

Point Samson Structure Plan

DRAFT

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Point Samson Structure Plan

Part A: Summary

May 2015



1.0 Introduction

1.1 Purpose

A district structure plan is a strategic document that will inform preparation of statutory town planning documents and policies that are used to guide decision making. It will:

- Define future growth areas and precincts;
- Define objectives for future development including preferred land uses, patterns of movement, and development character; and
- Outline the parameters within which more detailed planning and future development can take place. The Structure Plan will provide guidance on the future development of the site and will also inform the preparation of the City of Karratha's Local Planning Strategy and new Local Planning Scheme.

The Point Samson District Structure Plan (the Structure Plan) has been prepared for the area shown in Figure 1. This boundary encompasses the Point Samson townsite and immediate surrounds. In conjunction with the development of the Structure Plan, Precinct Plans have been prepared to provide more detailed guidance for focus areas within the town.



Figure 1 – Structure Plan Boundary

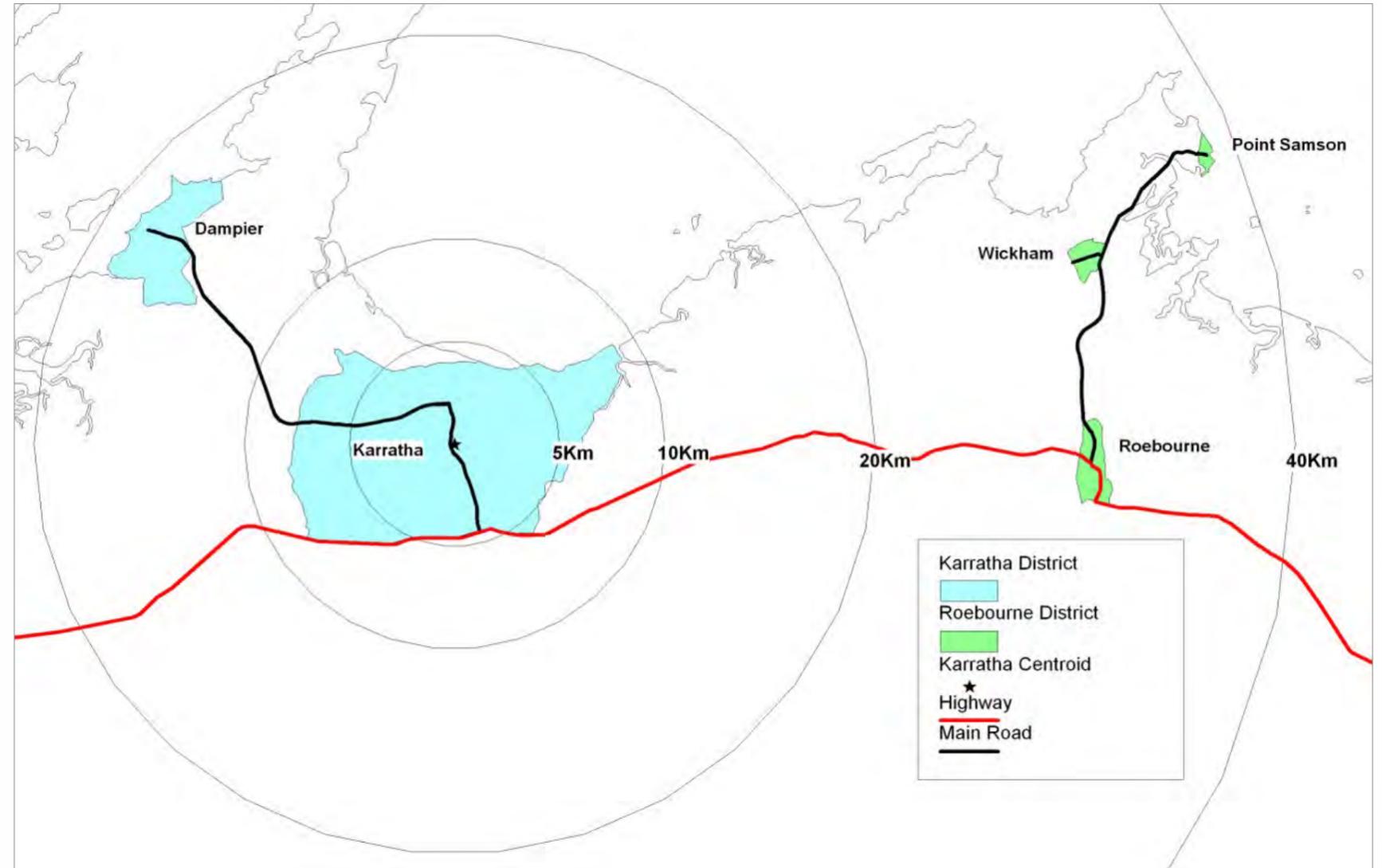


Figure 2 – Locational Context Plan

1.2 Context

Point Samson is a small coastal town with a population of approximately 300, located on the north-west coast of Western Australia approximately 50 kilometres by road from Karratha. It is located within what is known as the Eastern Corridor of the City of Karratha.

The town is located approximately four kilometres south-east of the Rio Tinto operated port at Cape Lambert and is approximately 7.5 kilometres north-east of the town of Wickham.

Point Samson is located on a peninsular defined by the Indian Ocean to the east and south-east, and John's Creek to the south-west. Figure 2 illustrates the locational context of Point Samson.

1.3 Structure Plan Content

The Structure Plan is comprised of two parts. This part, Part A, defines the vision, principles, objectives and key recommendations of the Structure Plan. Part B includes information from technical studies and various policies that form the basis and justification for the Structure Plan described in Part A.

1.4 Relationship to Planning Scheme

The Structure Plan is a strategic and non-statutory plan that will inform preparation of City of Karratha Local Planning Scheme No. 9 (LPS 9) and related planning policies and guidelines.

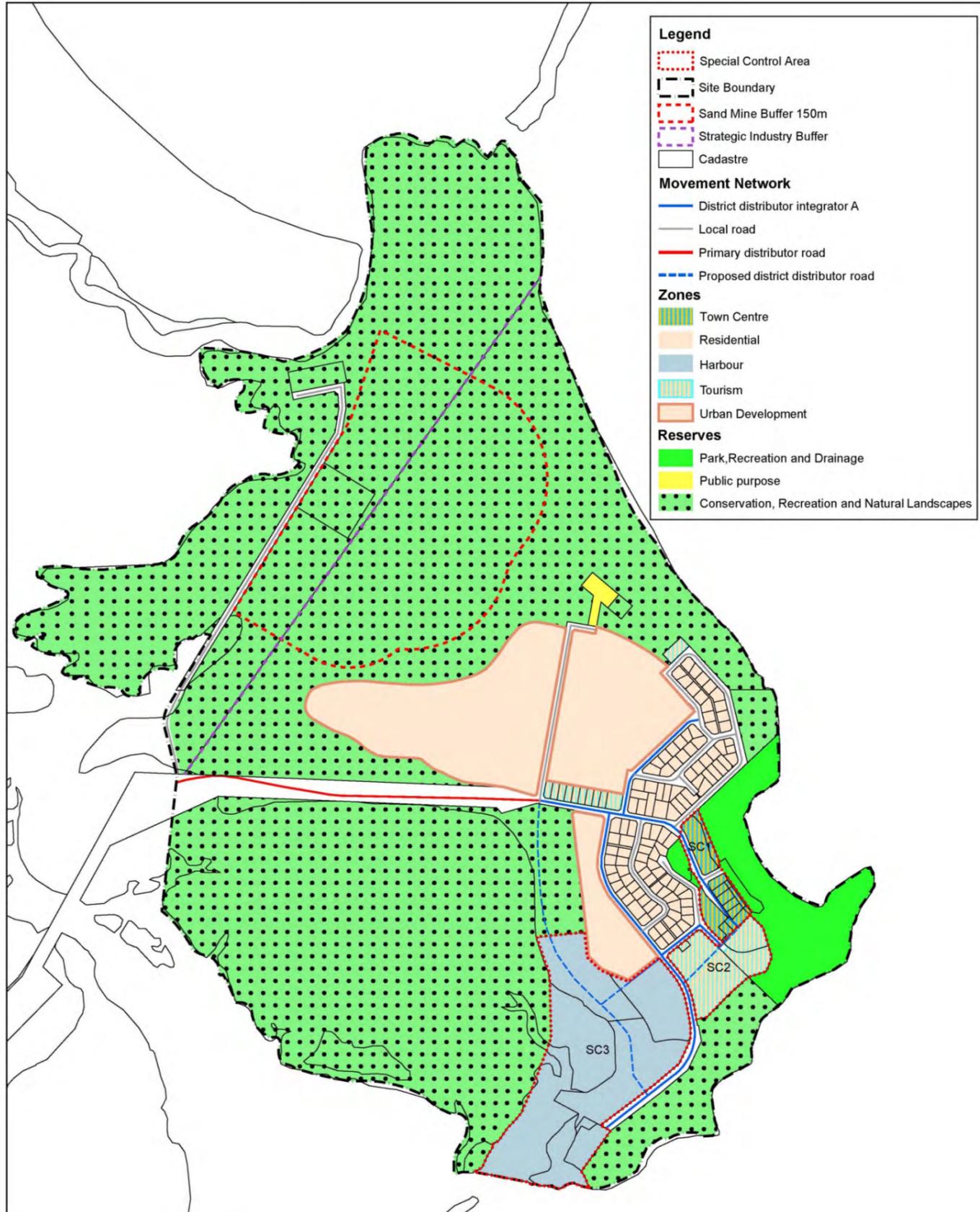


Figure 3 – Structure Plan

2.0 The Structure Plan

The proposed Structure Plan is illustrated in Figure 3. It outlines the proposed zones and other key elements of the town, such as the proposed movement network, coastal management areas, and public open space. Figure 4 is an enlargement of the town centre part of the Structure Plan, for easier viewing.

This plan is non-statutory. This means it is a strategic document that will provide a guiding framework to ensure co-ordination of subsequent layers of more detailed planning and development, such as finalisation of the City of Karratha Local Planning Strategy and the preparation of local structure plans (statutory) for identified future development areas.

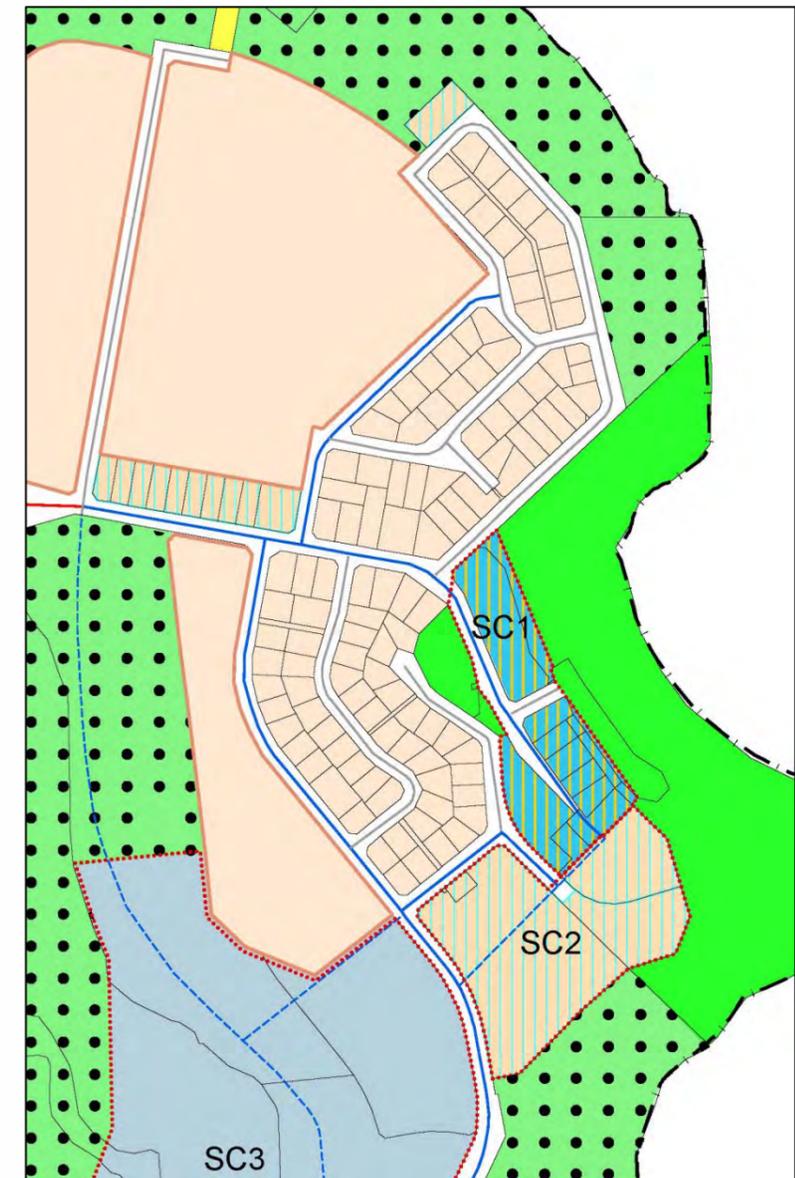


Figure 4 – Structure Plan enlargement of Town Centre

3.0 Vision, Objectives and Principles

3.1 Vision

The vision for Point Samson is for a small coastal settlement capable of accommodating an ultimate population of up to 1,000 people whilst retaining a coastal village character. It will have a residential, tourism and recreation focus that serves the people of the Pilbara and is also able to attract visitors from across Australia and add positively to the experience of international visitors.

3.2 Structure Plan Objectives

The purpose of preparing the Structure Plan is to guide future growth of Point Samson to accommodate a population of approximately 500 people, with the potential of accommodating up to 1,000 people, in a logical and staged manner that can meet demand as and when it arises.

The specific objectives for Point Samson are to:

- Develop an identifiable Local Centre with a coastal aspect.
- Facilitate the development of Point Samson as a sustainable tourist node where compatible with the social and environmental setting.
- Retain the "fishing village" atmosphere of Point Samson.
- Accommodate additional residential land release.

3.3 Spatial Summary

Table 1 provides a summary of the anticipated key statistics and planning outcomes of the Structure Plan.

Table 1 – Structure Plan Summary

Item	Data
Total Area covered by Structure Plan	376.69 ha
Area of each land use proposed:	
Residential	11.25 ha
Tourism	5.95 ha
Town Centre	2.65 ha
Harbour	22.69 ha
Urban Development	36.62 ha
Parks and Recreation Reserve (existing parks)	13.14 ha
Public Open Space (10% of future Urban Development)	3.66 ha
Conservation Reserve	261.97 ha
Estimated additional lot yield	277
Estimated number of new dwellings	277
Population:	
at 2011 Census	298
estimated additional capacity	482
estimated ultimate total	780 – 1,000
Major opportunity sites	<ul style="list-style-type: none"> • Southern part of Vitenbergs Drive road reserve, especially combined with Lot 268. • Land between Miller Close and Bartley Court, currently in single ownership. • Land within John's Creek Boat Harbour.

4.0 Land Use

4.1 Objectives of the Zones and Reserves

The zones and reserves recommended in the Structure Plan generally correspond to those used in Town Planning Scheme No. 8 (TPS8). Some zone names may change in the new LPS9, however the objectives for the zones and reserves proposed by the Structure Plan will remain broadly the same as described here. As this structure plan is not statutory, the suggested zones will not have statutory effect until they are incorporated into a local planning scheme.

Residential Zone

This zone provides for residential development with a variety of housing to meet the needs of different household types through the application of the Residential Design Codes.

Tourism Zone

This zone provides for major areas of tourist accommodation and tourist oriented land uses, with a focus on providing a range of tourist attractions to complement and enhance the character of Point Samson as a coastal fishing village and provide local employment opportunities.

Town Centre Zone

This zone provides for convenience retailing, local offices, health, welfare and community facilities that serve the local community.

Urban Development Zone

Land zoned Urban Development may be affected by development constraints, the extent and nature of which will need to be identified through the preparation of a Local Structure Plan.

Park, Recreation and Drainage Reserve

This reserve has the primary purpose of providing passive and active recreational activities and may also include drainage infrastructure.

Conservation, Recreation and Natural Landscapes

This reserve has the primary purpose of conservation of natural landscapes and may also accommodate compatible recreational activities such as walk trails and interpretation of natural and cultural values.

Public Purpose Reserve

The public purpose reserve is for Water Corporation use in the carrying out of its functions.

4.2 Harbour Zone

A Harbour zone is proposed over the area currently zoned Industry within TPS8. The proposed Harbour zone is intended to accommodate existing land uses within the area whilst recognising the opportunity for the harbour and its surrounding area to accommodate a greater range of land uses.

A range of commercial, light industrial, tourism and residential accommodation land uses are intended to be focussed around the harbour. This may include recreational boating facilities i.e. marina, as part of a potential harbour expansion.

Two sub-precincts and the potential expansion of the harbour northwards are identified within the proposed Harbour zone. The two sub-precincts within the Harbour zone area are the Marina sub-precinct and the Light Industry sub-precinct.

4.2.1 Marina Sub-precinct

The Marina sub-precinct affords a flexible range of land uses which include: Tourism; Commercial; Private Recreation; Public Open Space; and Car & Trailer parking. The layout of the land uses within the zone is to be determined through the preparation and approval of a Development Plan.

4.2.2 Light Industry Sub-precinct

The Light Industry sub-precinct is intended to cover the existing area zoned Industry where a range of industrial activities currently occur. Light Industry is not currently recognised within TPS8 however the City is considering an Amendment which seeks to reclassify all land within the City zoned Industry to either General Industry or Light Industry. Light Industry may be generally defined as industry where impacts are contained onsite.

4.3 Land Use Permissibility

The intention is for land use permissibility to correspond with the permissibility within the zones as outlined in the local planning scheme.

In areas where a local structure plan is required, the local structure plan will define the permissibility of land uses within the affected area.

4.3.1 Special Control Areas

Three Special Control Areas have been proposed within the townsite, over the following areas:

- Town Centre zone;
- Tourism zone; and
- Harbour zone.

The three Special Control Areas are depicted upon the Structure Plan in Figure 3 and are clearly visible in the enlargement of the town centre on Figure 4.

Under TPS8, if a Special Control Area is shown on the Scheme maps, the provisions of the Special Control Area apply. The imposition of the proposed Special Control Area's will, upon a suitable development trigger, necessitate the preparation of a Development Plan demonstrating a co-ordinated approach to development consistent with orderly and proper planning.

It is noted that TPS8 allows Council to make recommendation on subdivision proposals and to approve the development of land prior to a Development Plan coming into effect if it is satisfied that this will not prejudice the purpose of the Development Plan area.

4.3.2 Non-Conforming Uses

It is noted that any existing approved land uses within the current Industry zone of Point Samson which might not satisfy the Light Industry land use definition may continue operating under the Non-Conforming Use Rights provisions of TPS8.

Part 8 of TPS8 details Non-conforming Use Rights. Importantly, the continuation of the use of land for the purpose for which it was lawfully used prior to the gazettal date of LPS9.

In light of the above, the proposed Structure Plan is not considered to impinge upon the business opportunities of existing operators.

4.4 Residential Targets

The Structure Plan aims to provide sufficient zoned land to accommodate a population of up to 1,000. A dwelling yield of approximately 300 additional dwellings could be accommodated within the proposed new residential areas at a density of R10, which is the maximum density that could be permitted without reticulated sewerage under current Government policy.

4.5 Urban Design Principles

Future development and redevelopment in Point Samson should respond to the following principles:

Built Form

- Design and orientation of new lots and buildings should be appropriate for the climatic conditions at Point Samson.
- New developments within areas identified as being potentially impacted by coastal processes should be designed in response to an approved coastal hazard risk management and adaptation plan.
- New development should be designed to minimise visual impact.

Public Realm

- Pedestrian routes should provide safe and comfortable opportunities for people to walk throughout the town to access key destinations such as the foreshore, public open space, the town (local) centre, and John's Creek Boat Harbour.
- Permanent (constructed) public car parking should be provided to meet day-to-day needs only for most of the year, with provision for temporary

(overflow) parking during peak visitation periods. In this way, excessive areas of hard stand that radiate heat and exacerbate run-off are avoided.

- The road network should be easy for visitors to navigate.
- Parks and other public areas such as footpaths should be provided with shade through tree planting and shade structures as appropriate, for pedestrian comfort and visual amenity.
- Planting of appropriate tree species within road verges should be maximised to provide shade and visual amenity.

5.0 Movement Network

5.1 Proposed New Roads

Figure 5 illustrates the proposed movement network including existing and proposed roads and footpaths.

Vitenbergs Drive to Bartley Court

To improve permeability, which is compromised by the long street blocks and culs-de-sac in the main tourist part of town especially, a formal connection between Bartley Court and Vitenbergs Drive is proposed. The existing connection is achieved by an easement over private land, which makes maintenance of the road as part of the overall street network problematic, and creates issues with the provision of infrastructure services that can only be laid within a gazetted road reserve.

A number of options were considered (see 15.5 in Part B) and the preferred method of achieving this link is to obtain the land required for a road connection as part of the recommended amalgamation of the portion of the Vitenbergs Drive reserve to be closed with the adjacent private Lot 268 to create a site large enough for a significant tourist development capable of disposing of its wastewater on-site. All affected private land including Lot 268 are in the same ownership, which should make negotiations simpler. The current easements forming Sea Eagle Way would then revert to being a car park, with suitable access controls in place to prevent its continued use as a through-road.

If for any reason the route through Lot 268 cannot be negotiated as part of a land transaction then the alternative options are:

- No change – issues and risks with public access and piped services across private land will remain;
- Initiate land resumption proceedings to excise the necessary land to create the preferred alignment;
- Initiate land resumption proceedings to excise the necessary land to formalise the current 'easement' route.

Vitenbergs Drive to Honeymoon Road

In the event that the Cove Caravan Park is ever redeveloped, it would be opportune to achieve a connection to Honeymoon Road that aligns with the proposed Bartley Court to Vitenbergs Drive connection. This would provide a more direct route than the current dog-leg down MacLeod Street, and would take traffic away from MacLeod Street. This connection is not essential but desirable. Cove Caravan Park is not expected to be redeveloped in the foreseeable future, but if it is a road in this location could double as a form of coastal reinforcement, allowing more permanent structures on higher land that could be created by filling behind it. Being almost entirely within a part of Point Samson likely to be subject to more frequent inundation in the future, any development of the site will be subject to close scrutiny under coastal planning requirements.

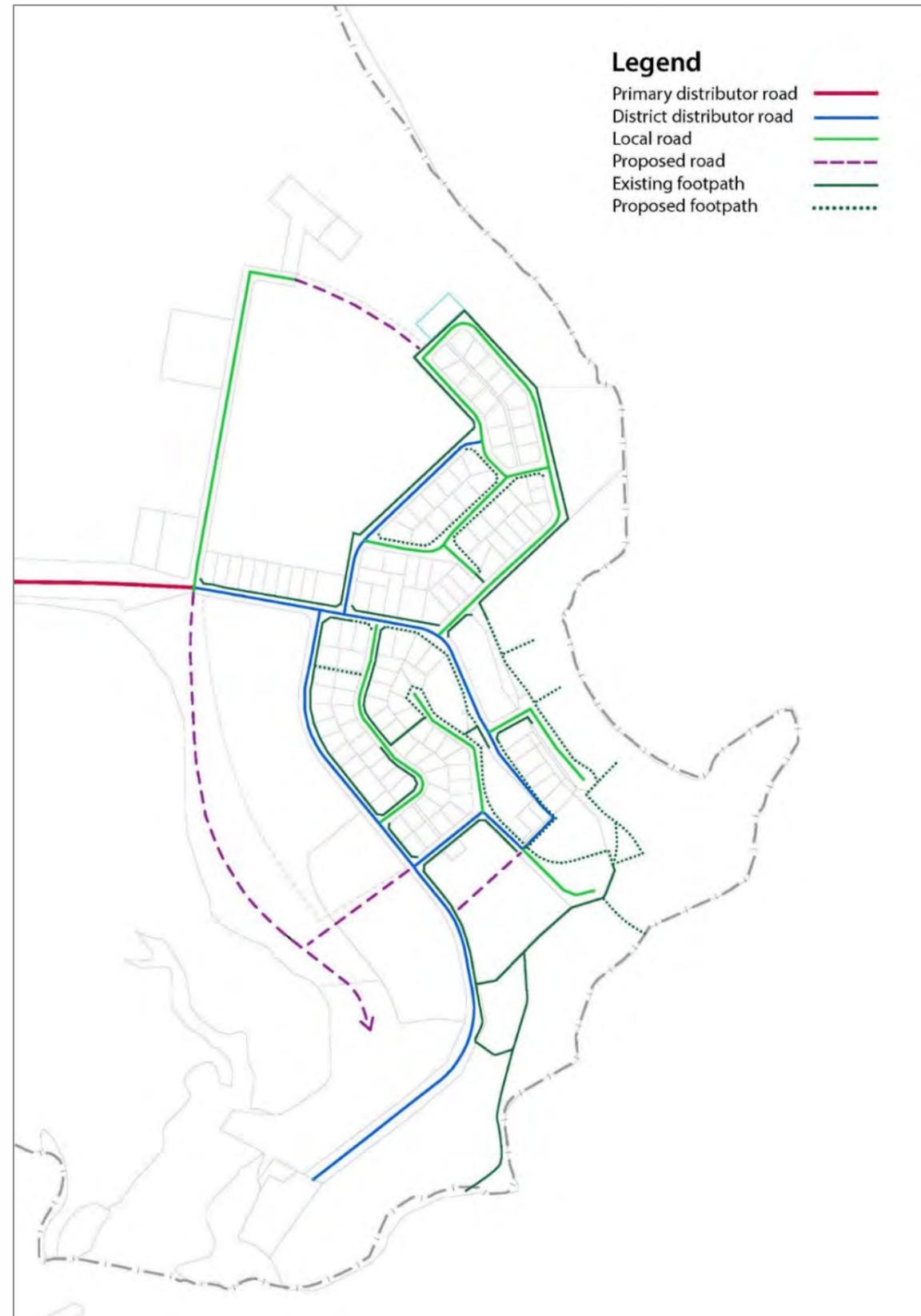


Figure 5 – Proposed Movement Network

Point Samson – Roebourne Road to John's Creek Harbour

An alternative route to John's Creek Harbour could be created west of Precinct 3 – Residential South. Such a route would take industrial and harbour related traffic off Honeymoon Road which is characterised by residential and tourism development and would preferably not carry heavy vehicles. Construction of this link would have to take into account predicted coastal processes and protection of the adjacent mangroves so is likely to be relatively expensive, however future redevelopment of the harbour could justify the investment. If built, it is envisaged that the road would connect with the Point Samson – Roebourne Road in the vicinity of Cliff Street, and would follow a route aligning with forecast sea level rise.

5.2 Proposed Road Hierarchy

As the only road into Point Samson, the Point Samson – Roebourne Road is designated a Primary Distributor Road until it reaches Cliff Street, after which it becomes a District Distributor Road as far as the current termination of Bartley Court.

The proposed Bartley to Vitenbergs connection, MacLeod Street and Honeymoon Road would also form part of the District Distributor network, as would a new harbour road, and Fisher Street as the main connection into the northern residential area.

All other roads will be local access roads. New roads as part of future subdivisions will be assessed and their position in the hierarchy identified as part of future local structure planning.

The road hierarchy is shown in Figure 5,

5.3 Pedestrian and Cycle Network

Safe pedestrian circulation is essential to promote walking, but the current network of footpaths is incomplete. Ideally and in accordance with the principles of good urban design there would be footpaths on both sides of all roads, with the possible exception of low order access streets where they could be limited to one side only, unless the street forms an important pedestrian link.

Pedestrian access to and along the foreshore will be defined in detail in the Foreshore Management Plan, however the principle of controlled access to the beach and along the coast is reflected in Figure 5.

Consideration should be given to making the coastal paths and paths along Honeymoon Road and the proposed new road to the harbour dual use paths to accommodate safe cycling. This would provide a safe recreational activity for residents and tourists.

The quality of the walking and cycling journey is an important element of encouraging the use of these active, healthy modes of transport so the provision of shade and rest stops will be a consideration in the design of new paths and improvements to those existing.

The existing and future pedestrian network is shown in Figure 5.

5.4 Typical Street Cross Sections

Typical street cross sections have been prepared to indicate the proposed treatment of streets within existing and proposed areas. Figures 6 - 8 overleaf show the three main typologies.

The indicative cross sections are not intended to represent any specific existing location. Rather, each street would be subject to detailed design to adapt the generic cross section to suit the particular application, but the principle is to introduce footpaths, street planting, building setbacks and car parking locations that are appropriate to the Town Centre (Bartley Court), the main entry roads (Honeymoon Road, Point Samson-Roebourne Road), and access streets (most residential streets).

The application of these street typologies can help people to interpret their environment and find their way around (also known as 'legibility' or 'wayfinding').



Figure 6 – Indicative Town Centre road cross section



Figure 7 – Indicative cross section for typical local roads



Figure 8 – Indicative cross section for main entry roads

6.0 Servicing and Infrastructure

6.1 Power Supply

The power supply for Point Samson currently comes from the Cape Lambert sub-station, which has a capacity of 1.5 MVA. The current summer peak load reaches 1.2 MVA. On this basis, power supply is adequate at present and there is capacity to accommodate moderate growth (approximately 30 additional residential units or equivalent), but an upgrade of infrastructure may be required to accommodate new development areas.

A developer contribution may be required to facilitate augmented supply from Horizon Power (the current provider). Details of any development contribution plan will be established in consultation with the City of Karratha as part of local structure planning for new development areas.

The use of alternative power supply such as solar energy is encouraged. The climate of Point Samson is suitable and the price of photovoltaic panels is steadily becoming more affordable and the technology more efficient. Use of alternative supplies of power would help reduce demand on the current and any future sub-station/s.

The design of new buildings in a manner that reduces the need for mechanical cooling would also reduce power requirements for consumers, and reduce demand on sub-station capacity.

6.2 Water Supply Infrastructure

Point Samson is supplied with potable water via a gravity fed main from a storage facility nine kilometres away at Wickham. An upgrade to a two kilometre section of this main is planned, which is critical to provide additional capacity to serve Point Samson as the network is presently at capacity.

However significant further development at Point Samson as proposed by the Structure Plan may require further upgrades to the water supply network. The Water Corporation has not planned for any significant growth and hence a feasibility study will be required to determine what infrastructure upgrades would be required to service future development.

Developer contributions may be required to fund the feasibility study and further network improvements if necessary, subject to negotiation with Water Corporation and the City of Karratha.

6.3 Wastewater Infrastructure

Point Samson has no reticulated sewerage disposal, and all household and commercial waste water is discharged into septic tanks or aerobic treatment units (ATUs).

An investigation conducted as part of the preparation of this Structure Plan established high level cost estimates for the provision of sewerage to the established town (infill) and to proposed development areas. Estimates included both the initial capital cost of installing the system, and ongoing operational costs. No allowance was made for the cost of connecting individual lots to the

system – this would be borne by the landowner – or ongoing costs to customers (rates).

On the basis of this investigation it has been concluded that provision and operation of a reticulated waste water system is cost prohibitive. Unless or until a developer determines that reticulated sewerage is financially feasible, the assumption is that all waste water will have to be disposed of on-site in a manner acceptable to the Department of Health.

At the present time, this means that either septic tanks with leach drains, or aerobic treatment units (ATU's) will be required. New technologies may be developed that will also be acceptable in time.

The investigation was necessary in part to understand the potential development yield (dwellings and tourism units) of new development areas. Current Department of Health policy dictates that unsewered lots must be a minimum of 1,000m². This means a maximum density of R10 will be possible for residential development.

6.4 Drainage

The District Water Management Strategy (DWMS – see Appendix C) identifies high level strategies for management of surface water, which will be refined in Local Water Management Strategies (LWMS) and Urban Water Management Plans (UWMP) at more detailed levels of planning, following the guidance of the Better Urban Water Management Guidelines (WAPC 2008). The DWMS is discussed further in section 12.5 in Part B.

The cyclonic nature of the rainfall pattern in Point Samson means the townsite drainage system is designed to hold small high frequency storm events and direct all other rainfall as quickly as possible away. Stormwater runoff is directed towards the roads and conveyed to topographic low points by high kerbing. In addition a number of open drainage channels convey the water to retention basins and away from the townsite. There is a network of interconnected channels throughout the site which are aided by strategically placed retention basins. These retention basins retain stormwater until it is able to be discharged.

A site visit in April 2014 identified three sumps, a number of designed attenuation basins and formal and informal stormwater channels across the townsite.

The basic principle of stormwater quantity management is to retain and infiltrate the first 15mm of stormwater. The DWMS specifies design criteria that can be achieved through the use of various Water Sensitive Urban Design (WSUD) strategies. As a minimum, retention basins are required to achieve the discharge requirements, however, the size of these basins can be reduced through the introduction of various WSUD techniques. Typical WSUD techniques are discussed in the DWMS but further investigation and negotiation with the DoW should be completed and presented in future LMWS documents.

Local improvements to the existing network may also be considered to cope with capacity problems in specific areas.

7.0 Precincts

The Structure Plan area has been divided into five precincts based on existing or future characteristics that differentiate them from each other. Figure 9 shows the precinct boundaries.

A plan has been prepared for each precinct that outlines:

- Statement of Intent, describing the desired character of the precinct including predominant land use.
- Main structural elements, such as roads, pedestrian routes, public open space, etc. In precincts where new development is proposed, it should be noted that the precinct diagrams are indicative only, as those precincts and development sites will be subject to detailed design based on detailed site investigations, which will provide further information to refine the precise location and extent of particular land uses, road alignments, etc.
- Built form and development approach, describing heights, spacing, orientation, architectural character, and/or other relevant elements that will help to achieve the desired visual and functional character of the precinct.

The precinct plans are summarised on the following pages. They will eventually become part of planning policy for Point Samson.

The precincts are:

- Precinct 1 – Town Centre and Tourism
- Precinct 2 – Marina
- Precinct 3 – Residential South
- Precinct 4 – Central Residential
- Precinct 5 – Residential North

Artist impressions of how future development in the Town Centre might look are provided in Figures 10 and 11, following Precinct 1.

A conceptual layout of how future development within the Marina Precinct might take place is provided in Figure 12, following Precinct 2.

It is important to appreciate that these figures are illustrations only, and not actual proposals.



Figure 9 – Precincts

Precinct 1 - Town Centre and Tourism

Statement of Intent

This precinct will be strengthened as the primary commercial, retail, tourism and recreational focus of Point Samson, centred on Samson Point Rd/Bartley Ct which will become a small but distinguishable 'main street' with a relatively intensive built form and well defined pedestrian environment, with strong visual and pedestrian links to the foreshore. The precinct will contain the greatest concentration and diversity of tourist accommodation in Point Samson. Interpretation of the town's rich history will be assisted by the presence of remnants of Point Samson's early life as a small but busy port such as the remains of the former jetty. The public realm of the precinct will link strongly to the enhanced public realm of the foreshore, which will include new foreshore parks and rehabilitation of degraded areas and vulnerable coastline.

Opportunities and Limitations

Primary opportunities for this precinct include: large landholdings in single ownership provide the opportunity for well integrated redevelopment over time; elevated land allows for new development above predicted future areas subject to coastal process, proximity to Town Beach and Honeymoon Cove; opportunity for establishment of coastal walk; potential to leverage Council controlled land to provide a site for a substantial new tourism development with excellent ocean views and beach access.

Primary limitations for this precinct are the setback requirements associated with ongoing coastal processes.



This precinct will be the focus of tourist accommodation, retail and recreational activity.

Objectives

- To create a precinct which attracts tourists
- To create an identifiable central place in Point Samson
- To create land assembly opportunities for viable tourism-oriented developments
- To manage and enhance the foreshore
- To maintain a casual human scale environment with a distinctive 'coastal fishing village' character
- To improve connectivity through development of an improved road system

Built Form

Buildings are to be no more than two storeys with form and materials consistent with the Pilbara Vernacular Handbook. Verandahs, simple roof forms with generous overhangs, designing for climate and durability are key requirements. Where possible, vehicles on private land should be hidden from street view.





Figure 10 – How the town centre could look from the SE (prepared by UDLA)



Figure 11 – How the town centre could look from the NW (prepared by UDLA)

Precinct 2 - Marina Precinct

John's Creek Boat Harbour is at capacity and struggles to adequately accommodate vessels during cyclones. DoT has given preliminary consideration to expanding the harbour to increase its capacity and to cater for the high demand for recreational boating in the Pilbara, but plans have not been progressed due to a lack of political priority and a lack of funding.

Statement of Intent

John's Creek boat harbour adjoins the southern portion of the townsite, providing an outlet for commercial fishing operations.

The design has been predicated upon the expansion of the harbour. The precinct will continue to provide a commercial boat harbour with supporting light industrial and landside facilities, but will evolve to include greater accommodation of recreational boating and tourism activities, as well as greater capacity to provide refuge for vessels during cyclones. With potential to expand the harbour northwards subject to necessary approvals, the harbour precinct could also include commercial tourism development such as short term accommodation and limited residential and tourist focused retail development. This tourism offer would provide depth to Point Samson's attractiveness as a destination for local, intra- and inter-state visitors, as well as international visitors. Development would connect back to the Point Samson local centre with pedestrian and local traffic links.

Opportunities and Limitations

Primary opportunities for this precinct include: possible expansion of the harbour to create a new recreational, tourism-based precinct; rationalisation of the existing harbour to enable some recreational uses such as boat pens and club facilities; upgrading existing boat launching facilities; development of tourism and residential uses – associated with any future harbor expansion. Land uses that may be considered within the 'Harbour land-side facilities' area extend, but are not limited to, tourism, car and trailer parking associated with the launching facilities, commercial, and public open space land uses.

Primary limitations for this precinct are: cost of expansion; potential disruption to mangroves if expansion occurs; setback requirements due to ongoing coastal processes.



John's Creek Boat Harbour is presently a commercial harbour with recreational boat launching facilities.

Objectives

- To create a tourism attractor for both day and overnight visits
- To create a recreational boating facility for public use
- To develop a harbour facility which can generate sufficient income to support proper ongoing maintenance
- To provide an alternative access road to divert traffic away from Honeymoon Drive
- To avoid damaging the viability of the mangroves and any related environmental or cultural values.

Built Form

Commercial buildings are to be limited to single storey and storage yards to be tidy and well maintained. Tourism facilities associated with any harbour expansion can be up to four storeys provided they do not obstruct views from adjacent residential areas on higher ground. Building form should be consistent with the form and materials outlined in the Pilbara Vernacular Handbook.

- A Possible boat pen area
 - B Possible harbour expansion for use as a public marina with pen facilities
 - C Possible future launching facilities
 - D Improved parking and launching facilities
- Harbour land-side facilities
 - Light Industry
- Major road network.
 All roads to be appropriately landscaped.
- Long-term inundation level.

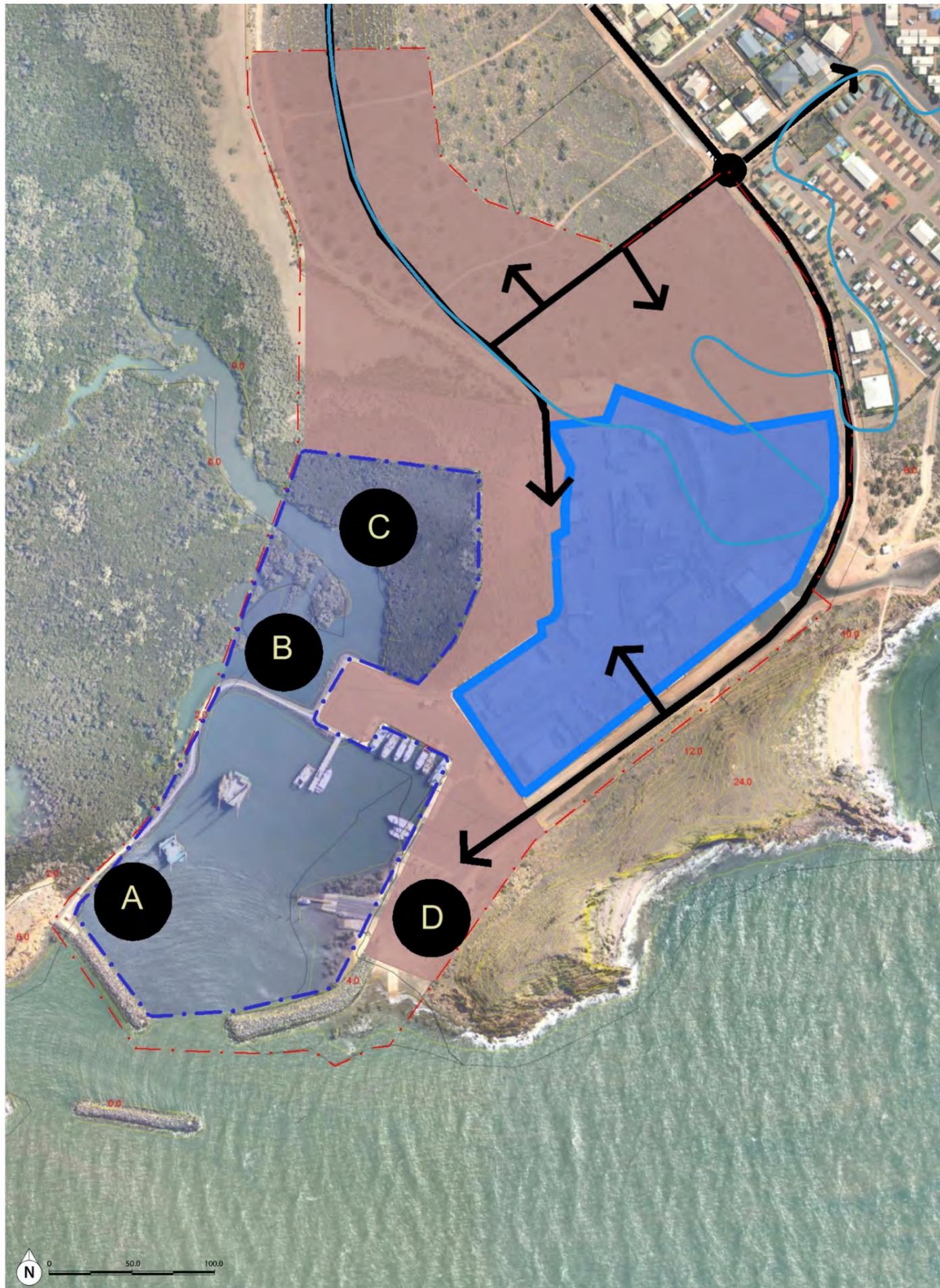




Figure 12 – Indicative conceptual layout for a redeveloped Marina Precinct

Precinct 3 - Residential South

Statement of Intent

The intent of this precinct is to provide an opportunity for residential expansion west of the established townsite along Honeymoon Drive on land that is elevated, with the potential to provide views from houses and public areas. The western extent of the precinct is defined by land exceeding 10% slope and the extent of predicted future potentially inundated land. A potential new road link west of the precinct to John's Creek Boat Harbour would carry industrial and general traffic associated with the harbour.

Opportunities and Limitations

Primary opportunities for this precinct include: provision of land for additional housing; provision of pedestrian connections to existing parts of Point Samson; changing the character of Honeymoon Drive; maximisation of view opportunities.

Primary limitation of this precinct is the lack of a centralised waste water treatment system which requires each residential block to be a minimum of 1,000m².



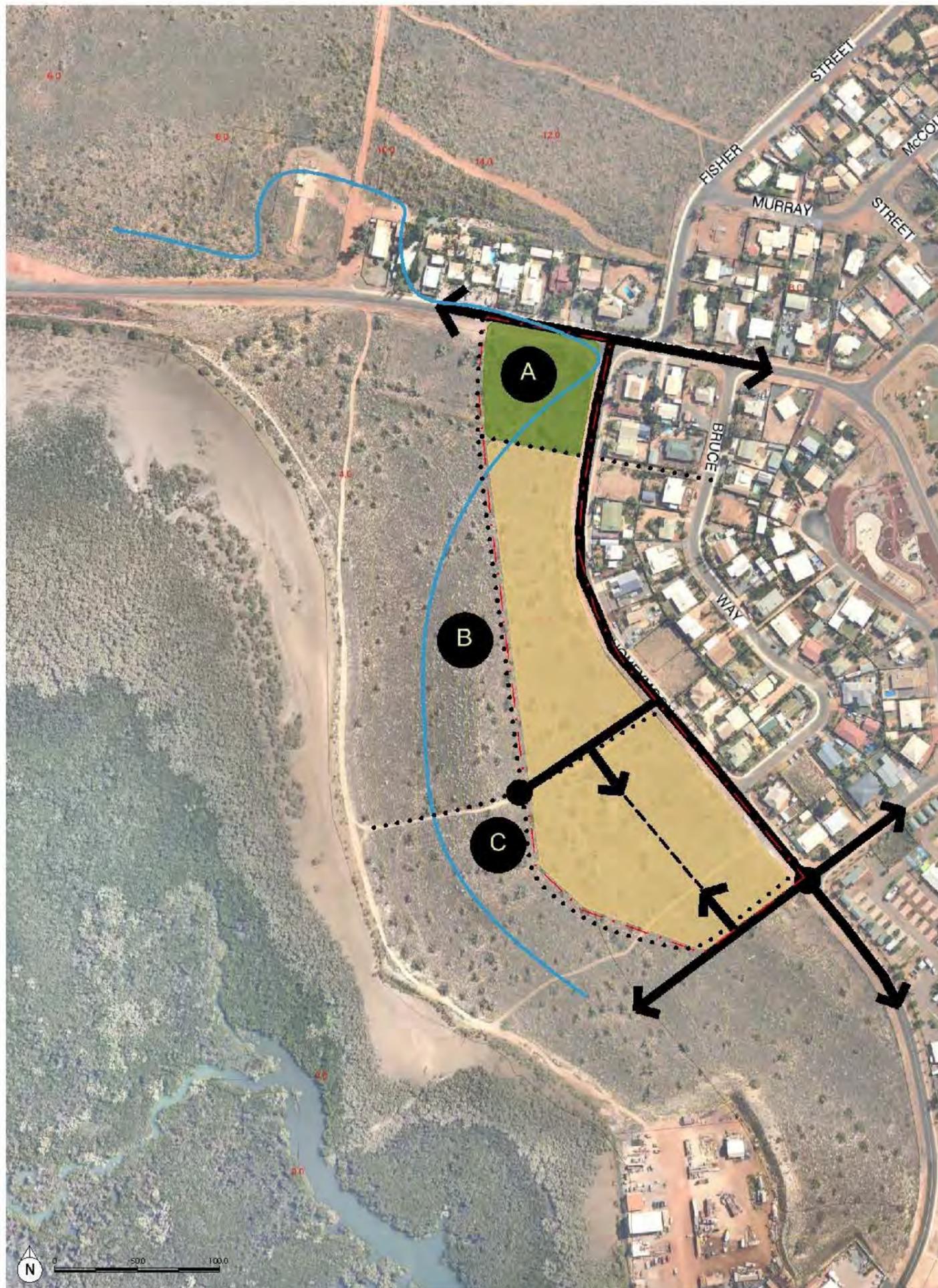
Land generally east of the ridgeline could be suitable for residential development

Objectives

- To create a desirable residential subdivision
- To landscape Honeymoon Drive and transform its character into a pedestrian-friendly environment
- To provide a public viewing opportunity on available high ground
- To ensure that a new subdivision is configured and orientated to maximize views
- To create well defined pedestrian pathways
- To ensure all streets are provided with appropriate tree planting.

Built Form

Houses are to be no more than two storeys. Buildings should be consistent with desirable form and materials represented in the Pilbara Vernacular Handbook. Vehicles on private land should not visually dominate the street. Verandahs, simple roof forms with generous overhangs, designing for climate and durability are key requirements.



- A** Low lying area not suitable for development
- B** Land form too steep for development
- C** Public lookout on high ground
- Residential development comprising minimum 1,000m² lots
- Public open space
- Major road network.
All roads to be appropriately landscaped.
- Long-term inundation level.
- Major pedestrian network

Precinct 4 - Central Residential

Statement of Intent

This precinct comprises the established primary residential area of Point Samson. The intention is for this precinct to continue to provide low density housing with limited compatible tourism uses such as bed-and-breakfast accommodation and holiday home rentals. It is anticipated that the majority of housing will remain as single dwellings but if site requirements can be met, consideration to grouped and multiple dwellings will be given. Public realm improvements will be achieved primarily by the provision of street tree planting to provide shade, and infill footpaths where necessary.

Opportunities and Limitations

Building stock age and condition varies greatly and there is no discernable local vernacular architectural style. There is opportunity for gradual renewal of this area through ad hoc redevelopment of sites and renovation of existing buildings. Centennial Park could be supplemented through provision of more shade and planting to enhance its function as public open space. Some low lying areas are subject to localised flooding during storm events due to inadequate capacity of existing drainage infrastructure.



Established residential area undergoing incremental redevelopment

Objectives

- Provide for primarily permanent residential accommodation
- Improve public realm with street tree planting and completion of footpath network.
- Improve overall quality of building stock through application of Pilbara Vernacular design guidance to new development.

Built Form

Houses are to be no more than two storeys high. Buildings should be consistent with desirable form and materials represented in the Pilbara Vernacular Handbook. Vehicles on private land should not visually dominate the street. Verandahs, simple roof forms with generous overhangs, designing for climate and durability are key requirements.

- A** Existing residential areas unchanged except for upgrade to streets
 - B** Well-signed junction indicating choice between access to Harbour or Town Centre
 - C** Changes to surface treatments to guide main traffic toward Town Centre
- Existing residential development
 - Public open space
 - Small public parking areas.
 - Major road network. All roads to be appropriately landscaped.
 - Major pedestrian network
 - Street landscaping
 - Long-term inundation level.

Precinct 5 - Residential North

Statement of Intent

The portion of this precinct east of Fisher St is intended to provide for residential expansion in the short to medium term, interfacing and connecting to the established part of Point Samson. Elevated with extensive views, this residential area would be highly desirable and could include public open space that provides viewing opportunities. West of Fisher St future investigation of soil conditions, topography, archeology and bushfire risk would be required to define the exact extent of residential development, should demand require it. It is intended that development will be situated so as to have minimal visual impact from the Roebourne – Point Samson Road, which is the sole road approach to Point Samson defined by a ridge of low hills and rocky outcrops on its northern side, and views across the mangroves on its south.

Opportunities and Limitations

Primary opportunities for this precinct include: extensive views across Point Samson to the ocean, mangroves and towards Wickham; adjacent to established residential area with extensive gazetted road frontage to the eastern portion. Defined catchment for drainage.

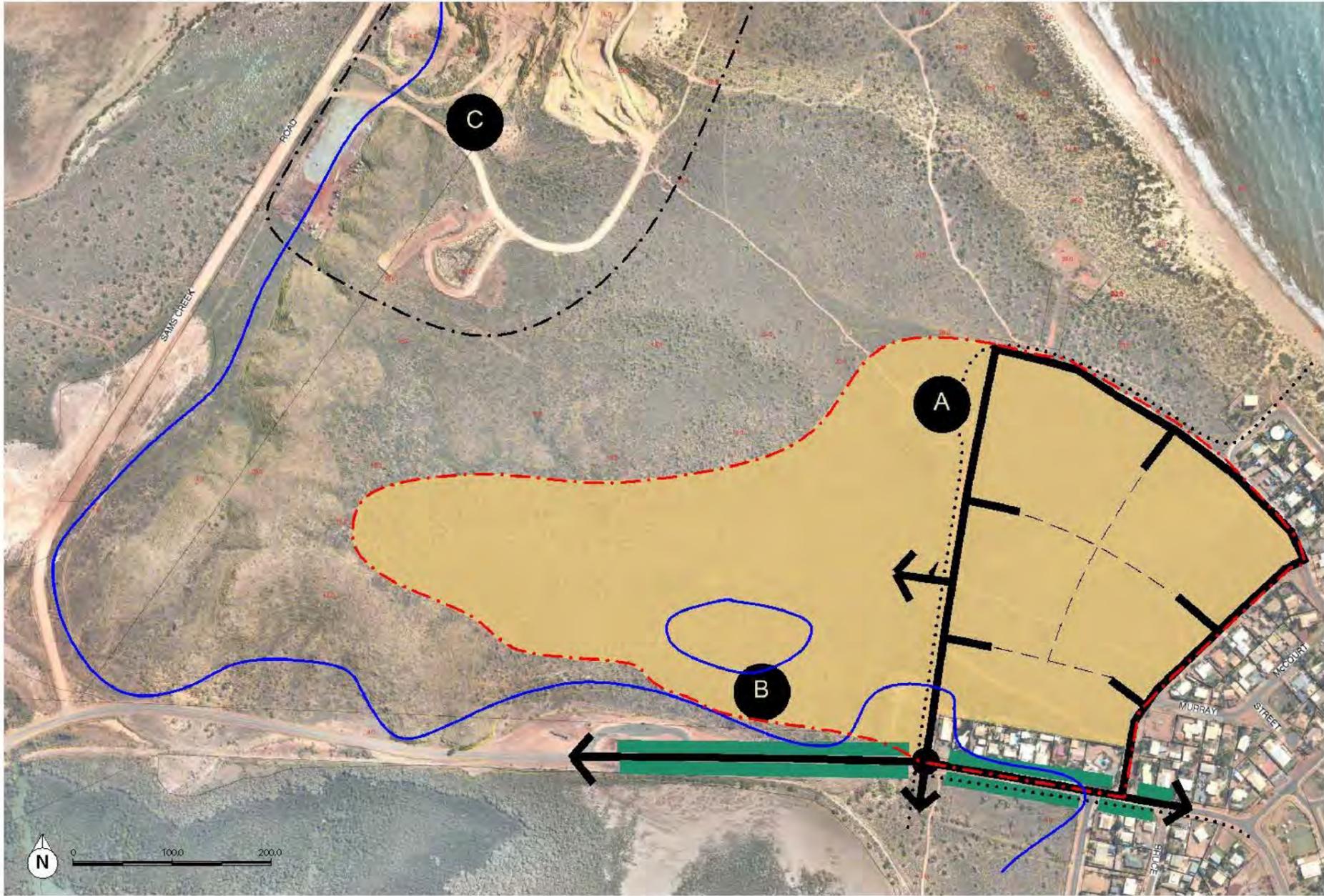
Primary limitations for this precinct are: lack of a centralised waste water treatment system which requires each residential block to be a minimum of 1,000m²; sand mine buffer will prevent development within parts of the precinct as long as it is operational; sloping land to the west; surrounding conservation reserve. Further investigation of the soil conditions in this area are required to determine the capacity of the land to accommodate on-site wastewater disposal. Being surrounded by grasslands and dune vegetation, the interface of this development with the conservation area would have to be carefully considered.

Objectives

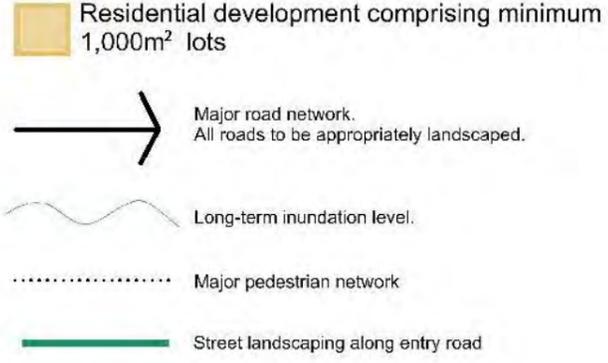
- To create a desirable residential subdivision with sensitive interface with established residential area and surrounding conservation lands
- To provide an appropriate buffer to minimise bushfire risk.
- To provide a public viewing opportunity on available high ground
- To provide for a new subdivision that is configured and orientated to maximise views
- To create well defined pedestrian pathways to established parts of Point Samson
- To ensure all streets are appropriately landscaped

Built Form

Houses are to be no more than two storeys. Buildings should be consistent with desirable form and materials represented in the Pilbara Vernacular Handbook. Vehicles on private land should not visually dominate the street. Verandahs, simple roof forms with generous overhangs, designing for climate and durability are key requirements.



- A** High land suitable for a lookout park
- B** New housing development set well back from entry road
- C** Sand mining area generates significant buffer zones which may preclude adjacent development in the medium-term



Proposed development area adjoins established area and enjoys excellent views.



New development would be set behind the ridge to minimise visual impact from Roebourne - Point Samson Road.

8.0 Implementation

8.1 Staging

Residential

Demand for new development land in Point Samson is not currently high but the intention of the Urban Development Zone is to allow the preparation of Local Structure Plans that will enable development to proceed as future demand dictates. The Local Structure Plans will include an indication of development staging.

Figure 13 is an indicative staging plan for residential development. Within remaining electrical capacity either of the areas coloured blue on the plan could potentially be developed. The blue areas represent the two most logical starting points for development based on the ability to connect into existing services. However no area could be developed without upgrading water services. Actual staging will depend on the outcomes of detailed site investigations and economic conditions at the time that development is proposed.



Figure 13 – Indicative residential staging plan

Stage 1 – Precinct 5 (east)

This elevated land with excellent views is contiguous with existing residential development and existing road reservations and is the most likely first stage for residential development. Rezoning of the land to Urban Development would be a prerequisite. A local structure plan could be prepared in parallel with rezoning but could not be adopted until the rezoning had been finalised.

The blue area marked 1a is approximately equivalent to 30, one hectare lots, which is the most that the existing power supply is likely to support. One of the requirements for a local structure plan is to indicate the likely staging, which can be better estimated at that level of planning.

Stage 2 – Precinct 3

In principle, that part of Precinct 3 – Residential South that is zoned 'Urban Development' and designated at Development Area 18 (DA 18) in TPS8 could proceed to local structure planning immediately, however the preference would be to include the whole precinct within a single, comprehensive Local Structure Plan.

The configuration of the existing zone does not cover the whole of this precinct. Further investigation of the land that is required to determine the most appropriate western boundary taking into account forecast sea level rise and topography so as to avoid steep land and minimise visual impact from the approach to Point Samson from the west also suggest that this area would be better as the second stage of residential expansion. This precinct will include an area near Point Samson – Roebourne Road that will provide drainage services to a wider area of the townsite

Stage 3 – Precinct 5 (west)

The area west of Cliff Street is considered to be a long term proposition, as it is the most remote from existing development and closer to the operational sand mine on Sam's Creek Road. It is unlikely that development of this area could be contemplated for many years.

Roads

Roads within future development areas will be subject to detailed design according to proposed subdivision layout, however there are some recommended changes to the road network within established areas. These are primarily intended to improve circulation and to regularise routes such as Sea Eagle Way that are presently achieved by easements across private land. In addition, there will be a need to provide alternatives to roads that are likely to be affected by future coastal processes. The particulars of the proposed road network are described in Section 5.0 (Movement Network).

In terms of staging, new roads will be provided as the opportunity arises, which will for the most part as redevelopment takes place and the road reserve can be created. For the section of Miller Close that runs parallel to the foreshore, a staged retreat will be necessary over time as the road is likely to be affected by coastal retreat, and foreshore protection and restoration measures will need to be implemented, as described in the Point Samson Foreshore Design Report (Cardno 2015). Figure 15 overleaf shows a landscape concept from that report.

Whilst no specific timeframes can be applied, Figure 14 illustrates the likely phasing of changes to the road network.

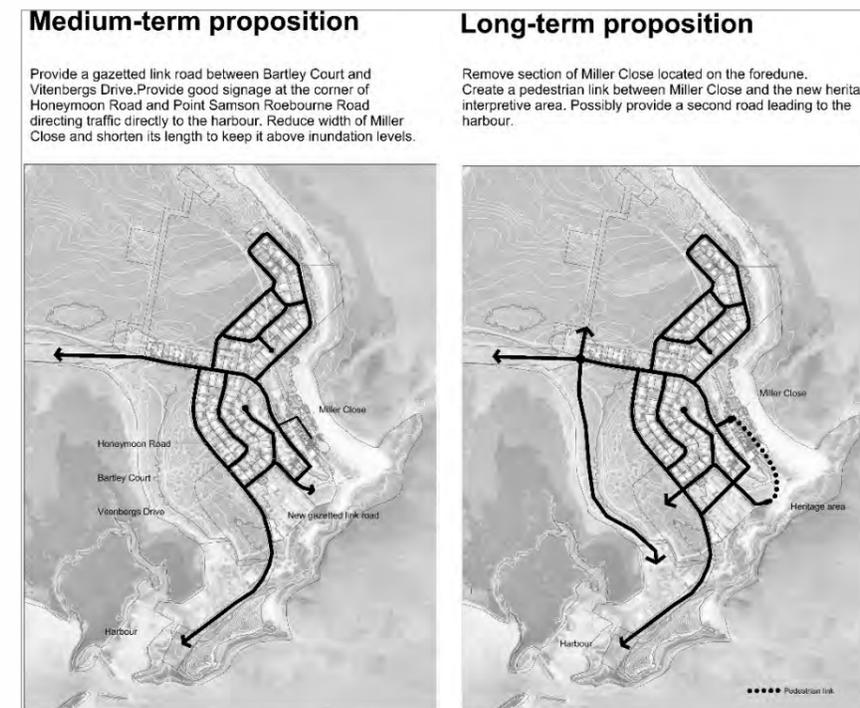


Figure 14 – Medium and Long Term Staging of Roads

8.2 Local Planning Scheme

The Structure Plan identifies proposed zoning, which for much of the area will require amendment to current zoning before development could progress. The intention is for these to be reflected in LPS9, but if for any reason progress on implementation of that scheme is delayed, it may be necessary to amend TPS8.

To the extent that current zoning and scheme provisions allow, this Structure Plan can be used as a guide for the assessment of proposals for development that are submitted prior to the gazettal of LPS9 or amendments to TPS8.

8.3 Local Structure Plans

Local Structure Plans will be required for urban areas identified as Urban Development before development or subdivision will be permitted. Structure Plans are required to be prepared in a manner consistent with that recommended in the WAPC *Structure Plan Preparation Guidelines*.

Local Structure Plans are statutory documents that provide far greater detail about how future development and subdivision will take place and how they will be implemented, including requirements for any developer contribution scheme considered necessary to fund infrastructure improvements required beyond the local structure plan area.

Preparation of Local Structure Plans will include site surveys to identify the presence of any significant flora, fauna or ecological communities that may occur within each site. Site surveys to identify aboriginal heritage will also be necessary.

Local Development Plans may be also required for smaller scale development, such as sites within the proposed Harbour zone.

The areas identified as Special Control Areas will require the preparation of Development Plans to demonstrate a co-ordinated approach to development consistent with orderly and proper planning.

8.4 Department of Transport

John's Creek Boat Harbour is within the control of the Department of Transport, which has ultimate responsibility for the design, construction and management of the harbour and associated land.

Implementation of Structure Plan recommendations for development in and around the existing harbour will be subject to detailed design and business cases put forward by DoT.

Precinct 2 – Marina, and the associated proposed Special Control Area extend slightly beyond the present DoT landholding. It is likely that if DoT does elect to pursue an expanded harbour precinct that it will seek to include the additional area within its control.

It is noted that some members of the Point Samson community expressed dissatisfaction with the degree of control that DoT has over the only industrial sites in the town, including the fact that these sites are only available as leaseholdings.

This issue cannot be resolved by the Structure Plan nor by the planning system more broadly, however it can be taken up directly with DoT to seek a mutually acceptable solution.

8.5 Foreshore Plan

A foreshore management plan is an essential component of coastal hazard assessment and adaptation planning.

The foreshore plan for the coastal area within Precinct 1 – Town Centre and Tourism will inform the ongoing management of the Point Samson foreshore, including remediation where required. Preliminary foreshore implementation plans were prepared by Cardno following a detailed site investigation in November 2014, and were informed by background information, including the Foreshore Management Plan (Essential Environmental, 2014), Point Samson Foreshore Assessment (Point Samson Community Association 2013), Foreshore Enhancement Plan (Astron, 2013) and the Draft Structure Plan (Cardno, 2015). Individual projects on the foreshore will be subject to detailed design and costing prior to implementation.

Figure 15 shows the Landscape Concept Plan from the Foreshore Design Report (Cardno, 2015). An implementation and works plan for some of the projects shown in the figure is being prepared by the City.



Figure 15 – Landscape Concept Plan – Point Samson Foreshore

8.6 Priority Actions

- Finalisation and adoption of a Foreshore Management Plan for Point Samson. It is noted that work on this is already underway.
- Reinitiate negotiations with the Department of State Development to designate the portion of Reserve 35813 between the Cape Lambert operations and Point Samson as 'Industrial Buffer and Landscape Protection'.
- Define requirements for future road and car parking at the foreshore end of Vitenbergs Drive and initiate closure of excess portions and acquisition of the land by the City of Karratha.

Point Samson Structure Plan

Part B: Supporting Information

May 2015



9.0 Introduction

Part B summarises technical and background information relevant to the Structure Plan area that has been reviewed or carried out to inform the preparation of the Structure Plan. Key issues and implications (opportunities and constraints) are highlighted, and conclusions and recommendations are drawn from the analysis.

It is important to acknowledge that most of the information reviewed was commissioned by the City to inform the preparation of the City of Karratha Local Planning Strategy and other work, rather than being specifically undertaken for this Structure Plan. These documents are acknowledged in the References section of this report.

Work that was commissioned specifically to inform the Structure Plan was:

- Additional coastal setback investigation to provide a more site specific assessment of parts of the Point Samson coastline than was available from earlier work (Cardno, 2014).
- Wastewater servicing investigation (Cardno, 2014).
- District Water Management Strategy (Cardno, 2015).

9.1 Purpose

The purpose of preparing the Structure Plan is to guide future growth of Point Samson to accommodate a population of approximately 500 people, with the potential of accommodating up to 1,000 people, in a logical and staged manner that can meet demand as and when it arises.

The specific objectives for Point Samson are to:

- Develop an identifiable Local Centre with a coastal aspect.
- Facilitate the development of Point Samson as a sustainable tourist node where compatible with the social and environmental setting.
- Retain the "fishing village" atmosphere of Point Samson.
- Accommodate additional residential land release.

9.2 Role of Point Samson in the Pilbara

The *Pilbara Planning and Infrastructure Framework* (WAPC 2012a) identifies Point Samson as a 'townsite' within the hierarchy of settlements, below major towns (eg: Wickham, Onslow), sub-regional centres (none identified) and cities (Karratha).

Point Samson is acknowledged as having a well-defined and unique strategic role within the Pilbara. This strategic role should be maintained and further enhanced. Point Samson's recreational lifestyle, tourism and commercial fishing industries present a positive synergy which should be leveraged.

9.3 Development Objectives

Accommodate an ultimate population of up to 500 people, with the potential of up to 1,000 people, in a logical and staged manner that can meet demand as and when it arises.

Future development will need to be:

- Low impact
- Environmentally sensitive
- Allow for coastal processes/ predicted sea level rise
- Economically and socially sustainable

9.4 Population Targets and Capacity for Growth

Point Samson will retain its small population base, which contributes to its character and unique lifestyle feel. Expansion of Point Samson is not required to accommodate forecast population growth in the Pilbara. However there needs to be provision for some growth to provide lifestyle and housing options for Pilbara residents, and provide for modest population growth to help support local businesses and allow for an enhance tourism offer. An increased tourism market in Point Samson may impact on the character of Point Samson if not carefully managed. This is a relevant consideration in the preparation of the Structure Plan.

Population growth is also limited in Point Samson due to the likelihood of storm surge events. A 1:100 year ARI event would result in Point Samson becoming an island, disconnected from the mainland, (Planning Solutions 2013b).

Due to this risk, it is preferred that the growth of Point Samson remains limited. A population between 300 and 500 is considered to be an appropriate target for the next 20 years.

The Structure Plan responds to these considerations by identifying future growth areas that could accommodate population growth to 500, with potential further growth if demand permits to an ultimate population of up to 1,000, in areas outside predicted sea level rise and extreme inundation events.

Infill and expansion of tourism within the existing townsite is anticipated, including the potential for diversification of activity around John's Creek Boat Harbour.

10.0 Land Description

10.1 Area and Land Use

The Structure Plan area covers approximately 371 hectares of land which includes the townsite and immediate surrounds, as shown in Figure 16.

The primary land use within the townsite is residential dwellings with some commercial and tourism uses including short term facilities such as two caravan parks, holiday chalets, a resort, holiday home rentals and bed-and-breakfast accommodation. John's Creek Boat Harbour adjoins townsite to the south.

A small commercial precinct is located at Bartley Court, including a tavern, general store and a restaurant. A community hall, volunteer fire brigade shed and a small range of other community facilities exist, mainly centred on Bartley Court.

Parks are limited, with grassed areas and a playground around the community centre, and a sculpture park with some seating, paths and immature tree planting. The main focus of recreation is the beach. There is no active playing field or school in the town.

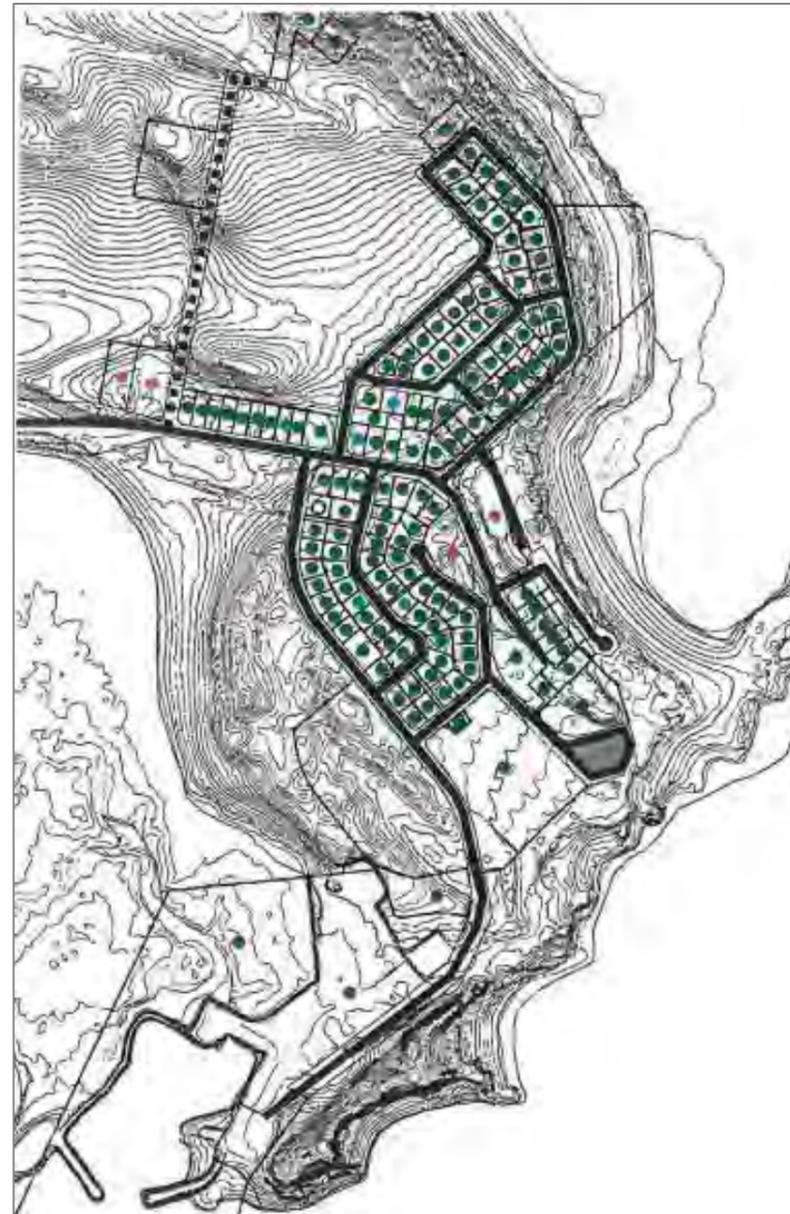
A sand mine is located in the north of the Structure Plan area on Sam's Creek Road. Otherwise the townsite is surrounded by undeveloped land, coast and mangroves. These land uses are discussed in more detail later in this document.



Figure 16 – Structure Plan Boundary

10.2 Land Ownership and Tenure

The *Point Samson – First Elements of a Structure Plan* analysis (Shire of Roebourne, 2012) provided generalised land ownership information for the town. As shown in Figure 17 and Table 3, all but one of the town lots have been developed, with 87% of developed lots being privately owned. A small number of lots are identified as being in the ownership of 'WA Government', 'Shire' and 'Aboriginal' (it is not clarified in the document what exactly referred to by the latter as it is not mapped).



Source: Shire of Roebourne 2012

Figure 17 – Town Land Ownership

Table 3 – Town Land Ownership

Ownership	Built-up		Vacant	
	No	%	No	%
Education	0	0	0	0
WA Government	5	4	0	0
City	4	4	1	100
Private	97	87	0	0
Department of Housing	0	0	0	0
Aboriginal	5	5	0	0
TOTAL	111	100	1	100

Source: Shire of Roebourne 2012

Ministerial Reserve 35813

Ministerial Reserve 35813 is approximately 409.2 hectares in area. The majority of the Reserve extends well beyond the Structure Plan area, to the north. It is vested in the Minister for State Development.

The City of Karratha has previously opposed any industrial development within the reserve that would have a deleterious impact on Point Samson or its associated coast, and has lobbied for the area between the Cape Lambert operations of Rio Tinto and Point Samson to be redesignated as 'Industrial Buffer and Landscape Protection'. However this has not yet occurred and is a source of considerable concern within the community and adds uncertainty to future development plans.

John's Creek Boat Harbour

John's Creek Boat Harbour occupies Reserve 39027 (Lot 383) and Reserve 39027 (Lot 288) which combine to cover an area of approximately 19.3 hectares. The harbour and other land within the reserve is managed by the Department of Transport (DOT). DoT leases land within the industrial area to a variety of businesses with marine-focussed activities.

Vitenbergs Drive

The termination of Vitenbergs Drive near the foreshore is unusual in that it includes an enlargement that is presently developed as a large car park. The shape of the road reserve at this point is the legacy of historic land uses related to the former port operations at the old jetty, and the presence and size of the car park in this location is the result of the need to seal the surface after remediation work to remove asbestos from the soil.

The road reserve and car park is largely excess to requirements and provides a possible infill development opportunity if part of the land could be converted to freehold.

Sea Eagle Way

The vehicular connection between Bartley Court and Vitenbergs Drive is shown on some maps as Sea Eagle Way, although some community members did not recognise the name when consulted. It is generally perceived as a public road but in fact it is three privately owned lots with an easement allowing public carriageway across them. This is not an ideal situation for an important vehicle link. The Structure Plan identifies an approach to address this.

10.3 Native Title

The registered native title body corporate for the Ngarluma portion of the site, the Ngarluma Aboriginal Corporation (NAC), is the legal entity that holds the native title rights of the Ngarluma native title holders. This includes the right to protect and care for sites and objects.

According to the Amani report (2013) prepared for the City of Karratha, a Native Title Claim has been lodged with the Native Title Tribunal for the Point Samson townsite. This issue requires further investigation.

The High Court and the (Commonwealth) *Native Title Act 1993* established that native title may exist in relation to State land – except where there are, or have been, certain acts or tenures recognised by the Act as having extinguished native title. Crown land managed by an authority prior to 23 December 1996 (date of the Ward determination) is not subject to Native Title. Unallocated Crown Land will be subject to the processes of relevant legislation.

The Act sets down requirements for dealing with Crown land potentially subject to native title, where the State proposes to carry out works on, grant interests in, or legislate over, that land. Such actions are termed 'future acts' by the Act. Native title parties are granted rights to negotiate with the State or other parties wishing to undertake future acts, such as development of the land.

The Act also provides a way for dealing with Crown land potentially subject to native title, through first undertaking compulsory acquisition. Where the intention is to subsequently grant an interest in that land (eg. sell or lease it) to a private party - commonly called 'third party grants' - special provisions apply.

As identified in section 2.2, there are significant areas of unallocated Crown land (UCL) within the Structure Plan area, and development of these areas would be considered to be 'future acts' and would be subject to the provisions of the Act.

In addition, section 104 of the *Land Administration Act 1997 (WA)* secures a right to the State's Aboriginal inhabitants to have access over unfenced, unimproved parts of pastoral leases for traditional hunting.

Aboriginal parties have special rights to use unallocated Crown land for traditional purposes, except to the degree restricted by any valid law.

11.0 Planning Framework

11.1 Local Planning, Zones and Reservations

City of Karratha Town Planning Scheme No. 8

All of the Structure Plan area is included in TPS8. TPS8 is being reviewed and a new Local Planning Strategy prepared, which will inform the preparation of a new Local Planning Scheme No. 9 (LPS9).

Figure 18 is an extract of the TPS8 Scheme Map that shows the zones and reservations currently applicable in Point Samson.



Figure 18 – Extract from LPS8 Scheme Map

Much of the land within the Structure Plan area surrounding the townsite is reserved as 'Conservation Recreation and Natural Landscapes'. Within the townsite most of the land is zoned 'Residential' with a residential density of 'R10'. The southern end of the townsite where the Cove Caravan Park is located is zoned 'Tourism'. The general store and tavern are within in the 'Town Centre' Zone. The townsite foreshore is reserved 'Parks, Recreation and Drainage'. The land on the eastern side of the boat harbour is zoned 'Industry'. The harbour itself is unzoned, being shown as part of the sea.

Land on the south-west corner of Point Samson-Roebourne Road and Honeymoon Road is zoned 'Urban Development - Development Area 18'. The development requirements for this site are outlined below. Land on the north side of Point Samson – Roebourne Road at the entry to town is zoned Tourism. The land immediately north between Cliff and Fisher Streets is zoned Rural.

An extensive area of land to the west of the 'Conservation Recreation and Natural Landscapes' Reserve is zoned 'Strategic Industry' and primarily encompasses the Cape Lambert Precinct (as defined in the Scheme) outside of the Structure Plan area (refer to section 15.3).

The key entry road (Point Samson - Roebourne Road) is reserved as a 'State and Regional Road'. It changes to a 'District Road' Reserve at the townsite entry at Cliff Street and this reserve continues into Bartley Court and part of Miller Close, and along Honeymoon Road to John Creek Boat Harbour.

Clause 5.12 of TPS8 outlines a number of objectives for Point Samson, as follows:

1. Develop an identifiable Town Centre with a coastal aspect;
2. Facilitate the development of Point Samson as a tourist node where compatible with the social and environmental setting;
3. Retain the "fishing village" atmosphere of Point Samson; and
4. Accommodate additional residential land release.

The Structure Plan area is located within the Storm Surge Risk Area (Special Control Area), which is subject to a number of Scheme provisions that may impact on development. In particular, Council is required to consider any land that is prone to 1 in 100 year storm surge events.

It should be noted that although TPS8 includes a definition for 'Industry-Extractive' that includes the extraction of sand, provisions in the *Mining Act 1978* override the *Planning and Development Act 2005* (and therefore TPS8 and any future local planning schemes).

Point Samson Development Policy

City of Karratha Development Policy 14 (DP14) sets out development requirements for the Point Samson Township. The Policy outlines the City's assessment criteria when considering new planning applications and gives specifics on performance -based and legislated development standards.

DP14 forms part of TPS8 and seeks to meet the following objectives;

- To provide standards and guidance for development within the Point Samson township.
- To ensure that development is consistent with the Point Samson precinct objectives contained in Part V of the Shire of Roebourne Town Planning Scheme No. 8 (TPS):
- To protect and enhance the natural beauty of the coastal area and to give full consideration to the objectives and principles for the State's Coastal Planning Policy 2.6.

- To ensure that development adjacent to coastal areas is compatible with the environment and does not result in adverse impacts on coastal processes.
- To minimise the risk of erosion, pollution and destruction of the environment through poorly managed development.
- To recognise Point Samson as a strategic tourist node.
- To ensure that development is appropriate to the locality with particular regard to the proximity of residential or sensitive land uses, the existing road network, and the likely emission of noise, vibration, odour or other pollutants.
- To encourage landscaping that complements the streetscape and does not compromise the safety of pedestrians or motorists.
- Outside of caravan parks and camping grounds, to discourage development of a temporary or transient nature.
- To ensure adequate off-street car parking is provided having regard to the highest potential use of the development site.
- To limit the impact of signage and encourage its integration into existing or proposed development.

As part of the proposed Local Planning Scheme (LPS9) the precinct plans will form the basis of a new Development Policy.

Draft City of Karratha Local Planning Strategy

A Local Planning Strategy for the City of Karratha is in the process of being prepared. A series of supporting technical investigation papers covering a number of land capability and development issues have been prepared and these will guide its preparation.

The Local Planning Strategy reinforces the strategic role of Point Samson as a small coastal settlement with a tourism focus.

11.2 Regional Planning

State Planning Strategy 2050

The State Planning Strategy (2014) does not specifically mention Point Samson but discusses future strategies for the Pilbara Region. The Pilbara Cities initiative aims to develop Karratha into a city which will attract more permanent residents. Target areas include improving access to high standards of education, health facilities and diverse employment areas.

The Strategy notes that a key factor in the success of the initiative will be to reduce the cost of living within the Pilbara cities. These initiatives may have flow-on effects for Point Samson, where an increased number of residents within the region may result in more visitors to Point Samson.

Pilbara Planning and Infrastructure Framework

The *Pilbara Planning and Infrastructure Framework* (PIF) released by the WAPC in 2012 identifies Point Samson as a village/community settlement, with Wickham shown as a major town. Port Hedland and Karratha are each identified as a 'Pilbara City'.

The PIF states that the scale and character of Pilbara settlements will change significantly over the next 25 years. While there are no significant new permanent settlements envisaged for the region, some will undergo major expansion while others will experience more modest growth and potentially even decline. The PIF anticipates that fly-in fly-out will have a lesser role in the working arrangements throughout the Region as the level of services, facilities and general amenity within the settlements are improved, making them more attractive places to live.

It is possible that Point Samson may be visited more often as a function of an increased regional population. If the increase in visitors is significant then the adequacy of existing facilities within Point Samson which cater to tourists/short-stay visitors may need to be considered.

The PIF notes that John's Creek Boat Harbour performs an important off-shore servicing and marine recreation role but that it may be appropriate to consider the existing role and operations of the harbour in order to adequately plan for the future of the harbour within the context of the Structure Plan area. The demand for access to the harbour facilities is heavily impacted by the support industries associated with many of the large scale projects at various Pilbara locations.

The PIF acknowledges that Point Samson's attractive coastal location is likely to attract additional high quality tourist development. However, the importance of maintaining the fishing-maritime character of the town is acknowledged. In addition to this, maintaining a general high standard of urban design and building design is also important. It is evident that Point Samson will continue to rely on Wickham for local community and commercial services and Karratha for higher order community and commercial services.

11.3 State Policies and Initiatives

State Planning Policy 2.6 – State Coastal Planning Policy

The most recent version of the policy was released in 2013 by the Western Australian Planning Commission.

The purpose of this Policy is to provide guidance for decision-making within the coastal zone, which is particularly relevant to Point Samson. This includes the establishment of foreshore reserves, managing development and land use change, and protecting, conserving and enhancing coastal values.

SPP 2.6 requires that adequate coastal hazard risk management and adaptation planning is undertaken where existing or proposed development or landholders are in an area at risk of being affected by coastal hazards over the planning timeframe.

Section 4.7.3 provides analysis of the expected coastal processes which will affect the site.

Coastal hazard risk management and adaptation planning guidelines 2014

Coastal zones are vulnerable to adverse impacts from inundation and erosion. The risk to the environment from climate change is influenced by the level of preparedness and response of the community and its recovery capacity.

SPP2.6 supports a risk management approach to adaptation planning for coastal hazards in Western Australia. The WAPC has issued the Coastal Hazard Risk Management and Adaptation Planning Guidelines to more detail on coastal hazard risk management and adaptation planning (CHRMAP).

The document is designed to assist statutory decision-makers (e.g. local governments, State government agencies, the WAPC and the State Administrative Tribunal) to:

- consider coastal hazards and to evaluate their likelihood and the consequence for specific assets;
- identify realistic and effective management and adaptation responses to those risks; and
- prioritise the management and adaptation responses.

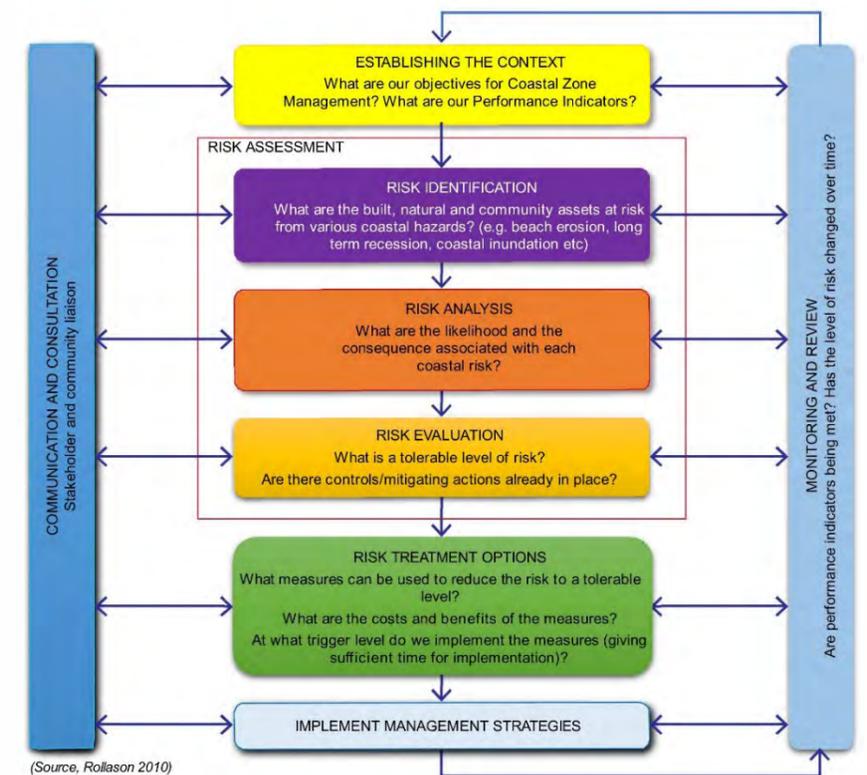
As a minimum CHRMAP should include the following elements:

- Establish the context;
- Coastal hazard risk identification/vulnerability assessment;
- Coastal hazard risk analysis;
- Coastal hazard risk evaluation;
- Coastal hazard risk adaptation planning; and
- Monitor and review.

The CHRMAP is focussed on the coastal zone, meaning the areas of water and land that may be influenced by coastal processes within the planning timeframe. It does not include assessment of possible impacts or adaptation strategies outside the coastal zone.

The CHRMAP is specifically designed to address potential adverse impacts from erosion and inundation hazards (in particular where they will be amplified by climate change and sea level rise) upon assets in the coastal zone. It should specifically target coastal risks that are identified as unacceptable/intolerable, and ensure management and adaptation measures are formulated to reduce these risks down to tolerable or acceptable levels.

Figure 19 is adapted from the guidelines and shows the process to be followed in preparation of a CHRMAP.



(Source, Rollason 2010)

Image adapted from WAPC 2014

Figure 19 - Risk management and adaptation process adapted to coastal planning flowchart

12.0 Site Conditions and Environment

12.1 Climate

Point Samson experiences an arid to semi-arid climate which is typical of the greater Pilbara region.

The Bureau of Meteorology webpage [BoM, 2007, Climate of Port Hedland, http://www.bom.gov.au/weather/wa/point_samson/climate.shtml (accessed 12 March 2014)] indicates that the Pilbara Region is located in the arid-tropics, with low and variable rainfall experienced throughout the area. Annual rainfall varies from 250mm to 400mm. The region is prone to severe cyclones which occur predominantly between January and March and account for the majority of rainfall in the region.

Any future development will need to be designed to respond appropriately to the climate, both structurally and for efficiency.

12.2 Landform and Soils

The site is characterised by a number of natural features including sandy beaches, coastal dunes, remnant dunes, rocky coast, limestone cliffs and outcrops and tidal mudflats with dense mangal (mangrove). Undeveloped areas north of Point Samson – Roebourne Road consist of low, undulating red sand dunes.

Point Samson is situated over the Pilbara fractured rock aquifer. This aquifer is typically made up of undifferentiated volcanic and sedimentary rocks in greenstone belts. Fractured rock aquifers are complex structures comprised of rock with typically low permeability separated by numerous randomly distributed infiltration pathways. This structure results in a difficulty to predict infiltration rates and pathways in areas where fractured rock is found. This will have implications for drainage and onsite wastewater disposal.

Six major soil types are present within the structure plan area (see Figure 20). Most of the existing Point Samson townsite and areas of mangroves are located over shelly sand in coastal dunes and old beach deposits (Qhms). The majority of the unallocated crown land in the centre and north of the site is situated over red-yellow wind-blown (Aeolian) sand and local sand ridges (Qs). Pockets of sedimentary rock in the form of banded iron formation, chert and ironstone also exist in this area, as well as along a narrow section at the end of the peninsula.

Acid Sulphate Soils

Acid Sulphate Soils (ASS) are naturally occurring soils that contain iron sulphide (iron pyrite) minerals. If disturbed by dewatering, drainage or soil excavation, the pyrites can oxidise thereby releasing iron compounds and sulphuric acid. These soils can result in environmental harm and damage to infrastructure. ASS that have been oxidised and resulted in the creation of acidic conditions are termed Actual ASS, and those that have acid generating potential but remain in naturally anaerobic conditions are termed Potential ASS.



Figure 20 - Geology

The potential for ASS to occur within the site may be assessed by examining the type of soil present and the depth to groundwater. These soils may occur in a variety of waterlogged soils such as dark organic rich soils and muds, peaty wetland soils, some pale grey sands and “coffee rock” (cemented iron and/or organic rich sands) found below the water table pyritic soils (Department of Environment and Conservation (DEC), n.d.)

Potential ASS are those which:

- have a pH close to natural (6.5-7.5);
- contain un-oxidised iron sulphides;
- are usually soft, sticky and saturated with water;
- are usually gel-like muds but can include wet sands and gravels which have the potential to produce acid if exposed to oxygen;

Actual ASS are characterised by:

- a pH of less than 4;
- contain oxidised iron sulphides;
- vary in texture; and

- often contain jarosite (a yellow mottle produced as a by-product of the oxidation process).

The WAPC provides broad-scale risk maps of ASS in WA. The map shows that the Structure Plan area covers multiple ASS risk mapping classifications. Portions of the centre of the site and the coast to the east and the south are classified as ‘no known ASS risk’. The majority of the area is classified as ‘moderate to low risk of ASS disturbance risk occurring within three metres of natural soil surface’. A small isolated section to the east of the site roughly 30m from the coast is classified as ‘high to moderate ASS disturbance risk occurring within three metres from surface’. ASS risk for the site can be viewed in Figure 21. Sampling undertaken by GHD (July 2013) along the western edge of the site showed the probability of ASS in this area to be very unlikely.

Any development proposed in the east of the site would require in situ ASS testing to be undertaken prior to construction and a management plan devised if necessary.



Figure 21 – ASS Risk Map

Contaminated Land

The Department of Environmental Regulation provides the Contaminated Sites Database which holds information on sites classified as: contaminated - remediation required; contaminated - restricted use; remediated for restricted use; or possibly contaminated – investigation required. A search of the database in April 2014 indicated that no contaminated sites are registered within the site. The closest registered contaminated site is located in the Anketell Point Industrial Area. That site is classified as contaminated – remediation required. The site will have no impact on the Structure Plan area.

It is known that historically Point Samson port was used to export asbestos mined at Wittenoorn and that this was once stored in bags prior to loading in areas near the jetty (see photograph at right, taken in 1971 by Aerial Surveys Australia and sourced from Battye Library). In around 1990 asbestos was removed from this area. However given the past industrial uses in the town, caution should be exercised in any site works to ensure that no contamination is present and if it is, that appropriate remedial or management measures be implemented.



12.3 Geotechnical

A field investigation undertaken by GHD from 18 to 22 June 2013 provided test pitting results for the Point Samson area (GHD, 2013).

Six test pits were carried out in total with the goal of determining soil profile observation and geotechnical assessment.

Sandy soils with variable silt and clay content are expected across the majority of the site with the possibility of bedrock outcrops occurring along the southern and eastern fringes. Ground conditions prove favourable for ground excavation with loose soils to a typical depth of 0.5m, which then grades to medium dense to dense with depth.

Only areas where outcropping cemented sands near beach areas could prove difficult during excavation but it could easily be excavated with the use of ripping or a rock breaker. Unsupported batters during excavation should be constructed at a maximum of 1V:2H.

Overall, there are no major geotechnical constraints restricting development of the site.

12.4 Flora, Fauna and Natural Areas

Vegetation

The vegetation of the Pilbara Region has been mapped with broad scale descriptions, generally based on strata and landform. Point Samson is located in the Fortescue Botanical District which is part of the Eremaeen Botanical Province (Beard 1975). The Fortescue Botanical District is further divided into nine physiographic units. Point Samson is located in the Abydos Plain inlet. Beard describes this area as being for the most part as low lying and muddy, fronted by mangroves with extensive areas of bare of hypersaline mud that's behind (Beard 1975).

No vegetation and flora surveys have been conducted onsite apart from the studies for the mangal (mangrove) (API, 2011) and a vegetation assessment of the foreshore area from the north of the town to Honeymoon Cove for the Foreshore Enhancement Plan (UDLA et al 2013b). The Mangal study revealed that some of the mangroves at Point Samson are up to 200 years old, and very slow growing. If destroyed, mangroves together with the ecosystem it supports, would be unlikely to regenerate in a lifetime as detailed by Astron Environmental Services (2013). The mangals are described as a significant vegetation community and no development should take place which would cause unacceptable impacts on the mangrove habitat, the ecological function of these areas or the maintenance of ecological processes which sustain the mangrove habitats.

Five vegetation associations were described during the foreshore survey for the Foreshore Enhancement Plan, 2013. These vegetation descriptions are limited to the foreshore area, including beach, foredune and disturbed areas:

- *Acacia coriacea* heath, with *Santalum lanceolatum* and a variety of other mixed coastal shrubs over native *Spinifex longifolius* and *Whiteochloa airoides* grassland on undisturbed dune face.

- Tamarisk (*Tamarix aphylla*) trees over very scattered *Spinifex longifolius* tussocks dominate the low dune along the beach area.
- *Spinifex longifolius* grassland with **Cenchrus ciliaris* (buffel) grassland and scattered *Acacia coriacea* and **Vitex trifolia* on highly disturbed areas and along part of the disturbed beach and *Spinifex longifolius* grassland with *Ipomoea pes-caprae* on less disturbed beach areas.
- *Acacia bivenosa* low shrubland over *Indigofera monophylla* and other mixed shrubs over *Triodia secunda* hummock grassland on remnant dune.
- *Trianthema turgidifolia* and **Aerva javanica* open shrubland over buffel grassland with coastal vines *Ipomoea pes-caprae* and *Canavalia rosea* on disturbed remnant dunes.

Much of the surrounding areas have been surveyed for potential industrial development. The vegetation of the Anketell Point Industrial Area located to the south-west of the site has been surveyed by Mattiske 2007, GHD Pty Ltd (2010, 2011) and AECOM (2010). Astron Environmental Services (2013) reviewed vegetation described in these reports and a comparison of landform and topography indicates that vegetation as detailed in Table 4 may be present onsite.

Table 4- Vegetation described for the Anketell Port Industrial Area that may be present on the site

Code	Description (GHD 2013)	Potential area for occurrence on site
M1	Mosaic of mangals dominated by <i>Rhizophora stylosa</i> and <i>Avicennia marina</i>	Pope's Nose Creek and Sam's Creek, south and south east to the site
M2	Mosaic of mangals dominated by <i>Avicennia marina</i> with occasional patches of <i>Rhizophora stylosa</i> .	Pope's Nose Creek and Sam's Creek, south and south east to the site
CS1	Low closed heath to low shrubland of <i>Tecticornia halocnemoides subsp tenuis</i> , <i>Tecticornia indica subsp bidens</i> , <i>Tecticornia ?¹pruinosa</i> , <i>Hemichroa diandra</i> , <i>Neobassia astrocarpa</i> , <i>Frankenia pauciflora</i> or <i>F. ambita</i> over scattered tussock grassland of <i>Eragrostis falcata</i> and <i>Sporobolus virginicus</i> .	Edges of tidal flats and saline flats

¹ There is a degree of uncertainty in taxa recognition

Code	Description (GHD 2013)	Potential area for occurrence on site
S1	Tall open scrub to tall shrubland of <i>Acacia coriacea subsp coriacea</i> over open heath to shrubland of * <i>Aerva javanica</i> , <i>Santalum lanceolatum</i> , <i>Acacia bivenosa</i> over tussock grassland of * ² <i>Cenchrus ciliaris</i> .	Disturbed hind dunes
S2	Tall shrubland of <i>Acacia sabulosa</i> and <i>A. coriacea subsp coriacea</i> over open shrubland of <i>Acacia bivenosa</i> and * <i>Aerva javanica</i> over low open shrubland of <i>Acacia stellaticeps</i> over closed tussock grassland to tussock grassland of * <i>Cenchrus ciliaris</i> and <i>Triodia epactia</i> .	Disturbed hind dunes and old dune deposits
HG12	Shrubland to open shrubland of <i>Acacia coriacea subsp coriacea</i> over low shrubland of <i>Acacia stellaticeps</i> and <i>Scaevola spinescens</i> over tussock grassland of <i>Triodia epactia</i> , <i>T. pungens</i> , <i>Eragrostis eriopoda</i> and * <i>Cenchrus ciliaris</i> .	Old dune deposits and sandy plains

None of the vegetation associations described for the Anketell Point Project is significant, but it is currently unknown whether these associations are locally significant considering the island nature of the area.

Apart from the foreshore and mangal area, no flora and vegetation surveys have been conducted over the site, therefore species presence, diversity and conservation value is unknown. It is recommended that a detailed vegetation and flora survey (level 2) over the potential development areas be undertaken as part of future local structure planning.

Threatened and Priority Ecological Communities

Communities of plants are described as Threatened Ecological Communities (TECs) if defined by the Western Australian Threatened Ecological Communities Scientific Advisory Committee and gazetted under the *Wildlife Conservation Act, 1950* (WC Act, 1950).

Some communities which are under consideration for listing as TEC's but do not meet the defined criteria, or have not yet been adequately surveyed for a

² *Denotes weed species

decision to be made, are added to the Department of Parks and Wildlife (DPAW) list of Priority Ecological Communities (PEC's). PEC categories are ranked in order of survey priority for evaluation of conservation status (Priority 1 to 3), are rare but not threatened (Priority 4) or conservation dependent (Priority 5). Definitions of conservation significant communities can be found in Appendix A.

DPAW TEC/PEC database searches were conducted in March 2014. The searches indicated that there are no TEC/PECs located within the Structure Plan area. However, there is potential for a PEC to occur within the site. The Coastal Dune Native Tussock *Whiteochloa airoides* Grassland on Barrow Island was added to the PEC list in 2009. So far this PEC has not been recorded elsewhere in an undisturbed natural state (Astron Environmental Services, 2013). *Whiteochloa airoides* Grassland was identified during the foreshore survey for the Foreshore Enhancement Plan, but ground truthing of the presence of this vegetation must be conducted to determine the significance of the vegetation community. This will be an action required prior to implementing any work on the foreshore likely to impact on identified vegetation communities.

Threatened and Priority Flora

Species of flora acquire 'Declared Rare' Flora (DRF) or 'priority' conservation status where populations are restricted geographically or threatened by local processes. DPAW recognises these threats and applies regulations towards population protection and species conservation. DPAW enforces regulations under the *Wildlife Conservation Act 1950* to conserve DRF species and protect significant populations. Priority flora species that are potentially rare or threatened are classified in order of threat as described in Appendix A.

Searches of DPAW's Threatened (Declared Rare) and Priority Flora database, the Western Australian Herbarium Specimen database and Threatened and Priority Flora List were undertaken in March 2014 for the area within a five kilometre radius of the Structure Plan area. DPAW records showed no species were located within this area. The WA Herbarium database showed that there are three priority species located within the area, but these will not have an impact on the proposed development areas. Locations of these species are shown in Figure 22.

Environment Protection and Biodiversity Conservation Act Protected Matters

Under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) threatened species and ecological communities are afforded protection as matters of national environmental significance. These threatened species are listed in categories defined in Section 179 of the EPBC Act. Any action that is likely to have a significant impact on listed threatened species and ecological communities under the EPBC Act must be referred to the Minister and undergo an environmental assessment and approval process.

Searches of the Department of Environment Nationally Significant Environmental Matters database and DPaW NatureMap online databases were undertaken in March 2014. Results of the NatureMap search indicated that four priority flora species were located within the site or within five kilometre radius of the Structure Plan area which can be viewed in Table 5. Based on the desktop database searches, no flora species listed under the EPBC Act were located within the site or within five kilometres.



Figure 22 – Locations of Priority Flora Species

Wetlands

Searches of the Department of Environment Nationally Significant Environmental Matters database (March, 2014) indicated that there are no internationally important Ramsar wetlands or nationally important wetlands within the site or within five kilometres of the Structure Plan area.

Fauna

No detailed fauna surveys have been undertaken on site. Fauna surveys have previously been conducted at the Anketell Point Industrial Area (Nixon 2008, Biota 2008, Phoenix 2010). Habitats and conservation significant fauna recorded during these surveys can potentially occur within or in close proximity to the Structure Plan area.

Any native fauna identified to be under threat of extinction, rare, or in need of special protection is provided protection under the *Wildlife Conservation Act 1950*. Native fauna protected under this Act is classified as ‘threatened’ (DPaW, 2014). To help protect and conserve these species and communities DPaW maintains a database which lists taxa that are threatened with extinction as well as taxa that are rare and threatened.

The results of the DPaW Threatened Fauna database search indicated that there were two reptiles (including turtles), one land based mammal and 20 bird species within the area and within a 10 kilometre radius.

The species and associated conservation codes are provided in Table 6.

Table 5 – Threatened flora species within a 5 kilometre radius

Species name	Conservation Code ³
<i>Helichrysum oligochaetum</i>	P1
<i>Tephrosia rosea</i> var. Port Hedland (A.S. George 1114)	P1
<i>Pentalepis trichodesmoides</i> subsp. <i>hispida</i>	P2
<i>Eragrostis lanicaulis</i>	P3

Table 6 – Threatened land based fauna within the site and within 10 kilometres

Species name	Common name	Conservation Code ³
<i>Lerista neviniae</i>	Slider, skink	T
<i>Natator depressus</i>	Flatback Turtle	T
<i>Dasyurus hallucatus</i>	Northern Quoll	T
<i>Actitis hypoleucos</i>	Common Sandpiper	IA
<i>Ardea modesta</i>	Eastern Great Egret	IA
<i>Ardea sacra</i>	Eastern Reef Egret, Eastern Reef Heron	IA
<i>Arenaria interpres</i>	Ruddy Turnstone	IA
<i>Calidris alba</i>	Sanderling	IA

³ Table A3 in Appendix A

Species name	Common name	Conservation Code ³
<i>Calidris canutus</i>	Red Knot	IA
<i>Calidris ruficollis</i>	Red-necked Stint	IA
<i>Charadrius leschenaultii</i>	Greater Sand Plover	IA
<i>Egretta sacra</i>	Eastern Reef Egret, Eastern Reef Heron	IA
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	IA
<i>Limosa lapponica</i>	Bar-tailed Godwit	IA
<i>Merops ornatus</i>	Rainbow Bee-eater	IA
<i>Numenius phaeopus</i>	Whimbrel	IA
<i>Pluvialis fulva</i>	Pacific Golden Plover	IA
<i>Sterna caspia</i>	Caspian Tern	IA
<i>Tringa brevipes</i>	Grey-tailed Tattler	IA
<i>Tringa stagnatilis</i>	Marsh Sandpiper	IA
<i>Falco peregrinus</i>	Peregrine Falcon	S
<i>Charadrius mongolus</i>	Lesser Sand Plover	T
<i>Numenius madagascariensis</i>	Eastern Curlew	T

A search of the DPaW NatureMap online database indicated that one additional threatened land based fauna species is likely to occur within the site and within a five kilometre radius of the site (Table 7).

Table 7 – Threatened land based fauna within a five kilometre radius

Species name	Common name	Conservation Code
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	T

A search of the Department of Environment Nationally Significant Environmental Matters database indicated that nine threatened species and six vulnerable species listed under the EPBC Act are likely to occur within the site and within a five km radius of the site. Marine species, other than turtles and birds, were excluded. Table 8 shows the species name, common name, status and the potential for the species to occur within the site.

Table 8 – Threatened fauna species located within the site and within 5 kilometres

Species	Common name	Status	Presence
Threatened Birds			
<i>Macronectes giganteus</i>	Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
<i>Rostratula australis</i>	Australian Painted Snipe	Endangered	Species or species habitat may occur within area
Threatened Mammals			
<i>Dasyurus hallucatus</i>	Northern Quoll	Endangered	Species or species habitat likely to occur within area
<i>Macrotis lagotis</i>	Greater Bilby	Vulnerable	Species or species habitat likely to occur within area
<i>Notoryctes caurinus</i>	Karkarratul, Northern Marsupial Mole	Endangered	Species or species habitat likely to occur within area
<i>Rhinoicteris aurantia (Pilbara form)</i>	Pilbara Leaf-nosed Bat	Vulnerable	Species or species habitat likely to occur within area
Threatened Reptiles			
<i>Aipysurus apraefrontalis</i>	Short-nosed Seasnake	Critically Endangered	Species or species habitat likely to occur within area
<i>Caretta</i>	Loggerhead Turtle	Endangered, migratory	Species or species habitat known to occur

Species	Common name	Status	Presence
			within area
<i>Chelonia mydas</i>	Green Turtle	Vulnerable, migratory	Breeding known to occur within area
<i>Ctenopus angusticeps</i>	Airlie Island Ctenopus	Vulnerable, migratory	Species or species habitat likely to occur within area
<i>Dermochelys coriacea</i>	Leatherback Turtle, Leathery Turtle, Luth	Endangered, migratory	Breeding likely to occur within area
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	Vulnerable, migratory	Breeding known to occur within area
<i>Natator depressus</i>	Flatback Turtle	Vulnerable, migratory	Breeding known to occur within area
Migratory Marine Birds			
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory	Species or species habitat likely to occur within area
<i>Macronectes giganteus</i>	Southern Giant-Petrel	Migratory, Endangered	Species or species habitat may occur within area
<i>Sterna caspia</i>	Caspian Tern	Migratory	Breeding known to occur within area
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Migratory	Species or species habitat known to occur within area
<i>Hirundo rustica</i>	Barn Swallow	Migratory	Species or species habitat may occur within area
<i>Merops ornatus</i>	Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Migratory Wetlands Species			

Species	Common name	Status	Presence
<i>Ardea alba</i>	Great Egret, White Egret	Migratory	Species or species habitat known to occur within area
<i>Ardea ibis</i>	Cattle Egret	Migratory	Species or species habitat may occur within area
<i>Charadrius veredus</i>	Oriental Plover, Oriental Dotterel	Migratory	Species or species habitat may occur within area
<i>Glareola maldivarum</i>	Oriental Pratincole	Migratory	Species or species habitat may occur within area
<i>Rostratula benghalensis (sensu lato)</i>	Painted Snipe	Migratory, Endangered*	Species or species habitat may occur within area

(Department of Environment, 2014)

A detailed fauna survey (level 2) is required to confirm which significant fauna species occur within the site and may provide constraints or opportunities for any proposed development. It is recommended that specific fauna surveys over the potential development areas are undertaken.

Fauna Habitat

The fauna habitat of highest conservation significance (i.e. locally significant) in or in close proximity to the site is the mangrove community. The mangroves are of major significance for juvenile Green turtles (a threatened reptile) foraging. The coastal dune systems may provide suitable habitat for the Schedule 1 listed Slider (skink, *Lerista neviniae*).

12.5 Groundwater and Surface Water

District Water Management Strategy

In support of this structure plan, Cardno also prepared a District Water Management Strategy (DWMS) to ensure that water management can be addressed across the site and to inform LPS9 and future local structure planning. The Draft DWMS is included in Appendix C.

The development of the DWMS has been undertaken with the intention of providing a structure within which subsequent development can occur consistent with a 'total water cycle management' approach. It is also intended to provide overall guidance to the general stormwater management principles for the area and to guide future Local Water Management Strategies (LWMS) and Urban Water Management Plans (UWMP) that will support the implementation of LPS9 and future development options.

The DWMS has been developed to:

- Provide a broad level stormwater management framework to support future development;
- Incorporate appropriate best management practices into the drainage systems that address the environmental and stormwater management issues identified;
- Minimise development construction costs;
- Minimise ongoing operation and maintenance costs; and
- Develop a water conservation strategy for the site that will accommodate existing drainage infrastructure associated with the townsite and propose additional measures to reduce or eliminate the need for retrofitting existing infrastructure and controls.

The DWMS outlines the proposed water supply and conservation strategy, stormwater management strategy, groundwater management strategy, wastewater management strategy and a monitoring strategy. These strategies have been determined based on the physical constraints of the site, as well as to achieve the requirements of government authorities.

The principle behind the stormwater management strategy is to retain and infiltrate the first 15 mm of any rainfall event as close to the source as possible and direct additional runoff offsite via overland flow. This is proposed to be achieved using Water Sensitive Urban Design features such as soak wells and, where more appropriate, rainwater collection tanks at the lot level and detention basins on a larger scale for runoff generated from the road reserves. Broad scale calculations have been provided which show the anticipated volume of stormwater detention required for the post development. Full details are provided within the DWMS outlining how the post development flows will be managed.

The DWMS provides a framework to assist in establishing stormwater management methods that have been based on site specific investigations and are consistent with relevant State and Local Government policies. The responsibility for working within the framework established within the DWMS rests with the City of Karratha, although it is anticipated that future

LWMPs/UWMPs will be developed in consultation with the City, Department of Water (DoW) and in consideration of other relevant policies and documents as well as the DWMS. The establishment of overall objectives, constraints and opportunities for whole water cycle management are outlined.

Regional Groundwater

The DoW Hydrogeological Atlas (<http://www.water.wa.gov.au/idelve/hydroatlas/>), accessed 4 March 2014, indicates that the hydrogeology beneath the site comprises superficial sediments with the Pilbara Coastal Saline deposits overlying Pilbara Alluvial deposits which are typically 'brackish'. The atlas also indicates that the total dissolved solids (TDS) of the groundwater beneath the site is in the range between 1000 mg/L and 3000 mg/L, which corresponds to between 'fresh' and 'brackish'. However, these values are based on Generalised State Salinity mapping which is broad scale and may not be accurate at a local scale. A previous investigation GHD Pty Ltd (2013), found that two boreholes located to the north of the site had groundwater quality ranging from brackish to highly saline and quantities available from the fractured rock aquifer are likely to be limited.

Groundwater Levels

The GHD Pty Ltd (2013) investigation found that the groundwater levels in the area ranged from 7.0m to 5.5m below ground level which is consistent with the Pilbara area.

Hydrology/stormwater

The Bureau of Meteorology webpage [BoM, 2007, Climate of Port Hedland, http://www.bom.gov.au/weather/wa/point_samson/climate.shtml (accessed 12 March 2014)] indicates that the Pilbara Region is located in the arid-tropics, with low and variable rainfall experienced throughout the area. Annual rainfall varies from 250mm to 400mm. The region is prone to severe cyclones which occur predominantly between January and March and account for the majority of rainfall in the region. These periods of heavy rainfall are likely to result in the rapid saturation of surface soils resulting in periodic flash flooding.

The cyclonic nature of the rainfall pattern in Point Samson means the townsite drainage system is designed to hold small high frequency storm events and direct all other rainfall as quickly as possible away. Stormwater runoff is directed towards the roads and conveyed to topographic low points by high kerbing. In addition a number of open drainage channels convey the water to retention basins and away from the townsite. There is a network of interconnected channels throughout the site which are aided by strategically placed retention basins. These retention basins retain stormwater until it is able to be discharged. A site visit in April 2014 identified three sumps, a number of designed attenuation basins and formal and informal stormwater channels across the townsite.

The *Stormwater and Coastal Management Strategy*, undertaken by Essential Environmental (2013) undertook flood modelling of the whole of the townsite and the majority of the Structure Plan area. Results from this model found that the 5 year Average Recurrence Interval (ARI) storm event was approximately contained within the townsite infrastructure. During the 100 year ARI storm event flooding was identified. Residential lots in the north become inundated due to the

inadequacy of the sump located in McCourt Street. Smaller sections to the south and an area to the west, south of Point Samson – Roebourne Road, which is zoned in TPS8 for future development (ie. Urban Development – Development Area 18) also becomes inundated in the 100 year ARI storm event. The natural low point in DA18 also could provide treatment before stormwater discharges into the mangroves. Runoff generated south of Point Samson – Roebourne Road discharges into the mangroves south-west of the townsite. It is essential that this runoff is treated before discharge into the mangroves as required by the Better Urban Water Management Guidelines (WAPC 2008). This should be taken into consideration during the structure planning process. An inundation map based on the Stormwater and Coastal Management Strategy Essential Environmental modelling has been provided in the DWMS.

12.6 History and Heritage

Post-Settlement History of Point Samson

The town and the peninsula was named Point Samson in honour of Michael Samson, who accompanied the district's first settler, Mr Walter Padbury as second officer of the ship, the 'Tien Tsin', on his journey in 1863. During an expedition to Nickol Bay, the town was named.

Point Samson was once a deep water port handling the third largest annual tonnage in Western Australia. After Cossack became inadequate as a port in the late 1890s and early 1900s due to the use of larger ships, a new jetty was required. The port and its deep water jetty was completed in 1904 to service Roebourne, Wittenoom (then boom town), and the developing community of Wickham.

From 1938 to 1966 blue asbestos or crocidolite was carried to Point Samson by rail from Wittenoom for ship loading.

The original 'T head' jetty was destroyed by a cyclone in 1925. The jetty stopped functioning as a working jetty in March 1976 and in June of that year was designated for recreational use only. The remaining part of the jetty was badly damaged by Cyclone Orson in 1989 and was completely removed in 1991. A small section was rebuilt on land as a reminder of the jetty's significant role in the town's past.

Since mining at Wittenoom ceased, Point Samson has evolved into a dormitory suburb of Wickham and a popular recreation and tourist destination.

Aboriginal Heritage

A search of the Department of Aboriginal Affairs (DAA) Aboriginal Heritage Inquiry System (AHIS) (DAA, 2014) indicated that there are eight registered Aboriginal Heritage sites within the site as detailed in Table 9.

Table 9 - Registered Aboriginal heritage sites

Site Name	Site ID	Site Type
Point Samson 1	8797	Artefacts / Scatter, Midden / Scatter
Sam's Creek Burial Site	27561	Skeletal material/Burial Site
Roebourne Midden	560	Midden / Scatter
Anadara Midden	8925	Artefacts / Scatter, Midden / Scatter
Jintupi Midden	8926	Artefacts / Scatter, Midden / Scatter
Popes Nose	7511	Midden / Scatter
Sam's Creek Midden	6813	Artefacts / Scatter, Midden / Scatter
Able Mine	6014	Artefacts / Scatter, Midden / Scatter

Anthropos Australia conducted a desktop study of the Aboriginal and European Heritage sites in Point Samson (2013). The study revealed that in addition to the DAA registered sites, there are seven additional unregistered Aboriginal sites within the site as summarised in Table 10.

As part of the study all previously submitted Aboriginal heritage survey reports were reviewed. Seven reports held by the DAA and two reports not registered with the DAA were found to be relevant to the site (Anthropos Australis, 2009 & 2013). All survey reports are detailed in the Table 11 and the results are mapped in Figure 23.

It is recommended that Aboriginal archaeological and ethnographic surveys be undertaken in areas proposed for development that are not covered by these surveys.

Table 10 - Unregistered Aboriginal heritage sites

Field code	Site type
ROEARCH 08-001	Shell Midden/Scatter
ROEARCH 08-002	Artefacts/Scatter, Shell Midden/Scatter
CLR3-12-04	Shell Midden/Scatter
CLR3-12-05	Shell Midden/Scatter
CLR3-12-01	Shell Midden/Scatter
CLR3-12-02	Artefacts/Scatter, Shell Midden/Scatter
CLR3-12-03	Artefacts/Scatter, Shell Midden/Scatter

Table 11 - Aboriginal Heritage Survey Reports relevant to the site

DAA Survey ID	Aboriginal Heritage survey
23416	The report of an Aboriginal Heritage Survey of the proposed Johns Creek Boat Harbour, Parking and Drainage Upgrade, Point Samson, West Pilbara Region, Western Australia
102203	Inquiry Regarding the Skeletal Material Located at Sam's Creek Midden (P06118) Point Samson, which Occupies Part of the Able Plant Hire & Construction Sand Quarry (M47/113): Includes Advice for Dealing with Future Incidents when Skeletal remains are located. July 1997.
101982	Report of an Archaeological Salvage Programme at Site P5431, Pope's Nose Creek, Pilbara, North-West Australia.
104899	A Survey for Archaeological Sites Relating to Associated Works - Perth- Darwin National Highway: White Springs -NWC Hwy. Section & North West Coastal Highway: Karratha-Whim Creek Section.
101841	Ethnographic & Archaeological Investigations for a Proposed Fish Hatchery, Pope's Nose Creek, Western Australia. Jun 1986.
103188	A Report on Archaeological Work in the Coastal Pilbara, Western Australia. Community Resource Document 1994.



Figure 23 - Aboriginal Heritage Sites

European Heritage

A search was conducted on the Heritage Council of WA's online database inHerit (2014) for European heritage places within the vicinity of the site. One site was recorded as detailed in The Local Government Heritage Inventory for the City of Karratha (2013) was reviewed and a total of three places were identified to be located within the site. These places, the significance and relevant management category are detailed in Table 12 and 13. All European Heritage sites are shown in Figure 24.

Table 12 – European heritage places listed by the Heritage Council WA

Site name	Site No
Point Samson Jetty	8679

Table 13 – European heritage places included in the Local Government Heritage Inventory

Site name	Management Category	Description	Desired outcome
Sam's Creek and Harbour	C – Moderate Significance	Contributes to the heritage of the locality. Has some altered or modified elements, not necessarily detracting from the overall significance of the item.	Conservation of the place is desirable. Any alterations or extensions should reinforce the significance of the place, and original fabric should be retained wherever feasible.
Point Samson Jetty	C – Moderate Significance	Contributes to the heritage of the locality. Has some altered or modified elements, not necessarily detracting from the overall significance of the item.	Conservation of the place is desirable. Any alterations or extensions should reinforce the significance of the place, and original fabric should be retained wherever feasible.
Solveig Shipwreck (located on Point Samson beach next to the Jetty)	B - Considerable significance	Very important to the heritage of the locality. High degree of integrity/authenticity.	Conservation of the place is highly desirable. Any alterations or extensions should reinforce the significance of the place.



Figure 24 - European Heritage Sites

12.7 Bushfire Hazard

No bushfire risk has been assessed as part of the environmental studies conducted over the Structure Plan area.

Under the *Planning for Bushfire Protection Guidelines 2010* published by the WAPC, Local Government is required to identify bushfire hazard levels in structure plans based on the bushfire hazard assessment methodology outlined in the Guidelines. Structure plan areas with a moderate to extreme bush fire hazard level need to be supported by a more detailed assessment of the bushfire risk and be compliant with the performance criteria and acceptable solutions set out in the Guidelines.

The Guidelines are proposed to be revised, and a draft version entitled *Planning for Bushfire Risk Management Guidelines* was released for public comment in May 2014 along with a draft *State Planning Policy 3.7: Planning for Bushfire Risk Management* (SPP 3.7). Upon gazettal, the new Guidelines will apply.

It should be noted that in August 2014 the Minister for Planning released proposed *Planning and Development (Bushfire Risk Management) Regulations*

2014 for public comment. These regulations were prepared under section 256 of the *Planning and Development Act 2005*, and contain deemed provisions under section 257B of that Act.

The regulations are intended to complement the release of draft SPP 3.7 and the revised Guidelines, and respond to recommendations made in *A Shared Responsibility; a report of the Perth Hills Bushfire February 2011 Review* (otherwise known as the Keelty Report).

According to the WAPC, the regulations are intended to: *clarify whether a property is within a bushfire prone area for the purposes of building and planning regulation; ensure that a bushfire risk assessment is undertaken before a new habitable building or land use is constructed in a bushfire prone area; and require development approval for habitable buildings and land uses on sites of extreme bushfire risk to ensure appropriate bushfire risk management measures are undertaken.* (<http://www.planning.wa.gov.au/publications/7183.asp>, accessed 16/12/14).

Local Structure Plans that will be required for future development areas defined in this Structure Plan will be required to comply with this requirement.

It is recommended that the bushfire hazard for the Structure Plan area be assessed by classifying the predominant vegetation within the site. This is the key to the initial determination of the site suitability development and if deemed suitable the potential level of construction standard is then determined by the application of the AS 3959 - Construction of buildings in bushfire prone areas. Vegetation can be classified as part of the flora and vegetation survey.

Initial findings of the desktop assessment suggest that the site is unlikely to have extreme fire hazard and there are no restrictions for the structure planning process to proceed. Any potential bushfire planning controls required for the site will be determined as part of the vegetation classification.

12.8 Foreshore Plans

Two separate foreshore plans have been prepared for Point Samson. The *Point Samson Foreshore Enhancement Plan-Findings Report*, October 2013, produced by Astron Environmental Services, UDLA and Damara WA was commissioned by the Point Samson Community Association (PSCA). The *Point Samson Foreshore Management Plan-Draft*, August 2013, was prepared by Essential Environment for the City of Karratha. The latter report extensively references the UDLA report and endorses some of its recommendations. The recommendations of the reports are very similar.

Generally both plans recommend the following:

- Revegetate degraded areas including the removal of weed plant species (including the Tamarisk trees) and dune revegetation to stabilise the dunes.
- Improve facilities and infrastructure along the foreshore, including seating, shade, car parking, access points and path ways and board walks.

The Foreshore Management Plan prepared by Essential Environment also recommends developing setbacks to protect the town site from sea level rise, and creating guidelines for building heights.

Point Samson Foreshore Enhancement Plan - Findings Report, October 2013

The Point Samson Community Association (PSCA) commissioned the Point Samson Foreshore Enhancement Plan-Findings Report, which was produced by UDLA, Astron Environmental Services, and Damara WA. The report was developed after three workshops and extensive consultation with the local community and representatives of Ngarluma Aboriginal Corporation.

The scope of the project includes the extent of Point Samson Foreshore from the northern end of Meares Drive, stretching south to encompass the foreshore area to Honeymoon Cove. As it does not include the harbour or areas of mangrove forest, there are a number of issues which have not been addressed as part of this report, that were later addressed in the FMP by Essential Environmental.

The final Point Samson Foreshore Samson Foreshore Enhancement Plan had the following objectives:

- Provide a landscape that will protect and enhance the natural beauty of Point Samson.
- Provide the community and visitors of Point Samson with an iconic foreshore that is culturally rich.
- Develop a pedestrian precinct, which is safe and family friendly.
- Increase recreational opportunities by providing temporary recreational hubs eg. 'pop up' shops/sheds for fishing, snorkelling or water sports at peak times, a jetty lookout, dune boardwalk and linear park along Town Beach foreshore.
- The pedestrian precinct will link into a wider pedestrian network, including connection to Meares Drive and John's Creek Boat Harbour.

Point Samson Foreshore Management Plan (August 2013)

Essential Environmental was engaged by the City to produce the Point Samson Foreshore Management Plan (FMP). The plan covers a number of environmental issues including: rare or endangered flora and fauna in the area; a list of weed plant species; some information on the mangrove forest; and the sand mining currently taking place. It highlights key issues associated with the Point Samson Foreshore area relating to coastal vulnerability; access and infrastructure; and vegetation management.

There are three key recommendations made by the FMP:

- To protect the town site from coastal processes such as predicted storm surge and sea level rise.
- To improve amenities such a shade, seating, barbeques and pathways along the foreshore, and improvements to pathways across the town site to key hubs.

- To revegetate areas of degraded natural vegetation along Point Samson, in particular the foreshore.

The report highlights the environmental importance of the mangrove forest to the surrounding ecosystem. In addition, the mangroves are significant to the Ngarluma people who fished and collected crabs in this area at low tide.

Revised Foreshore Plan

Cardno has been commissioned to create a final foreshore management plan that will integrate and calibrate the recommendations of the two earlier plans, which were based on extensive community consultation and therefore reflect the community's aspirations for the foreshore area.

It is anticipated that upon completion of the foreshore management plan there will be a number of clearly defined projects that will be able to be implemented in a staged manner to improve the condition and amenity of the foreshore and help to improve its resilience to coastal processes as well as identify a strategy for staged retreat in response to sea level rise.

12.9 Storm surge risk and disaster management

For any potential future development within a coastal location, it is imperative that sufficient coastal foreshore reserve be allocated to mitigate the impacts of coastal hazards and processes, notably erosion, inundation and sea level rise (SLR). State Planning Policy 2.6 (SPP 2.6) provides guidance for defining the coastal foreshore reserve for a planning timeframe of 100 years:

- For erosion and accretion, consideration is given to the peak steady water level (PSWL) resulting from a storm event with a 1% annual probability of being exceeded (AEP), ie: the Horizontal Shoreline Datum (HSD) as defined by SPP 2.6. From the HSD the following erosion allowances must be applied:
 - S1, acute (extreme storm) erosion
 - S2, long term erosion
 - S3, erosion due to sea level rise
 - An additional 0.2 m per year for uncertainty.
- S4, storm surge inundation. For this allowance, consideration is given to events with a 0.2% AEP over the 100-year planning timeframe (500-year Average Recurrence Interval, ARI). This corresponds to the PSWL resulting from a 0.2% AEP event in 2110.
- The allowance of 0.9 metres of sea level rise over a 100-year planning timeframe to 2110.

Several studies have been conducted at Point Samson and the greater Roebourne – Karratha Region that provide adequate information to define the coastal foreshore reserve, in most cases.

For erosion, the West Pilbara Cyclonic Surge Inundation Study (GEMS, 2009) provides storm surge levels for the HSD which is defined in SPP 2.6 as the peak steady water level under a 1% AEP storm.

Table 14 shows the GEMS levels at three sites in Point Samson.

Table 14 – Horizontal Shoreline Datum: 1% AEP (100-year ARI)

Site	HSD (m AHD)
Popes Nose Bridge	4.6
John's Creek Boat Harbour	4.6
Point Samson Beach	6.0

Predicted allowance for erosion over the planning timeframe should be measured from the HSD and calculated as the sum of the factors S1, S2, S3, and 0.2 m for uncertainty. The *Point Samson Foreshore Enhancement Plan* (UDLA, 2013), the *Stormwater and Coastal Management Strategy* (Essential Environmental, 2014) coastal erosion estimates based on work undertaken by Damara (2013).

Cardno was subsequently commissioned by the City to undertake additional investigations specific to sections of the Point Samson foreshore that are adjacent to potential future development areas.

The areas Cardno identified to be investigated further are delineated by the yellow lines in Figure 25:

- Site 1: The beach immediately to the north-east of the town, including the Dog Beach (dot/dashed yellow line)
- Site 2: Town beach (dotted yellow line)
- Site 3: The rocky coastline to the south-east of the town, including Honeymoon Cove (dashed yellow line)
- Site 4: The mangrove area to the south-west of the town (shaded yellow polygon)

The investigation involved a review of available literature and previous studies undertaken to define the coastal processes and foreshore reserve for Point Samson. A primary resource was the study undertaken by Essential Environmental (2014) and subsequently an. Whilst the Damara (2013) report was referenced in the Essential Environmental (2014) report, Essential Environmental's interpretation of the results and required setback allowances is potentially overly conservative given the landforms and geomorphic setting of Point Samson.

The further investigation applies information from a study regarding the coastal processes in the study area (Damara, 2013), along with additional modelling to examine each site with regards to the specific orientation, landforms and vegetation with the aim of optimising the required foreshore reserve to meet both the City and Department of Planning coastal planning objectives.



Figure 25 – Sites investigated

Sites 1 to 3: North-east, Town and South-eastern Beaches

Allowance for Erosion (S1, S2 and S3)

Analysis of Damara (2013) indicates the setback limits presented in Essential Environmental (2014) are overly conservative in some areas of the coastline. As part of Damara (2013), storm-bite modelling and a long term coastal processes assessment were undertaken at the town beaches. Sites 1 to 3 were re-analysed following a review of the Damara (2013) study. Setback distances defined by this assessment are presented in Table 15.

Table 15 - Predicted erosion allowance

Site	Acute Erosion (S1)	Long-term Erosion (S2)	Sea Level Rise Erosion (S3)	Uncertainty Allowance	Erosion Setback (m behind HSD)
Town Beach	29 m	0 m	32 m	20 m	81 m
Northern Coastline	40m	20 m	90 m	20 m	170 m
Southern Coastline	40 m	0 m	20 m	20 m	80 m
Mangrove Area	0 m	0 m	25 m	20 m	45 m

Setback due to acute, extreme storm erosion remains unchanged for the three sites. The southern coastline is predominantly a rocky coast with a couple of small sandy embayments. Erosion potential and storm bite will be controlled by the presence of the underlying rock structure and is unlikely to erode extensively due to an extreme storm. Honeysuckle Cove is a small sandy embayment, likely perched on underlying rock. As no site specific geotechnical information is available, a conservative allowance for acute storm erosion calculated assuming a sandy coast (40m) is used for the southern coastline.

Long term erosion, S2, is also unchanged. Whilst the assessment in Damara (2013) suggests that long term erosion is non-existent on the northern coastline, an allowance of 20m should still be used to allow for possible dune migration.

Damara (2013) undertook a geometric assessment of the potential shoreline recession at Town Beach due to future sea level rise. Whilst some uncertainty is associated with the assumptions on depth to bedrock and the control that the nearshore rock shelf will have under elevated sea level rise, the approach taken by Damara is reasonable and more appropriate than applying an arbitrary setback of 90m to allow for future sea level rise. North of Town Beach less data is available on the level and width of the nearshore rock shelf. As such, whilst 90m may be considered conservative, a setback of 90m is retained for the northern coastline. The southern coastline is predicted to recede 20m due to SLR. Given the rocky nature of the coastline, the setback is set at the translation of the HSD line by the distance between the 0m and 0.9m AHD contour.

Allowance for Inundation (S4)

SPP 2.6 specifies the allowance for the current risk of inundation to be the maximum extent of storm inundation, defined as the peak steady water level, plus wave run-up. For Point Samson, the storm definition is a tropical cyclone with an annual exceedance probability (AEP) less than 1 in 500. GEMS (2009) defines the appropriate peak steady water level, however the allowance for wave run-up must be calculated.

Stockdon et al (2006) provides a comprehensive study and empirical parameterisation of wave set-up, swash and run-up from an extensive dataset for natural beaches over a wide range of conditions. The formulae were applied to the beaches in the study area using a design wave height of 4m and wave period 10s. The estimated wave run-up levels for each site are presented in Table 16.

These wave run-up values are the calculated run-up for the maximum 2% of the design waves. Given the peak storm waves will only occur for approximately 2-3 hours across the peak in storm water level, it is likely that only 15-20 waves at most will reach the run-up levels listed in Table 16. In addition, this run-up value is calculated based on a beach surface, rather than acting on building and vegetation pathways, and as such does not account for the attenuation of wave energy across such obstacles. The inundation levels presented in the figures are for storm surge inundation only. Shoreward coastal infrastructure between the levels defined in Table 16 may be subjected to wave run-up during extreme events, however significant flooding is not likely. Site specific overtopping assessments should be conducted for development adjacent to the extent of storm surge inundation.

Table 16 – 500-year AEP storm surge inundation levels for Point Samson

Site	2010 (m AHD)	2110 (m AHD)	Average Beach Slope	Wave Run-up Level (m)	2010 (m AHD) - S4	2110 (m AHD) - S4
Town Beach	7.4	8.3	0.07	1.8	9.2	10.1
Northern Coastline	7.4	8.3	0.06	1.7	9.1	10
Southern Coastline	6.0	6.9	0.08	2.0	8	8.9
Mangrove Area	6.0	6.9	-	0	6	6.9

Site 4: Mangrove Area

Essential Environmental (2014) assessed the mangrove area to the south of Point Samson as 'Sandy Coasts (Coastal Lowlands)' classification using the wave conditions and erosion allowances for the exposed beaches on the north of Point Samson. Due to the shoreline orientation on a tidal creek, significant sheltering is provided by the sand bars and mangrove/salt marsh system. Cardno proposes to reclassify this area as 'Tidal Reaches of Inland Waters'. SPP2.6 acknowledges that the methods for determining an allowance for erosion for a sandy coast are derived principally for open coastlines. Given the above sheltering, the SPP2.6 allows for variation if the underlying coastal processes and driving forces are assessed appropriately in a site specific context.

The level of erosion that can occur during a storm / cyclone event within the mangrove area is significantly limited by the orientation of the shoreline, the sand bar system and the presence of mangroves. The bar will limit wave penetration, whilst the mangroves will dampen the wave energy that does penetrate into the area. Figure 26 presents the five directional sectors from which waves can approach and affect the site: northeast, east-northeast, east, east-southeast and southeast (NE, ENE, E, ESE and SE). The site is most

susceptible to waves from east through to the southeast; however waves from these directions are fetch limited, that is there is limited distance the wind can blow over the water and generate waves. Larger swell and storm waves from the north to northwest are limited by refraction around Cape Lambert and Point Samson.

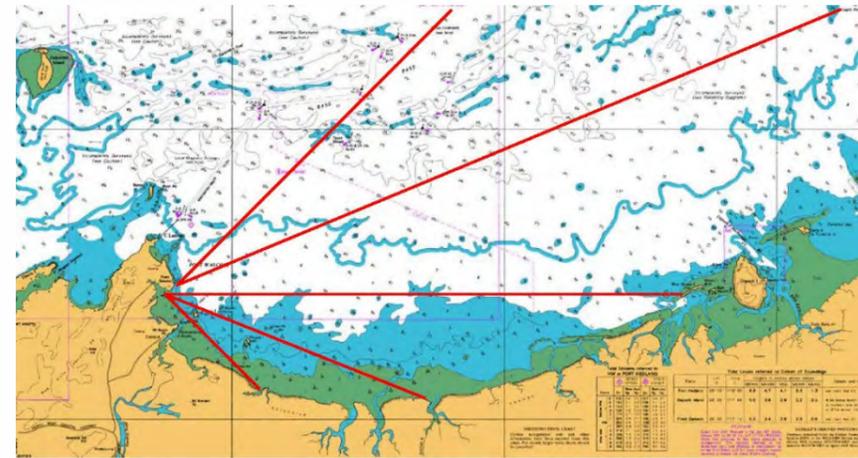


Figure 26 – Wave penetration angles to Mangrove Area: from NE, ENE, E, ESE, SE (AUS chart 740)

The 1 in 100-year Annual Exceedance Probability (AEP) significant wave height (H_s) approaching the site due to storm conditions from the north-east and east-northeast is estimated at 4m (Damara, 2013). Calculations were performed to calculate the fetch limited wave height generated from wind coming from the east, east-southeast and the southeast at the Harbour Entrance. A wind speed of 20 ms^{-1} was applied, which is representative of a 100-year (AEP) storm, based on Damara (2013) information. Table 17 presents the results of these calculations. The fetch limited waves are significantly smaller than the 4m 100-year AEP wave height. The design wave conditions are therefore not appropriate to apply from these fetch limited directions, and the fetch limited waves will be applied.

Table 17 – Fetch limited calculations

Wind Direction	Fetch (km)	Wind Speed (ms^{-1})	Average Water Depth over Fetch (m)	H_s (m) at Harbour Entrance	T_p (s) at Harbour Entrance
E	49.7	20	13.8	2.5	4.9
ESE	26.7	20	9.8	1.8	4.0
SE	12.8	20	8.8	1.3	3.1

To assess the wave penetration into the area from the design wave height, a model of the site using the SWAN model (Simulating WAVes Nearshore) was prepared. Figure 27 presents the model domain and bathymetry; contours from

the Aero3Dpro model supplied by the City and AUS740 navigation chart were used to create the model bathymetry.

The simulation scenarios are presented in Table 18. To represent the 100-year AEP storm, an H_s of 4m was applied at the model boundary, combined with a domain-wide wind speed of 20 ms^{-1} for cases coming from the NE and ENE. An H_s of 2m was selected as a conservative alternative forcing scenario to compare the wave penetration into the mangrove area for wave cases E through to SE. A peak wave height of 2m was observed near the entrance of the boat harbour during Tropical Cyclones George, Jacob and Melanie (Damara, 2013). A water level of 5.5m AHD corresponds to the 100-year AEP water level in 2110. These forcing conditions were applied from a range of directions in order to assess the maximum potential wave penetration into the mangrove area.

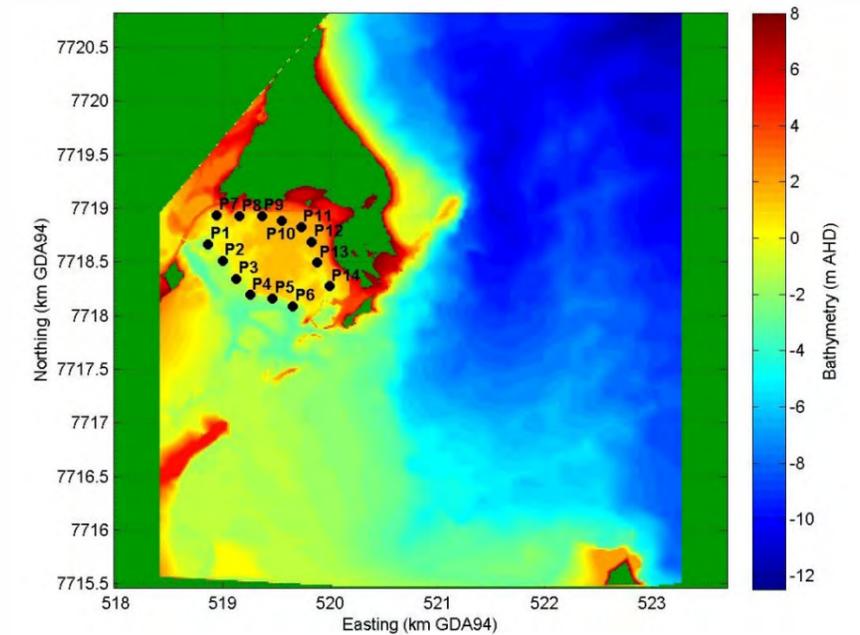


Figure 27 - Model domain and bathymetry

Table 18 – Simulation scenarios

Scenario	H_s (m) at Model Boundary	Wave Direction at Model Boundary	Wave Period (s) at Model Boundary	Wind Speed (ms^{-1}) over Model Domain	Wind Direction over Model Domain	Water Level over Model Domain (m AHD)
1	4	NE	10	20	NE	5.5
2	4	ENE	10	20	ENE	5.5
3	2	E	10	20	E	5.5
4	2	ESE	10	20	ESE	5.5
5	2	SE	10	20	SE	5.5

The east-north-easterly simulation (Scenario 2) predicted the greatest penetration into the mangrove area using the design wave height of 4m. The application of the 2m, fetch limited wave height, leads to the largest results for the south-easterly case (Scenario 4). This is a conservative result as the fetch limited wave height for this wind direction was only 1.3m. Figure 28 presents a spatial plot of the significant wave height from Scenario 2 and 4. These plots illustrate the significant reduction in wave height within the mangrove area due to the sheltering effect of the sand bars and small islands near to the boat harbour. This is demonstrated further in Figure 29, where these results are presented zoomed in over the mangrove area, and overlain an aerial photograph. The model does not account for the presence of vegetation within the mangrove area. It is likely that the wave height would be further dampened by the mangroves.

In order to assess the wave penetration into the tidal creek, model results were extracted at 14 locations within the mangrove area: Six points along the channel edge of the mangroves, and eight points well within the mangrove area, approaching Point Samson Road and the landward limit of the mangroves. These points are displayed in Figure 27; the results are presented in Table 19 and Table 20 respectively.

The wave height within the mangroves does not vary significantly between the two forcing scenarios due to the level of sheltering provided at the entrance to the area. The wave height is not predicted to exceed 0.9m at the edge of the channel, and 0.8m within the mangrove area (note the wave heights for the south-easterly case are conservative given the shorter fetch length). There is an 80% to 90% reduction in wave height within the tidal creek compared to the open ocean coastline. Given this significant reduction in wave energy, it is considered appropriate to reclassify the area as 'Tidal Reaches of Inland Waters'.

Table 19 – Model results - H_s at edge of mangrove area

Scenario	Direction	H_s (m)					
		P1	P2	P3	P4	P5	P6
1	NE	0.5	0.6	0.6	0.6	0.5	0.6
2	ENE	0.7	0.7	0.8	0.8	0.6	0.7
3	E	0.7	0.8	0.8	0.8	0.7	0.7
4	ESE	0.8	0.8	0.9	0.9	0.7	0.7
5	SE	0.8	0.9	0.9	0.9	0.8	0.8

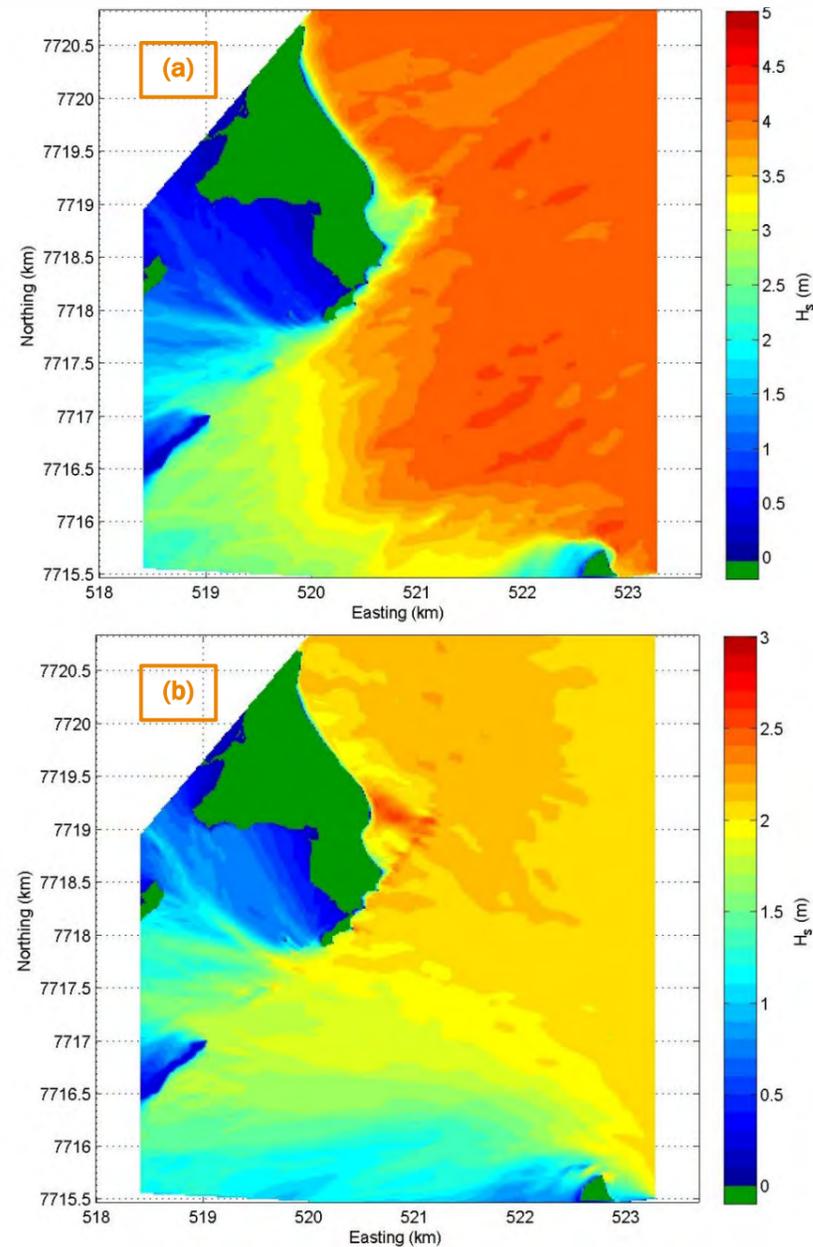


Figure 28 – Spatial plot of significant wave height (a) Scenario 2 (b) Scenario 5

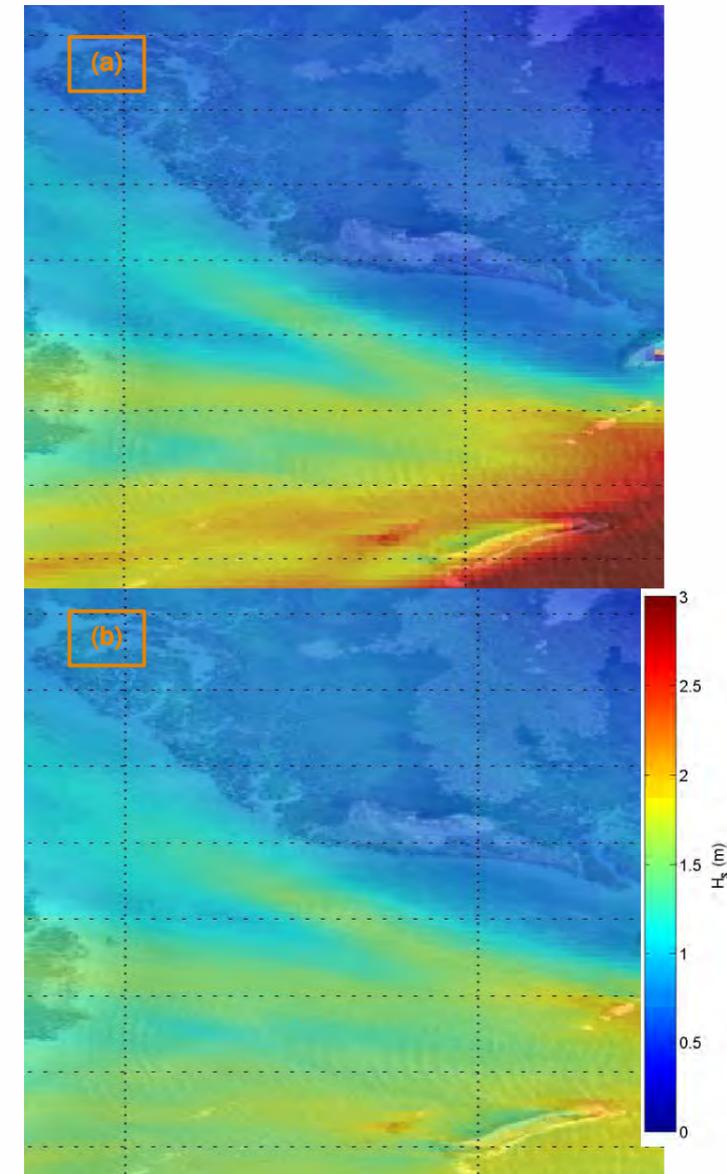


Figure 29 – Spatial Plot of significant wave height overlain aerial photo (a) Scenario 2 (b) Scenario 5

Table 20 – Model results - H_s within mangrove area

Scenario	Direction	H_s (m)							
		P7	P8	P9	P10	P11	P12	P13	P14
1	NE	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4
2	ENE	0.6	0.6	0.6	0.5	0.4	0.3	0.3	0.4
3	E	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.4
4	ESE	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.5
5	SE	0.8	0.8	0.8	0.7	0.6	0.6	0.5	0.6

Predicted Shoreline Retreat

The preceding discussion presents a case to reclassify the area as 'Tidal Reaches of Inland Waters'. The wave heights incident on the mangrove area are not predicted to exceed 0.6-0.8 m. The model does not account for the presence of vegetation within the mangrove area. In reality, the wave height would be significantly dampened by the mangroves. Wave attenuation rates range from 0.0014 to 0.011 (McIvor et al 2012). By applying these rates to the wave heights at output points P1 to P6, the potential wave height at the limit of the mangroves can be calculated. The width of mangroves behind P3 to P6 is such that the waves are predicted to be completely dampened by the landward limit of the mangroves. Applying the conservative lower attenuation rate (0.0014) results in a maximum wave height of 0.5m and 0.2m at the landward limit of the mangroves behind P1 and P2 respectively. Given these very small waves heights, and that the landform behind the mangroves is salt marsh and vegetation, it is not considered appropriate to assess the setback based on storm dune erosion processes. The coastal foreshore reserve should be assessed to conserve the ecological and biodiversity values of the mangrove region. As such some foreshore reserve should be maintained to allow for potential shoreline and vegetative retreat due to future sea level rise.

To assess the possible shoreline and vegetation retreat due to sea level rise, a spatial map of the existing distribution of the mangroves and salt marshes was developed based on aerial photography and LiDAR. Previous studies by Cardno have determined that mangroves will colonise areas approximately between the tidal planes of Mean High Water Neaps (MHWN) and Mean High Water Springs (MHWS). These tidal planes are displayed in Figure 30 by the black lines. Predicted sea level rise values were applied to the existing digital terrain model of the area, and the existing vegetation distribution transferred inland accordingly. This translation is displayed by the red lines in Figure 30. The predicted upper limit of the retreat of the mangrove system ranges from 8 to 25m across the mangrove area.

The resultant estimated future vegetation distribution was used to determine an appropriate coastal foreshore reserve that takes account of both the coastal

processes and biological values of the area. The calculated setback is applied instead of the S1 to S3 values. An uncertainty value of 20m is still applied, resulting in a maximum erosion setback behind the HSD line of 45m. This is presented in Table 15 and Figures 31 and 32.

It is recommended that the mangrove area be reclassified as 'Tidal Reaches of Inland Waters' for calculation of erosion allowances.

These figures identify a large amount of land that may be at risk of erosion and/or inundation. As such, a number of potential development sites appear to be impacted. It is recommended that further work be undertaken to investigate

the predicted erosion and wave run-up allowance for the site in a local, detailed context. Figures 33 and 34 depict the predicted inundation levels pictorially – it must be acknowledged that these are only indicative and do not account for potential mitigation measures.

In accordance with SPP 2.6, properties within the foreshore reserve that are identified as being subject to erosion or inundation should have the following notification on the certificate of title: *VULNERABLE COASTAL AREA – This lot is located in an area likely to be subject to coastal erosion and/or inundation over the next 100 years.*

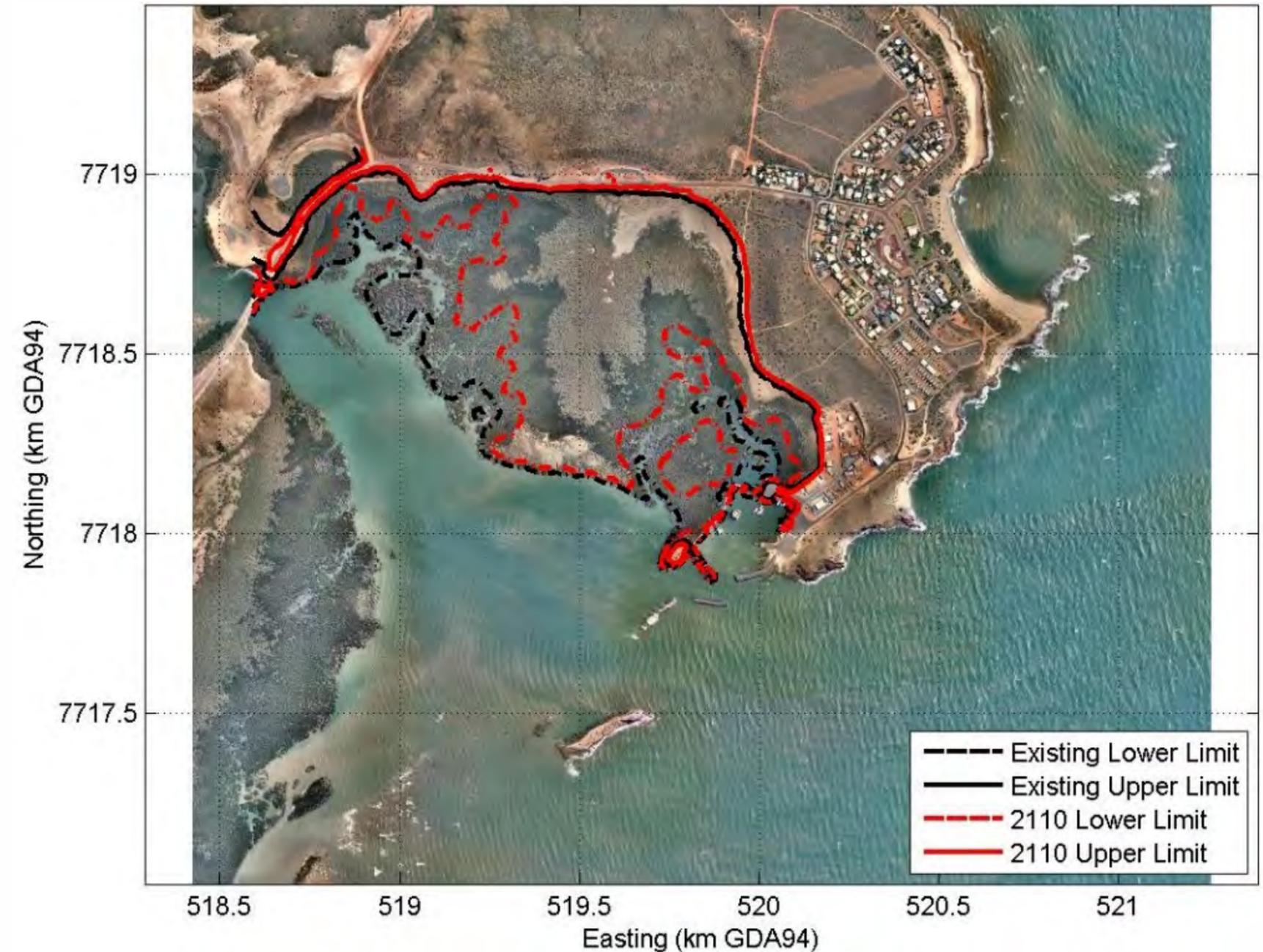


Figure 30 – Predicted translation of mangrove distribution

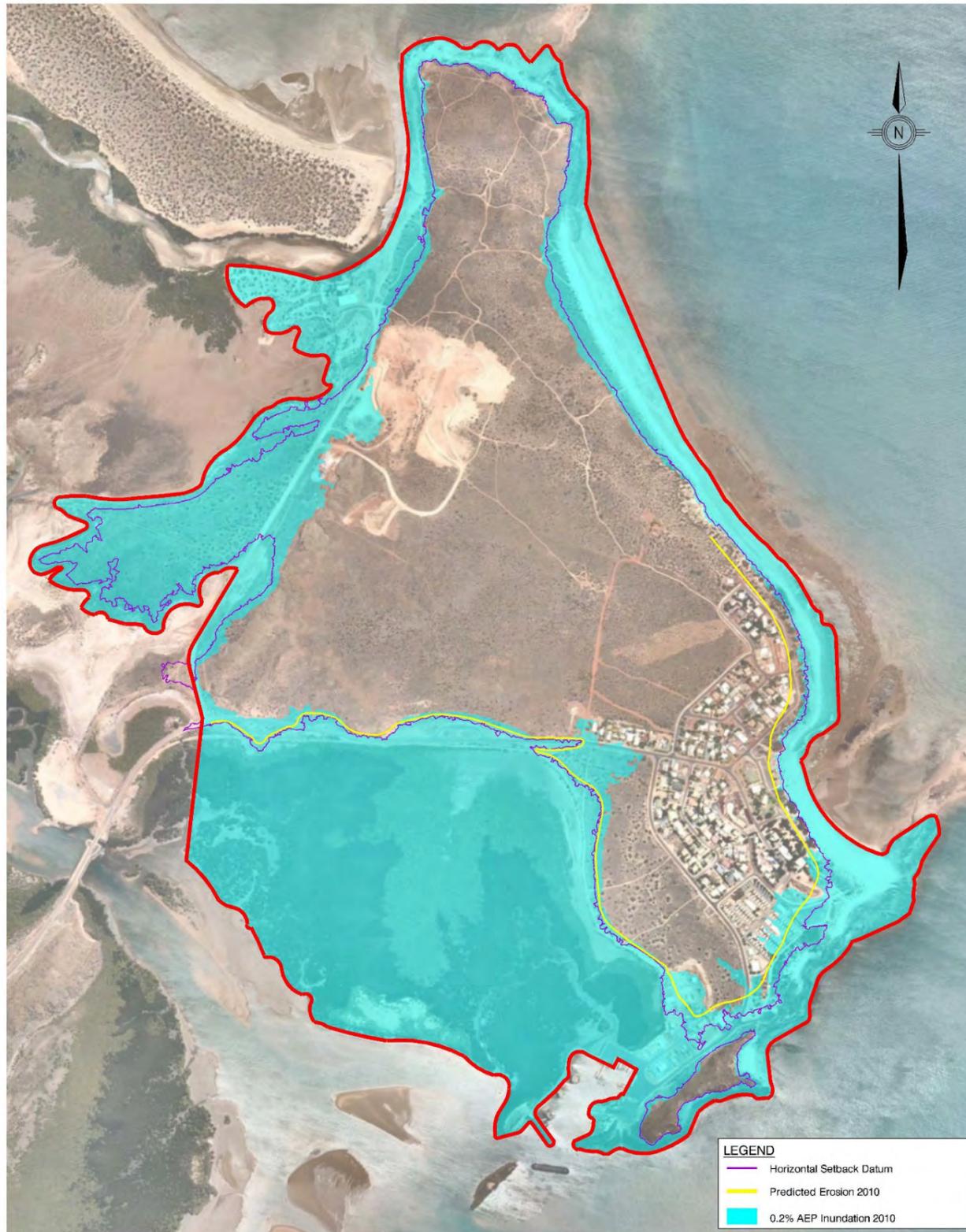


Figure 31 – Coastal Processes 2010

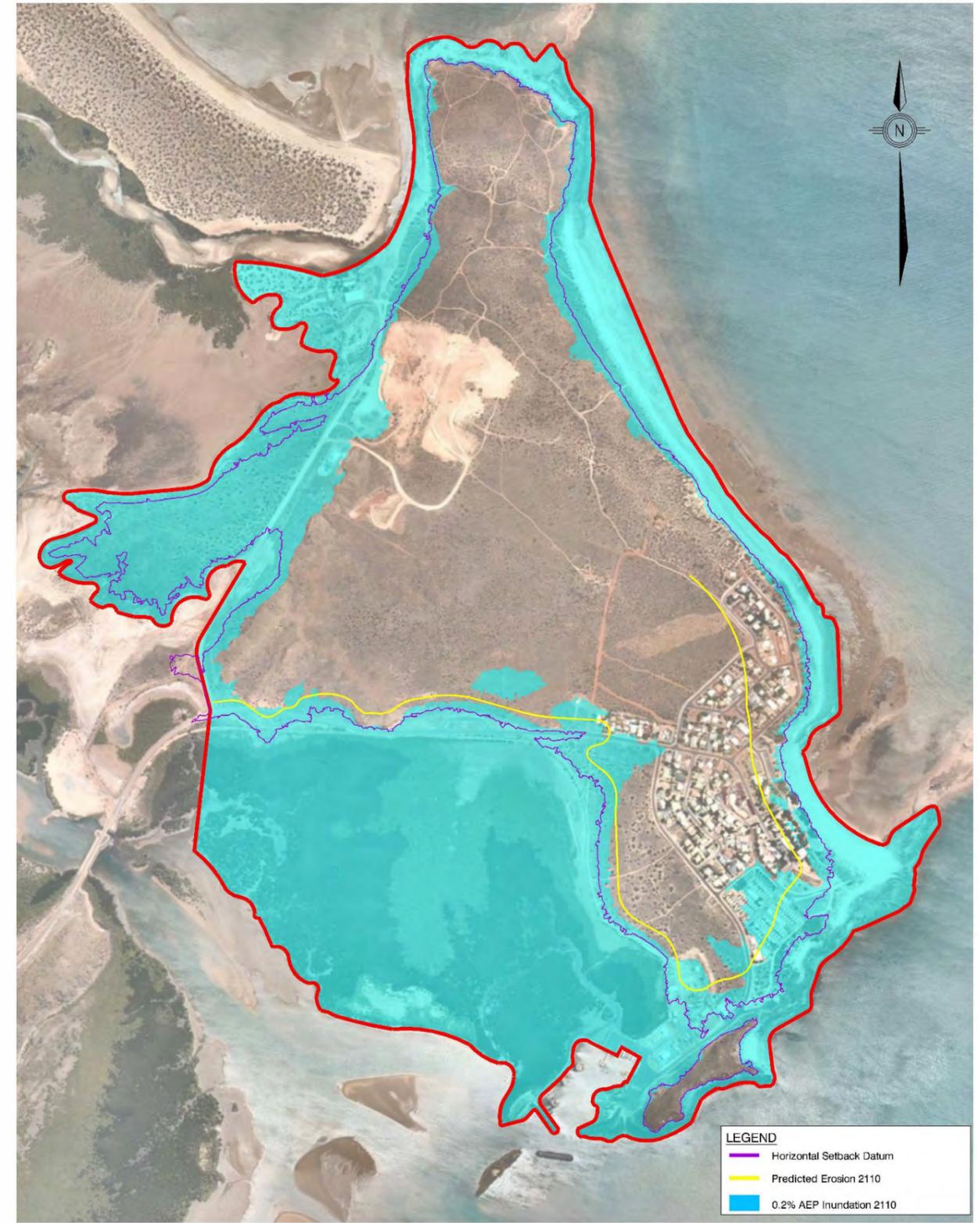


Figure 32 – Coastal Processes 2110



Figure 33 – Pictorial representation of inundation during extreme events in 2010



Figure 34 – Pictorial representation of inundation during extreme events in 2110

13.0 Socio-Economic Context

13.1 Demographics

The Australian Bureau of Statistics (ABS) provides 2011 Census data for Point Samson. Some key statistics from the 2011 Census are summarised below:

- The population of Point Samson was 298 people in 2011.
- The median age is 40 (3 years above the Australian average).
- There are 70 families with an average of 1.3 children per family.
- There are 262 private dwellings.
- There is an average of 2.5 people per household.
- The median weekly household income is \$2,625.
- There is an average of 2.3 motor vehicles per dwelling.
- Community covers a wide variety of employment areas, including clerical and administrative workers, technicians and trade workers, professionals, managers and machinery operators.
- Average house rentals are around \$750/week.

Although Point Samson is identified as a townsite with a relatively small population, it is apparent that the cost of housing and median weekly household income is comparatively higher compared to other areas of Western Australia. The statistics also show that there is a high correlation between the average number of motor vehicles per dwelling with the average number of people per dwelling. This may be inferred as a high rate of car dependency for the residents of Point Samson.

13.2 The Economic Context

Main economic drivers

Planning Solutions prepared the *Evidential Analysis Paper: Main economic drivers* for the City of Karratha in September 2013. A specific economic analysis has not been undertaken for Point Samson, which is very much influenced by the factors driving the broader Pilbara economy.

According to this paper, the City of Karratha had a Headline Gross Regional Product of \$18billion in 2012 which ranks it second only to the City of Perth out of all local governments in WA and nationally sixth after Brisbane, Sydney, Melbourne, Perth and Gold Coast.

In 2011/12, the Pilbara contributed 57% of WA's minerals and petroleum worth an estimated \$60billion to the WA economy.

Economic Base

There are three major resource companies operating in the Shire (Rio Tinto, Woodside Energy Ltd and Citic Pacific Mining). Each company is currently operating or rolling out mining and energy extraction infrastructure investments worth an estimated \$69billion. The most significant include the Woodside

operated North West Shelf Venture, Woodside's Pluto project, Rio Tinto's expansion of Dampier Port, Cape Lambert Port and CP Mining plans for Cape Preston. A total of more than 22,000 construction jobs and 4,000 permanent jobs are to be created from these projects.

The economy of the City is heavily dependent on the minerals and energy sector. Construction, the next largest sector measured by value added and the largest employment sector, is overwhelmingly directly related to mining and resources projects.

However, the resources sector is highly capital rather than labour intensive, and this is likely to become more marked over time. Extensions of technological applications will serve to subdue or even reduce regional labour demand from resources projects, even as the volume and value-added measures increase. This will serve to dampen regional population growth generally.

The base economic activity for the region is strong. Expansion projects in advanced planning include infrastructure that will strengthen the capacity of the Pilbara region overall.

However, the economy of the City can be expected to change in the short and medium term. Until now regional economic growth is currently primarily driven by major projects in the minerals and energy sector. A recent report released by the Chamber of Minerals and Energy contains overall conclusions from forecast changes in activity in this sector for the City of Karratha:

- The City will see a decline in the overall workforce directly related to minerals and energy projects. This decline will commence in 2014 and increase through to 2018;
- A major driver of the decline is the large construction workforce already employed in the area in 2011. This workforce will decrease as the current set of projects is completed;
- Although there will be a corresponding increase in the operations workforce, it will not be large enough to offset the decline in construction personnel.

Opportunities will be principally in value chain goods and services to both construction and operational phases. Karratha is already a centre for this, with a good number of small and medium enterprises marketing into the resource sector value chain.

Expansion of the existing economic base is largely out of the direct control of the City. There are many opportunities in servicing minerals and energy projects that can find competitive advantage in proximity to the mining operation, for example:

- Mining services;
- Marine services;
- Construction and fabrication;
- Project administration.

Diversification

The higher population scenarios intrinsic in the Pilbara Cities strategy are only feasible if supported by a significantly diversified economy. A number of opportunities for diversification have been identified. Principal ones are:

- Minerals and energy downstream processing
- Specialised agri-business;
- Tourism;
- Regional services;
- Education services;
- Health services;
- Administration (private sector and public sector);
- Knowledge industries, including research on regional specialties.

Tourism

The growth of the tourism sector will be an important action for the region from around 2014 on as the construction phase of major projects winds down. Demand for informal FIFO accommodation has underpinned the viability of many of the short-stay establishments in the region, including those with facilities suitable for general tourist accommodation. There is likely to be capacity and need to change orientation to tourist demand to maintain business turnover. This will spill over to many other areas of economic activity including retail and food services in the same period.

Economic Changes: Workforce and Population Effects

In summary, the potential changes in the Shire's economy include:

- Decline in construction activity;
- Increases in services activity with high increases in the retail, education services and health services sectors;
- Diversification of the economy.

This will change the composition of the workforce and these workforce changes will be accompanied by demographic changes. The main labour force scenario is for:

- Reduction in FIFO numbers as construction activity is completed;
- Stabilisation of operational workforce;
- Growth of service population (consumer services);
- High increases in the retail, education services and health services sectors;
- Possible growth of producer services; and
- Some increase in knowledge intensive producer and consumer services.

This will likely be accompanied by changes in income patterns. Currently there are stark differences in income patterns between Pilbara communities, including the City of Karratha and other communities, with unusually proportions of individuals earning high income (above \$1,500 per week and of that group more than two-thirds are earning above \$2,000 per week). This is likely to moderate over time, especially in the City of Karratha as the occupation mix changes. There would still be a high proportion of high income earners, but some growth in the proportion of lower and middle income earners. This will put pressure on housing affordability, with the need to provide moderately priced accommodation in greater numbers.

The ability to accommodate a much higher proportion of lower and moderate income workers is likely to be a key requirement to achieve the economic diversification necessary for the higher population scenarios.

Most directly relevant to Point Samson, is the identification of an opportunity for the expansion of adventure tourism, such as fishing and diving, to leverage the City's economic sector. This is noted by the paper as an important action for the City from 2014 as the construction phase of major projects declines throughout the City.

Together with Dampier, Point Samson could potentially provide a suitable platform to access adventure tourism activities based in the Dampier Archipelago and Montebello Islands. While the importance of leveraging the tourist base of the City is noted, it is also noted that there is currently insufficient tourism and short-stay accommodation facilities within the City. Point Samson is an exception with several tourist-oriented accommodation facilities. However, the existing facilities located within the site represent a relatively limited range in comparison to more prominent tourism destinations such as Broome which have a wide range of accommodation facilities. An increase in tourist accommodation facilities could bolster the tourist base of Point Samson. This is a relevant consideration in the preparation of the Structure Plan.

14.0 Urban Design Context

14.1 Public Realm

The public realm within the Point Samson townsite is defined by its relaxed and low-key coastal character. The character provides for an attractive destination for those seeking the relaxed lifestyle that the township offers.

However there is a general lack of shade in the form of tree planting within public areas such as in parks and along footpaths. It is evident from some private gardens that it is possible to grow shade trees (for example, Poinciana) and a strategy to provide more of these in the town would add immeasurably to its visual appeal and character, as well as providing a more comfortable environment for pedestrians.

There are locations within the Structure Plan area that enjoy excellent views or permit vistas to key landscape features such as the ocean, the mangroves lining John's Creek, and the surrounding rocky outcrops that are so much a defining feature of the landscape. Preserving these views and vistas whilst accommodating new development will be important to retaining the remote, coastal village feel of Point Samson.

Figure 35 shows the hills that are visible from Point Samson – Roebourne Road as vehicles approach the town. These are an important landscape feature and new development should be situated behind and below the ridgeline created by these hills as far as possible.

In acknowledgement of the relatively undisturbed nature of much of the dune vegetation, protection of biodiversity, aboriginal cultural values, and landscape protection, the setting of Point Samson will continue to be reserved for conservation in the local planning scheme. Figure 36 indicates the areas that have the highest conservation value.

14.2 Built Form

The built form is characterised by its residential dwellings which are a mix of small to medium size single dwellings on relatively large lots between 800-1000m² approximately. The style of housing varies widely, with little consistency so there is no discernible Point Samson 'vernacular' building style.

Having regard to the hot climate and the threat of cyclones and flooding, having quality built form requirements for new development is a necessity.

Adoption of the design principles of the *Pilbara Vernacular Handbook* (LandCorp 2012) would be advantageous.

The handbook aims to set up a base from which to consider and explore how rigorous planning and design can make a positive difference to the Pilbara. Its objectives are to:

- ensure high quality buildings and public realm and enhance the interface between the two
- provide a contemporary design response to the Pilbara context including logistic and economic considerations

- evoke a sense of place which reflects the local landscape, environment, climate and culture.

The handbook applies not only to the design of buildings but also the design of the public realm and infrastructure provision.



Figure 35 – Hills visible on the approach to Point Samson



Figure 36 – Areas of high conservation

15.0 Land Use

15.1 Land Use

The townsite predominately consists of residential dwellings with some commercial and tourism based.

Point Samson was initially developed as a port for the City of Karratha in 1910. Since then, Point Samson has since developed as a dormitory suburb of Karratha. The town is a tourist destination, providing short-medium term stay facilities for families and groups working in the region.

A small commercial precinct is located at Bartley Court, including a tavern, general store and a restaurant. Limited community facilities and public open space exist within Point Samson. John's Creek Boat Harbour adjoins the southern portion of the townsite, providing an outlet for commercial fishing operations.

15.2 Residential

At the time the paper was published (Planning Solutions, September 2013), 119 dwellings were present in Point Samson which is the smallest amount in any settlement within the City. Of the 119 dwellings; 109 were zoned R10 and another 10 with no R-Code density. According to the paper, the net density of the Point Samson townsite is approximately 10 dwellings per hectare.

As per the paper's findings, the capacity for further residential development over land zoned 'Residential' in Point Samson is limited.

15.3 Strategic Industry Buffer

Ministerial Reserve 35813 corresponds with the Strategic Industry Zone in TPS8. It is approximately 409.2 hectares in site. The majority of the Reserve extends beyond the Structure Plan area. It is vested in the Minister for State Development for 'Industrial Purposes'.

The City of Karratha has previously opposed any industrial development within the reserve that would have a deleterious impact on Point Samson or its associated coast, and has lobbied for the area between the Cape Lambert operations of Rio Tinto and Point Samson to be redesignated as 'Industrial Buffer and Landscape Protection'. Various documents reviewed that mention the Reserve indicate that Rio Tinto and the City are in broad agreement with this, however no evidence could be discovered that it has yet occurred.

This matter is of considerable concern to the Point Samson community as already there are occasions when noise and dust from the operations at Cape Lambert cause a nuisance within the town. Proposals for future townsite expansion north of the Roebourne – Point Samson Road make resolution and enforcement of the buffer a matter of critical concern.

Although located west of Reserve 35813, the proposed development at Anketell as outlined in the Anketell Port Master Plan (Department of State Development, April 2014) only exacerbates community concern about the potential for heavy industrial operations to negatively impact on Point Samson.

15.4 Sand Mining

Figure 37 identifies the six existing mining tenements that are located in the Point Samson Structure Plan area. These tenements are summarised in Table 21.

Table 21 – Mining Tenements in Point Samson

Reference	Owner	Area	Expiry Date	Company
M47/113	Darryl John Corps	4.695ha	11/9/2028	Karratha Earthmoving
M47/200	Darryl John Corps	2.58ha	3/10/2031	Karratha Earthmoving
M47/389	Donald Kimberly North	13.465ha	2/6/2020	Norwest Sand and Gravel
M47/526	Norwest Sand and Gravel Pty Ltd	0.8ha	25/6/2034	Norwest Sand and Gravel
M47/527	Norwest Sand and Gravel Pty Ltd	8.2ha	25/6/2034	Norwest Sand and Gravel
L47/349	Donald Kimberly North	Not Surveyed	6/10/2031	Norwest Sand and Gravel

Operations at the mining tenements are controlled by Tenement Conditions issued by the Department of Mines and Petroleum. In all circumstances for the operating sand mines (M47/113, M47/200, M47/389) Tenement Conditions require the preparation and implementation of a Mine Closure Plan. For those tenements that are yet to be mined (M4/526, M47/527), or are required to provide access to other tenements (L47/349), there is a requirement to submit a Plan of Proposed Operations prior to the use commencing. Actual operations on the tenements. Although the tenements were inspected, and discussions were had with the sand mining operators, it is not the purpose of this analysis to provide an audit of compliance with Tenement Conditions. For the purpose of this assessment, it is assumed that the sand mining operators have, and will, comply with relevant conditions.

Sand mining at Point Samson is generally of small scale and is opportunistic. There are three types of material that are mined being; sandy topsoil, fine sand and cemented sand (calcrete). The topsoil is sold for various purposes or stockpiled for rehabilitation works. The fine sand is used for concrete manufacture and the cemented sand is used for fill in a number of applications.



Figure 37 – Existing mining tenements

There is currently no sand processing equipment operated on any of the Point Samson tenements.

Sand reserves are mined using conventional techniques of a front end loader or excavator winning the sand and then depositing it into body trucks for transport off site. The demand for the sand is driven by its need for local construction projects. In the case of Karratha Earthmoving, extracted material is generally transported directly to project sites. In the case of Norwest Sand and Gravel, raw material is transported to a processing site situated near the town of Wickham.

The volume of material removed from the tenements is generally low, in comparison to typical extractive industry operations. Effectively the tenements operate as sand pits that are mined when there is a need for the material and do not operate on a full time basis. It follows that the volume of material being extracted will be based on market demand brought about by construction projects in the locality. It is important to recognise that distance of road transport for low cost construction materials is a primary driver of the economic viability for

the use of the resource and therefore the sand at Point Samson is generally used locally, excepting for the fine sand that is an essential ingredient in concrete manufacture which may be transported greater distances.

The Karratha Earthmoving tenements have effectively had the fine sand and topsoil removed and the remaining reserve is cemented sand. The Norwest Sand and Gravel tenements still contain all raw materials. The remaining volume of material is approximately 100,000 tonnes in the Karratha Earthmoving tenements and approximately 2,000,000 tonnes in the Norwest Sand and Gravel tenements. It should be noted that the fine sand component of the Norwest Sand and Gravel tenements is approximately 750,000 tonnes and that this is the material with the highest demand and commercial value.

As noted above, the volume of material extracted from Point Samson is generally low. Discussions with the operators indicated that the average yearly mass of material removed from the tenements is 6,000 tonnes per year for the Karratha Earthmoving tenements and 15,000 tonnes per year for the Norwest Sand and Gravel tenements. Actual demand is driven by market forces so the amount of material removed may be significantly higher, up to 50,000 tonnes per year, or lower than the average but the operations would still be considered as small scale. It follows that the expected life of the Karratha Earthmoving operations at Point Samson is approximately 10 years. The expected life of the Norwest Sand and Gravel operations is approximately 45 years. It is however important to understand that the life span of the operations is dependent on market forces and the above is an estimate only. Clearly if the Norwest Sand and Gravel operations continue to extract sand at the existing average rate there would be the need to extend the existing mining tenements as operations would continue beyond the current expiry date.

On the basis of the above information, an analysis of the potential impact of the sand mining operations on the future urban development potential of adjacent land can be put forward. Environmental or amenity impacts of extractive industry operations generally relate to noise, air quality, visual and transportation of raw materials. These matters as related to the Point Samson mining tenements are examined below.

Noise

The activities at the mining tenements involve the use of mobile powered mechanical equipment. Under expected operations this would require the use of a single excavator or front-end loader servicing one or more 10 cubic metre capacity body trucks. Given the existing landform, this equipment would operate below an active mining face such that the powered mechanical equipment would be below ground when observed from Point Samson. If it is assumed that the combined sound power level of the equipment is 115dB(A), which is a conservative estimate, and that the equipment is operating into a sand face the sound pressure levels from the equipment when measured at the existing rural zoned land in Precinct 5 would be below 40dB(A). If sand mining activities are conducted during daylight hours the noise level would clearly comply with the noise limits for noise sensitive places as defined by the Environmental Protection (Noise) Regulations 1997 – Regulation 8.

The anticipated noise impacts from the mining operations on the western part of Precinct 5 are negligible given the existing scale of the mining operations. Without doubt at the current scale of operations, urban development could be

constructed significantly closer to the sand mining activities and still comply with the Environmental Protection (Noise) Regulations 1997 – Regulation 8. In this respect it is appropriate to earmark land closer to the sand mining activities within a development precinct whereby the impact of the sand mining activities occurring at the time of proposed development could be reassessed in relation to future planning applications. On the basis of site inspections and review of operations, this is an appropriate strategy.

Figure 38 represents the likely mining buffer within which new development would not be appropriate. This is drawn at 150 metres from the expected extent of mining based on known resources within the tenements.



Figure 38 – Mining buffer

Air Quality

The potential impact of sand mining activities on local air quality is by way of dust emissions.

Significant air impurity emission created by extractive industry activities is usually associated with the processing (crushing and screening) of raw materials. In this circumstance the rock or sand particles are reduced in size by processing and fine dusts are created. It is this dust type that is entrained in air, transported from the site with subsequent impacts on adjacent sensitive uses. Given that there is no raw material processing and that the raw material is sand, significant separation distances are not required. The main determinant of this conclusion is that sand particles are relatively large and are only entrained in significant winds but generally settle quickly in close proximity to the source.

The conditions relating to the mining tenements also contain clauses about the area of the mine that can be “opened up” at any one time. These conditions are for the purposes of dust minimisation and to ensure progressive rehabilitation of the mine area. The circumstance that may result in increased dust emissions for the mine sites is the use of haulage roads where heavy vehicles can “grind” the particles and reduce grain size. These matters are generally dealt with in the plans of operation that require monitoring of haulage routes, and wetting down as necessary.

As for noise, the likelihood of air quality impact due to sand mining operations on the development precincts is low. There is little potential for impact to the land zoned Rural in TPS8 (proposed Precinct 5 east of Cliff Street) and the extent of any impact from the sand mining activities at the time of development of the western part of Precinct 5 would be subject to a separate investigation.

It should be noted that there is the potential for air quality impacts from the iron ore loading facility at Cape Lambert on Point Samson as a whole. It is assumed that this operation meets the relevant air quality guidelines stipulated for its use and that the strategic industry buffer land is sufficient to protect sensitive uses.

Visual Considerations

The operations by Norwest Sand and Gravel will, at some point in time, involve extraction of the fine sand reserve at the highest point of the secondary dune. This will present a “mined” landscape view from various locations in and around Point Samson. The impact is expected to be relatively short term as progressive rehabilitation of mining areas is required.

Discussions have been initiated with the operator of Norwest Sand and Gravel about required modification to the Mine Closure Plan that would minimise this visual impact. It is recommended that these discussions continue through the Mine Closure Plan approval process with the Department of Mines and Petroleum when feedback on the plan is sought from the City of Karratha. It is considered that a satisfactory outcome could be achieved in this respect.

Transportation of Raw Materials

Given the separation distance of on-site haulage routes from the urban areas of Point Samson and the fact that all haulage vehicles would travel via Sam’s Creek Road and head south from the mine sites on Point Samson – Roebourne Road heavy vehicle amenity impacts are unlikely. From site inspections there are no identified traffic matters that require modification to the current Structure Plan precinct designations. Again, the development of the western area of Precinct 5 would require reassessment of this matter at the relevant time.

The matter of potential impacts from lawfully operating sand mines within the Structure Plan area has been carefully examined by a person with suitable qualifications and experience. The Structure Plan provides an appropriate response to these potential impacts and the probability of disturbance to existing and future amenity within the Structure Plan area is low.

15.5 Movement Networks

Existing Network

A traffic analysis was undertaken for the Point Samson townsite in June 2013 by Riley Consulting.

The traffic analysis report found that the existing road network in Point Samson currently operates to a suitable standard. The traffic modelling undertaken as part of the analysis indicates that the existing roads within the network will continue to operate in a manner consistent with their classification.

Point Samson - Roebourne Road, which is the main road into the town, has been constructed to a sufficient standard and is able to accommodate 8,000 vehicle movements per day. The traffic modelling has assumed a rate of 1,400 vehicle movements per day on this road, based on a population of approximately 600 people. The traffic report notes that Point Samson-Roebourne Road could service a population of up to 3,500 people. The existing parking provision throughout the townsite is considered adequate.

Given the future traffic forecasts are not expected to exceed 1,500 vehicles per day, the report states that Point Samson will provide a good walking environment, allowing pedestrians to cross roads with minimal delays. The existing local roads are also noted as providing a safe and accessible cycling environment.

It is noted that the current population of Point Samson would not warrant the provision of public transport services.

Traffic Forecasts and Implications

The traffic modelling undertaken as part of the analysis assumed a hypothetical two-fold increase in the current population of 300 people to 600. The future development to support a doubling of the population was assumed by the report to be built upon current vacant lots, and the area of land currently zoned Rural between Cliff and Fisher Streets. The report states that significant road upgrades are not expected to be required to support a potential doubling of the current population.

The analysis suggests some minor road treatments which may improve the existing network. These include:

- Potential development to the west of Fisher Street should be cognisant of the reduced visibility at the Murray Street/ Fisher Street intersection. A stagger of Fisher Street and Murray Street, or a roundabout may be appropriate.
- Removing verge obstructions to improve visibility; and
- A median at the intersection of Point Samson Road and Honeymoon road to control undesired vehicular movements.

Although the report notes that forecast traffic demands do not require the provision of additional roads, a new link to provide better connectivity near the commercial uses in the south of Point Samson was proposed through the car park between Bartley Court and Vitenbergs Drive.

The traffic analysis report appears to be sufficient to support the preparation of the Structure Plan if the future development of Point Samson does not depart significantly from the assumptions utilised in the traffic modelling (i.e. population of 600 people).

If new development proposals are likely to result in the population exceeding 600, which is possible if all land identified for potential development in the Structure Plan is developed, then new traffic modelling will be required which may identify a need for modifications.

Options for Improving Traffic Circulation

As part of formulating the recommended Structure Plan, a number of options were considered for new road connections to help improve traffic circulation within the townsite. The current layout includes several culs-de-sac and informal (non-gazetted) roads and is difficult for people unfamiliar with the town – such as tourists – to navigate. This can result in visitors driving unnecessarily on residential streets as they try to reach their intended destinations.

The existing road layout and various options considered to improve circulation and legibility are illustrated and described in Figures 39 - 42.

15.6 Water Supply

The West Pilbara Water Supply Scheme (WPWSS) supplies water to Point Samson as well as the towns of Karratha, Dampier, Wickham, Roebourne, Cape Lambert and the Burrup Peninsula (Essential Environmental, 2013). The major users of the water include industries such as port facilities and construction, as well as irrigation and residential.

Network Supply

Water from the West Pilbara Water Supply Scheme is currently gravity-fed to the Point Samson townsite via a nine kilometre water main from a storage facility at Wickham, seven kilometres of which is 200mm diameter pipe while the remaining two kilometres is only 150mm diameter. The storage facility at Wickham has a capacity of 9000 cubic metres at a TWL of 75m AHD.

Currently there are approximately 130 single services and 140 multiple services in Point Samson. The current water supply network is at capacity, with plans to upgrade the remaining two kilometres of 150mm diameter pipe to a 200mm diameter.

The supply is sourced from both the Harding Dam and the Millstream borefield. The Harding Dam is used as the primary supply provided the availability and quality of water is suitable. The Millstream aquifer is used as a supplementary source when the Harding Dam water is not suitable.

It is unlikely any additional development can take place without infrastructure upgrades being looked at as the network is currently at capacity.

Future Supply and Demand

Any significant proposed development of an extra service would require a planning investigation, and there would be a requirement for an increase in the storage and treatment facilities in Wickham and the amplification and/or duplication of the nine kilometre water main to Point Samson.

Outcomes

Previous issues with the water source for the West Pilbara Scheme have been resolved. However as the closest source to Point Samson is approximately 40 kilometres away, water conveyance may need to be reviewed as the Water Corporation hasn't envisaged or planned for any substantial growth in Point Samson or considered funding any required infrastructure.

A feasibility study will be required from the Water Corporation in order to determine what upgrades will be required for future development of Point Samson.

15.7 Power

Point Samson is currently supplied by Horizon Power through the North West Interconnected System (NWIS). The NWIS serves Dampier, Wickham, Pannawonica, Paraburdoo and Tom Price through the Pilbara Iron (Rio Tinto) network and Port Hedland, South Hedland, Karratha, Roebourne and Point Samson through the Horizon Power Network.

Current Supply and Demand

Currently demand in Point Samson derives from approximately 300 residents together with associated street lighting.

The town is serviced by the Cape Lambert substation with a 7.4 km 11kV feeder line. Currently, this supply meets current demand from the town. The current capacity of the Cape Lambert sub-station is 1.5 MVA while a summer peak load reaches 1.2 MVA. Therefore there remains some capacity in the Cape Lambert sub-station to handle moderate growth to service approximately 30 additional residential units.

However, should large loads be applied for then a feasibility study would be required to assess the potential for future network upgrades.

Future Supply and Demand

An approximate demand increase will come from an increase in population size by approximately 1,500 residents.

After Diversity Maximum Demand (ADMD) is the maximum demand which the electrical distribution network (local transformer) is capable of supplying expressed as an average per dwelling. In consultation with Horizon Power on 28 March 2014, Cardno was advised that an ADMD of 10 kVA per lot is assumed for design purposes. This is due to the extensive use of air conditioning in the region. This will increase demand by approximately 7.5 MVA, with additional demand coming from a possible future sewer treatment and street lighting.

Required Information

A feasibility study will be required to determine whether future supply can keep up with demand. A feasibility study would have to be carried out by Horizon Power.

The quoted cost of obtaining a feasibility study as at April 2011 is \$5,361.80 excluding GST.



Figure 39 – Existing road network

1. New Harbour Access

This option would facilitate access to the harbour for commercial vehicles and visitors seeking to access boat launching facilities without the need to travel past homes on Honeymoon Road. It would only be justified if significant new development takes place within the Marina Precinct. Its alignment and construction would be strongly influenced by the risk of inundation and the need to avoid negative impacts on the mangrove community lining Johns Creek.

2. Local Harbour Access

A link into a redeveloped marina precinct would be required for local residents and tourist. It should link as directly as possible to the town centre. This link might also serve development within Precinct 3 – Residential South.

3. Light Industrial Access

The existing access road into the light industrial area could potentially be extended to connect to the new harbour access (1), enabling direct access to and from Point Samson-Roebourne Road for traffic serving businesses in this location.

4. Cliff Street

The existing Cliff Street road reserve is a likely to be retained to serve future development within the Residential North Precinct. The intersection of this road with Point Samson – Roebourne Road and possibly the new harbour access (1) would also be an opportunity to formally mark the entrance into Point Samson with some sort of special treatment (eg: signage, artwork, feature landscaping).

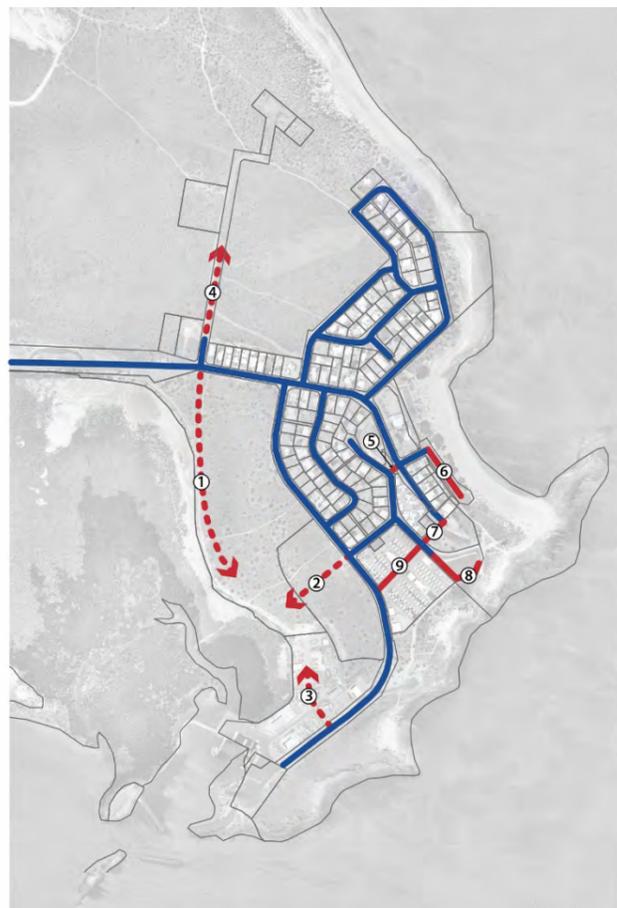


Figure 40 – Options considered 1 - 9

5. Link Miller Close and Vitenbergs Drive

A link connecting Miller Close to Vitenbergs Drive across Bartley Court was considered but not adopted in the preferred movement network as it would be geometrically difficult due to topography and the short distance involved, and would unnecessarily encourage non-residential traffic past homes in Vitenbergs Drive. However if road option (11) were ever pursued such a link would become essential to allow for efficient circulation of traffic.

6. Miller Close

As part of the response to coastal processes that forms part of the Point Samson Foreshore Management Plan, the pavement of Miller Close running parallel with Town Beach will be reduced and the car parking relocated to the south (pub) side. This will allow some of the current parking to be rehabilitated along with the adjacent dunes. Access to the Point Samson Caravan Park would still be available.

7. Sea Eagle Way

The Bartley Court road reserve ends approximately half way across the front of the Point Samson Hotel site. Beyond that point Bartley Court and the link to Vitenbergs Drive shown on some maps as Sea Eagle Way are easements across privately owned land. As a link in this location is critical for circulation within the town centre it is important that it be formalised as a road reserve. The preferred solution is to create a new road reserve parallel with the current connection and leave the existing paved area as a car park, limiting access to one end only (north/town centre side preferred). Acquisition of the necessary land would be required to create a road reserve and it is suggested that a land swap could be negotiated in exchange for all or part of the excess Vitenbergs Drive road reserve (as described

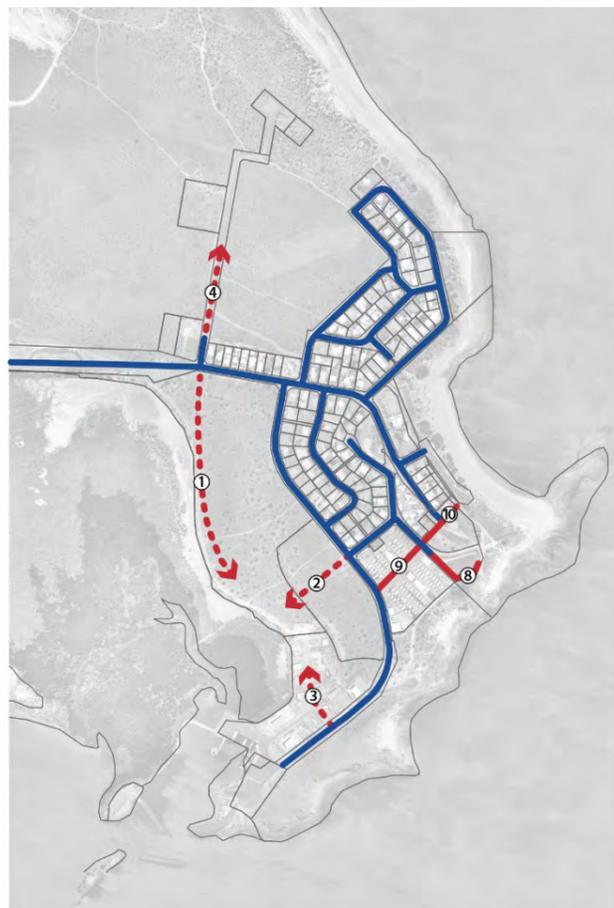


Figure 41 – Options considered 10

in 8). Alternatively the existing easement should be acquired and formalised.

8. Foreshore Access and parking

Rationalisation of the Vitenbergs Drive road reserve would provide road frontage for adjacent lots and allow for creation of a smaller car park and access to proposed improvements on the foreshore in this location. The balance of the road reserve could become a future development site for tourism purposes.

9. Vitenbergs Drive to Honeymoon Road

A more direct link between the town centre and Honeymoon Road than MacLeod Street could be achieved if a future redevelopment of the Cove Caravan Park site were to occur. Due to forecast inundation of much of this site due to sea level rise, a redevelopment that involved filling the part of the site closest to MacLeod Street to enable more permanent structures may eventually be proposed. In such a circumstance the creation of a new road link could be considered, which could also form part of defending the site against inundation.

10. Extend Sea Eagle Way northwards

A new cul-de-sac on the south-eastern side of the hotel from Bartley Court could provide on-street car parking, and additional road frontage to the adjacent tourism development site as well as keep a view to the ocean free of development. It was initially contemplated as an option to provide public access to the foreshore in response to earlier foreshore management proposals to remove most of Miller Close. However this road would require acquisition of private land and is not essential as public access and parking will still be available via Miller Close for the foreseeable future.

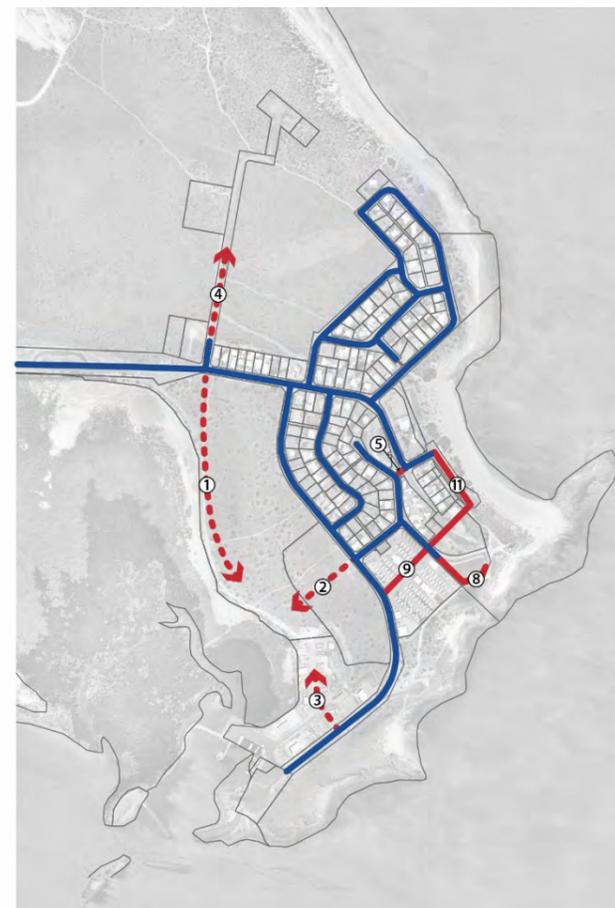


Figure 42 – Options considered 11

11. Loop Road

The City recognises that much of the land in the town centre is in single ownership and that as a result, the potential exists for a comprehensive redevelopment of the town centre on both sides of the Bartley Close. In such a circumstance it would be necessary to achieve alternative circulation and one way of doing so would be to encircle the town centre with a road linking Bartley Close (west), Miller Close and Vitenbergs Drive. However this option is not recommended and would only be contemplated along with other possibilities if such a radical redevelopment of the town centre were to be seriously proposed.

15.8 Wastewater

Background

Point Samson has no reticulated sewerage disposal. All household wastewater is discharged via Aerobic Treatment Units (ATUs) or into septic tanks which are then pumped out at the discretion of the landholder (Essential Environmental, 2013).

The two commercial lots at Point Samson treat waste water with ATUs.

Future Demand

An increase in population will see an increase in wastewater effluent. There is no current proposal or planning in place to develop a wastewater treatment plant in Point Samson. Pump stations, wastewater treatment plant and suitably zoned land would be required to treat effluent. A 500m buffer from residential zoned land would be required surrounding the wastewater treatment plant.

The City of Karratha requested Cardno to further investigate options for the disposal of wastewater within the town including the proposed growth areas. As part of this investigation, the potential for onsite wastewater disposal of a possible enlarged tourism development site in Bartley Court was requested as this was identified as a possibility in the Structure Plan. The Cardno report is included in Appendix B.

The investigations comprised assessing the areas required for onsite disposal of wastewater within the lot boundaries, the feasibility of constructing a centralised, reticulation system and the optimum number of units which could be serviced by an aerobic treatment unit within the new tourist precinct.

The conclusions drawn from the investigations are as follows:

- To continue with onsite disposal of wastewater. This option means the future residents would have to separately apply to the Department of Health with supporting geotechnical information to dispose of wastewater onsite.
- Theoretically smaller lot sizes would be possible using septic tanks and aerobic treatment units as the disposal areas would only require being 75m² and 30m² respectively. However Department of Health's Draft Country Sewerage Policy requires the minimum lot size to 1,000m².
- There may be perched groundwater and sewerage due to the presence of an aquitard in the form of a cemented sandstone layer. This may cause health concerns if it is true due to contamination of groundwater.
- If single story units are proposed within the new tourist precinct, approximately 184 units could be constructed with a disposal area of 4,600m².
- If two storey units are proposed within the new tourist precinct, approximately 266 units could be constructed with a disposal area of 6,650m².
- To install an infill sewerage system in the existing town, including a pumping station, rising main and treatment plant, it will cost

approximately \$ 3.7M ±75% upfront with \$40,000 / month ongoing costs.

- To install an infill sewerage system in the existing town and to provide capacity for the proposed new development, including a pumping station, rising main and treatment plant, it will cost approximately \$6.5 million ±75% upfront with \$40,000 / month ongoing costs.
- It is recommended that further site investigations are undertaken to ascertain if there is indeed perched groundwater throughout the town. This will confirm if the area remains suitable for onsite disposal of treated wastewater.

Outcomes

Integrating a wastewater system in Point Samson with the wastewater system in Wickham would be considered impractical given the topography and costs involved.

The other option is to continue the practice of ATU/septic tank usage in the area. This has a number of limiting factors. One of which is limiting the lot sizes to a minimum of 1,000m². The other limiting factor is the requirement for a 100m offset from any environmentally sensitive area, which will likely affect the area to the south-east in proximity to the tidal mangrove flats.

15.9 Gas

There is no reticulated gas service in any of the towns in the City of Karratha with bottled gas being used throughout the area. ATCO Gas has advised that no future gas infrastructure has been planned for Point Samson.

As there is no reticulated gas being provided to Point Samson or any of the nearby township surrounding it, it is unlikely to be provided in the foreseeable future.

The provision of reticulated gas services to Point Samson would require higher level planning for the City of Karratha as a whole.

The cost of providing reticulated gas services to such a small community at such a distance from existing infrastructure may prove to be cost prohibitive.

Telecommunications

Engineers Australia carried out a Telecommunications Report Card in 2007 and found the Pilbara Region ranks poorly, even though it hosts long haul infrastructure used to connect submarine cables and satellite station to the national network.

In the grading system the Pilbara Region received an F for fixed infrastructure and an E for Mobile Infrastructure (rated from A being the best to F being the worst).

Current Network Infrastructure

Point Samson is serviced by the Wickham Exchange which is located on Wickham Road for fixed line. Telstra provides wholesale and retail fixed line services to the area through the Wickham Exchange.

For mobile telephony, Point Samson is serviced by a mobile tower located on hills south of Wickham and east of the Point Samson – Roebourne Road. The town is covered by 3g gaining typical download speeds of between 1.1 to 20 Mbps.

Future Network Infrastructure

There are no plans to increase the telecommunications infrastructure network in the near future. Typically telecommunications companies react to increases in demand rather than pre-emptively increasing network capacity.

Point Samson is listed on the WA Cities and Towns Next Generation Wireless list. This is an indicative list of towns that will receive some wireless coverage. The list is based on initial detailed modelling work done by NBN Co. which may be subject to change following more detailed planning and design work. The wireless modelling does not take into account terrain modelling and clutter, and may not result in contiguous coverage of all locations within the indicated wireless footprint.

Conclusion

Point Samson is covered sufficiently with telecommunication infrastructure so as not to impose any restriction on potential development.

Any increase in population would likely be dealt with through the current infrastructure network.

15.10 Industry

John's Creek Boat Harbour

John's Creek Boat Harbour is the only parcel of land within Point Samson zoned 'Industry' under TPS 8. The harbour and environs is controlled by the Department of Transport (DoT), which leases land to marine-focused industries.

Figure 43 shows the DoT lease areas. This plan was created in 2012 and it was verbally noted by the DoT officer who provided it that the lease area controlled by DoT now also includes the car park adjacent to the boat ramp (lease area 443), which is controlled by the City of Karratha.

Discussions held with DoT officers during preparation of the Structure Plan revealed that the harbour is at capacity and struggles to adequately accommodate vessels during cyclones. DoT has given some thought to expanding the harbour to increase its capacity and to cater for the high demand for recreational boating within the Pilbara, but plans have not been progressed due to a lack of political priority to date, and a lack of funding to undertake what would inevitably be very expensive works.

It is noted that the officers consulted indicated a willingness to consider land uses beyond industrial uses if they did not conflict with the operation of the harbour, particularly if the inclusion of such uses could help to build a business case for funding of improvements at the harbour.

Imani Development (2013) provided an initial assessment of the operations of the harbour in a report commissioned for the Local Planning Strategy (*Draft Commercial and Retail Property Analysis of Point Samson*). This stated that the

fishing industry had recently been reduced to only one operator and that seafood businesses which once operated at the harbour are no longer in business. A charter company that once catered to tourists now caters for other marine service operators instead.

Imani stated that businesses supplying marine services had indicated that there are considerable difficulties at present, with the viability of such business having decreased substantially from 2010-2013. These difficulties include a downturn in opportunities to service the resource industries because other service providers from the main ports of Dampier, Exmouth and Onslow are performing these tasks.

Imani also noted that the need for marine servicing facilities at John's Creek Boat Harbour may be further reduced if the Anketell Port, which is planned to be a large-scale industrial area, is developed. The report suggests that the "use of the harbour could be re-orientated towards recreational boating and tourism related commercial activities, in line with the natural attractions of Point Samson and its surroundings".

The report recommended that it is important that local and State Government agencies "clarify and determine future usage policy for John's Creek as the harbour is an integral part of the history of Point Samson. More importantly it could be a key factor in leveraging the development of the town if it provided a more dynamic commercial environment".

The draft report also states that there is unlikely to be a further demand for industrial zoned land within Point Samson. Rather, the report recommends that future development potential is associated with lifestyle housing, hospitality and tourism uses, although based on other reports consideration needs to be given to various other constraints on development. It is noted that further industrial development may conflict with the character of the townsite and its recognition as an attractive lifestyle/tourism town.

Demand for Industrial Land

During consultation for preparation of the Structure Plan some members of the Point Samson community expressed concern that the only industrial land in town is leasehold land controlled by DoT and limited to marine industries. The view was expressed by some that additional industrial land should be made available in town and that it should be freehold, which would allow market rates to prevail in a manner that they perceive are not reflected by DoT prices.

Assessments of the need for industrial land within the eastern corridor of the City of Karratha do not support the view that provision of further industrial land within Point Samson itself could be justified. In addition to the views expressed in Imani Development (2013), the report by Syme Marmion and Co (2013) entitled *Industrial Land in the Eastern Corridor of the Shire of Roebourne* indicates that industrial and mixed business land provision of around 30ha in the Structure Plan for Wickham forms an important element of service provision for the Wickham/ Point Samson community and would be expected to be immediately developable. Around 39ha could be required by 2031. Industrial land planned at Roebourne (44ha in total) may substitute for it to some extent, but industrial estates at Karratha are too distant and neither substitute for it nor compete with it.

There is insufficient serviced land in Point Samson to accommodate an additional industrial area whereas land to be developed at Wickham is only five kilometres away. Furthermore, if the indications that marine industries may eventually move away from John's Creek Boat Harbour in preference to industrial land at larger ports are true, then there should be more opportunity for other types of light industry to locate there.

The matter of tenure (leasehold) of land at the harbour is a separate issue from that of land use. Discussions with DoT officers regarding the future of the harbour indicate that DoT is unlikely to change its practice of leasing land as it is a source of income that helps with maintenance of the harbour infrastructure. Furthermore, the harbour reserve is still Crown land, and as such could not be sold as freehold.



Figure 43 –DoT lease areas as at May 2012

15.11 Key Opportunities and Constraints

'Sieve mapping' the main spatial constraints to development (Figure 44) results in an area within which urban expansion could be considered (Figure 45). Whilst other constraints, such as identification of sites of cultural heritage significance or rare and endangered species, will inevitably influence the ultimate detail of proposed development layout and form, for the most part these will be minor and/or can be dealt with through management mechanisms.

Figure 46 depicts the key spatial opportunities and constraints with regard to the potential future development of the Structure Plan area that were identified in the background investigations that inform the Structure Plan.

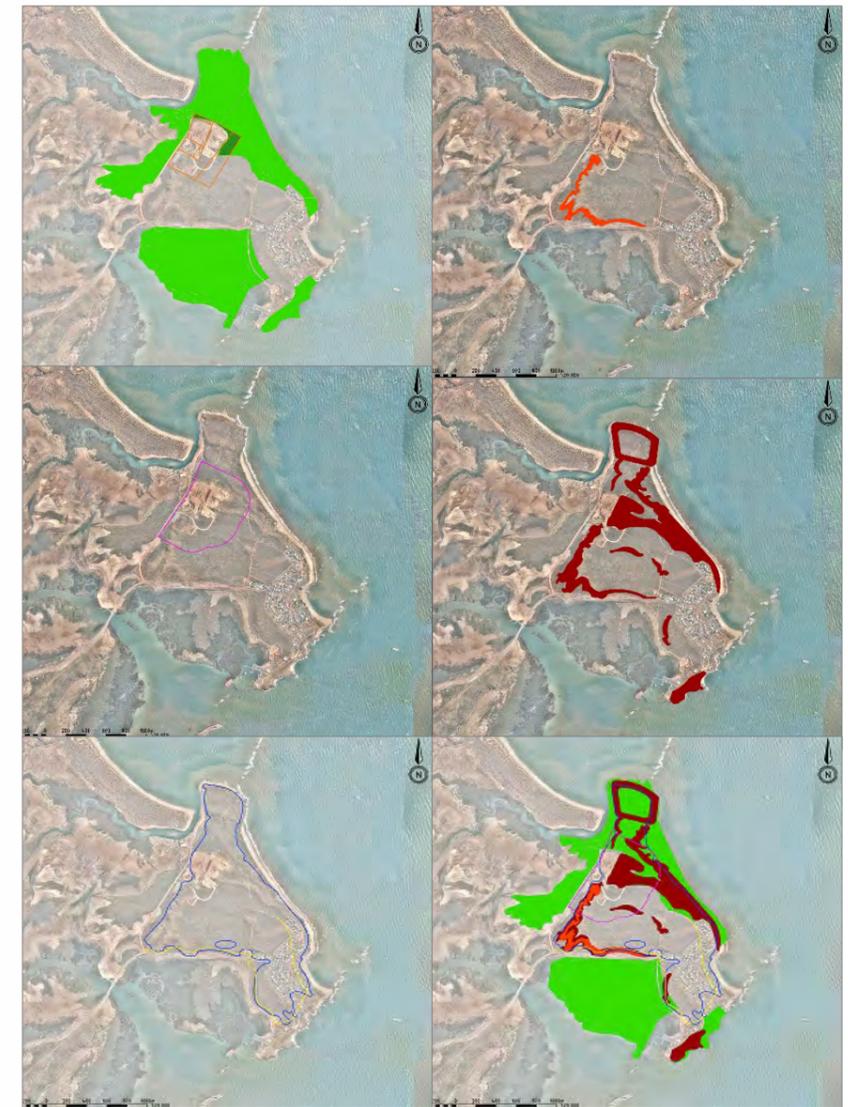


Figure 44 - Landscape protection, conservation areas, coastal setbacks, and mining buffers combine to give an indication of areas that can be considered for future expansion.

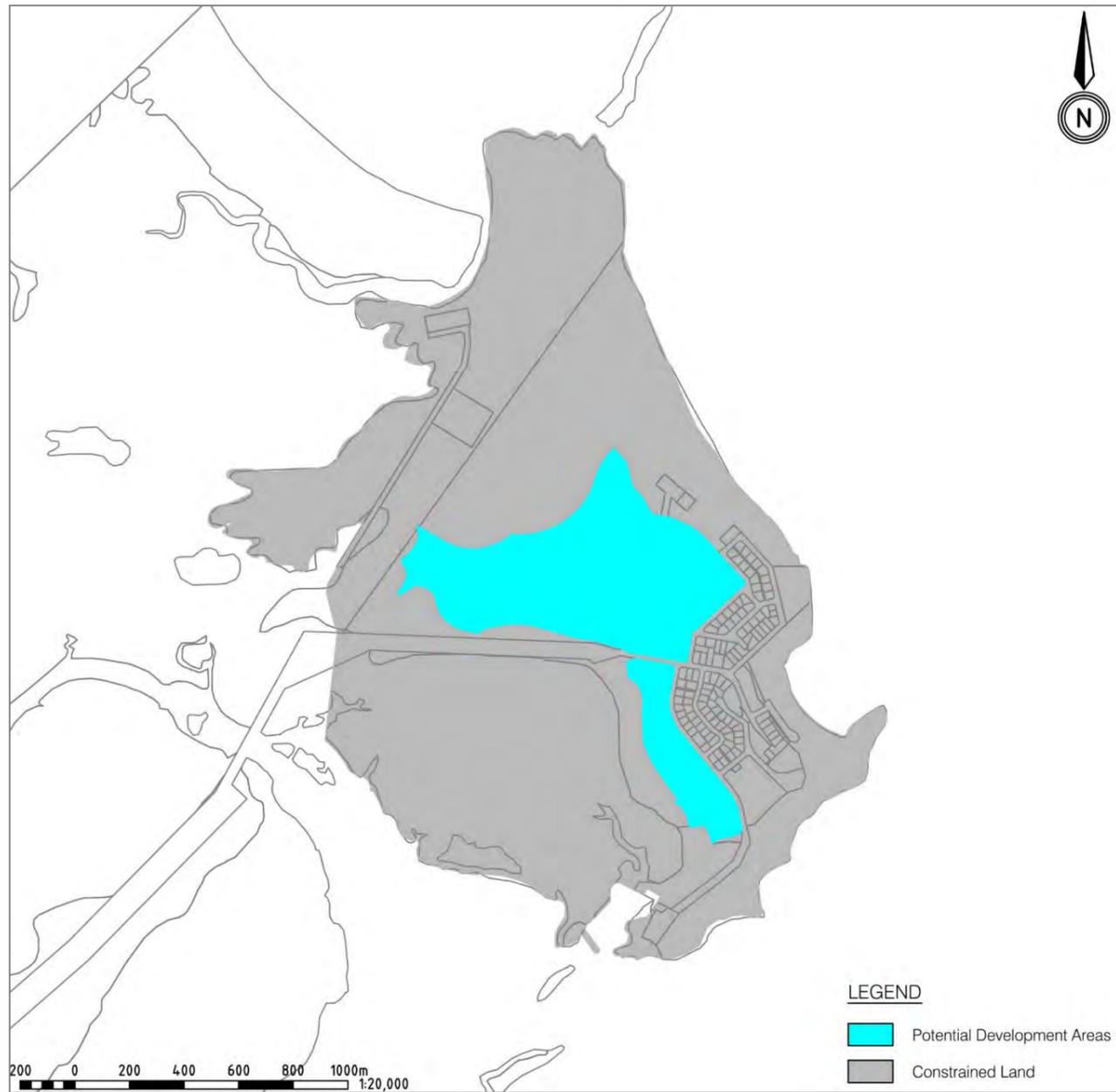


Figure 45 – Areas available for possible future development

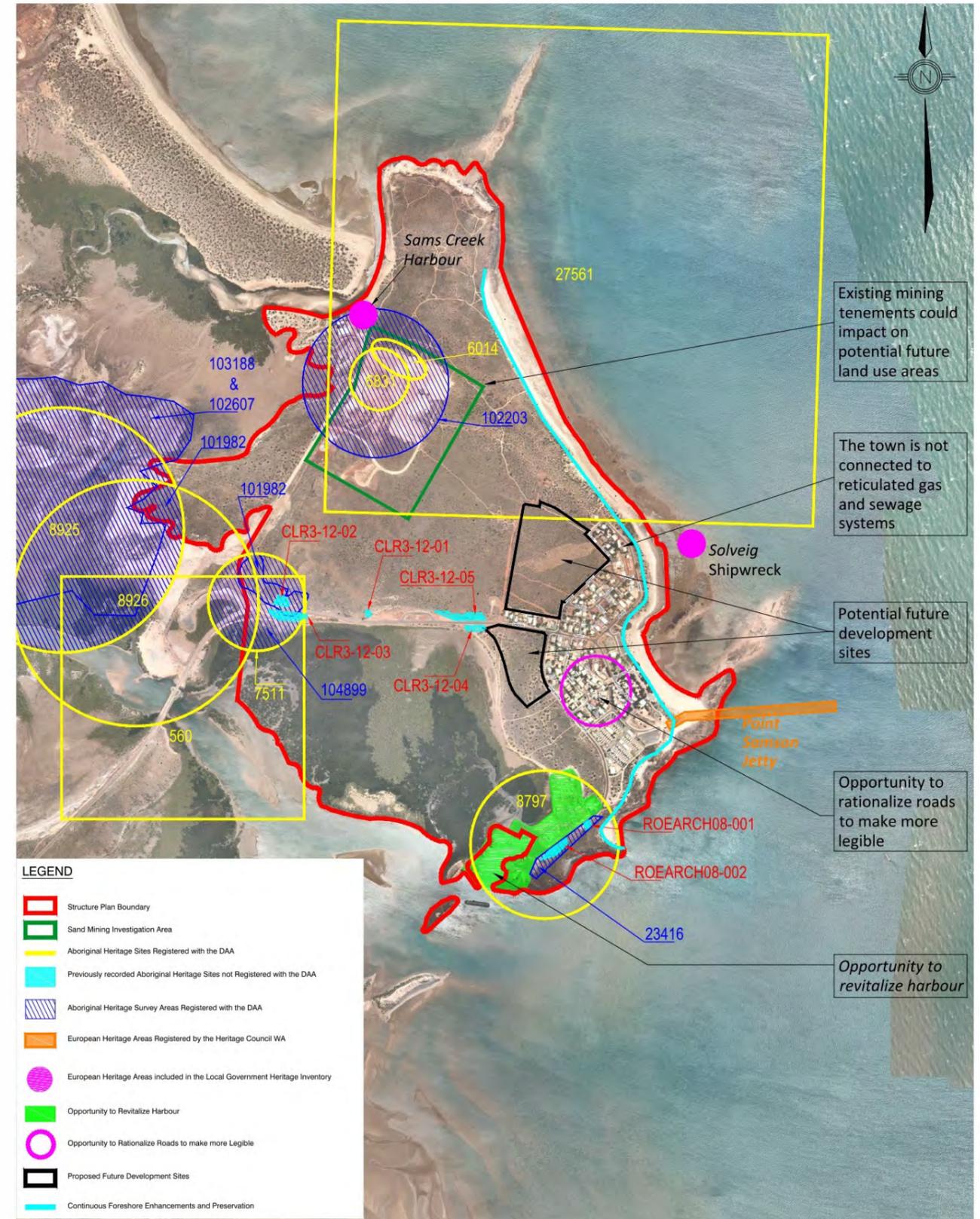


Figure 46 – Opportunities and Constraints

16.0 Other Requirements

The following technical investigations are recommended to be undertaken in support of future detailed planning in response to the Structure Plan.

- A traffic assessment may need to be undertaken before future development of Point Samson departs significantly from the assumptions utilised in the traffic modelling (i.e. population of 600 people).
- Level 2 flora and fauna surveys are to be undertaken over any vegetated areas identified for potential future development as part of local structure plans, detailed area plans (if required) or prior to determination of a development or subdivision application.
- Aboriginal archaeological and ethnographic surveys should be undertaken in areas proposed for development that are not covered by existing surveys.
- Feasibility studies are required from Horizon Power and the Water Corporation to determine the potential future power and water requirements, respectively, based on the Structure Plan design.
- A Bushfire Risk Hazard Assessment may be required to be undertaken in support of the Structure Plan. Discussions with the Department of Planning and a flora survey will reveal whether this assessment is required.
- A coastal hazard risk management and adaptation plan should be prepared for sites within Point Samson in accordance with the Coastal Hazard Risk Management and Adaptation Planning Guidelines (WAPC 2014).
- Aboriginal archaeological and ethnographic surveys should be undertaken in areas proposed for development that are not covered by existing surveys.

17.0 Consultation and Community Vision

17.1 Engagement Process

The purpose of the engagement process is to capture a range of perspectives proffered by the community and other key stakeholders. Integral to the process has been working towards a shared vision for the future development of the townsite.

The input received has been utilised to inform the development of the Structure Plan and principles and objectives for each precinct.

The main source of community input was obtained from three workshops held in Point Samson during April, May and September 2014. These aimed to establish community priorities and ideas, issues and concerns, and obtain a response to ideas for the Structure Plan and precinct plans as they developed.

In addition to workshops there was liaison through meetings, telephone calls and correspondence with other key stakeholders such as the Department of Transport, Department of Planning, sand mine operators and technical officers of the City of Karratha.

Consultation with the local Aboriginal community was not undertaken during the preparation of the Structure Plan as it was determined by the City and the Ngarluma Aboriginal Corporation (NAC) that NAC would undertake that consultation independently.

17.2 Community Vision

The key directions that came from the community workshops held during 2014 are summarised below:

1. Remain a viable small coastal node
 - Sustainable tourism industry
 - Marine focused recreational opportunities
 - Limited growth between 500-1,000 people
2. Retain low key, coastal village
 - Low density – larger lots
 - Low scale buildings
3. Environmentally sensitive response
 - Topography
 - Environment
 - Coastal processes
4. Improved local amenity
 - Streetscapes
 - Open space
 - Infrastructure

The Structure Plan addresses these issues to the extent possible in a District level strategic document, and aims to ensure that they are taken into account at the appropriate level of planning.

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APPENDIX A – Environmental Conservation Definitions

Table A1 – Definition of Conservation Significant Communities

Category Code	Category
Threatened Ecological Communities (TEC)	
PTD	<p>Presumed Totally Destroyed</p> <p>An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extinct and either of the following applies:</p> <ul style="list-style-type: none"> records within the last 50 years have not been confirmed despite thorough searches of known likely habitats; or all occurrences recorded within the last 50 years have since been destroyed.
CE	<p>Critically Endangered</p> <p>An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria:</p> <p>The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification;</p> <p>The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or</p> <p>The ecological community is highly modified with potential of being rehabilitated in the immediate future.</p>
E	<p>Endangered</p> <p>An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically</p>

Category Code	Category
	<p>Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria:</p> <p>The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification;</p> <p>The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or</p> <p>The ecological community is highly modified with potential of being rehabilitated in the short term future.</p>
V	<p>Vulnerable</p> <p>An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria:</p> <p>The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated;</p> <p>The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; or</p> <p>The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.</p>

Table A2 – Priority Ecological Communities Definitions

Priority Ecological Communities (PEC)	
P1	<p>Poorly-known ecological communities</p> <p>Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.</p>
P2	<p>Poorly-known ecological communities</p> <p>Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.</p>
P3	<p>Poorly known ecological communities</p> <p>Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat; or</p> <p>Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.</p>
P4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened or that have been recently removed from the threatened list. These communities require regular monitoring.</p>

Priority Ecological Communities (PEC)	
P5	<p>Conservation dependent ecological communities</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

Table A3 – Declared Rare and Priority Flora List Conservation Categories (DPaW, 2014)

Conservation Code	Description
T	<p>Threatened Flora – (Declared Rare Flora – Extant)</p> <p>Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.</p>
X	<p>Presumed Extinct – (Declared rare Flora-Extinct)</p> <p>Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.</p>
1	<p>Priority One - Poorly known Taxa</p> <p>Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.</p>
2	<p>Priority Two - Poorly Known Taxa</p> <p>Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.</p>
3	<p>Priority Three - Poorly Known Taxa</p>

	<p>Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.</p>
4	<p>Priority Four - Rare Taxa</p> <p>Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors.</p> <p>These taxa require monitoring every 5-10 years.</p>

APPENDIX B – Wastewater Servicing Investigations



APPENDIX C – District Water Management Strategy

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