BLOWHOLES RESERVES MANAGEMENT PLAN
2014 – 2036

Shire of Carnarvon

in association with
Edge Planning & Property and Ferart

April 2015

EXECUTIVE SUMMARY

This Management Plan provides a framework to guide future planning, development and management of recreation and tourism at the Blowholes Reserves, so Carnarvon residents and visitors can enjoy the areas' natural attractions in a sustainable manner. In particular, the Management Plan sets out guidance until the year 2036 as the Blowholes transitions from shacks to new chalets with formal leases and enhanced management.

The Blowholes Reserves (to be called the "Blowholes") are located approximately 70 kilometres by road north of Carnarvon. The Blowholes are mainly used by shack "owners" and their families and friends, plus caravaners/campers and recreational/professional fishers.

The 43 shacks currently occupying the Blowholes will be removed. In their place, new chalets will be established in an alternative location outside of the storm surge/coastal setback area. This approach of removing the shacks is consistent with State Government directives and policies including the State Government's *Illegal Occupation of Coastal Crown Land (Squatters) Policy.*

The Management Plan sets out strategies for appropriate and sustainable recreation and tourism uses, access and circulation, rehabilitation, interpretation, management arrangements and implementation of works. The strategies were informed through:

- reviewing relevant background information;
- assessing the site's physical characteristics, existing use, context and constraints;
- developing management strategies to guide ongoing planning and development;
- providing site development concepts to indicate the type of land use and development envisaged; and
- direction provided by the Council for various matters including the "look and feel" of the chalet precinct.

The vision for the Blowholes is to:

> Manage the Blowholes Reserves as a district and regional coastal public recreation and holiday destination, while recognising limited servicing, strong community associations, cultural heritage, specific character and environmental context.
>
> To ensure that the Blowholes Reserves will be a sustainable and popular public coastal destination where local Carnarvon residents and tourists can participate in day visits or stay overnight.

The Management Plan supports future land uses and development which are equitable, sustainable and compatible with the area's conservation values.

The Blowholes will provide nature-based recreation and tourism opportunities for day visitors and short-stay holiday makers at an affordable price. The provision of basic amenities provides for visitors seeking a coastal experience or holiday in a unique location.

The Plan, shown in Figure 3, includes provision for:

- enhanced day use areas and facilities;
- walk trails, parking and other visitor facilities;
- 60 caravan sites to accommodate up to 240 people;
- 15 tent sites to accommodate up to 60 people; and
- 40 chalets to accommodate up to 200 people.

The Management Plan is consistent with the *Ningaloo Coast Regional Strategy Carnarvon to Exmouth (2004)* which designates the Blowholes as a "tourism node" and which limits overnight accommodation to 500 people.

Development and management of the Blowholes aims to achieve enhanced levels of environmental awareness and conservation. The natural environment will be an integral part of visitor experiences and facilities. Sensitive landscapes will be restored and conserved. Infrastructure will incorporate appropriate technologies which are cost effective, minimise environmental impacts and which generally maximise the use of renewable resources.

1.0 INTRODUCTION

1.1 Location and key features

The collection of four Reserves associated with the area are collectively referred to herein as the Blowholes Reserves and are located in the Gascoyne Region approximately 45 kilometres north of the Gascoyne River and 70 kilometres by road north of Carnarvon and approximately 970 kilometres north of Perth (Figure 1) in the vicinity of Point Quobba. The location gets its name from a series of blowholes located approximately 500 metres north of Point Quobba.

The Blowholes Reserves are located in the Gascoyne Region approximately 70 kilometres north of Carnarvon and approximately 970 kilometres north of Perth (Figure 1). The Blowholes Reserves, situated at Point Quobba, are commonly known as "The Blowholes".

The Blowholes are accessible via a sealed road and are closely linked to Carnarvon which acts as the service centre for the Blowholes. The Reserves and nearby Quobba Station form the southern "gateway" to the Ningaloo Reef.

The Blowholes are a popular recreation and camping area for both locals and tourists and are a distinctive feature in the region. The Point Quobba lagoon and beach is the nearest clear-water ocean beach to Carnarvon.

The Reserves currently contain 43 "squatter" shack leases along with caravan and tent sites. The shack sites are leased by local residents who frequently stay at the Blowholes generally on weekends and during peak holiday periods. Intrinsic environmental qualities, a strong sense of community, seasonal occupation, a particular style and form of development (typical of random coastal holiday cottage developments) have all contributed to the development of an area of distinctive character.

1.2 Purpose of reservation, date and management authority

The Blowholes consists of four Crown Reserves which are under Management Order to the Shire of Carnarvon ('Shire') as shown in Figure 2. This means the Shire is responsible for the day to day management of the Reserves. Approval of the Management Plan by the Council and the Minister for Lands will guide the effective management of the Reserves.

Information relating to the Reserves is summarised below:

Reserve Number	Cadastral details	Purpose	Power to lease?	Area (hectares)
37457	Lot 347 on Deposited Plan (DP) 216439 and Lot 383 on DP 91266 Reserve extends to the high water mark	Parklands, Recreation and the Letting of Cottages	Yes and up to 10 years on Lot 347 Yes and up to 6 years on Lot 383.	Total 98.816 ha Lot 383 (50.791 ha) and Lot 347 (48.025 ha)
37458	Lot 382 on DP 216430	Holiday Chalets	Yes and up to 10 years	26.364 ha
37459	Lot 363 on DP 215097	Caravan Park and Camping	Yes and up to 21 years	5.2287 ha
39666	Lot 381 on DP 216430	Rubbish Site	No	2.6635 ha

The four Reserves have a total area of approximately 133 hectares with the western boundary extending to the high water mark.

The Shire was originally vested management of the Reserves in the 1980's. The shacks are wholly located on Reserve 37457. An Instrument of Delegation from the Minister for Lands enables the Shire to remove shacks and structures owned by persons who do not enter into a lease agreement with the Shire to occupy the relevant land for a period terminating on 27 March 2008.

In December 2012, correspondence was received from the Minister of Lands detailing a way forward for the removal of shacks and allocation of up to 40 leased chalet lots to existing shack owners and new occupants and requiring the development of a formal Land Administration Act Management Plan.

1.3 Characteristics of boundaries/tenures and management of adjoining land

The Blowholes adjoins the Quobba Pastoral Station which is used for pastoral grazing. There are also tourist facilities and accommodation in the vicinity of the Quobba homestead and at Red Bluff.

Off-shore, there is a Fish Habitat Protection Area that includes coastal waters between Point Quobba and Black Rock. All forms of fishing, with the exception of the taking of oysters by hand and the taking of squid using a squid jig without bait, are prohibited within the lagoon area. Recreational fishing is permitted elsewhere in the FHPA in accordance with State-wide recreational fishing rules.

1.4 Purpose of the Management Plan

The Shire has prepared the *Blowholes Reserves Management Plan* (to be called the "Management Plan") to facilitate proper planning and management of the Blowholes Reserves for tourism and recreation purposes until the year 2036.

The Management Plan has been prepared to manage the Reserves in a more strategic, coordinated, equitable and sustainable manner.
Once endorsed, the Management Plan will be the principal document guiding development and management at the Reserves.

The Management Plan is to provide a framework to guide future planning, development and management of recreation and tourism uses and development. This is to occur in a way that is ecologically sustainable, safe, equitable and which respects the cultural significance of the area. This is in order that visitors can enjoy the areas' special values, particularly the natural attractions and landscape, in a sustainable manner.

In particular, the Management Plan:

- supports various nature-based recreation and tourism opportunities which appeal to a wide range of existing users and potential visitors;
- identifies appropriate tenure and sustainable land uses;
- develops proposals for future access, circulation and use;
- outlines accommodation options and location for development;
- guides development and management to ensure that future use is equitable, sustainable and compatible with the high conservation values of the area;
- identifies the requirements for rehabilitation along with environmental conservation and enhancement;
- identifies education and interpretation opportunities;
- sets out strategies for future management, development standards and planning requirements;
- ensure that sustainability objectives are met by integrating environmental, social and economic considerations; and
- supports and will assist to facilitate effective implementation.

The Shire seeks to balance various considerations including State Government policy and directives, sustainability, risk, public safety and equity. Importantly, the Shire has a duty of care to effectively manage the Reserve including environmental assets and development and human impacts.

1.5 Planning/management context

There is a significant range of legislation, strategies, plans and policies that influence what development can occur in the Blowholes Reserves.

The *Blowholes Reserves Management Plan* is prepared pursuant to Section 49 of the *Land Administration Act 1997*. The formal process adopted for this Management Plan is that the final version will be endorsed by the Council and the Minister for Lands.

1.6 Structure of report

The Management Plan consists of this report and the associated Background and Context report. This report is set out into the following sections:

1.0 Introduction - this sets the scene for the Management Plan.
2.0 Management Proposals – sets out the vision, objectives, management strategies and actions for future management of the Reserves.
3.0 Implementation – this outlines an implementation pathway to turn the opportunities set out in this Management Plan into reality.

2.0 MANAGEMENT PROPOSALS

2.1 Vision

The vision is to:

> Manage the Blowholes Reserves as a district and regional coastal public recreation and holiday destination, while recognising limited servicing, strong community associations, cultural heritage, specific character and environmental context.
>
> To ensure that the Blowholes Reserves will be a sustainable and popular public coastal destination where local Carnarvon residents and tourists can participate in day visits or stay overnight.

Based on the above vision and recognising the planning/management context, the Blowholes Reserves will provide nature-based recreation and tourism opportunities for day visitors and short-stay holiday makers catering for various interests. Basic amenities and interpretive facilities will be provided for day visitors seeking access to the beaches and other natural attractions of the area. Visitor services include information/interpretation, public toilets and boat launching. Overnight facilities will cater for up to 500 people and will include various accommodation types.

2.2 Sustainability

Sustainability		
Objectives	**Management Strategies**	**Actions**
1. Protect and enhance environmental assets and natural resources.	<u>Overview</u> The key assessment of the appropriateness of management measures, land use or development proposals will be whether the management measure or proposal is consistent and/or beneficial to the purpose of the Reserves as set out within the Management Order, consistent with the Management Plan objectives and consistent with sustainability principles. <u>Design and development</u> Work with the features of the natural environment and ensure that new structures, roads and services minimise impact on the natural environment.	Through the Shire's website, signage and visitor centre, provide information to visitors that encourage appropriate behaviour towards wildlife, cultural resources, historic and natural features. Continue the replacement program of Shire infrastructure at the Reserve.

	Ensure development appropriately takes account of coastal processes, fire and other risks. Site planning will be capable of staged development to ensure it is financially self-sustaining. <u>Management</u> Environmental management will recognise the context and function of the Reserves within the broader natural environment and its relationship to the Fish Habitat Protection Area and the nearby Ningaloo Coast.	

2.3 Role and function

Recreation areas and facilities will continue to be provided at the Reserves to encourage, promote and facilitate public awareness and the enjoyment of unique attractions and natural values of the area. Some visitors may stay less than an hour, enough time for a quick overview of the Blowholes. Others may come for days or weeks to undertake a range of activities such as fishing, swimming, boating or relaxing. Recreation facilities should be located and designed to have minimum visual intrusion on landscape values and should provide appropriate and safe access.

Role and function		
Objectives	**Management Strategies**	**Actions**
1. Facilitate the provision of recreation, tourist accommodation and other visitor services and facilities, consistent with achieving equitable use, environmental sustainability and economic viability. 2. Protect the natural, social and cultural values of the Reserves	<u>Accommodation capacities</u> Maximum overnight accommodation will be limited to 500 people. <u>Maximum length of stay</u> Other than for the caretaker/ranger and the caretaker's/ranger's family, no person can stay at the Blowholes Reserves for longer than 3 months in any 12 month period.	Shire/Blowholes caretaker will continue to monitor certain public facilities to determine their capacity including sullage points and public toilets to ensure the 'roster' for emptying or filling tanks by Shire contractors is sufficient to cope with growth in visitation at certain peak periods.

by limiting the accommodation capacity of future development to predetermined levels. 3. Development should not be or feel like an enclave for a select few. 4. Ensure that overnight accommodation does not dominate the Reserves to the point where day visitors feel unwelcome.	<u>Shop/commercial</u> No on-site shop is to be provided although transient vendors may be permitted with an appropriate licence from the Shire.	Ensure that "permits" for visitor stays are limited to a maximum of 3 months in any 12 month period. Ensure that the permit of stay for camping be a maximum of 30 days between 1st April - 1st October and 60 days from 2nd October - 31st March. Clearly defined and separated precincts for day use, chalets and tents to be implemented within the Reserve to accommodate all current Reserve uses.

2.4 Tenure

Tenure		
Objectives	**Management Strategies**	**Actions**
1. Allocate a tenure that reflects the Reserve's importance for recreation and tourism and facilitates balanced appropriate environmental outcomes. 2. Chalet leases limited in duration. 3. Land is not privately owned.	<u>Maximum leasehold period</u> The maximum period for chalet leasehold is 21 years. <u>Amalgamate Reserves and power to lease</u> Amalgamate the current Reserves 37457, 37458, 37459 and 39666 into one Reserve for the purpose of Recreation, Tourism and Landscape Protection with the Shire having the power to lease. <u>Beach Road</u> The Shire will review whether the road through the Reserves is dedicated as a road.	The tenure to be modified to enable the chalet precinct to be developed through the power to lease for 21 years. Department of Lands to amalgamate Reserves 37457, 37458, 37459 and 39666 into one Reserve.

2.5 Proposed uses and facilities

Proposed uses and facilities		
Objectives	**Management Strategies**	**Actions**
1. Promote increased day visitation. 2. Ensure that the various forms of overnight accommodation can harmoniously co-exist.	<u>Day visitors</u> Support the ongoing upgrade of facilities, information and services to enhance visitor numbers and enhance a unique experience. <u>Short stay and chalet accommodation</u> Leasehold chalets provide the opportunity for short term accommodation and rentals. Any short term use license or sub-lease basis will require the prior approval of the Shire and the Minister of Lands. Caravan and tent sites provide for short term visitor accommodation for caravans, motor homes and campers in designated areas as set out in the Management Plan.	Shire to consider necessary facility maintenance and upgrades Sites to be defined at the Reserve.

2.6 Desired development character

Siting and orientation should minimise excavation, cut and fill, conserve the existing landform where ever possible and provide pedestrian access between buildings and features. All buildings to be single storey and comply with the *Building Code of Australia.*

2.7 Landscape protection

Landscape protection		
Objectives	**Management Strategies**	**Actions**
1. To conserve and enhance the character of the Blowholes. 2. The existing sense of place will be honoured wherever possible subject to addressing storm surge/coastal setback. 3. Protect important views and minimise the visual impact of the development upon the natural environment.	Outside of the Chalet Precinct, development will be in the form of ablutions and shade shelters. Any new ablutions or shade shelters will respect the natural, visual and built character of the area. Where practicable, firebreaks and services should follow natural landform, vegetation or land use patterns. Revegetation of areas vacated by shacks and camping	Appropriate barriers installed around car parks to protect vegetation Clearly defined paths from precincts (day use, chalets & camping) to encourage visitors to stay off sensitive dune areas and vegetation Progressively install appropriate barriers around areas designated for revegetation after the removal of shacks or redundant camping sites.

2.8 Servicing

Servicing		
Objectives	**Management Strategies**	**Actions**
1. To ensure that minimal infrastructure is provided to enable establishment of visitor services and tourist accommodation.	<u>Water</u> The provision of potable water will be the responsibility of all users and private bores will not be permitted. There will be no reticulated water supply to chalet sites the provision of potable water will be the responsibility of the individual chalet lessee.	Signage will be placed at the entry to Blowholes Road and North West Coastal Highway advising that no potable water is available at Blowholes. Public toilets will be regularly cleaned by the Shire and/or the caretaker.

2. Ensure that effluent disposal does not have a detrimental impact on the lagoon and/or on human health.	The provision of shower facilities will be the responsibility of all users, with no shower facilities to be provided by the Shire within the Blowholes Reserves. <u>Effluent disposal</u> The Blowholes Tourist node is designated as a chemical toilet area and no private sub surface septic systems will be approved. All effluent disposal systems are to use approved portable systems which are designed, located and maintained to the satisfaction of the Shire to address human health requirements and minimise environmental impact. No effluent disposal wells are to be located closer than 100 metres to mean high water mark. <u>Waste disposal</u> Users will be required to carry out their own rubbish on departure. It is at the discretion of the Shire as to whether rubbish disposal bins will be provided. <u>Power supply</u> Should Chalet owners wish to provide their own independent power supply, they will need to ensure that all power supply systems are designed and managed to not detract from the amenity and character of the area particularly in terms of noise. Support solar power technology and passive solar design principles. Locate wind turbines carefully to minimise compromising the area's visual quality. Support efficient, clean burning wood or gas heaters.	The Shire will lobby Telstra for improved communications in proximity to the Blowholes Reserve. Signs to be erected prohibiting the collection of wood or other vegetation.

	Electrical supply that requires crossing of roads/tracks will not be supported. No public power supply will be supplied.	

2.9 Proposed pattern of access

Proposed pattern of access		
Objectives	**Management Strategies**	**Actions**
1. Enhance the movement network on safe low key basis including restrict un-licenced off road vehicles. 2. Provide and maintain a structured, safe and sustainable access system, while ensuring	<u>Paths</u> Prevent pedestrian access to sensitive dune vegetation through the installation of appropriate fencing and brushing. Formalise high usage beach access paths to encourage pedestrians to stay on the path.	As part of amalgamating the existing four Reserves into one Reserve, Beach Road within the Reserves may be formally closed. Provide public car parks in designated areas within the Reserves.

environmental values are not compromised.	<u>Vehicular access</u> The standard for the local road network is to remain "low key" with a low speed environment, emphasis on pedestrian movement and safety and controlled traffic management consistent with the informal character of the Blowholes. Roads, tracks and car parks will be designed to restrict the visual and environmental impacts on the landscape and visitor experience. Unused or superfluous vehicle tracks will be closed and rehabilitated. The realignment of the main access road to the Blowholes is subject to suitable road design parameters which minimise clearing, a suitable level of construction (initially to formed limestone standard or similar), effectively managing drainage and detailed survey. In the longer term, the main access road may be sealed if required. Minor access roads will be formed to limestone standard or similar but will remain unsealed. Access road width will be reduced to a maximum of 6 – 8 metres width but should be no narrower than 5 metres. Existing roads must be used for all vehicle movements and except for the beach, no off-road vehicle usage will be permitted outside existing roads <u>Public car parks</u> Public car parks should: • have minimal intrusion on landscape amenity; • be constructed of compacted limestone or similar; • be defined with appropriate methods; • be connected to pedestrian access paths; and • manage water run off sensitively to prevent adverse impacts on the environment.	Monitor low usage paths to determine whether or not formalisation or closure is more appropriate. Signs to be maintained prohibiting the use of off road vehicles outside existing limestone roads.

	Off-Road vehicles Vehicles are not permitted on the dunes and will be prevented through the installation of appropriate barrier measures. Closing/rehabilitating tracks In rationalisation of access tracks within the Blowholes Reserves, the Shire will consider matters including: • access planning and traffic management; • safety of visitors; • fire management; • susceptibility to erosion; • protection and enhancement of visual qualities; • visitor needs and expectations; and • on-going cost of maintenance. Close superfluous paths and appropriately rehabilitate.	

2.10 Fire management

Fire Management		
Objectives	**Management Strategies**	**Actions**
1. Protect people, property and conservation values from bush fire and other fires. 2. Reduce the risk and frequency of an unplanned fire starting	Develop, implement and maintain a Fire Management Plan for the Blowholes Reserves in accordance with State government guidelines.	The Shire to implement an endorsed Fire Management Plan.

near or within the Blowholes Reserves as a result of human activity.		

2.11 Soil conservation, erosion control and rehabilitation

Soil conservation, erosion control and rehabilitation		
Objectives	**Management Strategies**	**Actions**
1. Rehabilitate degraded areas to a stable condition resembling the natural environment as closely as possible.	<u>Minimise clearing</u> Retain natural vegetation and landform (dunes) wherever possible and promote revegetation works based on best practice. <u>Rehabilitation program</u> A rehabilitation program will be developed for the Blowholes Reserves based on the following priorities: • exposed shack sites immediately upon removal; • unused or superfluous vehicle and pedestrian tracks; and • disturbed areas. Rehabilitate degraded and weed infested areas in accordance with a rehabilitation program. Control recreational use and management activities, particularly uncontrolled vehicle and pedestrian access, to minimise the degradation of landform stability and scenic values. <u>Fencing</u> Install appropriate fencing along beach access paths and car parks to protect vegetation and landforms (dunes).	In areas exhibiting signs of degradation, consider installing temporary, transportable fencing to restrict access. Rehabilitation will be ongoing and periodically monitored.

2.12 Management of Flora

The DPaW maintains lists of threatened flora protected under the *Wildlife Conservation Act 1950* and priority flora that are not ranked as threatened but are considered a high priority for protection. There are no records of threatened flora in the vicinity of the Blowholes Reserve however the priority flora species *Acacia Ryaniana* has been recorded within 200 metres of the Reserve. The species is known to occur on coastal sand dunes in the area however there is little information regarding its distribution and very few records of the species exist. DPaW recommends that future development within the Blowholes Reserves is to avoid clearing occurrences of *A. ryaniana*. To achieve this, DPaW recommends that a flora survey be initiated to check for the presence of *A. ryaniana*. Should *A. ryaniana* be found in the planning area, DPaW recommends that clearing should be aligned to protect the species.

Management of Flora		
Objectives	**Management Strategies**	**Actions**
1. Minimise clearing of native vegetation where possible.	Disturbance or loss of native vegetation is minimised or avoided. The clearing of vegetation on the chalet lease lots is only permitted subject to Shire approval. Any clearing or removing of native vegetation requires a clearing permit unless exempt in accordance with Schedule 6 of the *Environmental Protection Act 1986* or Regulation 5 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* administered by the Department of Environment Regulation. Planting of introduced flora within the Reserve is prohibited.	Provide appropriate signage and information to enhance viewers understanding of the flora, fauna and landscape they are looking at and experiencing.

2.13 Management of introduced and domestic animals

Management of introduced and domestic animals		
Objectives	**Management Strategies**	**Actions**
1. Minimise the impacts of domestic animals.	The Shire may consider designating areas within the Reserve prohibiting dogs and cats.	Through the Shire's website, signage and visitor centre, inform visitors of the requirements associated with having dogs at the Reserve.

2.14 Management of native fauna

Two threatened bird species and fifteen migratory birds protected under the international agreements (listed below) have been recorded within 5 km of the Blowholes Reserve.

Species	Common Name	Conservation Status
Charadrius mongolus	Lesser Sand Plover	Threatened
Puffinus Huttoni	Hutton's Shearwater	Threatened
Actitis hypoleucos	Common Sandpiper	International Agreement

Arenaria interpres	Ruddy Turnstone	International Agreement
Calidris alba	Sanderling	International Agreement
Calidris ruficollis	Red-necked Stint	International Agreement
Charadrius leschenaultii	Greater Sand Plover	International Agreement
Haliaeetus leucogaster	White-bellied Sea-Eagle	International Agreement
Numenius phaeopus	Whimbrel	International Agreement
Oceanites oceanicus	Wilson's Storm Petrel	International Agreement
Pluvialis fulva	Pacific Golden Plover	International Agreement
Pluvialis squatarola	Grey Plover	International Agreement
Stercorarius pomarinus	Pomarine Skua	International Agreement
Sterna Dougallii	Roseate Tern	International Agreement
Sterna hirundo	Common Tern	International Agreement
Tringa brevipes	Grey-tailed Tattler	International Agreement
Tringa nebularia	Common Greenshank	International Agreement

Management of native fauna		
Objective	**Management Strategies**	**Actions**
1. Minimise impacts on native fauna.	Disturbance or loss of native vegetation is minimised or avoided. Consider interpretative signage informing visitors of the protected fauna within the area.	Provide appropriate signage and information to enhance viewers understanding of the flora, fauna, landscape they are looking at and experiencing.

2.15 Cultural heritage

Cultural heritage		
Objectives	**Management Strategies**	**Actions**
1. Acknowledge the area's cultural heritage.	Ensure visitor, development and management activities do not adversely impact upon significant historical and cultural sites.	Ensure that all development complies with the provisions of the *Aboriginal Heritage Act 1972*

2.16 Visitor safety and information

Visitor safety and information		
Objectives	**Management Strategies**	**Actions**
1. Highlight risks and appropriate responses to visitors and locals. 2. Increase awareness, appreciation and understanding of the natural and cultural values of the Blowholes and the surrounding area.	The Shire's Emergency Response Plan applies to the Blowholes Reserves. <u>Safety Awareness information</u> Develop and install consistent signage for directional, interpretative and public safety in accordance with the Blowholes Signage and Style Guide Strategy. <u>Emergency response</u> Support the establishment of a Sea Search and Rescue facility at the Blowholes.	Incorporate safety messages in information provided to visitors including interpretive signage. Investigate means to improve accessibility to the Blowholes across the rocks and install a viewing platform. Officers occupying the caretakers dwelling to be provided with adequate facilities for contacting emergency services should an incident occur. Caretakers dwelling be fitted with adequate first aid supplies should an incident occur.

2.17 Reserve management/governance

There is a need for a dedicated caretaker at the Blowholes. The caretaker will perform a number of duties throughout the peak season to ensure that the Reserves are being used appropriately by visitors.

These duties include collection of camping fees, ensuring ablution facilities are cleaned daily and ensure campers are within areas designated for camping.

Reserve management/governance		
Objectives	**Management Strategies**	**Actions**
1. Ensure that the Reserves are effectively managed. 2. Ensure equitable use and availability of camping sites.	The Shire to provide a management regime and presence at the Blowholes that includes a full time caretaker/s. Shire to limit the maximum length of stay in camping sites to 30 days between 1st April - 1st October and 60 days between 2nd October - 31st March. Each shack may have one camp fire base constructed and maintained in accordance with the Fire Management Plan. Within the camping area camp fire bases will only be permitted in accordance with the Fire Management Plan. Collecting of fire wood from within the Blowholes Reserves or the surrounding Quobba Station is prohibited.	The Shire to use its best endeavours to provide an effective management regime and presence at the Blowholes. Shire to provide and maintain a caretakers office/dwelling at the Blowholes. Shire to erect signs noting the prohibition on collection.

2.19 Commercial development

Commercial development		
Objectives	**Management Strategies**	**Actions**
1. Commercial development is not supported.	Commercial development is not supported operating from the beach or other parts of the Reserves.	Shire not to approve applications for commercial development

2.20 Itinerant traders

Issue: Itinerant traders		
Objectives	**Management Strategies**	**Actions**
1. Manage opportunities for itinerant traders to operate at preferred locations.	The Shire may accept itinerant traders (i.e. hire equipment, food vendors etc.) in locations at the Reserves to operate their business. Under this Management Plan and the relevant local law, all itinerant traders will need to apply for and receive Shire approval to operate at the Blowholes.	The Shire may separately prepare policy guidance relating to itinerant traders and preferred or non-preferred locations to operate at the Reserves.

2.21 Management and development partnerships

Management and development partnerships		
Objectives	**Management Strategies**	**Actions**
1. On-going management will recognise that the Blowholes Reserves are predominantly for public recreation, tourism purposes with chalet accommodation for no longer than 21 years.	Shire will endeavour to manage the area so as to not erode the essential attractive characteristics of the Blowholes Reserves. The Shire will seek to work effectively with local user groups including but not limited to Blowholes Protection Association (BPA) and a "Friends of the Blowholes" group.	The Shire to consider establishing a "Friends of the Blowholes" group to assist in the sustainable management of the Reserves.

2.22 Removing existing shacks

Removing existing shacks		
Objectives	**Management Strategies**	**Actions**
1. Ensure that cleared sites are protected from wind erosion. 2. Ensure existing shacks are removed and responsibly disposed.	All existing shacks are required to be removed by shack owners prior to occupation of new chalet sites. Shacks should be removed by the date and process defined in the Lease or Licence or by 31 December 2015 whichever is the sooner. 2016 Existing shack material is required to have been removed from the Reserve and disposed of appropriately at the Shire Waste Disposal site prior to occupation of the new chalet receiving sign off from the Shire.	The Shire will review the outcome of the remediation works. The Shire will utilise its accumulated past shack rents to demolish and rehabilitate the existing shack sites.

2.23 Precincts

As set out in Figure 3A and 3B, various precincts have been identified at the Blowholes. The precincts are Day Visitor, Caravan and Camping, Chalet, Beach and Foreshore, and Conservation. It is highlighted there is some overlap e.g. day visitors may use the boat ramp which is outlined in the Beach and Foreshore Precinct (section 2.28).

2.24 Day visitor precinct

Public day use facilities will be upgraded. This may include the provision of:

- car and long vehicle parking;
- shade and wind shelters;
- wheelchair access to key features and facilities where practical and possible;
- lookout structures for viewing of the surrounding landscape;
- sheltered picnic tables, gas barbeques and toilets;
- a boat launching area with boat trailer parking; and
- walk trails.

Day Visitor Precinct		
Objectives	**Management Strategies**	**Actions**
1. Provide an appropriate level of facilities and amenities for the public utilising the Reserves. 2. Ensure that all day use activities can be safely undertaken. 3. Ensure that the provision of disabled access has been considered for the majority of day use activities. 4. Ensure that appropriate parking is provided for day visitors.	Day use facilities may include: • adequate and appropriate parking; • appropriate access to the beach; • public toilets and universal access to toilet facilities; • beach shelters to provide shade protection; • a range of walk trails; • boat launching area; • combination of stairs and ramps provided at the lagoon; • rubbish bins; • interpretative information including at the Blowholes and the lagoon; and; • signage advising on dangers of approaching the Blowholes including warning of dangers of king waves and a dangerous coast. Investigate means to improve accessibility to the Blowholes across the rocks and install a viewing platform.	Shire to consider necessary facility maintenance and upgrades

2.25 Camping precinct

The camping precinct occupies part of the former shack footprint. Up to 60 caravan sites and 15 tent sites will be provided. Various communal facilities will be progressively provided. There will also be opportunities to retain some of the pre-existing camp sites, towards Black Rock, where appropriately sited in existing cleared areas.

Camping precinct		
Objectives	**Management Strategies**	**Actions**
1. Contain and formalise caravan and tent sites to prevent damage to the natural environment. 2. Ensure that a range of suitable spaces are provided for different size and configurations of caravans and rigid or semi-rigid motor homes. 3. Ensure that dedicated pedestrian pathways are provided from caravan and tent sites to the beach to minimise impacts on vegetation. 4. Minimise costs through the provision of non-serviced individual caravan sites. 5. Provide suitably protected tent sites where no additional clearing is required.	<u>Caravan sites</u> Up to 60 sites will be provided. The sites will: • be unpowered and not serviced with water; • provide a range of spaces to be provided for different size and configurations of caravans and rigid or semi-rigid motor homes; • have a minimum width of 10 metres and a minimum depth of 10 metres; • be designed to provide sufficient room to enable large motor homes and caravans to manoeuvre and park; and • be provided with a suitable movement system which is a continuous loop. No permanent sites will be provided by the Shire. <u>Tent sites</u> Up to 15 tent sites will be provided. The sites will be unpowered and not serviced with water. <u>Camping facilities</u> The following communal facilities may include: • a meeting area including barbeques, tables, shelters; • centralised ablution facilities; • rubbish disposal facilities;	Shire to establish appropriate identification/numbering of caravan and tent sites.

	• central sullage disposal facility; • fencing or other suitable barriers are provided to the perimeter of the camping precinct; and • pathways leading to the beach.	

2.26 Chalet precinct

As set out in Figures 3A, 3B and 4, the chalet precinct is in a different location to the current shacks. The rationale for the new siting is outlined in various sections of this report. The chalet precinct includes provision for up to 40 chalets (200 beds) and a network of pathways and convenient access to the beach.

The survey of the chalet lease boundaries is a prerequisite to leases being issued. This will need to be conducted to provide security for lessees and allow for implementation of chalet design guidelines. A detailed design for the chalet precinct will be undertaken having regard to a site survey and the Fire Management Plan.

The design and management approach for the chalet precinct sets out mutual responsibilities to look after land on each lease lot which is similar to "common property" in strata schemes.
The chalet lease lot and design guidelines do not establish a preference or a requirement of either a kit structure, architect designed building or converted "shipping container/s".

The intent is that the opportunity be available for a lessee to construct a chalet in the manner they prefer. What is a defined requirement will be the building area, single storey construction, roof area, minimum roof pitch, colourbond© cladding and a colour scheme that reflects a schedule (to be defined at a later date in association with leaseholders and the Blowholes Protection Association).

Chalet precinct		
Objectives	**Management Strategies**	**Actions**
1. To facilitate a chalet development for a period of 21 years at the Blowholes. 2. Development standards should recognise the "informal" holiday and recreation functions of the area, as distinct from traditional urban areas. 3. Ensure that car movements and associated parking does	<u>Tenure and use</u> Land tenure will be through a lease for a maximum 21 year term which will not be renewed. Leaseholders own the buildings but they do not own the land. Buildings cannot be occupied as permanent dwellings. Buildings may only be occupied by the lessees or their non-fee paying guests or invitees for short periods with no person staying more than 3 months in a 12 month period. Use of chalets for tourist purposes will require a particular special lease from the Shire.	<u>Use of chalets for tourist purposes</u> Chalet leaseholders proposing to lease their chalet for tourist purposes require the prior approval of the Shire and the Minister for Lands. The special lease will incorporate special conditions and rental. <u>Allocation of chalet lease lots</u> The Shire to establish an appropriate and equitable procedure to undertake allocation of leases which is consistent with the *Local Government Act 1995*.

not dominate the chalet development. 4. Ensure chalet sites are outside of the coastal setback area. 5. Ensure that dedicated pedestrian pathways are provided from chalets to the beach and throughout the development to minimise the clearing of natural vegetation. 6. Enable a sustainable chalet development to be realised at the Blowholes. 7. Ensure that the new chalet development can be staged.	<u>Chalet lease lots</u> Leasehold lots will: • not exceed a site area of 180m^2; • not be internally fenced; with the exception of step-over blue tail barriers; and • display a uniform site marker/number, issued by the Shire, in a visible location for identification purposes. <u>Survey and chalet lease boundaries</u> The survey of the lease boundaries is to be completed by a qualified surveyor appointed by the Shire prior to any chalet lots being approved. <u>Buildings and structures</u> All buildings (chalets) and other structures will comply with *Building Code of Australia* and be constructed to Region D building classification. <u>Chalets</u> Chalets will: • be Class 1 building (i.e. dwelling – used for short stay purposes) of the *Building Code of Australia*; • be constructed and repaired/maintained using new materials; • have a roof area of not more than 100m^{2}and a roof pitch of not less than 15°; • have an area (measured from the external walls) of not more than 80m^2; • incorporate at least one covered outdoor area under the main roof (i.e. patio or verandah); • be single storey;	<u>Allocation by Blowholes Protection Association</u> The Shire will provide the BPA an opportunity to allocate new chalet sites where there is 100% support from current shack owners. On this basis, the BPA President will advise the Shire and the Department of Lands as to how the allocation will be undertaken and will provide the Shire with a Statutory Declaration stating that 100% of all shack owners would like the BPA to arrange the allocation and agree to the proposed process. The Shire would then give a defined date by which the BPA would need to provide the Shire and Department of Lands with a list of the allocated lots. The list of allocations would need to be accompanied by a second Statutory Declaration advising that the list was undertaken with the acceptance of 100% of current shack owners. <u>Allocation by Shire</u> If 100% acceptance of current shack owners cannot be achieved through the BPA, the Shire will undertake the allocation through a ballot system.

	• be externally clad in colour bond custom orb or an appropriate alternative (e.g. Hardiplank weatherboard or Fibre cement) and be a colour/s as provided for in the adopted External Colour Schedule; • have a flooring system that reflects the site characteristics with minimal earthworks; • have a minimum ceiling height of 2.4 metres; • be capable of storing potable water which is supplied and carted to site by the occupier; and • chalets will be individually serviced by a portable toilet system supplied by shack owners. Chalets may: • include windbreaks using netting, shade cloth or similar; • include an outbuilding (for storage purposes) of not less than 4m^2 and not greater than 9m^2; and • be designed to harvest rainwater. <u>Setbacks from lease boundaries</u> Buildings will generally be setback 5 metres from the front lease lot boundary and 1 metre from the side and rear lease boundaries. The setbacks can be reduced where justified by the leaseholder and supported by the Shire. <u>Vehicle and boat parking</u> Provision should be made to ensure that a parking area to accommodate a maximum of two vehicles and a 5 metre boat is provided on the lease lot. <u>Servicing</u> Chalet lease holders are required to provide suitable energy sources for lighting, cooking and other requirements.	Once the ballot is undertaken, preferably by a returning officer of the Australian Electoral Commission, shack owners would have 30 days to advise whether they will retain the balloted lot or a lot that they may have negotiated/exchanged with another balloted lot recipient. The ballot process would not prevent the swapping of lots without any money or benefit changing hands amongst current shack owners up until the defined closing date. Once the defined closing date has passed current shack owners will have either advised Shire they have chosen to accept a lot or decided against accepting a new lot. A current shack owner who does not take up the offer of a new lease by the defined closing date will lose entitlement to their existing shack. The Shire would then require the shack owner to remove the existing shack within 60 days or face legal compliance. Any lease lots left over from either the BPA process or the ballot system will be the 'property' of the Shire and available for lease to the general public at a cost determined by the Shire.

	Photovoltaic cells for solar hot water systems and small wind generators affixed to the chalets are supported. The Shire may set a limitation on the use of generators such as restricting hours of operation. The Blowholes Tourist node is designated as a chemical toilet area. Chalets will be individually serviced by a portable toilet system supplied by shack owners. Sullage disposal points will continue to be monitored and serviced by the Shire of Carnarvon. <u>Clearing</u> The clearing of vegetation on the chalet lease lots is only permitted subject to Shire approval. <u>Key principles for new leasing to current shack owners</u>. These key principles include: • up to a 21 year lease will be offered to existing shack owners for the development of a chalet in accordance with the endorsed Management Plan. Shack owners have three months to accept and execute the new lease. Conditions of the lease include that the lessee construct a chalet on their allocated lease lot to lock up stage within two years, with the potential to extend by a further 12 months if substantial works have occurred; • there is no occupation of the chalet until there is written "sign off" from the Shire that the original shack had been removed and disposed of appropriately at the Shire Waste Disposal site and the new chalet meets planning, building and health requirements and a new lease has been entered into; • the end date for all leases be 31 December 2037. Lessees who sign the lease later will have a shorter lease period;	Any disposal of land by the Shire is to be consistent with the *Local Government Act 1995*. Should the disposal of land be via tender, the tender would not be open to the recipient of a lot or anyone who has an existing shack and once undertaken the lease would immediately come into effect due to new lessees not having an existing shack to remove. <u>Potential request for 3 additional chalet lots</u> If the topography can support additional sites and if the WAPC agrees to the additional sites, Council will request the consideration of an additional three chalet lots from the Minister of Lands should all 43 original shack owners take up leases. <u>Allocation of chalet sites to non-shack owners</u> Any lease lots remaining after the initial shack owner ballot process or lots forfeited throughout the 21 year lease period will revert back to being the 'property' of the Shire of Carnarvon (as the Blowholes Reserves Management body).

	• leases will generally be allocated to one or two clearly defined natural persons; • no person or entity will be permitted to hold a licence or lease over multiple lots; • the person/s must be an existing old shack lessee; • leases will only be transferable from the original lessee to another individual by registration of a transfer at Landgate; • leases need to be entered into with the Shire before the chalet is constructed; • leaseholders have a pedestrian right of access across any uncovered parts of leases; • leases are finite and will default to the Shire at termination; • the chalet is not to be occupied by any person for a period greater than 3 months in any 12 month period; • the chalet is built to standards set by Management Plan; • the chalet is appropriately maintained; • the chalet is removed after expiration of the lease and site reinstated to the satisfaction of the Shire; • the removal of survey pegs/identification number is prohibited and any re-pegging/re-numbering is at the lessee's expense; • the annual lease fee will be $1000 which is indexed to CPI (this is separate to the below "performance bond") and reviewed every 5 years; and • requiring a "performance bond" to limit the possibility that Shire is left with the responsibility of future clean-up and rehabilitation of the shack area after the twenty one year leases expire. The performance bond is paid annually and will be deposited into a Shire reserve account (or similar). On removal of the chalet and site rehabilitation by year 21 the bond would be returned to the lessee.	These lots may be made available for lease to the public at the discretion of the Shire. Council would need to consider and endorse the release of any remaining lots at one of their Ordinary or Special Council Meetings. Should Council deem it appropriate to reallocate the remaining site or sites a two stage ballot process would be undertaken. *Stage One - Expression of Interest (EOI)* Shire of Carnarvon would advertise the availability of chalet lots at the Blowholes in the local paper for a period of two consecutive weeks, along with advertising on the Shire of Carnarvon website and at the Shire of Carnarvon front office. During the open for submission period (four weeks) individuals would be invited to submit an application expressing their interest in obtaining a chalet lot/entering into a lease agreement. Once the EOI application deadline has closed no further applications will be accepted. *Stage Two - Ballot*

	<u>Allocation by chalet sites to non-shack owners</u> Should a current shack owner not take up the offer of a new chalet lease together with its obligation to construct within two years or should they accept a new chalet lease but fail to meet the timeline requirements of removing their shack and building their new chalet, then the lease will be forfeited to the Shire for any disposal at the Shire's discretion and is required to be consistent with the *Local Government Act 1995*. A 'current shack owner is one that is registered with the Shire at the date Council endorsed the Management Plan (22nd September 2014). The EOI process for obtaining a chalet lot will not be open to the recipient of a lot in a previous ballot or anyone who has an existing shack/chalet lease. No person or entity will be permitted to hold a licence or lease over multiple lots. New lease holders would be subject to the same conditions as the existing chalet leaseholders with the following two additions: • once undertaken the lease would immediately come into effect due to the new lessees not having an existing shack to remove; and • up to a 21 year lease period will be available; however as all leases will be required to have the same end date; lessees who sign or obtain their chalet lease at a later date than the original lessees should be aware that a shorter lease period will be written into their lease agreement. The 21 year lease period commences from the date the Minister of Lands endorses the Management Plan.	All eligible applications received will be entered into a ballot carried out by the Shire of Carnarvon. Once the ballot has been undertaken, preferably by a returning officer of the Australian Electoral Commission, the successful EOI individuals will have thirty days to advise the Shire whether they will retain the balloted lot or a lot they may have negotiated/exchanged with another balloted lot recipient (should more than one lot be released during the ballot process). Once the defined deadline has passed the individual/s will have either advised Shire they have accepted the lot and entered into a lease agreement or advised Shire that they no longer wish to enter into a lease agreement. This will result in a redraw of the lot from the remaining EOI candidates.

2.27 Beach and foreshore precinct

Beach and foreshore precincts		
Objectives	**Management Strategies**	**Actions**
1. Conserve the coastal environment while encouraging an appropriate level of access. 2. Ensure that publicly accessible boat launching is maintained.	<u>Development</u> Development in the precinct is limited to those structures necessary for public facilities which are coastally dependent or those which are temporary. <u>Boat launching</u> The existing beach based boat ramp is to be retained for use by recreational and commercial fishers. Boat launching is limited to/from the beach and no boat ramp will be provided. <u>Vehicles on the beach</u> Vehicles are not permitted on the beach other than for boat launching. <u>Parking</u> Formalise the use and extend the existing car park in the vicinity of the boat ramp area. Improve pedestrian safety in the vicinity of the boat launching area. <u>Fishing and off-shore activities</u> Whilst the Management Plan has no authority within the lagoon areas, it is noted that all forms of fishing, with the exception of the taking of oysters by hand, are prohibited within the lagoon area as set out in the Fish Habitat Protection Area (FHPA).	The Shire will review the use and extent of the car/trailer parking area. The Shire acknowledges that the Department of Fisheries manages off-shore fish and aquatic resources for ecological sustainability.

	The collection of all coral, live rock and benthic organisms (including live and dead shells but excluding oysters) within the lagoon area of the FHPA is prohibited.	

2.28 Conservation precinct

Conservation precinct		
Objectives	**Management Strategies**	**Actions**
1. Support the conservation of natural assets with low-key recreation opportunities.	The majority of the Reserves will generally remain undeveloped.	Suitably located tracks being provided to enable visitors to experience the environment and landscape

2.29 Professional fishers

Professional fishers		
Objectives	**Management Strategies**	**Actions**
1. Where requested, seek to accommodate professional fishers in a way that respects other Reserve users and which addresses amenity and safety considerations.	The operations of any professional fishers will be an ancillary component of the Blowholes.	The Shire will liaise with the Department of Fisheries and other stakeholders regarding professional fishing in the vicinity of the Blowholes and land based requirements.

3.0 IMPLEMENTATION

3.1 Overview

In terms of implementing the Management Plan, the approach is required to be flexible to allow staging including for the chalet precinct, camping precinct and other infrastructure. Infrastructure will be provided to the level required only for each stage of development. Recreation, tourism and planning/development for public facilities (i.e. day visitor facilities) along with conservation initiatives, will be ongoing over the coming years.

The priority for the implementation of Management Strategies is to meet the overall sustainability objective in the management, development and use of the Reserves. The Management Strategies deal with both operational matters and capital works. There is a need to undertake progressive improvements to infrastructure which can be sustainably afforded and maintained/managed by the Shire.

3.2 Priority works/management programs

Priority works/management programs		
Objectives	**Management Strategies**	**Actions**
1. Seek effective implementation of the Management Plan.	The priority for the Reserves will focus on those matters required to ensure the sustainable management of the Blowholes and in particular the provision of essential services and facilities.	Lease boundaries for 'lots' to be defined.

3.3 Governance

Governance		
Objectives	**Management Strategies**	**Actions**
1. Promote good governance to implement the Management Plan and to comply with legislative requirements.	The intent of the Shire is that the management regime for the Blowholes Reserves will be funded largely through fees generated through overnight stays and chalet leases.	Shire review and set camping fees as part of its annual budget process.

3.4 Monitoring and review

The timeframe of the Management Plan extends to 21 years up to the year 2036. Many changes can occur during this time including some unforeseen matters. The Shire considers it is important that the Management Plan remains relevant and "living". Accordingly, it will be monitored and reviewed to reflect the ever-changing State, regional and local planning/management context.

Monitoring and Review		
Objectives	**Management Strategies**	**Actions**
1. Ensure the Management Plan remains relevant and meets the aspirations of the district along with State Government objectives for the Reserves.	The Management Plan will be reviewed after ten years to determine if the Management Plan is still current or if it needs to be revised. Any proposed changes will be subject to community and stakeholder consultation.	The Management Plan will be reviewed at a maximum interval of every 10 years, however can be reviewed earlier should it be determined as warranted.

3.5 Endorsement

This is a Management Plan pursuant to Section 49(1) of the *Land Administration Act 1997*.

Blowholes Reserves Management Plan Endorsement

Local government endorsement

Adopted for final endorsement by the Council of the Shire of Carnarvon at the meeting of the Council held on 22 September 2014

.....
Shire President

Shire of Carnarvon Common Seal

20/4/2015.
.....
Date

.....
Chief Executive Officer

20/04/2015
.....
Date

Minister for Lands endorsement

Endorsed by the Minister for Lands on 11 January 2016 pursuant to Section 49(1) of the Land Administration Act 1997.

.....
Minister for Lands

11/1/2016
.....
Date

REGIONAL MANAGER
MID WEST

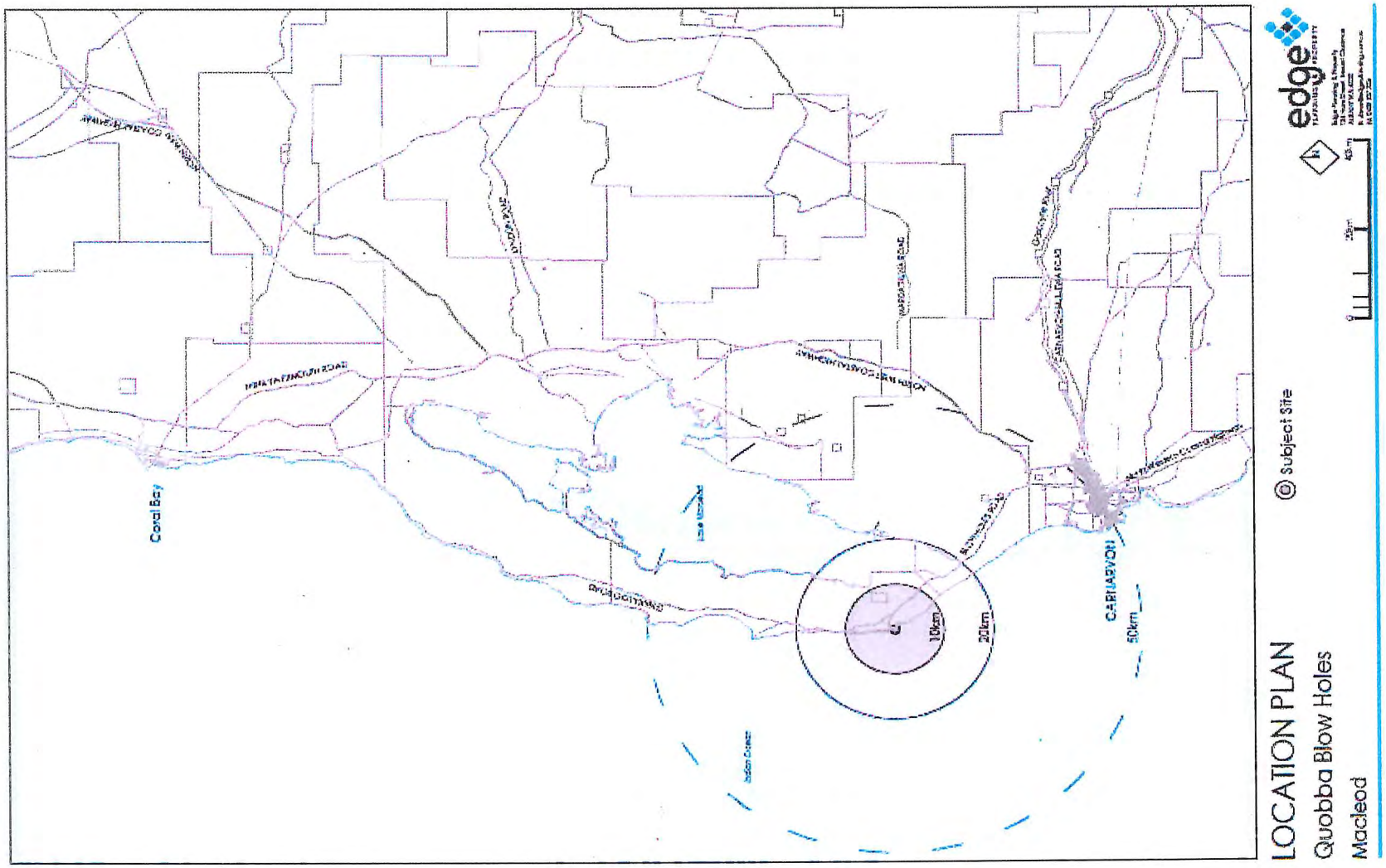
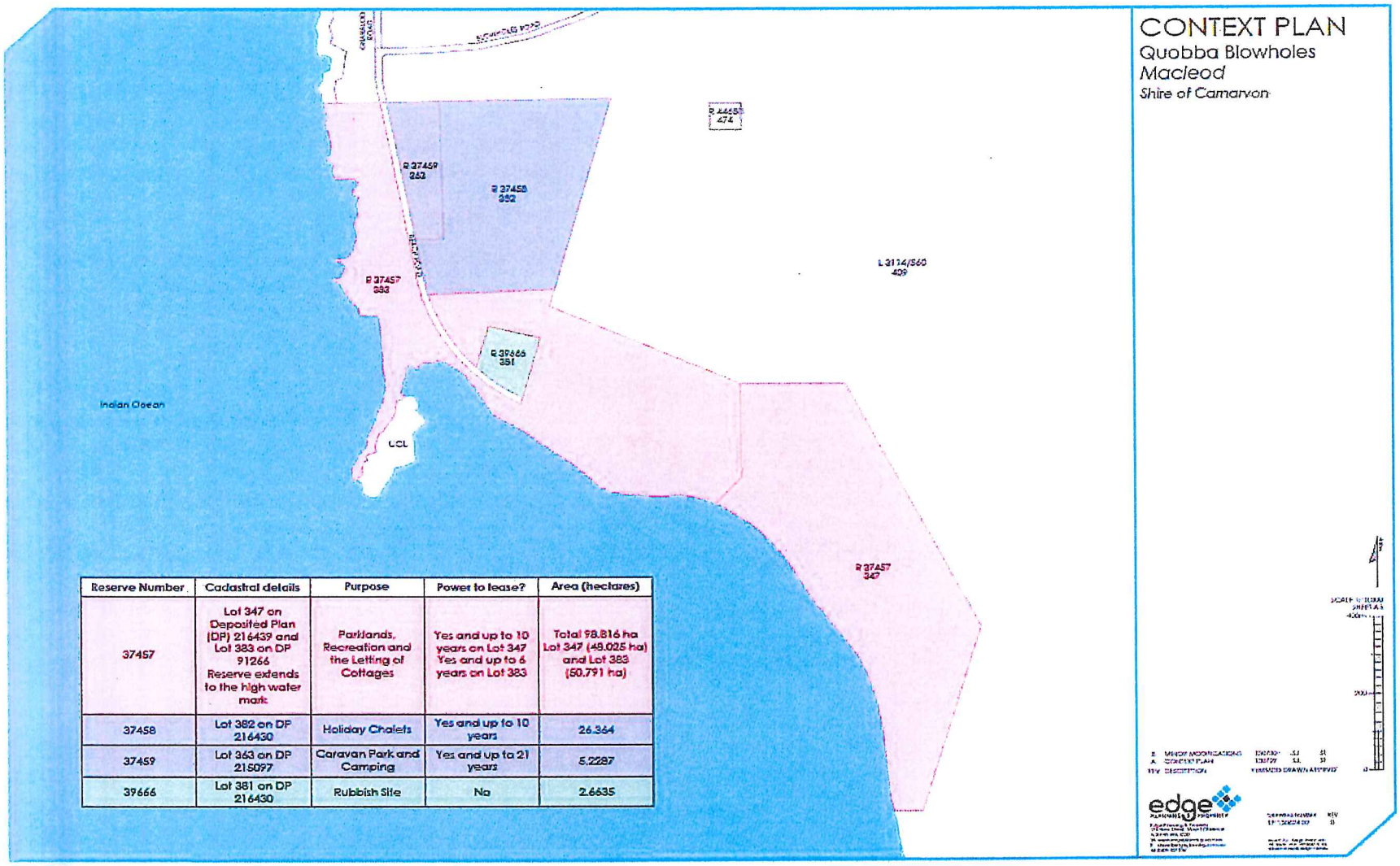


Figure 1: Location Plan



Reserve Number	Cadastral details	Purpose	Power to lease?	Area (hectares)
37457	Lot 347 on Deposited Plan (DP) 216439 and Lot 383 on DP 91266 Reserve extends to the high water mark	Parklands, Recreation and the Letting of Cottages	Yes and up to 10 years on Lot 347 Yes and up to 6 years on Lot 383	Total 98.816 ha Lot 347 (48.025 ha) and Lot 383 (50.791 ha)
37458	Lot 382 on DP 216430	Holiday Chalets	Yes and up to 10 years	26.364
37459	Lot 363 on DP 215097	Caravan Park and Camping	Yes and up to 21 years	5.2287
39666	Lot 381 on DP 216430	Rubbish Site	No	2.6635

Figure 2: Context Plan

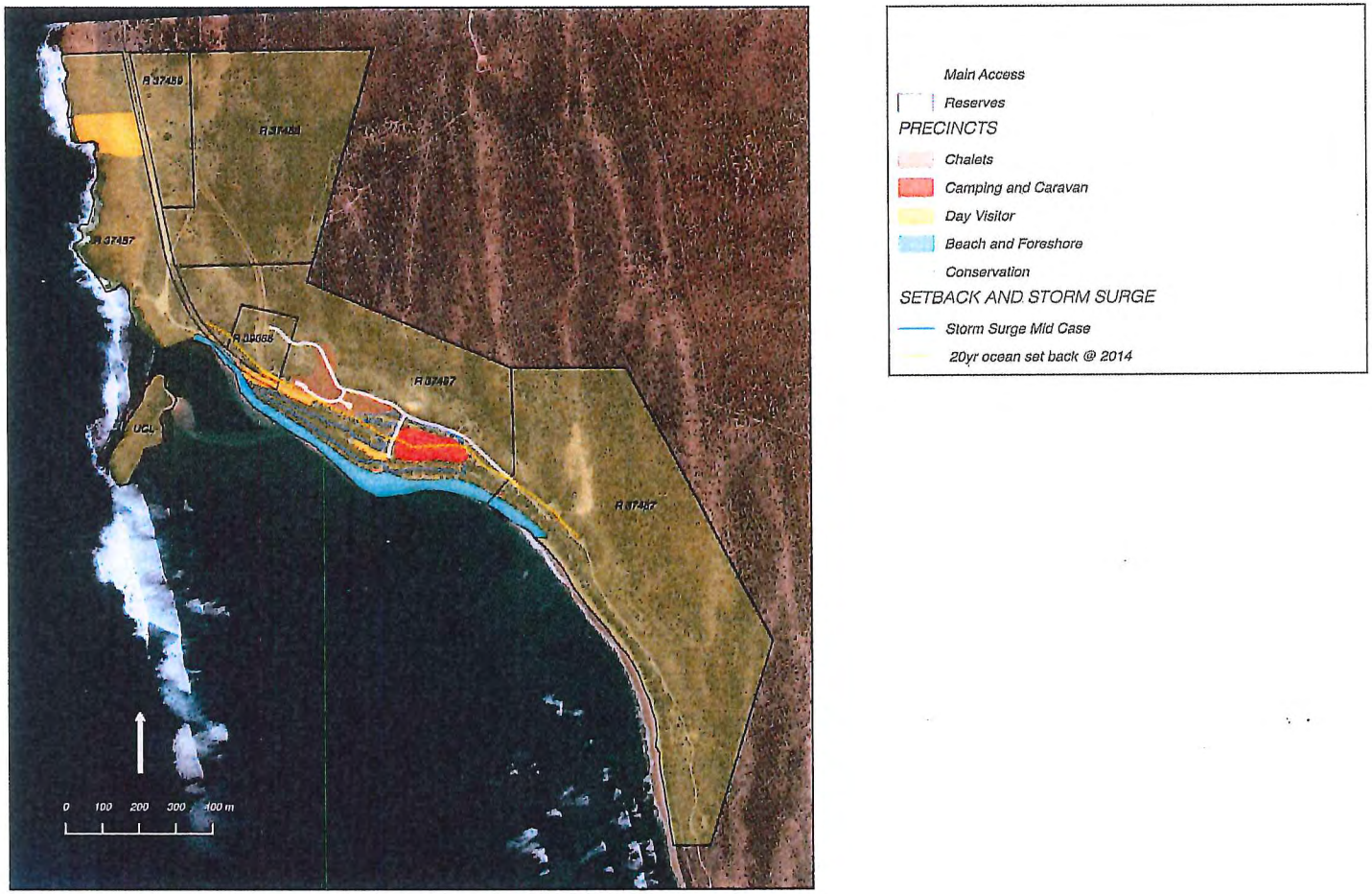


Figure 3A Area Plan

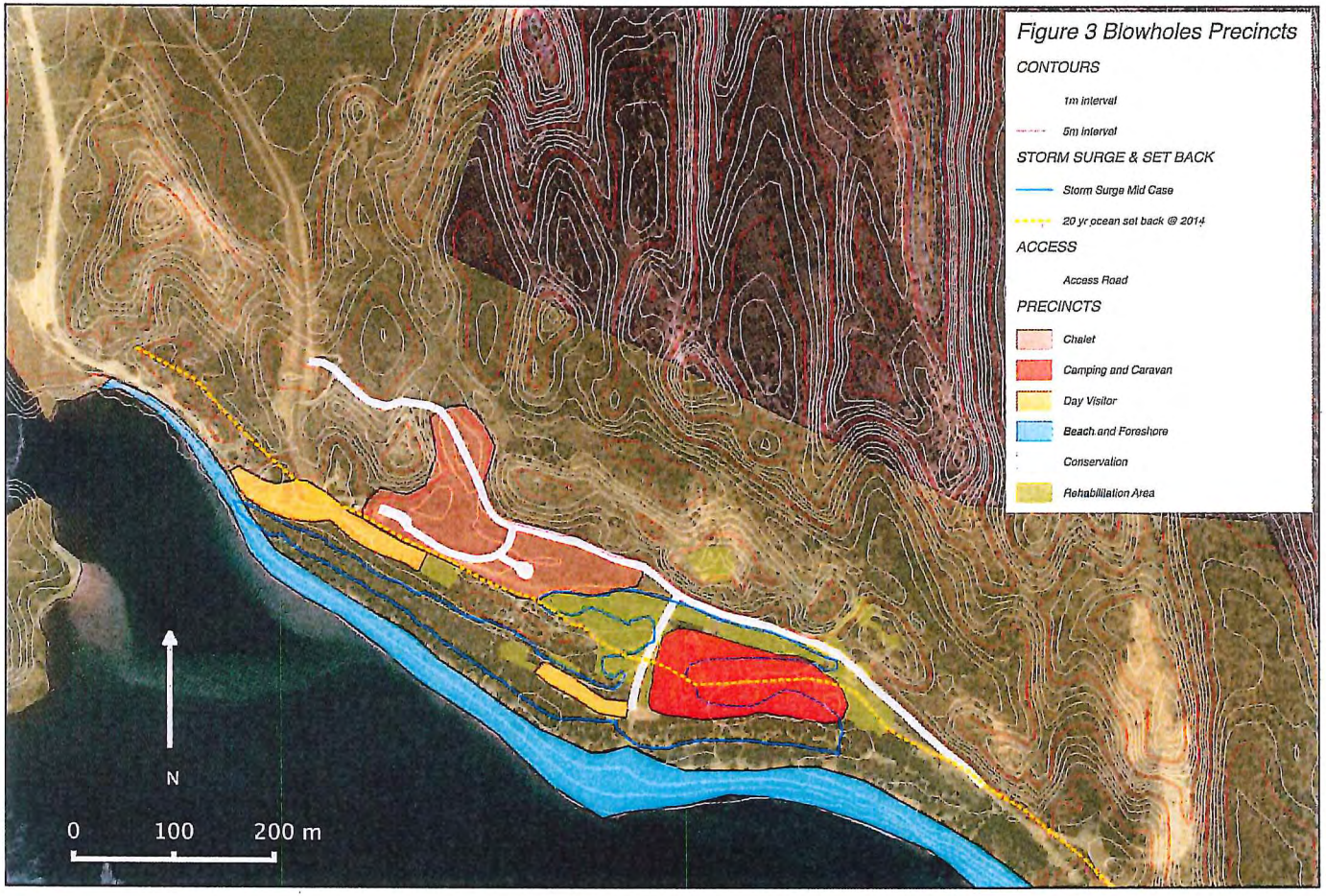


Figure 3B: Precinct Layout

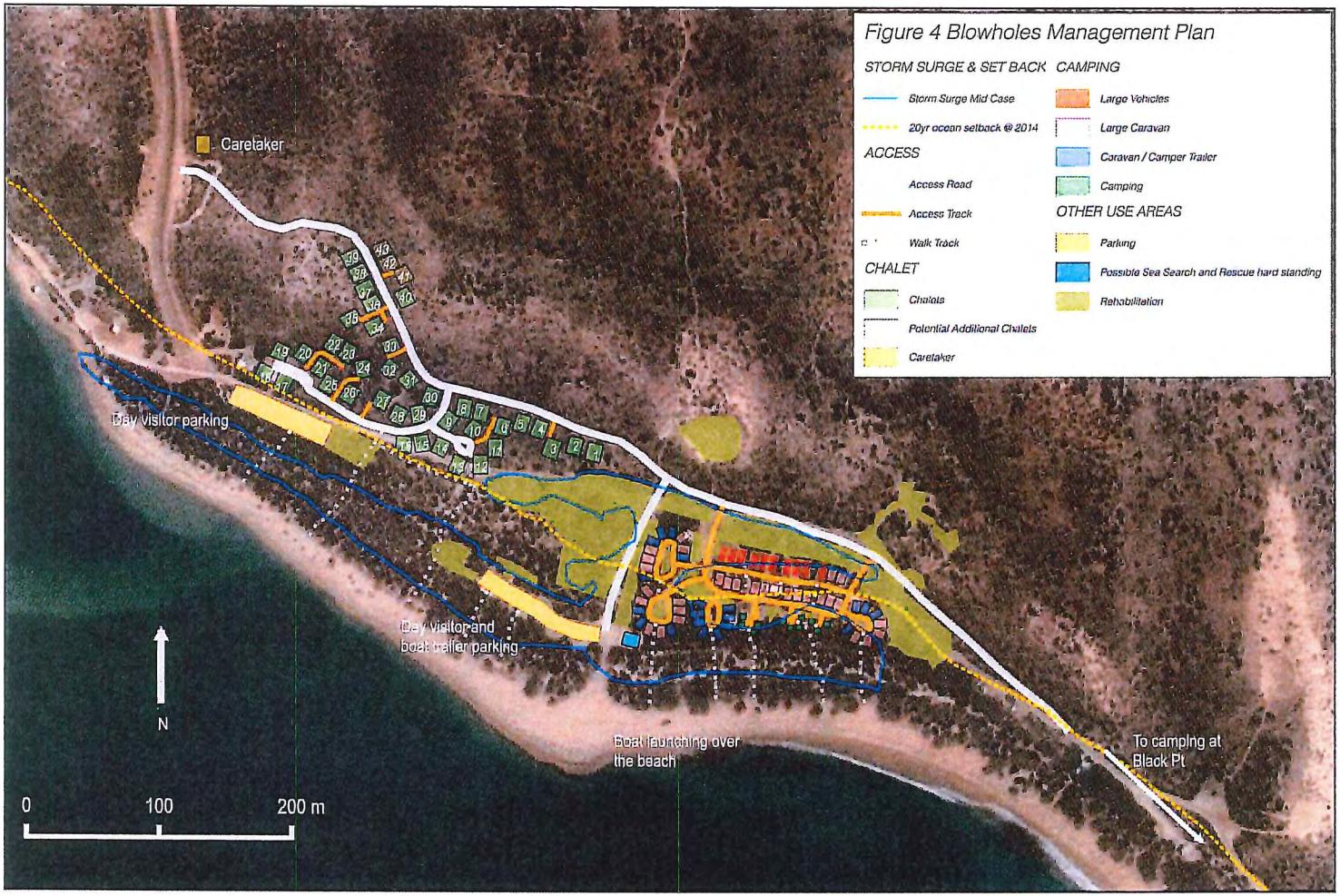


Figure 4: Detailed Precinct concept plan

Blowholes Signage

September 2012 - Final

Report by Kirkgate Consulting

Content

Disclaimer: Whilst every effort has been made to identify and list all signage no guarantee is given that this report contains reference to every sign within the study area. This report should be used as a guide only.

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Phone: 0419 831 129

1.0 Introduction

The Shire of Carnarvon has prepared a master plan for the northern end of the area known as the Blowholes which has been adopted by Council. The master plan primarily focuses on controlling the spread of illegal camping in the area and providing visitors with a better experience. There is currently little directional and interpretive signage within the area.

This report recommends locations for directional and interpretive signage including an indication of signage content and interpretive content. As an addition to this report signage concept designs have been developed which link to the Carnarvon brand town site signage. The concepts are for a suite of signs for the area and show materials, form, structure and layout. The signage references the landscape of the area and the materials used will complement the unique topography of the area.

When considering signage it is important to consider the minimum signage requirement that will add to the visitors experience but not detract from the unique setting by creating a clutter and visual pollution of too many signs. It is considered that the recommendations within this report achieve that balance.

2.0 The Blowholes approaches

It is 49 kilometres from the turnoff at the North West Highway to the Blowholes with little in the way of points of interest in between. Visitors travelling on this road whether to the Blowholes or to Gnaraloo and Quobba Station have to return to the North West Highway as there is no through access north or south. It would therefore be appropriate to locate an information Board including parking bay just to the west of the North West Highway / Blowholes Road junction. This would enable potential visitors to be provided with appropriate information for them to decide whether to travel the 49 kilometres to the Blowholes or not. The Information Bay should be located within 200m of the junction on the south side of Blowholes Road.

There are many different designs for information boards from plain simple boards to gazebos incorporating the information. Given the location it would be appropriate to provide some shelter for the Information Board and ideally some picnic tables. It would be preferable to have a design where little or no maintenance is required and in a location such as this advertising should be kept to a minimum as that can have maintenance issues. The design for the information bay should reflect the signage design for the Blowholes as detailed in the Media on Mars report. Two examples of information board structures are given below

As a minimum the information board should give the following details:

- 2 maps of the area (this should be the focal point for the board)
  - Map one being a regional map detailing the blowholes and north to Gnaraloo Station
  - Map 2 being a map of the Blowholes giving location of toilets etc.
- Interpretive info on the Blowholes and the surrounding area
- Information on King Waves and the dangers of going to near the edge
- Contact details for the Ranger should they wish to camp
- Info on rules of camping at the Blowholes (toilets, parking noise etc)
- Info on waste disposal (what you take in you take out)
- Info on facilities at Quobba, Red Bluff, 3 Mile Camp & Gnaraloo

A blue I sign should be located 20m before the information bay.

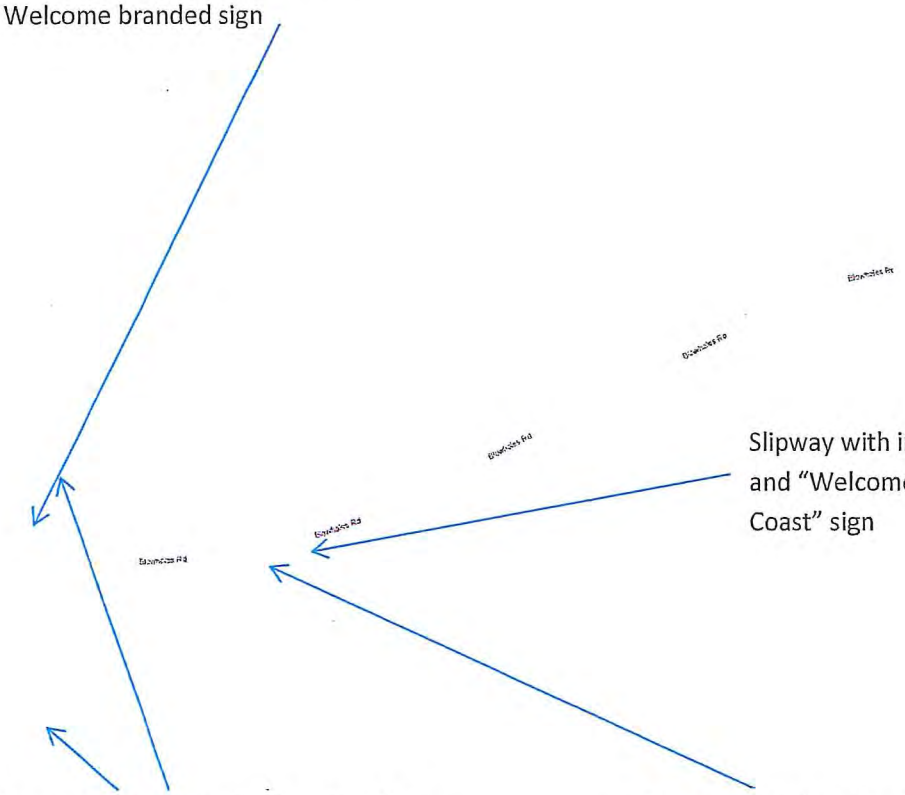
The next area that requires signage is the T junction between Blowholes Road and Gnaraloo Road. On the approach approximately (200m as the road curves slightly to the north) an information slipway with map of blowholes giving location of toilets etc, a brown tourist sign is required similar to the one at the North West Highway junction. This sign should of an appropriate size to compliment other signs in this area and should list the same destinations in similar order but obviously with new distances and with appropriate arrows to the left and right.

The "King Waves Kill sign which faces visitors when they reach the T junction is an icon of the Blowholes and should remain in place. It carries an important message which should be reinforced which is the main message of the sign, no further attachments to the sign will be entertained. A "Welcome to the Quobba Coast" sign to be within the slipway located between the Quobba/Gnaraloo Road intersection and the lighthouse road.

There is also a requirement for directional signage when approaching the Blowholes Road / Gnaraloo Road junction from the north and south. These signs will serve two purposes and will be a green sign on top and a brown sign underneath as per the example given below.

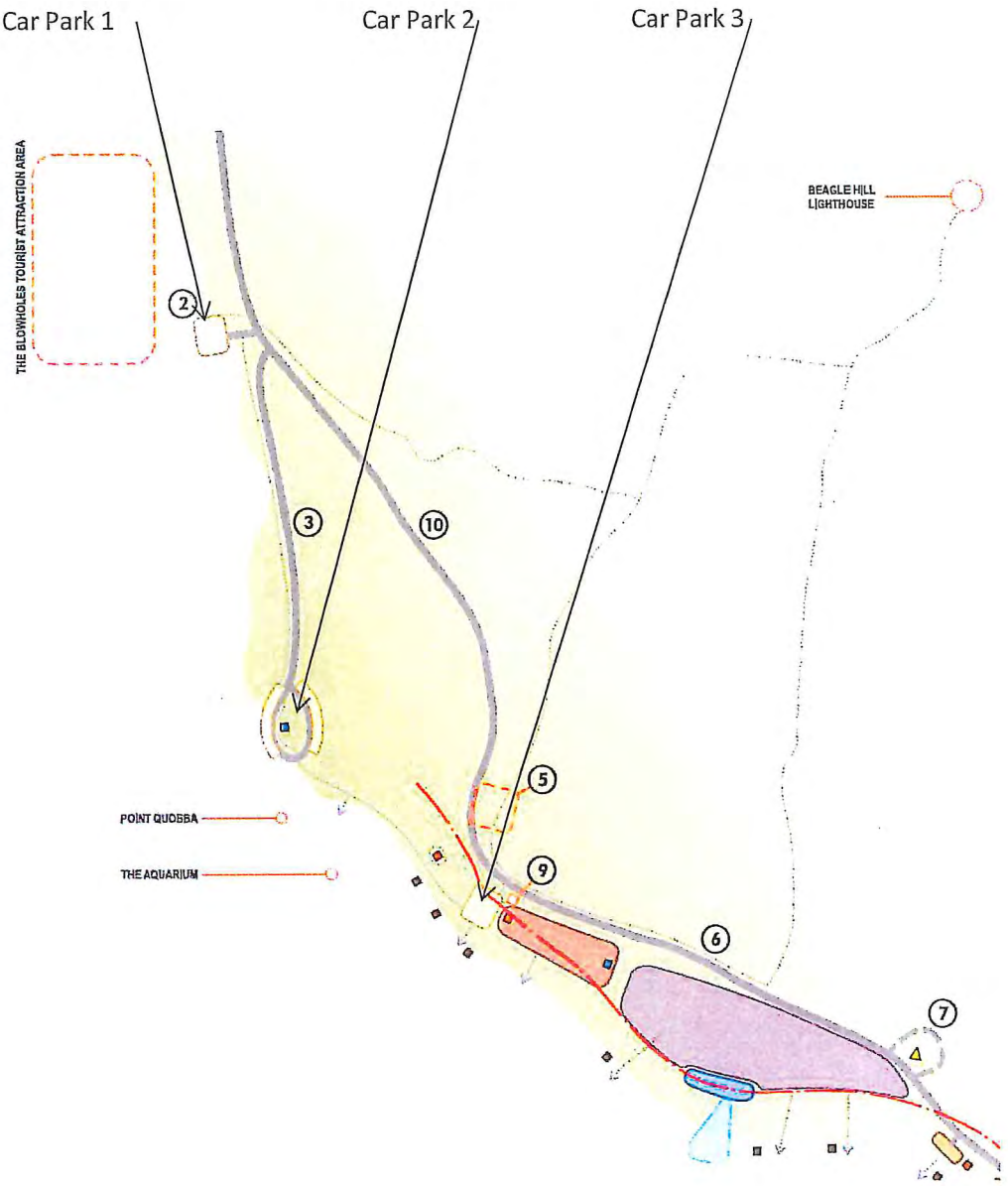
The top green sign in both directions should to direct on to Blowholes Road with the destination being Carnarvon. The bottom brown sign which will be located to the south of the junction needs to direct to Gnaraloo with an arrow straight on. The bottom brown sign which will be located to the north of the junction needs to direct to Blowholes with an arrow straight on.

The blowholes approaches sign locations



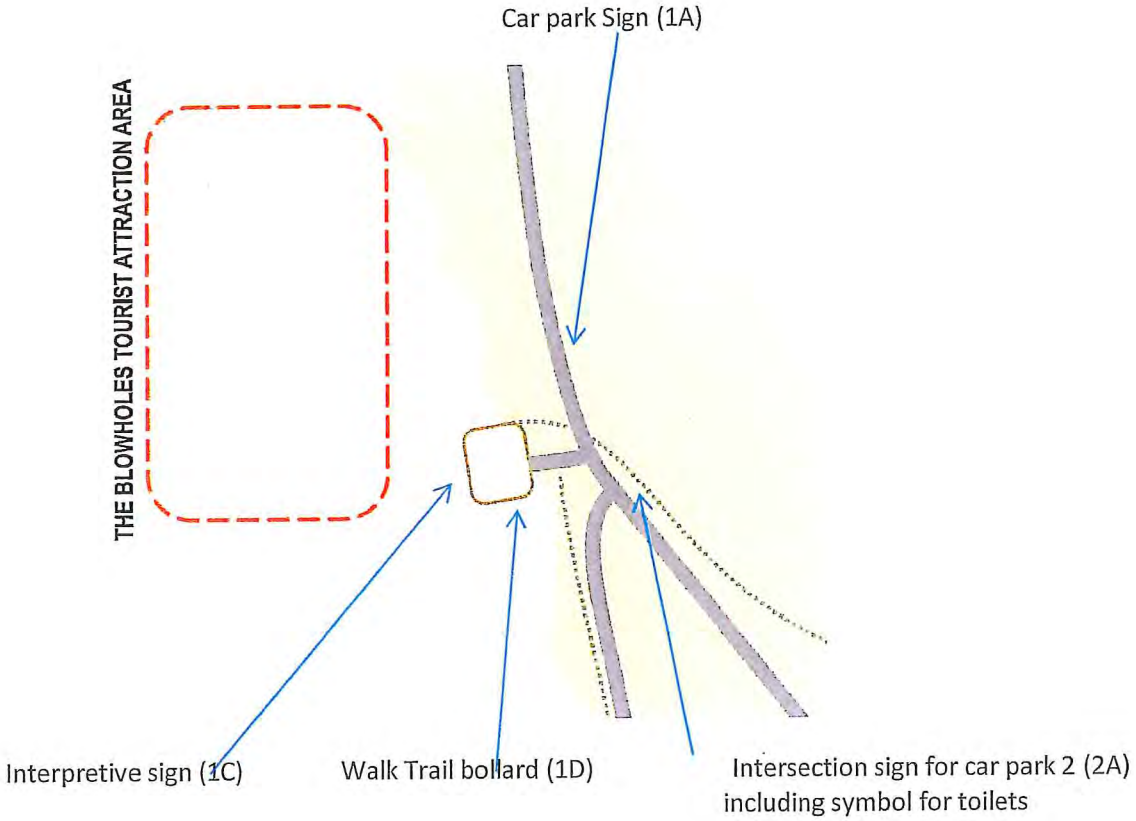
3.0 Blowholes car parks

The main locations for interpretive and directional signs are the three car parks.



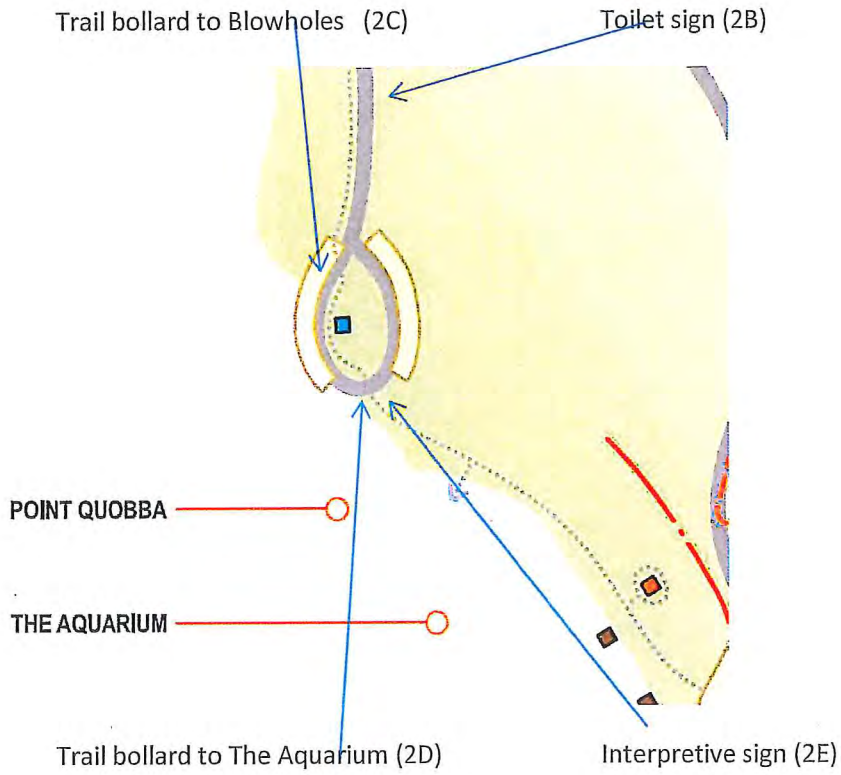
Car Park 1 – (Blowholes) at northern entrance adjacent to blowholes

1. Directional sign indicating Blowholes Car Park when approaching from the north located 20 metres from the intersection – blue with white lettering.
2. Interpretive sign giving information on the Blowholes and also warning of danger of king waves. The sign to be located on the western side of the car park with uninterrupted views to the Blowholes.
3. Bollard with walking symbol indicating walk trail to car Park 2, The Aquarium and Car Park 3
4. Directional sign to "Point Quobba Car Park" at intersection off main road and road leading to Car Park – include symbol for toilet – blue with white lettering.



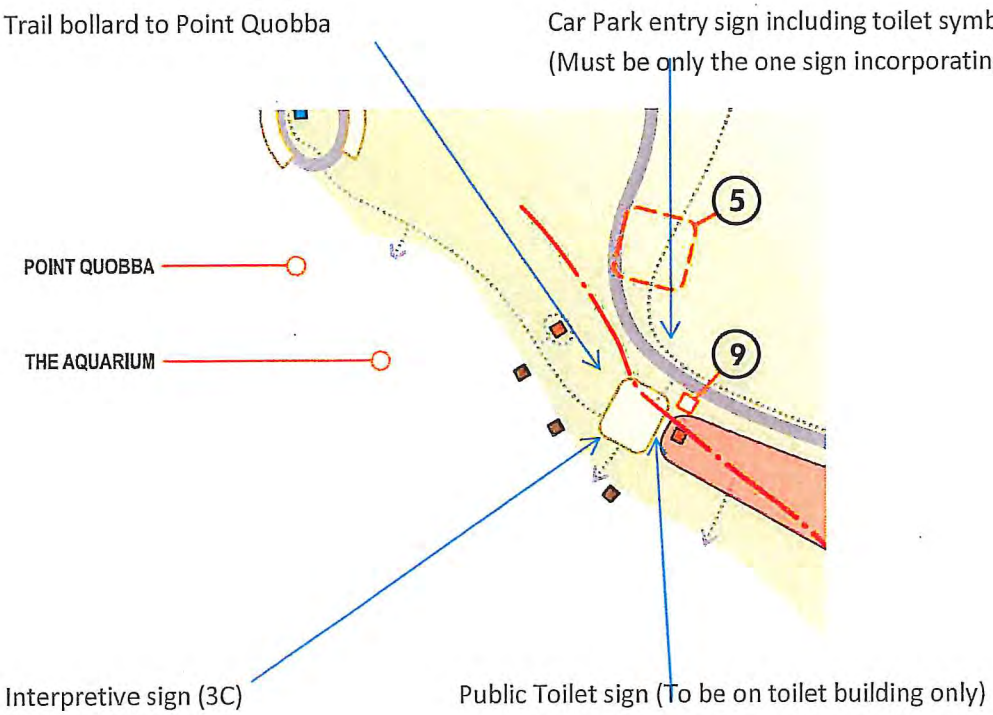
Car Park 2 – (Point Quobba North) at point north of The Aquarium accessed from intersection with main road near to car park 1. This car park is currently not available.

1. Sign indicating path to toilets using symbols – blue of white lettering.
2. Bollard indicating walk trail to The Blowholes
3. Bollard indicating walk trail to The Aquarium/ Car park 3 and in the opposite direction to Car Park 1
4. Interpretive sign for the Aquarium



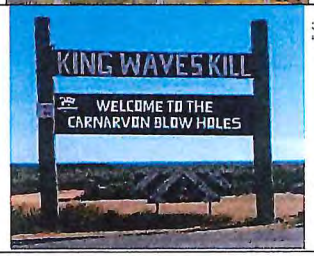
Car park 3 – (The Aquarium) at southern end of Aquarium

1. Entry sign at main road intersection
2. Trail bollard to Point Quobba and the Blowholes Car Park
3. Interpretive sign for the Aquarium.
4. Public toilet sign



4.0 New Signage Recommendations

New signage recommended Blowholes approaches

Ref	Location	Sign Type	Size (mm)	Example
BH1	On Blowholes Road, south side, approx. 180m east of junction with North West Highway.	Blue sign with white lettering and white i for information	990 x 900	
BH2	On Blowholes Road, south side, approx. 200m east of junction with North West Highway.	Information Bay and sign with shelter	To be determined	
BH3	On south side of Blowholes Road approx. 200m east of junction with Gnaraloo Road	Brown tourist directional sign as detailed in section 2 (to be incorporated within the slipway with map sign and other signs)	2100 x 1600	
BH4	Consensus is no further signs to be attached to the "King Waves Kill" sign			

Ref	Location	Sign Type	Size (mm)	Example
BH5	On west side of Gnaraloo Road 100m south of junction with Blowholes Road	Green directional and Brown directional	2000 x 750 (each sign)	
BH6	On east side of Gnaraloo Road 100m north of junction with Blowholes Road	Green directional and Brown directional	2000 x 750 (each sign)	

New signage recommended Car park one

Ref	Location	Sign type	Size (mm)	Example
1A	50m North of Car Park one on east side	Blue with white lettering "Blowholes Car park 50m"	1500 x 400	
1B	At Car Park 1 intersection on east side of road	Blue with white lettering "Blowholes Car Park" with arrow	1500 x 400	
1C	At the western edge of the car park overlooking the blowholes	Interpretive sign giving information on Blowholes and also warning of dangers of king waves.	To be determined	
1D	At southern edge of car park	Bollard with walk trail symbol directing to the Aquarium and car park 3.	To be determined	

New signage recommended for car park two

Ref	Location	Sign Type	Size (mm)	Example
2A	At intersection with main road	Blue with white lettering "Aquarium Car Park" incorporating public toilet symbols	1500 x 400	
2B	On road to car park two at intersection with track leading to toilets	Blue with white toilets symbol.	600 x 600	
2C	Northern end of car park	Bollard with walk trail symbol directing to the Blowholes	To be determined	
2D	Southern end of car park	Bollard with walk trail symbol directing to The Aquarium	To be determined	
2E	Southern end of car park	Interpretive sign	To be determined	

New signage recommended for car park three

Ref	Location	Sign Type	Size (mm)	Example
3A	Intersection with main Road at entry to car park	Blue with white lettering "Parking" + Public Toilet symbol	1500 x 400	
3B	Northern end of car park	Bollard with walk trail symbol directing to Point Quobba and Blowholes car park	To be determined	
3C	Eastern side of car park overlooking the Aquarium.	Interpretive sign.	To be determined	
3D	Southern end of car park	Blue sign with public toilet symbol	600 x 600	

4.0 Signage Content

Wording for interpretive signs to be developed through a consultation process with key stakeholders. Signage may take the form as reflected below.

Interpretive signage is to be used at the information board and car parks 1, 2 and 3. There are a number of areas that require interpretation including:

The Blowholes – Blowholes are formed as sea caves grow landwards and upwards into vertical shafts and expose themselves towards the surface which results in blasts of water being forced through the holes as the waves surge in. This natural phenomenon can be an awe inspiring sight as water jets erupt, sometimes up to a height of 20 metres. It wasn't until 1911 that Europeans discovered the Quobba Blowholes.

King Waves – The sign that was erected as you enter the Blowholes which warns that King Waves Kill was put there for very good reason. This area is susceptible to King Waves which occur when winds, tide and swell combine to form a large wave that reaches higher and further than the majority of waves, without warning. This can be extremely dangerous for people fishing and standing on rocks that are near the waterline. Always stand well back and avoid getting too close.

Whales – There are two main species of whales which can be seen off the Blowholes, the Southern Right Whale and the Humpback Whale. May signals the beginning of the annual whale migration as they make their way from the food rich southern ocean to breeding grounds in the warm northern waters and then they return south in November. The whales follow the continental shelf, hugging the coast as they travel through the warm waters of the Indian Ocean, playfully breaching and showing off their water skills.

Fire Management Plan

for inclusion in the

Blowholes Reserve Management Plan - 2014 to 2035

Prepared by South West Fire Services - August 2014

Figure . 1 Blowholes Location Map

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FIGURES

ABBREVIATIONS & DEFINITIONS

BAL	Bushfire Attack Level
Biomass	Annual vegetation growth - grass/shrubs
Building Protection Zone (BPZ)	A vegetated reduced buffer from the outside wall of a building for a distance of 25 metres
BFAC	Bush Fire Advisory Committee
Direct Attack	Implementing fire suppression direct on fire edge
DPaW	Department of Parks and Wildlife
MOU	Memorandum of Understanding
DFES	Department Fire and Emergency Services
Firebreak	Areas cleared of vegetation to mineral earth 3m break
Fire Management Strategy	Recommended Activities to Mitigate Fire Threat & Risk
Fire Regime	Frequency of Fire Incidents
FROS	Forward Rate of Spread
Fuel Reduced Buffer	Areas of modified vegetation to reduce fire intensity
Hazard Separation Zone (HSZ)	An area adjoining the Building Protection Zone where the fuel levels are maintained at less than 5 tonnes per hectare.
LEMC	Local Emergency Management Committee
Planning for Bush Fire Protection Guidelines, Edition 2 (2010)	An interpretation of the Australian Standard 3959 - Construction of Buildings in Bushfire-Prone Areas
Rate of Spread	Speed fire travels while consuming vegetation
UCL	Unallocated Crown Land

1 INTRODUCTION

The purpose of this document is to describe:

- The fire regime in the land that surrounds the Quobba Chalet and Accommodation lease area and Camp site facilities;
- Relationship between interested parties inside and outside of the lease areas (overlap)
- the threat to occupants and assets that a bushfire in the neighbouring Reserves presents, and;
- the Fire Management Plan that the Shire of Carnarvon proposes the Lessees and Campground occupants consider and adopt when occupying the recreation precinct.

This document has been created in response to the requirements of the *Draft Blowholes Reserves Management Plan 2014 – 2035,* which identified the need to develop a Fire Management Plan for the proposed recreation development objective in Table 2.11 of the draft plan, titled Fire Management.

The scope of this strategy document includes description and explanation of the Bush Fire Threat, Risk and Consequences Assessment of the adjacent Reserves, to the proposed lease areas at the Blowholes, and the fire management issues that need to be considered by the Shire of Carnarvon who will be responsible for fire management at the site.

The proposed bushfire management strategy contained in this Fire Management Plan will be presented to the Shire for consideration, and discussion with adjoining land holders and lessees before adopting the recommendations.

2. SITE SUMMARY

The location of the Blowholes Recreation Reserves is remote and within an area where fire history illustrates previous fire events have in the past impacted parts of the Quobba area of the Carnarvon Basin.

The Shire has prepared the *Blowholes Reserves Management Plan* to facilitate proper planning and management of the Blowholes Reserves for tourism and recreation purposes until the year 2035.

To ensure an improved level of protection from unplanned bushfire events, it is proposed that appropriate fire management strategies be developed and implemented as part of the Reserves Management Plan. For these fire management measures to be effective they must be carried out annually in a controlled manner. The fire threat reduction measures are required to be agreed to, and in effect from the commencement of demolition of the old shacks and the construction period of new chalets, and ongoing for the life of the development.

These strategies represents the Shire of Carnarvon preferred position in regard to biomass management, and takes into account the risk that an unplanned bushfire presents to users of the recreation development at the Blowholes. The strategy has been created based on field hazard assessment, public safety, environmental considerations and good industry practice with consideration to the requirements of both duty of care, and legal obligations.

2 SITE DETAILS

An aerial image of the proposed layout for the Blowholes Camping and Chalets showing the recreation development concept location in relation to existing facilities within the Reserves under management by the Shire of Carnarvon.

There are two chalet locations being considered Figure 2 A, and Figure 2 B, both covered by the recommendations contained within the Fire Management Plan.

The aerial image clearly illustrates the extensive network of swales with the heavier vegetation cover in gullies where the potential for increased fire fuel when good seasonal rainfall occurs. This will be especially evident where buffel grass is present with Spinifex and other grass species, and will be the fire hazard that will need to be monitored in years of good rainfall.

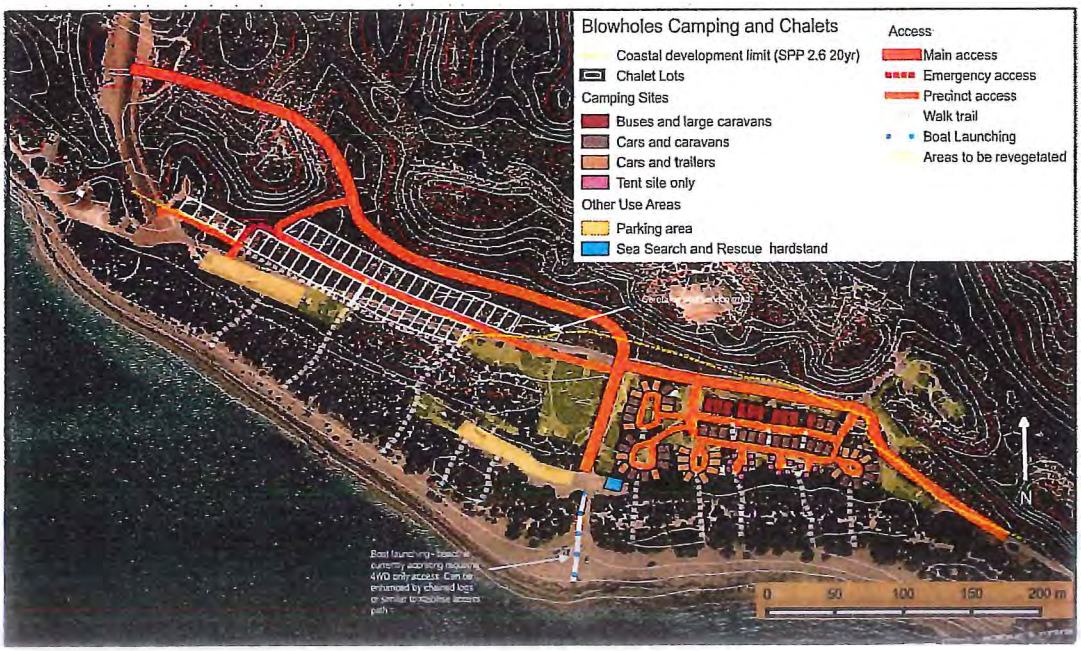


Figure. 2. A. Blowholes Camping and Chalets Layout Plan

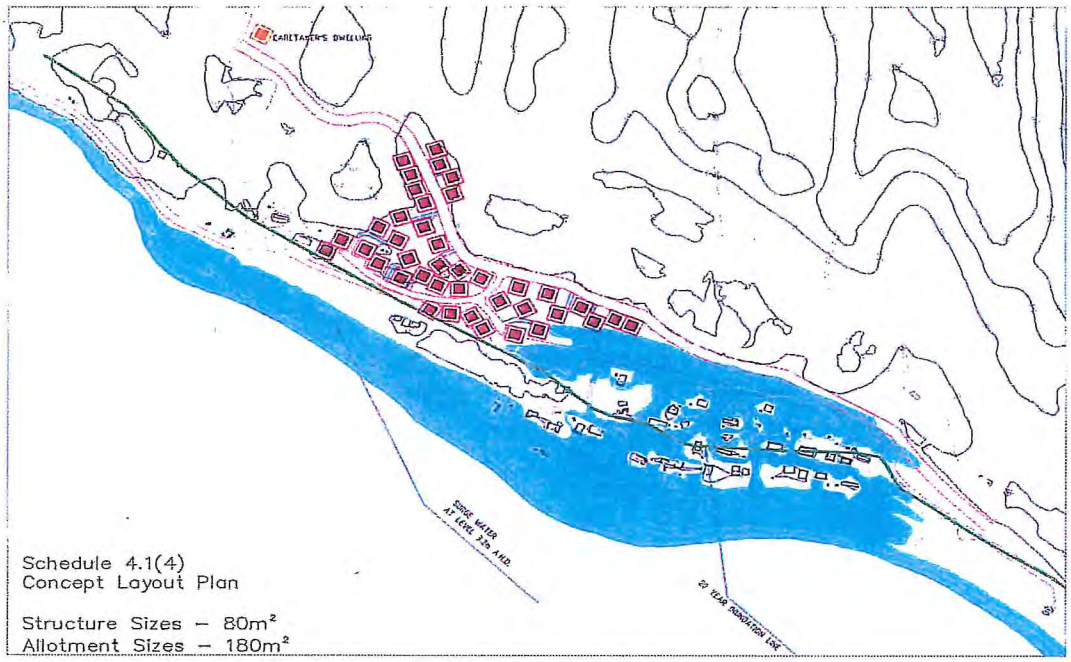


Figure 2.B. Blowholes Development Alternative Chalet Layout

4 .1 Fire Preparedness Current Situation

1. The current Blowholes recreation facility consists of several chalets and camp area with limited facilities with their general condition requiring improvement with the visitor numbers experienced.
2. It has multiple ownership of individual cottages in various condition and level of maintenance
3. It has no current caretaker, and it would appear ancillary assistance for maintenance requirements are engaged as required.
4. Individual cottages are occupied part time during the year with most occupancy occurring during the summer months. *This coincides with the normal fire season (with potential for wildfire events)* which is at its greatest from September to May.
5. If third parties sub-rent such rental operations impose a legally binding "Duty of Care" responsibility on the owners thus renting. It is essential that the owners are fully aware of their obligations and take necessary steps to make the site as safe as practically possible.
6. It is a safe assumption that not all guests would be familiar, experienced or skilled with bushfires, and will require detailed supervision and guidance during a fire emergency.
7. The natural vegetation within the reserves currently has limited contiguous fire fuel close to the cottages, but this can change with good rains, especially over consecutive seasons.
8. There are some shacks with introduced weeds almost against the external wall of the shack, (See Figure 3. Section 6.1)should a fire impact the area these buildings are not defendable, equally should an internal fire occur adjoining properties would also be lost.
9. There appears to have been accidental ignitions of a couple of older cottages, and it will be important for the Shire of Carnarvon to be very diligent to ensure that it is not used as a method of disposal of dwellings that need to be removed.
10. The real possibility of fires rapidly escalating from this type of activity, driven by frequent strong winds from all directions, especially late afternoon sea breezes is a real possibility.
11. Likely delays in response time by local emergency service personnel because of the remote location requires the Shire of Carnarvon to establish a Response Plan to ensure there is no possibility of liability, should an unplanned fire event destroy an asset.

Actions

There are a number of actions that may be considered and implemented by the Shire of Carnarvon to reduce and improve the threat to guest, visitors and property from future wildfire, with different priorities and desired outcomes.

Here I have outlined a timetable for the Bushfire Management Strategies outlined in Section 5.

4.2 Immediate Actions

1. Access for the new recreation development should include and support the establishment of the 25m BPZ, and consider using existing tracks for the HSZ and emergency access for fire management.
2. Close and rehabilitate those tracks not needed for management of the recreation lease area, but consider providing a strategic external break as a first fire response strategy.
3. Develop a Signage Plan especially for Muster/Refuge sites (like the beach), and other important management issues like traffic flow - water supplies - rehabilitated areas- emergency access etc.
4. Prepare/upgrade list of current property owners, Emergency Phone Numbers, neighbours and ensure all involved know protocols for a fire emergency.
5. Prepare visitor information sheets to be available to all visitors on arrival, (fire season only), include total fire ban on the use of gas fires outside approved fireplaces.
6. Prepare up to date detailed plan of site, and access changes and distribute to neighbours and brigades who would respond to a fire event.
7. Ensure current cottages and new dwellings have hard wired smoke alarms.

4.3 Short Term Actions

1. Consider signpost suitable Emergency Refuge area(s) during a wildfire event. It should be considered a place of last refuge for a number of people only if no other alternative exists e.g. Exit Road blocked by fire etc. The beach is ideal where there is width between vegetation and surf.
2. Undertake weed management where plant communities provide a fire threat close to camping areas, and consider including removal of buffel grass within the Hazard Separation Zone.
3. Involve Local Brigades and adjacent landowner in planning access and firebreak layout, especially where there are issues of concern.
4. Ensure a flora search is undertaken for the proposed new chalet and access network before work commences.
5. Use the relocation of recreation areas as an opportunity to examine the existing firebreak network and determine if strategic firebreaks are needed with the expected increase in visitor numbers, and the potential for an increase in unplanned fire events.

4.4 Long Term Actions

1. Consider environmentally acceptable solutions to reduce the growth for years when biomass volumes within the HSZ exceed 5T/ha. (*The reason 25m BPZ was recommended was to reduce ember attack from airborne Buffel grass when burnt under High fire intensities)*
2. Consider including within the lease agreement a condition for; each owner to provide lockable 19mm tap outlets on domestic tank water supplies for access during fire emergencies.
3. Investigate the employment of a Seasonal Caretaker to provide a presence throughout the busy period of the tourist season, who would provide education and information to visitors especially on fire matters.
4. Provide the caretaker with a fire response capability as one of his roles.

5. Pursue funding from DFES to install an emergency water supply for fire response once a caretaker has been engaged.
6. Seek Federal Grant funds to eliminate some of the weed species especially those that pose a fire threat and make camping and campgrounds an unpleasant experience.
7. Establish a monitoring strategy to determine what if any the impact of increased visitation has on the fragile coastal zone, especially any increase in weed invasion and increases in erosion and unplanned fire incidents.

5. KEY BUSHFIRE MANAGEMENT STRATEGIES

Task	Responsible for Task Execution	Timetable	Shire of Carnarvon Desired Outcome	Phase
Review and Update Access Roads and Firebreak Requirements Design campground and chalet road network to provide a 25m Building Protection Zone free of combustible vegetation, and emergency access 100 metres out from the chalet lease areas to act as a Hazard Separation Zone boundary	Shire of Carnarvon	As part of the development of the new chalet and campground access to be maintained annually	The provision of access to the site can also be used as part of the strategic protection of assets and reduce the need to have additional remnant vegetation removed to create a 25m clear area from dwelling wall to vegetation. The biomass management can be scheduled in different cells annually to provide diversity.	As part of the Development establishment and be maintained annually
The Shire to Establish an MOU with Neighbours The Shire to prepare a Memorandum of Understanding with the neighbouring property to establish joint protocols for: • Prevention • Preparedness • Response • Recovery Plan to be reviewed regularly and updated as required. *25 metre BPZ Recommended to manage airborne embers from mature Buffel Grass when burning under High fire intensities	Shire Ranger Services	Immediately and annually for the life of the development	• Property owner to be encouraged to use priority grazing adjoining the Reserves to reduce annual growth especially those years of average or above rainfall. • Have as part of the chalet development a static below ground water supply(5000lt) accessible by the adjoining property owner for fire emergencies. • As a quick response to any unplanned fire event within the reserves, establish a recoup protocol with the adjoining land holder for fire response on Shire Tenure. • Consider offering the establishment/maintenance of annual firebreaks - rubbish removal within the reserves to the adjoining property owner to encourage familiarisation and a presence when the campground is busy. • Consider establishing strategic firebreaks with the adjoining landowner and restrict the movement of unwanted recreational	Ongoing

			vehicle access within the Shire Reserves.	
Develop an integrated Fire Management Plan Plan to be developed that considers the protection requirements and response by the Shire of Carnarvon (in Reserves) and Property Owner/Manager (within property lease areas)	Shire of Carnarvon	To be established when assets are present within the Recreation and Lease areas	Plan to consider the following; • Biomass management plans • Communication protocols • Access tracks and rehabilitated areas • Water supplies • Standardised signage • Fire response integration • Describe communication and interface protocol (including industry and agency working groups) • Adequacy review program • Use of shared resources	Construction Phase onward
Shire of Carnarvon to consider a Caretaker for management within the lease areas The Shire to consider appointing a part time Caretaker if it is not possible to establish an MOU with the adjoining property owner Once well established the new campground and chalet leases will need a Caretaker if only during the busy tourist period	Shire of Carnarvon	An annual part time appointment during peak fire and tourist period	For the fire management supervision of demolition and construction phase of the development, and seasonally thereafter.	Construction phase and as considered appropriate considering seasonal conditions
Shire to Establish Fire Response capability Shire to develop a response capability to minimise the risk of fire impacting on visitors and campers within the Reserves. Part of Shire Duty of Care obligations	Shire of Carnarvon	Construction and operational phases	Establish emergency response protocols (via ERP) with trained and equipped response personnel to attend to unplanned fire events giving priority to life, property and the environment. Builders/Contractors to have fire response capability onsite while building during fire weather conditions. Minimum capacity 250Lt.	Construction Phase and ongoing for the duration of leases

Develop joint agency Emergency Response Plan (for Bushfire) A specific Emergency Response Plan regarding Bushfire near Blowholes to be developed in conjunction with BFB, Shire, DFES and Property Owner.	BFB, Shire, DFES & Property Owner	Construction and operational phases	ERP (Bushfire) to be part of Operations ERP Plans to be distributed to the relevant response agencies; • Minimum standards and capability • Communication protocols • Include activity restrictions in severe weather periods including construction • Response Plans (to be communicated) • Agreed suppression strategies (by BFB) • Refuge and Muster points • Emergency Water supplies • Muster List process • Emergency Egress and Access • Integration with fire suppression systems (if available) • Incident Management structures • Traffic Management Plans • Agency Response & Recovery plans	Construction phase and ongoing
Shire Firebreak Requirements Develop program to comply with Shire of Carnarvon Firebreak requirements as directed by the Shire of Carnarvon Ranger Services	Shire - CFCO	Commencement of the Restricted Burning Period then annually for the life of the Development	Compliance with Shire requirements. Actively plan and manage vegetation to achieve requirements Firebreaks and emergency access tracks are free of vegetation Access and Firebreaks to be clearly signposted where access is restricted to emergency vehicles, or traffic flows one way	An annual requirement

Building Structures to Reflect AS 3959 Chalet construction to comply with recommendations contained in AS 3959 including metal cladding on walls - iron roof with ridge and valleys ember sealed - closed eaves No external timber decking - screened air-cons	Shire Building regulations	As part of Building Approval process or Lease Agreements	As these dwellings will not have occupants for much of the year construction materials and methods should make every endeavour to exclude possible ember attack when unattended	Construction compliance

6. SUPPORTING INFORMATION

6.1 Bushfire Hazard Assessment

Due to the variation in vegetation structure associated with seasonal rainfall, surface fuel loadings (annual and perennial grasses), the area within the Reserves adjoining the development is classified as a **MODERATE** Fire Threat Level. The remote location, and the extensive perimeter areas of coastal shrubland are also considered Bushfire Prone Areas in accordance with the Building Code of Australia Standard 3959 (2009) and WAPC/DFES Planning for Bushfire Protection Guidelines – Edition 2 2010.

The vegetated area northeast of the proposed campground and chalet area has vegetation types with structural form **Group C, Low Shrubland** on the stable dune system, and **Group G Open Tussock Grasses** on disturbed coastal areas (from Planning for Bush Fire Protection 2010). Group C vegetation comprising *Nitrari billardierci* and clumps of *Atriplex isatidea* with well established *Spinifex longifolius, Buffel grass* with the addition of annual and perennial grasses as the understory species.

The total area under this classification is approximately 80% with the remaining 20% predominantly tracks and open ground areas.

From the field survey a bushfire hazard assessment has been undertaken using aerial photos and measured vegetation data of the area surveyed and assessed to represent a 7 year fuel structure (accurate fire history unavailable), and the campground and chalet site has been evaluated as **MODERATE** (flame zone) with a **BAL of 19, from Table 2.4.3 - C - Low Shrubland, (the greater fuel loading of the area assessed)** with the current following requirements;

- The vegetation surrounding the external accommodation buildings will be cleared (a minimum of 25m from the buildings external walls adjacent to the vegetation as a Building Protection Zone, BPZ and emergency vehicle access). **This is critical for the caretakers chalet and four lots NE of the main access road within proposal Figure 2 B.**
- However the open shrubland outside the vegetation free BPZ for a further 75 metres distance from the location will require the biomass to be assessed to meet the requirements of the Hazard Assessment where total fuel loading is to be < 5T/ha.
- The Shire of Carnarvon annual firebreak orders, ensure that there has been management of the biomass to create a Hazard Separation Zone (HSZ) out to 75 metres from the BPZ..(*This requirement will only apply when average or above rainfall creates a substantial increase in biomass quantity (>5T/ha).*
- Screening plants used in landscaping between and within the village are either non flammable and well spaced or maintained to a compact form and not within 5m of any structure. (Tamarisk are low flammable trees)
- A prescribed biomass plan is developed with the objective to maintain all vegetated areas within 100 metres of the village at or below 5 tonnes per hectare at all times.
- Building protection Zones of 25m to meet DFES and Shire standards around all dwellings and construction work sites.
- Physical storage of construction materials and building mobile plant must meet the conditions for storage of Dangerous Goods (accelerants), and safe operation of mobile plant under the Bush Fires Act 1954, to ensure it complies with the Shire of Carnarvon Annual Firebreak Orders.

It is also a requirement of the contractor/builders to ensure that all construction adjacent to the Low Open Shrub vegetation meets the applicable guidelines and requirements for a **BAL of 19** set out by the Shire of Carnarvon, WAPC/DFES Planning for Bushfire Protection Guidelines – Edition 2, 2010. and the Australian Standard 3959 (Construction of buildings in bushfire-prone areas). ***Hence the recommendation for builders/contractors to have a fire response capability while demolishing or constructing new chalets.***

Group G Open Tussock Grasses

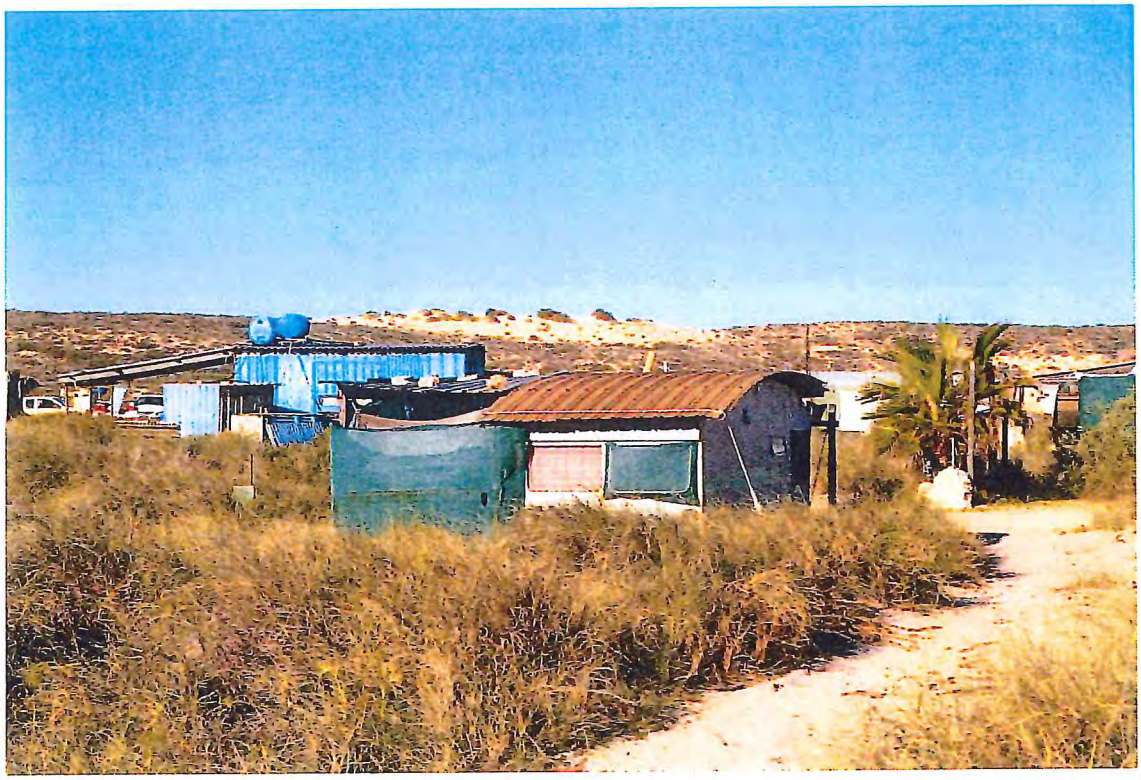


Figure 3: Vegetation Management- these shacks are not defendable in a fire situation

In the remaining vegetated areas of the lease, given the very close spacing of the accommodation buildings and limited areas of cleared land within the development it is important that landscaping of the site does not compromise the Building Protection Zones and Hazard Separation Zones.

It is essential that where physical separation currently exists between the chalet development site and perimeter vegetation that this separation be maintained. This separation will allow for safer biomass management to be undertaken in future to meet the shire annual firebreak notice requirements, and improved fire suppression options.

6.2 Risk to Shire of Carnarvon

Bushfires on the Blowholes Reserves have the potential to present a significant risk to the Recreation Precinct and day visit sites. Some of the risks associated with a bushfire include ember attack, smoke (air quality), ash and radiant heat impacting people, plant and assets.

Plans to minimise the effect of a bushfire have been considered in the design and planning of the facilities within the lease areas, however, without biomass management these protection measures would be tested. **(The shacks in Figure 3, are not defendable and where the shire endorses the establishment of new Chalets these must meet a minimum BPZ to ensure the Duty of Care requirements are complied with).**
It will be very important for the shire to ensure that the caretakers chalet and each of the four lots east of the access road always meet the minimum recommendations of this FMP.

Biomass management both within and surrounding the Recreation Precinct is the most effective method to reduce the risks associated with an unplanned bushfire.

Buildings that comply with AS 3959, especially the construction materials used, and construction methods that seal dwellings from ember attack are also very important to minimise fire impact.

Property owners will be responsible for the biomass management within their lease boundary to reduce the risk to people, plant and assets to as low as reasonably practicable in a remote location, and in accordance with legislative requirements.

The Shire of Carnarvon will be responsible for the maintenance of access and biomass quantities within the 75 metre Hazard Separation Zone, and adjoining the lease areas within the 25 metre Building Protection Zone outside lease boundaries.

There will also be a responsibility on the Shire to ensure leases construction materials and building proposals don't endanger other users of the camping and chalet area.

6.3 Vegetation Types and Classifications

Native Vegetation

The vegetation of the Reserves is generally consistent and representative with that found in the Carnarvon Basin, which is dominated by arid (Eremaean) perennial shrub association. The native vegetation is highly resilient and is capable of survival through adverse seasonal conditions. The area's semi-arid climate and associated landforms directly impact the range of native vegetation at the Blowholes. Most vegetation is low lying, a result of the wind swept nature of the coast, the low rainfall and the soil types. Despite low rainfall, warm to high temperatures and high evaporative rates, most dunes are generally well vegetated.

Vegetation consists of a parallel suite of plant communities, with sand-fixing pioneer plants and perennial grasses on the foredunes, and open shrub land on the more sheltered and stable dunes. Undulations amongst the dunes at the Blowholes create different vegetation habitats and communities compared to dunefaces and ridges. Little shelter or shade is found on dune faces and ridges.

Riches and Chalmers (1982) set out that the foredunes are dominated by the bushy green cover of *Nitrari billardiersi* and the taller growing clumps of *Atriplex isatidea* (saltbush). *Spinifex longifolius* is also well established. The valleys and ridges of the old stabilised dune system are generally well vegetated by a range of the low growing shrubs and ground cover. This includes *Thiptomene crossifolia, Rhogodia preissii, Acanthoreapus preissii, Enchylaena tomentose, Olearia eaillaris, Threkeidia diffuse* and *Acacia pydfolia.*

The old stabilised dune system Vegetation Classification from the Bushfire Hazard Risk Assessment using the vegetation type from AS 3959, is **Group C Low Shrubland**, while the coastal foredune disturbed areas where assessed as **Group G Open Tussock Grassland.**

Group C Low Shrubland

Figure 4 Coastal Vegetation Cover in Stable Undulating Dunes

Introduced Species and Weeds

Recreational and tourism impacts at the Blowholes, along with pastoral development, have introduced changes upon the native vegetation including the introduction of non-native vegetation, weeds and the de-pasturing of the land by livestock. For instance:

- introduced buffel grass(*Cenchrus ciliaris)** grows vigorously in the valleys of the old stabilised dune system;
- planted species include Tamarisks (low flammable species which assist to provide shade and protection from the wind); and
- there are various environmental weeds, especially in disturbed areas.

*** Listed as one of the most significant weeds in arid non-pastoral areas.** (State of the Environment Report WA).

Vegetation information courtesy of the draft Blowholes Reserves Management Plan.

6.4 Fire Management Issues

6.4.1 Development Duration

The demolition and construction phases will create additional fire risks, and this will need to be documented and managed as part of the building approval process, and controlled by the Shire of Carnarvon.

Unforeseen changes need to be considered and accommodated during the transition from the old dwelling site to establishing the new campground and chalet area, especially the damage to vegetation and exposed bare areas where demolished buildings previously stood. There will be potential for increased erosion, and damaged vegetation that can contribute to an increased fire threat.

The combination of climatic change and its impact on environmental issues including future clean air legislation will require the establishment of a review process that can evaluate what impacts if any, and what changes this will have in future on the recommendations within this Fire Management Plan.

6.4.2 Topography

Landforms surrounding the campground and chalet lease area footprint comprise widespread undulating coastal swales with insufficient long gradients to have any major influence on fire behaviour, as most wildfire spread within the area are determined by wind direction and strength rather than topography undulations.

Important surfaces of the Blowholes Reserves in the vicinity of the Campground and Chalet footprint were outlined by *Australia State of the Environment (2011)* and comprise:

- coastal Rudosol minimally developed soils
- Holocene coastal beach sand and sand dunes, with some lime-indurated beach-rock;

6.4.3 Biodiversity Risk Profile

The vegetation within the lease areas and the adjoining managed buffer will require annual biomass management to provide the necessary protection needed to ensure the safety of occupants and infrastructure from future unplanned fire events. It is particularly important to keep the strategic buffer area annual growth at less than 5 tonnes per hectare, to ensure any unplanned fire intensity is low enough to ensure embers are not carried airborne over the chalets and campground infrastructure, and suppression action will be successful.

The annual requirement for fire fuel management within these managed buffers may well have adverse impacts on the biodiversity that currently exists within the Reserve buffer area over the life of the project. It is for that reason that the graduated staged mosaic fuel management is recommended with variable timetables radiating out from the chalet lease areas.

A monitoring program needs to be in place to capture the current situation adjoining the new lease areas, and timely reassessments made over the life of the project that would determine any change, and provide timely evidence of any need for remedial action.

6.4.4 Vegetation Diversity in Relation to Fire Management

The vegetation is typically semi arid Gascoyne coast, with sparse open shrubland, with understory grass species on the more sheltered and stable dunes according to rainfall and geology; and open tussock grasses and sand-fixing pioneer plants on the foredunes.

The vegetation in the area surrounding the proposed new campground and chalet lease area footprint was described in the State of the Environment report WA, as fair to poor:

- where areas of sheltered stable dunes with Spinifex and Buffel Grass present have potential to carry a wildfire, especially with the wind prone exposed nature of the area. Seasons of good rainfall pose the greatest fire threat;

- the area of foredunes and ridges are more likely to carry a wildfire within the vegetation structure of introduced weeds where an annual cover will establish after rain, later curing to provide fire fuel. The hazard level will be totally reliant on rainfall quantity and frequency.

6.4.5 Biological Factors of Environmental Significance

Vegetation in the area shows evidence of high frequency recreation activity by 4x4 vehicles and off-road bikes.

The proposed recreation area biomass reduction strategies to be deployment within the buffer vegetation and habitat should be monitored in order to establish if they have any adverse impact over time, to ensure the strategies recommended for the project area protection from bushfire does not have adverse impacts.

6.4.6 Flora of Conservation Significance

There were no Rare or Declared flora species found to be present within the proposed recreation development area from a search of the DPaW, Nature Base web site.

6.4.7 Cultural Sensitive Areas

There are areas of cultural sensitivity associated with parts of the coastal foreshore along the western side of the reserve west of the proposed access road, and their occurrence within this management zone may require management consultation to determine options within these areas. There will need to be approvals sought from the custodians if significant sites are within the area, to clarify what will be acceptable management within these locations. If in fact there are any present, and if approval is not granted then alternative strategies clear of the cultural sensitive areas(*if any)* will need to be negotiated and developed.

6.5 Proposed Fire Management

6.5.1 Biomass Management

Within the 100m buffer fuel modified zone, biomass management may be required to maintain the fire fuel levels at less than 5 tonnes per hectare, low enough that it will not sustain an intense fire under all but catastrophic weather conditions. Implementing this strategy will greatly reduce the possibility of ember attack over the lease area chalets in the event of an unplanned wildfire.

Firebreak annual maintenance requirements within the Reserve and biomass modified zones will ensure fire fuel quantities are maintained at less than 5 tonnes per hectare through biomass management. Access within the reserves for Emergency Response vehicles is a critical component of the protection strategies for the campground and chalet occupants.

In the unlikely event of multiple above average rainfall seasons, and a dramatic increase in biomass quantities across the reserves, consider allowing managed grazing of the area before the annual growth matures and becomes unpalatable to livestock to reduce the fuel quantity.
The areas close to the campground can be slashed to bring the annual grass growth to ground and reduce the flammability and intensity of any unplanned fire event.

6.5.2 Strategic Firebreaks

Adequate pre fire season planning for wildfire management is essential and must include annual strategic firebreak preparation, access tracks for fuel reduction and possible fire suppression, and must include an annual audit of fuel levels within the strategic protection buffer zones.

There will need to be consideration given to the establishment of perimeter strategic firebreaks that can be established by collaboration with the adjoining property owner. This emergency access will need to be maintained throughout the fire season (as determined by the Shire of Carnarvon Annual Firebreak Notice).

The access will be an integral part of the protection strategies that supports the 100 metre fuel modified buffer surrounding the Recreation Lease Area, and will need to link strategically and be well signposted as emergency access.

6.5.3 Strategic Access - Firebreaks within the Reserve and Adjoining Land

The proposed recreation development has excellent hard surfaced strategic access from Carnarvon via North West Coastal Highway and Blowholes Road providing fast access for emergency response vehicles.

There are a number of access tracks which can provide Strategic Access, or be emergency firebreaks within the Reserve and adjoining land linking to the existing road networks.

Some of these need to be considered as strategic and maintained for emergency access in the event of bushfire or recreation emergency, for long term management of the recreation area.

Others that are deemed to be unnecessary should be closed and rehabilitated.

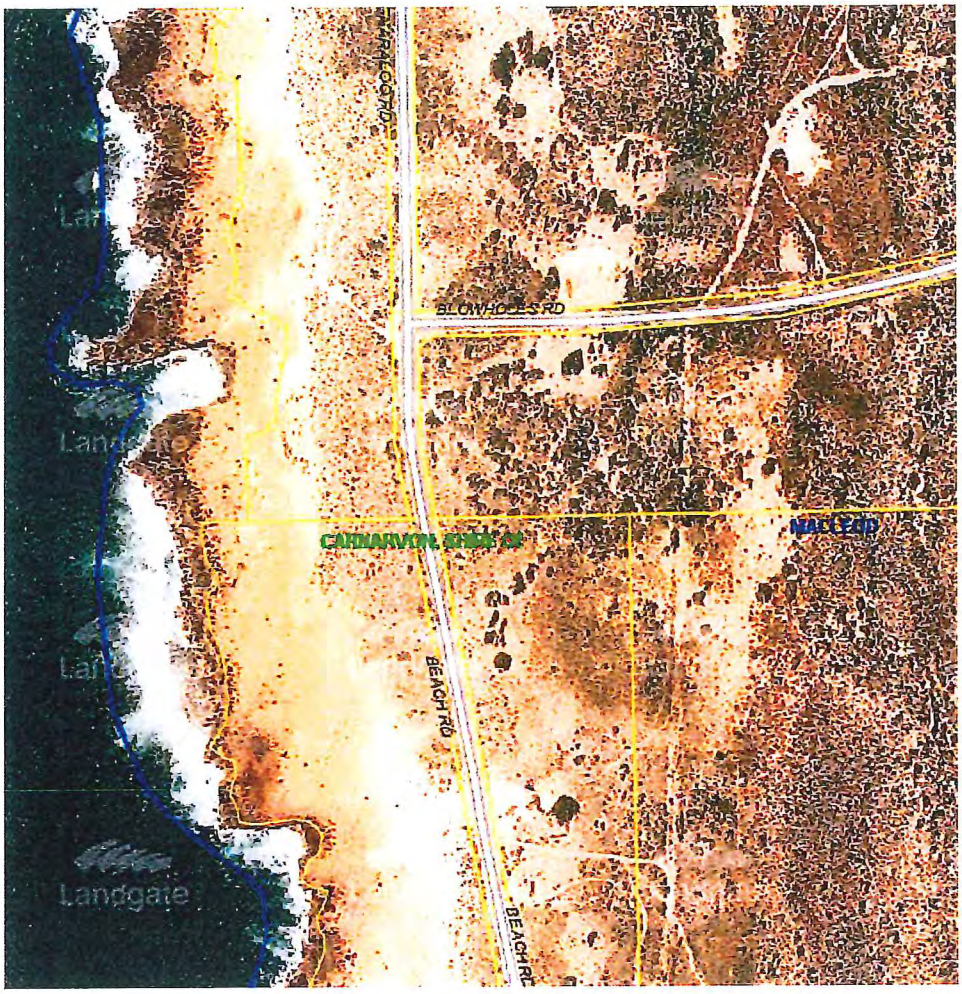


Figure. 5 Access to the Blowholes and Proposed Recreation Development is Excellent

7.1 Fire Protection Summary

The proposed lease area within the Blowholes Reserves is subject to very severe seasonal conditions that influence both the native vegetation, and introduced weeds. The current condition of the vegetation cover is highly stressed because of a prolonged period without rainfall, resulting in a very short growing period and poor annual growth. .

The Bush Fire Threat, Risk and Consequences Assessment of the lease area indicated a lower than usual annual rainfall had been experienced for possibly more than one year, resulting in less biomass within the annual and perennial grasses than may be present in a year or two of good rainfall.

However there are areas of introduced weeds (*Buffel grass)* adjacent to the existing shacks that make them un-defendable in their present condition should a fire impact on the site.

Because Spinifex and especially Buffel grass were present within the stable dune areas of better soil and disturbed areas, the assessment calculations identified the Threat Rating as Moderate, and the Bushfire Attack Level (BAL) 19.

The likelihood of a fire occurring was given a Likelihood value of 3, Possible (Appendix 6). The reasoning for the value given was the potential for increased unplanned fires during both the dismantling operation and the construction phase of the new chalets.

South West Fire Service considers the risk of a serious fire very low, especially while the current vegetation cover is seriously stressed as a result of low annual rainfall, and therefore providing the key Strategies recommended in this Fire Management Plan are endorsed, visitors will be as well protected as possible in a remote location .

The essential elements that will provide very good protection, and ensure the Shire of Carnarvon meets both their Duty of Care obligations and Legal Liability protection are:

- Establish a process for rapid response either via an MOU, or a Seasonal Caretaker.
- Ensure the recommended BPZ of 25 metres, supported by biomass modification out for a further 75 metres to maintain fire fuel levels < 5T/ha is established and maintained. See Figure 6. (important for the Duty of Care obligations on the shire who are recommending the site to existing and future chalet lessees)
- Provide an emergency water supply either by a dedicated supply, or via a condition that a lease building approval requires any residential water tanks installed to have a locked 19mm takeoff to enable access in a fire emergency.
- Buildings to be constructed with non-combustible materials with eaves closed, ridge and valleys to be ember sealed, and no timber decks.
- All external cooking fires in both the campground and at chalets to be gas fired only.
- Ensure the firebreaks and fuel reduced areas are maintained annually
- Ensure a fire response capability is provided by builders and contractors while working onsite during periods of fire weather.
- Provide Guidelines for recreation site visitors outlining their obligations regarding four wheel off-road driving, campfires etc as visitors and occupants of the Reserves.

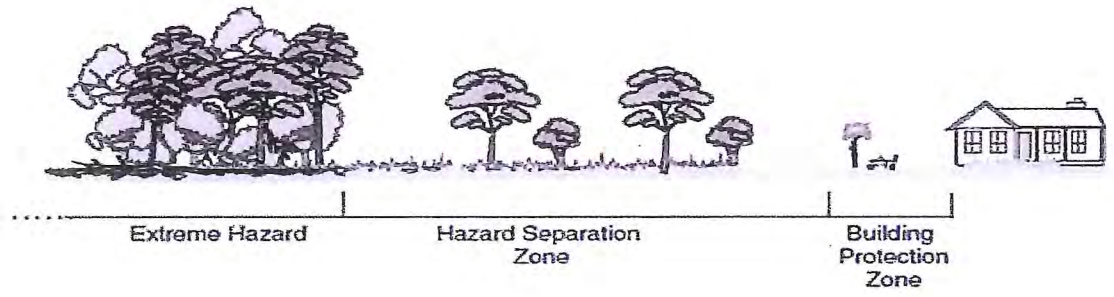


Figure 6. Example only of Building Protection Zone and Hazard Separation Zone

7.2 Reference Documents & appendices

- Department of Planning Western Australia (2010). Planning for Bush Fire Protection Guidelines, edition 2. Government of Western Australia, Perth.
- Department of State Development (DSD) 2010. Browse Liquefied Natural Gas Precinct – Strategic Assessment Report. Government of Western Australia, Perth.
- AS 3959 (2009) – Construction of Buildings in bushfire-prone areas
- Bushfire Act 1954, Western Australia
- Bushfire Regulations as amended, Western Australia
- Shire of Carnarvon - http://www.carnarvon.wa.gov.au

Appendix 1 Bushfire Hazard Risk Hierarchy

High

- Hospitals, schools and aged care homes.
- Public buildings and residential subdivisions where escape routes are limited and access for fire fighting equipment poor.
- Shopping complexes or large Industrial sites.
  Essential utilities (electrical power stations or transformer sites).
- Vehicle bridges/culverts that are the responsibility of Main Roads.

Medium

- Residential subdivisions and public and private buildings with multiple access and escape routes.
- Environmentally Sensitive Areas (ESAs).

Low

- Buildings that have intervening local roads, cleared parkland or < 2 t/ha fuel.
- Little or no vegetation between the road and adjacent buildings or utilities.

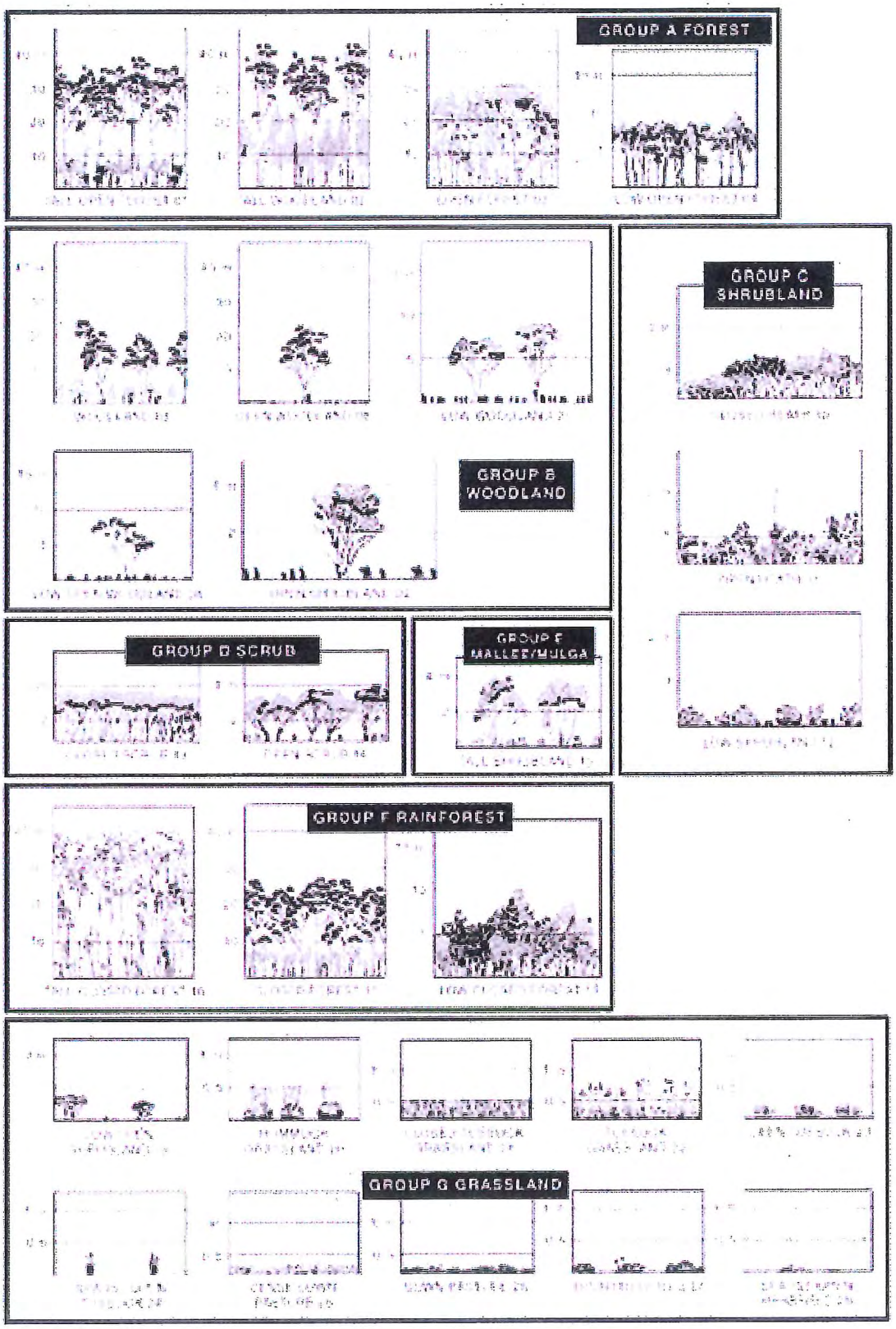
Appendix 2

SOUTHWEST FIRE SERVICES www.bushfireservices.com.au

Bush Fire Threat, Risk and Consequences Assessment Form	
1.Reserve name and location, detail	
2.Adjacent Property or values at possible risk	
3.Fire history/ears since last burnt, inc fire source/s	
4. Vegetation class and type	
5. Distance to structure (m)	
6.Slope degrees	
7. BAL rating	
8. Threat rating	
9. Like-lihood of fire	

10. Frequency of fire - years	
11. Consequences to assets	
12. Risk Ranking	
13. Assess and record fuel age, total qty, in various vegetation types and locations.	
14. Comments, recommendations, actions. Attach aerial and ground images to separate sheet.	
Compiled by K.J.White SWFS	

APPENDIX 3 Vegetation Type and Class



NOTE: Refer to Figures 2.4A to 2.4G for greater vegetation detail.

FIGURE 2.3 CLASSIFICATION OF VEGETATION—SUMMARY

Appendix 4

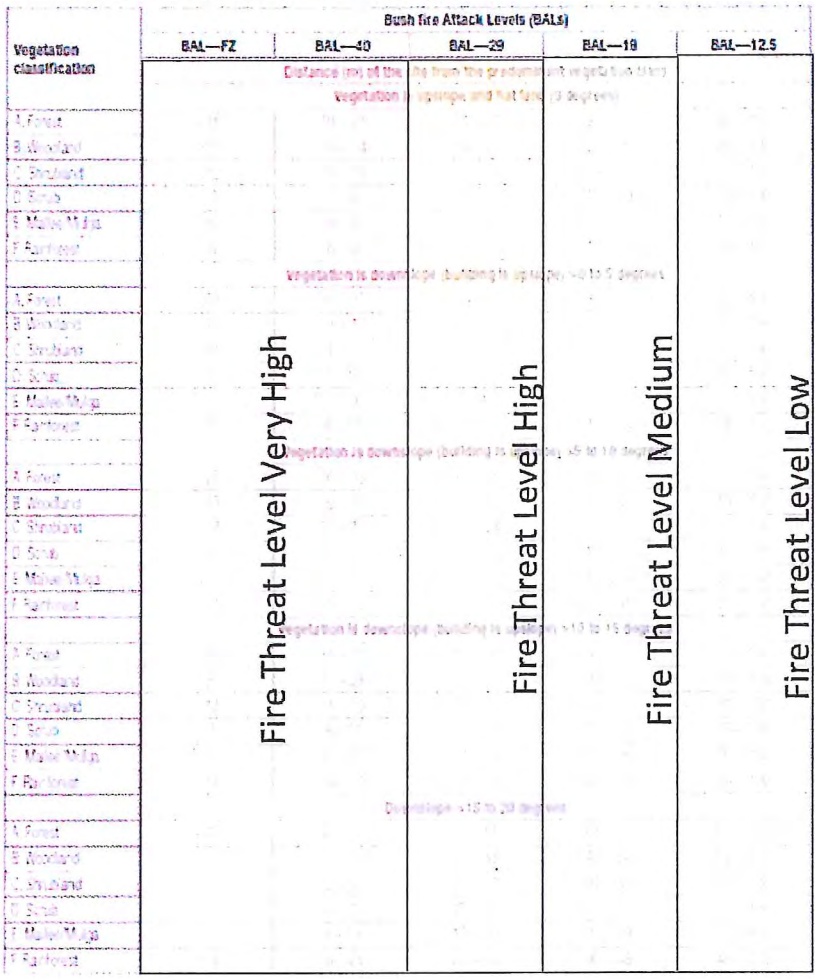
TABLE 2.4.3

DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL)—FDI 80 (1090 K)

Vegetation classification	Bushfire Attack Levels (BALs)				
	BAL—FZ	BAL—40	BAL—29	BAL—19	BAL—12.5
	Distance (m) of the site from the predominant vegetation class				
	All upslopes and flat land (0 degrees)				
A. Forest	<10	10–<21	21–<31	31–<42	42–<100
B. Woodland	<10	10–<14	14–<20	20–<29	29–<100
C. Shrubland	<10	10–<13	13–<19	19–<27	27–<100
D. Scrub	<7	7–<9	9–<13	13–<18	18–<100
E. Mallee/Mulga	<6	6–<8	8–<12	12–<17	17–<100
F. Rainforest	<6	6–<9	9–<13	13–<19	19–<100
	Downslope >0 to 5 degrees				
A. Forest	<20	20–<27	27–<37	37–<50	50–<100
B. Woodland	<13	13–<17	17–<25	25–<35	35–<100
C. Shrubland	<11	11–<15	15–<22	22–<31	31–<100
D. Scrub	<7	7–<10	10–<15	15–<22	22–<100
E. Mallee/Mulga	<7	7–<9	9–<13	13–<20	20–<100
F. Rainforest	<8	8–<11	11–<17	17–<24	24–<100
	Downslope >5 to 10 degrees				
A. Forest	<26	26–<33	33–<46	46–<61	61–<100
B. Woodland	<16	16–<22	22–<31	31–<43	43–<100
C. Shrubland	<12	12–<17	17–<24	24–<35	35–<100
D. Scrub	<8	8–<11	11–<17	17–<25	25–<100
E. Mallee/Mulga	<7	7–<10	10–<15	15–<23	23–<100
F. Rainforest	<11	11–<15	15–<22	22–<31	31–<100
	Downslope >10 to 15 degrees				
A. Forest	<33	33–<42	42–<56	56–<73	73–<100
B. Woodland	<21	21–<28	28–<39	39–<53	53–<100
C. Shrubland	<14	14–<19	19–<28	28–<39	39–<100
D. Scrub	<9	9–<13	13–<19	19–<28	28–<100
E. Mallee/Mulga	<8	8–<11	11–<18	18–<26	26–<100
F. Rainforest	<14	14–<19	19–<28	28–<39	39–<100
	Downslope >15 to 20 degrees				
A. Forest	<42	42–<52	52–<68	68–<87	87–<100
B. Woodland	<27	27–<35	35–<48	48–<64	64–<100
C. Shrubland	<15	15–<21	21–<31	31–<43	43–<100
D. Scrub	<10	10–<15	15–<22	22–<31	31–<100
E. Mallee/Mulga	<9	9–<13	13–<20	20–<29	29–<100
F. Rainforest	<18	18–<25	25–<36	36–<48	48–<100

Appendix 5

Table: 2 Determination of bush fire attack level (BAL)



Notes:

Appendix 6. Fire Risk Analysis Matrix

Appendix 2 Fire Risk Analysis Matrix, rankings, likelihood, and consequence.

RISK ANALYSIS MATRIX					
	LIKELIHOOD				
CONSEQUENCE	1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
6 Catastrophic:	H	H	H	H	H
4 Major:	M	H	H	H	H
3 Moderate:	M	M	M	H	H
2 Minor:	L	L	M	H	H
1 Insignificant:	L	L	L	M	M

Definitions of Fire Occurrence and Consequence						
Likelihood (of Fire occurring)		Consequence of fire damage (how severe)				
Descriptor	Frequency	Descriptor	Health and safety	Asset loss	Financial loss	Environmental loss
Rare	Less than once in 20 years	Insignificant	No medical treatment required	Single dwelling or building	Less than $100,000.	Minor damage to listed flora
Unlikely	At least once in 10 years	Minor	First aid treatment	Single dwelling or building	$100,000 to $500,000	Significant damage to any listed flora
Possible	At least once in 3 years	Moderate	Medical treatment required	Multiple dwellings or buildings	$500,000 to $5 million	Loss of listed vulnerable flora
Likely	At least once per year	Major	Extensive injuries	Multiple dwellings or buildings	$5 million to $20 million	Loss of listed endangered flora
Almost Certain	More than once per year	Catastrophic	Death or severe permanent disablements	Substantial or high value larger buildings	More than $20 million	Loss of critically endangered listed flora

Risk Rankings	
H	Very High – Unacceptable
H	High – Urgent Action
M	Moderate – Management Controls)
L	Low (Specify Actions & Monitor)

Appendix 7. Fuel Quantity Guides

7. AIDS FOR PRESCRIBED BURNING

7.1. RATE OF LITTER ACCUMULATION

Litter weights (in tonnes/ha) includes leaf, bark and twig material up to 10 mm diameter only.

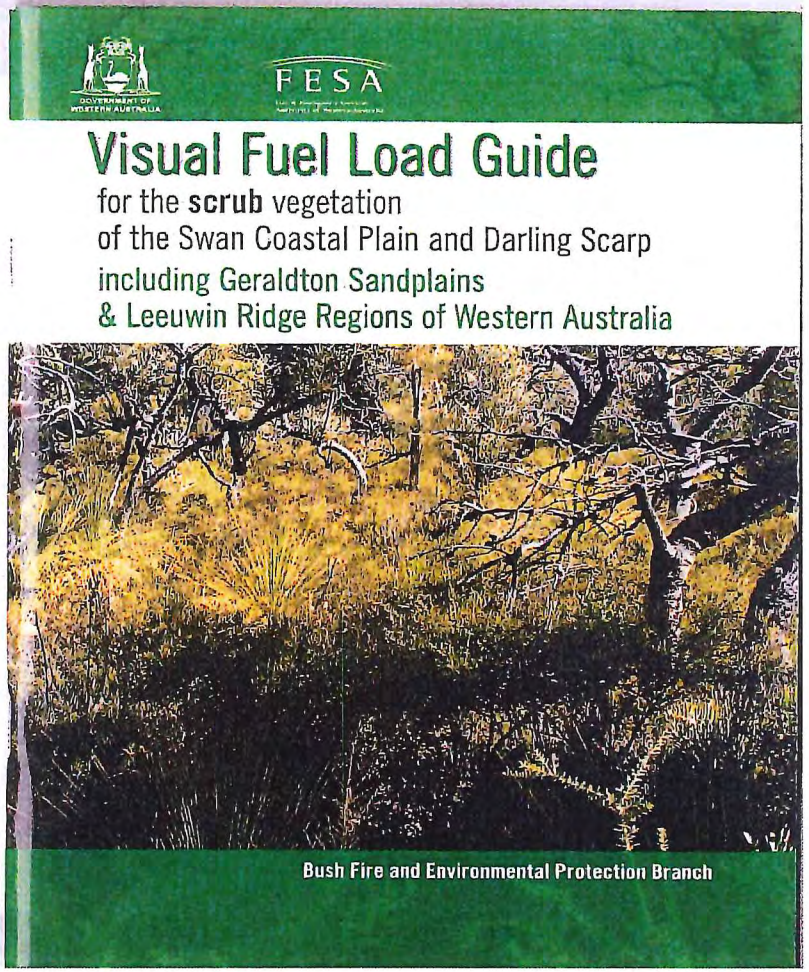
7.1.1. Jarrah Litter (tonnes/ha)

No. of Annual Leaf Falls	Canopy Cover %				
	20	40	50	60	80
1	1.0	1.4	2.4	3.0	3.5
2	1.6	2.6	4.0	4.4	5.0
3	2.5	4.0	5.2	6.2	7.2
4	3.4	5.2	6.3	7.4	8.5
5	4.2	6.2	7.5	8.6	9.8
6	5.0	7.2	8.5	9.6	10.8
7	5.8	8.1	9.5	10.6	11.8
8	6.5	9.0	10.3	11.5	12.8
10	7.7	10.3	11.5	13.0	14.4
12	8.8	11.5	12.7	14.2	15.5
15	10.5	13.0	14.2	15.6	17.5
20	12.7	15.0	16.5	17.8	20.2
25	14.8	17.0	18.5	20.0	22.5

7.1.2. Karri Litter (tonnes/ha)

No. of Annual Leaf Falls	Canopy Cover %				
	30	50	60	80	100
1	4.0	6.0	7.0	9.5	12.5
2	6.2	8.5	9.7	12.7	16.0
3	8.2	10.7	12.2	15.5	19.0
4	10.0	13.0	14.5	18.0	21.7
5	11.7	15.0	16.7	20.2	24.2
6	13.5	16.7	18.7	22.5	26.7
7	15.2	18.7	20.7	24.7	29.2
8	17.0	20.3	22.5	26.7	31.5
9	18.5	22.5	24.5	29.0	33.7
10	20.2	24.2	26.2	31.0	36.0
15	25	29	34	41	46
20	30	35	40	47	52
25	35	40	44	53	58

40



8. DISCLAIMER

This Fire Management Plan has been prepared by Kevin White, for South West Fire Services, using material provided by the Shire of Carnarvon and several other sources including a site inspection.

It is, at the time of preparation, complete and correct to the best of my knowledge. The actions and standards recommended in this Fire Management Plan are the minimum required to provide some degree of protection from wildfires, and should not be construed to assure total bush fire protection.

People residing or visiting this location must recognise that this is a recognised bush fire prone area and bushfires will inevitably occur.

Furthermore, the consultant has no control over future actions, or lack of them, by the current or future landowners or occupiers Consequently, the consultant will not be liable for any loss or other consequences, except as required by law, for any outcome or action resulting from statements, standards, or recommendations in this Fire Management Plan.

8.1 DOCUMENT HISTORY

Custodian:	South West Fire Services
Author:	Kevin White
Date Issued:	18/09/14
Dates Updated:	
Review date:	30/09/15

8.2 ENDORSEMENT

Endorsed By: John Evans

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Our reference: K1155:CRD/MPR:Letter 14026 Rev 0
Enquiries: Clint Doak, direct line: 9254 6613

8 April 2014

Mr Rob Paull
Shire of Carnarvon
PO Box 459
CARNARVON WA 6701

Dear Rob

CARNARVON BLOWHOLES COASTAL SETABCK REPORT REVIEW CONSIDERATION OF 20 YEAR PLANNING HORIZON

As requested, we have completed a review of the *Carnarvon Blowholes: Desktop Coastal Setback Assessment* completed by Oceanica Consulting in August 2013. Specifically, this review has been completed with consideration of the potential coastal setback requirements for a 20 year planning horizon. The requirement for the consideration of a 20 year planning horizon is based on the expected lease agreement timeframe for "squatters" shacks located within Reserve 37457.

The August 2013 report completed by Oceanica was prepared as an update to the previous coastal setback assessment that had been completed for the area in 2006 (Oceanica 2006). The requirement to update the previous (2006) report was based upon the release of a revised version of *State Planning Policy 2.6: State Coastal Planning Policy* in July 2013.

The 2013 report by Oceanica noted several instances where the requirements of the 2013 version of SPP2.6 could not be fully achieved or understood without completion of further modelling and assessment work. Noting these limitations, the report provided updated allowances for coastal erosion for a planning timeframe of 100 years. The updated allowances are presented in Table 1 below.

Table 1 – Revised Allowances for Coastal Erosion at Point Quobba from Oceanica (2013)

Allowance Component	Oceanica (2013) Allowance
S1 – Storm Erosion	7 m
S2 – Historic Shoreline Movement	10 m
S3 – Future Sea Level Rise	90 m
Allowance for Uncertainty	20 m
Total Allowance for Erosion	**127 m**

In addition to the above, Oceanica 2013 also note the requirement to locate development above the maximum extent of storm inundation, which is defined as the peak steady water level during the 500 year ARI event, plus wave run-up, plus the required allowance for sea level rise. Oceanica note that the interaction of these three components is complex and would need to be specifically modelled for this location.

1. Requirements of 2013 SPP2.6

The coastal setback requirements outlined in the 2013 version of SPP2.6 deal predominantly with the general case of freehold development on an undeveloped coastline. Consequently, the policy is based on a 100 year planning horizon. For this general case the following allowances are required.

- **S1 allowance for the current risk of storm erosion**
  - Should be determined based on the potential for cross shore and longshore storm erosion caused by a tropical cyclone event (for this location) with an annual probability of exceedance of 1% (this is akin to a 100 year Average Recurrence Interval event).
  - Should also provide an allowance for potential slope failure where relevant to a maximum slope of 30 degrees.

- **S2 allowance for historic shoreline movement trends**
  - Should provide an allowance of 100 times the historic annual rate of erosion.
  - Where shoreline accretion has occurred in excess of 0.2 m/yr, a negative allowance of half the long term rate of accretion can be applied.

- **S3 Allowance for erosion caused by future sea level rise**
  - Should provide an allowance of 100 times the adopted sea level rise for planning in Western Australia of 0.9 m over a 100 year timeframe, or 90 m.

- **Allowance for uncertainty**
  - An allowance of 0.2 m/yr, or 20 m, should be provided as a factor of safety for the overall setback calculation.

- **S4 Allowance for the current risk of storm surge inundation**
  - Should be the maximum extent of storm surge inundation plus wave run-up during an event with an annual exceedance probability of 0.2% (akin to a 500 year ARI event).
  - Where a barrier dune is present the potential for erosion of that barrier dune should be reviewed.

The 2013 SPP2.6 also outlines the requirement for development to be informed by a Coastal Hazard Risk Management & Adaptation Plan (CHRMAP). This CHRMAP should consider how the risks associated with coastal hazards can be managed over the 100 year planning horizon. The hierarchy of management responses to risks posed by coastal hazards is as follows:

- **Avoid** locating development within areas vulnerable to the coastal hazard.

- **Planned or Managed Retreat** of assets located within areas that may be vulnerable to coastal hazards over their planning timeframe.

- **Accommodate** the risks associated with the potential coastal hazards through measures such as design and/or management strategies that reduce the risk posed by coastal hazards to acceptable levels.

- **Protect** where the risk from coastal hazards cannot be accommodated, coastal protection works may be completed.

2. Potential Setback Requirements

As stated previously, it is understood that the shacks are to be subject to a 20 year lease period. As a result, and given the relatively low value nature of the infrastructure, it is reasonable that the CHRMAP for the shacks be prepared on the basis of **planned or managed retreat** in response to potential coastal hazards. In the first instance consideration should therefore be given to locating the shacks so that they have a low risk of being impacted by coastal hazards over this 20 year lease period.

Based on the work completed by Oceanica (2006 and 2013) combined with MRA's own review of certain items, as described below, the following allowances may be appropriate for a 20 year lease period.

S1 allowance for the current risk of storm erosion

The Oceanica (2013) report proposes to use an allowance of 7 m for S1, based on the results of the 2006 work. This allowance was determined based on the maximum erosion observed of any contour on the modelled profile. However, the 2013 SPP2.6 requires that the allowance for erosion be determined as the recession from the Horizontal Shoreline Datum (HSD) to the land extent of storm erosion as calculated by the model. The HSD is defined as the seaward shoreline contour representing the peak steady water level modelled during the design storm.

The Oceanica (2006) report only presented the model results from the simulation of a "worst cyclone + Sea Level rise". In this instance, the peak steady water level modelled during this event was 2.8 mAHD plus a 0.4 m allowance for sea level rise, for a total water level of 3.2 mAHD. The results from the modelled profile is provided in Figure 1. As shown on the figure, the extent of erosion behind the HSD for this model simulation is approximately 20 m.

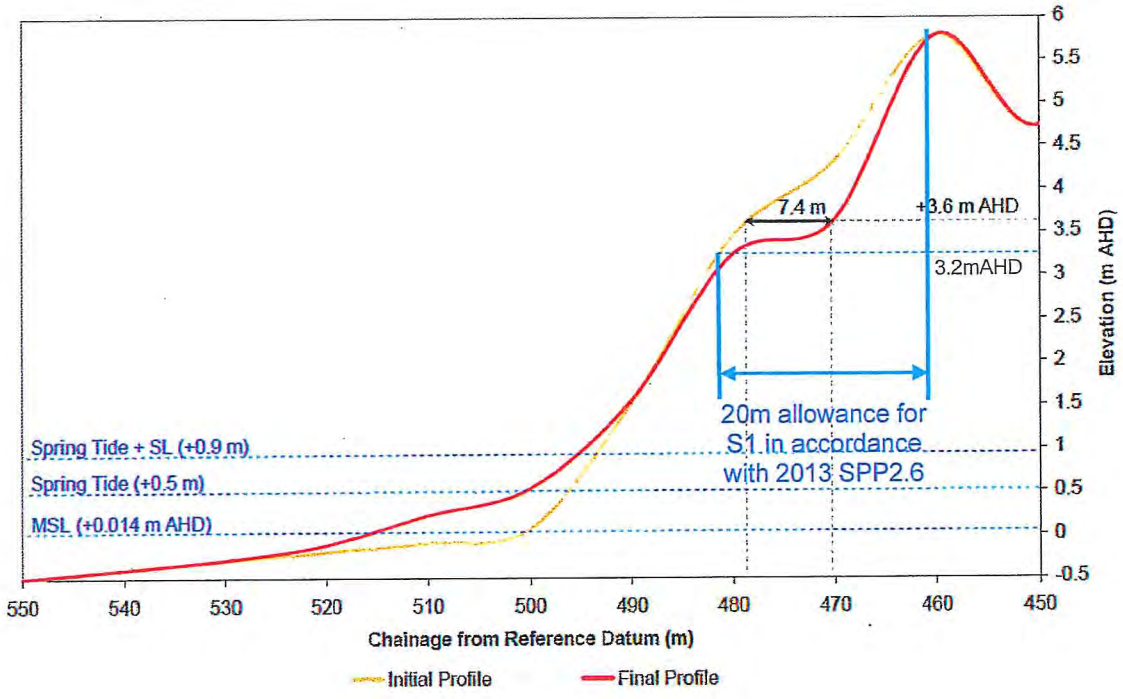


Figure 1 SBEACH Model Results from Oceanica (2006)

The above allowance is made to account for the potential cross shore transport of sediment that could occur during a severe storm, however the 2013 version of SPP2.6 also requires consideration of the potential for longshore sediment transport. Longshore transport of sediment occurs when oblique waves impact the shoreline and transport sediment along the beach. Where an obstruction or gradient in longshore transport occurs this can cause erosion of the shoreline.

No assessment has been made by Oceanica (2013) to quantify what the erosion potential of longshore transport could be for this shoreline. MRA's experience suggests that due to the presence of the rocky shoreline to the north and the nearshore island and reefs, a 10 m allowance could be appropriate. This is based on experience in similar areas. In the absence of further work a preliminary allowance of 10 m should be included, however the appropriateness of this allowance should be confirmed through further investigation and modelling.

Combining the allowances for cross shore and longshore erosion, the preliminary S1 allowance should be 30 m.

S2 allowance for historic shoreline movement trends

The assessment of the appropriate allowance to account for historic shoreline movement trends that was made within the Oceanica report was based on using the shoreline movement rate that was observed at the worst location and applying it to the remainder of the site. This is a somewhat conservative approach that does not account for the differences in the shoreline aspect, exposure and subsequent geomorphology, particularly that which has seen the northern portion of site accrete over the observation period. A plot of the shoreline movement presented in the Oceanica (2006) report is provided in Figure 2.

Based on the information contained within the shoreline movement plan it is clear that the portion of the site between Transects A to C has experienced sustained accretion over the period. This accretion has been in the order of 0.7 m/year. As a result, a negative allowance of half this rate (0.35 m/year) can be applied to the setback calculation for this area.

To the north of Transect A the shoreline has experienced some erosion at a rate of around 0.1 m/year. Similarly, to the south of Transect C the accretion has decreased to the point where erosion, at a rate of around 0.1 m/year, is observed just south of Transect F.

A review of the remainder of the sediment cell does not suggest that there is anything that is likely to have an impact on the shoreline and cause changes to its behaviour over the planning horizon. Therefore, given the observed rates of shoreline movement, the following allowances should be provided for a 20 year planning horizon.

Table 2 Preliminary S2 Allowances

Transects	Shoreline Movement Erosion Rate[1]	Allowance for 20 year Planning Horizon
North of Transect A to Transect A	0.1 m/yr to -0.35 m/yr	2 m to -7 m
Transect A to Transect C	-0.35 m/yr	-7 m
Transect C to Transect F	-0.35 m/yr to 0.1 m/yr	-7 m to 2 m

Note : 1. Negative values for erosion rate indicate accretion.

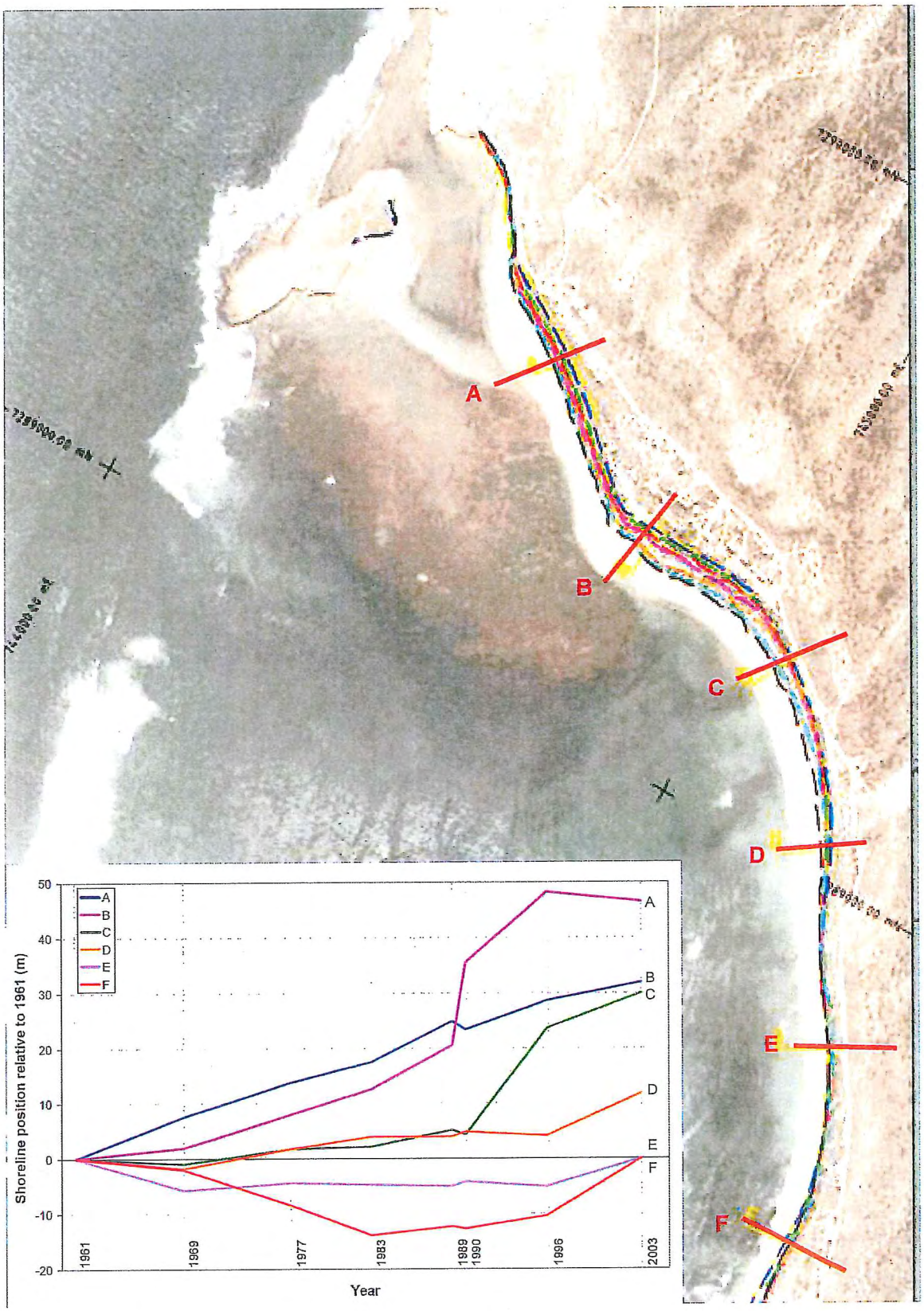


Figure 2 Shoreline Movement Plot (Oceanica 2006)

S3 Allowance for erosion caused by future sea level rise

The allowance for future sea level rise required by SPP2.6 is based on work completed by Department of Transport (2010). The adopted sea level rise scenario is presented in Figure 3.

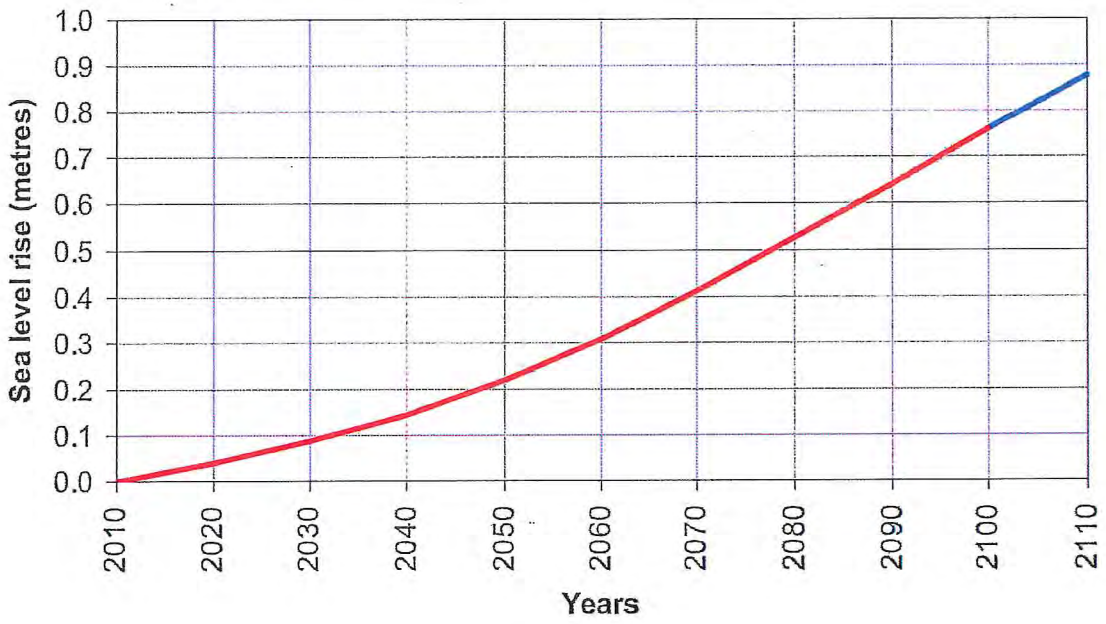


Figure 3 Recommended Sea Level Rise Scenario for Coastal Planning in Western Australia (DoT 2010)

Based on the recommended sea level rise scenario, the allowance for sea level rise for 20 years from 2014/15 would be around 0.1 m. Consistent with the requirements of SPP2.6, the allowance for shoreline erosion should be 100 times the potential sea level rise. The S3 allowance for a 20 year period would therefore be 10 m.

Allowance for Uncertainty

SPP 2.6 states that an allowance for uncertainty of 0.2 m/year should be included in the calculations. For the general case of a 100 year planning horizon, this would equate to a 20 m allowance. This 20 m allowance is generally sufficient to cover short and medium term fluctuations in shoreline position that could occur due to annual and inter-annual variability in sediment transport. This is in addition to the longer term trends that are covered by the S2 allowance.

Review of the shoreline movement information presented in Figure 2 indicates that medium term shoreline fluctuations have not been particularly prevalent in this location. However, shorter term fluctuations may not have been captured by the aerial photography. As a result, it is recommended that a 10 m allowance for uncertainty be included at this location. It is acknowledged that this is greater than what would be required by strictly applying the 0.2 m/year allowance over the 20 year planning horizon as required by the policy, however it is prudent to provide for potential shoreline fluctuations that could be in the order of 10 m over the 20 year lease period.

Preliminary Estimate of Setback to Account for Coastal Erosion over a 20 year Planning Horizon / Lease Period

The total setback to account for the action of coastal erosion over a 20 year planning horizon is determined by summing each of the allowances determined above. The recommended allowance based on this preliminary assessment is provided in the following table.

Table 3 Preliminary Setback Allowance

Transects	S1 Allowance	S2 Allowance	S3 Allowance	Allowance for Uncertainty	Preliminary Setback for 20 year Planning Horizon
North of Transect A to Transect A	30 m	2 m to -7 m	10 m	10 m	52 m to 43 m
Transect A to Transect C	30 m	-7 m	10 m	10 m	43 m
Transect C to Transect F	30 m	-7 m to 2 m	10 m	10 m	43 m to 52 m

SPP2.6 requires that this setback distance be measured from the HSD. To determine the S1 allowance a HSD elevation of 3.2 mAHD was used by Oceanica, however this was based on a "worst cyclone + sea level rise" storm, and is likely to have a return period well in excess of the 100 year ARI specified within the policy. These modelling results were also used to determine the S1 allowance as they were the only modelling results that were presented within the Oceanica report.

Despite this, in the absence of additional modelling that quantifies the level of the 100 year ARI event, a HSD elevation of 2.8 mAHD is recommended by MRA. This is the peak steady water level from the "worst cyclone" as modelled within GEMS (2006) for the present day case.

A plot showing the location of the preliminary setback line based on the above information is provided in Figure 4.

Figure 4 Plot showing the Location of Preliminary Setback Line to Account for Coastal Processes over a 20 year Planning Horizon

It should also be noted that the 2013 SPP2.6 specifically requires that other items such as the requirement for a functional foreshore reserve also be included in addition to the above setback. Given the nature of this development, being leasehold and subject to a planned or managed retreat approach to foreshore management and risk minimisation, it is considered appropriate that no further allowance be provided in this regard.

3. Inundation

S4 Allowance for the current risk of storm surge inundation

SPP2.6 requires that freehold development be located above the area inundated during a 500 year ARI storm surge plus the appropriate allowance for sea level rise over the planning horizon. Additionally, the impacts of wave run-up also need to be considered. A 20 year leasehold development should be viewed differently.

The GEMS (2006) work provides estimates of the inundation levels and subsequent wave run-up elevations. As outlined previously, the GEMS work has not accurately quantified the return period inundation levels. As a result, given the absence of other suitable information, the "worst cyclone" case should be used for this preliminary work. The peak steady water level of this modelled event was 2.8 mAHD. Including an allowance for sea level rise over the 20 year planning horizon would increase this inundation level to 2.9 mAHD.

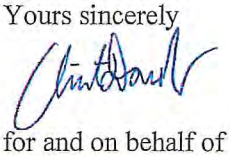
Given this inundation level, the work completed by GEMS (2006) suggests that the total extent of wave run-up would be around 6.0 mAHD for the section of shoreline in question. To meet the requirements of this aspect of SPP2.6 any development should therefore be located above 6 mAHD. Nevertheless, given the type of development it is debatable whether such a low level of risk exposure is appropriate. Inundation from the 100 year ARI cyclone plus 0.1 m allowance for sea level rise plus inshore setup may be more appropriate for areas about 50 m behind the foredune. Such an approach is likely to give a development level of about 3.5 to 4.0 mAHD.

4. Conclusions

The above assessment has been made based solely on the information available within the Oceanica reports from 2006 and 2013 and from the GEMS report from 2006. The level of detail provided in these reports was not sufficient for MRA to review the adequacy of the modelling works that have been completed. Further, the information provided is not in the form that enabled an assessment to be completed that is consistent with the full requirements of the 2013 version of SPP2.6. As a result MRA can make no representations or warranties regarding the accuracy of the information provided in this letter. This information should be considered to be preliminary in nature and should be confirmed through additional investigations.

Should you have any queries regarding anything outlined above, please do not hesitate to contact us.

Yours sincerely



for and on behalf of
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