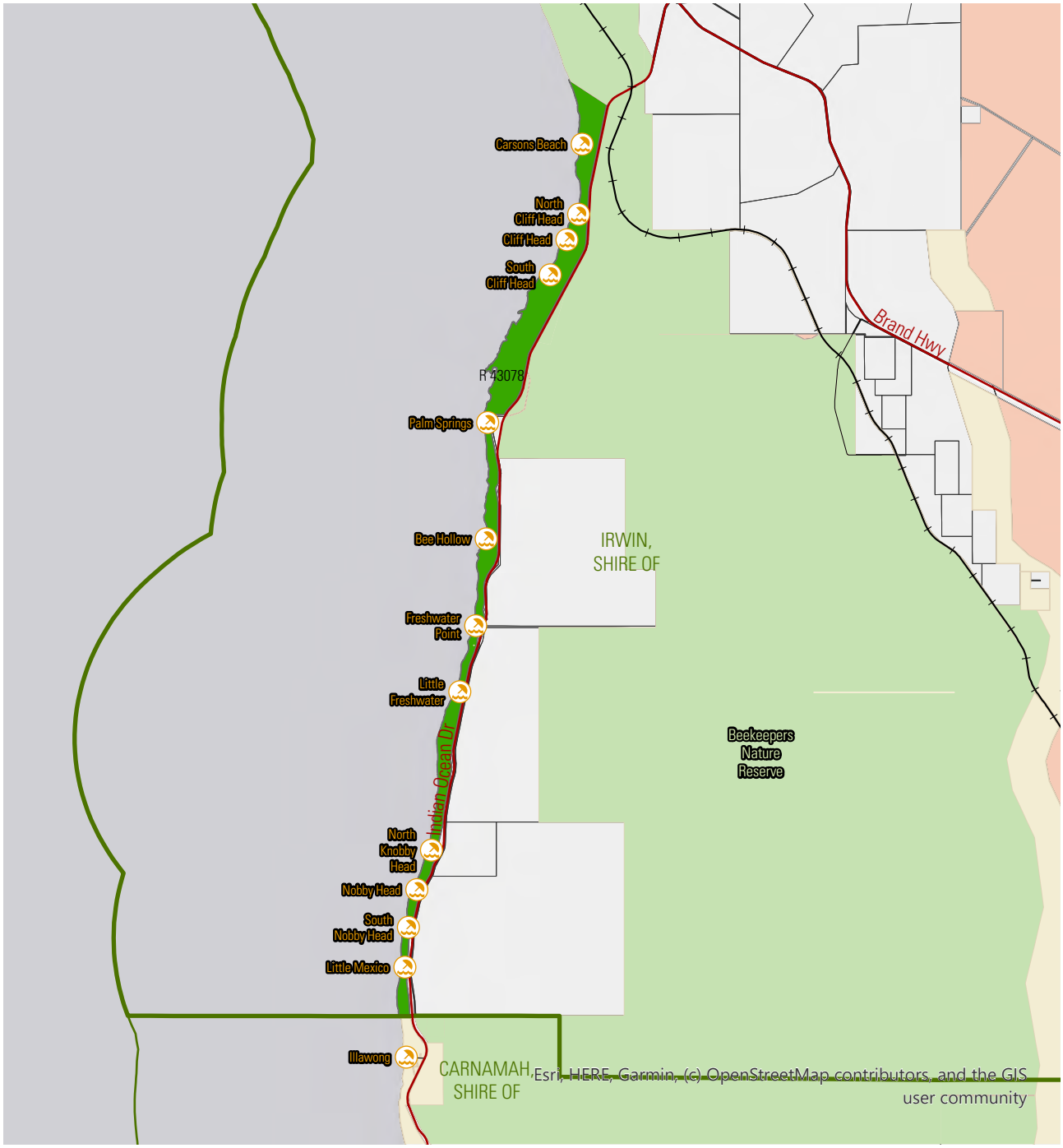
South Cliff Head Camping Node

Photo by Land Insights, May 2019



North Cliff Head Camping Node

Photo by Land Insights, May 2019



Plan 11.1: Sector 3 Overview

Table 11.2 - Sector 3 Reserves

RESERVE NO.	LOT NO.	PLAN NO.	LOCATION	PURPOSE	MANAGEMENT ORDER
43078	11982	P243167	Little Mexico to North Cliff Head	Parkland recreation and the letting of cottages existing thereon on 14/2/1994 (with power to lease for any term not exceeding 8 years subject to the consent of the Minister for Lands).	Shire of Irwin
24496	12174	P039607	Beekeepers Reserve	Protection of Flora	National Parks and Nature Conservation Authority
39270	11560	187025	South of Freshwater Point	Navigation Beacon Site	Minister for Transport

11.2 COASTAL PROCESSES

The southern coast of the Shire of Irwin, which includes the series of small coastal nodes and fishermen's shacks (Figure 11.2 and Figure 11.3), has a wide, shallow nearshore area, resulting in substantial wave damping for both extreme and ambient wave conditions. The shoreline orientation promotes alongshore sediment transport, with limited dune building. This interacts with local variation in seabed structure, particularly nearshore reef platforms, to create small zones of sediment accumulation, which subsequently evolve, typically migrating as a 'pulse' of sediment alongshore, which gradually widens in alongshore length. There is a relative lack of capacity for alongshore dunes to build elevation from wind-blown sand transport due to the coastal orientation. This is modified locally where there is a cross-shore feature such as a rock headland or a sand salient toward a nearshore reef, resulting in high dunes building on the south side of headlands or formation of foredune 'lobes' such as has built recently at Cliff Head.

The ability of rock headlands to capture sediment on their southern side can affect the relative availability of alongshore sediment supply. This has been locally highlighted at Freshwater Bay, where rapid erosion occurred on the downdrift (northern side) from 2013-2015 (Figure 11.1). For other headlands, including Cliff Head and Knobby Head, sufficient beach width remained during this period for sand supply to naturally bypass. This behaviour is important for the south Irwin coast in the context of projected sea level rise, as general coastal retreat will cause the headlands to have greater influence, producing local downdrift 'scalloping' similar to that observed at Freshwater Bay.



Freshwater Point Camping Node

Photo by Land Insights, May 2019

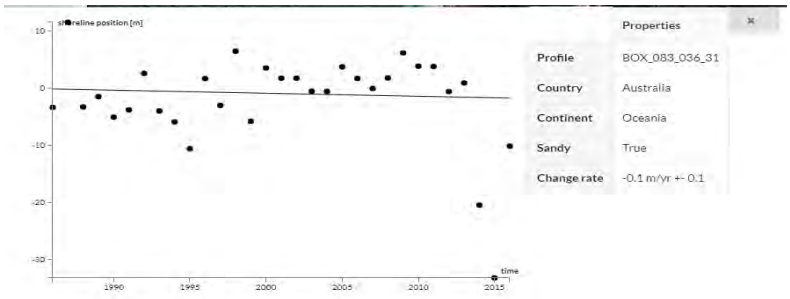


Figure 11.1: Shoreline Position at Freshwater Bay (from Shoreline Monitor)

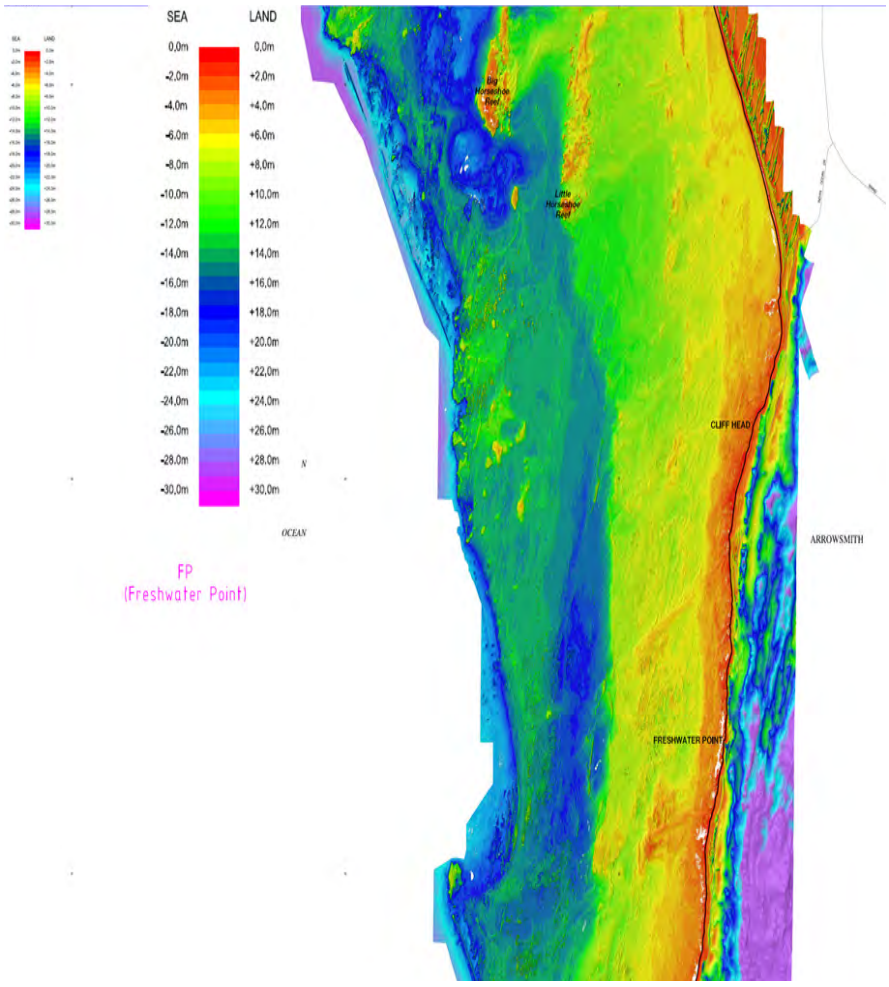


Figure 11.2: South Central Shire of Irwin Coast

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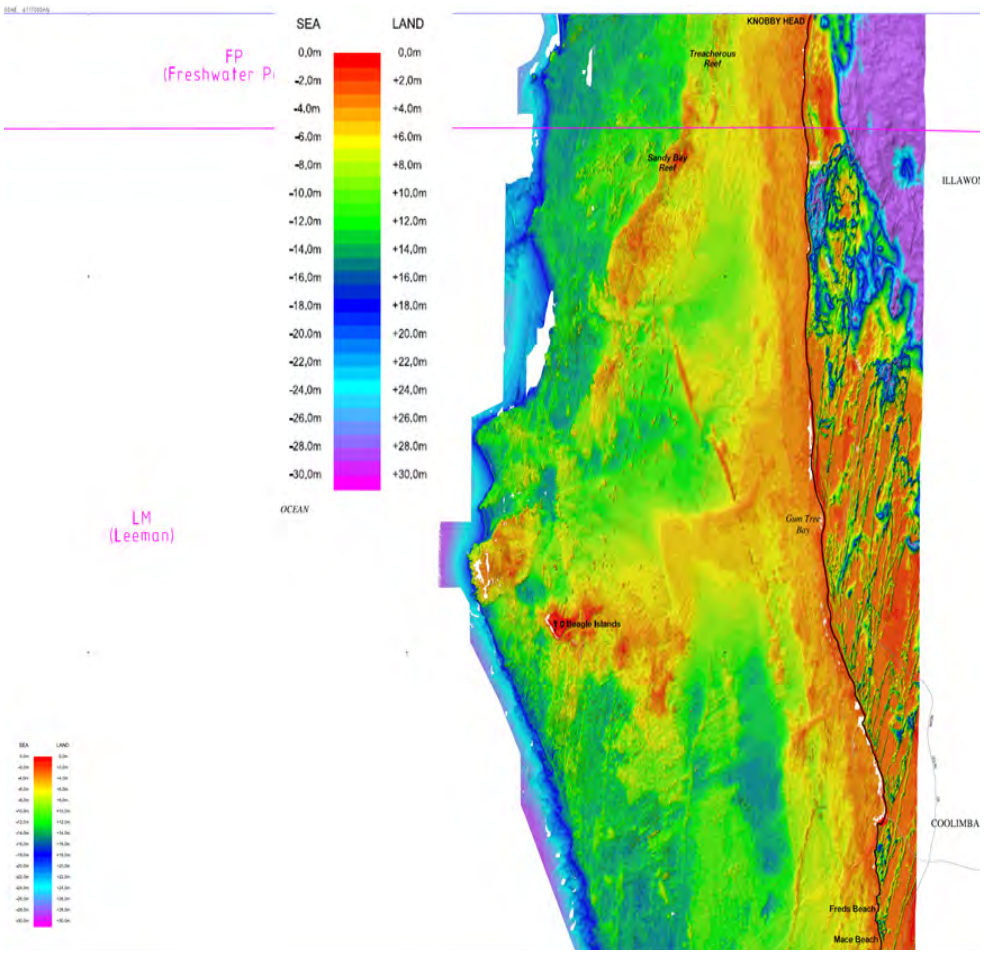


Figure 11.3: South Shire of Irwin Coast

11.3 SOCIAL, RECREATION AND LAND USE

NORTH CLIFF HEAD, CLIFF HEAD AND SOUTH CLIFF HEAD

This site comprises of North Cliff Head, Cliff Head and South Cliff Head which are all slightly separate coastal sites located in close proximity to one another.

The entrance signage states that the site is a '72-hour rest area'. Camping is permitted up to three nights in any period of 28 consecutive days at either Cliff Head, Knobby Head or Freshwater Point. Camping is currently available free of charge (although the Shire is currently in the process of implementing paid camping at these nodes in 2020). The Shire Community Ranger occasionally checks on the coastal sites to make sure that visitors aren't staying too long and are abiding by the Shire rules.

The following facilities are provided:

- North Cliff Head – One toilet block (older than the others)
- Cliff Head – One toilet block, skip bin.
- South Cliff Head – Two new toilet blocks, shelter with picnic benches, fire pit and skip bin.

Camping bays exist along the tracks leading north from Cliff Head. While the camping areas are not signposted or fenced, they seem to provide sufficient space for campers and there is no evidence of native vegetation degradation around the edges.

Some fishermen shacks remain at Cliff Head, although this is a significant reduction from the past.

A small jetty was previously located at Cliff Head, however this was removed by locals/shack owners in December 2018. The reason for removing the jetty was due to sand accretion along the beach from the past few years which had essentially completely covered the jetty.

FRESHWATER POINT AND LITTLE FRESHWATER

Freshwater Point is another popular camping spot along this Sector. It is one of the three camping spots (the other two being Knobby Head and Cliff Head) which are permitted '72-hour rest areas' in which campers can stay at any of the three locations for up to three consecutive days. Access is from a track leading from Indian Ocean Drive.

There is space for camping on the beach, although room is limited due to the topography (rising dunes to the east and a headland to the south).

There is evidence of old shacks at Freshwater Point. Recent coastal erosion has eaten away at the beach and most of the shacks have fallen into the sea. The only remains are the concrete pads which are currently falling apart. No shacks remain at Freshwater Point.

Facilities at Freshwater Point include a long-drop toilet and a skip bin.

Crayfishermen boats moor within the bay at Freshwater Point.

The limestone cliff to the south of the bay offers protection to the beach area from strong south-westerly winds. There is evidence of pedestrian tracks up the cliff. This can potentially be a safety issue and signage with some warnings of the dangers will be beneficial.

NORTH KNOBBY HEAD

North Knobby Head is accessed via Indian Ocean Drive. A limestone track leads into the site and well-established tracks weave throughout to provide access north and south and to fishermen shacks.

Only approximately five shacks exist at North Knobby Head, which is a reduction to the original number.

The entrance signage at North Knobby Head states that the site is a '72-hour rest area'. Camping is permitted up to three nights in any period of 28 consecutive days at either Cliff Head, Knobby Head or Freshwater Point. Camping is currently available free of charge.

Facilities available at North Knobby Head include a rubbish bin for waste and long-drop toilets. The Shire ranger regularly checks on the coastal sites to make sure that visitors aren't staying too long and are abiding by the Shire rules.



Beach Access, Nobby Head

Photo by Land Insights, May 2019

11.4 SECTOR 3 – ISSUES AND OPPORTUNITIES

A review of all issues and opportunities and how they have helped form the recommendations is provided below.

Issues and opportunities for Sector 3 is provided in the table below.

Table 11.3 - Sector 3 Issues and Opportunities

ISSUES	OPPORTUNITIES
DEVELOPMENT PLAN	
The Development Plan prepared in 2000 recommended extensive development of key nodes in the Shire's south. While some of the lower-key elements have been implemented, the majority of the larger scale tourist-based proposals have not. It is suggested that the significant development proposed within this Sector be scaled back significantly.	There has been a significant increase in nature-based camping and RV accommodation demand throughout Australia, which has seen the popularity of the southern coastal nodes increase significant for short-term camping. This has been reflected in Council Policy (e.g. Non-Commercial Camping Policy) and the promotion of Dongara as being 'RV Friendly' with the provision of appropriate facilities. Some improvements have already been put in place by the Shire in recent years and following some informal discussion between the CMP Project Team and people using the camping facilities, it appears that the improvements have been well received. There is an opportunity as part of this CMP process to review, refine and adopt longer-term Concept Plans for key nodes.
EXTENT AND NUMBER OF NODES	
There are a large number of nodes located along the southern section of the Shire. Many of these have been established for many years and were the location of squatter shacks which have now been removed. The large number of sites, most of which are interconnected by tracks, could make ongoing management difficult and resource intensive.	The focus of management should be on key nodes, where appropriate management can occur and facilities provided for those people wishing to utilise this section of the coast. Other areas should generally be managed over time to reduce general public access, rehabilitate duplicate tracks and revegetate degraded dune areas.
ACCESS	
The coastal reserve in this sector is often narrow, with numerous tracks accessible from Indian Ocean Drive. The number of access points should be reduced over time to focus vehicles to key locations – particularly for general public access to the coast. It is important that safe ingress/egress points from the highway are provided at key sites.	Good access to key nodes is available directly from Indian Ocean Drive and thus there is an opportunity consolidate these as the key points to access the coast within this sector. Accidents along Indian Ocean drive could be reviewed to observe whether there is any link to the use of the coastal sites. Where other existing access points are not required for other purposes (e.g. professional fisherman access) consideration should be given to closing them from the highway.
FACILITIES	

ISSUES	OPPORTUNITIES
Increasing demand for short stay camping/RV parking at coastal nodes has resulted in a demand for facilities. This has been met by the Shire recently with the installation of some infrastructure such as toilets and picnic tables. The Shire also provides a rubbish collection services at key sites. During peak periods there is likely to be increased demand for facilities, which will need to be monitored by the Shire. Provision of facilities is expensive, and their distance from Dongara adds to the cost and time required for ongoing management and maintenance.	Facilities provided for short stay camping should be focused on the key sites, with no facilities provided elsewhere. The provision of facilities at each of the key sites is considered largely adequate for the short to medium term use. The majority of private shacks have been removed from this section of coast. The continual removal of any remaining shacks (apart from authorised professional fisherman shacks) can continue.
SIGNAGE	
Signage is provided at most sites, however it is not consistent, and some sites do not have any signage.	The Shire should employ a coastal signage strategy which provides for the use of consistent signage at coastal sites. Most importantly, the signage should include standard symbols to communicate warnings and regulations. Signage can also include educational and interpretative information, locational, directional and other information as considered relevant to each site.
BENEFIT TO SHIRE	
The Shire currently provides free camping at the coastal nodes in this sector. It is unclear what the economic benefit of these sites is, however, presumably there is some benefit to the Dongara/Denison local economy as it is the largest town in the immediate vicinity.	While outside the scope of this CMP, opportunities to encourage campers to visit Dongara and Pt Denison should be further explored. Consideration is also being given currently to the implementation of a camping fee at Cliff Head, along with a caretaker at this site. While this will provide some benefit to the Shire in regard to collection of camping fees, it may result in the increased use of other nodes in the area where free camping remains.
COASTAL PROCESSES	
The orientation of the shoreline in this Sector promotes the movement of sediment along the coast, with limited dune-building. The movement of sediment interacts with elements of the seabed (such as nearshore reefs) resulting in some areas of sediment accumulation. The rocky headlands along this section of the coast will have increasing influence on sediment movement in the context of projected sea level rise, where sediment transfer is interrupted, and erosion can rapidly occur on the northern side of the headlands.	Given the possibility of sediment transfer interruption and subsequent erosion, development near the coast will need to be set-back and equality, particularly around the rocky headlands of Knobby Head, Freshwater Bay and Cliff Head.

11.5 SECTOR 3 – RECOMMENDED ACTIONS

OBJECTIVES

To promote sustainable recreational uses and to preserve the environmental values and low impact character of the Sector.

ACTIONS

Actions for the southern nodes/Sector 3 are provided in the form of Concept Plans for the key nodes (Plans 11.2 to 11.8). These are presented on the following pages and summarised below.

Table 11.4 – Sector 3 Actions

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
CLIFF HEAD			
CH1	Monitor demand at the South Cliff Head. Consider a longer-term opportunity for expansion between the two existing camping spots at South Cliff Head if demand requires.	M-L	Shire of Irwin
CH2	Avoid development seaward of the access tracks at South Cliff Head due to the possibility of dune re-mobilisation in this area.	O	Shire of Irwin
CH3	Maintain the camping spots at Cliff Head (central) to their current extents.	O	Shire of Irwin
CH4	Fence camping spots and bays with low-level, non-intrusive fencing. Focus on areas where vegetation is damaged or there is evidence of camping areas encroaching landward into vegetated areas.	M	Shire of Irwin
CH5	Maintain access to North Cliff Head by monitoring erosion of the current track and providing an alternative inland route if required.	M	Shire of Irwin
CH6	Retain the currently closed North Cliff Head track as an emergency access only.	O	Shire of Irwin
CH7	Limit the further northerly expansion of the North Cliff Head	O	Shire of Irwin
CH8	Increase ranger presence and increase monitoring/management at Cliff Head during peak periods (to monitor Cliff Head, South and North Cliff Head).	M	Shire of Irwin
CH9	Consider options for payment of a fee for camping/pre-booking during peak periods (for Cliff Head, South and North Cliff Head).	M	Shire of Irwin
CH10	Install low-level fencing around areas that require protection (such as sensitive vegetation and dunes) and hazardous areas (such as cliff rocks). Fencing can also be installed to help direct access around camping sites to prevent vegetation disturbance and around picnic shelters and surrounding shade trees to prevent these areas from being exclusively used by campers (ensuring availability to all).	M	Shire of Irwin
FRESHWATER POINT			
FP1	Close and rehabilitate the track to the north as indicated on Plan 11.6.	S	Shire of Irwin

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
FP2	Remove the remaining concrete slabs associated with now-removed shacks and re-contour beach.	S	Shire of Irwin
PF3	Establish a fenced low-key day use area in the shaded central area of the site.	M	Shire of Irwin
KNOBBY HEAD			
KH1	Close and rehabilitate the track to the north as indicated on Plan 11.8.	S	Shire of Irwin
KH2	Maintain the extent of the overnight camping area as shown on Plan 11.8.	O	Shire of Irwin
KH3	Install signage to direct users to the overnight camping area as shown on Plan 11.8.	S	Shire of Irwin



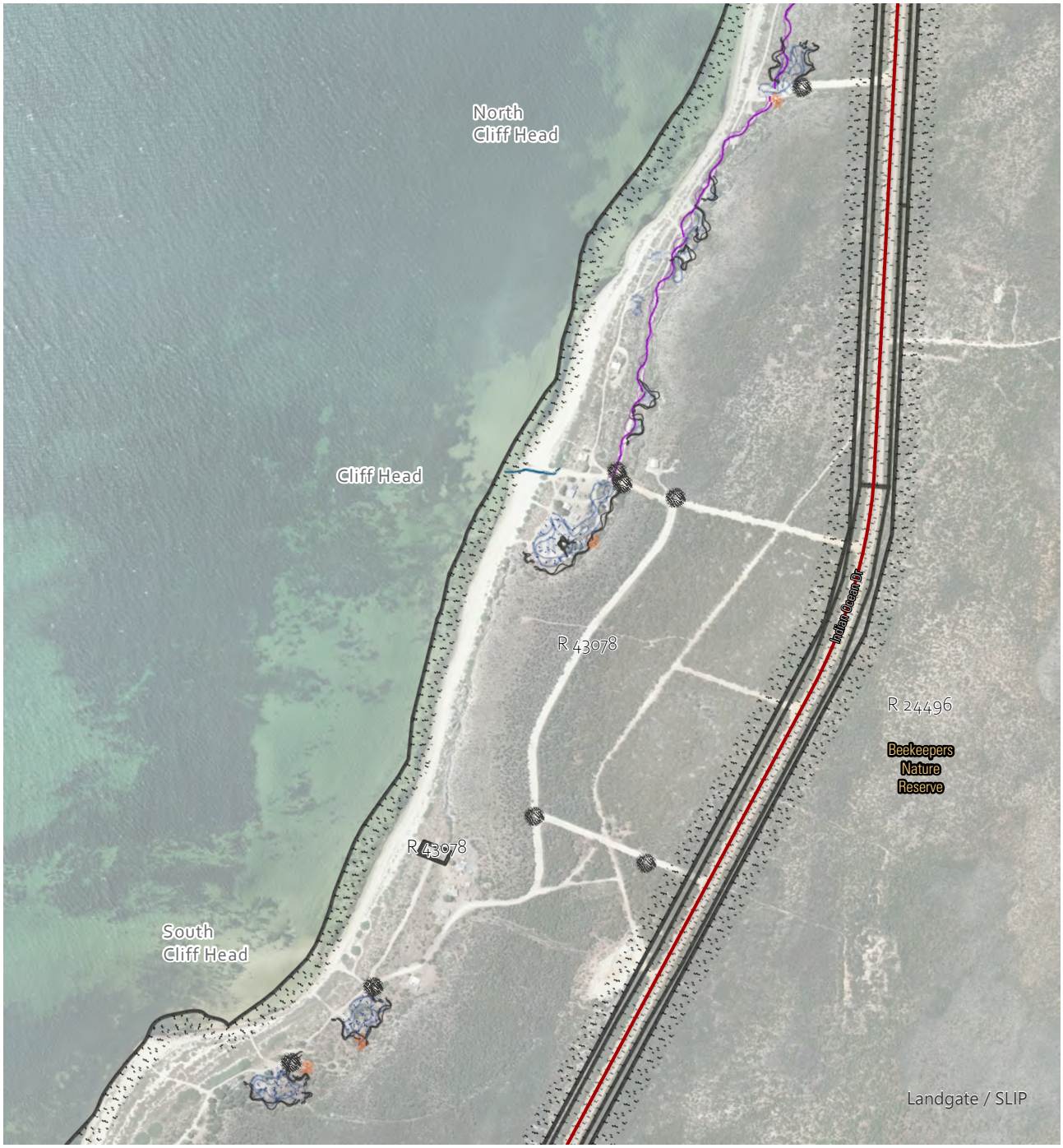
South Cliff Head Panorama

Photo by Land Insights, May 2019



Existing Shacks, Cliff Head

Photo by Land Insights, May 2019



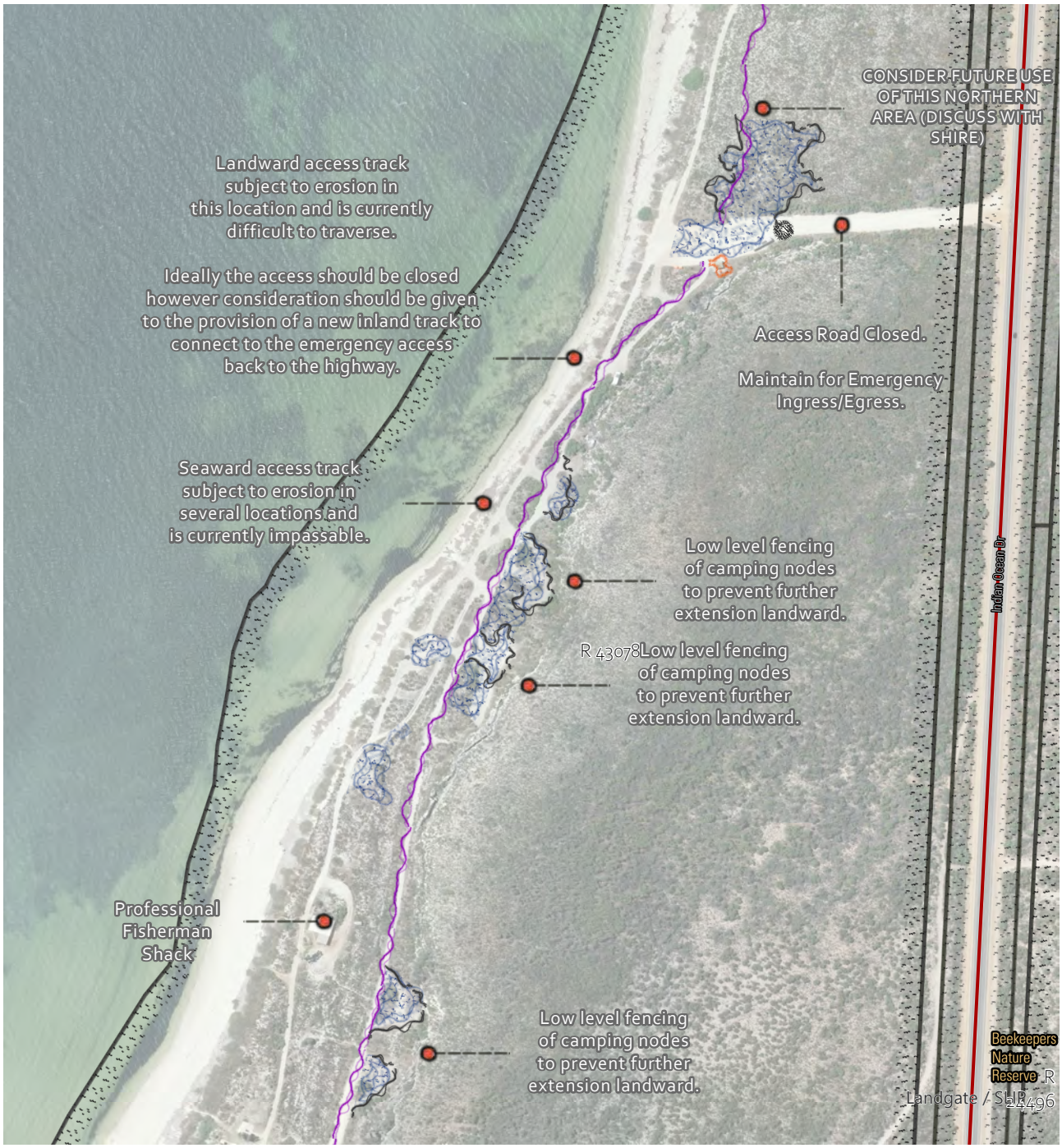
Cadastre
Low Level Fencing
Camping Node Extent
Signage - Existing/Proposed
Main access track
Boat Launching
Ablution Block
Picnic Shelter

N

1:10,000

0 100 200 300 400 m

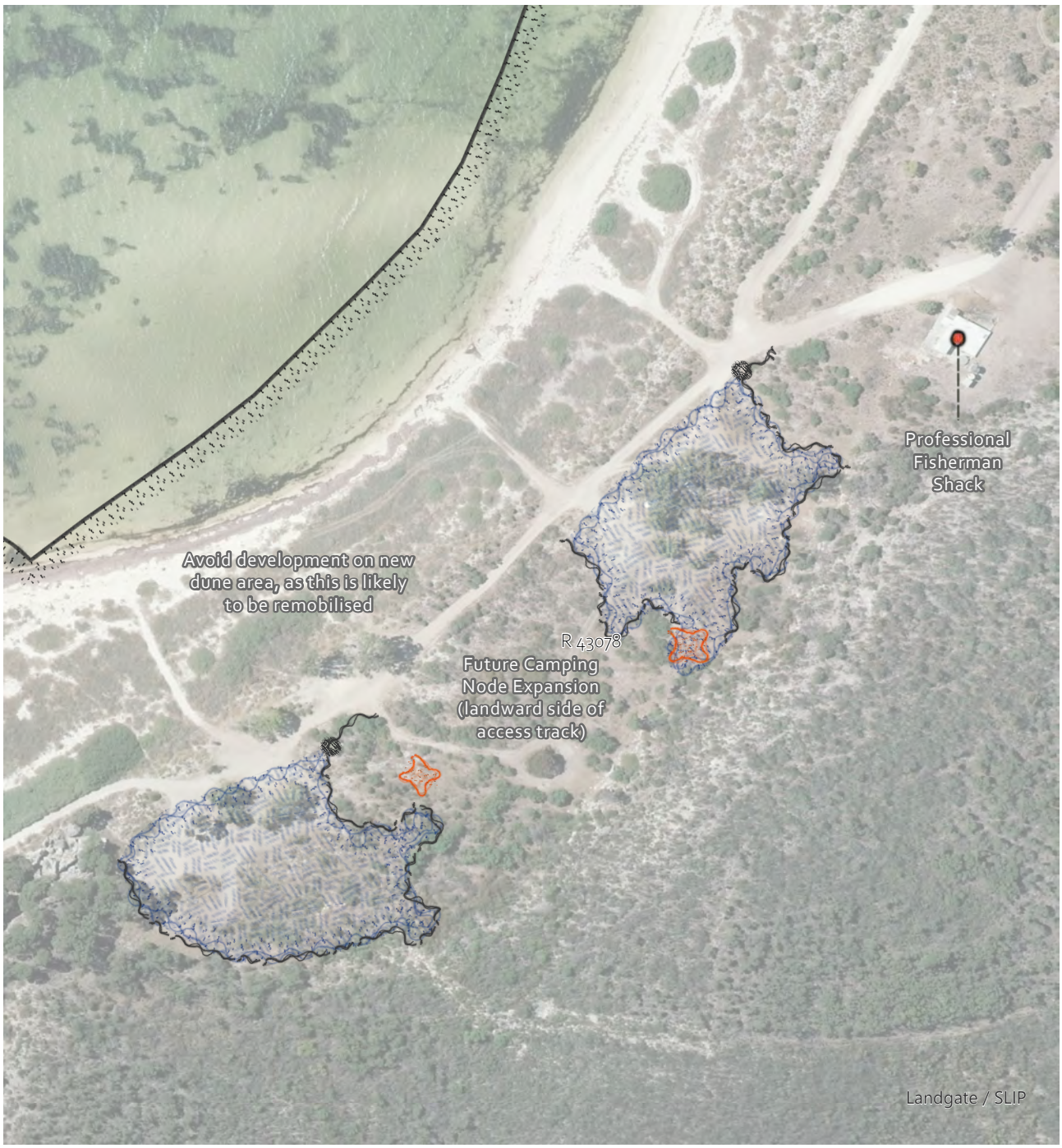
Plan 11.2: Cliff Head Concept Overview - Camping Nodes Sector 3



Plan 11.3: North Cliff Head Overview Sector 3



Plan 11.4: Cliff Head Overview
Sector 3



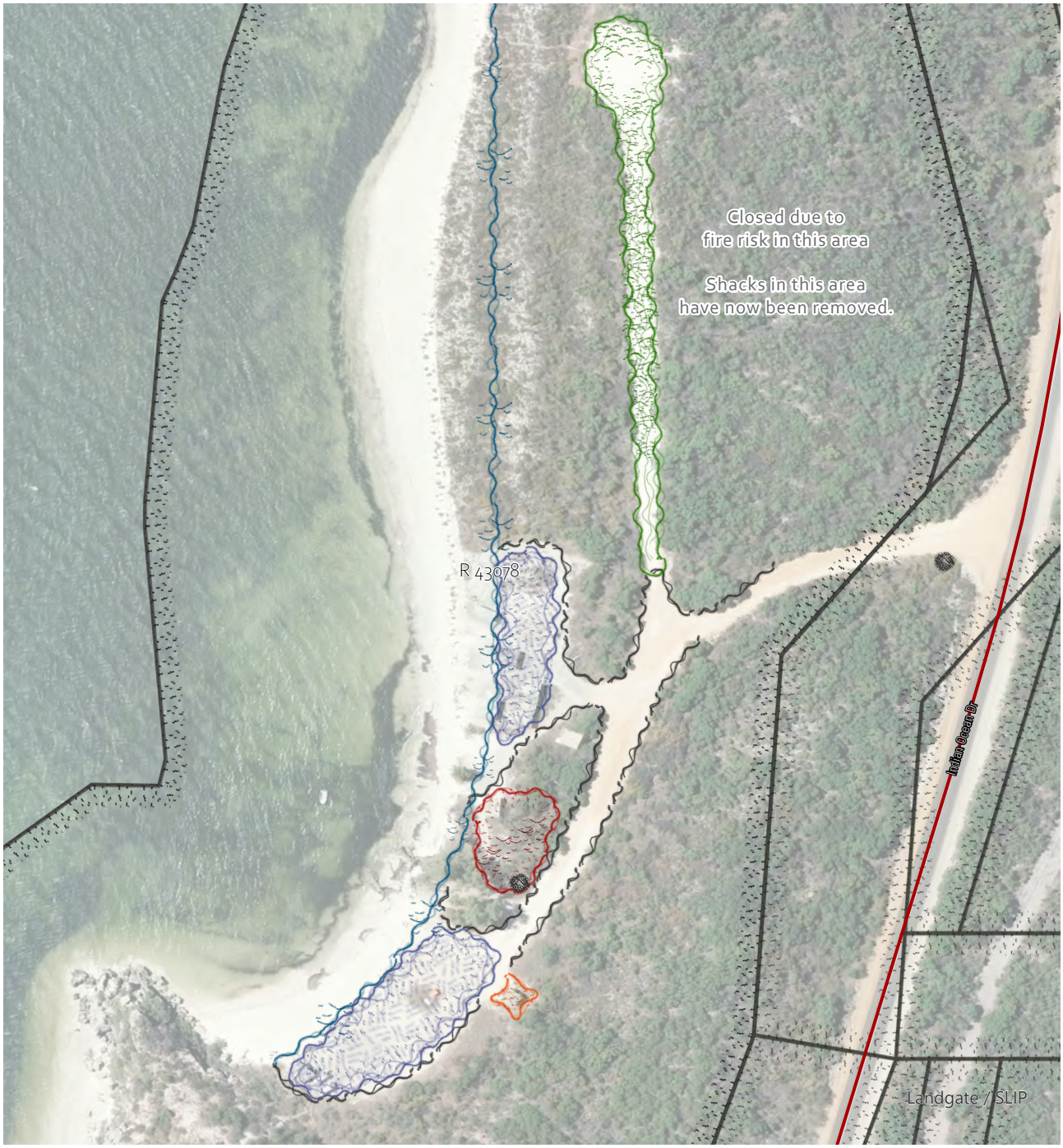
Cadastre
Camping Node Extent
Ablution Block
Low Level Fencing
Signage - Existing/Proposed

N

1:2,000

0 25 50 75 100 m

Plan 11.5: South Cliff Head Overview
Sector 3



Freshwater Beach Location (Approx) May 2019
Signage Location
Ablution Block
Day Use Site
Close and Rehabilitate
Low Level Fencing
Overnight Camping Area
Cadastre

N

1:2,000

0 20 40 60 80 m

Plan 11.6: Freshwater Point Concept Overview
Sector 3



Freshwater Beach Location (Approx) May 2019
Signage Location
Ablution Block
Day Use Site
Close and Rehabilitate
Low Level Fencing
Overnight Camping Area
Cadastre

N

1:1,000

0 12.5 25 37.5 50 m

Plan 11.7: Freshwater Point Concept Detail Sector 3



Plan 11.8: Knobby Head Concept Overview Sector 3

12.0 implementation

12.1 INTRODUCTION

This chapter provides guidance on the implementation of the Coastal Management Plan. It can be used as a framework to ensure coastal management is adequately catered for in future budgets. The implementation of recommendations from the Plan will need to be appropriately costed and programmed for implementation by the responsible land managers.

12.2 PRIORITIES

The priorities assigned to each action are advisory only and reflect a timeframe for implementation. Priorities can be reviewed as required to take into account availability of resources and granting of funding requests.

Priorities have been classified as follows:

S: Short term – within the next 2 financial years

M: Medium term – within the next 5 financial years

L: Long term – within the next 5 to 10 financial years

O: Ongoing – over life of the CMP as required.

With regards to management actions with responsibilities assigned to the Shire, it is envisaged that those listed as Short priority will be works provided for either in the Shire annual budget or through grant funded projects within the next 2 years. Actions with Medium priority could be implemented by Council within the next 5 years, and actions identified as Long-term priorities could be implemented in the next 5 plus years.

Priority was determined through consideration of the comments received from the Steering Group, stakeholders and the community (which indicated issues and concerns which were high priority for them and which should be addressed in the short to medium term), the costs associated and the complexity of each action.

12.3 RESPONSIBILITIES

The responsibilities for implementation vary depending on the coastal landowner or manager. The responsibilities were determined largely through consideration of the tenure and land managers responsible for each site. While there is some UCL and the northern coastal dunes are largely located within private ownership, the remainder of the Shire's coastline is located within Shire-managed reserves. In addition, most of the coastal recreation sites are located within the Shire-managed reserves. As such, a majority of the responsibilities will be with the Shire of Irwin.

12.4 MONITORING & REVIEW

Monitoring is an essential component of the Coastal Management Plan. Its purpose is to assess the success of recommended actions and to determine whether they have achieved the desired outcome. It can also indicate whether the Plan requires modification to help reach the objectives more efficiently.

It is considered relevant to monitor the following within the study area:

- Visitor numbers to sites, especially during peak periods
- The success of rehabilitation
- The creation of new tracks and the amount of dune degradation
- The condition of facilities
- The condition of signs
- The cleanliness of coastal areas and whether clean-ups are required
- Rate of dune migration.

It is suggested that the Shire prepare a Monitoring Plan (Action EL15). This should include a process for the Shire to follow in order to review actions in this Plan and whether they have been achieved. Monitoring should ideally be undertaken at least annually, but possibly sooner in particular areas or where management issues are evident. In addition to visual observation of coastal features, monitoring could use technology to get an indication of how things are changing. For example, select locations can be chosen to undertake a photo database (take photos at a certain site on a regular basis over time to get an idea of coastal changes) or an annual drone flight (to take photos of the coast from the air). It may also be possible to utilise technology (such as mobile apps) to assist with monitoring. These apps could also be used by the community (e.g. to notify the Shire of any issues that may need to be resolved).

Relevant actions such as weed control, revegetation, closure of tracks, replacement of signs and facilities, provision of a caretaker or ranger etc. should be undertaken if monitoring results indicate no improvement or degradation. The Shire is encouraged to involve community where possible and where there is interest.

It is recommended that this Plan is reviewed after a 10-year period to determine if the actions are still relevant and to take into consideration changes to the social, economic and environmental context.

12.5 FUNDING SOURCES

Responsible land managers may be able to seek funding for

certain activities from other sources. Funding opportunities such as these tend to change on a regular basis and as a result a review of options should be undertaken each year. Projects and activities tend to be given higher priority if the proposed activities have been identified in a Coastal Management Plan. Applications will generally need to show how the proposed activities will have an environmental and social benefit and will need to provide details as to how the activity will be carried out, timeframes, costings and responsibilities. Funding can currently be applied for through the following:

- Coastwest Grants Program (through the Department of Planning, Lands and Heritage)
- Coastal Management Plan Assistance Program (Department of Planning, Lands and Heritage)
- Coastal Adaptation and Protection (CAP) Grants (Department of Transport)
- State Natural Resource Management (Department of Primary Industries and Regional Development)
- Recreational Boating Facilities Scheme (RBFS) grants (Department of Transport)
- Regional Grants Scheme (RGS) (Department of Primary Industries and Regional Development).

12.6 ACTIONS

Actions associated with Implementation are provided in Table 12.1 below.

Table 1201 – Implementation Actions

ACTION #	DESCRIPTION	PRIORITY	RESPONSIBILITY
IA1	Prepare a Monitoring Plan which sets out a list of actions to review the outcomes of this Coastal Management Plan and their effectiveness. The Monitoring Plan should list timeframes/frequency of monitoring and responsibilities.	S	Shire of Irwin
IA2	Prepare and Implement a simple Beach Monitoring Plan to regularly monitor (site visits and photography) key coastal locations to identify triggers for management identified throughout the CMP.	S	Shire of Irwin
IA3	Plan to undertake a review of this Coastal Management Plan within 10 years of its final adoption date.	L	Shire of Irwin

13.0 references

ATA Environmental and Shire of Irwin, (2005), Irwin River Estuary Coastal Management Plan, Shire of Irwin, WA.

Bagnold RA. (1941) The Physics of Blown Sand and Desert Dunes, Morrow, New York, (republished in 1954 by Methuen, London).

Bureau of Meteorology, Climate Data Online, Accessed 2019a from http://www.bom.gov.au/climate/data/

Bureau of Meteorology, Wind Roses for Selected Locations in Australia, Accessed 2019b from http://www.bom.gov.au/climate/averages/wind/selection_map.shtml

Bureau of Meteorology: BoM. (2012) Record-breaking La Nina events. An analysis of the La Nina life cycle and the impacts and significance of the 2010-11 and 2011-12 La Niña events in Australia.

Damara WA Pty Ltd. (2015) Peron Naturaliste Partnership Region Coastal Monitoring Program. Coastal Monitoring Action Plan. Report 245-03.

Department of Aboriginal Affairs and Department of Premier and Cabinet, (2013), Aboriginal Heritage Due Diligence Guidelines, Department of Aboriginal Affairs and Department of Premier and Cabinet, WA.

Department of Biodiversity, Conservation and Attractions, Threatened Plants, Accessed 2019a from https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

Department of Biodiversity, Conservation and Attractions, Threatened Ecological Communities, Accessed 2019b from https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities

Department of Biodiversity, Conservation and Attractions, Threatened Animals, Accessed 2019c from https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals

Department of Environment and Energy, Australia's Bioregions IBRA, Accessed 2019 from https://www.environment.gov.au/land/nrs/science/ibra

Department of Planning, Lands and Heritage, (2019a), Aboriginal Heritage Inquiry System, accessed from https://www.dplh.wa.gov.au/information-and-services/online-services/aboriginal-heritage-inquiry-system

Department of Planning, Lands and Heritage, (2019b), Search Heritage Places, accessed from http://inherit.stateheritage.wa.gov.au/Public/

Dieback Working Group, (2015), Managing Phytophthora Dieback in Bushland, Dieback Working Group, WA.

Easton A. (1970) The tides of the continent of Australia. Research Paper No. 37, Horace Lamb Centre of Oceanographical Research, Flinders University.

Ecoscape (Australia) Pty Ltd, (2011), Dongara to Cape Burney: Visual Landscape Assessment, Department of Planning, Lands and Heritage, WA.

Eliot I, Gozzard JR, Eliot M, Stul T and McCormack G. (2012) The Coast of the Shires of Gingin and Dandaragan, Western Australia: Geology, Geomorphology and Vulnerability. Prepared by Damara WA Pty Ltd and Geological Survey of Western Australia for the Department of Planning and Department of Transport.

Eliot M & Travers A. (2011) Dynamics of Scarborough Beach, City of Stirling, Western Australia. Proceedings of the 20th Australasian Coastal and Ocean Engineering Conference and the 13th Australasian Port and Harbour Conference, Perth.

Eliot MJ. (2018) Western Australian Sea level Variability. PhD Thesis, University of Western Australia.

Extent, type and status. Department of Agriculture, South Perth, WA. Resource Management

Feng M, Li Y & Meyers G. (2004) Multidecadal variations of Fremantle sea level: footprint of climate variability in the tropical Pacific. Geophysical Research Letters, 31, L16302, doi:10.1029/2004GL019947.

Gozzard JR. (2011) WACoast – Lancelin to Kalbarri. Geological Survey of Western Australia digital dataset.

Hetzel Y, Janekovic I, Pattiaratchi CB & Wijeratne EMS. (2015) Storm surge risk from transitioning tropical cyclones in Australia. Australasian Coasts & Ports Conference 2015, 15 - 18 September 2015, Auckland, New Zealand.

Hydrologia, (2017), Irwin River Flood Study, Shire of Irwin, WA.

James NP, Bone Y, Kyser TK, Dix GR & Collins LB. (2004) The importance of changing oceanography in controlling late Quaternary carbonate sedimentation on a high□energy, tropical, oceanic ramp: north□western Australia. Sedimentology, 51(6), 1179-1205.

Land Insights Pty Ltd & Damara WA Pty Ltd. (2015) Local Government Coastal Planning Study: Mid-West Region. Prepared for the Department of Planning.

Lemm A, Hegge BJ & Masselink G. (1999) Offshore wave climate, Perth, Western Australia. Marine & Freshwater Research, 50 (2): 95-102, doi:10.1071/MF98081.

Luijendijk A, Hagenaars G, Ranasinghe R, Baart F, Donchyts G & Aarninkhof S. (2018) The state of the world's beaches. Scientific Reports, 8(1), 6641.

McArthur WM & Bettenay E. (1974) Development and Distribution of Soils of the Swan Coastal Plain, Western Australia. CSIRO, Soil Publication No. 16.

National Tidal Facility Australia. (2000) Western Australian sea level variability due to tides, weather and extreme events. A report to the Government of Western Australia, Coastal Management Branch, Department of Transport.

No author, (no date), Flooding within the Shire of Irwin, Shire of Irwin, WA.

Northern Agricultural Catchments Council, (2013), Irwin Estuary Weed Management Plan, Shire of Irwin, WA.

Northern Agricultural Catchments Council, (2015), Off-Road Vehicle Areas in the Northern Agricultural Region of Western Australia – Feasibility Study

Peter Hammond and Associates, (2000), Draft Irwin Coastal Plan Environmental Assessment and Management Recommendations, Shire of Irwin, WA.

Public Works Department: PWD. (1976) Proposed construction of a fishing boat harbour at Port Denison: investigation report. Public Works Department of Western Australia. Harbours and River Branch, Coastal Investigations Section. Report No. CIS 76/1.

Pye K, Saye S, Blott S & Defra/EA. (2007) Sand dune processes and management for flood and coastal defence. Bristol, UK: Environment Agency.

Sanderson PG & Eliot I. (1996) Shoreline salients, cuspate forelands and tombolos on the coast of Western Australia. Journal of Coastal Research, 12 (3): 761-773.

Seashore Engineering Pty Ltd. (2018) Assessment of Coastal Erosion Hotspots in Western Australia. For the Department of Transport and Department of Planning, Lands and Heritage. Report SE052-01-Rev 1.

Shepherd, D. P., Beeston, G. R. & Hopkins, A. J. M. (2002), Native vegetation in Western Australia.

Shire of Irwin & LandVision (2000), Shire of Irwin Coastal Development Strategy

Shire of Irwin (2012) Roads and Footpaths Infrastructure Asset Management Plan

Shire of Irwin (2013), Tourism Development Plan 2013-2018

Shire of Irwin and Land Insights, (2014), Irwin River Estuary Management Plan, Shire of Irwin, WA.

Shire of Irwin and RPS, (2013), Port Denison Foreshore Masterplan, Shire of Irwin, WA.

Standards Australia, (2009), Australian Standards AS 3959, SAI Global, Australia.

Steedman & Associates Pty Ltd. (1982) Record of Storms, Port of Fremantle 1962-1980. Report No. R112, Steedman & Associates, Perth.

Stul T, Gozzard JR, Eliot IG & Eliot MJ. (2014) Coastal Sediment Cells for the Mid-West Region between the Moore River and Glenfield Beach, Western Australia. Report prepared by Seashore Engineering Pty Ltd and Geological Survey of Western Australia for the Western Australian Department of Transport, Fremantle. Report M 2014 07001.

Technical Report 249.

United States Army Corps of Engineers: USACE. (2003) Wind-blown Sediment Transport. Coastal Engineering Manual, Part III, Chapter 4. EM 1110-2-1100.

Wandres M, Pattiaratchi C, Wijeratne ES & Hetzel Y. (2016) The influence of the subtropical high-pressure ridge on the western Australian wave climate. Journal of Coastal Research, 75, (SP1), 567-571.

Western Australian Planning Commission (2008) Shire of Irwin Local Planning Scheme No. 5.

Western Australian Planning Commission, (2000), Bush Forever, Western Australian Planning Commission, WA.

Western Australian Planning Commission: WAPC. (2002) Coastal Planning and Management Manual: A community Guide for Protecting and Conserving the Western Australian Coast. WAPC, Perth.

APPENDIX A

COMMUNITY MEETING OUTCOMES REPORT SURVEY RESPONSES

Coastal Management Plan

Community Workshop

14 October 2019

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community PERSPECTIVES

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Introduction

The Community Workshop for the Shire of Irwin's Coastal Management Plan was held on 14 October 2019, with twenty participants working together to address four key questions.

A total of 299 comments were generated and these have been collated and analyse to identify the key themes to emerge from the responses to each question which are highlighted below.

What are the best things about living close to the coast in the Shire of Irwin?

Each Participant identified the best things about living close to the coast and a total of 113 comments were recorded with four key themes to emerge.

Key theme 1 - Opportunities and lifestyle the coast provides

Well over half of responses related to the many activities and opportunities the coast provides and the special lifestyle this provides. The beach, swimming, fishing, family time and activities, socialising with friends, walking and dog exercise, surfing, sailing and boating and camping featured the most prominently.

Many activities available

- The many activities that are available
- Access to coast for camping, surf club, community, diving, family time
- Beach – swimming, surfing, surf lifesaving club, exercising
- Lots of spots
- Coastal – beach fishing, camping, climate
- Lifestyle – surfing, fishing, camping, diving
- Beach lifestyle
- Lifestyle – relaxing, beach, fishing, boating, scenery
- Being able to knock off after work and head down the coast
- Going to the beach
- Watching sunsets
- Sunsets
- Cool weather
- Protection from Southerly winds at Grannies Beach
- Cool weather
- Mid coast location
- Sea breeze

Fishing

- Ocean – fishing
- Fishing
- Fishing
- Fishing
- Able to catch fish and lobster

- Catch a meal
- Netting
- Fishing
- Good fishing
- Camping and fishing
- Camping and fishing

Swimming and safe beaches

- Swimming
- Safe beaches e.g. South beach – small swell
- Swimming
- Swimming
- Swimming lessons – Grannies Beach
- Safe – stingers and sharks
- Swimming
- Safe for kids swimming/surfing

Family time and activities

- Good environment to raise a family
- Healthy family activities
- Family beach days
- Family activities
- Family friendly – South Beach
- Family outings
- Family time at the beach

Socialising with friends

- Socialising
- Catch up with friends on the beach for dinner
- BBQs
- Picnics
- Beach BBQ's

Walking and dog exercise

- Walking
- Walking
- Dog exercise
- Walking the dogs
- Beach walking
- Dog walking
- Good beaches for walking and dog exercise

Surfing

- Surf quality

- Other surf beaches with big swell
- Surfing
- Uncrowded surf
- Surfing
- Surf carnivals

Sailing and boating

- Boating
- Beach launch areas out of town – 7 mile, Freshwater, Cliff Head
- Sailing
- Boat launching

Camping

- Camping
- Camping and fishing
- Camping
- Camping and fishing

Playgrounds, toilets and bins

- Playgrounds
- Toilet facilities
- Bins for rubbish

Kite boarding

- Kite boarding
- Kite surfing

Diving

- Diving
- Diving

Key theme 2 - Untouched, relaxing and uncrowded

The coast being relatively untouched, free of commercial development and uncrowded, quiet and relaxing was the next most common theme to emerge.

- No commercial development on beaches and foreshore
- Very natural with no imposed structures …
- Water quality
- Cleanliness
- Undeveloped compared to metro/east coast
- Unadulterated
- Relaxing
- Relaxing and quiet
- Relaxing

- Uncrowded beaches
- Little private
- Secluded beach access

Key theme 3 - Access to the coast

Access to the coast in term of walking, riding and driving and the open access to the beach for everyone including dogs and the lack of restrictions was the third most common theme to emerge.

- Walk/ride from home to the coast
- Easy access, not too far to travel to
- Close to home
- Close to town
- Lack of restrictions
- Open access
- Anyone can use it, cars allowed and dogs
- Access
- Access to South Beach
- Beach access

Key theme 4 - Being able to drive on the beach

Being able to drive on the beach was the fourth most common theme to emerge, with South Beach mentioned.

- Can drive on the beach
- South Beach is unique by being able to drive 2 wheel drive cars
- Driving and low tide
- Beach 4WD access
- Being able to drive for miles along South Beach

Other

- Tourism
- Biodiversity
- Marine life
- Marine safety
- Combined industries
- Retirement facilities
- Low crime rate
- Combination of developed and development areas
- Land blocking access
- Work – place

How has the coast changed since you first came to live here?

Participant considered how the coast has changed since they first came to live here and a total of 71 comments were recorded with seven key themes to emerge.

Key theme 1 - Erosion and loss of beaches

Erosion and loss of beaches was identified as the main way the coast had changed since people came to live here. While erosion along the whole stretch of coast was identified as a major change, the erosion of Grannies Beach, Surf Beach, South Beach and Freshwater Point were highlighted in particular.

- Erosion
- Lots of erosion
- Beach erosion – tidal
- Beach erosion
- Erosion of most beaches
- Coastal erosion
- Major erosion and beach loss along the whole stretch of coast
- Erosion at Grannies surf beach, Freshwater
- Wide spread erosion at Grannies area
- Grannies – little beach left
- Surf Beach north of Grannies disappearing
- Surf Beach has eroded about 30 metres since we arrived here
- Erosion at Grannies and Surf Beach
- Grannies and Surf Beach changes
- Surf Beach and Grannies down along Ocean Drive reclaimed by ocean
- Erosion, specifically north of Grannies to Seaspray
- Freshwater Point has been savagely eroded in the past 32 years
- Also, the noticeable erosion in particular to the Northshore area in the last 2 years and around the point at South Beach

Key theme 2 - Changes to the coastline and ocean

Changes to the coastline and ocean were also identified as a significant change that had occurred over the years with this relating to the changes in the shoreline, in particularly at South Beach. Sand cliffs disappearing, changes to the river mouth, dunes, sand deposits and the growing number of sea urchins and the impact of reef health were also highlighted.

- South Beach has grown 100m wider
- Narrowing of the beach south of South Beach profound change with the harbour coast..1979
- South Beach changes
- Cliff Heads has grown out in the past 20 years
- Loss of shoreline
- Reef more exposed at Grannies
- Sand on home reef and small beach forming south wall
- Silting up with sand no depth
- Change of ocean sand deposits

- Sand cliffs disappearing
- Recession of coastline
- Changes of river mouth position
- Sea urchins
- Sea urchins and reef health seems different
- River mouth shift
- Change of dune positions
- Surf Club disappears under dune

Key theme 3 - Mitigation measures and development

Increasing measures to mitigate the impact of erosion with retainer and rock walls and the marina and harbour development were identified as a major change to have occurred. Both negative and positive impacts were highlighted such as the increasing erosion at Grannies Beach since the marina was put it and beaches inside the harbour being calmer and safer for children and safer anchorage and mooring.

- Retainer walls and rock walls
- Rock wall at Grannies
- Groyne extension
- Breakwaters eroding stopped but creeping
- Rocks in the water – hazards to surf beach from rock wall
- Surf Beach has gone and rock wall appeared
- Completion of Groyne
- Rocks put in drive access now in ocean
- Erosion/rock wall constructions
- Grannies has been basically ruined by harbour and rock wall
- Since the marina was put in, Grannies Beach has eroded drastically
- Concrete recreational jetty, fishing boat pens
- Harbour being built
- Interior changes to marina
- Safe anchorage now for mooring small boats and launching … was often very difficult in big swells before the harbour
- Beaches inside harbour are much calmer, great for small children …
- Beaches in the harbour now used for family outings and socialising
- Profound change with the Harbour Coast 1979…
- Rivers edge development
- Increased infrastructure, surf club cafe etc
- Surf club – sports more facilities
- Extended lawn area

Key theme 4 - Increasing tourists and camping

Increasing numbers of tourists and camping on the coast was also identified as a major change, together with the impact of this such as increasing coastal tracts, dune erosion, traffic and rubbish.

- Tourism increases
- Increase in tourism

- Increase camping
- A lot more camping – grey nomads
- More caravans/campers down the coast
- Often overcrowded on southern nodes
- More tourists at 7 Mile
- Less locals at some beaches
- Coastal nodes being used by caravans during off peak times in town when town is empty
- Coastal camping nodes
- Increase coastal tracks
- Increased use of coastal tracks and accesses
- Camping areas changed locations, more use with population growth
- No control of campers, how many
- Sand dune erosion from people camping
- Increased traffic on South Beach particularly holiday periods
- Faeces and toilet paper and rubbish in the areas
- 7 Mile – lots of rubbish and tourists camping

Key theme 5 - Loss of coastal vegetation and rehabilitation efforts

While the loss of coastal vegetation was identified as a change, increasing revegetation and rehabilitation efforts were also highlighted.

- Non-native trees being planted
- Loss of coastal vegetation
- Vegetation damage
- Removal of vegetation and seaweed causing erosion – Grannies caravan park and marina
- Removal of Boxthorn
- River mouth rehabilitation efforts
- Revegetation campaigns at rivermouth and Obliesk
- Grassed areas removed by Shire
- Vegetation growth

Key theme 6 - Changes in uses

The decrease of shacks down the coast was also identified as a change, together with an increase in kite surfing, kayaking, paddle boarding, boating and 4WD vehicles and trailer boats.

- Decrease of shacks
- Loss of fisherman/shacks down the coast
- Decreased number of shacks
- Remnants from shacks – what is going to happen to them
- More kite surfing, kayaking, canoeing and paddle boarding
- Increase amateur boating
- More 4WD vehicles and trailer boats

Key theme 7 - Changes to the weather

Changes to the weather was also identified and included less rainfall, less winter swells, Norwest winds and big cold fronts.

- Less rainfall
- Less big winter swells and Norwest winds – less big cold fronts
- Storm surges suck around break wall

Other

- Better access
- Community more environmentally aware – social media
- Fishing stocks – Whiting, Taylor, Herring diminished over years
- Population increase
- Old wooden jetty removed
- Vermin control
- Obelisk parking

What are the key issues and challenges that must be address to better protect and manage the coast?

Participant worked on identifying the key issues and challenges that must be addresses to better protect and manage the coast and a total of 69 comments were documented with five key themes to emerge.

Key theme 1 - Dealing with the impact of tourists

Dealing with tourists was identified as the biggest key issue and challenge to better protecting and managing the coast and this related to overuse, overcrowding, rubbish and human waste, tourists not sticking to the rules and the need for better signage, regulations and management. Maximising the benefits that tourists can bring to the town, including charging fees was also highlighted.

- Overuse of camping areas with rubbish being left behind and vegetation being damaged – management issue
- More people = more waste and environmental impact
- Too many campers at nodes – 72 hours, not regulated
- More visitors on South Beach
- Lack of management of camp areas
- Unsustainable use of free camping areas and overcrowding
- Identify tourism nodes and manage/construct effectively
- Better protection for camping areas eg 7 Mile
- People creating their own camping spots
- Rubbish and human waste
- Tourists don't stick to the rules – signage
- Visitors and tourists not sticking to rules, parking, walking and waste
- Charge a small fee instead of free camping – help cover the costs to ratepayers
- Provide proper bays at major camping nodes for caravans/camping and charge a fee
- Effective signage
- More signage for tourists regarding rubbish
- Free camping – is it bringing anything into town
- Managing increased population/tourism while maintaining undeveloped/easy access to coastline
- More tourism – people on beaches
- Ocean Drives proximity to steep dunes
- Camping sites

Key theme 2 - Addressing erosion

Dealing the impacts and preventing further of erosion was identified as the second biggest issue and challenge in protecting and better managing the coast and this included natural and human made erosion and Surf Beach and Grannies Beach were mentioned in particular.

- Managing Surf Beach erosion
- Sort out Surf Beach erosion
- Grannies Beach is very unattractive today, reefs exposed with deep
- Removing rocks randomly in shore break
- Gutters, required constant sand reinstatement – none being done now

- Less interference or adjusting nature
- Dune blow outs on South Beach repaired but not fixed…
- Erosion
- Erosion – natural and human
- Erosion along Ocean Drive
- Erosion threatens to take Ocean Drive
- Save Ocean Drive
- Measures to prevent more erosion
- Cyclic environmental changes – shifting sands don't retain beaches
- Sand constantly blowing into and overtop of surf club

Key theme 3 - Improving the management of the coast

Improving the management of the coast including better controls and monitoring of changes to the water quality, reef systems, seagrass beds and erosion was identified as the third biggest issue and challenge to better protecting and managing the coast. This included continuing vegetation rehabilitation.

- If areas are not controlled, 'being public beaches' vegetation, environments are destroyed
- Public access limited 7 mile no car park only caravans
- Monitoring of people camping visiting areas (vandalism)
- Manage direct access to beach front
- Management of South Beach access maintenance area around surf club
- Effective monitoring – is it in place for water quality, reef systems, seagrass beds, erosion rates
- Coastal protection systems need to consider long term conditions
- Divert storm surge further north past river mouth
- Over fishing net species
- Tidy town?
- Pollution needs to be addressed – fines need to be put in place
- Continue vegetation rehabilitation, reduce weeds
- Vegetation
- Native trees to be planted

Key theme 4 - Developing more facilities

Developing more facilities, particularly public toilets and other amenities at beaches and camping nodes and walking paths was also identified as a key issue and challenge to protecting and managing the coast.

- Public toilet facilities
- Toilets facilities needed at Grannies
- Need more toilet facilities as numbers of locals and tourists increase
- Need toilets
- Construct appropriate amenities
- Coastal nodes with facilities – user pays
- Facilities required at some camping areas
- Walking path access areas
- Walking tracks
- Non commercialisation of the Marinna precinct

Key theme 5 - Impact of vehicle use

The impact of vehicle use including 4WD and motorbikes on the coast was also identified as a key issue and challenge, with the lack of traffic management identified on South Beach.

- Manage vehicle use better
- Restricting 4WD access
- Off roads vehicles and motor bikes damaging dunes
- Designated road access – speed limits
- Increase use of 4WD tracks
- No traffic management on South Beach

Other

- We can't have any more foreshore …
- Build a Groyne out from …
- Building set backs
- Fracking?

What actions, opportunities and big ideas would you like to see in the CMP?

Participants identified 46 actions, opportunities and ideas they would like to see in the CMP with 3 key themes to emerge.

Key theme 1 - Improving the management of the coast and tourists

The highest number of comments related to improving the management of the coast with many comments relating to managing the impact of tourists, introducing fees for camping and closing 7 Mile Beach to camping. Increasing signage and more rangers and controls were also suggested. Addressing the future of the reef and erosion and improving the appearance around the Surf Club was also identified along with the need for a long term vision for the coast and preserving the lifestyle.

- Better control of tourists
- Don't increase tourism
- The town should not be overwhelmed with tourist facilities
- No 72hr free camping
- No free camping
- Make tourists pay
- Charge camping fees for sites with facilities
- User pays system at camp areas to fund management
- Stop 72hr camping at 7 mile – too close to town
- 7 mile – close this area, it's a car park, only 10 km from town
- Close camping at 7 mile – day use only, with facilities
- Volunteer local for controlling visitors
- Better information for tourists on the area and a tourist bureau that has tourist friendly hours for them – locate it in an area that tourist can find it
- Better facilities and management of camping sites
- Improvements for locals will be good
- Dedicated rangers to manage campsites
- More ranger staff to control public
- Less building on coastal land
- Better management – fines, signs, more rangers, better parking 7mile
- Shire of Irwin to take an approach more like WAG to visitors use of camping beaches
- Maintain access along South Beach
- Water quality management
- Signage – rubbish, fires, no free camping, bio diversity, stick to paths, speed limits
- Better signage
- More signage eg. dogs on leash
- Multi-lingual signage
- Signs to …
- Proper use of professional marina
- Make area around surf club and cage more attractive
- Effective erosion control at Surf Beach and Grannies
- Get rid of the rocks – bring back the beach
- Preserve the natural appearance of the Town

- Long term vision from Grannies and Surf Beach
- The future is coming – continue to consult the community to steer change
- Develop town and surrounding areas while preserving our lifestyle
- Community involvement in coastal/marine monitoring
- Renovate…
- No more parking for trailer boats should be provided in the foreshore, paring should be in the …
- Keep it simple
- Sea grass's/reefs future?

Key theme 2 - More facilities along the coast

More facilities along the coast particularly toilets, shelters, shade, seating, bins, BBQs and walking paths was the second most common actions participants wanted to see in the CMP and this included disabled access to South Beach and Grannies, more canoe launching facilities, a pontoon at Grannies Beach and a foreshore playground.

- Better facilities – toilets, shelters
- Modern shelters for foreshore
- Better shelters at the beaches
- Facilities – toilets, BBQ, shelter
- Public toilets facilities upgraded
- Plant trees not shade sails
- Long parking at foreshore with clean upgraded amenities
- Toilets for Grannies Beach
- Grannies Beach toilets
- Construction of amenities at camp sites
- More bins
- More seating for foreshore
- Disabled access to South Beach and Grannies
- Put in walking areas to beaches
- Paths for access like the ones in National Parks eg. Kalbarri
- Bird watching – river, more designated paths
- More canoe launch facilities
- Pontoon at Grannies
- Foreshore playground build for locals not tourists
- Promote events at South Beach as kite stock, surf carnivals etc
- Paddle pool in Harbour
- Tidal solar pump (Freo)

Key theme 3 - Creating an artificially reef, snorkelling and dive site/trails

The development of an artificial reef, snorkelling and dive site/trail was identified as the third most common opportunity and idea participants would like to see in the CMP and this included a shipwreck plague at 7 Mile.

- Artificial reef north of break wall or more break wall to stop erosion
- Artificial reef
- Artificial reef
- Put in artificial reef at Grannies
- Artificial reef at Grannies
- Snorkelling sites/snorkel trails
- Maybe drive trail
- Dive sights
- Dive trails
- Shipwreck plaque 7 mile

Other

- Economic benefits don't need to be made from the coastal strip
- Stop focusing on retirement
- Multi access at …
- Transports from the airport
- Direct marketing

Summary

What are the best things about living close to the coast in the Shire of Irwin?

- Key theme 1 - Opportunities and lifestyle the coast provides
- Key theme 2 - Untouched, relaxing and uncrowded
- Key theme 3 - Access to the coast
- Key theme 4 - Being able to drive on the beach

How has the coast changed since you first came to live here?

- Key theme 1 - Erosion and loss of beaches
- Key theme 2 - Changes to the coastline and ocean
- Key theme 2 - Mitigation measures and development
- Key theme 3 - Increasing tourists and camping
- Key theme 4 - Loss of coastal vegetation and rehabilitation efforts
- Key theme 5 - Changes in uses
- Key theme 6 - Changes to the weather

What are the key issues and challenges that must be address to better protect and manage the coast?

- Key theme 1 - Dealing with the impact of tourists
- Key theme 2 - Addressing erosion
- Key theme 3 - Improving the management of the coast
- Key theme 4 - Developing more facilities
- Key theme 5 - Impact of vehicle use

What actions, opportunities and big ideas would you like to see in the CMP?

- Key theme 1 - Improving the management of the coast and tourists
- Key theme 2 - More facilities along the coast
- Key theme 3 - Creating an artificially reef, snorkelling and dive site/trails

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

Absolutely concerned, we are considering moving because of the erosion here. Investigation of erosion mitigation strategies and implementation of these quickly.
Accessibility to beach from erosion at grannies and surf beach Sand dumping to bring back the beach
Always concerned, however I do believe it is mother nature and no matter what we do the problem will arise somewhere else (ie it will just push the problem further up the coast)
Answered in question 12
Area outside big4
Beach erosion
Beach erosion by the big 4 and grannies, to me it looks too late to save and should of been sorted out decades ago
Build a break water to protect grannies beach
Changes to Grannies beach, needs more protection some how
Changing every where , fix as needed
Climate change
Coastal erosion
Coastal erosion at Grannies beach and surf beach
Coastal erosion at surf beach and grannies, the state of grannies is terrible
Concerned about grannies and eroding coastline these concerns should be managed by our shire
Concerned about rock walls replacing beaches. Offshore reefs should be created instead, so as to create fish habitat, a surf break and a longer flatter beach.
Concerned for the road and the caravan park eroding away
Concerned with erosion as we have a front property on the dune
Concerns about Grannys Beach
Corrosion

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

Defiantly! Allowing 72 hrs of camping, allowing campers to use chainsaws on vegetation, light fires, poo in the bush and litter! Rate payers can't even use their local beach or park at the car park! There is only one picnic bench that is used by a caravan who has their own table and park horizontally across the entire car park. The beach has a resident dugong, a shipwreck, a marine park area and is a port for commercial fishermen.
Do you best to preserve it
Eroding coastline
Eroding grannies
Erosion
Erosion
Erosion
Erosion around surf beach and grannies beach. Fear it's too late
Erosion at grannies surf beach and foreshore a major concern Foreshore requires more plantings of trees
Erosion at Grannies. Employ a professional environmental/ coastline conservationist
Erosion at surf beach
Erosion of the beach - at times there is no beach and the dunes are being chopped away. dunes need to be planted, stop vehicles driving right along the beach breaking cover
Erosion would be our main concern
Erosion, I think there needs to be an artificial reef of some sort or even another break wall offshore to divert the storm surges north. From the river mouth north the natural reef is already in place. Just the coastline from granny's north to the river mouth needs some serious attention

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

Erosion, plant appropriate shrubs to hinder sand erosion
Erosion. .....
Erosion. Prevent it.
Excess large rocks being used along grannies to surf
Exposure of hazardous areas
Extend rock walls and look at pylon style beach access for low tide Artificial reef to lesson wave impact onto shoreline
False reef and dive trail to protect shore from future erosion
Grannies - erosion Artificial reef
Grannies beach erosion, create a man made reef to reduce it
Grannies beach washing away again
Granny's and surf beach erosion
Haven't seen any change to south beach coastline in fourteen years. Have seen some dune erosion at seven mile due to wild weather not through the public walking on. Cannot see any merit in trying to control this natural erosion.
Honestly I am not sure. I'm minorly concerned about climate change but unsure of the impact to make a judgement.
I am concerned but am unsure of how to solve the problem
I am concerned, especially about Grannies, I think we need another option rather than just increasing the number of rocks added on the 'beach' this is very costly and keeps needing to be redone
I am concerned. Maybe some artificial reefs placed strategically?
I don't know how to manage it. But yes it concerns me. It's eroding very quickly. I worry about the existing houses the big 4 and skate park
I haven't lived here long enough to notice a change

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

I think an artificial reef to preserve the eroding coast line between grannies and the river mouth

I'd like to see a reef or something put in to stop the destruction of the beach at grannies during winter storms

I'm concerned about beaches washing away, eg Grannies, surf beach, sand between surf beach and Nunn's pool. I would investigate the cause of the sand erosion and rectify.

I'm concerned about the erosion at the surf beach and grannies pool. I'd like to see a better solution than the piled rocks in front of the caravan park.

I'm worried about the infrastructure that has been put around the coast and the fact its likely we will loose it due to coastal erosion

Improvements need to be made to flush the marina , pipe need to be added on the seaward side , improve swimming conditions and general marine health

In my opinion the biggest change is around the harbour ,with the changes to the harbour construction over the years so has the coastline altered on response. I believe that changes were made to the original design and construction which stopped the waterflow ,so we now years later can see changes within and outside the harbour.

Manage .....take more care with any further construction

Probably not a lot can be done .Leave the remodelling if the coastline to mother nature

Isn't this part of nature

It is a wild beast and it is always changing. It is our own fault that it isn't allowed to change the way it should. Humans have way too much to answer for.

It is a worry.. but see it as natural erosion when you live so close to the coastline its to be expected. Every time man interferes with nature it makes things a lot worse.

It is not changing that much considering the wind been pretty much the same for 40 odd years I can remember

Lack of consulting regarding works

Lack of toilets

Leave as is

Less cars

Let nature take its course.

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

Losing grannies beach is a huge concern. Don't know the answer.
Losing it to corrosion
Make sure it actually works
More recycling in Dongara to reduce plastic. Ban motor cycles in the dunes to encourage natural vegetation.
Need to fix erosion next to big 4.
Need to protect the coastline
No, let earth do it's thing, deal with it..
No.
No. I haven't been in town long enough to notice changes to the coastline
No. Nature does as it wishes
No. The sea is the sea and will always change the coastline.
Non-local 4x4 entering private property's through private roads spread throughout the coast from seven mile and destroying habitation from getting bogged. As they do not appreciate the roads or properties. My suggestion would be close monitoring of non-local 4x4 drivers through surveillance.
Nope the ocean will take it over. So leave it alone
Northern break wall to Nun's pool erosion has been bad for a number of years. Building break wall on the beach may have saved the caravan park but it's only diverted the problem north. Instead of short term fixes from each council over the years, we need to invest properly with consultation from oceanographers on possible management. An artificial reef may help with trapping the sand in, as the natural reefs along the coast, from Seaspray to 7 mile, is evidence that the erosion isn't as bad. Hence, consultancy from an Oceanographer. If we don't fix it now then we won't have an Ocean Drive in 10 years time.
Not concerned
Ocean pool would be amazing
Only concern is car parks is more important then play equipment for the kids.
People not looking after them
Potential loss of Ocean Drive due to erosion

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

Put in another boat ramp
Raising levels, Dongara low levels
Rocks at grannies due to sand movement, erosion around grannies and rock wall
Seaweed and erosion
Stop all the drains that empty into the marina
Surf beach and grannies are the main concern. Grannies coz it's well frequented and surf beach because of the caravan park
Surf Beach and Grannies never get resolved regarding wave erosion. I would tell the Shire of Irwin. I don't have the expertise to manage my concerns any other way, this is a silly question.
Surf beach erosion, hopefully it's not just going to become a line of rocks
Surf beach used to be a beach
Take a hard stand and approach as directed by someone who knows and not be controlled by the noisy minority
That it will be closed off
The beach at grannies will continue to erode because of the groynes. If at all possible there should be breaks in the groynes to allow the ocean to flush out the marina and possibly alleviate the erosion further along the coast. Filling with rocks is not user friendly
The beach erosion on ocean drive
The coast line between grannies an nunns pool I'm unsure on how to fix it
The coastlines are all changing!!! That is thanks to mother nature
The erosion at Grannies
The erosion at grannies why are putting granite rocks the solution when it seems to me that we need to slow the ocean down maybe with a man made reef?

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

The erosion is pretty bad in some spots - and something needs to be done about cliff heads rubbish problem- it's extreme. We take a garbage bag of rubbish home each time we go but it needs more to be done than that.
The erosion needs to be stopped to the beaches from Granny's Beach to Seaspray and reclaim some beach back Maybe we need to haves more groins and breakwaters installed before it's all gone
The erosion on the beaches can't be stopped it can only be delayed for a little while. Although you could place artificial reef in order to delay it for a longer period of time
The erosion. Continue the large rocks where needed that can be found at grannies. Or place an artificial reef if studies show it will help. Or place an additional rock barrier out on the ocean like Geraldton
The main concern is the damage already done from the introduction of the rock wall and the stopping of long shore drift of sand to grannies.
The new car park is awful, it's not obvious how to get in and out from road and not obvious caravans etc cant drive straight through. The drainage is appalling but at least the shire put in that pool the people have been asking for
they need to build an imitation reef out from grannies like they do in Bali to stop the erosion.
This has been stated in previous questions. More research is required into sandbags or even a man-made reef. I would like to see the Shire consult surrounding shires such as Northampton with the work they have successfully done using sandbags at Horrocks.
We are in a cycle
We have created the change by building a marina and changing the way the ocean moves and flows.
Yes - The coast along Grannies to Nunn's pool is very concerning. An artificial reef can help to dissipate the swell before it reaches the shore, provide a habitat for wildlife and provide a more reliable surf spot. An artificial reef is being constructed at Palm Beach in QLD and it looks great
Yes but it's happening everywhere
Yes concerned about surf beach and the coastal erosion. Keep updated with the Shire.
Yes concerned. Don't just grade the beach. Put sand in from platform to surf beach
Yes -erosion with high tides -recent damage at granny's highlights this. Not sure what can be done as Mother Nature can be brutal

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

Yes I am ...more needs to be done .on a regular basis to clean up the seaweed on most beaches ..especially Grannies. People would use this more if it was cleared on a regular basis ..badly neglected in Winter and spring but visitors often want to use the beach at these times and can't

Yes I am concerned about the erosion occurring near the north side of the marina/surf beach. I guess more studies need to be made to see what the best plans are for this coast going forward

Yes I am concerned. I think we need to preserve our coastline with whatever it takes. Rocks or walls

Yes I am. It all began when the last west most breakwater was built.

Mmm. I'm no engineer, but what about removing the breakwaters? One or both? Subject to investigation by an independent qualified panel

Yes Surf Beach to grannies have been ruined by the shire due to very poor 'planning' choices

Yes the beachline from grannies up the surf beach is eroding and has changed so much over the last 30 years. I'm concerned what will happen in the next 30 if something doesn't change.

Yes the coast is eroding so bad I don't know what can be done to stop it

Yes the erosion of the beaches especially Grannies. I'm not to see what could be done. Maybe a sand bag reef of the shore.

Yes the erosion of the coastline is a worry. I have witnessed the change over the years.

Yes the wash out around Grannies Beach each winter.

Yes though I'm unsure how to make it better

Yes very concerned only solution is rock wall to stop the disappearing dunes

Yes very concerned.. I'm not sure of the answer on how to fix or preserve our coast better..

Yes we are concerned but its the same all up and down the coast. Main concern Grannies, Surf beach and Ocean Drive. Need to be protected. North Cronulla NSW has a wall (approx 45 degree angle) of large hexagonal concrete blocks which works well. They have sand in the hollow centre of each block and natural vegetation can grow.

Yes

Artificial reef

Yes! Erosion of the beaches; Grannies to Surf Beach...won't take long before the erosion makes its way to Ocean Drive, as it's already taken out the footpaths... look at the benifits of atifical reefs and groines.

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

Yes, am aware of it. Nature.

Yes, beach erosion at grannies and surf beach continues to put property and public access areas at risk. We need to engage marine/oceanography experts to come up with a sustainable solution

Yes, but there is nothing I can do to manage it.

Yes, erosion is huge all way from grannies North. How bad will it get.

Yes, erosion

Unsure, about what can be done

Yes, extremely concerned about the reduced parking for towing vehicles. Port Denison / Dongara should be expanding the tourism and the current parking allocations has limited the ability for our tourists to call in and spend money in Port Denison.

Yes, Grannies and Surf beach are ruined. Some kind of groin from the elbow like Geraldton has done would surely help and provide a more sheltered swimming spot. The fishing platform needs to be relocated.

Yes, grannies and surf beach will soon disappear

Yes, I'm concerned with the damage that has been done from the marinas development and what the flow on affect is

Yes, surf beach used to be a great beach and is not basically not usable for swimmers. I'd think an artificial reef off surf beach would help with erosion and provide surfers with a good break

Yes, the erosion at grannies beach

Yes, the erosion from surf beach up to seven mile in particular

Yes, very. I wonder why we cannot have a sea wall for those places in danger of caving in - check out the coastline of UK!!

Yes, what is causing the sand to erode so rapidly over the last few years. And where is it all going.

Yes. Deterioration of coast. Lack of access for holiday makers in the beaches close to town -parking for large vehicles, vans etc. No crosswalk on road between marina and shops. Murky water in marina.

Look at the root of the problem causing erosion and long term solution.

Take out the obstacle course of curbing that has been put in around the maRina

Paint crosswalk/s

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

Examine wate flow within marina
Yes. Build up of sand around Surf club area, erosion at Surf Beach. Sand should be removed and maintained around club area.
Yes. But you can't fight mother nature. We have more water and some countries are losing their water, in the oceans.
Yes. Coastal erosion is a huge and prevalent concern
yes. coastal erosion the north side of the big 4 caravan park.
Yes. Erosion at Grannies and Surf Beach.
Yes. Erosion at Grannies, surf beach.
Yes. Erosion.
Yes. From granny's north the erosion is extreme. Some sort of groine needs to be constructed to deflect swell, or an artificial reef put in to create surf
Yes. Has the marina caused the erosion? I don't think it can be fixed. I think a management device would locate the problem elsewhere on our beaches. You can't win a war with the ocean.
Yes. I think the building of the marina wall has had a great effect on surf and grannies beach. So it should probably be reviewed and changed if necessary
Yes. Infrastructure and natural assets being eroded away. Be very strategic about what to save/protect and what to move/retreat. Definitely restrict further development near the coast.
Yes. Not sure we can change Mother Nature but beach corrosion is a big issue. Get an expert in to advise what we can do and look also on what effect that will have on the environment.
Yes. Property damage/ safety.
Yes. The erosion along the coast, particularly Grannies, Nunns Pool, Sea spray & Northshore beaches. Build an artificial reef out from Grannies to start with
Yes. The erosion at surf beach. A solution that prevents more and more boulders being dumped there would be great. I am unsure how you would achieve this. I also love the upgrades to the marina foreshore thus far.
yes. there need to be some protection off the coast line maybe groins along off shore every few km's. the fish platform needs to be moved further out the groin as the fishing scraps attract sharks

Survey Question 13

Are you concerned about the changing coastline in Dongara and Port Denison? If so, what are your main concerns? What would you do to manage your concerns?

(Relevant responses as recorded)

Yes.... the erosion....

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

A better playground along the port Denison foreshore
A bicycle trail along the coastline
A few more bins
A interpretive space for the fishermen history, a better play area close to the water, more modern toilet and BBQ block on the foreshore, more shade
A kids play ground similar to Jurien bay. A great way to break up a long car trip. A fake reef at Grannies. Good consistent surfing waves is something Dongara has always lacked.
A nature playground with some BBQs has worked well in other towns and would be a great asset to our town.
A water park for kids on the foreshore
Access is shocking ,this goes back to round abouts and remodelling of the main street in Dongara .now the changes to the road and parking profile in port Denison are not conducive or welcoming to tourists ,esp. Those with caravans and campers .no decent parking ,difficult access ...more activities ..open up the river to canoeing ,paddleboats in the harbour, marine heritage museum ..so much could be done .travelling tourists now avoid and have done so for many years once access became difficult
Access to beaches north of town
Advertise is for something it is and not for something it is not. It is a family friendly place to offer a relaxed family vacation in a safe environment.
An activity business on the foreshore that rented out kayaks, bikes, surfboards would be good. Maybe at peak times a coastal clipped that runs 3 times a day and once in the evening
As above
As there is a great fishing spot a fishing comp over a long weekend or holidays, and add a boat and fishing expo to it. Put on a wild food festival. Organise a low n slow BBQ comp you would get people from all over the state/country even overseas turn up. Options are endless if the community are wanting to bring more people in
Beach activities, equip hire
Better facilities at marina, shelters and shade, expand boat ramp, make better use of north marina wall more fishing platforms and lighting
Better facilities in the actual townsite. Apart from the pubs, no nightlife except the drive-ins for part of the year. Access to tennis/badminton/squash courts casually, family orientated facilities
Better parking

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

food vans market days night food markets snorkelling trails kayak trails focus on lobster for Chinese tourists highlight shipwreck walk
Better parking for caravans, camper trailers to encourage visitors to stop
Better play areas for children.
Better playgrounds and shade picnic areas along marina
Better playgrounds at the foreshore for visitors
Better toilet facilities create an unique attraction
Better tourism info centre on the foreshore so easily found with an local history museum to draw people in. Similar to my gambier in south Australia would be beneficial
Bigger fines for littering and better ranger patrols
Bigger playground on the foreshore
Build a kick ass playground similar to Kalbarri or a water play ground park at the foreshore
Children's playground at foreshore area
Clean up the rubbish and add some activities along the coast. Surfboard hire, jet ski hire, canoe hire etc beach volleyball competition, sand castle competition
Coastal clean-up and maintaining
Coin operated BBQs
Continue to encourage them to take their rubbish with them.

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

Continued improvements as recently done along the foreshore. More walking tracks but it is already a beautiful place
Develop foreshore
Develop the foreshore for families!! Put in better play equipment such as the water park in Geraldton. Fix the atrocious parking tee's has recently been completed and is disastrous. Refurbish the shelter sheds. Provide more facilities for parks at grannies and the park near the obelisk. Fix the boardwalk by the river. This town has beautiful coastline that is not being marketed correctly.
Dive trail / surf reef / external marina moorings / improved facilities other than Denison foreshore i.e. BBQ and shelters at river mouth (nuns pool)
Do not knock any more buildings down
Dogs under control.
Dongara and port Denison attract next to no one. The busses loaded with tourists pass us daily. No modern accommodation, no modern restaurants or coffee shops. This is what we need. Modern accommodation and facilities and activities.
Dongara port Denison has always absorbed its tourists really well - a few more car parks in the Dongara area would help but I sure people come here because it's quiet.
Enhance the marina, bring people and parking in. Bring amenities, facilities for pop up shops, fitness eq and nature playground
Exercise station, water fountains,
Extend ocean drive so it travels directly through Dongara rather than back to brand highway. Better signage and town entrances to attract visitors.
Fantastic place issues as I have said is the erosion and wind one can be changed other not so
Fix surf and grannies beach. Probably too late though.
Fix up the boat ramp.
Focus on more native vegetation for amenity plantings - like the shires in the south west. More shade.
Foreshore , marina development for families
Foreshore development
Free camping spots and ablutions

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

Free camping spots and create user friendly facilities
Get surf beach back! Whatever it takes. The rocks are an eyesore & only a quick fix. Spend the money now & it'll return later through tourism
Good parking and better opening hours for coffee shops
Have a decent playground to keep more than handful of children satisfied at any one time.
Have more signs around
Having tours for example canoeing down the Irwin river, bring back the pontoon at grannies as the teenagers and tourists would enjoy it, or build an eco friendly rock pool
High quality play ground and water play ground
I feel most of our tourists have trailers or campervan attached so we need more parking for them. More publicly toilets and update the current facilities. Renting only- larger difference in price between renting and other accommodation (suggestion from my sister who says tent sights should cost less as it's not much difference for her to sleep with a roof over her head).
I have moved here recently and love the place
I think it's fine as it is. You don't want thousands and thousands of people in town cause that when the problems start
I think some improvements have already been made but I think Dongara needs to be advertised more as a place to come and visit based on its natural beauty. Beaches/ river, safe surrounds for kids etc. It would be good to have a better / bigger set of playground equipment on the foreshore and up at the Northshore carpark to attract families especially during summer
I think we attract families and our beaches are the major draw cards. Facilities at our beaches and marina are priority for me as a mum with young children. I would add more seating along the marina, improve our playgrounds. Love Kalbarri & shark bay nature playground for instance. I would add additional toilets & a baby change. More permanent shade. Long term I would like to see a seasonal ice cream hut or small wine / bean bag bar, outdoor cinema or some sort of entertainment at the foreshore. Just to add a little something extra to the beaching experience.
I think we do things pretty well and most people who come here like that we are pristine and they can get direct access to beaches

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

I'm disappointed there's not the available parking for caravans in town. This is becoming more popular than ever before . We need to consider their parking near shops or main interests. I would like to see the old fisherman's hall a cafe
Improving play parks and amenities for children, shade shelters, erosion
Increase time at free camping but also add a daily charge with a caretaker to manage areas with free accommodation in return for the upkeep of camp sites
Information signs about attractions.
It already is very positive. Keep up the good work
Other than the pubs and occasional drive in there's nothing open later in the day early evening for families
Kayak trails snorkel sites lobster tours charter boats foreshore landscaping tourist information shipwreck walk Leander history multimedia platforms fishing platforms swimming platforms
Kayaks or surfboards for hire, a disabled ramp at grannies,
Keep beaches clean of seaweed over summer
Keep blessing of the fleet going
Keep planting native vegetation wherever possible

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

Keeping them clean, nice picnic facilities!!
Our areas are natural and that is the beauty of where we live
Large foreshore playgroup, water park, safe swimming pool
Larry lobster was ruined when it was split up
Let visitors know that it's beauty is what attracted them so just keep it how it is
Longer stays
Love it whilst you can.
Love the port Denison foreshore but would love to see a nature playground similar to Kalbarri in the area. Toilets in front of port store need upgrading.
Low tariffs
Make parking caravans along the foreshore easier - signage where they should not enter because there is no way out the other end. Less tight kerbing
Make port Denison more RV parking
Make the foreshore more family/tourist friendly, especially at night. More permanent, long lasting shelters. Have a look at the Denham foreshore, take a leaf from their book. Best foreshore ever there
Maybe underwater sculptures like that of other shires, in protected waters of nun's pool. Subsidise local accommodation for a deal of 1 nights accommodation and a ticket to the drive in, as the drive in is a novelty for many. A regional discount to entice people from neighbouring towns
More attractions/actives other than a beach. If visiting with a young family once it's too windy for the beach there isn't much
More BBQ facilities and shelter sheds.
More bins down the coast
More bins, shade
More boat ramps and beach camping facilities
More caravan parking at the foreshore and main street would be a start. I have spoken to many tourists who simply keep driving because there is no or not enough parking.

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

More entertainment for older children.
More family fun areas with more for children to do so parents can relax and enjoy the coast while their children are playing close by
More for families; as above
More paths
More play areas for kids better playground at the foreshore!!
More play equipment... A water playground like Geraldton's would be fantastic!! More shade more BBQ facilities. More toilets.
More playgrounds on the foreshore. Another boat ramp. Better parking facilities for buses and caravans in port Denison foreshore area. Extra parking for boat trailers at the foreshore.
More promotions of a family friendly holiday destination and maybe a floating ocean fun park in marina to the southern side protected from wind
More restaurants. Cheaper rent for businesses so that they can lower prices for customers.
More retail shops at the marina. Restaurant on the foreshore
More thought for tourists and caravan parking. What's happened at the marina is appalling. Make tourists more aware that coming off the highway through port Denison is no further than going around the highway. Advertise the hell out of south beach.
More to do. Tour buses and guides, boating experiences. Cray fishing experiences. Hire facilities for canoes kayaks dingy paddle boats snorkelling gear fishing gear
More water sport activities is canoe tours/hire for the river. Boat hire/jet skies/paddle boats etc
Nautical theme nature playground at the marina (Kalbarri and Denham have awesome examples). Pontoons to swim out to. Ice cream van on south beach. Equipment hire (sups, kayaks, tinnies etc) out of fisherman's hall or the surf club shed.
Need to try to fill the empty shops around town i.e. port store coffee shop, Dongara fish and chips, tokos, old IGA building

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

Newer parks, more BBQ facilities, toilets
No beach driving-cars not slowing down on south beach is dangerous and annoying
No litter and more seating areas with shade
No more free overnight stays it doesn't bring them into town
No motorbikes on south beach and build quality playgrounds!! Fix the shelter sheds
Ocean pool
Park at the local oval in town and make it a gold coin donation not free! Caravan parks are missing out on business, workmen still have to maintain the free camping area which rate payers have to pay for and making it local in town they can walk to shops and cafes! Only visit the beaches during the day and only leave footprints behind!
Pity the cray processing plant isn't open for tourists. Tourists come to Dongara for crayfish-they'd love to buy some, at a cheap price. Our entry statement (the crayfish) is a misnomer to some.
Playgrounds, better toilet/shower facilities
Prefer Dongara/Denison for locals. Tourists should simply be a bi-product. However they do need more caravan space and public toilets, showers. Shire of ruined the marina and caused huge problem with parking. It was much better back in the 70's 80's and I know because I have lived here for over 40 years.
Proper foreshore development that's family friendly. Decent playground (the ones currently there are rusty, broken, poorly maintained), more easy food options like some of the places available on the Geraldton foreshore i.e. Beached barrel, jaffle shack. Shaded areas.
Provide functional parking along the foreshore
Provide more camping nodes like point louise's
Put in a big playground on the foreshore
Putting in sand will save our beaches, roads, carparks and have a positive impact on tourism. Big sandy beach and surf
Reclaim the beaches
Remove the sea weed when it builds up too much. Especially in the warmer months. More shade shelters

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

Restaurants and coffee shops so to open for longer. More events
Shade, toilets, rubbish bins, signage with historical information, local plant & animal species info & reminders to clean up & respect the area
Shady spots to get occasional relief from burning sun. E.g. More trees
Shelter from weather wind and better parking and signage for long vehicles
Shire adopts a better management structure of its beaches, more like the way government manage its national park beaches (Kalbarri, Exmouth etc.)
Signage, better paths, better tourist info. More interactive things to show the history of Dongara. A decent playground like the big one in Kalbarri. I think longer cafe hours would be helpful. Somewhere for tourists and locals to purchase ice creams, cool drinks and simple takeaways near the beach. Tourist bureau nearer to marina or tourist attractions as it is hidden and the hours are not tourist friendly.
So far your ideas are not doing the port Denison foreshore any favours. Getting rid of all the old history is a crime. Carnarvon are doing the right thing and preserving their heritage
Some shelters on the beach
Something that first brought us to Dongara when we were tourist 13yrs ago was the.play ground at the foreshore. Get better parks and tourist will come and enjoy the dining but nothing for kids to play on they go to the next town.
South beach alone is worth the drive to Dongara in the summer. There should be more advertisement and incentive to make the trip that far up from Perth for it
Stop people overnighting in places without toilets
Stop ruining the car parks in Dongara so tourist can actually get cars and caravans in to access the beaches or marina!!
Take your rubbish with u
The free camping idea is great
The parking along the shore front is now pretty bad for caravans, it is difficult for them to turn around.
There have been lots of positive changes. Businesses should make the most of tourist season. Open longer hrs etc.. Tourist go out for the day to the beach then come back just before sunset.. Usually shower and then want

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

something to eat... But places are closed. This puts tourist off.
Think about what you are doing to make the foreshore more pleasurable to all. Families and kids. Whether they are visiting or live here. Look at Geraldton's effort, certainly a great improvement and I love taking my grandkids there!
To be more welcoming and the shire more open and supportive to start up business trying to improve experiences for locals and tourists
Toilets at 7 mile
Toilets at 7 mile would be good.
Toilets more bins
Update playground. Build an ocean pool. It will be used by locals too
Update the shade shelters along the foreshore.
Updated playgrounds for kids and a park exercise equipment for the adults
Upgrade and maintain boardwalk and playground upgrade at foreshore
Upgrade foreshore playground (see shark bay) ablution and shelters
Upgrade to facilities at south beach more flexibility for service providers and support to help them think outside the box.
A nature playground that perhaps reflects and incorporates the history of Dongara and has a story to tell for tourists that come through. Allows families of all ages to interact with each other while learning about the history of the town.
Upgrading of the port Denison foreshore, particularly getting rid of the old shelter sheds and replace with something more user friendly and aesthetically pleasing. Public exercise zones would be a good inclusion
Visitors like the laid back feel of both towns and are not looking for a "gold coast experience" caravan and RV parking need to be well sign posted and user friendly. Public toilets in Dongara are unfortunately at each end of town, but probably not a lot can be done about that. Also, Dongara town site is starting to look extremely tired, possibly when funds allow, flowerbeds etc along Moreton tce.
We have beautiful coastline as is.

Survey Question 15

Dongara and port Denison attract visitors throughout the year. Do you have any suggestions to make tourism along the coast a more positive experience?

(relevant responses as recorded)

We need better parks to attract families down to the foreshore. Tourism should be our bread and butter. There isn't a lot for tourists to do here though.
We should have more rules set in place for tourists so they keep our coastline clean & safe also need more water activities
Well a fishing museum would be nice. The beach hall could have been an ideal place for it. The history of Pt Denison could be promoted with historic walks etc. Move the toilet block across the road next to the sea rescue and modernise the shelter sheds. Leave the beaches alone.
Yes
Yes, more information about the kite surfing spots including location pointers with numbers to identify the location in case of an emergency, making it safer for everyone. More awareness of the coastline that is in Dongara i.e. south beach, its pristine and untouched
Yes, think like a tourist. More towing vehicle parking. Tourist signs in port Denison, maintain shelter sheds, improve the boat ramp, fish cleaning table. There are some many improvement opportunities.
Yes. Leave it as it is. The beauty of the Dongara and Denison coastline is it isn't too over developed. There are plenty of grassed and shaded areas along the inner harbour foreshore for people to enjoy. There are good walkways e.g. Mouth of the river and enough cafes e.g. The little starfish and places to sit e.g. The green beanie, to enjoy these places. Being able to drive on the south beach sets it apart from other places around WA but people need to drive behind the cars not on the water's edge which at times presents a safety risk. Installing the ospreys' nests was a fantastic idea and we enjoy looking for the birds when we come to town.

Survey Question 16

Do you have any other suggestions or ideas for improving coastal management within the Shire?

(Relevant responses as recorded)

A coffee shop or family restaurant near the foreshore.
A foreshore in Dongara would be nice. Where the old cray factory used to be
A man made reef would help protect grannies
a team dedicated to restoration and maybe placing platform out at grannies during summer like the beaches in Geraldton foreshore
Artificial reef could work but in the short term pay 2 shire workers to fill that corner up with sand every year for 5 years during end of September, October, November when tides are good and historically little swell. Get the sand out to the platform at least and don't just grade the beach
Artificial reefs
As above, remove the seaweed when it builds up too much, especially in the warmer months
Banning of motorbikes and jet skis on the main section of south beach. Perhaps they can be allowed past the point at south beach
Be nice to get funding to do a good job at surf/grannies beach. Vertical walls just make backwash
Bins and no quad bikes on south beach
Cliff head is a good set up so most people stop there and leave the rest of the coast the way it is.
Coastal areas should be sculptured by nature and left for us all to appreciate .access needs to be managed
Coastal rehab of vegetation at 7mile beach on the left side. A reef off Grannies Beach A linked walkway at the river mouth from one side to another. 9mile taken off maps as it's privately owned! It's not a public place to fish or visit!
Continue the rocks along from Grannies to Surf beach.
Controlled containment (campers) without imposing too many restrictions, we want them to come back! I think the balance is quite good at the moment.
Don't detract from the natural beauty
Don't let the harbour become smaller than it already is! I have an issue with so much concrete around the place. It feels like the nanny state has taken over – 'you will park here, not there, this is better' because we have

Survey Question 16

Do you have any other suggestions or ideas for improving coastal management within the Shire?

(Relevant responses as recorded)

Unmountable kerbing which I hate with a vengeance. Please no more! It is so very unfriendly - surely the mountable kerbing was better.....
Ensure that when the shire is building something new and an environmental study has predictions that they are taken seriously. Too many times along the western Australia coast these pre-studies are ignored and the predicted happens.
Eradicate " Dongara daisy"
Erosion control priority
Expand parking at the boat ramp and a second boat ramp
Fish cleaning bay
Get some professional help in the planning, make a model and get it on display for public comments and approval
Get some professionals opinion to help with the matter
Have people with the required knowledge (but without the agendas) on the committee to advise the shire of the best possible solutions
Hopefully sopping erosion
I believe that mostly the coast is managed to a good degree. Obviously the erosion is important to manage but I wouldn't want to see any over management whereby we lose a lot of our freedoms along the coast because that is why we all live here and love Dongara
I haven't read the Shire's Coastal Risk Hazard Management and Adaptation Plan but would like to see a long-term solution for the coastal erosion at Grannies and Surf Beach. I
Ice cream van perhaps?
Invest in saving surf beach and ocean drive. This will have a far bigger impact for the town and tourism then spending money demolishing one building
Keep amenities within the town not on the beaches
Keep doing what your doing. It is looking great
Keep it in its natural state as much as possible
Keep the shades up on playgrounds and skate park all year
Leave as is. Just manage rubbish and parking

Survey Question 16

Do you have any other suggestions or ideas for improving coastal management within the Shire?

(Relevant responses as recorded)

Leave it alone
Leave it to the professionals but they need to communicate better to the public
Listen to local knowledge about the marine
Look at Kalbarri and their walk ways etc for great ideas. They have informative signs that are easy to see and read around their attractions. Their shelters around their attractions are amazing.
More ablution blocks need to be installed they are to far apart especially for the elderly
More clean up days
More rock walls
More study. A proper study taken over 6 to 12 months using station met buoys to record the ocean movement over a period of time not 5 mins on a computer
Needs attention before it disappears altogether
Ongoing monitoring of erosion and possibly funding longer term solutions now while interest rates are low like 2% for government loans and producing jobs for locals
Overall very good, however we need to attract as many tourists as possible. Street Gym for
payed beach camping with the ranger collecting the money to pay for facilities
Plant fast growing vegetation and trees to encourage bird life and family areas. Tipiunana trees particularly. Floating jetty in river area for kayak / canoe use
Plant more trees along the coast, the marina needs more play equipment
Plant some more saltwater friendly plants or trees
Police the speed limit on south beach it is dangerous for children and eroded the beach
Pontoon
Prepare through reclamation. Increase walls to produce high embankment. Floating jetties
Preserve it
Promote coastal management and the shires future plans
Protection of native dune vegetation, such as invasive weed control and brushing and/or revegetation. Employing staff that are experienced, trained and knowledgeable in coastal and environmental issues. Start investing in the

Survey Question 16

Do you have any other suggestions or ideas for improving coastal management within the Shire?

(Relevant responses as recorded)

Environment and making it a priority (beyond planning - I.e. integrated into all aspects of planning, works activities, budgeting, etc).
Rangers
Regular surveying is a good idea, as long as the feedback from the community is acted upon. Seems to be lots of rubbish collected on our beaches by locals which is great, some sort of annual clean up day to get more community members involved would help too.
Remove excess seaweed from south beach prior to summer
Remove retainer walls that create a backwash. Some spots the erosion is only washing away reclaimed land not the natural coastline
Repairs shelter sheds and better parking , parking is shocking
restrict the traffic along the beach, it may be only a few idiots being problematic but they do a lot of damage
Rock wall at grannies
Rock walls
seaweed to be removed from the beach, the smell and bugs is increased.
Separate bridge over the river
Some outdoor exercise equipment on the foreshore would be good
Someone needs to go down on the 4wd drive track we know to the beach at cliff head and have a look at the rubbish it's very dire and extremely serious. Because it's not a read road I'm not sure that the shire is even aware that it's there. It's very bad after a storm. It's coming in from the ocean.
Sometimes less is best. We don't need more bollards, parking areas etc. Seating places would be nice, to just sit and enjoy the view. A token bench seat here and there isn't really inviting. More and possibly larger rubbish receptacles to encourage people to tidy up after themselves. As a fair proportion of the rubbish washed ashore appears to come from the commercial fishing fleet maybe they need as a group to make a concerted effort to educate fishers on the disposal of bait bags etc.
Stop allowing more people to build on the foreshore. It is eroding away as it is and has been for ever. Leave it as open family areas so less stress as it moves
Stop trying to stop life and stop playing with the coast line. If you park to close deal with it.
Swimming pool

Survey Question 16

Do you have any other suggestions or ideas for improving coastal management within the Shire?

(Relevant responses as recorded)

The area at 7 mile needs to be bigger for camping and parking bays marked to allow people to come and go
Those slippery concrete mosaic things at the marina are awful, giant sandbags much better idea
Too late , protection of caravan park at grannies lost major beach on coast
Upgrading play ground for kids...adding more modern play areas/equipment
We have 2 questions here. What to do about coastal management and what to do to make our coastline more appealing to tourists. Too broad a topic for one small survey.
We need to continue the boxthorn removal program along the Irwin river (and river mouth). This is an invasive weed that presents a hazard to people using the area (sharp thorns).
Wooden boardwalk could be repaired maybe seating along the river if some of the bushes could be cleared it does need a tidy up along the path ways along river

Survey Question 17

Do you have any comments about any other coastal spots in the Shire?

(Relevant responses as recorded)

7 mile beach being abused with campers
7 mile needs coastal node setup
9-mile desperately needs a rubbish clean
9mile is private land- it needs to be taken off maps and noted its not accessible by public! People are still being rude cutting the chain at the front gate and the poor farmer with his cows worries livestock gets out! 7mile beach should not be 72hr camping! It's 10kms from town! The by-laws state 24kms. And it doesn't have any carpark designation, facilities or signage. Let alone the number of campers is not regulated. It should only be visited during the day and footprints left behind! Nuns pool needs it's plank walkway extended over the sensitive dune area to have access to the beach and a walkway to link up the other side of the river.
Bags are used but only temporarily. I think something more solid is better.
Ban quad bikes
Beautiful and a massive infrastructure to manage. Overall doing a good job. Keep it up
Camping and ablutions for seven and nine mile Development of block next to sea search and rescue as picnic/BBQ area and playground
Caravans taking up all parking at 7 mile beach
Chemical toilet required at 7 mile
Clean up seaweed at grannies
Community rubbish pick ups along the coast and tree planting would be great
Don't become "that shire" with too many rules and signs everywhere! We don't want that. Don't graffiti our town with useless signs like the ones saying that dangerous marine life is in the ocean etc etc
Free camping at 7 mile and other locations are a major issue and should not be allowed!! This does not create employment or promote tourism in any way by stopping people from using accommodation providers
Free camping Is detrimental for the community tourism, campers do not spend money in the town with ratepayers funding the facilities and maintenance
I am not sure that free camping at 7 Mile is good. We don't go there but have heard it is pretty bad.

Survey Question 17

Do you have any comments about any other coastal spots in the Shire?

(Relevant responses as recorded)

I will need to explore more
It is lovely to have picnic areas at each spot
It would be good to have public access to more of the local beaches
It would be nice if locals were allowed to stay more than 3 nights at Cliff Head etc when it's not full of Grey Nomads etc.
Just be more eco-friendly also replace the dog poo plastic bags with brown paper bags
Just make sure we protect the coast from erosion
Leave cliff head as it is at the moment otherwise it is going to get ruined for the people that have lived and grown up there for their whole lives. It's already starting to get over fished. Don't make beach access and boat launching too easy
Look at what other shires are doing to bring people in but don't copy make it our own, we have some great companies, business in town that draw people in, invest time in to them and people will return time and time again.
Lots of plastic and fishing waste are washing up on our beaches like pot floats and rope
Maybe just some more bins We could encourage 1 day a month where the shire invite people to gather at beaches and pickup trash
Might be an idea to put toilets at seven mile. Have seen a lot of toilet paper, extra in the bush where there is temporarily campers/caravans at times.
More boat pens in marina and look at calling Port Denison the southern gateway to the Abrolhos
New car park is awful
Only occasional hooligan activity people on bikes/quads
Other then where I go for walks swim and picnics no I cannot comment
Possible oil and gas works at Palm Springs needs to be monitored closely by state, federal and local governments. If talk of a plant goes ahead then get the companies to pay, or at least contribute largely, for remediation works at Surf Beach
Public toilets at Grannies beach would be very convenient for families. Public toilets at 7 Mile. The foreshore could be beautified with better undercover areas, BBQ's, kids playgrounds, etc.
Put designated parking bays for caravans at seven mile

Survey Question 17

Do you have any comments about any other coastal spots in the Shire?

(Relevant responses as recorded)

Remove free camping as this only costs rate payers in maintenance and rubbish costs. Long drop toilets smell and are mainly used for dumping portable toilet waste making them impractical.
Rubbish from campers along the coast south of Dongara.
Seven Mile may need better guidance for tourists in regards to where to park and how to protect the spot. Maybe a long drop.
Sevin mile beach could do with a gravel road behind the dunes heading north for a couple of kms with a few parking spots added
Shade needed if possible
The board walk could do with a touch up.. as pretty dangerous where there are no side rails in parts..
The boardwalk near Nuns pool, the solar lights are pretty much dead.
The carpark at Seven Mile could do with some work and parking lines.
the facilities provided are great, but please don't overdo them. especially along the coast road as there is far too many inconsiderate impatient drivers as well as tourists not used to driving on country roads (both Aus. and O/S) which is why there are so many accidents. too many stop off points will cause more problems.
the new car park layout at the front of the Denison foreshore has made it harder for tourists towing caravans as there is not exit up near the fisherman's hall so have witnessed vans being towed over the footpath onto the road. Not an ideal layout.
The seaweed at south beach needs to go, they do it in Albany with no fuss
The shire have done a great job down at cliff head and the other areas along that part of the coast and should be commended for it efforts. Well done
The walkway along the river mouth needs maintenance
To create a more enjoyable and relaxing time for tourists there really needs to be a toilet at grannies beach
Tourists I have spoken with have praised the work done at Cliff Head and how much they have enjoyed staying there. 7 Mile seems rather chaotic compared to Cliff Head. Possibly upgrade with the same facilities (might appease some of the locals as well)
We can't stop the wind
Why do rate payers upkeep free camp sites for others that contribute little to our town. They should be charged at cliff head seven mile etc
With our wind conditions it may be worth while encouraging more water sports to our area to increase tourism. E.g. kite surfing, fishing competitions along our coast.

Survey Question 17

Do you have any comments about any other coastal spots in the Shire?

(Relevant responses as recorded)

Yes, where was the public consultation with regard to mixing concrete with the sand at surf beach? It looks like an eye sore and is not a long lasting solution. Wasting money when funding could be obtained and a long lasting result could be found. Think about the future not just the present.
You gave away our town caravan (tourist park) are you going to do the same with your new venture at Cliff head. More preservation of south beach, keep motor bikes off the dunes

APPENDIX B
LITERATURE REVIEW

landinsights
PLANNING DESIGN ENVIRONMENT

COASTAL MANAGEMENT PLAN

LITERATURE REVIEW

PREPARED FOR

SHIRE OF IRWIN

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1 Introduction

1.1 Background

This report presents the review of the background documents relating to the Coastal Management Plan for the Shire of Irwin, including federal, state and local government policies as well as other planning documents and background information. The purpose of the literature review is to establish the planning context (to communicate to the reader the guiding principles behind coastal management and the obligations of local and state government and land holders) and to provide information on the variety of reports which have been prepared for the study area which provide justification for some of the recommendations provided.

Planning documents such as the *Shire of Irwin Local Planning Scheme No. 5* (WAPC, 2008) and *Shire of Irwin Local Planning Strategy 2017* (Shire of Irwin and TPG, 2017) provide context for the future planning of the area. Local reports such as the *Coastal Hazard Risk Management and Adaptation Plan* (Shire of Irwin, 2016) and *NACC Off-Road Feasibility Study* (NACC, 2015) provide context and help to guide the formulation of strategies and actions. Detailed information is extracted from these documents where relevant in the CMP to provide environmental, social and cultural context of the study area.

The documents included in this review include the following:

- Australian Coastal Public Safety Guidelines
- Multiple Land Use Framework
- The Burra Charter
- Risky business – a resource to help local governments manage environmental health risks
- Mid-West Regional Planning and Infrastructure Framework 2015
- Mid-West Tourism Development Strategy
- State Planning Policy 2 – Environmental and Natural Resources Policy
- State Planning Policy 2.6 (SPP 2.6) and Guidelines
- Coastal Hazard Risk Management and Adaptation Planning Guidelines

- State Planning Policy 3.5 – Historic Heritage Conservation
- Status of Coastal Planning in Western Australia 2012
- Coastal Planning and Management Manual 2003
- Coastal Management Specification Manual 2010
- Tourism Planning Guidelines 2014
- A Strategic Approach to Caravan and Camping Tourism in Western Australia 2012
- Batavia Coast Strategy
- Climate Change Adaptation Action Plan
- Shire of Northampton Local Planning Scheme No. 10
- Shire of Chapman Valley Coastal Management Strategy and Action Plan 2016
- Shire of Northampton Coastal Strategy 2006
- Off-Road Vehicle Areas in the Northern Agricultural Region of Western Australia Feasibility Study
- Control of African Boxthorn Regional Management Plan
- Lucky Bay Coastal Node Study
- Geraldton Regional Flora and Vegetation Survey
- Migration of limesand dunes in Western Australia and their impacts
- Shire of Northampton Strategic Community Plan 2016-2026

2 Federal

2.1 Australian Coastal Public Safety Guidelines

The *Australian Coastal Public Safety Guidelines* were prepared in 2007 by Surf Lifesaving Australia. The purpose of the guidelines is to provide world-best practical advice to land managers with a responsibility for public safety on the Australian coast.

Application/Implication

These guidelines can be used by the Shire when considering coastal hazards and risks, coastal signage, beach cleaning, emergency management and coastal tourism safety.

2.2 Multiple Land Use Framework

Multiple landowners can exist over an area and can cause issues when it comes to access and land use across an area, especially where historic cadastre patterns have resulted in odd-shaped lots and patterns. The *Multiple Land Use Framework* (MLUF) was prepared by the Standing Council on Energy and Resources in 2013 in recognition of the conflict arising over land access and land use. The aim of the MLUF is to enable government, community and industry to effectively and efficiently meet land access and use challenges, expectations and opportunities. It was developed with the minerals and energy resources sectors in mind, however the underlying concepts can be applied to all sectors. The MLUF recognises that access to land is fundamentally important to the successful management of competing interests of mining, energy, agriculture, environment, community and other significant land users.

Application/Implication

This document has a focus on outlining the guiding principles and objectives of the project, rather than specific advice as to how land use conflicts and access can be resolved. Each situation should be considered on a case-to-case basis and terms negotiated between affected parties.

2.3 The Burra Charter

The Burra Charter (Australia ICOMOS Inc., 2013) provides guidance for the conservation and management of places of cultural significance (cultural heritage places). It sets a standard of practice for those who provide advice, make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians. The Charter can be applied to all types of places of cultural significance including natural, Indigenous and historic places with cultural values. It provides guidance on conservation principles, conservation process and conservation practice.

The steps in the Burra Charter process are:

- Understand the place
- Assess cultural significance
- Identify all factors and issues
- Develop policy
- Prepare a management plan
- Implement a management plan
- Monitor the results of the management plan.

Application/Implication

The principles and guidelines from The Burra Charter should be used by the Shire and coastal managers in the management and protection of cultural heritage sites.

2.4 Risky business – a resource to help local governments manage environmental health risks

Risky Business – a resource to help local governments manage environmental health risks was prepared by the Australian Government Department of Health (previously the Department of Health and Ageing) and the Environmental Standing Committee in 2012. The aim of the resource is to raise awareness of how to minimise the financial, health and reputation risks related to the environmental health responsibilities of local governments and thereby protect the best interests of both their communities and their organisation. It outlines six steps to achieve effective environmental health risk management:

- Identify responsibilities

- Identify roles – how does the local government manage environmental health
- Identify what the environmental health risks are
- Identify the likelihood and likely consequences of the risks
- Identify how the local government can reduce the risks
- Identify how local government can achieve risk management outcomes.

Application/Implication

This guideline is a useful resource not only for the CMP but for the Shire of Irwin to use in their regular operations. Some of the guidelines can be incorporated into the Shire's Strategic Plan and other environmental management plans.

3 State

3.1 Mid-West Regional Planning and Infrastructure Framework 2015

The *Mid-West Regional Planning and Infrastructure Framework* was finalised by the WAPC in 2015. It provides a regional context for land use planning in the Mid West, an overview of major regional economic, social, cultural and environmental issues, priority actions for planning and priority infrastructure projects. It categorises the region into three sub-regions: Batavia Coast, North Midlands and Murchison. The Shire of Irwin is located within the Batavia sub-region.

The Batavia coast includes the Regional City of Geraldton and the two Sub-Regional Centres of Dongara–Denison and Kalbarri. This sub-region will have the greatest pressure for development and will therefore require careful growth management. Dongara-Denison is identified as a *sub-regional centre.* They are described as centres which '*support the population and economic activities within the surrounding hinterlands'.* A *Potential Infrastructure Corridor* is also shown running through Dongara-Denison and north along the coast towards Geraldton.

The Framework also identifies a number of minerals and resources along the coast including a gypsum mine south of Dongara and a limestone-limesand mine close to the Dongara townsite.

Application/Implication

The Framework states that the Batavia Coast will have the greatest pressure for development. This increased pressure for development and population growth could have a cumulative effect on the coastal area by increasing the number of visitors to the area, especially during holiday periods. Being located in close proximity to Geraldton also appeals the coastal areas of the Shire to locals from surrounding local government areas which places even greater pressure on the Shire for coastal management.

3.2 Mid-West Tourism Development Strategy

The *Mid West Tourism Development Strategy* was prepared by the Mid West Development Commission, the Regional Development Australia and Evolve Solutions in 2014 to inform future development and investment in the Mid West. The Strategy identified that the Mid West is underperforming as a tourist destination in that its potential is not being realised and recommends the following:

1. *Increasing accommodation capacity from camping through to resorts*
2. *Opening up day use sites-places previously overlooked or under-developed to enhance the Mid-West's appeal as a destination*
3. *Improving the quality and distribution of information for pre-trip planning and way finding*
4. *Attracting more high-yield visitors and the growing self-drive and RV market*
5. *Increasing the range of Aboriginal and eco nature-based tourism activities, attractions and experiences.*

The following recommendations are made with regards to the Shire of Irwin:

- *Continue to encourage the development of a 4-5 star hotel-resort at the former Kailis plant site near the foreshore; ideally 40-50 rooms to support events / seminars using the conference facilities within the recreation centre. Encourage TWA to co-promote the site to investors*
- *Encourage the development of additional farmstays, holiday homes, B&B's and lodges-hostels; encourage growth in visitation during the peak periods*
- *Investigate the development of a fortnightly or monthly farmers market in-near town; encouraging local producers, entrepreneurs and businesses to deliver a variety of produce and products.*
- *Investigate parking for long vehicles near the main street, with appropriate signage*
- *Continue to explore the sustainability of an ocean pool as an attraction*
- *Investigate greater use of the river, the riverbanks and surrounding areas, including day time activities (e.g. trails, picnic areas, benches, pathways, canoeing, swimming) and evening activities (e.g. BBQ's, rest areas)*
- *Investigate larger, more prominent signage on the Brand Highway / Kailis Drive junction to encourage higher volume of visitors / vehicles into Port Denison.*

- *Investigate re-branding as Dongara with a strong emphasis on ocean/coast, river, heritage, country town, fishing and marine activities. Phase out Port Denison and Shire of Irwin from all branding and tourism promotion. Introduce a logo and tag line and incorporate into all promotional mediums.*
- *Investigate upgrading directional signage in-around Geraldton to the visitor centre, day use sites, attractions / places of interest, hospitality, parking (for long and short vehicles), trails and sport-rec facilities.*
- *Continue to progress the Port Denison Foreshore master plan.*
- *Continue to progress the Town centre revitalisation plan including the RV park, the relocated Visitor Centre and visitor amenities at the Park.*
- *Continue to progress the development of tourism nodes along the coast both as day use sites and overnight short stay sites.*

Application/Implication

Implementation of the above actions for the Shire of Irwin is hoped to lead to an increase in tourism and visitation in the Shire, focusing on the coastal areas and the townsite. This can lead to increased coastal use and possible degradation which will need to be appropriately managed by the Shire and other coastal managers to help manage degradation.

3.3 State Planning Policy 2 – Environmental and Natural Resources Policy

State Planning Policy 2 – Environmental and Natural Resources Policy (SPP) was prepared by the WAPC in 2003. The Policy objectives of SPP 2 are to integrate environmental management with broader land use planning, to protect, conserve and enhance the natural environment and to promote sustainable use of natural resources. Policy Measures in SPP 2 focus on water resources, air quality, soil and land quality, biodiversity, agricultural land, minerals, petroleum and basic raw materials, marine resources and aquaculture, landscape, greenhouse gas emissions and energy efficiency.

Application/Implication

The preparation of this Coastal Management Plan is a response to the objectives of SPP 2 and its main purpose it to protect, conserve and enhance environmental features along the coast, to promote sustainable use for future generations to enjoy and to provide practical and realistic actions that can be used by decision-makers.

3.4 State Planning Policy 2.4 – Basic Raw Materials

SPP 2.4 – Basic Raw Materials was prepared by the WAPC in 2000. It *sets out the matters which are to be taken into account and given effect to by the Commission and local governments in considering zoning, subdivision and development applications for extractive industries (for the extraction of basic raw materials) and zoning, subdivision and development applications in the vicinity of identified basic raw material resource areas*.

The policy objectives are to:

- *identify the location and extent of known basic raw material resources;*
- *protect Priority Resource Locations, Key Extraction Areas and Extraction Areas from being developed for incompatible land uses which could limit future exploitation;*
- *ensure that the use and development of land for the extraction of basic raw materials does not adversely affect the environment or amenity in the locality of the operation during or after extraction;*
- *provide a consistent planning approval process for extractive industry proposals including the early consideration of sequential land uses.*

Application/Implication

While the Policy mapping does not extend into the study area, the policy objectives are applicable. The Mid-West Regional Planning and Infrastructure Framework identifies a number of minerals and basic raw materials along the coast including a gypsum mine south of Dongara and a limestone-limesand mine close to the Dongara townsite. The use of the site for low-key coastal development should not have an adverse impact on the possible future use of the site for basic raw materials extraction. Any permanent development proposed along the coast should consider the impact on basic raw materials.

3.5 Draft State Planning Policy 2.4 – Basic Raw Materials and Guidelines

Draft SPP 2.4 – Basic Raw Materials and the *Basic Raw Materials Guidelines* were released for public comment in October 2018. The SPP 'enables the responsible extraction of Basic Raw Materials (BRM), while ensuring the protection of people and the environment.' The updated mapping identifies 'Extraction Sites' and areas of 'Significant Geological Supplies'. The Policy provides guidance to operators and decision makers regarding applications for BRM extraction, as well as other types of planning applications that can potentially impact on extraction sites or significant geological supplies.

The draft SPP 2.4 mapping indicates that a number of limesand significant geological supplies are located along the coast south of the Port Denison/Dongara townsite.

Application/Implication

As with the current SPP 2.4, the implications of the draft SPP 2.4 are similar in that any application for basic raw materials will need to consider the impact on the environment and any coastal development will need to consider its possible impact on BRM. The use of the site for low-key coastal development should not have an adverse impact on the possible future use of the site for basic raw materials extraction.

3.6 State Planning Policy 2.9 – Water Resources

SPP 2.9 – Water Resources was prepared by the WAPC in 2009. It provides guidance to planning decision-makers for consideration of water resources in land use planning. The objectives of the policy are:

1. *To protect, conserve and enhance water resources that are identified as having significant economic, social, cultural and/or environmental values*
2. *To protect, conserve and enhance water resources that are identified as having significant economic, social, cultural and/or environmental values*
3. *To promote and assist in the management and sustainable use of water resources.*

Water resources included within the Policy include groundwater, wetlands, waterways and estuaries.

Application/Implication

The only surface water feature in the study area is the Irwin River. The surface water catchment areas for the Shire's coastal area includes 'Moore-Hill Rivers' and 'Greenough River'. The entire coastal area is included within the 'Arrowsmith' Proclaimed Groundwater Area (under the *Rights in Water and Irrigation Act 1914*). Application of SPP 2.9 will be required should any development be proposed along the Shire's coast that may impact on water resources.

3.7 State Planning Policy 2.6 – State Coastal Planning Policy

SPP 2.6 – State Coastal Planning Policy was prepared by the WAPC in 2013. This Policy provides guidance for decision-making within the coastal zone including managing development and land use change, establishment of foreshore reserves; and to protect, conserve and enhance coastal values. The Policy is to inform and guide decision-making by the WAPC and its Committees, and in integrating and coordinating the activities of state agencies that influence the use and development of land in the coastal zone. It also provides guidance for private landowners wishing to undertake development in the coastal zone.

Application/Implication

SPP 2.6 will be used as a guiding document during preparation of the CMP and the hazard assessments undertaken by Seashore Engineering.

3.8 State Planning Policy 2.6 State Coastal Planning Policy Guidelines

The *State Coastal Planning Policy Guidelines* were prepared by the WAPC in 2013. These guidelines were prepared to support the implementation of SPP 2.6 and to assist decision-makers to:

- Consider coastal hazards and evaluate their likelihood
- Identify realistic and effective management and adaptation responses to those risks
- Prioritise the management and adaptation responses.

The Guidelines provide detailed guidance for the application of the policy measures. It includes details on the following:

- Development and settlement
- Earthworks and soil
- Water resources and management
- Visual landscape
- Coastal hazard risk management and adaption planning process
- Vulnerability assessment
- Assessing risk adaption options
- Ongoing risk management and adaption planning
- Communication and consultation
- Coastal adaption and protection grants scheme
- Infill development
- Coastal protection works
- Public interest
- Public access
- Coastal roads and car parks
- Coastal pedestrian access and dual use paths
- Coastal foreshore reserves
- Ecological values
- Landscape, seascape and visual landscape
- Heritage
- Coastal strategies and management plans.

A large focus of the guidelines is planning and adapting to setbacks and ensuring infrastructure and facilities are appropriate.

Application/Implication

The SPP 2.6 Guidelines will be used during preparation of the CMP and the hazard assessments undertaken by Seashore Engineering.

3.9 State Planning Policy 3.4 – Natural Hazards and Disasters

SPP 3.4 – Natural Hazards and Disasters was prepared by the WAPC in 2006. The purpose of the Policy is to encourage local governments to adopt a systematic approach to the consideration of natural hazards and disasters when making planning decision. Natural hazards and disasters include flood risk, bushfire, landslides, cyclonic activity, severe storms and storm surge.

The Policy objectives are to:

- Include planning for natural disasters as a fundamental element in the preparation of all statutory and non-statutory planning documents, specifically town planning schemes and amendments, and local planning strategies
- Through the use of these planning instruments, to minimise the adverse impacts of natural disasters on communities, the economy and the environment.

Application/Implication

Natural hazards and disasters applicable to the coastal zone include flood risk (in low-lying areas such as waterways), bushfire, coastal erosion, storm surge, severe storms (including cyclones) and landslides (or limestone collapse). The hazards most applicable to the study area include bush fire (this is addressed under SPP 3.7), coastal erosion and storms (this is addressed under SPP 2.6) and flood risk (applicable to the Irwin River areas). There are no limestone outcrops or slopes of 15% or greater that will warrant too much concern about landslides. Natural hazards and disasters can be addressed through the Shire's fire and emergency response plan for the coast. Any applications for development or building along the coast will need to take this policy into consideration.

3.10 State Planning Policy 3.5 – Historic Heritage Conservation

SPP 3.5 – Historic Heritage Conservation was prepared by the WAPC in 2007. This policy sets out the principles of sound and responsible planning for the conservation and protection of Western Australia's

historic heritage. It applies principally to historic cultural heritage including heritage areas, buildings and structures, historic cemeteries and gardens, man-made landscapes and historic or archaeological sites with or without built features.

The objectives of this policy are:

- *To conserve places and areas of historic heritage significance*
- *To ensure that development does not adversely affect the significance of heritage places and areas*
- *To ensure that heritage significance at both the State and local levels is given due weight in planning decision-making*
- *To provide improved certainty to landowners and the community about the planning processes for heritage identification, conservation and protection.*

The policy measures include identification and assessment of places of state significance by the Heritage Council of WA, designation of heritage areas, establishment of heritage lists, consideration of heritage when undertaking planning and establishment of development control principles.

Application/Implication

There is one heritage site on the State Register located at the Port Denison townsite ('two obelisks and commemorative plaques'. Two Registered Aboriginal Heritage Sites are located within the Port Denison/Dongara townsite. The first is the 'Irwin River' (ID 18907) which is described as 'historical, mythological, camp, natural feature, water source' and the second is 'Leander Point' (ID 5280) which is described as 'artefacts/scatter, midden/scatter'. One 'Other Heritage Site' is identified within the study area which stretches along the southern part of the Shire's coast. This site is called 'Eneabba West' (ID 15297) and is identified as 'stored data' and not a site as such. It is described as 'ceremonial, fish trap, camp, water source, other'.

There are few implications from SPP 3.5 as there are few heritage sites identified in the study area. However, should any development be proposed in the study area it will be necessary to follow the guidance in this policy as well as the relevant legislation.

3.11 State Planning Policy 3.7 – Planning in Bushfire Prone Areas

SPP 3.7 – Planning for Bushfire Prone Areas was prepared by the WAPC in 2015. It provides the foundation for land use planning to address bushfire risk management in Western Australia and to inform and guide decision-makers, referral agencies and landowners to help achieve acceptable bushfire protection outcomes. It applies to development in designated bushfire prone areas.

The entire coastal area is included in the mapped bushfire prone area, including parts of the coast through the Port Denison/Dongara townsite. This is owing to the amount of vegetation located along the Shire's coastal areas which increases fire hazard.

Application/Implication

Fire and emergency management plans are essential for coastal areas which are identified as bushfire prone. This is particularly important as the coastal areas are frequently used by the community for recreation and social purposes. The Shire should ensure that they have appropriate fire and emergency management plans in place and implemented as appropriate.

3.12 Draft Position Statement – Tourism Land Uses Within Bushfire Prone Areas

The *draft Position Statement – Tourism Land Uses Within Bushfire Prone Areas* was prepared by the WAPC in 2018. It provides the WAPC's policy position for short stay tourism land uses and tourism land uses limited to day/night use with no overnight stay located within bushfire prone areas. It should be referred to in conjunction with SSPP 3.7.

The objectives of the Policy are to:

- *minimise vulnerability of tourism land uses in bushfire prone areas*
- *provide bushfire protection relevant to the characteristics of the tourism land use*

- *identify and understand the risks in order to anticipate and provide suitable bushfire risk management measures*
- *achieve a balance between bushfire risk management measures, environmental protection and biodiversity management and landscape amenity.*

With regards to caravan parks, the Position Statement states the following:

> *Standard type caravans and motor homes used for short-term tourist accommodation generally cannot achieve any level of construction under AS 3959. Compliance with the general policy measures should be demonstrated including the provision of APZs for habitable buildings such as offices, shops and enclosed eating areas. The emphasis should also be on emergency management, early evacuation and/or non-operation on days of catastrophic fire danger rating or in high fire risk areas, a fire danger rating of very high, severe or extreme, may be more appropriate. Where suitable vehicular access to two different destinations cannot be provided, the BMP should identify the risks and propose bushfire mitigation measures to reduce this risk, including a refuge building or open space area.*

With regards to camping grounds, the Position Statement states the following:

> *No construction requirements for tents are provided in AS 3959. Due to the nature of materials used in tent construction, little can be done to enhance structural resilience. The emphasis should also be on emergency management, early evacuation and/or non-operation on days of catastrophic fire danger rating or in high fire risk areas, a fire danger rating of very high, severe or extreme, may be more appropriate. Western Australia contains many camping grounds that are remote from townsites and emergency services and require special consideration. Some of these camping grounds provide limited facilities and may or may not include an on-site caretaker. There is an inherent risk associated with these areas, bushfire being one of them. It is the responsibility of the owner/operator to provide information on the bushfire risks associated with the area and any emergency management options available. It is also the responsibility of those visiting these areas to understand and prepare for these risks. Vehicular access may be limited to 4-wheel drive; and*

potable water and water for firefighting may not be available. The use of remote camping grounds in high risk bushfire prone areas during periods of elevated bushfire danger is discouraged. The BMP should identify the risks and propose bushfire mitigation measures to reduce this risk. This could include improvements to vehicular access, signage and identification of areas of 'least risk' for the camp sites.

Application/Implication

The draft Position Statement is a useful document for coastal managers in the Shire of Irwin because a majority of the coastline is located within a bushfire prone area. The preparation of any bushfire or emergency management plans should refer to the Position Statement. Recommendations from the Position Statement can be included such as improvements to vehicular access, signage, identification of areas of 'least risk' for the camp sites, emergency management, early evacuation and/or non-operation on days of catastrophic fire danger rating or in high fire risk areas, a fire danger rating of very high, severe or extreme.

3.13 Status of Coastal Planning in Western Australia 2012

The *Status of Coastal Planning in Western Australia* was prepared by the WAPC in 2012 to assist with the implementation of the Coastal Planning Program for the state.

The Coastal Planning Program is one of the tools used to update the WAPC on land use and management of the State's coastal resources. The report identifies that the coastal considerations for the Mid West region are:

- *Protection of the coast and the cost of protection works.*
- *Control of off-road vehicles.*
- *Balancing recreational demands for coastal access and Oakajee Port requirements.*
- *Preservation of areas with high biodiversity conflicting with land use required for residential or commercial development.*
- *Planning for climate change.*

Application/Implication

The report identifies a number of existing plans relating to the Shire of Irwin's coastal areas, however some of these have been updated since the Status of Coastal Planning was prepared (such as the Irwin River Estuary Management Plan prepared in 2014). The report doesn't identify any outstanding plans in need of preparation in the Shire of Irwin. However as the existing Irwin Coastal Development Strategy is close to 20 years old it is considered in need of revision.

3.14 Coastal Planning and Management Manual 2003

The *Coastal Planning and Management Manual* was prepared by the WAPC in 2003 to provide a practical guide to coastal planning and management in WA. It provides information on a broad range of issues which should be considered when managing the coastline such as the following:

- Common coastal management problems
- Techniques for dune stabilisation
- Rehabilitation of coastal landscapes
- Revegetation methods
- Weed management.

A number of principles are described in the manual, the aim of which is to advise readers about an appropriate framework for managing the coast. These principles address the following:

- Sustainable management
- Identifying the limits of acceptable change
- Maintenance of ecosystem integrity
- Consultation
- Respect for and protection of Indigenous rights, interests, culture and heritage
- Identification of management objectives
- Staged management approaches
- Minimal intervention
- Site-specific management approaches.

Application/Implication

This manual is a useful environmental planning tool which can be used by the Shire when undertaking rehabilitation, dune stabilisation and weed control.

3.15 Coastal Management Specification Manual 2010

The *Coastal Management Specification Manual* was prepared in 2005 by Green Skills for the South Coast Management Group and revised in 2010. It provides a guide for the construction of coastal infrastructure, including specifications and drawings for the design of features such as seating and tables, BBQs, signage, cap parking areas, campsites, timber boardwalks and steps, viewing platforms, birdhides, low water use toilets and fish cleaning stations.

Application/Implication

The Specification Manual should be referred to when designing and constructing infrastructure along Shire's coastline.

3.16 Tourism Planning Guidelines 2014

The *Tourism Planning Guidelines* were prepared by Tourism WA, the then Department of Planning and the Western Australian Planning Commission in 2014. They aim to provide assistance to local governments when preparing the tourism component of a local planning strategy. The purpose of this is to encourage an increased focus on land use planning for tourism and to provide local governments with a rationale for determining future land allocation, planning controls and infrastructure needs for tourism.

The report provides guidance with regards to site assessments for future tourist accommodation development, infrastructure and services, tourist attractions, activities and amenities, tourism precincts and sites, zoning for tourism, tourist development in non-tourist zones, redevelopment areas, hotels, holiday homes and caravan parks.

The Guidelines encourage caravan parks and camping to provide for a particular niche in the short-stay accommodation market and the provision of affordable accommodation for tourists. Camping grounds are

described in the Guidelines as low-key, low impact sites that have no or limited facilities. With regards to caravan park redevelopment, the Guidelines suggest that the local planning scheme require that a Local Development Plan is prepared to support the development.

Application/Implication

The Shire's coastal areas primarily comprise of low-key camping areas and recreational areas, including some squatter shacks along the southern coastal areas. The Guidelines should be referred to when considering whether certain sites should be improved, new sites created or existing sites closed or when the Shire updates its Local Planning Strategy or Scheme.

3.17 A Strategic Approach to Caravan and Camping Tourism in Western Australia 2012

A Strategic Approach to Caravan and Camping Tourism in Western Australia was prepared by Tourism WA, Brighthouse and Starfish Business Solutions in 2012 and provides recommendations to address the provision of caravan and camping infrastructure, particularly in coastal locations. The aim is to make WA the preferred caravan and camping holiday destination.

One medium priority was identified by Tourism WA within the Shire of Irwin. The priority identified was the need for more dump points along Indian Ocean Drive.

Recommendations presented in the report include the following:

- *Recommendation 1: Streamline caravan park and campgrounds regulations to improve supply and meet market demand*
- *Recommendation 2: Increase support for landbank to release land for more caravan park developments where viable*
- *Recommendation 3: Identify opportunities to access Western Australia's conservation estate*
- *Recommendation 4: Create public-private partnerships to improve delivery and maintenance of caravan and camping facilities*
- *Recommendation 5: Partner with Indigenous Australian's to develop caravan and camping infrastructure on Indigenous land*

- *Recommendation 6: Provide better guidelines for the development of caravan parks to Local Government*
- *Recommendation 7: Develop a State-wide overflow policy that works for visitors and supports industry*
- *Recommendation 8: Raise the bar on skills for the caravan and camping sector*
- *Recommendation 9: Improve data to support decision making*
- *Recommendation 10: Develop a marketing strategy to improve perceptions and online presence of the caravan and camping sector*
- *Recommendation 11: Secure sustainable regional tourism benefits from the resource mining boom.*

Application/Implication

This document does not make many recommendations with relation to the coastal areas within Shire or Irwin. Despite this, there is some useful information contained within the above general recommendations which can be applied to the study area.

3.18 Aboriginal Heritage Due Diligence Guidelines

The *Aboriginal Heritage Due Diligence Guidelines* were prepared by the then Department of Aboriginal Affairs (now DPLH) and Department of Premier and Cabinet in 2013. The purpose of the Guidelines is to assist land users to be more aware of how their activities could adversely impact an Aboriginal site. Compliance with the Guidelines will not of itself guarantee compliance with the *Aboriginal Heritage Act 1972*, however, where the Guidelines are followed, it is less likely that Aboriginal sites will be harmed. The Aboriginal Heritage Directorate recommends that developers undertaking activities within the study area take into consideration the Guidelines when planning. The Guidelines have been developed to assist proponents to identify any risks to Aboriginal heritage and to mitigate risks where heritage sites may be present. Due diligence may involve one or more of the following actions:

(a) assessing the landscape where an activity is to take place;

(b) assessing the proposed activity and the potential impact on the landscape;

(c) searching the Register of Aboriginal Sites and the Aboriginal Heritage Inquiry System;

(d) consulting with the relevant Aboriginal people;

(e) agreeing to an Aboriginal heritage survey; or

(f) other heritage management strategies.

Application/Implication

Two Registered Aboriginal Heritage Sites are located within the Port Denison/Dongara townsite. The first is the 'Irwin River' (ID 18907) which is described as 'historical, mythological, camp, natural feature, water source' and the second is 'Leander Point' (ID 5280) which is described as 'artefacts/scatter, midden/scatter'. One 'Other Heritage Site' is identified within the study area which stretches along the southern part of the Shire's coast. This site is called 'Eneabba West' (ID 15297) and is identified as 'stored data' and not a site as such. It is described as 'ceremonial, fish trap, camp, water source, other'.

The Guidelines should be considered by coastal managers when undertaking any development along the coast. Following the Guidelines should help with compliance with the *Aboriginal Heritage Act 1972* which should also be adhered to when undertaking any development along the coast.

3.19 Indian Ocean Drive Planning Guideline

The *Indian Ocean Drive Planning Guideline* was prepared by the WAPC in 2014. The Guideline sets out broad guidelines for the location, siting and design of various land uses and development in the locality of Indian Ocean Drive with the purpose of retaining the rural and natural landscape and enhancing the provision of services and facilities available to all users of the road. It applies specifically to a 500 metre corridor on either side of the road reserve.

The Guidelines state that currently there are no tourist accommodation providers directly abutting Indian Ocean Drive outside towns but a number of proposals for tourist development in the vicinity of Indian Ocean Drive are being considered including a caravan park on freehold land in the vicinity of Knobby Head.

With regards to stopping locations, Main Roads established a stopping place along the northern section of the road near Knobby Head and the Guidelines state that there is potential for additional stopping places in the northern section of the road.

The Guidelines makes the following recommendations with regards to the study area:

1. *Establish a permanent forum for shire planning officers from the Shires of Gingin, Dandaragan, Coorow, Carnamah and Irwin with Department of Planning, Main Roads and Department of Parks and Wildlife officers support as needed.*
2. *Prepare a uniform local planning policy to be adopted by the five local governments to guide decision-making in relation to land use and development along Indian Ocean Drive.*
3. *Prepare model provisions that could be incorporated into local planning schemes when rezonings are considered that would assist in controlling the siting and screening of development, based on the outcomes of a visual landscape assessment.*
4. *Investigate mechanisms that could be incorporated into local planning schemes to ensure that permitted development such as sheds, single houses, fencing and water tanks are consistent with this Guideline.*
5. *Investigate mechanisms that could be incorporated into local planning schemes to ensure that permitted development such as sheds, single houses, fencing and water tanks are consistent with this Guideline.*
6. *Improve signage on Indian Ocean Drive to identify the location and distance to stopping places and toilets, such as at Hangover Bay and Cervantes, and to inform road users of fuel availability along the road.*
7. *Consider new look-outs in the northern section of Indian Ocean Drive, such as at Freshwater Point (Shire of Irwin) and the upgrading of existing look-outs, such as at Lions Lookout (Shire of Dandaragan).*
8. *Progress planning for additional toilet facilities approximately mid-way between Perth and Jurien Bay.*

9. *Consider enhancing opportunities for travellers to enjoy the landscape and its natural features through the construction of walk trails of various lengths, starting from roadside bays, e.g. from the Wedge lookout down to the coast, or from one roadside stopping place to the next, taking care to locate trails beyond the noise and sight of traffic.*
10. *Consider the guidelines and strategies regarding form and colour as reflected in the Guideline when maintenance, improvements or reconstruction of Main Roads' stopping places occur.*
11. *. Determine the need for additional telecommunications infrastructure to improve mobile phone coverage in areas that currently lack that access such as north of Coolimba and between Nilgen and Grey, south of Cervantes.*
12. *Prepare a fire and vehicle accident risk assessment and associated procedures for the management of emergencies, including evacuation, utilising Indian Ocean Drive and the connecting road network.*
13. *Develop a mobile phone 'application' for road users, particularly visitors, that provides information about the facilities such as stopping places, tourist destinations and service stations, on and in the vicinity of Indian Ocean Drive, as well as interpretative information about the environment.*

Application/Implication

The Guidelines mention a possible caravan park on freehold land in the vicinity of Knobby Head. It recommends additional stopping places north of Knobby Head and lookouts north of Freshwater Point.

3.20 Coastal Sediment Cells for the Mid-West Coast (between the Moore River and Glenfield Beach, Western Australia)

Coastal Sediment Cells for the Mid-West Coast (between the Moore River and Glenfield Beach, Western Australia) was prepared by Seashore Engineering for the Department of Transport in 2014. The aim of the report was to identify a hierarchy of sediment cells to assist planning, management, engineering, science and governance of the Mid-West coast. The report identified Six primary cells, 15 secondary cells and 41 tertiary cells between the Moore River and Glenfield Beach.

The primary cells within the Shire of Irwin were RO7D (south of Dongara) and RO7E (north of Dongara). The secondary cells from south to north along the Irwin coastline are 9, 10, 11 and 12.

Application/implication

The report states that *a major technical use for sediment cells is to improve erosion hazard assessments by better integrating regional and local coastal change. Regional changes may include the effects of climate or sea level fluctuations and the consequent variations in sand supply. Local changes include storm responses and coastal interactions with natural and artificial structures. Improved knowledge of how local changes may have broader impact is essential to good coastal planning.* Further technical information and recommendations from Seashore Engineering will be integrated into the CMP for priority sites.

3.21 Coastal Risk Profile – Sector 4

The *Coastal Risk Profile* Report was prepared by Surf Lifesaving Western Australia in 2005 for the Local Government Insurance Services WA. It evaluates coastal risk at coastal locations stretching from the Shire of Gingin to the Shire of Northampton. The assessment undertakes a risk profile analysis which gives a rating for hazards, population use and frequency of use. The resultant rating is the Facility Visitation Rate which is an indication of overall risk to coastal users.

The report gives the following Facility Visitation Risk ratings for the coastal sites within the Shire:

- Arurine Bay and Port Denison Harbour – 5
- Nine Mile Beach and Ten Mile Beach – 4
- Carsons Beach, Irwin River mouth, Dongara, King Bay, Five Mile Beach and Seven Mile Beach – 3
- Knobby Head, Freshwater Point and Cliff Head – 2

Application/Implication

It is not clear from the report what the scale of the Facility Visitation Risk ratings are, however it can reasonably be concluded that the lower the number the lower the risk. Beaches within the Shire of Irwin have been identified as having low risk. It should also be noted that some of the beach names listed in this report could be inaccurate or not the local names.

3.22 Climate Change Adaptation Action Plan

The *Climate Change Adaptation Action Plan* was prepared by AECOM Australia Pty Ltd for the Batavia Regional Organisation of Councils (BROC) in 2010. The BROC comprises the City of Geraldton-Greenough and the Shires of Irwin, Northampton and Chapman Valley. It identifies risks and opportunities and develops adaptation actions for the councils in response to the higher temperatures, reduced rainfall and sea level rise projected for the region in the future. The report identifies 68 individual risks (which are rated from 'Low' to 'Extreme') and highlights 12 potential climate change related opportunities.

In general, the report proposed the following actions to address the following areas:

- *Water and energy efficiency and other sustainable design issues;*
- *The climate resilience of essential infrastructure;*
- *The long term protection and enhancement of public open spaces;*
- *The protection of local properties from sea level rise and bushfire risks;*
- *Community resilience to increased heat and bushfire risks;*
- *Staff health and safety;*
- *The protection of at risk coastal and other habitats;*
- *Weed and pest control and the protection of biodiversity corridors;*
- *The financial preparedness of BROC members in the face of climate change risks; and*
- *The economic development potential of the renewable energy and the aquaculture industries in the region.*

Most proposed actions take one of the following forms:

- *Providing additional community education (for example regarding the potential impacts of climate change on local biodiversity);*

- *Providing incentives to encourage climate resilient behaviours in the community (for example to encourage residential and commercial uptake of rainwater tanks);*
- *Undertaking further studies (for example cost-benefit analyses and risk mapping projects);*
- *Incorporating or strengthening of resource efficiency and climate resilient principles in councils' existing plans and strategies (for example in the City of Geraldton Greenough's Bushfire Emergency Response Plan);*
- *Implementing ongoing monitoring programs (for example regarding infrastructure conditions or patterns in the use of community facilities);*
- *Providing additional community services (for example targeting vulnerable populations during heat waves);*
- *Closer collaboration with relevant regional bodies (for example with the Fire and Emergency Services Authority and the Department of Planning).*

Application/Implication

While the actions and recommendations in the *Climate Change Adaptation Action Plan* more closely relate to a CHRMAP rather than this CMP, there are certain suggestions which can be applicable such as community education and monitoring.

3.23 The Coast of the Shires of Coorow to Northampton, Mid West, Western Australia: Geology, Geomorphology and Vulnerability

The Technical Report for *The Coast of the Shires of Coorow to Northampton, Mid West, Western Australia: Geology, Geomorphology and Vulnerability* was prepared by Eliot, et al. (2012) for the DPLH and DoT. The aim of the project was *to determine the vulnerability of landforms on the Mid-West coast to changing weather and oceanographic conditions, including projected changes in climate*.

Sixty four cells were identified along approximately 160 km of coast (however three of these cells were not considered in the assessment). Out of these, five cells a (8%) were highly susceptible to environmental change, 39 of the 61 (64%) cells examined were moderately susceptible and 17 cells (28%) had a landform association with a low susceptibility. Areas with low susceptibility to environmental change were

most common south of Flat Rocks (City of Greater Geraldton), a number of which are within the Shire of Irwin including the area from Webb Islet to Cliff Head, Leander Point to Seven Mile Beach and Bookara South.

An analysis of landform stability revealed that a high proportion, fifty three of the 61 (87%) cells examined, were moderately to highly unstable. Eight cells (13%) had a low instability ranking, 25 cells (41%) were moderately unstable and 28 cells (46%) were of high instability. Sediment cells with low instability were most common on the coast south of Cliff Head. Cells within the Shire of Irwin with high instability include tracts of land between Cliff Head and Leander Point and at Nine Mile Beach.

The overall results for coastal vulnerability indicated that four (6.5%) of the 61 cells examined had a low level of vulnerability; 14 (23%) were of low-to-moderate vulnerability; 17 (28%) were moderately vulnerable; 22 (36%) were of moderate-to-high vulnerability and four (6.5%) had a high vulnerability.

The report gives some more detailed information on the susceptibility, instability and vulnerability at the Port Denison ad Dongara townsite. Seaspray Beach is considered to have a high vulnerability due to the influence of the Irwin River and modifications as a result of the Harbour (constructed in 1979). The report recommends that *a coastal setback is required north of Seaspray Beach where there is potential for migration of the shoreline salient*. The low-lying land adjoining the Irwin River is vulnerable to inundation of the alluvial flats, approximately 1.5-4 km upstream of the mouth. Blowouts and sandsheet activation are of concern, particularly south of the harbour and the report advises that *coastal access be designed to minimise loss of vegetation of the foredunes and frontal dunes*.

Application/implication

The Technical Report provides information on the susceptibility, landform stability and vulnerability within the Shire of Irwin, and includes recommendations and advice with a focus on the Port Denison and Dongara townsite. This information will continue to be used by Seashore Engineering in their detailed assessment of certain hotspot sites for incorporation in this CMP.

3.24 Draft Coastal Character and Values Study – Stage One Study of Four Case Studies in Western Australia

The draft *Coastal Character and Values Study – Stage One Study of Four Case Studies in Western Australia* was prepared by Middle, G. and Scherini, R. at Curtin University in 2013 for the National Sea Change Task Force. The aim of the study is to develop *a methodology and planning tool to capture and document coastal values and character in coastal communities*. This document reports on stage one of the study which involved selecting four coastal communities in WA as case studies to test and refine the methodology. The four coastal communities were:

- Shoalwater, City of Rockingham
- Australind, Shire of Harvey
- Flinders Bay, Shire of Augusta-Margaret River
- Falcon, City of Mandurah

The methodology involved a survey of beach users and a photo-elicitation to record and research visual aspects.

A review of the beach survey found that the results of all four case studies was similar. Those surveyed valued most highly the naturalness of the coast, the beach as an important social space and the primary uses were low key based recreation and aquatic-based recreation. The photo-elicitation found that the naturalness of the coast is significant in defining character and that there are two broad coastal settlements based on the built environment: those where built form is considered significant at defining character and those that do not.

The study recommended that the survey is also expanded to ask participants to identify in words or phrases to describe the overall character of the settlement.

Application/Implication

The results of the study provides useful information on what the community generally value about the coast and how to capture the important characteristics of a beach through community surveys and photos. This is applicable to the development of this CMP which involves a community survey and a site assessment by the consultant team to determine opportunities and constraints to future use and management.

4 Local

4.1 Batavia Coast Strategy

The *Batavia Coast Strategy* was prepared in 2001 by the Batavia Coast Coastal Planning Group and Landvision. The Batavia Coast Strategy provides regional and local directions for future coastal planning and management along the Batavia Coast. The study area extends from the northern boundary of the Shire of Northampton to Dongara in the south. It includes the coastal towns of Geraldton, Dongara, Cape Burney, Horrocks, Port Gregory and Kalbarri.

The Strategy states that tourism development *in the region, including permanent developments, tour operations, and events of a temporary nature (such as surfing and windsurfing competitions), may be both appropriate and desirable at certain locations along the Batavia Coast*. It recommends the encouragement of greater tourism and recreation opportunities at Kalbarri, Port Denison and Dongara.

The Batavia Coast Strategy recognises the need to maintain off-road vehicle access to recreational sites and opportunities but advocates a more controlled approach in co-operation between ORV users and land managers. It also recognises the possibility of additional camping areas being identified in the future as pressures grow.

Application/Implication

The Batavia Coast Strategy is a higher-level document which applies to a number of local government areas. The new Coastal Management Plan provides an opportunity to provide more detailed recommendations for the Shire, as well as an updated recommendations based on current use and demand.

4.2 Off-Road Vehicle Areas in the Northern Agricultural Region of Western Australia Feasibility Study

The *Off-Road Vehicle Areas in the Northern Agricultural Region of WA Feasibility Study* was undertaken by Pretzel S. and the Northern Agricultural Catchments Council (NACC) in 2015 as a response to community and environmental concerns about unmanaged off-road vehicle (ORV) use within the coastal zone of the Northern Agricultural Region (NAR). The study investigates the feasibility of establishing one or more areas of land within the NAR as an ORV 'Permitted Area' under the *Control of Vehicles (Off-Road Areas) Act 1978*.

Currently there are five gazetted areas under the *Control of Vehicles (Off-Road Areas) Act*. These areas are located in Lancelin, Ledge Point, Cervantes, Jurien and Southgates.

The Study identified a number of 'hot spot areas' within all Shires including three in the Shire of Irwin – Port Denison dunes, White Tops Reserve and South Beach.

The study investigated the possibility of creating Permitted Areas at Southgates, Buller River Mouth and Jurien Bay. No Permitted ORV Areas were identified within the Shire of Irwin.

Application/Implication

The Study does not identify any ORV areas within the Shire of Irwin. Permitted ORV Areas need to be gazetted under the *Control of Vehicles (Off-Road Areas) Act* and it is unlikely that there is enough demand or an appropriate site in the Shire to warrant this. Regardless, use of off-road vehicles will need to be addressed in the Coastal Management Plan.

4.3 Control of African Boxthorn Regional Management Plan

The *Regional Management Plan to Control African Boxthorn* (NACC, n.d.) was commissioned by NACC with the purpose of guiding and prioritising on-ground works to control African boxthorn (*Lycium ferocissimum*) within four local government areas in the Northern Agricultural Region (the Shires of Irwin, Chapman Valley and Northampton and the City of Greater Geraldton). The document aims to collate and

present as much information as possible on the effective management of African Boxthorn, and to prioritise sites for future control works based on the current known distribution data, locations of current investment in control and proximity to conservation assets.

There is occurrence along the Irwin River Estuary which is being managed as required.

4.4 Migration of limesand dunes in Western Australia and their impacts

The *Migration of Limesand Dunes in Western Australia and Their Impacts* as prepared by the then Department of Mines and Petroleum (now the Department of Mines, Industry Regulation and Safety) in 2017. It is a documentation of the rates and directions of migration of limesand dunes along the Mid West coast between Lancelin and Geraldton. The study has a focus on the Shire of Coorow, however the findings are also applicable to the Shire of Irwin.

The study used ArcGIS, georeferenced maps and aerial images from 1960 to 2010 to measure and monitor the locations of a selection of mobile dunes. Over the period of the study those measured travelled at rates that averaged between 4.1 and 15.8 metres a year for the 50 years, generally moving in a northerly direction, covering between 20,000 and 14 hectares and the longest migration distance identified is 21 kilometres. The monitoring of migration rates can provide valuable information for resource management and geohazard risk reduction as the rates and directions measured can provide predictive tools to document future impacts on built infrastructure.

Application/Implication

There are no large mobile dunes within the study area that impact along the coast. Some dunes are located within Beekeepers Nature Reserve, however this is outside of the study area.

4.5 Shire of Irwin Coastal Development Strategy 2000

The *Shire of Irwin Coastal Development Strategy* was prepared by the Shire of Irwin and Land Vision in 2000. The study area extended approximately 18 kilometres from Little Mexico to North Cliff Head (the southern part of the Shire's coastline). The purpose of the Strategy is to:

- *Ensure the orderly removal of the squatter-built structures from the coast and their replacement with more appropriate forms of land use, including establishment of node for commercial fishing and coastal recreation*
- *Provide a framework for rehabilitation of the coastal lands following removal of the squatter shacks and other buildings*
- *Incorporate ecologically, environmentally and socially sensitive features though an innovative design technology and philosophy balanced with the need for use of the coast to be economically viable and ecologically sustainable*
- *Provide for the establishment of small development nodes that support commercial fishing and coastal recreation, and that will become an asset to the Shire of Irwin*
- *To enable the Shire of Irwin and relevant State Government agencies to agree to an implementation process for creation of coastal access points for day visitors, nodes for commercial fishing and recreational use of the nearshore waters, and tourist accommodation.*

The following coastal sites are included in the Strategy:

- Little Mexico
- South Knobby Head
- Knobby Head
- North Knobby Head
- Little Freshwater
- Freshwater Point
- Bee Hollow
- South Cliff Head
- Cliff Head
- North Cliff Head.

The Strategy provides a proposed level of development for each of the above coastal sites and proposed design guidelines.

Development proposed for each site is listed in the table below. Comment is also provided regarding the current level of development for each site.

SITE	LAND USE FROM 2000 STRATEGY	PROPOSAL FROM 2000 STRATEGY	COMMENT
Little Mexico	16 shacks. Used for recreational fishing and boat launching. Used for picnics, day use activities and camping.	Short term: • Remove shacks and rubbish • Investigate potential for developing group camping and accommodation for schools • Implement rehabilitation program in conjunction with the development of day use facilities (including access, pathways, parking, boat launching from the beach, picnic areas and shelters) and maintain beach launching. Medium to long term: • Investigate group accommodation and marine research and development opportunities.	Certain recommendations are still applicable (such as removal of shacks not currently licenced to professional fishermen, removal of rubbish and rehabilitation where required). Further development (such as day use facilities and group accommodation) is not considered necessary for this site.

SITE	LAND USE FROM 2000 STRATEGY	PROPOSAL FROM 2000 STRATEGY	COMMENT
South Knobby Head	19 shacks. Used for recreational fishing and boat launching. Used for picnics, day use activities and camping.	Short term: • Remove shacks and rubbish • Investigate potential for developing group camping and accommodation for schools • Implement rehabilitation program in conjunction with the development of day use facilities (including access, pathways, parking, boat launching from the beach, picnic areas and shelters). The Strategy also recommends investigating the potential for development of an 'Eco Centre' – a specially designed centre which would contain an environmental research centre, limited accommodation, educational/interpretation centre, group facilities (indoor gathering space, amphitheatre, kitchen, showers etc.) and day visitor facilities (toilets, seating, drinking fountains etc.).	Certain recommendations are still applicable (such as removal of shacks not currently licenced to professional fishermen, removal of rubbish and rehabilitation where required). Further development (such as day use facilities, group accommodation and an 'Eco-Centre') is not considered necessary for this site.

SITE	LAND USE FROM 2000 STRATEGY	PROPOSAL FROM 2000 STRATEGY	COMMENT
Knobby Head	12 shacks. Used for recreational fishing and boat launching. Used for picnics, day use activities and camping.	Short term: • Remove shacks and rubbish • Implement rehabilitation program in conjunction with the development of day use facilities (including access, pathways, parking, boat launching from the beach, picnic areas and shelters).	Certain recommendations are still applicable (such as removal of shacks not currently licenced to professional fishermen, removal of rubbish and rehabilitation where required). Further development (such as day use facilities) is not considered necessary for this site.

SITE	LAND USE FROM 2000 STRATEGY	PROPOSAL FROM 2000 STRATEGY	COMMENT
North Knobby Head	9 shacks including 5 used by professional fishers. Used for professional and recreational fishing. Also for boat launching, beach activities, picnic, camping and say sue activities. Five boat moorings.	Short term: • Provide sites for professional fishing camps • Remove shacks and rubbish • Implement rehabilitation program integrated with the development of non-serviced caravan and camping sites (required detailed plan) • Develop multi-use car parks, pathways, boat launching areas and picnic sites Medium to long term: • Investigate opportunities for developing low-key family style accommodation such as cabins, cottage, chalets, bunkhouses, dormitories for groups and maintain caravan and camping areas (developer could be Council or joint venture) • Assess strategic implications of development of permanent residences on privately owned land adjoining the site.	The CMP has reviewed the actions and taken an approach to keep these sites for lower key camping and RV use.

SITE	LAND USE FROM 2000 STRATEGY	PROPOSAL FROM 2000 STRATEGY	COMMENT
Little Freshwater	Approximately 30 shacks used by recreational and professional fishers. Used for picnics, camping and day trip activities. Two professional fisher vessels are moored here.	Short term: • Remove shacks and rubbish • Implement rehabilitation Medium to long term: • Develop non-serviced caravan and camping sites including toilet (low-key with limited facilities). Requires detailed plan and management program and assessment of effluent disposal. • Develop parking, paths, boat launching areas, picnic sites.	Certain recommendations are still applicable (such as removal of shacks not currently licenced to professional fishermen, removal of rubbish and rehabilitation where required). Further development (such as a formal camping site) is not considered necessary for this site.

Freshwater Point	Some shacks (number not disclosed). Used for fishing industry receival depots, professional fishing camps. Beach used for boat launching, loading and unloading of fishing boats. Fishing boat refuelling. Major boat mooring area.	Short term: • Remove shacks and rubbish • Relocate fishing camps to approved sites (provide for 10 professional fisher camps) • Develop a 'Fishers Centre' including sea search and rescue station, gathering areas, amenities, car park and other facilities) • Rationalise fishing industry facilities and improve road and parking • Provide sites for receival depots • Provide sites for bulk fuel storage and associated facilities • Investigate potential for jetty/marina • Ongoing monitoring and review Medium to long term: • Provide additional activities and sites as required • Investigate potential for tourist resort • Include a site for a caretaker • Investigate opportunities for aquaculture • Investigate water supply and effluent treatment/disposal.	The CMP has reviewed the actions and taken an approach to keep these sites for lower key camping and RV use.

SITE	LAND USE FROM 2000 STRATEGY	PROPOSAL FROM 2000 STRATEGY	COMMENT
Bee Hollow	9 shacks. Used for boat launching, picnicking, beach fishing, recreation and boat mooring.	Short term: • Remove shacks and rubbish • Implement rehabilitation • Construct public access and facilities • Develop lookout • On-going management and monitor impacts. No timeframe: • Seek expressions of interest for a tourist resort providing for mixed use accommodation from camping to resort accommodation. • The area for tourist development to be identified through a detailed capability and suitability study.	Certain recommendations are still applicable (such as removal of shacks not currently licenced to professional fishermen, removal of rubbish and rehabilitation where required). Further development (such as a tourist resort) is not considered necessary for this site.

SITE	LAND USE FROM 2000 STRATEGY	PROPOSAL FROM 2000 STRATEGY	COMMENT
Palm Springs	2 shacks in this location. Used for beach fishing and some beach boat launching. Good swimming beach.	Short term: • Remove shacks and rubbish • Establish a walking track to the beach • Close unnecessary tracks • Develop access and management facilities (low priority) Medium term: • On-going management and monitor impacts.	Certain recommendations are still applicable (such as removal of shacks not currently licenced to professional fishermen, removal of rubbish and ongoing management). Installation of facilities is not considered necessary for this site.

SITE	LAND USE FROM 2000 STRATEGY	PROPOSAL FROM 2000 STRATEGY	COMMENT
South Cliff Head	17 shacks located along approximately 500 metres of coast, largely occupied by recreational users and one professional fisher.	Short term: • Remove shacks and rubbish • Construct coastal access parking and access to the beach and boat launching areas. • Develop day use picnic sites. • Rehabilitate and close unnecessary tracks. Medium term: • Install toilets Long term: • Detailed site assessment to determine suitability for tourist development • Seek expressions of interest for a low-medium level tourist resort or nature-based operation. • On-going management and monitor impacts.	Certain recommendations are still applicable (such as removal of shacks not currently licenced to professional fishermen, removal of rubbish, rehabilitation and ongoing management where required). Picnic areas and toilets have been installed. Further development (such as a low level tourist resort) is not considered necessary for this site.

North Cliff Head and Cliff Head	Approximately 64 shacks, largely occupied by recreational users, three by professional fishers. A jetty is located at the southern end of the site.	Short term: • High – site should be one of the first rehabilitated and developed • Remove shacks and rubbish • Implement rehabilitation program • Develop public facilities • Develop professional fisher sites • Designate camping and day visit areas • On-going monitoring, management of impacts and reviewing program Medium term: • Plan and develop holiday accommodation which could be through one or more of the following methods: o Council ranger or tender out ranger services to collect fees from camping and caravan sites using Cape Range National Park model (i.e. designated sites, no booking, limit of length of stay, limited facilities to support tourists, only toilet and showering facilities). o Council to develop and manage tourist accommodation using the	Certain recommendations are still applicable (such as removal of shacks not currently licenced to professional fishermen, removal of rubbish, rehabilitation and on-going monitoring where required). Further development (such as holiday accommodation) is not considered necessary for this site. There may be some provision for consideration of a caretaker for the camp site.

SITE	LAND USE FROM 2000 STRATEGY	PROPOSAL FROM 2000 STRATEGY	COMMENT
		Rottnest Island Board as a model o As above but in a joint venture with private enterprise o Long term lease of each or all development nodes.	

Application/Implication

The proposals in the 2000 Strategy range from simply removing shacks and rehabilitating each site to development into a formal professional fisher and recreational camping sites. Since that time there has been more research and policy around coastal hazards and setbacks. The coastal hazard risks are likely to be a roadblock with regards to more formal development of these sites. Since 2015 the Shire have lost the ability to lease shacks and therefore other management and use of the area will need to be considered.

4.6 Shire of Irwin 10+ Year Strategic Community Plan 2017 – 2027

The *Shire of Irwin 10+ Year Strategic Community Plan* was prepared by the Shire in 2017. The Plan states that the vision of the Shire is *a safe place to live, an exciting place to visit and a progressive place to work*. The Shire's mission is *delivering excellence in service, driving growth and building strong relationships – we are open for business*.

Through the results of a community survey, the Shire identified four main priorities areas for the Shire to focus on. One of these four priorities is management of the coast and estuary *by rehabilitating local beaches and addressing erosion, repairing and upgrading the boat ramp, and providing better amenities*.

The Strategy explains that *it is evident that the community values its 'coastal/country town' atmosphere and whilst development is embraced, good planning is essential to ensure growth and development improves, and does not detract, from the coastal lifestyle valued by the community*.

Application/Implication

The vision of the Community Plan is relevant as it relates to tourism in the Shire, much of which is concentrated along the Shire's coastline. It is also clear that the community value the Shire's coastal areas and would like to see management focus on these areas.

4.7 Shire of Irwin Corporate Business Plan 2013 – 2017

The *Shire of Irwin Corporate Business Plan* was prepared by the Shire in 2013 as a response to the 2012 Shire of Irwin Strategic Community Plan. The purpose of the Plan is to set out the prioritisation of actions and the availability of resources to achieve the actions set out in the Strategic Community Plan.

The Plan identifies protection and management of the Shire's coastal areas. Strategy 1.2.6 is to *Develop a Coastal Management and Facilities Strategy* and it lists Actions 1.2.6.1 and 1.2.6.2 as *review the Irwin Coastal Plan, with an emphasis on infrastructure and facilities, and include a stakeholder and community engagement component* and *Improve and maintain coastal infrastructure*.

One of the Environmental Objectives of the Plan is to *manage and protect the coastal environment and the Irwin river environment*. The Strategies and Actions to achieve this are as follows:

STRATEGY	ACTION
Continue to partner with State Government and other funding providers, to support coastal protection works.	Formalise a partnership with State Government and other funding providers who support coastal protection. Including a regular reporting mechanism to inform them of current works and future requirements.
Review, regulate and monitor access to our natural assets.	Review the Shire of Irwin Coastal Development Strategy (south coast settlement nodes)

STRATEGY	ACTION
	Prepare a coastal management strategy for the coastal reserves along the Shire's northern coastline.
Support environmental community organisations and initiatives that promote coastal protection, foreshore and river reserve management, such as Northern Agricultural Catchment Council.	Provide Shire representation and/or in-kind support to environmental community initiatives as appropriate.
Review and implement an Irwin River Estuary Management Plan, including noxious weed eradication.	Review the Irwin River Estuary Management Plan and provide a staging plan for implementation.
	Implement the revised Irwin River Estuary Management Plan

Source: *Shire of Irwin Corporate Business Plan,* 2013

Application/Implication

Review of the Shire of Irwin Coastal Development Strategy (2000) and preparation of a new Coastal Management Plan which incorporates the entire coastline is recognised in this Plan. The strategies and actions listed should also help guide the content of the new Coastal Management Plan.

4.8 Shire of Irwin Property Infrastructure Asset Management Plan

Th *Shire of Irwin Property Infrastructure Asset Management Plan* was prepared by the Shire in 2012 to investigate *whether Council's current level of asset operational, maintenance and renewal funding are sufficient to sustain the assets at a standard that will be acceptable to both asset owners and users*. The assets covered by the Plan include (amongst others) community uses, historic site buildings, land blocks, public toilets and sporting and park amenity buildings.

The Plan acknowledges that tourism is a significant industry for the Shire and that *predicted growth in the tourism and resource industries in the region will see increased demand for new infrastructure and greater wear on existing infrastructure as the population expands. This will likely lead to higher costs to Council as*

asset lives will be reduced. The Plan also anticipates that, based on data from the Tourism Forecasting Committee, that tourism numbers will continue to grow until the year 2020. The Plan predicts that with the *Shire a popular destination for tourists a greater demand for recreational facilities, including ablution blocks, boat launching ramps, walking trails, footpaths etc., will ensue. In summary, it is expected that there will be an increase in demand for recreational facilities due to an ageing population and increasing tourist numbers*.

Application/Implication

The Shire's Asset Management Plan will continue to be revised by the Shire to take into account current assets, required maintenance and budget. The Asset Management Plan should take into account the recommendations of the Coastal Management Plan to ensure they are properly budgeted and planned for.

4.9 Shire of Irwin Roads and Footpaths Infrastructure Asset Management Plan

The *Shire of Irwin Roads and Footpaths Infrastructure Asset Management Plan* was prepared by the Shire in 2012 to investigate *whether Council's current level of asset operational, maintenance and renewal funding are sufficient to sustain the assets at a standard that will be acceptable to both asset owners and road users*. It collates current road network asset condition, valuation, income and expenditure data, and compares it with the asset stock's long term funding needs.

Application/Implication

While there are not many local or Shire roads that occur within or provide access to the coastal sites outside of the townsite, this Asset Management Plan outlines the funding that can be allocated to upgrades and maintenance of the roads that exist primarily within the townsite. Likewise, footpaths are primarily located within the townsites and the Asset Management Plan provides for upgrades to these.

4.10 Shire of Irwin Draft Long Term Financial Plan 2013 – 2028

The *Shire of Irwin draft Long Term Financial Plan 2013 – 2028* was prepared by the Shire in 2013. The purpose of the Plan is to set out service levels into the future to assist the Shire with maintain a healthy financial position and forecasting population growth of 2.5% per annum over the life of the Plan.

The Plan does not list many capital projects along the coastline north or south of Dongara/Port Denison. A majority of the capital projects are located within the townsite. Some allocation was given for Seven Mile Beach Road in 2014/15.

Application/Implication

The Long Term Financial Plan indicates where budgeting and spending will take place until the year 2028 (approximately the next 8-9 years). While there is some investment shown for coastal areas within the townsite there is not much allocation to other areas along the coast. The Shire's financial position should be taken into account when preparing the Coastal Management Plan and what can be achieved in the short to medium term. There might be an opportunity for some investment in the long term once the Long Term Financial Plan is reviewed in the future.

4.11 Shire of Irwin Tourism Development Plan 2013 – 2018

The *Shire of Irwin Tourism Development Plan 2013 – 2018* was prepared by the Shire in 2013 to enable the Council to take an integrated and co-ordinated approach to tourism planning and to guide tourism growth in the Shire of Irwin over the next five to ten years.

The Plan reviews the impact of tourism on the Shire, the current tourism markets, opportunities and constraints, planning, marketing, events and an action plan for implementation.

Positive impacts of tourism noted in the Plan are that it creates employment opportunities and brings investment to the area through new businesses and infrastructure development. Negative impacts are noted as overloading local services during peak periods, creating traffic problems and bringing antisocial behaviour. The Plan states that in the case of the Shire *it is critical to consider a market, which could be defined as "traditional family holidays" where families and family groups can enjoy healthy, safe and affordable time together doing something different every day*.

The Plan notes that after a review of the existing tourism market that *Dongara-Port Denison currently has a dominant domestic tourism market share of approximately 95% with it comprised of 90% intrastate and 5% interstate.* Tourism is strongly affected by seasonal factors such as school holidays and Easter holidays and long weekends.

The following actions relate to the Shires coast:

- Action 5.8 – review of coastal camp sites within the Shire

The Plan makes the following comment with regards to the coastal camping sites in the Shire:
There currently exists coastal camp sites at Knobby Head, Fresh Water Point and Cliff Head approximately 50 kilometres south of Port Denison on the Indian Ocean Drive and 7 Mile Beach north of Dongara off the Brand Highway. There are a number of sites adjacent to the beach that attracts caravans, RVs and campers. Due to the distance, it is an area that is not patrolled by the Shire ranger on a regular basis. This is a lost opportunity for the Shire in that the people that stay at this site bring no economic benefit as they do not necessarily buy supplies in Dongara-Port Denison and in fact are a cost in that the sites need to be visited from time to time and rubbish needs to be collected. There are a number of alternative approaches to these sites from closing them and that signs are erected advising that caravan and camping sites are available in Dongara - Port Denison through to contracting/licencing a third party to manage these areas and charge for use. Detailed analysis of the options is beyond the scope of this study and it is recommended that a review of the sites and options should take place with the view to increasing the benefits to local business and protecting the environment.

Application/Implication

Research information from the Tourism Development Plan can strongly inform the Coastal Management Plan by indicating where tourism demands are and what the opportunities and weaknesses are.

4.12 Shire of Irwin Access and Inclusion Plan 2012 – 2017

The Shire of Irwin Access and Inclusion Plan was prepared by the Shire of Irwin in 2012. The Plan sets to ensure that areas of the greatest need and impact for people with a disability are initiated first. It sets out seven desired outcomes aimed at improving access and inclusion for people with disability. These outcomes are included below.

1. *People with disability have the same opportunities as other people to access the services of, and any events organised by the Shire of Irwin*
2. *People with disability have the same opportunities as other people to access buildings and other facilities of the Shire of Irwin*
3. *People with disability receive information from the Shire of Irwin in a format that will enable them to access the information as readily as other people are able to access it*
4. *People with disability receive the same level and quality of service as other people from the staff of the Shire of Irwin*
5. *People with disability have the same opportunities as other people to make complaints to the Shire of Irwin*
6. *People with disability have the same opportunities as other people to participate in any public consultation by the Shire of Irwin*
7. *People with disability have the same opportunities as other people to obtain and maintain employment with a public authority.*

The document includes an 'Implementation Plan' which lists the tasks to achieve the above outcomes.

Application/implication

While the natural topography and landscape of coastal areas can make it difficult to provide access for people with disabilities, it should be provided wherever possible by referring to the Access and Inclusion Plan. The Plan requires the Shire to ensure all infrastructure related to transport facilities are accessible, including upgrades to footpaths and fishing platforms. Provision should be made in the CMP to provide for disability access along the Shire's coast where possible.

4.13 Shire of Irwin Coastal Hazard Risk Management and Adaptation Plan (CHRMAP)

The *Shire of Irwin Coastal Hazard Risk Management and Adaptation Plan (CHRMAP)* was prepared in 2016. The purpose of the CHRMAP is to *provide strategic guidance on coordinated, integrated and sustainable management and adaptation for land use and development in the coastal zone*. It provides information on the effects of coastal hazards, presents a decision-making framework to assess risks, highlights coastal hazard areas (in terms of vulnerability and risk) and suggests adaptation options.

Sites identified with a *high* risk priority level for coastal inundation are:

- Port Denison, Granny's Beach and Surf Beach
- South Beach South
- Seaspray Beach

Sites identified with an *extreme* risk priority level for coastal erosion are:

- Port Denison, Granny's Beach and Surf Beach
- South Beach North
- Seaspray Beach

Sites identified with a *high* extreme risk priority level for coastal erosion are:

- South Beach South
- Freshwater Point
- Cliff Head North
- Cliff Head South.

Actions of *High Priority* are as follows:

1. *In the Port Denison, Granny's Beach and Surf Beach area:*
    a. *Investigate potential inundation impacts and ascertain the need and viability for improving the inundation resilience of public infrastructure in this area (e.g. the sea wall between Granny's Beach and Surf Beach)*

b. *Investigate retrofitting urban drainage systems to accommodate fluvial flooding*
c. *Investigate the need for coastal protection structures to protect/defend areas from erosion*

2. *Carry out flood modelling of the Irwin River, including an analysis of combined river flooding and coastal impacts.*

Actions of *Medium* priority are as follows:

1. *In all coastal areas where new buildings are proposed, ensure all buildings are relocatable.*
2. *In urban areas – continue to implement the Shire's Green Infrastructure Strategy and the Local Planning Policy for Water Sensitive Urban Design.*
3. *Modifications to the Planning Scheme.*
4. *In all areas, educate the public about the area's natural communities and sensitive habitats and encourage public appreciation and environmentally sound recreational enjoyment of the area.*
5. *In all areas monitor and allow natural processes to occur, and ensure the public are kept informed.*

As can be seen from the above, most of the CHRMAP's high priority actions relate to the foreshore areas in the townsites (Port Denison, Granny's Beach and Surf Beach) and around the Irwin River mouth. Many of the medium priorities relate to other coastal sites such as South Beach and the sites in the southern part of the Shire. With regards to South Beach (south of Port Denison) the CHRMAP recommends to educate the public, ensure that all approved buildings within the caravan park are relocatable, to monitor for natural processes and to plan for the movement of infrastructure. With regards to Freshwater Point, Cliff Head North and Cliff Head south the CHRMAP recommends to ensure that all approved buildings are relocatable, educate the public, monitor and allow natural processes to occur and to plan for the movement of infrastructure.

Application/Implication

The high priority sites identified in the CHRMAP are supported by other coastal engineering reports undertaken in the area of the years and these sites are to be given particular attention in the assessment by Seashore Engineering. The long term future use of areas at high risk of erosion as identified in the CHRMAP should also be considered in the CMP. Management actions should be practical and realistic considering the outcomes of coastal hazard assessments.

4.14 Irwin River Estuary Management Plan

The *Irwin River Estuary Management Plan* was prepared in 2014 by Land Insights and the Shire of Irwin. The purpose of the Management Plan is to facilitate improved access, signage and low-key recreational facilities along the Irwin River Estuary. The study area extends from west of Dongara (Priory Lodge) to the river mouth.

Recommendations from the Management Plan focus on improvements to the environment (such as weed removal and revegetation) and enhancing the recreational potential along the River (such as revitalisation of Dongara House, providing a footbridge across the river, revitalising the picnic area and installing signage).

The Management Plan study area extends further inland than the Coastal Management Plan, however it includes some coastal areas such as Reserve 41087 at the mouth of the river and Reserve 38046 along the coast. Management recommendations along this section include the following:

- P3 – Liaise with major landowners of freehold land within the Study Area to investigate opportunities to swap, cede or manage these lands in accordance with this Management Plan.
- E3 – Create Fauna Habitat Protection Areas.
- R9 – Provide bike facilities at the picnic area near the bridge, at either side of the proposed footbridge, at the carpark along Ocean Drive and at the Church Street lookout.
- R13 – Install interpretative signage along the walking tracks and at recreation nodes.

Application/Implication

Although the Irwin River Estuary Management Plan is largely outside of the study area for the Coastal Management Plan, the recommendations for the river mouth and any coastal areas can be taken into consideration.

4.15 Shire of Irwin Green Infrastructure Strategy 2015 – 2020

The *Shire of Irwin Green Infrastructure Strategy 2015 – 2020* was prepare by the Shire in 2015. It describes the network of green spaces and water systems that deliver multiple environmental, economic and social values and benefits. The aim of the Strategy is to improve the integrated network of multifunctional green spaces and corridors and ensure that the Shire leads by example by reducing water and energy consumption, and by implementing efficient and innovative systems, projects and initiatives.

Green infrastructure considered by the Strategy includes:

- Street trees and verge plantings
- Improvements to public open space (parks) and other green spaces
- Community gardens and horticultural areas
- Sustainable building design principles
- Recycling programs
- Wind farms, solar farms and wave power
- Water resources and desalination systems
- Sustainable drainage systems incorporating the principles of Water Sensitive Urban Design
- Connections, including roads, verges, footpaths, cycle ways, water courses and other wildlife corridors.

It promotes and encourages multifunctional greenspaces connected by footpaths and cycleways, reducing water and energy consumption, utilising sustainable energy sources, enriching biodiversity and creating cool urban areas through the use of green infrastructure.

Application/Implication

The Green Infrastructure Strategy focuses the townsite and developed areas which does not directly apply to a majority of the Shire's coastal areas except for those areas within the town. The proposals in the Strategy to utilise sustainable energy, reduce water and energy use, enhance biodiversity through use of green spaces and creating connected, multifunctional green spaces are applicable to the use and possible future development of the Shire's coastal areas. The focus, as supported by the Green Infrastructure Strategy, is to create low-key and sustainable recreational spaces that can be enjoyed by the community.

4.16 Dongara-Port Denison District Structure Plan

The *Dongara-Port Denison District Structure Plan* was prepared by the Shire of Irwin and GHD in 2014. It *sets out the broad principles for development of Dongara-Port Denison and will guide the preparation of more detailed local structure plans.*

The Structure Plan identifies the coastal areas and coastal reserves as *Public Open Space.* The Plan notes that climate change and sea level rise may become a real challenge for the coastal and rivers edge areas within the Structure Plan area and recommends that in order to protect and manage these areas, that the Shire complete a coastal adaptation study. This has been undertaken (CHRMAP, 2016). It also recommends that the Shire *develop an integrated network of multifunctional green spaces and corridors as part of a Green Infrastructure Strategy which should be underpinned by easily maintained, economically and environmentally sustainable engineering solutions*.

Inland from the *Public Open Space* areas, the Structure Plan identifies *Existing Urban* as well as a *Neighbourhood Centre* adjacent to the Port Denison Foreshore. The Structure Plan encourages the redevelopment and revitalisation of the Port Denison commercial area to *strengthen the area as a neighbourhood centre and promote the Centre's role as a tourist destination*. Areas identified for *Future Urban* in the Structure Plan are inland from the coast.

Application/Implication

Revitalisation and redevelopment of the Port Denison neighbourhood centre will improve and increase the attractiveness of the area for tourists, which could in turn place additional use and pressure on the

adjacent coastal areas. The *Future Urban* areas identified as *St Dominics Precinct* and *Race course Precinc*t are north of Dongara and run parallel to the coast. Development of these areas will increase the number of residences/population north of town and will ultimately lead to increased use of the coastal areas north of Dongara. Any development proposals for these areas will need to consider how the coast will be managed including what linkages will be provided (roads and pathways), facilities to be provided and other management.

4.17 Dongara Tourist Park Local Development Plan and Foreshore Management Plan

The *Dongara Park Local Development Plan (LDP) and Foreshore Management Plan* was prepared by Halsall & Associates on behalf of the Dongara Tourist Park in 2016. The LDP applies to Part Lot 3000/Reserve 32182 and Part Reserve 42150 Carnarvon Street and George Street, Port Denison, located at the southern side of Port Denison, adjacent to South Beach and lose to the fishing boat harbour. This site has been leased by Council over the years as a caravan park and the LDP sets out the future planning and goals for the site to allow for improvements and development.

Reserve 32182 (Lot 3000) incorporates the majority of the caravan park and associated development while Reserve 42150 is the coastal foreshore area.

The site comprised of 73 caravan and camping sites and 16 chalets before preparation of the LDP. It also includes associated amenities such as a manager's residence, reception and shop, recreation facilities, access and parking areas and landscaped areas. The LDP proposed to increase the accommodation options to 66 camping and caravan sites, 35 chalets with ensuites and 3 chalets with disability access. Other additions include two pools, barbeque areas, a café and additional parking.

A Foreshore Management Plan was also prepared as part of the LDP. The Plan notes that since the time of purchasing the property in 2003, the owners have undertaken coastal management of the foreshore adjacent to the site including:

- Dune stabilisation to stop sand drift across the park
- Stabilising blow outs immediately fronting the boundary

- Forming natural barriers to stop uncontrolled pedestrian access
- Created a designated pedestrian pathway to the beach
- Built low impact barriers to direct pedestrian movement onto designated pathways.

The owners have limited uncontrolled pedestrian movement in a number of ways already including the establishment of a limestone wall along the southern boundary supplemented by planting vegetation to stop uncontrolled pedestrian access to the south and by constructing a brick-paved walkway behind the cabins and fencing off the vegetation.

The Foreshore Management Plan proposes to continue rehabilitation and management of the coastal reserve and to ensure that the main elements of the Plan are implemented within two years of the LDP adoption. Actions include:

- *Recognising hazards and risks associated with extensive seaweed beds particularly across the frontage of the reserve and to the north and fragile cliff areas further north*
- *Noting the dunes are at the high water mark*
- *Recognising areas requiring rehabilitation either due to natural 'blow out' or through previous disturbance*
- *Direction of visitors to the park to one main point of access to the beach and strengthening this pathway system*
- *Continuing rehabilitation works which includes brushing and seeding of affected areas within the foreshore*
- *Implementing signage along the beach and adjacent to the edge of the park to advise persons to stay out of conservation areas and fragile dune systems and direct persons to the dedicated beach track*
- *Allocate signage and deposit visitors to the beach southward avoiding encouragement of beach users to the north where hazards exist and advising beach users to enter that their own risk*
- *Presenting a hard edge to the foreshore by way of low key fencing and limestone walls to define the edge of the reserve*

- *Maintaining post and wire fences about the designated path to the beach to avoid visitors exiting the designated track prior to the beach.*

Application/Implication

The proposal in the LDP for additional accommodation sites will increase the number of tourists and potential coastal users in the town. The additional management proposed for the foreshore will assist with protection of the coastal reserve from additional use pressure. The recommendations from the Foreshore Management Plan should be considered during preparation of the Coastal Management Plan.

4.18 Port Denison Foreshore Masterplan

The *Port Denison Foreshore Masterplan* was prepared by the Shire of Irwin and RPS in 2013. The Plan extends from Granny's Beach to the obelisk and is bound to the east by Port Leander Drive. It provides the future vision for the Port Denison foreshore.

The Master Plan divides the area into five precincts:

1. Granny's Beach Precinct
2. Foreshore Park Precinct
3. Foreshore Core Precinct
4. Boat Ramp Precinct
5. Obelisk Precinct.

The Master Plan provides detailed recommendations for the above five precincts including new car parking, new amenities block, creation of sandy beach areas, children's play area, new fig and pine trees and construction of footpaths. Recommendations aim to enhance and improve on the recreational potential of the area.

Application/Implication

The Master Plan provides detailed recommendations for the Port Denison foreshore area which should be referred to and considered in the preparation of the Coastal Management Plan.

4.19 Shire of Irwin Local Planning Strategy

The *Shire of Irwin Local Planning Strategy* was endorsed by the WAPC in 2017. It sets out the long term planning directions for the Shire and guides land use planning over the next 20 years. The Strategy recognises the coastline as a significant asset to the Shire and forms a part of the community. It also acknowledges that the coastline experiences significant development pressure and that there is a need for a greater understanding of coastal processes in the area.

The preparation of the Coastal Management Plan is identified as Action 1.2.3 of the Strategy which states:

> *In accordance with the CHRMAP, prepare a detailed Coastal Management Plan for the Irwin Coastline in order to provide a framework for the coordination of activities along this section of the coast.*

The Strategy also makes the following recommendation with regards to squatter shacks (Action 1.12.1):

> *Progressively address the squatter shack issue in accordance with the State Government Squatter Policy and State Planning Policy 2.6 - State Coastal Planning Policy.*

With regards to the Irwin River, the Strategy notes that it is subject to flooding and makes the following recommendation (Action 1.4.1):

> *Introduce a Special Control Area in the Local Planning Scheme to provide development controls in relation to the Irwin River flood-way and floodplain development control area.*

The Shire's coastal areas are included in Policy Areas A, B, E and H. Policy Area A stretches from the south of Port Denison to south of Cliff Head. Policy Area B includes the Dongara and Port Denison townsites and the coastal areas directly north and south of the town. Policy Area E extends from north of Dongara to the northern boundary of the Shire. Policy Area H stretches from Cliff Head to the southern boundary of the Shire.

The following recommendations are made with regards to coastal management.

ACTION NUMBER	POLICY AREA	RECOMMENDATION
PA 1.3 1.3.1	A	Coordinate the preparation of a detailed Coastal Management Plan in conjunction with Policy Area E to coordinate management and appropriate use of the coastal nodes along the Irwin coastline.
PB 1.7.1	B	Prepare a set of Design Guidelines for lots along Point Leander Drive located adjacent to the foreshore to ensure objectives relating to character, amenity and a positive aesthetic contribution to the adjacent public realm are met.
PE1.1 1.1.1	E	Implement relevant actions from the Coastal Hazard Risk Management Adaptation Plan (CHRMAP) to guide the future use, development and protection of this section of coastline.
PE1.1 1.1.2	E	Require a foreshore reserve to be defined and ceded as a condition of approval to any rezoning or subdivision of land.
PE1.1 1.1.3	E	Retain the dune system within the 'General Farming' (Rural) zone where there is a general presumption against subdivision except where land is first reclassified to 'Special Use' to facilitate a project of tourist significance.
PE1.1 1.1.4	E	Require rezoning for subdivision and/or development, to have regard to the recommendations of relevant strategic planning documents, particularly in relation to development and access to the coast and Brand Highway, and any other management plan prepared for the coastal strip.
PE1.1 1.1.5	E	Support the undertaking of a Coastal Management Strategy for the coast north of Dongara, including this policy area, and consider adoption of its recommendations once complete.
PE1.1 1.1.6	E	Support the implementation of a fire management plan for the coastal dune area in conjunction with the relevant authorities.

ACTION NUMBER	POLICY AREA	RECOMMENDATION
PH1.1 1.1.1	H	Support the removal of existing unlawful squatter shacks on coastal Crown land as per the State Government Squatter Policy (July 1989 and January 1999).
PH1.1 1.1.2	H	Investigate the formalisation of leasehold tenure for fishers' shacks only in the circumstance that the use of the shack is in conjunction with fishing licenses issued by the Department of Fisheries and subject to negotiation between local authorities and the Department of Lands.
PH1.2 1.2.1	H	Further investigations in consideration of the character and environmental values of the natural area to be undertaken by the landowner/s to justify any development of tourist traveller facilities and appropriate ancillary uses.

Application/Implication

The Strategy identifies the same coastal nodes as identified in the Shire of Irwin Coastal Development Strategy 2000 and includes the same recommendations. However, it also recognises the need to prepare a new and updated Coastal Management Strategy/Plan for the whole coastal area. A number of recommendations are made with regards to the future use and management of the Shire's coastal areas which are incorporated and supported by the Coastal Management Plan.

4.20 Shire of Irwin Local Planning Scheme No. 5

The *Shire of Irwin Local Planning Scheme No. 5* was endorsed by the WAPC on the 7th May 2008. The Scheme zones land and sets aside land for reserves for public purposes and controls the types of uses and development allowed in different zones.

The following zones and reserves apply to the Shire's coastal areas.

LOCATION	ZONE/RESERVE
Northern boundary to the Dongara townsite.	Coastal area is reserved as *Local Reserve.* Inland from the reserve the land is zoned *General Farming.*
Dongara and Port Denison townsite	Coastal area is reserved as *Local Reserve*. Directly south of Port Denison the coastal area is reserved as *Local Reserve*. Inland from the *Local Reserve* the land is reserved for *Public Purposes* (*Airport* and *Common*).
South of Port Denison to North Cliff Head	Reserved as *Conservation* for Beekeepers Nature Reserve.
North Cliff Head to the Shire's southern boundary	Coastal area is reserved as *Local Reserve.*

A person must not use a *Local Reserve* or commence or carry out development on a Local Reserve without first having obtained planning approval under Part 9 of the Scheme.

The objectives of the *General Farming* zone are to preserve and protect land for agricultural use and to ensure the preservation of the rural character and rural appearance of the zone.

In addition to the above zones and reserves, the Scheme also designates some *Special Use* zones adjacent to the coastal areas which can also impact on future use and management. These are listed in the table below. As can be seen, there are multiple areas zoned *Special Use* to allow for the use and development of these areas for holiday accommodation and tourist uses. Many are located in the Dongara and Port Denison townsite and two (SU1 and SU29) are located north and south along the coast respectively.

LOCATION	NUMBER	SPECIAL USE PERMITTED USES
Wakeford Road, Bookara. Adjoining the northern boundary of the Shire.	Special Use SU1	Tourism and Recreation Resort compromising: • Resort Centre/Hotel/Motel Accommodation (Licensed) • Clubhouse • Mediterranean (Seaside) Villas • Holiday Villas and Lake • Resort Shopping • Camping Area • Caravan Park • Horse Riding Farm • Dormitories • Function and Convention Centre • Resort Community Facilities • 18 hole Golf Course • Model Tourist Farm • Rural Pursuits • Incidental uses to the permitted uses.
Strata Lot 1, Church Street, Dongara	Special Use 6	• Caravan/Chalet Park • Camping Ground • Holiday Accommodation • Incidental uses to the permitted uses.
Lot 94 (reserve No. 25412) Church Street, Dongara	Special Use 7	• Holiday Accommodation • Incidental uses to the permitted uses.
Pt Sub Lot 48, Point Leander Drive, Port Denison	Special Use 12	• Public Restaurant • Holiday Accommodation • Tavern: provided it is incidental to the other permitted uses • Incidental uses to the permitted uses

LOCATION	NUMBER	SPECIAL USE PERMITTED USES
Pt Sub Lot 49, Point Leander Drive, Port Denison	Special Use 13	• Caravan/Chalet Park • Incidental uses to the permitted uses.
Lot 915, (reserve no. 37184), Ocean Drive and Point Leander Drive, Port Denison	Special Use 14	• Aged persons village
Lot 946 (reserve no. 25826), Ocean Drive, Port Denison	Special Use 15	• Caravan/Chalet Park • Camping Ground • Incidental uses to the permitted uses.
Lot 947, Hampton Street, Port Denison	Special Use 16	• Eating House • Incidental uses to the permitted uses.
Lot 3000 (reserve no. 32182) Corner George and Carnarvon Street, Port Denison	Special Use 17	• Caravan/Chalet Park • Camping Ground • Incidental uses to the permitted uses
Lot 742, Corner Fletcher and George Street Port Denison	Special Use 18	• Aged persons village
Lots 53 and 54, Point Leander Drive, Port Denison	Special Use 28	• Hotel • Motel • Restaurant • Eating House

LOCATION	NUMBER	SPECIAL USE PERMITTED USES
Portion of Lot 55, Indian Ocean Drive, Arrowsmith. Opposite North Knobby head, inland on Indian Ocean Drive	Special Use SU29	Tourist Site, comprising: • Caravan Park • Chalet Park • Camping Area • Single House • Workforce Accommodation • Convenience Store • Restaurant • Incidental uses to the permitted uses

Application/Implication

The entire coastal area is reserved as *Local Reserve*, except for the Beekeepers Nature Reserve which is reserved as *Conservation.* The northern coastal areas only have a small strip within the reserve, apart from certain sites such as 7 Mile Beach and Bookara Beach which have additional areas reserved. This reservation is appropriate for the Shire's coastal areas and allows for its continued use for recreation.

The Special Use sites which adjoin the Shire's reserves provide for a variety of tourist and recreational uses such as camping, caravanning and holiday accommodation. These uses are compatible with coastal areas. The Special Use areas within the townsites provide a location for camping and caravanning to reduce the incidence of this occurring within coastal reserves. North and south of the townsites there are no formal camping or caravanning locations. There are two Special Use areas (SU1 and SU29) located north and south of the townsites (SU1 is located at the northern boundary and SU 29 is opposite Nobby Head). Neither have been developed.

4.21 Irwin River Flood Study

The *Irwin River Flood Study* was commissioned by the Shire of Irwin and prepared by Hydrologia in 2017. The objective of the study was to provide updated hydraulic modelling and mapping to inform decision-making and mitigation strategies regarding use of flood prone land, with consideration of the effects of

climate change. The purpose of this is to guide future land use planning and development decision making, emergency response planning and increase community awareness of flood risk.

The Study notes that flooding of the Irwin River has occurred at multiple times since European settlement.

The Study provides outcomes of the hydraulic modelling and floodplain mapping for 1 in 10 AEP (annual exceedance probability), 1 in 100 AEP, 1 in 2000 AEP and probable maximum flood.

Application/Implication

The study area for the assessment included the Irwin River from the east of Dongara and does not specifically focus on the Irwin River mouth or coastal area. Nevertheless, the document includes historical information and photographs from previous floods at the Irwin River mouth and the hydraulic modelling and floodplain mapping shows the areas possibly at risk for the river mouth.

4.22 Dongara to Cape Burney: Visual Landscape Assessment

The *Dongara to Cape Burney Visual Landscape Assessment* was commissioned by the then Department of Planning and prepared by Ecoscape in 2011. The study was prepared as a response to increase development pressure along the coast. The aim of the study was to develop key findings for landscape management and design guidelines for future development within the study area. The study was undertaken by reviewing the Department's assessment of landscape character and by undertaking a site reconnaissance, an evaluation of landscape values, recreations sites, visual access, viewsheds and cross section analysis.

The study notes that the area lies within the *Geraldton Plain landscape character type* which is characterised by *rocky shorelines, exposed mobile dunes and shrub covered dunes across open alluvial flats and steep flat topped ranges to the east.*

The dune system along the section of the coast from Dongara to Nine Mile Beach is described as having no exposed sand areas on the dunes and a thick cover of coastal vegetation. Some tracks and firebreaks are evident along fencelines of lots throughout the area.

The coastal plain unit (inland from the dune system) from Wakeford Road to Dongara is described as generally being of rural character with some natural elements due to greater diversity in landform and natural vegetation. This section of the coast is within the Tamala South System which is *characterised by lowhills and rises with some limestone outcropping. As a result the terrain of this landscape character unit is varied with several gently contoured basins or swales. These gentle swales are interspersed with areas that are undulating or contain low dunes and/or patches of remnant vegetation*. The typical vegetation species within this area is listed as being *Acacia rostellifera, Melaleuca huegelii, Eucalyptus* oraria *and Eucalyptus obtus*iflora.

The 'most preferred' landscapes within the study area are listed as:

- areas with high degree of naturalness
- high degree of topographic variety
- vegetation diversity
- outstanding combinations of landform, vegetation
- patterns and waterbodies in one area
- presence of waterbodies
- seascapes
- significant/historic features
- distinctive remnant vegetation
- individual structures that strengthen rural character.

Areas identified as 'most preferred' were identified mostly along the coastal plain unit along Brand Highway north of Seven Mile Beach to McKenzies Beach.

Application/Implication

The Visual Landscape Assessment provides interesting information on the landscape characteristics of the coastal area north of Dongara. The 'most preferred' areas were identified west of the Brand Highway and did not extend to the dune system or beach areas. However, the assessment describes the coastal area north of Dongara as having largely intact and undisturbed dunal vegetation and topographic variety which adds to the tourist and recreational appeal of the area.

4.23 Monitoring: Coastal Erosion

The Shire of Irwin prepared *Monitoring: Coastal Erosion* in 2013 to document erosion within the Dongara and Port Denison foreshore areas and the coastal areas to the south of Port Denison. It provides information for each of the following sites:

Freshwater Point

Erosion occurred in 2011. Tamarisk trees were damaged, and fishermen shacks were undermined by erosion. Limestone Mahl fill was placed back onto the eroded areas.

Denison Foreshore

In past years, erosion continually affected the foreshore area and the Shire replenished with sand each year. Concrete blocks were used to build a wall in December 2009 but did not work. Further erosion problems existed in 2012 and the concrete blocks previously laid were washed out. The forshore was backfilled and Flex Mat placed down before being covered with sand and grass.

Granny's Beach

Damage was caused by storms in 2009. Limestone blocks were used to create a wall later in 2009. Erosion occurred again in 2010 and storms in 2011 undermined the footpath and caused extensive erosion. The stone sea wall was constructed in 2011. Further erosion occurred in 2013, exposing the limestone wall footings. The beach was subsequently covered in sand and seaweed. Cracking of the limestone wall was evident in 2013.

Surf Beach

Following erosion issues, the Shire added sand replenishment to Surf's Beach in 2009. Erosion issues continued in 2010 and 2011. In 2012 the Council removed up to half the car park and footpath and commenced battering down the dune to provide safer access to the beach. Concrete blocks were placed down as a border to define the beach from the car park.

Seaspray Beach

Erosion issues in 2013 exposed old infrastructure from the crayfishing industry.

Seven Mile Beach

Access eroded away in 2013 and sand replenishment undertaken in the same year. Signage was added in 2013 to protect the dune systems. A new car parking area was constructed in 2013.

4.24 Dongara to Cape Burney, Western Australia – Coastal Geomorphology

The *Dongara to Cape Burney, Western Australia – Coastal Geomorphology Technical Report* was prepared by Damara WA Pty Ltd in 2011. The primary objective of the project was *to describe the geomorphology of the coast between the northern limit of the Dongara Townsite and the mouth of the Greenough River at Cape Burney South*. The secondary objective was *to identify areas of relative instability including sections of the beach and barrier dune that are potentially subject to risk in response to projected environmental change*.

The report concludes the following:

- The seaward part of the barrier is highly susceptible to destabilisation by Metocean processes, particularly north of Nine Mile Beach. Hence development of infrastructure (such as roads, parking areas and amenity buildings) on frontal dunes is highly constrained.
- Compartment 1 (south of Nine Mile Beach) is the most amenable for development
- Compartment 2 (Nine Mile Beach to Headbutts) comprises active dunes that is highly susceptible to change.

Cells 1 – 6 relate to the Shire of Irwin. The susceptibility, instability and combined risk for these cells is included in the table below.

		SUSCEPTIBILITY		INSTABILITY				
CELL	**BOUNDARY**	**FOREDUNE AND FRONTAL DUNE**	**BACK BARRIER AND HIND DUNE**	**INSHORE**	**FORESHORE**	**FRONTAL DUNE**	**BARRIER**	COMBINED RISK
1	Leander Point to Dongara North	Low to moderate (2)	Low (1)	Low to moderate (2)	Moderate (3)	Low to moderate (2)	Low to moderate (2)	Low to moderate (12)
2	Dongara North to Harleys Hole	Low to moderate (2)	Low (1)	Low to moderate (2)	Moderate (3)	Low to moderate (2)	Low to moderate (2)	Low to moderate (12)
3	Harleys Hole to Seven Mile	Low to moderate (2)	Low (1)	Low (1)	Moderate (3)	Low to moderate (2)	Low to moderate (2)	Low to moderate (11)
4	Seven Mile to Nine Mile	Moderate (3)	Low to moderate (2)	Low (1)	High (1)	Moderate (3)	Moderate to high (2)	Low to moderate (12)
5	Nine Mile to Bookara South	High (5)	Low to moderate (2)	Moderate to high (4)	High (5)	High (5)	Moderate to high (4)	Moderate to high (25)
6	Bookara South to Shire boundary	Moderate to high (4)	Moderate (3)	Moderate to high (4)	High (5)	Moderate to high (4)	Moderate (3)	Moderate to high (23)

Adapted from Damara WA Pty Ltd, (2011)

Recommendations for Cells 1 – 6 are shown in the table below.

CELL	BOUNDARIES	CONSDERATIONS
1	Leander Point to Dongara North	1. The coast between Leander Point and Dongara North is outside the Study area but is a natural extension from a resource management perspective and should be considered as such. 2. Any proposal for development Near the shore Between the Mouth of The Irwin River and Dongara North should consider the changes in The sediment budget due to erosion south of the river. 3. Setbacks to Development should allow for adjustment of the coastal outline in plan within the northern section of the cell. 4. Beach access ways should be minimised and tracks along the coast kept well to the landward margin of the narrow foredune plain, if not abandoned altogether.
	Dongara North to Harleys Hole	1. Calculation of setbacks should allow for potential changes to the configuration of the coast under projected changes in climate and sea level. 2. Beach access ways, particularly through the frontal dune ridge may pose a management risk. 3. Tracks along the coast should be kept to the landward margin of the narrow foredune plain and off the seaward slopes of the frontal dune ridge.
3	Harleys Hole to Seven Mile	1. Calculation of setbacks should allow for potential changes to the coastal outline in plan form under the appropriate scenario for projected change in climate and sea level. 2. Tracks along the coast should be kept to the landward margin of the narrow foredune plain and off the seaward slopes of the frontal dune ridge. 3. Consideration should be given designing development on the backbarrier to fit the topography rather than imposing a grid layout of any subdivision.

CELL	BOUNDARIES	CONSDERATIONS
4	Seven Mile to Nine Mile	1. Calculation of setbacks should allow for potential changes to the coastal outline in plan form under the appropriate scenario for projected changes in climate and sea level. 2. Beach access ways, particularly between Seven Mile and Getaway Beach and in the northern half of the cell, may pose a management risk. 3. The reach of coast in Cell 4 is increasingly susceptible to erosion with distance north. Hence tracks along the coast should be kept to the landward margin of the narrow foredune plain in the southern part of the cell and restricted access provided in the northern sector. 4. Access tracks to the beach should be established through stable dunes demonstrably perched on coastal limestone. 5. Consideration should be given designing development on the backbarrier to fit the topography rather than imposing a grid layout of any subdivision.
5	Nine Mile to Bookara South	1. There is scope for development on deflation plains and depressions in the Northern half of the back barrier. 2. The change in orientation and the active blowouts along the coast in Cell 5 may be a consideration in future planning. 3. Access tracks to the beach should be established through stable dunes demonstrably perched on coastal limestone.
6	Bookara South to Shire boundary	1. Deflation plains and depressions in the southern third of the cell adjoin those in Cell 5 and appear amenable to development. 2. Access tracks to the beach should be established through stable dunes demonstrably perched on coastal limestone. 3. Any proposed development should be contingent for plans to minimise access tracks to the shore, and keep them within the southern third of the cell.

Adapted from Damara WA Pty Ltd, (2011)

Application/implications

The Technical Report for Dongara to Cape Burney provides some useful recommendations for the future use and development north of Dongara to the northern boundary of the Shire. This section of the coast is relatively undeveloped, apart from a formal access point at Seven Mile Beach and tracks leading to other beach sites. The low-key nature of this area of coastline is likely be continued in the future.

4.25 Coastal Hotspots

The Coastal Hotspots document was prepared by Seashore Engineering in 2019. It identifies 'hotspot' number 14 at Port Denison which extends from Granny's Beach to north of Surfs Beach. The hotspot is described as follows:

Erosion at Grannies Beach in Dongara has occurred progressively in response to construction of the Port Denison Marina modifying an embayment and truncating sediment transport from the south. Grannies Beach was originally in the central part of a half heart shaped embayment controlled by rock outcrops at Leander Point and in the vicinity of the Irwin River mouth. It was intermittently supplied by sediment from the south, bioproduction from offshore reefs, and sediment discharge from the Irwin River during flood events; the latter two components have been insufficient to compensate for the loss of sand from the south. Erosion has threatened the Dongara Denison Beach Holiday Park, which would have been sited as a relocatable asset, resulting in the construction of a rock revetment. This revetment has enhanced erosion due to regularly reflecting wave action creating a loss of a permanent beach, and transfer of the erosion hazard to the north. Most recently the revetment was extended north and the car park was modified.

Eight publicly owned assets may be at risk of erosion damage in the area, with four assets at risk of damage in the short-term, including shade umbrellas, beach access points, the path and the reconstructed car park. In the longer term, Ocean Drive, Marine Heights, the leasehold caravan park, and associated services (critical water pipeline, phone, power), as well six private properties are high-value assets at risk.

The main recreational uses of the site are swimming, surfing, windsurfing/kitesurfing, walking and cycling. The Dongara community have an active interest in the management of this foreshore.

The management options for the next 0-5 years are to 'protect' the area, for the preparation of planning frameworks for retreat in the next level of management and to review lease agreements with the caravan park for clarify responsibilities for coastal erosion mitigation. The management options for the next 5-25 years is to retreat (relocate Ocean Drive and caravan park) and to protect by extending the revetment 150m to protect the road at the southern end. The management options for 25+ years is to retreat (relocate the road and retreat the caravan park).

4.26 Modelling of Coastal Inundation and Erosion Process at Shire of Irwin Coastal Region – Technical Input for Irwin Coastal Hazard Risk Management and Adaptation Plan

Modelling of Coastal Inundation and Erosion Process at Shire of Irwin Coastal Region – Technical Input for Irwin Coastal Hazard Risk Management and Adaptation Plan was prepared by Curtin University for the Shire of Irwin, NACC and the WAPC in 2016. It sets out the results of numerical modelling of coastal inundation and coastal erosion and displays the sea level rise and water level scenarios on maps. Sites of interest in the study include Port Denison, Granny's Beach/Surf Beach, South Beach, Seaspray Beach/Irwin River, Seven Mile Beach, Freshwater Point and Cliff Head. Inundation maps and erosion maps are provided for each site for the 1 year ARI, 100 year ARI and 500 year ARI in the present year (2016) and also for the year 2070 and 2110. It is important to note that the study acknowledges that it *was conducted with very limited data and site information* and that *the results should be used as indicators and preliminary findings for further detailed studies*.

Overall, the study found that *future climate change and sea level rise has adverse impacts on Shire of Irwin coastal region. Inundation will be expanded inland creating more areas inundated by severe weather conditions. Erosion will be more active and erode the beach at most of the locations, especially where extreme wave conditions occurs.*

Application/Implication

The study recommends that the results should be used as indicators and preliminary findings for further detailed studies which are listed in the report. The more coastal hazard investigations being undertaken by Seashore Engineering for certain sites will provide this more detailed information for incorporation into the CMP.

4.27 Port Denison Beach Erosion Investigations

The *Port Denison Beach Erosion Investigations* were undertaken in 2001 by MJ Paul and Associates Pty Ltd on behalf of the Shire of Irwin and the Department of Transport. It focuses on the beach adjacent to the 'Dongara Denison Beach Caravan Park' located north of the Port Denison harbour and looks at the likely causes of beach erosion and assesses the full range of options for managing its impact.

The study reviewed historic aerial photos, beach profile surveys and near-shore hydrographic surveys. The beach profile monitoring confirmed that the beach erosion is limited to a 400m long section of beach.

The options provided in the report are:

- Do nothing – this option is to not add any coastal protection but to look at relocating the buildings associated with the caravan park.
- Seawall – this options would prevent further erosion of the beach opposite the caravan park
- Beach renourishment – adding sand of similar particle size and grading to widen and improve the beach
- Rubble mound groynes – consisting of 4 x 50m long groynes spaced 200m apart, along with sand renourishment
- Offshore rubble mound breakwaters – consisting of 7 x 60m long groynes spaced 200m apart, along with sand renourishment.

The preferred strategy recommended by the report was sand renourishment.

Application/implication

This report is almost 20 years old, however it contains some useful historical information regrading the coastline at Granny's and Surfs Beach which may be useful in the detailed coastal hazard investigation undertaken by Seashore Engineering for this CMP.

4.28 Dongara Beaches Concept Plan

The *Dongara Beaches Concept Plan* was prepared in 2012 by MP Rogers and Associates Pty Ltd.

It states that after the 2001 *Port Denison Beach Erosion Investigations* report the Shire continued to undertake sand renourishment but the dune continued to erode and threaten the caravan park. A 30m seawall was constructed in 2010 and an extension of 170m occurred in 2011 leaving Granny's Beach and Surf Beach without protection. The purpose of this report is to *investigate options to help maintain beach width at these beaches and reduce the amount of beach nourishment required to be placed*.

Four options were investigated for Granny's Beach:

- Existing Case – Beach Nourishment. Placing sediment on the beach and in the nearshore area to mitigate coastal damage and beach erosion
- Concept Option 1 – Offshore Breakwater with Beach Nourishment. Construction of an offshore rubble mound breakwater extending north from the Port Denison breakwater. The conceptual structure is 50 m long and approximately 50 m from the design beach position.
- Concept Option 2 –GSC Groyne with Beach Nourishment. A 30 m long groyne constructed to the -1 mAHD contour at the northern end of Grannies Beach to trap some of the northern longshore sediment transport.
- Concept Option 3 – Perched Beach with Beach Nourishment. Placement of a structure with a crest height around mean sea level to hold sand nourishment at Grannies Beach.

After consideration of the above options, the Shire and DoT *agreed that concept Option 2 (GSC groyne) appears to be the most appropriate to meet the objectives of the Shire*.

Three options were investigated for Surf's Beach:

- Existing Case – Beach Nourishment. Placing sediment on the beach and in the nearshore area to mitigate coastal damage and beach erosion
- Concept Option 1 – Rock Groyne with Beach Nourishment. Construction of a rock groyne to the north of the car park, beach renourishment, extension of the existing rock wall by 50m and the construction of a low crested, terraced seawall at the rear of the newly placed beach
- Concept Option 2 – Extend the Existing Seawall. Extending the existing rock seawall approximately 150 m to the northern end of the car-park.

After consideration of the above options, the Shire and DoT agreed that concept Option 2 (Extending the Seawall) was the most appropriate.

Application/Implication

This report provides useful information on the history of Granny's Beach and Surf's Beach and the recent construction of the sea wall. This may be useful in the detailed coastal hazard investigation undertaken by Seashore Engineering for this CMP.

5 References

AECOM Australia Pty Ltd, (2010), *Climate Change Adaptation Action Plan*, Batavia Regional Organisation of Councils (BROC), WA.

Australia ICOMOS Incorporated, (2013), *The Burra Charter The Australia ICOMOS Charter for Places of Cultural Significance*, Australia ICOMOS Incorporated, VIC.

Australian Government Department of Health and Ageing and the Environmental Health Standing Committee (2012), *Risky business – a resource to help local governments manage environmental health risks,* Australian Government Department of Health and Ageing, Canberra.

Batavia Coast Coastal Planning Group and Landvision, (2001), *Batavia Coast Strategy*, Ministry for Planning, WA.

Bruch, J., and Freeman, M.J, (2017), *Migration of limesand dunes in Western Australia and their impacts,* Department of Mines and Petroleum, Perth, WA.

Curtin University, (2016), *Modelling of Coastal Inundation and Erosion Process at Shire of Irwin Coastal Region – Technical Input for Irwin Coastal Hazard Risk Management and Adaptation Plan*, Shire of Irwin, NACC and the WAPC, WA.

Department of Aboriginal Affairs and Department of Premier and Cabinet, (2013), *Aboriginal Heritage Due Diligence Guidelines*, Department of Aboriginal Affairs and Department of Premier and Cabinet, WA.

Ecoscape (Australia) Pty Ltd, (2011), *Dongara to Cape Burney: Visual Landscape Assessment*, Department of Planning, Lands and Heritage, WA.

Eliot I, Gozzard JR, Eliot M, Stul T and McCormack G., (2012), *The Coast of the Shires of Coorow to Northampton, Mid West, Western Australia: Geology, Geomorphology and Vulnerability*, Department of Planning, Lands and Heritage and Department of Transport, WA.

Greenskills, (2010), *Coastal Management Specification Manual*, South Coast Management Group and Department of Planning, WA.

Halsall & Associates, (2016), *Dongara Park Local Development Plan (LDP) and Foreshore Management Plan,* Shire of Irwin, WA.

Hydrologia, (2017), *Irwin River Flood Study*, Shire of Irwin, WA.

Mid West Development Commission, Regional Development Australia and Evolve Solutions (2014), *Mid West Tourism Development Strategy*, Mid-West Development Commission and Regional Development Australia, WA.

Middle, G. and Scherini, R., (2013), *Coastal Character and Values Study – Stage One Study of Four Case Studies in Western Australia*, Curtin University and the National Sea Change Task Force, WA.

MJ Paul and Associates Pty Ltd, (2001), *Port Denison Beach Erosion Investigations*, Shire of Irwin and the Department of Transport, WA.

Pretzel S, (2015), *Off-Road Vehicle Areas in the Northern Agricultural Region of Western Australia Feasibility Study a report by Trail Bike Management Australia to the Northern Agricultural Catchments Council,* Northern Agricultural Catchments Council, WA.

Seashore Engineering, (2019), Assessment of Coastal Erosion Hotspots in Western Australia), DPLH/DOT, WA.

Shire of Irwin and Land Vision, (2000), *Shire of Irwin Coastal Development Strategy*, Shire of Irwin, WA.

Shire of Irwin, (2012a), *Shire of Irwin Property Infrastructure Asset Management Plan,* Shire of Irwin, WA.

Shire of Irwin, (2012b), *Shire of Irwin Roads and Footpaths Infrastructure Asset Management Plan,* Shire of Irwin, WA.

Shire of Irwin, (2012c), *Shire of Irwin Access and Inclusion Plan 2012 – 2017*, Shire of Irwin WA.

Shire of Irwin, (2013a), *Shire of Irwin Corporate Business Plan 2013 – 2017,* Shire of Irwin, WA.

Shire of Irwin, (2013b), *Shire of Irwin draft Long Term Financial Plan 2013 – 2028,* Shire of Irwin, WA.

Shire of Irwin, (2013c), *Shire of Irwin Tourism Development Plan 2013 – 2018,* Shire of Irwin, WA.

Shire of Irwin, (2013d), *Monitoring Coastal Erosion*, Shire of Irwin WA.

Shire of Irwin and RPS, (2013), *Port Denison Foreshore Masterplan,* Shire of Irwin, WA.

Shire of Irwin and Land Insights, (2014a), *Irwin River Estuary Management Plan,* Shire of Irwin, WA.

Shire of Irwin and GHD, (2014), *Dongara-Port Denison District Structure Plan,* Shire of Irwin, WA.

Shire if Irwin, (2015), *Shire of Irwin Green Infrastructure Strategy 2015 – 2020,* Shire of Irwin, WA.

Shire of Irwin, (2016), *Coastal Hazard Risk Management and Adaptation Plan (CHRMAP),* Shire of Irwin, WA.

Shire of Irwin, (2017), *Shire of Irwin 10+ Year Strategic Community Plan,* Shire of Irwin, WA.

Shire of Irwin and TPG, (2017), *Shire of Irwin Local Planning Strategy*, Western Australian Planning Commission, WA.

Standing Council on Energy and Resources, (2013), *Multiple Land Use Framework*, Standing Council on Energy and Resources.

Stul T, Gozzard JR, Eliot IG and Eliot MJ, (2014), *Coastal Sediment Cells for the Mid-West Region between the Moore River and Glenfield Beach*, Western Australia, Department of Transport, WA.

Surf Life Saving Western Australia, (2005), *Coastal Risk Profile – Sector 4,* Surf Life Saving Western Australia, WA.

Surf Life Saving Australia, (2007), *Australian Coastal Public Safety Guidelines 1st Edition,* Surf Life Saving Australia, WA.

Tourism WA, (2012), *A Strategic Approach to Caravan and Camping Tourism in Western Australia*, Tourism WA, WA.

Tourism WA, (2014), *Tourism Planning Guidelines, A Guide to Preparing the Tourism Component of a Local Planning Strategy in Western Australia*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2000), *State Planning Policy No. 2.4 – Basic Raw Materials*, Western Australian Planning Commission, WA.

Western Australian Government, (2003a), *State Planning Policy No. 2 Environment and Natural Resource Policy*, Western Australian Planning Commission, WA.

Western Australian Government, (2003b), *Coastal Planning and Management Manual*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2006), *State Planning Policy No. 2.9 Water Resources*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2007), *State Planning Policy No. 3.5 Historic Heritage Conservation*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2008) *Shire of Irwin Local Planning Scheme No. 5*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2012) *Status of Coastal Planning in Western Australia*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2013a), *State Planning Policy No. 2.6 State Coastal Planning Policy*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2013b), *State Planning Policy No. 2.6 State Coastal Planning Policy Guidelines*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2014), *Indian Ocean Drive Planning Guideline*, Western Australian Planning Commission, WA.

Western Australian Planning Commission (2015a), *Mid West Regional Planning and Infrastructure Framework*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2015b), *State Planning Policy No. 3.7 Planning in Bushfire Prone Areas*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2017), *Shire of Irwin Local Planning Strategy,* Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2018a), *Draft State Planning Policy No. 2.4 – Basic Raw Materials Policy*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2018b), *Draft State Planning Policy No. 2.4 – Basic Raw Materials Guidelines*, Western Australian Planning Commission, WA.

Western Australian Planning Commission, (2018c), *draft Position Statement – Tourism Land Uses Within Bushfire Prone Areas*, Western Australian Planning Commission, WA.

APPENDIX C
OTHER MINOR SITES



Base data provided by SLIP.

- Cadastre
- State Road
- Reserve - Shire of Irwin

landinsights

N

Scale: 1:5,000

0 25 50 75 100 m

Bee Hollow
Shire of Irwin Coastal Management Plan



Base data provided by SLIP.

Cadastre

landinsights

N

Scale: 1:5,000

0 50 100 150 200 m

Box Rox
Shire of Irwin Coastal Management Plan



Base data provided by SLIP.

- Cadastre
- State Road
- Reserve - Shire of Irwin
- Other Reserves

landinsights

N

Scale: 1:5,000

0 50 100 150 200 m

Carsons Beach
Shire of Irwin Coastal Management Plan



Base data provided by SLIP.

Cadastre

Reserve - Shire of Irwin

landinsights

N

Scale: 1:5,000

0 50 100 150 200 m

Harleys Hole
Shire of Irwin Coastal Management Plan



Base data provided by SLIP.

- Cadastre
- State Road
- Reserve - Shire of Irwin

landinsights

N

Scale: 1:3,000

0 25 50 75 100 m

Little Freshwater
Shire of Irwin Coastal Management Plan



Base data provided by SLIP.

- Cadastre
- State Road
- Reserve - Shire of Irwin

landinsights

N

Scale: 1:3,000

0 25 50 75 100 m

Little Mexico
Shire of Irwin Coastal Management Plan



Base data provided by SLIP.

Cadastre

landinsights

N

Scale: 1:7,500

0 50 100 150 200 m

Nine Mile Beach
Shire of Irwin Coastal Management Plan



Base data provided by SLIP.

Cadastre

landinsights

N

Scale: 1:5,000

0 50 100 150 200 m

Nine Mile Camp
Shire of Irwin Coastal Management Plan



Base data provided by SLIP.

- Cadastre
- State Road
- Reserve - Shire of Irwin
- Other Reserves

landinsights

N

Scale: 1:3,000

0 25 50 75 100 m

Palm Springs
Shire of Irwin Coastal Management Plan



Base data provided by SLIP.

Cadastre

Reserve - Shire of Irwin

landinsights

N

Scale: 1:3,000

0 25 50 75 100 m

Pistons
Shire of Irwin Coastal Management Plan



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