



District Structure Plan Report

East Carnarvon and Kingsford
Shire of Carnarvon
October 2015

This structure plan is prepared under the provisions of the Shire of Carnarvon Town Planning Scheme No.10

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON: **10 SEPTEMBER 2015**

Signed for and on behalf of the Western Australian Planning Commission



_____ an officer of the Commission duly authorised by the Commission pursuant to Section 16 of the *Planning and Development Act 2005* for that purpose, in the presence of:

M. Wieclaw

_____ Witness

12 November 2015

_____ Date

_____ 10 September 2025

_____ Date of Expiry

Pre-lodgement consultation

Agency	Date of consultation	Method of consultation	Summary of outcome
Department of Water	Apr 2013	Information gathering	Acquisition of information
Department of Environment Regulation	Apr 2013	Information gathering	Acquisition of information
Main Roads Western Australia	Apr 2013	Information gathering	Acquisition of information
Department of Transport	Apr 2013	Information gathering	Acquisition of information
Horizon Power	Apr 2013	Information gathering	Acquisition of information
Water Corporation	Apr 2013	Information gathering	Acquisition of information
Carnarvon Growers Association	Apr 2013	Information gathering	Acquisition of information
Department of Agriculture and Food	Apr 2013	Information gathering	Acquisition of information
Department of Education	May 2013	Information gathering	Acquisition of information
Land owners within and adjacent to the structure plan area	Jun 2013	Vision Workshop	Vision for site
Gascoyne Development Commission	Jul-Aug 2013	Information gathering	Acquisition of information
Carnarvon Chamber of Commerce	Jul-Aug 2013	Information gathering	Acquisition of information
Gwoonwardu Mia	Aug 2013	Information gathering	Acquisition of information

REVISION SCHEDULE

No.	Date	Details	CM
1	7/03/14	First Draft	DJ
2	31/04/14	Revision based on comments from Shire	DJ
3	5/06/14	Revisions post Council endorsement	DJ
4	18/06/14	Amendments made by Shire prior to WAPC approval to advertise	DJ
5	19/09/14	WAPC revisions	MS
6	27/11/14	WAPC/Council clarifications and revisions	DJ
7	7/05/15	WAPC clarifications and revisions	MS
8	8/10/15	Modifications prior to WAPC endorsement	MS

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Executive summary

Hames Sharley was commissioned by the Shire of Carnarvon to undertake the development of a District Structure Plan Report for the East Carnarvon and Kingsford area ("the site"). The Structure Plan will set the strategic framework for future development of land uses within the site. This Structure Plan and Report were prepared based on the Western Australian Planning Commission Structure Plan Preparation Guidelines.

The Shire of Carnarvon is situated approximately 906km north of the State's Capital Perth, at the mouth of the Gascoyne River. The site is located 4km east of the Carnarvon townsite. The site comprises a diverse range of land uses including horticulture, tourist accommodation, general and light industry and residential at a range of densities and community uses.

Community consultation was an integral component in the development of the East Carnarvon and Kingsford Structure Plan. A Landowners Visioning Forum was held in June 2013 over two consecutive evenings for landowners to share their ideas with the project team considering redevelopment options for the study area. The vast majority of respondents value the close proximity of East Carnarvon and Kingsford to the town and its facilities, whilst at the same time being distant enough to retain a rural lifestyle amenity. When asked to imagine the study area in 10-15 years, the most frequent responses included more land release for lifestyle blocks, an expansion of footpaths throughout East Carnarvon and general improvement of the visual amenity throughout the study area. These themes were common across both the evening forums and the formal surveys.

An outcome of the community visioning was an aspired vision for the structure plan area, as follows:

The Structure Plan will 'complete' the existing community to form a well serviced, structured and legible neighbourhood with a comprehensive range of strategically located land uses. The Plan will enrich employment and tourism opportunities available within Carnarvon as well as foster a diverse and dynamic blend of residential lifestyle types. Natural and cultural features will, where possible, be protected, enhanced and integrated within the development to form an intrinsic part of its character and sense of place.

Determining the future land uses is important as it provides a framework for potential development. The Structure Plan proposes the creation of a "main street environment" along Marmion Street connecting to Chainman's Pool and the establishment of a tourism hub around this node. Furthermore the Structure Plan links to the proposed expansion of the industrial area associated with the Carnarvon Airport Precinct Structure Plan, as well as prioritising intensive horticulture in Kingsford. These future land uses will guide scheme provisions and provide a planning framework for future development.

Structure plan summary table

Item	Data	Section number referenced within the Structure Plan Report
Total area covered by the structure plan	780.35 hectares	3.3.1
Area of each land use proposed:		3.3.1
Residential	98.04 hectares	
Special Residential	213.46 hectares	
Mixed Use	6.19 hectares	
Tourist Accommodation	15.08 hectares	
Service/Commercial	29.44 hectares	
Intensive Horticulture	159.02 hectares	
Industrial	74.69 hectares	
Community Use	16.72 hectares	
Recreational and Open Space	65.07 hectares	
Airport and Associated Development	15.09 hectares	
Estimated lot yield	1400	3.3.2
Estimated number of dwellings	1400	3.3.2
Estimated residential site density	4.5 dwellings per residential zoned hectare	3.3.2
Estimated population	3500 people (based on full build out)	3.3
Number of high schools	1 (already provided)	3.5
Number of primary schools	1 (already provided)	3.5
Estimated commercial floor space	Approx 12.6ha	3.3.2
Estimated number and % of public open space:	65.07ha of open space (11% of developable area)	3.3.2
– Regional open space	11.66 ha of regional open space	
– District open space	39.05 ha of district open space	
– Local open space	14.36 ha of local open space	
Estimated number and area of natural area and biodiversity assets	33.8ha	2.2, 3.3.2

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Part One – Statutory section

1. STRUCTURE PLAN AREA

This part applies to the East Carnarvon and Kingsford Structure Plan (the Structure Plan) being all of the land contained within the inner edge of the dashed red line shown on the plan below.

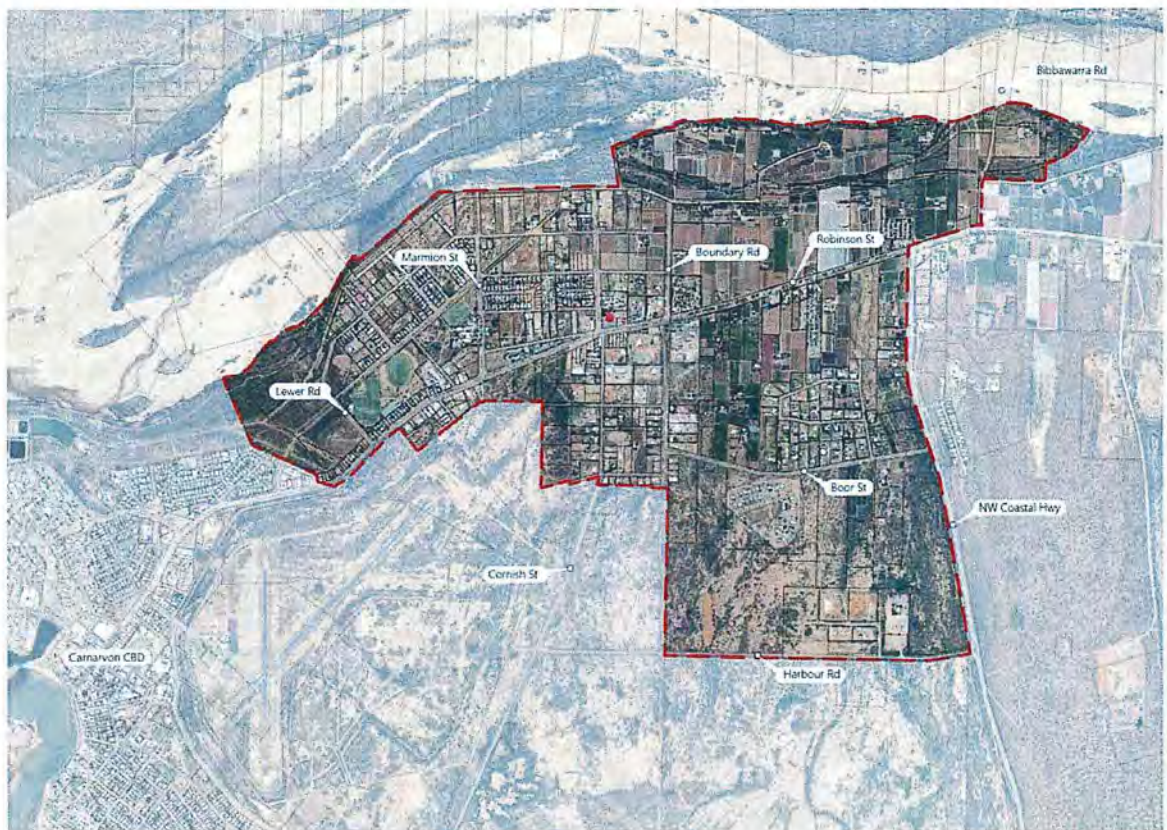


Figure 1. Location Plan

2. STRUCTURE PLAN CONTENT

This District Structure Plan comprises:

- Part One – Statutory section which comprises the structure plan map and statutory planning provisions and requirements;
- Part Two – Explanatory (non-statutory) information which is used as a reference guide to interpret and justify the implementation of Part One; and
- Appendices – East Carnarvon and Kingsford Structure Plan including plans indicating Navigational Aid Equipment Height Limits and Dampier to Bunbury Natural Gas Pipeline Corridor and Buffer.

3. INTERPRETATIONS AND SCHEME RELATIONSHIP

The words and expressions used in this Structure Plan shall have the respective meanings given to them in the *Shire of Carnarvon Town Planning Scheme 10* (TPS10).

In the absence of any specific provisions contained within TPS10 to guide the preparation and enable the implementation of structure plans, this Structure Plan has been prepared in accordance with the Western Australian Planning Commission's *Structure Plan Preparation Guidelines* (August 2012) and best practice.

4. OPERATION

This Structure Plan shall not come into effect until the Carnarvon Shire Council adopts it under relevant provisions of a Local Planning Scheme. Until formal adoption, the Structure Plan shall provide the non-statutory strategic guidance to land use and development within the Structure Plan area.

5. LAND USE AND SUBDIVISION

The Shire of Carnarvon may recommend subdivision (or approve the development) of land within the structure plan area if the local government is satisfied that this will not prejudice the specific intent, purposes and requirements of the structure plan area. Where the Shire is not satisfied that the principles of proper and orderly planning as set out by the framework presented in the structure plan can be achieved, more detailed Local Structure Plans will be required.

6. STATUTORY STRUCTURE PLANS

The Structure Plan is classified as a district structure plan. A district structure plan is defined as a high-level, predominantly strategic, document that provides guidance on future land use, employment, density targets and the coordination and provision of major infrastructure.

It is intended that this document will be endorsed as the guiding document to assess local structure plans, subdivision and development by way of the Shire of Carnarvon's Local Planning Scheme. In regards to the East Carnarvon Subdivision Guide Plan, the Structure Plan supersedes these layout plans which will be removed from the Scheme through an amendment process.

7. LOCAL DEVELOPMENT PLANS

Local Development Plans prepared within the Structure Plan area shall be generally in accordance with the provisions, standards and requirements of this structure plan.

Part Two – Explanatory section

1. PLANNING BACKGROUND

The structure plan for East Carnarvon and Kingsford will set the strategic framework for the future development of land uses within the site area. The structure plan acknowledges the staged provision of sewer to enable densification of East Carnarvon and protection of valuable agricultural land in Kingsford.

The vision for the East Carnarvon and Kingsford site is:

The Structure Plan will 'complete' the existing community to form a well serviced, structured and legible neighbourhood with a comprehensive range of strategically located land uses. The Plan will enrich employment and tourism opportunities available within Carnarvon as well as foster a diverse and dynamic blend of residential lifestyle types. Natural and cultural features will, where possible, be protected, enhanced and integrated within the development to form an intrinsic part of its character and sense of place.

1.1. INTRODUCTION AND PURPOSE

This report has been prepared in support of the East Carnarvon and Kingsford Structure Plan (herein referred to as the Structure Plan). In the past, the lack of a contemporary Structure Plan to guide the subdivision and development of land in this area has resulted in a relatively fragmented and 'ad-hoc' approach to the planning and approval process. This Structure Plan and Report have been prepared as part of a review of the East Carnarvon Subdivision Guide Plan so as to provide a contemporary framework for the coordinated provision of services, infrastructure, land use and development. In addition the Structure Plan recognises the importance of the horticultural industry to Carnarvon and the wider region. The East Carnarvon and Kingsford areas contain approximately 16 per cent of the area farmed for horticulture in the Carnarvon Irrigation District (with most of this land being in Kingsford and Lewers Island).

The Structure Plan will provide a strategic basis for land use planning decisions within the Structure Plan area over the next 15 years and beyond to assist the Shire and the Western Australian Planning Commission in assessing subdivision applications and development proposals.

1.2. LAND DESCRIPTION

1.2.1. LOCATION



Figure 2. Regional Location Plan

Carnarvon is the commercial, administrative and population centre for the surrounding Gascoyne region. The traditional or anchor industries comprise of fishing, mining, pastoralism and horticulture. The area is particularly well known for its salt farming, prawns, fruit and vegetable production.

The Gascoyne region has a growing tourism profile particularly in the short break and travelling holiday market. In recent times, Carnarvon has become an important gateway to the region's key natural attractions including the Ningaloo Reef, Shark Bay, Mount Augustus and the Kennedy Ranges.

The Carnarvon townsite and built up area cover an area of about 15,000 hectares and is located approximately 900 km north of Perth (refer to Figure 2). The settlement sits within the Gascoyne River delta and at the junction of the North West Coastal Highway and the Carnarvon-Mullewa Road, which are the two principal transport routes in and out of the Shire.

The Shire lies within a large sedimentary basin known as the Carnarvon Basin. This basin slopes gently towards the coast and is characterised by low relief (about 200 metres AHD), open drainage and large, gently undulating sand plains, except for outcropping of Permian Rocks (rising to over 300 metres AHD) in the east (Kennedy Ranges) and north (Giralia Range).

1.2.2. AREA AND LAND USE

The study area is bound by Campbell Way and the airport site on the west, Gascoyne River to the north, North West Coastal Hwy and Bibbawarra Rd to the east and Harbour Rd to the south (see Figure 1). The Structure Plan area is approximately 541ha and divided into three suburbs; East Carnarvon, Kingsford and Lewers Island.

The area includes a diverse range of land uses including intensive horticulture, tourist accommodation, general and light industry, residential at a range of densities and community uses. Notable features of the area include the Festival Ground (Carnarvon's principal sporting facility), underdeveloped public open space (Wise Park), Carnarvon Community College, Carnarvon power station (soon to be decommissioned) and Mungullah Aboriginal Community.

1.2.3. LEGAL DESCRIPTION AND OWNERSHIP

The land within the site is approximately 57% privately owned by companies and individuals, whilst the remaining 43% is owned by local, state and federal government authorities (refer to Figure 3).



Figure 3. Tenure Information

1.3. REGIONAL AGRICULTURE

In 2013, the horticulture industry was valued at \$77.4 million with 1,200 ha under production (source: *Carnarvon Plantation Industry Production Statistics*, Department of Agriculture and Food WA, 2014).

There are 197 ha included within blocks in East Carnarvon and Kingsford where all or some of the land is used for irrigated horticulture (see Figure 4). It is likely that the actual area under crop at any one time is about 160 ha. This means that the East Carnarvon and Kingsford areas contain approximately 16 per cent of the area farmed for horticulture in the Carnarvon Irrigation District (with most of this land being in Kingsford and Lewers Island).

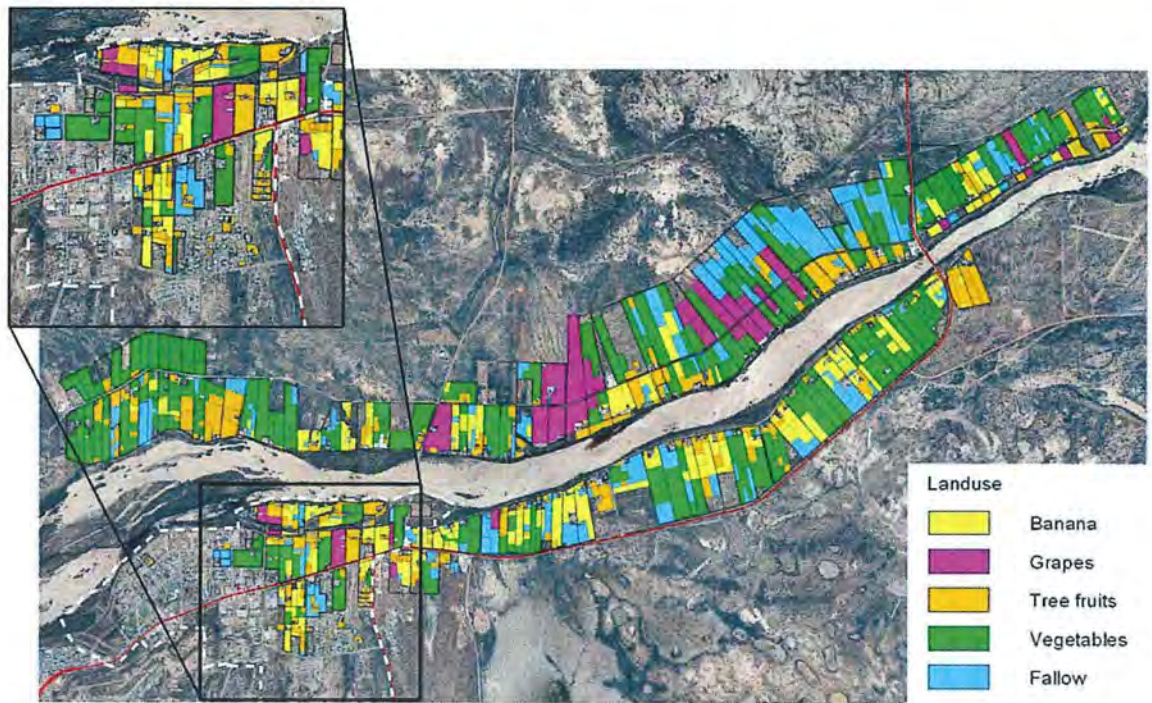


Figure 4. Extent of Carnarvon horticulture in 2010 (DAFWA 2012)

1.4. PLANNING FRAMEWORK

As part of the planning for this project, a list of key documents was analysed. This included important local planning strategies and relevant state policies and guidelines.

1.4.1. ZONING AND RESERVATIONS

Shire of Carnarvon Town Planning Scheme No.10– Carnarvon Townsite & Environs

The Shire of Carnarvon Town Planning Scheme No.10 (the Scheme) have a range of land uses allocated, including residential uses predominantly within East Carnarvon, industrial uses around Boundary Road and Cornish Street and horticulture and special residential within the Kingsford area. Refer to Figure 5 below.

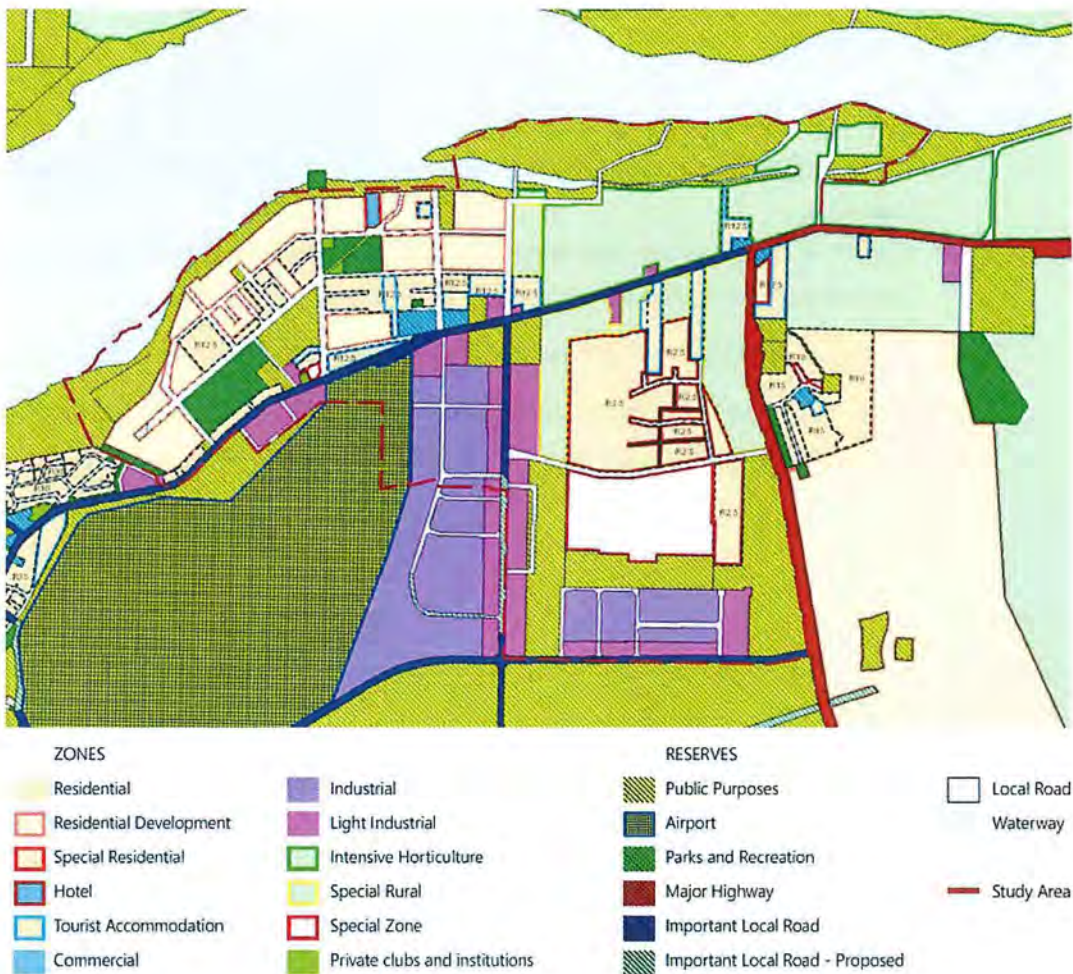


Figure 5. TPS 10 (Department of Planning, Devnet)

There is no requirement under the Scheme for a Structure Plan over the subject land but given the scale of the site a District Structure Plan is considered appropriate to guide future development.

Shire of Carnarvon Policy Statement No. 1 (TPS No. 10)

This Policy Statement deals with *'Planning and Development Control objectives with respect to land used for intensive horticulture and plantations'*.

The objective of the Policy is *'to preserve and maintain the affected land [within the Intensive Horticulture Zone of the Scheme] as viable units for horticulture and plantation which will include resistance, by recommendations for refusal, to proposals for subdivision and refusal of any land use or development proposals which would operate in conflict with this objective'*.

Policy Statement No. 1 is currently gazetted under TPS No. 10, Amendment No. 68 to TPS No. 10 (in progress) however, propose to better align the Policy with the Scheme, removing any inconsistencies in order to provide clarity to both the Local Government in decision making and potential applicants.

The key statements in the Policy are as follows.

- Council will not recommend approval to any subdivision proposal for lots smaller in area than 6 ha.
- Council will oppose any development which will result in a diversion of land from horticultural or plantation production.

This policy applies to all Intensive Horticulture lots as shown in Figure 5.

There is a linkage between the Shire's Policy Statement 1, and WAPC *State Planning Policy 2.5 Land Use Planning in Rural Areas (2012)*, as discussed above in Section 1.4.2.

East Carnarvon Subdivision Guide Plan (Area 1 – East Carnarvon and Area 2 – Kingsford)

The East Carnarvon Subdivision Guide Plan proposes a subdivision based on the future provision of underground sewer in the area. Having been gazetted in TPS 10, the guides are statutory documents, which identify redevelopment and subdivision opportunities. However, the guide plans are now outdated and require re-evaluation. The East Carnarvon and Kingsford Structure Plan will replace these layout plans through an amendment process.

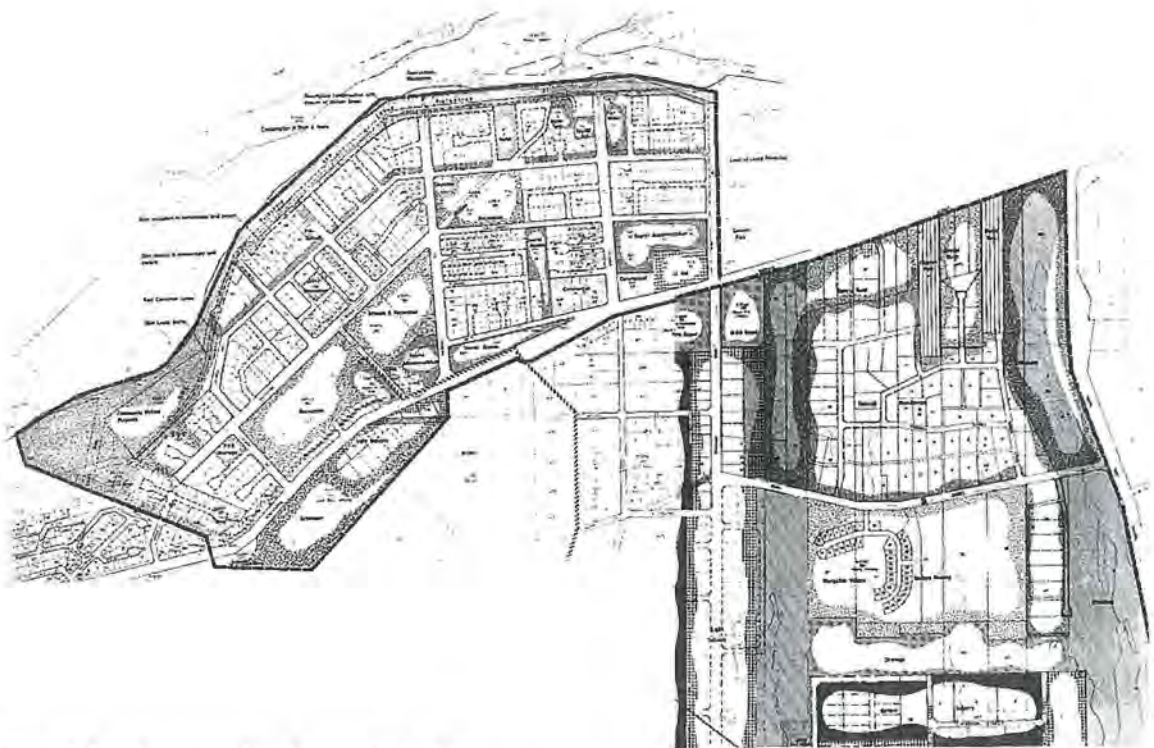


Figure 6. East Carnarvon Subdivision Guide Plan

1.4.2. POLICIES

State Planning Policy 2.5 Land Use Planning in Rural Areas

Western Australian Planning Commission – May 2012

This State Planning Policy is guided by the main objectives which are to protect rural land from incompatible uses, minimise conflicts and promote regional development. The Policy applies to the whole of the Carnarvon Irrigation District, including the Kingsford and the Lewers Creek area as well as the rural residential areas in southern Kingsford.

In regards to protection of rural land, the Policy provides the following guidance:

- Policy measure 5.1b - land identified as priority agricultural land in a planning strategy or scheme is to be retained for that purpose; and
- Policy measure 5.1e - creation of new rural lots will be by exception and in accordance with Development Control Policy 3.4 – Subdivision of Rural Land, or planned in a strategy or scheme.

In regards to rural living precincts, the policy in section 5.6 states that the WAPC will consider identifying rural living precincts or supporting proposals for rural living when a range of aspects are considered, most notably:

- the precinct is adjacent to existing urban areas and has appropriate access to services, facilities and amenities;
- the precinct will not conflict with rural land use activity or reduce the primary production potential of adjoining or nearby land;
- areas required for priority agricultural land are avoided;
- where lots with an individual area of 4 hectares or less are proposed and a reticulated water supply of sufficient capacity is available in the locality;
- it has been demonstrated the precinct can be supplied with reticulated electricity;
- the precinct is predominantly cleared of remnant vegetation or the loss of remnant vegetation through clearing for building envelopes, bushfire protection, access and fencing is minimised and environmental assets are not compromised; and
- the land within the precinct is capable of supporting the development of a dwelling(s) and is not located in a flood prone area.

State Planning Policy 2.6 Coastal Planning Policy

Western Australian Planning Commission – July 2013

This policy promotes urban development to be concentrated in and around existing settlements around coastal areas, particularly those with established infrastructure and services. Given that East Carnarvon is protected by an existing levee bank and has been identified for increased density the principles of the structure plan comply with this policy. It is also intended that water sensitive urban design and integrated water cycle management be implemented in the more detailed works to follow.

State Planning Policy 2.9 Water Resources

Western Australian Planning Commission – December 2006

This policy, focuses on the impact development has on water resources. In respect to the Structure Plan, it relates to the Gascoyne River and its intermittent floodway through the site. A District Water Management Strategy is currently being undertaken by the local government as a separate process.

State Planning Policy 3 Urban Growth and Settlement

Western Australian Planning Commission – March 2006

This policy document sets out broad principles which apply to planning for urban growth and settlements in Western Australia. This Structure Plan inherently captures many of the key elements listed within the regional context of Carnarvon.

State Planning Policy 3.1 Residential Design Codes

Western Australian Planning Commission – August 2013

The R-Codes provide a comprehensive basis for the control of residential development throughout Western Australia by local governments and this policy provides guidance in regards to density and built form in urban areas.

State Planning Policy 3.2 Aboriginal Settlements

Western Australian Planning Commission – May 2011

This policy provides the planning framework for the preparation of community layout plans and their incorporation into town planning schemes. Whilst this study will not include this level of planning, the study area does include Mungullah Aboriginal Community and this document should be taken into consideration during more detailed planning of the area.

State Planning Policy 3.4 Natural Hazards and Disasters

Western Australian Planning Commission – April 2006

The primary objective of this policy is to include planning for natural disasters as a fundamental element in the preparation of statutory documents such as structure plans. Specific to this structure plan is flood risk, as the Gascoyne River floodway traverses the site. Also, storm surge as a result of cyclone activity is another risk based on the *Cyclonic Inundation and Coastal Process Modelling* developed for Carnarvon. The Department of Water have developed modelling for the Gascoyne based on stage two flood mitigation.

State Planning Policy 3.5 Historic Heritage Conservation

Western Australian Planning Commission – May 2007

This policy sets out the principles of sound and responsible planning for the conservation and protection of Western Australia's historic heritage. The study area includes several properties

listed on the Heritage Council of WA interim and permanent heritage places register and any proposal which impacts these properties will need to show regard for this policy.

Draft State Planning Policy 4.1 State Industrial Buffer

Western Australian Planning Commission – July 2009

This policy addresses the need for buffers between conflicting or incompatible land uses. Industry and essential infrastructure can generate emissions such as noise, smoke, fumes, dust, odour, vibration, light as well as risk levels that in some instances cannot be contained on site and may result in adverse impacts to sensitive land use, if in the vicinity. Buffers can protect existing industry and essential infrastructure from encroachment by incompatible development that could restrict current and future operations.

There are guidelines for determining recommended buffers for industry and essential infrastructure in *Guidance for the Assessment of Environmental Factors No 3 Separation distances between industrial and sensitive land uses* (Environmental Protection Authority, June 2005).

The study area includes an industrial zone, an airport, a power station and DBNG pipeline, and therefore this policy will require consideration and is discussed later in the report.

State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning

Western Australian Planning Commission – September 2009

This policy facilitates the development and operation of an efficient freight network. The North West Coastal Highway and Robinson Street are listed as state freight roads. Subsequent to this Structure Plan and the adjacent structure plan for the airport precinct, the use of Robinson Road may diminish as industrial freight movements are directed towards the industrial area adjacent to the airport via an upgrade of Harbour Road.

State Planning Policy 6.3 Ningaloo Coast

Western Australian Planning Commission – August 2004

The Ningaloo Coast SPP applies to all land within the Ningaloo Coast policy area which includes the townsite of Carnarvon. The document provides guiding principles in which to assess proposed development and planning within the policy area. These guiding principles promote the core pillars of sustainability; community, economy and environment. Of specific relevance to the project, the policy states that when preparing planning documents, the Carnarvon Structure Plan and guidelines for sustainable tourism as detailed in the Ningaloo Coast Regional Strategy Carnarvon to Exmouth, apply. This Strategy is discussed below.

Liveable Neighbourhoods

Western Australian Planning Commission – January 2009

The principles within Liveable Neighbourhoods apply to the preparation of regional and district structure plans for new growth areas, local structure plans for new subdivisions, and in planning for the revitalisation or redevelopment of existing areas. This policy guides the design and intent of this Structure Plan.

Draft Country Sewerage Policy

Department of Health – December 2003

This draft policy has been used to guide the requirements for unsewered subdivisions and land development for the Structure Plan. The more recent Draft Government Sewer Policy 2012 has not been used in this instance as it is currently undergoing a detailed review.

Where properties cannot be connected to a reticulated sewerage system, wastewater must be treated and disposed of on-site in accordance with this policy and other regulations. The policy defines a minimum acceptable development lot size of 2000m² or R5 for unsewered lots.

1.4.3. REGIONAL AND SUB-REGIONAL FRAMEWORK

Ningaloo Coast Regional Strategy Carnarvon to Exmouth

Western Australian Planning Commission – August 2004

The Ningaloo Coast Regional Strategy Carnarvon to Exmouth is a regional strategy providing a 30 year strategic planning framework. The strategy identifies East Carnarvon as residential north of Robinson Street and airport and industrial to the south. The strategy notes that sewer provision in this area would assist in the supply of affordable residential land in Carnarvon. For Kingsford, north of Robinson Street is designated as plantation and to the south is special or rural residential with strategic industry along Harbour Road.

The Structure Plan diagram for Carnarvon contained in the coastal strategy is illustrated below in Figure 7.

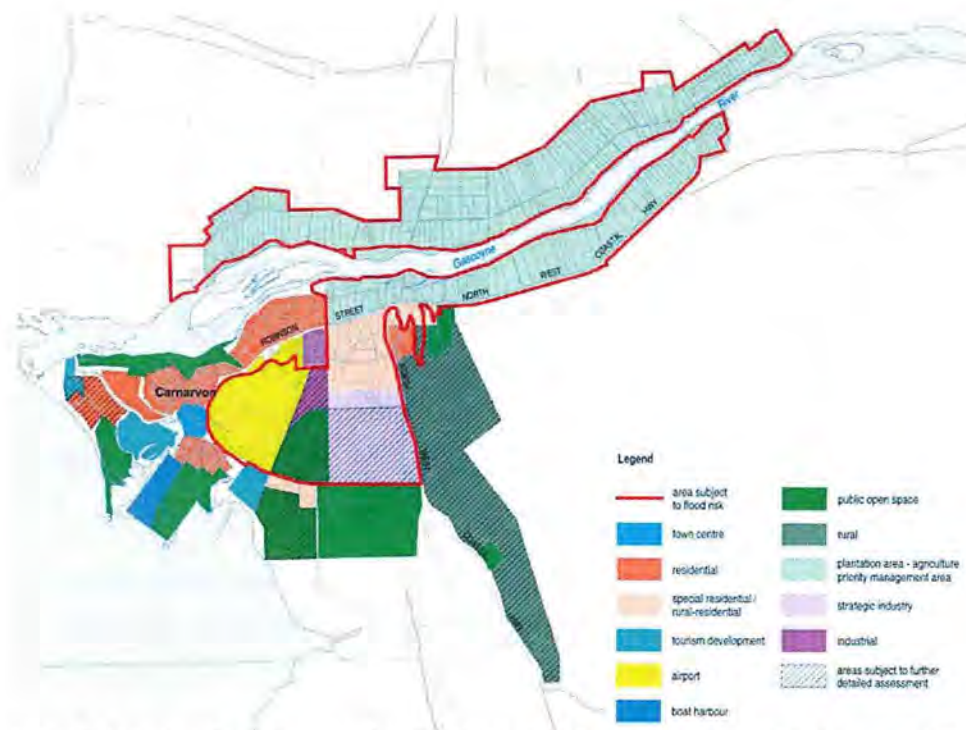


Figure 7. Ningaloo Coast Regional Strategy Carnarvon to Exmouth - Carnarvon Structure Plan

The strategy identifies a range of actions and objectives, those with relevance to the study area include:

Flood management

- Introduce no-dwelling areas adjacent to any levee in the unlikely case of levee failure or overtopping;
- Encourage flood-proofing of commercial and industrial premises;
- Encourage relocation of buildings/premises in areas of high flood risk; and
- Designate identified floodways and introduce controls to preclude building and restrict other forms of land use and development (e.g. fences, landfill, embankments etc.) within them.

Residential

- To encourage appropriate residential infill in existing residential areas within flood levee banks;
- Encourage medium-density development within close proximity to the activity node to accommodate aged and dependent persons' accommodation; and
- East Carnarvon is recognised as a priority sewerage area for Carnarvon's infill sewerage program and should be progressively serviced and staged in the short term.

Special residential/rural residential

- Provide a limited amount of special residential/rural-residential land in appropriate locations that will not constrain future residential or other land use expansion within the townsite; and
- Assess the future development requirements of Mungullah Village.

Industrial land

- To provide adequate land, appropriately located and serviced, for a range of industrial uses; and
- To minimise the impact on the natural environment of future industrial development.

Urban design and townscape

- Continue the streetscape landscaping project for Carnarvon to make the town more walkable; and
- To promote the Morgantown to East Carnarvon streetscape landscaping to make this area more walkable.

Gascoyne Regional Planning & Infrastructure Framework

Western Australian Planning Commission – July 2012

The Gascoyne Regional Planning and Infrastructure Framework sets a regional overview for the Gascoyne, identifies growth opportunities and projects to enable these opportunities. The Framework fits within the structure of the State Planning Strategy and acts as a regional strategy. Once finalised, the status of the other regional land-use strategies such as the Ningaloo Coast Regional Strategy Carnarvon to Exmouth (2004) which are encompassed by the Framework will be determined.

The Framework identifies agriculture/fisheries, retail trade and tourism services as the Gascoyne's most labour intensive industry sectors, with each employing approximately 10-14 per cent of the region's workforce. The tourism sector alone represents over 30 per cent of the Gascoyne's gross regional product.

The Framework highlights the importance of the Carnarvon Horticultural District to the regional economy, part of which is included within the study area. The document identifies the following:

- The industry is estimated to be worth \$75.8 million in 2009;
- The horticultural production at Carnarvon provides a sizable component of the Gascoyne's agricultural output;
- The main crops grown are bananas, table grapes, tomatoes, capsicums, cucurbits, avocados and mangoes;
- The horticulture industry in Carnarvon utilises approximately 1000 hectares of the 2000 hectares zoned;

- There are currently about 170 plantations, with plantation size ranging between two and 40 hectares; and
- The State Government's Gascoyne Food Bowl Initiative is investigating the development of new water resources and expanding the Carnarvon horticulture area by up to 400 hectares.

Within the industry sector of retail trade is manufacturing, which reported a turnover of \$27 million in 2006-07, with the majority of the 28 business establishments being located in the Shire of Carnarvon, and many of these are within the study area. Manufacturing includes a range of products such as food processing (including fruit, vegetables and seafood) and metal product manufacturing.

The Framework identifies a range of growth opportunities and projects to enable these opportunities. Those with relevance to the study area include:

- Expanding and diversifying aquaculture pursuits in the region;
- Expanding and diversifying the tourism sector;
- Developing strategic and sustainable tourism and recreation infrastructure and services to cater for an anticipated increase in demand;
- Investigation of regional affordable housing requirements;
- Promoting Gascoyne communities as sources of labour and bases for fly-in fly-out mining operations;
- Establishing an abattoir in the Gascoyne to service the North West;
- Attracting residents and workforce through the provision of quality social infrastructure, services, affordable housing and well-designed communities, taking into account the region's remoteness and distance between settlements;
- Utilising appropriate natural resource management information to assist strategic regional planning;
- Utilising places of heritage value to support further growth and development of the region;
- Protecting and managing the region's cultural heritage and arts, including indigenous places of significance, historic places and landscapes of significance;
- Incorporating design principles in new development that embraces the Gascoyne's climatic conditions; and
- Involving regional community consultation and engagement to inform State Government decision making.

Lower Gascoyne River Carnarvon Floodplain Management Study

Sinclair Knight Merz – October 2002

An outcome of *A Framework for Floodplain Management in Western Australia, Ministerial Taskforce Report into Floodplain Management in Western Australia*, was the appointment of SKM to undertake an assessment of the level of flooding and develop a floodplain management plan for Carnarvon.

The study recommends a suite of appropriate measures, both structural and non-structural to be implemented. Phase One of this project has been completed except for the Six Mile Crossing flow distribution. In July 2012, funding was secured to commence on Phase Two of the works which will reduce the flood levels west of North West Coastal Highway (north-south bound) and north and south of North West Coastal Highway (east-west bound). Phase 2 was completed in 2014 and will further reduce the flood levels within Kingsford.

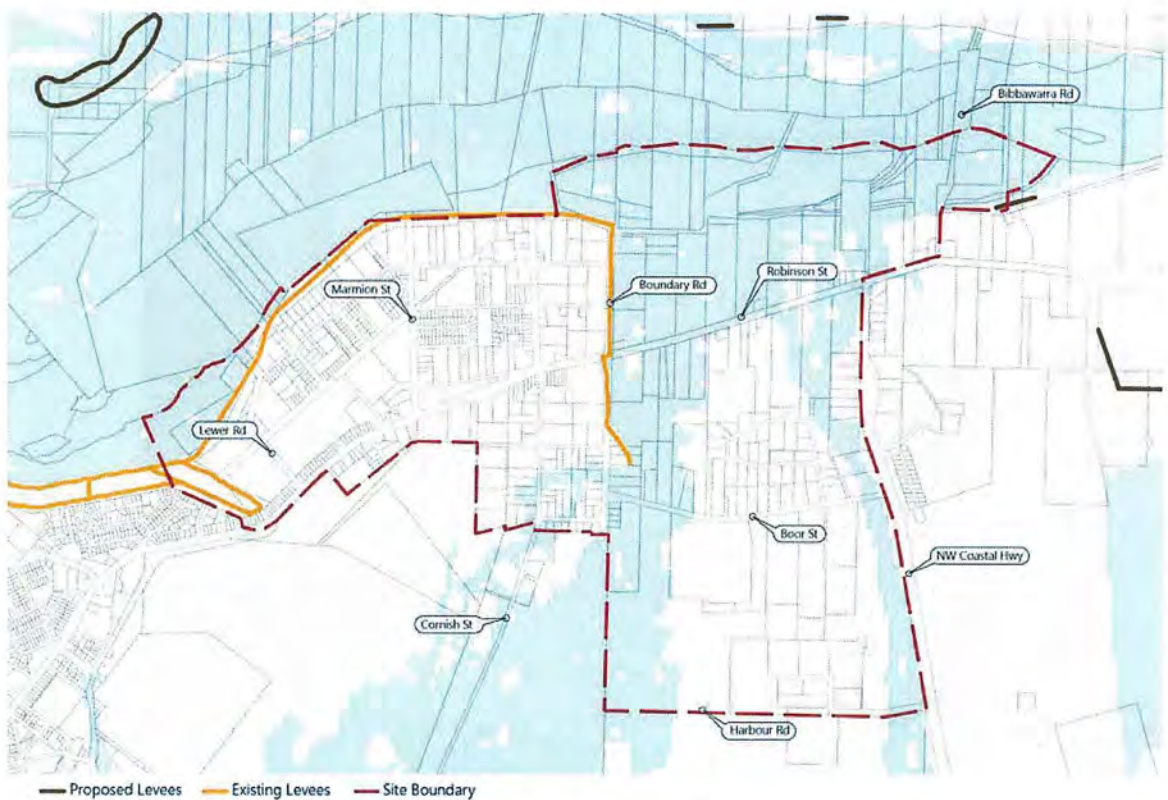


Figure 8. Carnarvon Levels (adapted from Sinclair Knight Merz 2002)

1.4.4. LOCAL PLANNING STRATEGIES

Draft Kingsford Land Use Study

Sinclair Knight Merz – September 2010

The study identifies appropriate land uses based on the flood mitigation works proposed to be undertaken in the area. Consultation undertaken as part of the study indicated that there was a limited availability of rural residential development in Carnarvon. Based on this and the proposed flood mitigation works, the Draft Land Use Plan proposes 'Special Residential' zoning over those properties currently zoned 'Special Rural'. For lots fronting onto Robinson Street the minimum lot size is larger at 5,000m², which will allow for possible future road widening by limiting the number of direct vehicle access points to Robinson Street. This will also retain the ability to provide for potential tourist accommodation uses or future mixed-uses. Refer to Figure 9 below.



Figure 9. Kingsford Land Use Study - Draft Land Use Structure Plan (Sinclair Knight Merz 2010)

Carnarvon Tourism Strategy

Shire of Carnarvon – August 2010

This latest Tourism Strategy reports that the local visitor market has remained unchanged over recent years and comprises mostly elderly travellers on extended stay, families on short term holidays and travellers passing through Carnarvon heading for nearby or further destinations. Although visitation and visitor nights have been declining since 2006, Carnarvon hosts on average around 137,800 overnight visitors staying 793,730 nights annually,

The tourism market, dissected seasonally, is composed of:

- Families staying during school holidays;
- Elderly travellers, nomads and young families staying for extended periods during the winter months;
- International visitors staying for short visits year-round including the hotter summer months; and
- Day visitors from nodes within 200km of Carnarvon (visiting mostly for supplies and/or a change of scenery).

Tourism visitation to Carnarvon is mostly during April to September, peaking in July with most of the accommodation fully utilised. In recent years, overflow camping has been increasing and proven to be problematic, which has led to anecdotal evidence of illegal camping in random location within Carnarvon and surrounding areas.

Carnarvon has short stay accommodation capacity of around 2,752 beds with the majority (69%) in caravan parks and a minority (19%) in hotel/motels and apartments/units/B&B (8%). The report states that this supply of budget style accommodation has remained largely unchanged since the 1980's.

Critical gaps relevant to future tourism land use include:-

- Carnarvon's limited accommodation and peak utilisation in July is potentially forcing some visitors to leave Town and/or camp in areas unwelcomed by the Shire and community.
- Car parking around Town for long vehicles is lacking and not well signposted.
- Carnarvon's year-round average temperature of 26°C is truly Mediterranean, however, there is limited opportunity for visitors to dine and socialise outdoors.
- Carnarvon has no high-end accommodation such as resorts, eco-safari or luxury apartments.

The Strategy identifies that one of the key 'sells' Carnarvon enjoys is the ability to market 'locally grown' food. The horticultural industry is seen as a key attraction to Carnarvon as a region, whilst

the strategy doesn't refer to the study area specifically, any attempt to remove the visual character along Robinson Street should be discouraged.

1.4.5. BUFFERS BETWEEN AGRICULTURAL LAND AND OTHER LAND USES

Department of Health Pesticides Policy

Department of Health – 2010

The Department of Health's guide to pesticide use in WA includes reference to sprays used in agriculture where the agricultural land use is located close to non-agricultural land users. Suggested practical steps to ensure neighbour protection in agricultural situations are as follows:

- Developing a Spray Drift Awareness Zone (SDAZ) for existing properties;
- Choosing the most appropriate method of application;
- Establishing permanent buffer zones;
- Notifying neighbours of impending pesticide spraying events; and
- Resolving spray drift disputes with neighbours.

Disputes over spray drift occur. These can be solved by dialogue between the parties, but in some cases use is made of provisions in the *Agricultural Practices (Disputes) Act 1995*, administered by DAFWA. The Act provides for resolution of the dispute by the use of mediation between the parties.

Guidance for the assessment of environmental factors - Separation distances between industrial and sensitive land uses No 3

Environmental Protection Authority 2005

The EPA recommended a buffer of between 300 and 500 m between broad acre market gardens and sensitive uses, to address gaseous, noise, odour and dust emissions from the market garden operations. A buffer of 100 m was recommended for nurseries, 500 m for orchards, and 500 m for viticulture.

The EPA defines sensitive uses as residential developments, hospitals, hotels, motels, hostels, caravan parks, schools, nursing homes, child care facilities, shopping centres, playgrounds, and some public buildings. Some commercial, institutional and industrial land uses which require high levels of amenity or are sensitive to particular emissions may also be considered "sensitive land uses". Examples include some retail outlets, offices and training centres, and some types of storage and manufacturing facilities (p. 5). Given the existing land use within proximity to the existing intensive horticultural areas these requirements pose some difficulties.

Advice from other jurisdictions

Information of buffers to reduce spray drift is available in Victorian and Queensland publications.

- Victorian advice is that good vegetative buffers should be semi-permeable, and at least 50 per cent higher than the target plant (to be sprayed). It should be multi-rowed if possible and made up of species with long, thin, rough foliage (DPI 2009).
- Queensland guidelines specify a minimum spray drift buffer width of 20 m planted with trees and at least 10 m clear of vegetation to either side of the vegetation to give a total buffer width of 40 m. The guidelines note that buffer area requirements can be varied according to the chemical used, application method, prevailing wind direction, sensitivity of the land uses, and other conditions (see Department of Health 2010).

Given the close proximity of the different existing land uses in the Robinson Street area, achieving buffering to the degree mentioned above is clearly not feasible. However, the need for adequate buffering would need to be considered if there was to be any further land use change in the area.

2. SITE CONDITIONS AND CONSTRAINTS

2.1. URBAN DESIGN AND BUILT FORM STUDY

The urban structure in the study area reveals the land use patterns for which they contain and the time period in which the subdivision occurred. The grid arrangement of the residential area is relatively uniform and differs only in east-west street length from between 300m and 700m, see below Figure 10.

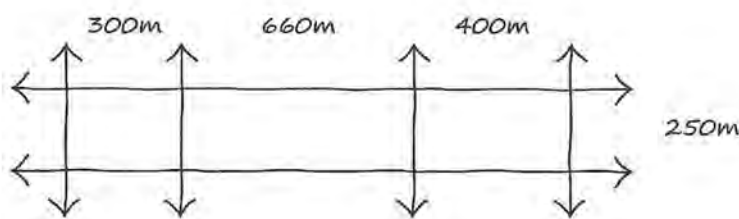


Figure 10. East Carnarvon Residential Street Morphology

The existing residential typology in Carnarvon reveals that there is a standard lot dimension of 20m by 40m with sizes varying from 600m² to 1600m² within the town. Within East Carnarvon residential lots are quite diverse (800m² to 1ha), refer to Figure 11, and some lots close to the Gascoyne River still retain a horticultural function, albeit at a small scale (1-2ha). In the initial public engagement and stakeholder consultation, a desire for 800m² lots was identified. In most of the properties the house is situated within 10m of the front property boundary with a sealed driveway or dirt track leading down the side of the house to the rear garage, this has been termed the "Carnarvon Lot". Many lots within the subject area are below the minimum area (2,000m²) set by the 2003 Draft Government Sewerage Policy.

The majority of houses are tin or zincalume corrugated roofing, constructed of either painted and rendered brick or timber framed structure clad with fibro sheeting. Some properties east of the Carnarvon Community College are newer in style and others reflect a Mediterranean influence.

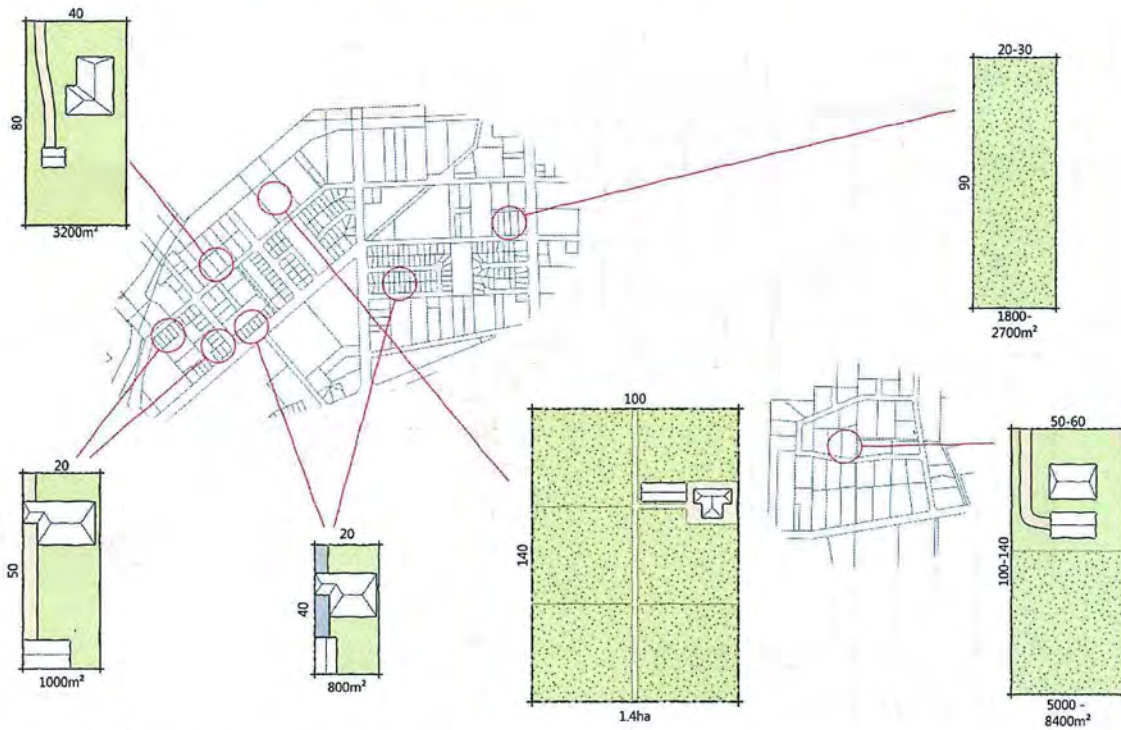


Figure 11. Residential Lot Typologies

The Industrial Precinct also reflects a grid network with a more uniform street morphology, although this is likely due to the small size of the precinct (see Figure 13). The future plans for the area indicate that industrial land uses will expand south and south west along Cornish Street and Boundary Road. Based on the current proposal for the Airport Precinct, this will only require minor modifications and development east of Boundary Road will be restricted by the floodway.

The industrial subdivision on Cornish Street currently being developed by LandCorp proposes lots ranging from 2,880m² to 8,970m², which reflects a standard typology in the surrounding industrial

area. The majority of lots have a frontage of 40 to 50m and up to 100m in some cases, while lot depths range from 50 to 160m. Sites are typically void of landscaping, with minimal cohesive locations for the storage of products and machinery. There appear to be some existing residential structures within the precinct that reflect a similar typology to those within East Carnarvon.

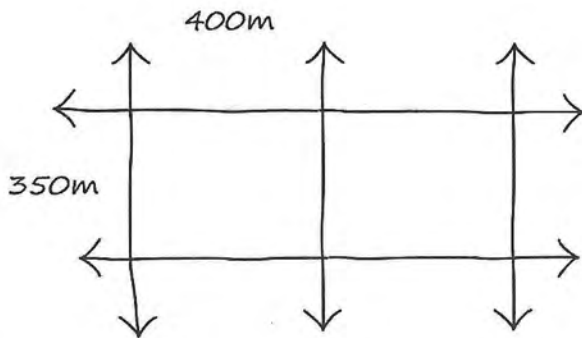


Figure 12. Industrial Precinct Street Morphology

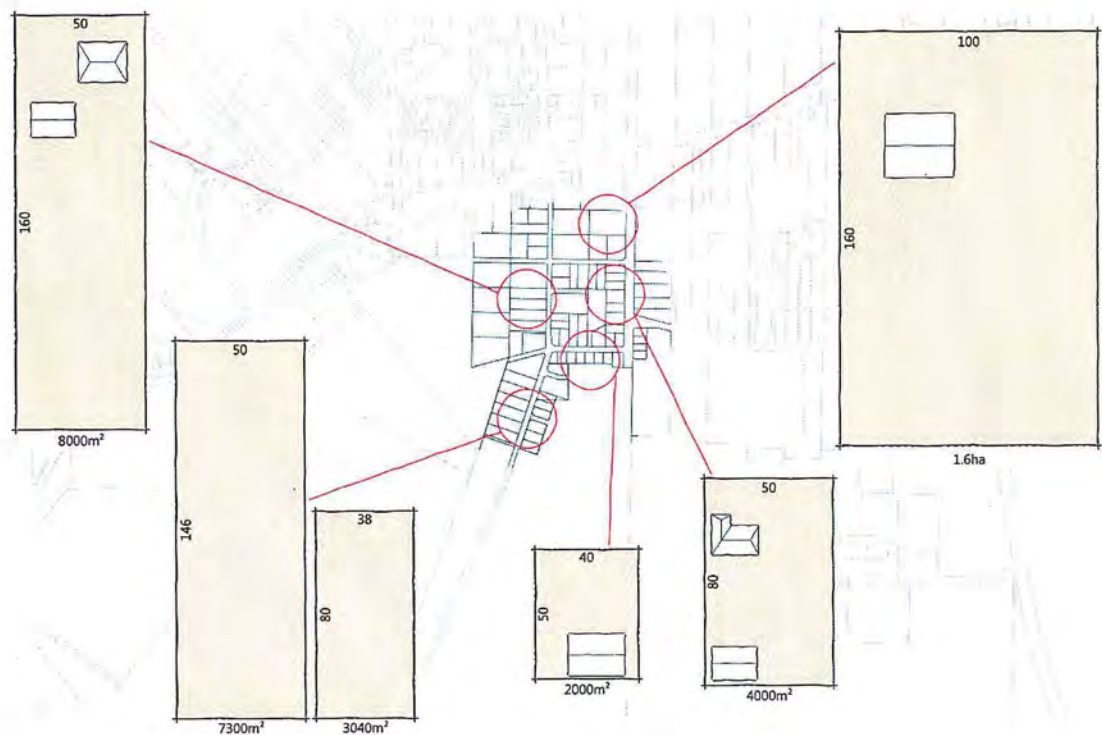


Figure 13. Industrial Lot Typologies



Figure 14. Industrial Structure Typologies

The Kingsford locality primarily consists of horticultural properties, rural residential and tourist uses. Commercial horticultural blocks range in size and on the northern side of Robinson Street are typically 160m wide and 500m in length with an average area of around 7.8ha. From their shape it is clear that lots to the south were once larger (approximately 260m wide) before subdividing the front portion of the property (see Figure 15).

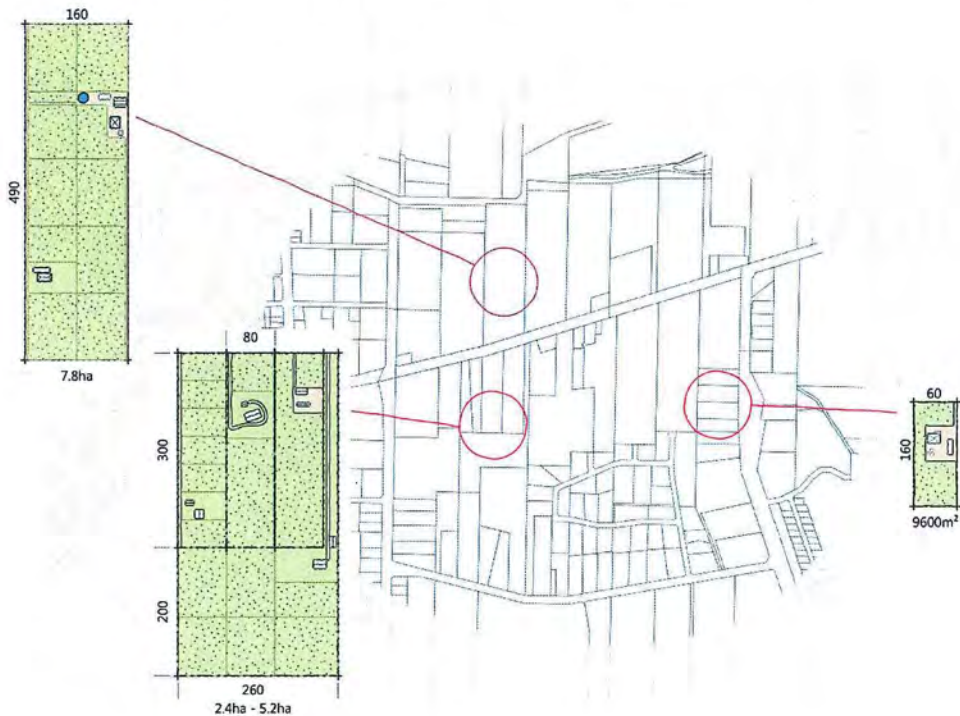


Figure 15. Horticultural Lot Typologies



Figure 16. Horticultural Lot Typologies

2.1.1. LAND USE CONFLICTS

The figure below spatially maps the location of known and potential land use conflicts which exist within the study area. Discussions with the Shire indicate existing issues related to on-going noise complaints against the service station from the adjoining caravan park as well as issues arising out of spray drift from the horticultural properties into the adjoining tourist land uses.

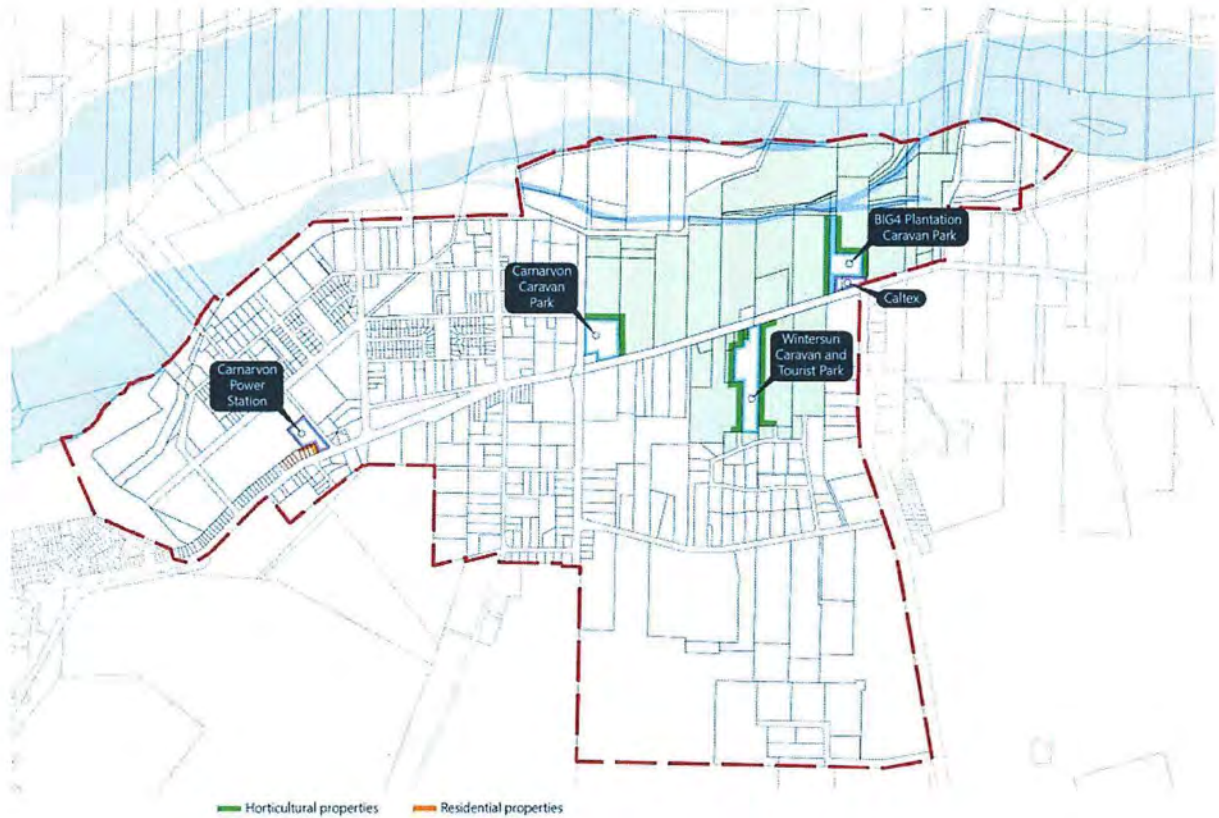


Figure 17. Potential and known conflicts

2.1.2. MOVEMENT ANALYSIS

Overview of Existing Traffic Access Provisions for Carnarvon

East Carnarvon & Kingsford are located adjacent to the North West Coastal Highway. There are daily flights between Perth and Carnarvon that take approximately two hours. The low volumes of traffic produced by the airport are not expected to have an impact on the road network. Integrity Coach Lines also operates bus services between Perth and Carnarvon 3 times per week, which take approximately twelve hours. The highway is constructed as a regional rural highway with a typical 9m sealed carriageway and a posted speed limit of 110kph.

East Carnarvon and Kingsford are linked to the Carnarvon townsite CBD via Robinson Street, which is adjacent to the southern boundary of East Carnarvon and passes through Kingsford. The two areas are between 1.5 and 5km east of the CBD of Carnarvon.

Robinson Street is constructed as a single carriageway road with duplication (four lanes) adjacent to the intersection of Babbage Island Road (which is to the west of this study area). Main Roads Western Australia (MRWA) data indicates Robinson Street recorded an average daily volume of 7,900 vehicles per day (vpd) (June 2010), projecting 8,343vpd in 2013, which falls below the 15,000vpd desirable max traffic volume for a distributor road. The peak periods are shown to be:

- AM Peak 07:00 – 08:00 309 eastbound 351 westbound
- PM Peak 15:00 – 16:00 379vph eastbound 377vph westbound

Access to Robinson Street from the south is limited to Cornish Street and Boundary Road with more intersections to the north of Robinson Street leading into predominantly residential areas. The daily volume on Robinson Road reduces to east of Marmion Street and reduces even further between Marmion Street and the North West Coastal Highway.

The southern boundary of Kingsford on Harbour Road contains a MRWA road train assembly area. This is a fully sealed main changeover section along North West Coastal Highway for B-Doubles and singles. There are no current plans to expand the southern yard assembly area or the freight depot on the north of Harbour Road which has secure fencing and appropriate security measures. Truck numbers are expected to decline in the next few years following the completion of projects in the region. The unsealed nature of Harbour Road can be problematic for trucks and heavy rain can exacerbate poor road conditions.

The Shire of Carnarvon has considered building a truck bypass near the Carnarvon landfill which is located south of Brown Range on Speedway Road. The community consultation did not reveal any issues with truck through traffic and given that the current north-south main truck route does not dissect East Carnarvon or Kingsford and that the prevalent truck activity is expected to decrease in the future, the bypass should not be considered a high priority. MRWA traffic digest

data reveals the North West Coastal Highway carries approximately 30% heavy vehicles and Robinson Street typically carries 5-7% heavy vehicles.

There are only a small number of car parks located in East Carnarvon and Kingsford due to the agricultural and low density characteristics of the area. The local sporting clubs, such as the soccer, football/cricket and netball clubs, have informal parking in unsealed car parks off Gascoyne Road, Robinson Street and Iles Road. The main sealed car park in the area is for the IGA supermarket and the bottle shop on the corner of Angelo Street and Robinson Street. Comments from staff reveal that it is rarely full and operates well below its capacity of approximately 100 spaces. Other major parking areas include the Gateway Motel Carnarvon, Outback Oasis Caravan Park and the Wintersun Caravan and Tourist Park all located off Robinson Street.

2.1.3. SITE ANALYSIS

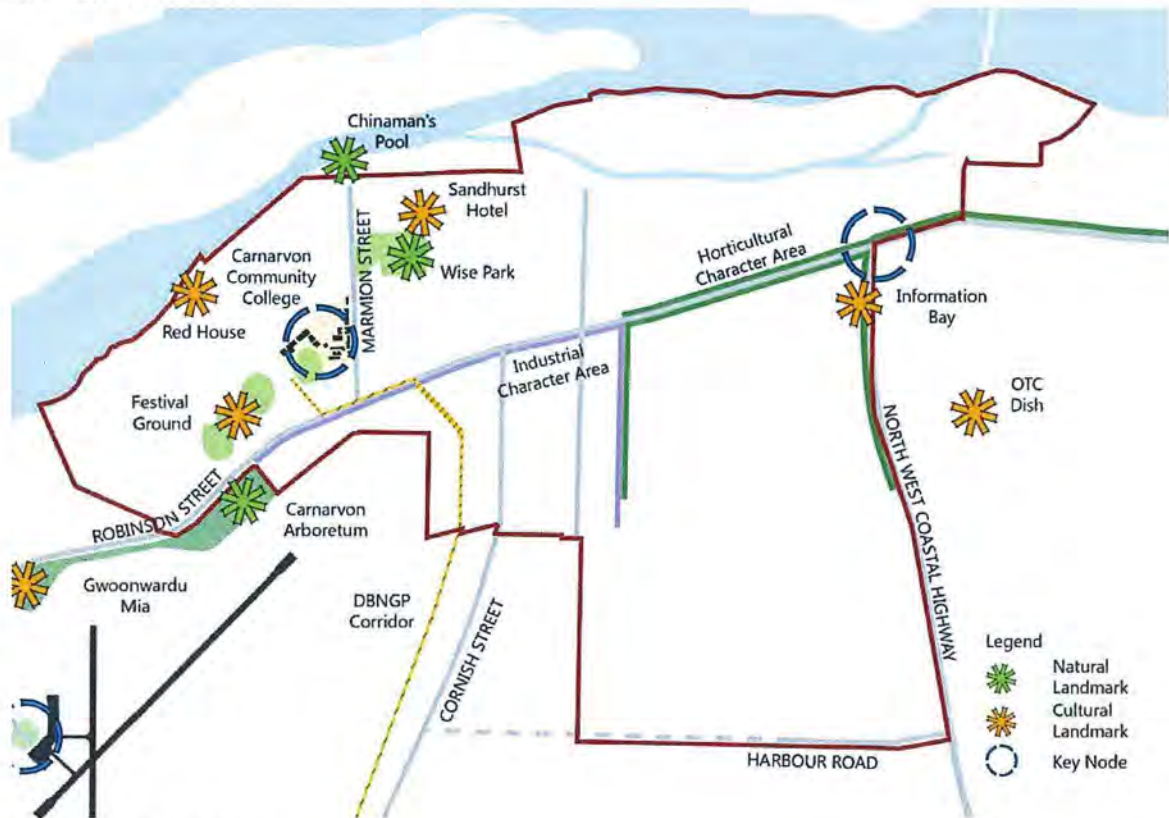


Figure 18. Site Analysis

There are two entry points into town; one from the south via HMAS Sydney II Memorial Avenue/Carnarvon Road and the other from the north via Robinson Street. The entry from Robinson Street traverses the Structure Plan area and begins with a horticulture character forming a pleasant tree lined entrance, followed by the industrial frontage which lacks amenity and detracts from the streetscape as reflected in Figure 19 and Figure 20 below.



Figure 19. Horticulture Character Area



Figure 20. Industrial Character Area

This road falls within the jurisdiction of Main Roads WA, although the Shire accepts responsibility for maintaining the road verge through a contractual arrangement. In consideration of its current presentation there is significant opportunity for enhancement through:

- Upgrading and landscaping of the road verge for its full length;
- Reviewing vehicle access/egress in relation to private property;
- Applying increased standards for car parking and building façade;
- Improving/extending pedestrian pathways; and
- Removing the parking of large vehicles within the Robinson Street road reserve, which appears to be a common occurrence in front of the Gateway Motel.

Other attractions within the study area or in close proximity adding to the local character and are key destinations including the heritage listed Sandhurst Hotel, Arboretum, OTC Satellite Station, Chinaman's Pool and Gwoonwardu Mia Cultural Centre.



Figure 21. Carnarvon Arboretum



Figure 22. Gwoonwardu Mia Cultural Centre



Figure 23. Chinaman's Pool

2.1.4. CONSTRAINTS

Height Limits

Obstacles in the vicinity of an airport, whether they are natural or constructed, may seriously limit the scope of aviation operations into and out of an airport. The approach and departure surfaces as well as circling areas surrounding an airport are defined by Obstacle Limitation Surfaces (OLS). OLS are conceptual surfaces associated with a runway and are measured at a set gradient from the natural surface of the Runway End Safety Area (RESA).

Below is a diagram of the proposed runway location and OLS as per the CAPSP. The immediate clearance requirement of >10 metres represents the only real constraint in height as it is unlikely there will be any structures over 10 metres in the OLS area.



Figure 24. Proposed OLS

Navigational Aids

As part of the infrastructure required at the proposed relocation of the runway, the Civil Aviation Safety Authority (CASA) requires height limitations to reduce the risk of interference. The VHF Omni-directional Radio Range (VOR) requires a buffer 1500m. Development proposals between 100m and 1500m that exceed the gradient height, require assessment by a VOR technical authority. 300m from the antenna, the height limit (10.5m) is not a constraint on development in the study area. Within 100m the VOR and 150m of the Non-Directional Beacon requires very limited interference as per CASA standards.



Figure 25. VOR Buffer Area

Flooding

A key strength of the structure plan area is that East Carnarvon is completely enclosed by a levee system that runs from Robinson Street north around East Carnarvon, and then along Boundary Road, finishing just north of the intersection between Boundary Road and Boor Street. However, Kingsford is largely restricted by the extent of the 100 ARI flood modelling which limits potential redevelopment and infill opportunities. As discussed in section 1.4, stage two flood mitigation works were completed in 2014 and the modelling for this is illustrated below. For further detail on topography refer to section 2.3.

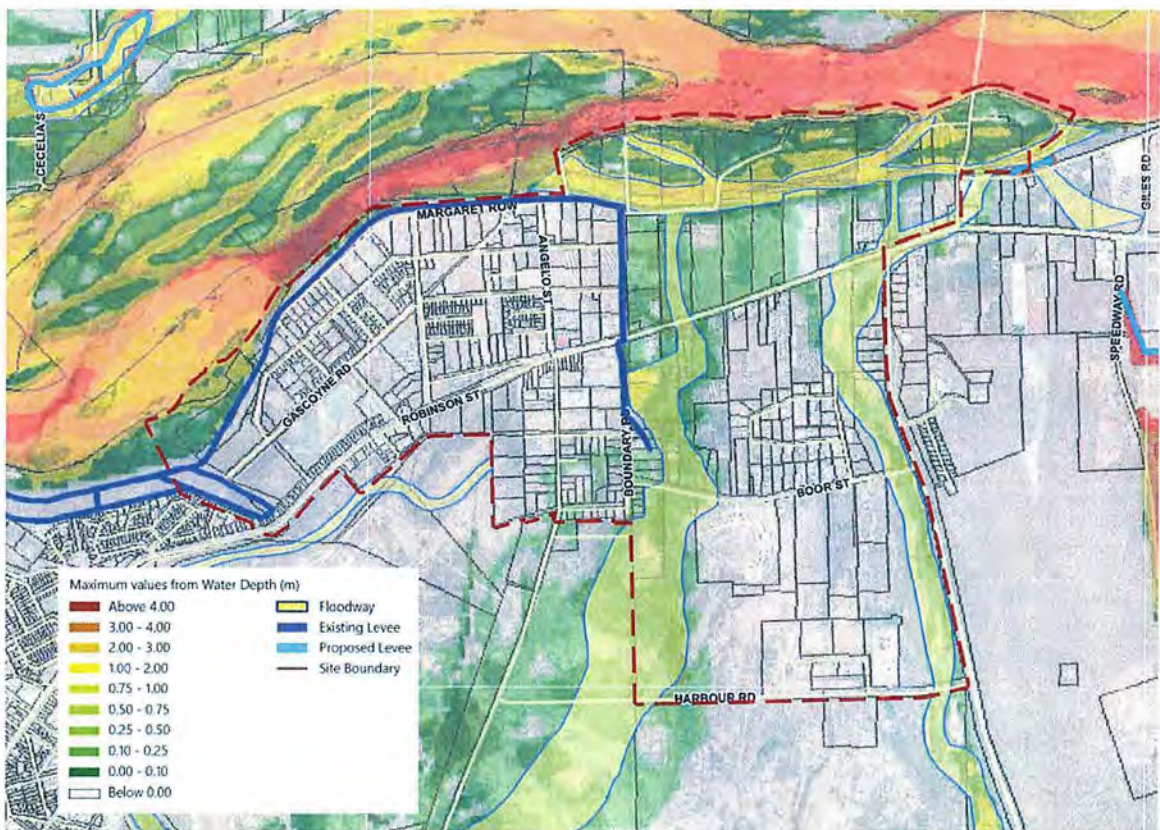


Figure 26. Stage two modelling of the 100 year ARI floodplain (Adapted from DoW)

Reticulated Sewer Provision

Reticulated sewerage provision is a significant limiting factor to densification within the Structure Plan area. The existing reticulated sewer line ends at the western edge of the Structure Plan area and is pumped from No.2 Pump Station westwards to the Carnarvon Wastewater Treatment Plant on Babbage Island Road. In addition, a sewer line connects to Mungullah Village, however, it is understood that system has reached capacity. The nearest access point to the existing reticulated sewerage system is No.2 Pump Station located in Robinson Street (refer to figure below).

In order for the Structure Plan to be fully realised, reticulated sewer will need to be delivered to East Carnarvon. This is discussed further in Section 3.7 Infrastructure Coordination and Servicing and Section 4.1 Implementation Process. In the short term, development will be required to act in accordance with the *Draft Country Sewer Policy 2003*.

It is also important to note the cumulative impact of onsite waste systems within the site must be taken into account when assessing the capability of a lot to absorb treated effluent without negatively impacting its surroundings. Effluent must be contained onsite within the boundaries of the allotment to prevent the transport of nutrients, pathogens and other pollutants to surface and ground waters and to prevent any negative impacts on 'groundwater beneficial uses' within the catchment.

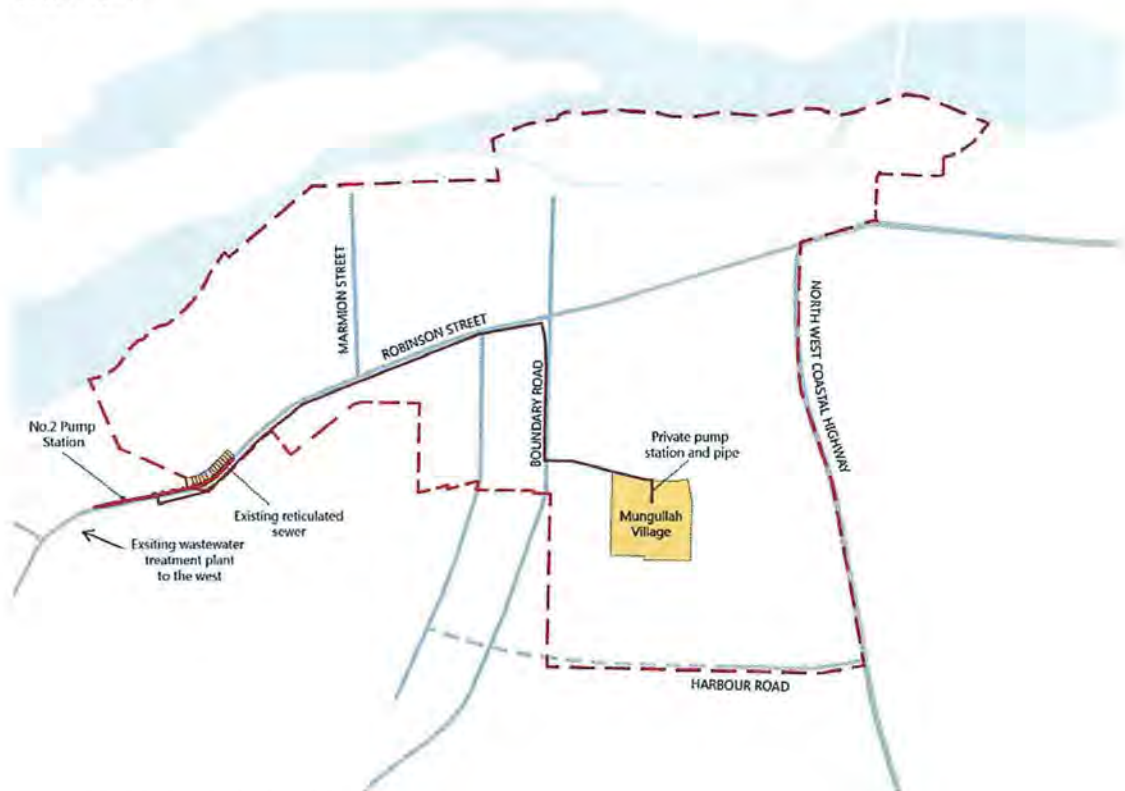


Figure 27. Existing Reticulated Sewer

Dampier to Bunbury Natural Gas Pipeline corridor

The Dampier to Bunbury Natural Gas Pipeline (DBNGP) corridor is located within the structure plan area (as shown in yellow below). The DBNGP easement is approximately 15 m wide and is a feeder line to the existing Carnarvon power station. It is possible that once the Mungullah Power Station is commissioned, the Carnarvon Power Station and pipeline infrastructure could be decommissioned. Thus it is envisioned that the easement and pipe infrastructure will no longer be needed. On this basis it is anticipated the easement will not restrict development in the future.



Figure 28. DBNGP corridor (Sourced from: Landgate WA Atlas)

2.2. BIODIVERSITY AND NATURAL AREA ASSETS

2.2.1. FLORA

The East Carnarvon, Kingsford and Lewers Island areas generally support degraded native vegetation in the horticultural, residential and industrial land use areas, due to clearing and land use changes. The Department of Parks and Wildlife (DPaW) advised that there is important remnant riparian vegetation along the Gascoyne River adjacent to the study area that has been disturbed through flooding and the presence of weeds (Gary Hearle, pers comm.). This riparian vegetation is an important ecological community in the region, and is significant to the river geomorphology in providing stabilisation of banks, windbreaks and enrichment of soils, as well as providing habitat (DoW 2011). River Red gum (*Eucalyptus camaldulensis*) is the dominant species of the Gascoyne River (DoW 2011), with other eucalypt species and *Acacia* sp. also present (DoW 2009). Ensuring the maintenance of this vegetation is an important consideration for the Structure Planning process.

A search of the Commonwealth Department of Environment Protected Matters database did not identify any flora species of National Environmental Significance (NES) within the Structure Plan area. A search of the DPaW and WA Herbarium database, *NatureMap* was undertaken for the study area in May 2013. There are no Threatened Flora species known to occur within the area, however, the search identified two DPaW Priority species; *Acacia ryaniana* (Priority 2) and *Bergia auriculata* (Priority 2).

Acacia ryaniana is a prostrate shrub, growing between 0.1 m and 0.4 m high, and is found in the Carnarvon Interim Biogeographic Regionalisation for Australia (IBRA) Region. Habitat for this species comprises white / red sand and coastal sand dunes (DEC 1997). This habitat is not present within the study area, and therefore will not need to be considered in preparing the Structure Plan. *Bergia auriculata* is a prostrate perennial herb that prefers habitat comprising clay soils and mudflats, and is found in the Carnarvon, Murchison and Yalgoo IBRA Regions (DEC 1996). As the study area does not contain the preferred habitat for this species, it will not need to be considered in preparing the Structure Plan.

The DPaW confirmed that the area to the south, which is mostly zoned for industrial and public purpose land use under the Town Planning Scheme 10, contains native vegetation, however does not contain any flora or vegetation of conservation significance (Gary Hearle, pers comm.). Some blocks here have already been cleared for development.

Much of the study area has already been cleared and additional land that requires clearing will be subject to a Native Vegetation Clearing Permit application, under the *Environmental Protection Act 1986*.

The DoE Protected Matters search identified four weed species likely to occur within the study area, including *Cenchrus ciliaris* (Buffel Grass), *Cylindropuntia* spp. (Prickly Pear), *Prosopis* spp. (Mesquite) and *Tamarix aphylla* (Athel Pine). The DPaW advised that other weeds such as *Ricinus communis* (Castor Oil

Plant), *Passiflora foetida* (Stinking Passion Flower) and bamboo are also an issue within the area (Gary Hearle, pers comm.). Buffel Grass is widespread in the Carnarvon area, and although it is a weed species, it provides groundcover and stabilisation of soil surface.

Athel Pine, also known as Tamarisk or Tamarix is listed as a Weed of National Significance (WoNS) by the Commonwealth, and is an introduced species of concern in the area. The main infestation in Western Australia is known to be in Carnarvon, along the bed of the Gascoyne River (DAFWA 2012). Tamarisk is classified under the *Agricultural and Related Resources Protection Act 1976* (ARRPA Act) as a P1 weed species for the whole state: prohibiting movement and the introduction of declared plants or their seeds into, or movement within the declared area (DAFWA 2012). This species is present within the area. The DPaW advised that despite previous targeted eradication programs, Tamarisk is still present in high numbers, notably within the flats on either side of the river and in some residential areas (Gary Hearle, pers comm.).

2.2.2. FAUNA

A search of the DPaW NatureMap database was conducted for the study area in May 2013. The database search determined that there may be 32 species with the potential to occur within the study area, including species protected under international agreements, species that are rare or likely to become extinct, and DPaW priority listed species.

A Department of the Environment (DoE) Protected Matters search was conducted to identify any species or areas listed under the *Environmental Protection and Biodiversity Conservation Act 1990* (EPBC Act) with the potential to occur within the Project area. The search identified two Threatened species, and 25 Migratory Species listed as Matters of NES, with species or habitat for the species having the potential to occur within the study area. These have been listed below¹:

- *Acanthiza iredalei* Slender-billed Thornbill (V)
- *Actitis hypoleucos* Common Sandpiper (IA)
- *Arenaria interpres* Ruddy Turnstone (IA)
- *Apus pacificus* Fork-tailed Swift (IA)
- *Ardea alba* Great Egret, White Egret
- *Ardea ibis* Cattle Egret (IA)
- *Calidris alba* Sanderling (IA)
- *Calidris canutus* Red Knot, Knot (IA)
- *Calidris ferruginea* Curlew Sandpiper (T)
- *Calidris ruficollis* Red-necked Stint (IA)
- *Calidris tenuirostris* Great Knot (T)
- *Charadrius leschenaultii* Greater Sand Plover, Large Sand Plover (IA)

¹ V – Vulnerable; T – Threatened Rare or likely to become extinct; IA – Protected under international agreement

- *Charadrius veredus* Oriental Plover, Oriental Dotterel (IA)
- *Haliaeetus leucogaster* White-bellied Sea-Eagle (IA)
- *Heteroscelus brevipes* Grey-tailed Tattler (IA)
- *Hirundo rustica* Barn Swallow (IA)
- *Leipoa ocellata* Malleefowl (V)
- *Limosa lapponica* Bar-tailed Godwit (IA)
- *Limosa limosa* Black-tailed Godwit (IA)
- *Merops ornatus* Rainbow Bee-eater (IA)
- *Numenius madagascariensis* Eastern Curlew (IA) (T)
- *Numenius phaeopus* Whimbrel (IA)
- *Pandion haliaetus* Osprey (IA)
- *Pluvialis squatarola* Grey Plover (IA)
- *Tringa glareola* Wood Sandpiper (IA)
- *Xenus cinereus* Terek Sandpiper (IA)

It should be noted that the known/recorded list of fauna appears biased towards bird species and it is likely that species of mammals, reptiles and amphibians exist in the study area that are not formally known or recorded.

2.3. LANDFORM AND SOILS

The Shire of Carnarvon lies within a large sedimentary basin known as the Carnarvon Basin. This basin slopes gently towards the coast and is characterised by low relief (approximately 200 metres AHD), open drainage and large gently undulating sand plains, except for outcropping of Permian Rocks (rising to over 300 metres AHD) in the east (Kennedy Ranges) and north (Giralia Range). The study area is bounded to the north by the Gascoyne River, which consists of mainly saline soils with low lying shrublands of blue bush and saltbush widely degraded and eroded.

The soil types for the study area range from tidal flats and mangrove swamps to calcareous clay silt and sand material. The soils are easily powdered and prevailing south western winds can cause the odd dust storm. Extensive efforts have previously gone into rehabilitation and dust control programs for this region, where portions of the area have been identified as being severely degraded. Sandplain and sand dune deposits are particularly prominent around the Gascoyne River.

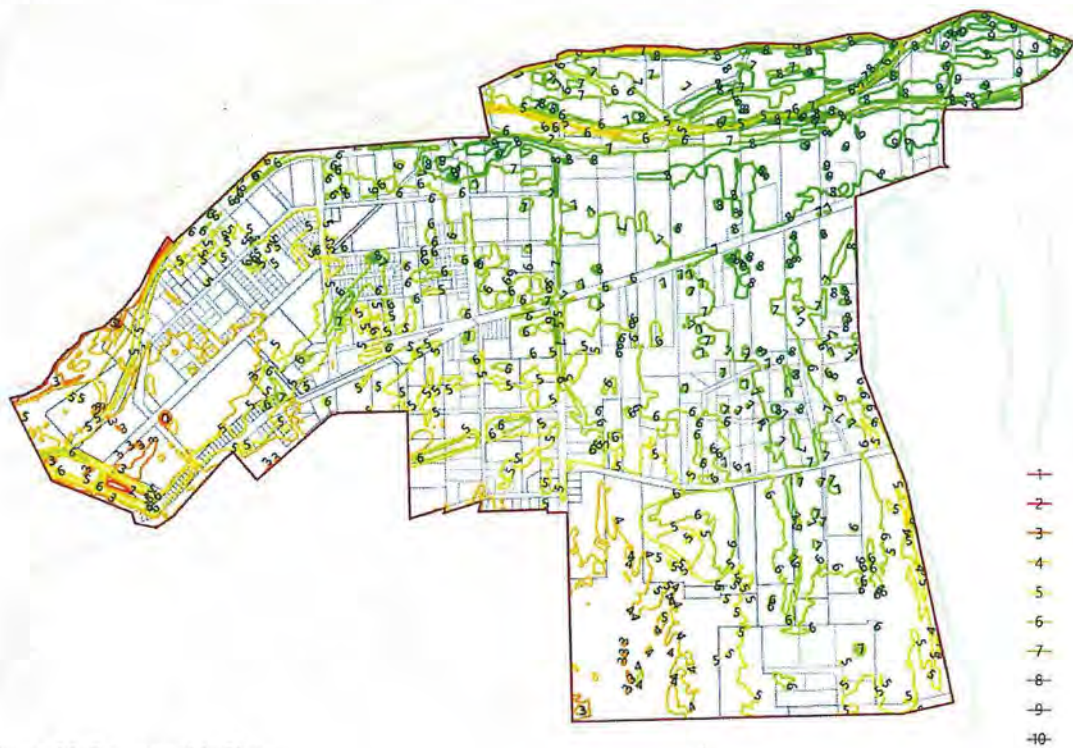


Figure 29. Topographic Plan

Further detailed drainage and geotechnical investigation would be required to be undertaken to determine the suitability of the land for development.

2.3.1. ACID SULPHATE SOILS

The CSIRO's Australian Soil Resource Information System (ASRIS) and Landgate SLIP Enabler (WA Atlas) was accessed on 15 May 2013. Both databases determined that there are areas along the western and northern borders of the study area that have a "high to moderate risk of acid sulphate soils occurring". Refer to Figure 30.

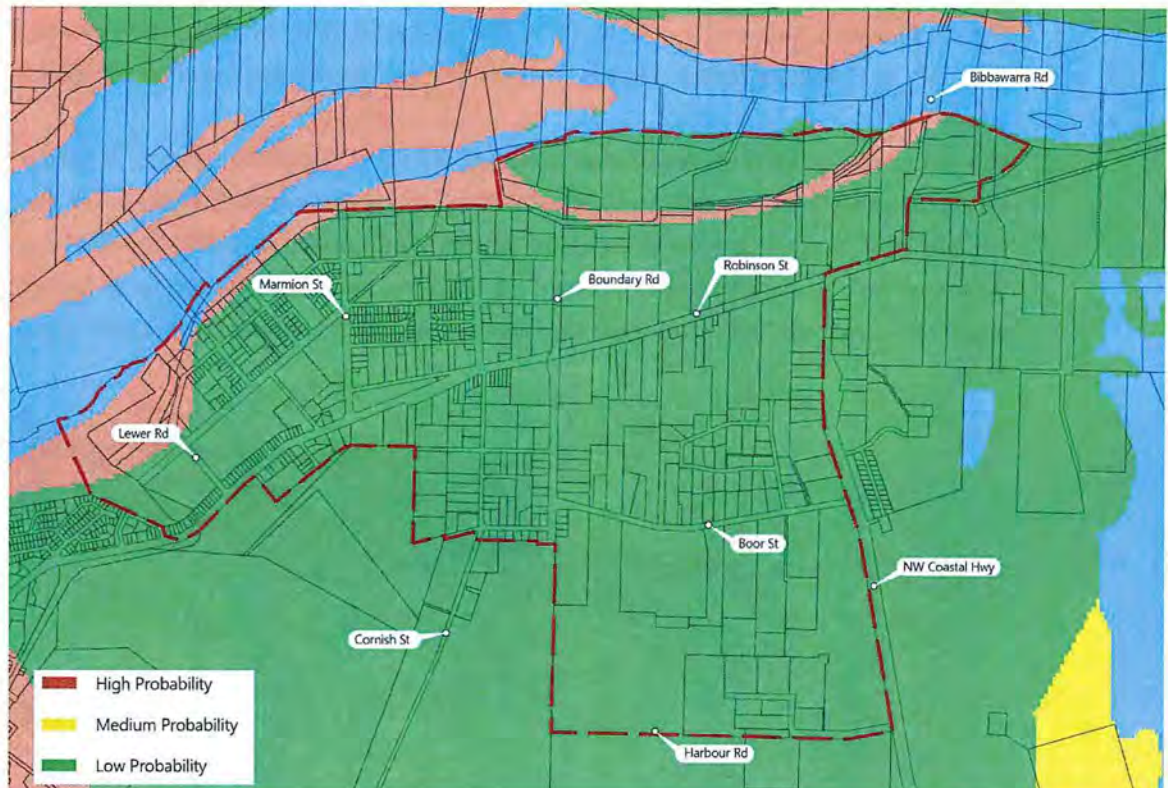


Figure 30. Potential Acid Sulphate Soils within the Study Area (Sourced from: Landgate WA Atlas)

When acid sulphate soils are disturbed, either by excavation or lowering of the water table below natural seasonal levels, sulphides present are exposed to air, allowing oxidation and consequently, the formation of sulphuric acid. Acidic conditions generated by acid sulphate soils can corrode concrete and steel (pipes, underground services and other infrastructure) and can result in the rapid deterioration of asphalt surfaces where they overlie acid sulphate soils.

It should be recognised that while some ancillary developments (e.g. large residential swimming pools) may result in the disturbance of acid sulphate soils at depths or volumes, the primary use is unlikely to be disturbed.

The "high to moderate risk of acid sulphate soils occurring" along the north western border will need to be assessed and managed in accordance with the WAPC Acid Sulphate Soils Planning Guidelines (2008).

As part of any local structure planning and subdivision, it is recommended that further detailed studies are undertaken to determine the likely presence and distribution of acid sulphate soils on the land.

2.3.2. FLOOD MANAGEMENT

East Carnarvon is completely enclosed by a levee system that runs from Robinson Street north around East Carnarvon, and then along Boundary Road, finishing just north of the intersection between Boundary Road and Boor Street. Kingsford and Lewers Island have no direct protection from inundation during flood events (refer to Figure 26. Stage two modelling of the 100 year ARI floodplain (Adapted from DoW).

The floods of 2000 and 2011 have accelerated planning and construction of additional levees to protect infrastructure and horticultural land from flood damage. A number of levees have been constructed to direct flood water away from the horticultural land north and south of the river (refer to Figure 31). These works will provide an indirect benefit to Kingsford and Lewers Island by directing floodwater into the Nickol Bay flats (area to the east of Brown's Range) and away from the main flow passing north of Brown's Range.

The levees are all designed to cope with a 1 in a 100 year flood, plus 0.5 m (note: the 2011 flood was of this severity). The levees on the south side of the river are:

- From the pumping station east of 9 Mile Bridge heading south west (Lawson St Gully Levee) – to divert flood water away from the horticultural area;
- From Santa Rosa plantation (half way between GRS and the 9 Mile Bridge, heading south west to Nickol Bay flats (Nickol Bay Levee) – to divert flood water away from the horticultural area;
- Flood detention barrier alongside North West Coastal Highway east of Brown's Range to prevent water flowing from Nickol Bay flats back into the river channel through the irrigation area; and
- A levee along South River Road, east of Bibbawarra Rd to protect horticultural land from inundation.



Figure 31. Structural measures to address flooding

Modelling shows that these works will reduce the expected inundation in the Kingsford area, although the design shows that two broad shallow floodways will still be required to carry water in a 1 in 100 year flood from Lewers Creek south across Robinson Road through the whole of the Kingsford area (see Figure 26). The effect of the levee installations will be to reduce the depth of the inundation from between 0.25-0.75 m without the works, to 0 to 0.25 m with the works (refer to Figure 26).

2.4. GROUNDWATER AND DRAINAGE

Fresh groundwater occurs within the floodplain sediments beneath the Gascoyne River to a depth of 60 m below the ground, but is surrounded by brackish groundwater. River flow is the main source of recharge to the floodplain sediments and the groundwater is used to supply the needs of the horticultural industry and the town of Carnarvon. Groundwater depth beneath the irrigation area is typically greater than 10 m (Dodson 2009). There is no evidence of any areas of shallow water table in East Carnarvon (Wells 2001).

Generally, stormwater runoff is retained on site and disposed of through a suitable stormwater drainage system but varying approaches are adopted by individual land owners in the area. The East Carnarvon area is served by open drains and it is the responsibility of individual land owners to manage the stormwater on their landholdings. It is believed that the majority of stormwater will run off into the council open drains. At some locations, open space areas act as a retaining basin during high rain events.

This approach will not need to change significantly within the study area, with the exception of those areas in East Carnarvon zoned 'Residential' with a designated density coding of R17.5 and above. At the time of subdivision of these areas a specific Water Management Plan will need to be prepared that adequately addresses the disposal of stormwater.

2.5. BUSHFIRE HAZARD

According to the Department of Sustainability, Environment, Water, Population and Communities (2008), fire in the Carnarvon townsite was insignificant during the 1997–2005 period, with a maximum of 3.4% of the Carnarvon bioregion burnt in 2000. The frequency of fire between this same timeframe was very low. The risk of bushfires within the study area is negligible.

2.6. HERITAGE

2.6.1. ABORIGINAL HERITAGE INQUIRY SYSTEM

Aboriginal heritage sites are protected in Western Australia through the following overlapping state and federal legislation:

- *Aboriginal Heritage Act 1972 (WA)*;
- *Australian Heritage Commission Act 1975 (Commonwealth)*;
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Commonwealth)*; and
- *Native Title Act 1993 (Commonwealth)*

The project area falls within the registered Gnulli Native Title claim area (WC1997/028) lodged in 1997 and as yet is undetermined. A search of the Aboriginal Heritage Inquiry System revealed seven surveys have been conducted over the area identifying seven (7) previously recorded sites in the general area as shown in the table below:

Aboriginal Site Identifier	Site Number	Site Name	Status	Access Type	Site Type	Restriction
7129.0	P05795	Lewer Road Reserve **	L	O	Historical	N
7130.0	P05796	Lewer Road Watersnake	R	C	Mythological	N
7131.0	P05797	Lewer Road Law Ground	R	C	Ceremonial, Repository / cache	M
7132.0	P05798	Breakwater No. 2.	R	C	Mythological, Artefacts / Scatter	N
7232.0	P05684	Moburn Tree	R	C	Ceremonial, Mythological	N
7233.0	P05685	Njuni Talu	R	C	Ceremonial	N
7235.0	P05687	Waterhole	R	C	Ceremonial, Mythological	N

*** Information on this place has been lodged with DAA however a determination on whether this place meets the criteria of the AHA as an Aboriginal site has not yet been made.*

There is a legal responsibility for the Shire of Carnarvon to comply with the provisions of the *Aboriginal Heritage Act 1972*.

The spatial information regarding these identified sites is noted as 'reliable' on the AHIS and may be reasonably relied upon for land use planning. However, the Shire of Carnarvon may consider undertaking an Aboriginal heritage survey specific to the development of a Structure Plan so as to provide confidence that they will not be in breach of Section 17 of the *Aboriginal Heritage Act 1972*.

2.6.2. LOCAL HERITAGE

During the original settlement of the town, Afghan cameleers traditionally camped in East Carnarvon, or Yankee Town as it was better known in the early 1900's, in an area around Chinaman's Pool, and on the vacant scrubland to the south-western edge of the East Carnarvon primary school. In this locality, the Afghans ran a small shop, stocked with obsolete and unsold goods from the town's central stores, their main customers being Aborigines. The Gascoyne's camel teams were gradually replaced by motorised vehicles. One of the few physical reminders of these pioneers is the date palms scattered along the river and recognised in the Shire's Municipal Heritage Inventory, although they haven't been mapped. Another remnant of the area's use is the wide road reserves which were required for the turning circles of the camel, horse, donkey and bullock teams (see Figure 32).



Figure 32. Camel train in Camel Lane (Carnarvon Heritage Group Inc. 2014)

In 1908, orange trees were brought to Carnarvon, and in 1928 bananas were introduced. Since then, horticulture has been gradually developed in the area and now represents a significant economic driver for the town.



Figure 33. Carnarvon horticulture in the 1920's (Photo courtesy of Carnarvon Heritage Group Inc. 2014)

A search of the Municipal Heritage Inventory and the Heritage Council of WA identified several sites of interest (locations shown in Figure 38):

Name	HCWA Number	Lot Details	Construction Date
Mungullah Aboriginal Community	4594	Lot 358 on P184399 Res. 37185	Circa 1980
The Hermitage	3354	Lot 68 on P222240	Circa 1886
Police House (fmr.)	0470	Lot 503 on P58881	Circa 1912
Red House Homestead	0455	Lot 13 on D76740	Circa 1883
Plantation Dwellings	6816	Lewer Island	N/A
Carnarvon Aboriginal Reserve	6838	Lot 1307 on P191044 Res. 22313	N/A
Afghan camp sites	N/A	Lot 4 & 6 on P251767 Lot 50 & 51 on P51718	N/A
Sandhurst Hotel	N/A	Lot 7 on P251767	Circa 1905



Figure 34. Mungullah Aboriginal Community (courtesy Stephen Antonopoulos)



Figure 35. Red House Homestead



Figure 36. Carnarvon Aboriginal Reserve. The reserve comprised 22 camps made up of galvanised sheds, tents and humpies with up to 150 residents. The structures were washed away during floods in 1980.



Figure 37. Sandhurst Hotel. The hotel originally provided accommodation for the camel teamsters.

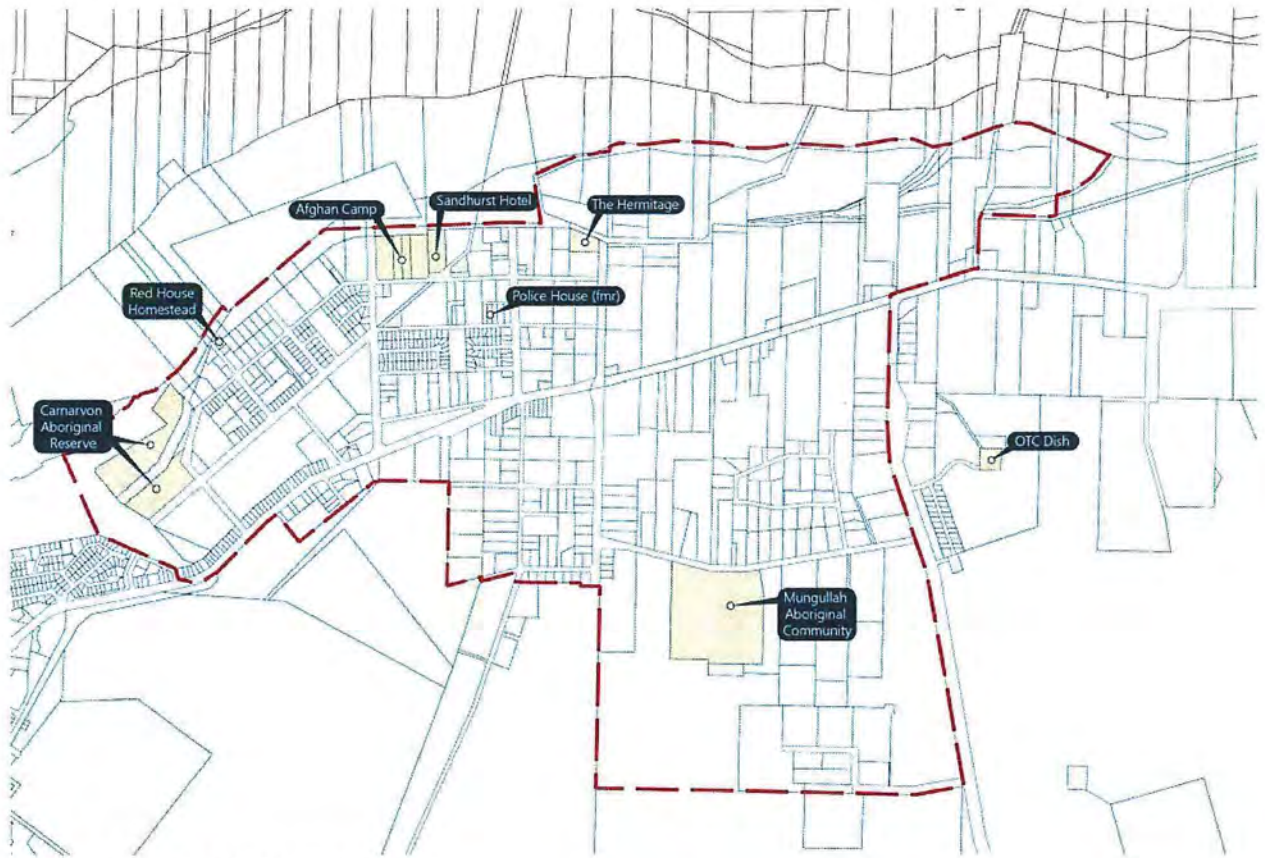


Figure 38. Location of listed heritage sites

3. LAND USE AND SUBDIVISION REQUIREMENTS

3.1. STRATEGIC DIRECTIONS

3.1.1. LAND USE, URBAN DESIGN AND COMMUNITY

A balanced and diverse range of land uses have been planned for the structure plan area to create an activity centre heart, ensure compatible uses, prevent conflicts and accommodate future growth of the town. The structure plan is focussed on reinforcing and supporting the horticultural and agriculture industry in Kingsford as well as facilitating the creation of an Activity Corridor heart in East Carnarvon, in doing so creating an environment where the local economy can grow. The structure plan's key design principles regarding land use and the design and form of development are:

- Ensure that a coordinated and sustainable approach is taken to urban development in accordance with strategic area planning;
- The provision of housing options and affordability has potential to ensure that the community can continue to mature and adapt from changes in demographics. This diversity has the potential to stimulate a vibrant, thriving and sustainable community;
- A diversity of lifestyle choices will be on offer in the structure plan area based on being a connected, well-planned and attractive place with the appropriate infrastructure and services to support a village type atmosphere for both urban and rural living and working;
- Public spaces are to be safe, comfortable and attractive, that offer opportunities for meeting places, street activity and casual surveillance;
- Development and activity should be focused on Marmion Street in order to establish it as a main street hub for East Carnarvon;
- Development along Robinson Street should enhance the entry statement into town;
- Density and development intensity increases with proximity to the school and Marmion Street, creating the critical mass that will result in the creation of nodal centres that offer better facilities and services for the community;
- Retail development should focus on Marmion Street in order to strengthen the activity node core and main street;
- Commercial development should be focused on the southern section of Marmion Street and along Robinson Street;
- Industrial development should be located close to the airport and transport depot to take advantage of potential synergies;
- Development should reflect the Carnarvon context that complements its regional town setting; and
- Supporting a reduction in the number of crossovers along Robinson Street.

3.1.2. ECONOMY AND EMPLOYMENT

- The Structure Plan provides guidance and a framework for development, but also allows for flexibility to respond to market demands;
- Development should take advantage of the strategic advantages enjoyed by connections to local and interstate markets supported by major road and air transport networks;
- The horticultural and agricultural industry is a significant employer and economic driver for Carnarvon and should be protected where appropriate.

3.1.3. ENVIRONMENTAL ASSETS

- East Carnarvon and Kingsford will have a healthy climate and environment through protecting and enhancing local and regional ecosystems and biological diversity;
- Reinstatement of native vegetation will be encouraged;
- East Carnarvon and Kingsford will be at the forefront of new water technologies, with reticulation pipes and water sensitive urban design principles to secure long term flood mitigation;
- Development should aim to strike a balance between the natural and man-made environment to better utilise the area's intrinsic resources. Achievement through enhancement of open space (green space) values through habitat and corridor restoration and waterway protection is encouraged.

3.1.4. INFRASTRUCTURE

- Environmentally responsive civil infrastructure provision – new areas need to ensure the timely, sequenced and sustainable provision of essential social and physical infrastructure;
- Civil infrastructure facilities and services need to be provided upfront in the initial stages of development while continuing to provide for increasing service demands as the local community grows; and
- Civil infrastructure provision fronts should be identified to support efficient sequencing of infrastructure provision. For further detailed information on infrastructure requirements refer to 3.7. Infrastructure coordination and servicing.

3.2. CATALYSING IMPROVEMENTS IN CARNARVON

3.2.1. EAST CARNARVON CORE

Issue

Currently, the activities within the structure plan area are disjointed and the area lacks a defined core.

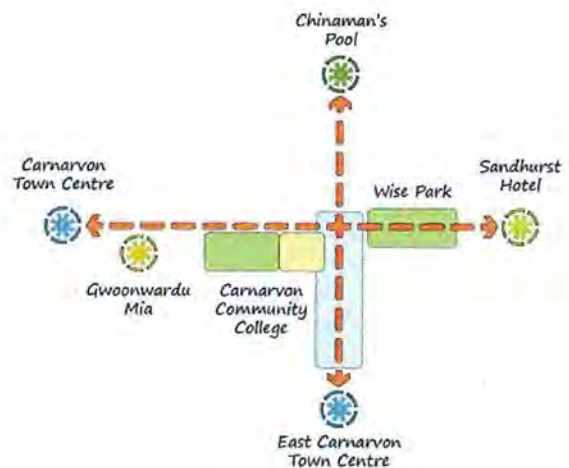
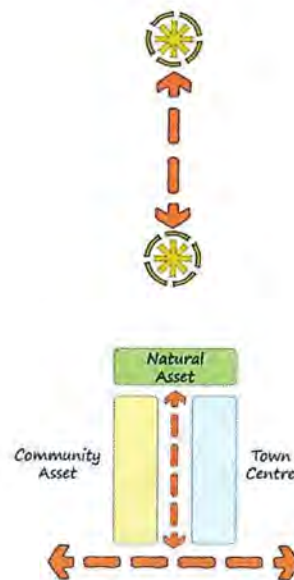
Design Principle:

The Activity Corridor shall create a welcoming civic spine through East Carnarvon, beginning and terminating with high quality public spaces

Capture the passing trade by anchoring off the main entrance into town

Design Solution:

Create a compact, walkable neighbourhood along two key axes (Marmion and Gascoyne) with anchors or destinations at the four axial points



3.2.2. CONNECTING KEY NODES

One of the key principles of the structure plan is to make land surrounding key locations more efficient. The following conceptual figures illustrate how density and land uses can enhance the urban form and enhance the place.

Chinaman's Pool is considered to be a local asset and is listed on the local tourism map as a key node; however, it lacks the infrastructure and critical mass to support activity. This structure plan proposes to create a tourism node around Chinaman's Pool, supported by short-term accommodation options. This node will link with the activity node to the south through the enhancement and density intensification along Marmion Street.

-  Natural Asset
-  Community Asset
-  Town Centre



Figure 39. Enhancement of Marmion Street

Increasing density, and subsequently population, around schools reduces the need for vehicle transport as well as being an efficient use of land. It also plays an important aspect in passive surveillance, particularly when the school is not operational.



Figure 40. Carnarvon Community College

3.2.3. WISE PARK REDEVELOPMENT

Wise Park was dedicated to the Hon. Frank Joseph Scott Wise, a local politician and once Premier of Western Australia in the mid-1900s. Anecdotal evidence suggests that the park was given to the Crown for the future of Carnarvon's children. The park has recently received funding through Royalties for Regions to provide play equipment on the north-western side of the park (see top image in Figure 41), however, the remainder of the park is under developed open space (see bottom image in Figure 41).



Figure 41. Wise Park (Top to bottom: Playground; Park looking east; current residential interface)

One potential solution to facilitate access to funds to redevelop the site, is if the Shire could subdivide a portion of the eastern side of the park (refer to Figure 42). This would improve the interface between the park and residential areas which is currently a tall cream ZINCALUME® fence. In addition, density should be increased (to R10) around the park to make more efficient use of the land and allow for passive surveillance in accordance with Liveable Neighbourhoods. The community and Shire have expressed a desire for R20 development at the high end of the density spectrum, and as such will be designated accordingly.

It is also recommended that the Shire investigates the costing and future location for a toilet block and shade structures within Wise Park.



Figure 42. Wise Park Redevelopment

3.2.4. PARTNERSHIP WITH OTHER AGENCIES AND COMMUNITY GROUPS

Recreation and walk trails were a key theme that emerged from discussions with the community. The proposed structure plan aims to locate linear green spaces that connect with key origins and destinations, such as schools, shops or areas of higher density housing; to allow most people within the community to experience them on their day to day business.

The primary functions of these trails include leisure, relaxation, recreation and tourism as well as providing an informal meeting place for the community. At each landmark and along the trail, interpretive features and signage will significantly add to the overall experience of trail users. In addition, supporting infrastructure such as seats, shade and toilet facilities along major trails are a critical aspect which was raised in the community forums.

Partnership with the following agencies is recommended:

- Department of Sport and Recreation
- Department of Parks and Wildlife
- Department of Lands
- Gascoyne Development Commission
- Department of Environment and Conservation
- Indigenous groups including Gwoonwardu Mia and the Mungullah Community Aboriginal Corporation
- Community groups such as Lions and Rotary



Figure 43. Walk Trail Opportunities

3.2.5. INDUSTRIAL SYNERGIES WITH AIRPORT

As identified in the Carnarvon Airport Structure Plan, the layout of the airport and terminal facilities may provide some industrial land uses with a significant advantage. The unique collocation of diverse heavy, support and infrastructure industries, as well as the airport provides a strong foundation for the identification and development of synergistic opportunities including the exchanges of by-products, shared use of utility infrastructure and supply chain enhancement.

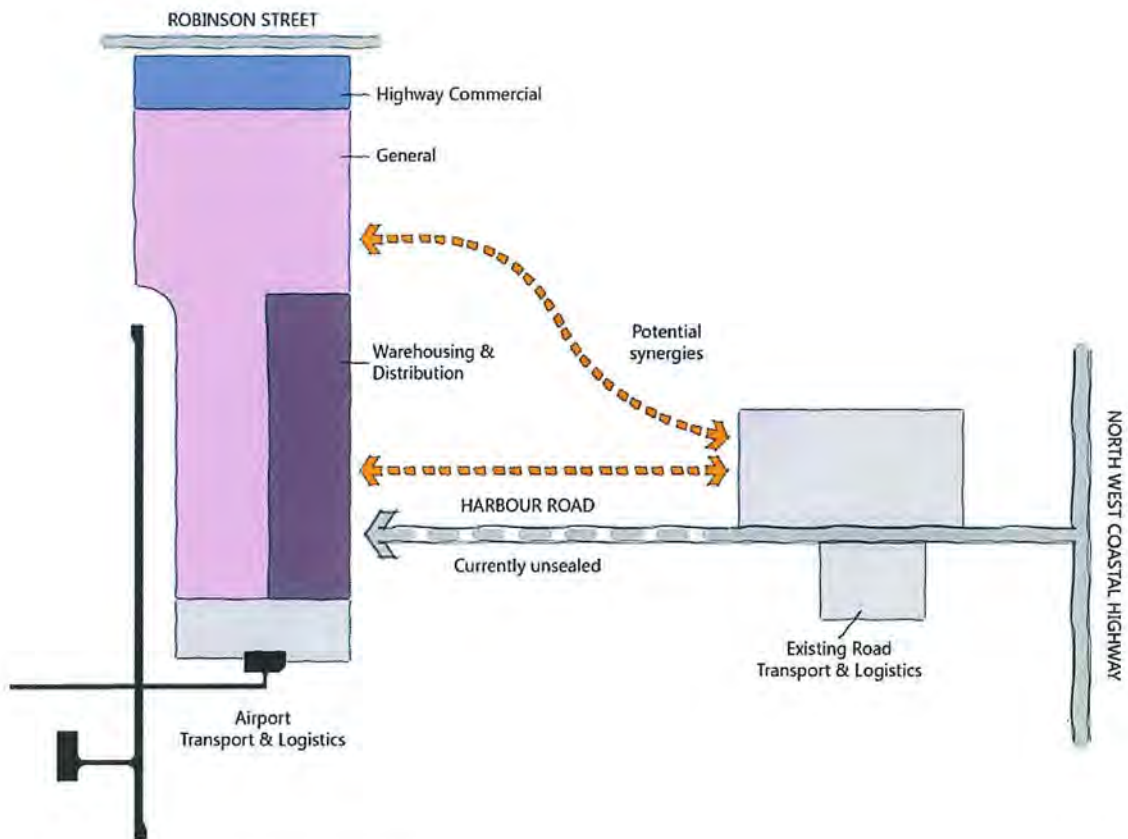


Figure 44. Industrial synergies opportunities

The cluster based approach of industrial economic development has been adopted in many countries throughout the world. Various definitions for clusters exist but they are generally regarded as:

“A geographically proximate group of inter-connected companies and associated institutions in a particular field, linked by commonalties and complementarities” (Porter & Stern, 2001)

Industrial clusters with their close proximity and close relations between suppliers and customers, as well as stakeholders, can undoubtedly provide efficient, robust and competitive conditions for industry. There is also significant evidence that the cluster structure provides an environment

conductive to innovation, allowing adaptability to changing markets and ongoing increases in productivity.

The transformed industrial precinct will provide means for exporting perishable and non-perishable agricultural output out of Carnarvon via either road or air as well as increase access for industries to receive and process goods. This move is a way of transforming the transport sector into a major revenue source for Carnarvon and adds value to existing industries.

3.2.6. RELEASE OF STRATEGIC INDUSTRIAL SITES



Figure 45. Industrial synergies opportunities

Both the Shire and Main Roads currently operate depots at one of the primary entries into the industrial precinct at the intersection of Robinson Street and Boundary Road. An opportunity exists to either relocate the depots to the industrial precincts as outlined in the Carnarvon Airport Precinct Structure Plan or to provide an enhanced interface with Robinson Street and Boundary Road and set the benchmark in design standards.



Figure 46. Boundary Road intersection looking east

3.2.7. AN ENTRANCE WHICH REFLECTS CARNARVON'S HISTORY



Figure 47. James Street entrance to airport

The entrance into Carnarvon along Robinson Street should celebrate the unique natural and cultural character by retaining the rural setting through Kingsford and gradually urbanising through East Carnarvon. The extensive planting of eucalyptus and palm trees along Robinson should be further encouraged as part of the area's visual identity.



Figure 48. Existing situation on Robinson Street

3.3. LAND USE

3.3.1. LAND USE BUDGET

The Structure Plan covers a gross development area of 780 hectares and with regional and district open space, roads and community facilities are removed, approximately 604.47 hectares is available for development. Refer to Table 1 for a breakdown of areas.

Table 1. Land Use Breakdown

DESCRIPTION	HECTARES	% TOTAL
Gross area	780.35	
Non Developable	175.88	
Carnarvon Community College	8.13	1.04%
Festival Grounds	11.66	1.49%
Wise Park	5.25	0.67%
Levee Bank Reserve	0.62	0.08%
Western Floodway Reserve	33.80	4.33%
Existing Road Reserve	87.45	11.21%
Airport and Associated Development	15.09	8.58%
Available for Development	604.47	
Residential	98.04	16.22%
Special Residential	213.46	35.31%
Mixed Use	6.19	1.02%
Tourist Accommodation	15.08	2.49%
Service/Commercial	29.44	4.87%
Intensive Horticulture	159.02	26.31%
Industrial	74.69	12.36%
Community Use	8.12	1.34%
Recreational	0.33	0.05%

3.3.2. PROPOSED LAND USES

The Structure Plan identifies the densification of existing residential areas, a new Activity Node in East Carnarvon, an expanded industrial area to link with the Carnarvon Airport Precinct, and intensive horticulture in Kingsford as priorities.

a. Residential

Definition

A land use in which housing predominates, in this case, single dwelling housing will be the dominant typology.

Objective

- To provide a diverse range of residential lifestyles including rural living, continuation of the 'Carnarvon Lot' as discussed in Section 2.1 Urban Design and Built Form Study and denser options closer to amenities and the activity node;
- To seamlessly establish affordable and social housing throughout East Carnarvon, close to community facilities and the activity node;
- To focus density on Marmion Street and around Carnarvon Community College, supporting the creation of a Activity Corridor;
- To prevent public health or environmental impacts by recognising the *Draft Country Sewerage Policy 2003* and its restrictions on lots below 2000m² for unsewered properties;
- To reinforce the rural nature in rural/special residential properties of Carnarvon through building design, fencing and building envelope; and
- To support low-key tourist accommodation such as Bed and Breakfast establishments where appropriate.

Considerations

Approximately 311 hectares of the Structure Plan area has been designated for residential development of some form. The structure plan area proposes a range of lot types ranging from 2.5 to 20 dwellings per hectare and recognises that some locations have a greater propensity for accommodating density, particularly those close to the proposed activity corridor, amenities and most importantly, sewer connection.

The Draft Country Sewerage Policy has been used to guide the requirements for unsewered subdivisions and land development for the Structure Plan. Where properties cannot be

connected to a reticulated sewerage system, wastewater must be treated and disposed of on-site in accordance with this policy and other regulations. The policy defines a minimum acceptable development lot size of 2000m² or R5 for unsewered lots in the 'Residential' designated area.

The lot type mix generally translates into the following residential typologies:

Residential R20: This typology enables moderate housing growth and diversity while respecting the rural character of the region and traditional lot size configurations;

Residential R5: Due to sewer access constraints, these lots will require large areas for wastewater treatment. Development and subdivision should take into consideration the future impact of sewer connection and the resulting densification; and

Special Residential (R2.5): Special Residential refers to land in a rural setting, used primarily for residential purposes but may also fulfil a specific user-defined purpose such as horse keeping or horticultural activity.

Policy position

Residential R20

Lots coded R20 are currently connected to sewer and development shall be undertaken in accordance with *SPP 3.1 Residential Design Codes 2013*.

Residential R5/ R20

Where a site has dual coding the lower code shall prevail as the maximum permissible residential density for any land within the Residential zones unless reticulated sewerage is or becomes available to any land within the zone or subject to the provisions of the *Draft Country Sewerage Policy 2003 (as amended)*.

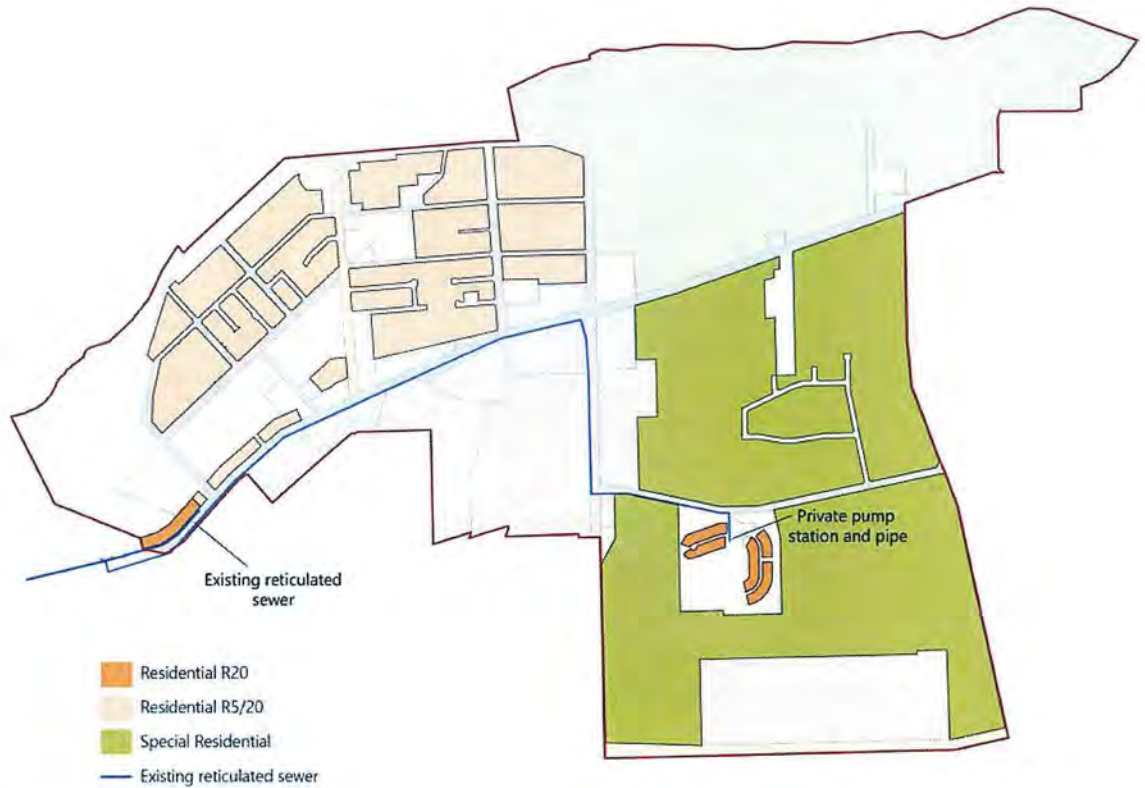


Figure 49. Density Plan

Special Residential (R2.5)

Some horticulture or keeping of horses may take place on the land; however, it will be ancillary to the residential use. It is likely to be carried on for 'lifestyle' reasons and is unlikely to provide a significant source of household income. Where soils are appropriate, onsite effluent disposal systems can be used and 4000m² is considered the minimum lot size. Site suitability for onsite effluent disposal should be demonstrated at subdivision and development application stage.

The following table provides a breakdown of the projected residential typology yields, precise lot and dwelling yields will only be known as detailed subdivision design progresses. The design phase of works will occur as part of the implementation of the structure plan, thus ensuring that each stage is carefully planned for site responsiveness.

Table 2. Residential Yields Budget

Developable Area 594.08ha
 Total Residential Zoned Area 311.57ha

Lot Typology	Area (ha)	Area (%)	Maximum Estimated Yield (dwellings)
Residential R20	5.45	0.92%	72
Residential R5/R20	92.59	15.3%	460 (@R5) – 2060 (@R20)
Special Residential	213.46	35.3%	532
Residential dwellings on Intensive Horticulture zoned land	159.02	26.3%	26
Total			1090-2690

The table above is purely based on the land area available and does not cater for lot boundaries which will likely require amalgamation in this instance. A more realistic figure is 750 dwellings, should sewer be implemented for Residential R5/R20 properties. This results in a realistic forecast of approximately 1400 dwellings including residential dwellings on Intensive Horticultural zoned land.

Actions

- Ensure unsewered development does not have negative environmental impacts;
- Ensure unsewered development occurs in accordance with the *Draft Country Sewer Policy 2003 (as amended)*;
- Reticulated sewer implemented throughout the site in a phased manner for 'Residential' zoned land; and
- Shire of Carnarvon Town Planning Scheme to be amended to reflect proposed densities.

b. Mixed Use

Definition

A land use enabling buildings to contain commercial and other non-residential uses in conjunction with residential dwellings.

Objectives

- Land uses to assist in the creation of a Activity Corridor with opportunities for increased levels of economic stimulus and to create activity and interest at the key nodes;
- The Activity Node to provide residential communities with daily retail needs and services and assist in the creation of a Main Street environment as well as provide for denser housing options where appropriate;

- The Chinaman's Pool Node to provide for high quality tourist accommodation facilities and denser housing options as well as showcase Chinaman's Pool as a key local asset;
- To provide, where appropriate, building frontages with active uses that engage with the street to encourage an increased interaction with the public realm;
- To encourage development that contributes to the creation of a human-scale pedestrian streetscape along Marmion Street;
- To provide diverse employment opportunities for the Carnarvon region; and
- To provide a focal point for the community in the Structure Plan area.

Considerations

The Structure Plan strategically allocates land along Marmion Street to provide flexibility in assessing development opportunities which respond to market demands. Chinaman's Pool is a key local asset as a permanent water body and is under realised and should be enhanced through a landscape master plan to enhance its appeal and to manage any environmental impacts due to increased usage.

The mixed use precincts should be developed as the two most significant strategic sites within the Structure Plan area, providing the critical foundations and infrastructure investment necessary to ensure that the proposed Activity Corridor can grow sustainably and mature into the future. The success of this will then encourage further investment and growth in the surrounding neighbourhood. This land use enables a range of uses including residential, tourism, retail and office to be co-located in a way that supports sustainable activity node.

Carnarvon currently has approximately 7,000m² net lettable area (NLA) of retail floorspace, which serves a resident population of approximately 5,347 and a large tourist population during peak visiting periods. Based on this existing ratio of 1.3m² NLA per person, and the Structure Plan's estimated additional population of 3500, a total of approximately 4,550m² of additional NLA retail floorspace may need to be accommodated in Carnarvon in the future. This could be accommodated in the newly created mixed use activity node on Marmion Street with an estimated 25,400m² of land area.

Policy position

It is envisioned that the mixed use areas will provide a range of retail, commercial, office and residential uses (with a maximum density of R60) that responds to an active neighbourhood centre character. The two precincts identified have different priorities; the Activity Node will

focus on retail, office and commercial development, whereas the Chinaman's Pool Node will provide tourist accommodation and attractions. In addition, both will aim to provide residential components at higher densities to cater for first homebuyers, retirees and key worker accommodation. This is particularly important in the Chinaman's Pool Node as a dominance of tourist accommodation may result in a lack of vibrancy in the off-peak season. A maximum density of R60 will be applicable to the residential component of 'Mixed Use' areas.

Actions

- Reticulated sewer implemented throughout the site in a phased manner, particularly along Marmion Street;
- Streetscape improvements along Marmion Street;
- Landscape improvements around Chinaman's Pool and formalise access;
- Incentivise retail uses to relocate and develop along Marmion Street; and
- Shire of Carnarvon Town Planning Scheme to be amended to reflect proposed land uses.

c. **Tourist Accommodation**

Definition

A land use where the primary purpose is to provide a place where travellers can sleep and find other services. This could include accommodation forms such as eco-tourism, bed and breakfasts, hotels and motels, backpackers, caravan parks and camping grounds.

Objectives

- To enhance and promote the Carnarvon experience whilst ensuring a balanced approach is taken to managing visitor numbers to protect the natural features and values of the area; and
- To provide for and encourage a range of tourism facilities and development within the area in appropriate locations that respect environmental assets and the area's character.

Considerations

Carnarvon and the study area in particular is fortunate in that it already attracts tourists heading north and backpackers wanting to work on the plantations. The tourism industry currently contributes substantial economic and employment benefits to the region capitalising on the area's natural attractions, coastal experiences and rural landscape.

Policy position

Based on the unique features of the site area and its location, the Shire will require tourism development and its design to be sympathetic to the local environment and setting.

Actions

- Develops policy provisions that encourage design of tourism accommodation to reflect the Carnarvon environment; and
- Shire of Carnarvon Town Planning Scheme to be amended to reflect proposed land uses.

d. **Service/Commercial**

Definition

Highway-oriented commercial and service industry uses including manufacturing facilities with a retail shop front, showrooms, hardware stores, and wholesale, service and repair activities.

Objectives

- To provide high quality interface treatment through site and building design, landscaping and access arrangements by development fronting Robinson Street thus enhancing and providing a pleasant entrance into the town;
- To ensure commercial uses along Robinson Street benefit from a high level of exposure to passing trade;
- To require design of buildings to facilitate development which can accommodate a diverse range of flexible commercial, service and office premises;
- To provide diverse employment opportunities for the Carnarvon region; and
- To provide land for large retail spaces and showrooms, service and light industry as well as fuel outlets while excluding general industry and all types of residential use including tourist accommodation.

Considerations

The Service/Commercial precinct along Robinson Street currently detracts from the streetscape, particularly in contrast to the horticultural setting through Kingsford. This could be redressed through landscaping, quality signage or other techniques.

Policy position

Development should address a common thematic approach to building form, materials and colours, signage, car parking area design and landscaping principles as set out in a design guideline document. Access from Robinson Street is to be limited and where feasible, the use of common driveways encouraged.

Many retail uses should be discouraged from locating within this zone as they do not mix well with highway-oriented uses, particularly pedestrian orientated uses.

Actions

- Prepare and implement design guidelines to control the visual amenity of Carnarvon's northern entry including but not limited to guidelines recommending tree species that does not drop leaves or branches and does not dewater the surrounding area; and
- Shire of Carnarvon Town Planning Scheme to be amended to reflect proposed land uses,

e. Industrial

Definition

Industrial land uses provide for manufacturing industry, the storage and distribution of goods and associated uses in a manner that does not affect the safety and amenity of local communities.

Objectives

- To direct transport and logistics uses towards land nearer to Harbour Road and the proposed Boundary Road extension;
- To design buildings and sites to create an attractive and landscaped industrial streetscape;
- To develop this area of the Precinct as a 'skilled' precinct to attract highly technical and diverse businesses;
- To provide diverse employment opportunities for Carnarvon;
- To provide areas for industry separated from living, business and community areas so as to reduce adverse impacts on the amenity of residents and users of land in the vicinity of industrial activities;
- To provide for the ongoing operation of the existing industrial area and an expansion area to be developed in the future when the demand for land justifies this;

- To promote innovative approaches to the design and development of industrial enterprises; and
- To achieve high standards of environmental management for commercial, transport and industrial development and associated activities.

Considerations

The proposed industrial precincts are linked to the Camarvon Airport Precinct Structure Plan (CAPSP), as such, the same typologies are adopted (see Figure 50). Below is a table identifying industrial typologies and location criteria as per the CAPSP.

Table 3. Industrial Typologies and Location Criteria

Industry typology	Potential Land Uses	Location criteria
Light/Service	Manufacturing that utilises partially processed materials to make products Showroom and services	Highly accessible, visible frontage, transport/activity corridors/some residential locations Very close to centres of population and trade
General	Agriculture and food processing Metal fabrication	Regional arterial roads Small lots (up to 2,000m ²) and some medium sized lots (4,000m ²)
Warehousing & Distribution	Storage and display of goods	Road freight routes Linked to logistics and transport industries Very large sites 4000m ² - 8ha
Transport & Logistics	Transport and courier depot and services Distribution centre Packaging, parts and services Disposal, recycling	Strategically located in relation to source of produce/goods, transport corridor and/or ports and the market Links to warehousing sites Very large sites 4000m ² - 8ha

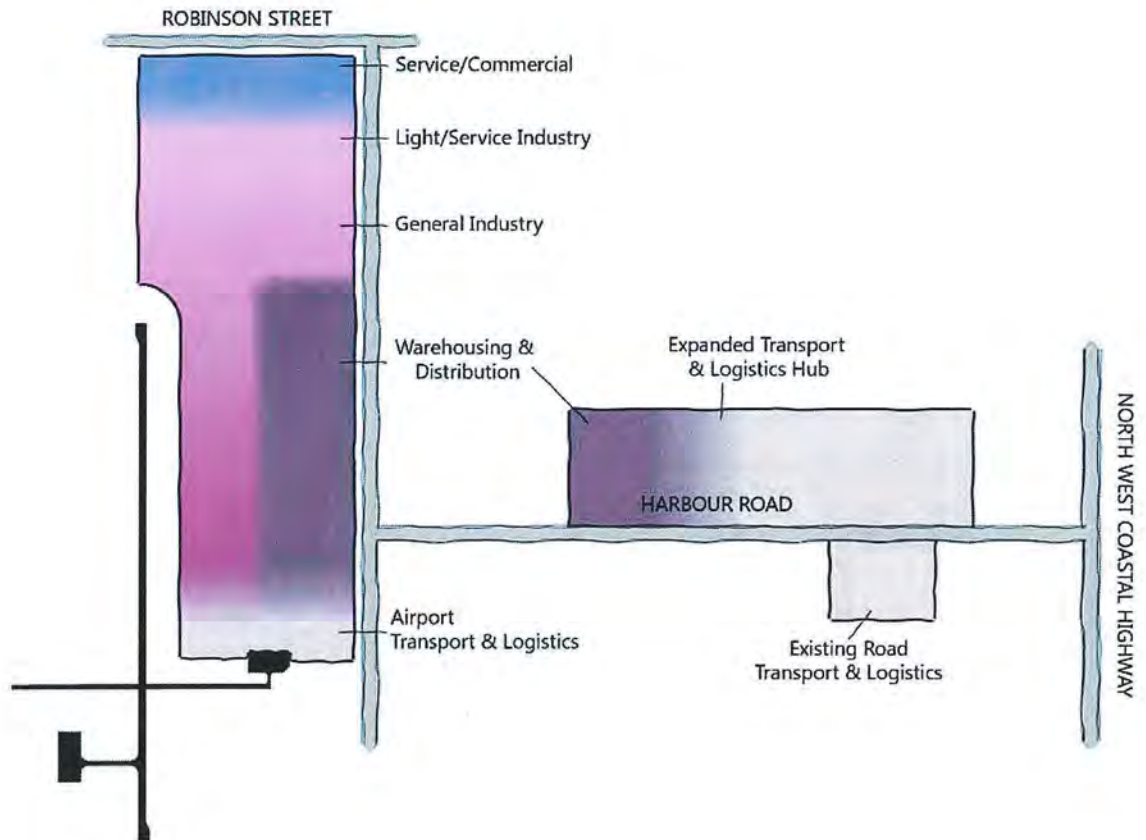


Figure 50. Industry Location Concept

Policy position

The provision of varying lot sizes should facilitate the establishment of the entire range of industrial activity within the town and have sites strategically located based on land use type.

Actions

- As the dominant landowner, the Shire will need to subdivide the parcels in such a way that it caters for these specific land uses and strategically locates them;
- Undertake the construction/sealing of Harbour Road through to Cornish Street; and
- Shire of Carnarvon Town Planning Scheme to be amended to reflect proposed land uses.

f. **Intensive Horticulture**

Areas depicted as 'Intensive Horticulture' within the structure plan are intended to reflect the current zoning of the land under the Shire of Carnarvon Town Planning Scheme No. 10.

As stated previously, Policy Statement No. 1 of the Planning Scheme currently limits development on Intensive Horticulture zoned lots. More recently the Shire has resolved to take a more flexible approach to facilitate subdivision where appropriate, and are exploring several options in this regard.

Definition

The Shire of Carnarvon Town Planning Scheme No. 10 definition for Intensive Horticulture is as follows: *"means agricultural practices which are carried out with the aid of techniques including water reticulation to render the land capable of sustaining considerably greater number of stock, higher crop yields, or different types of crops than could be produced without the aid of those techniques"*.

Objective

To preserve and maintain the affected land as viable units for horticulture and plantation which will include resistance, by recommendation for refusal, to proposals for subdivision and refusal of any land use or development proposals which would operate in conflict with this objective.

Considerations

Department of Agriculture and Food (DAFWA) staff have advised that land in Kingsford (north of Robinson Street) is some of the best horticultural land within the whole Carnarvon Irrigation District, with high fertility and low salinity (Tony Della Bosca and Chris Schelfhorst *pers. comm.*).

As discussed in Section 1.4.2, SPP 2.5 Land Use Planning in Rural Areas addresses the protection of agricultural land uses and mitigation of conflicts. The intent of the Intensive Horticulture zone aims to protect this along with the advice on spray drift as discussed in 1.4.5 and 3.3.3. The SPP does not provide guidance on determining minimum lot size nor any specific measures on avoiding conflicts.

Water allocation is recommended to be considered, however the Department of Agriculture and Food and the Department of Water are the responsible agencies for the allocation of water for horticultural purposes.

Policy position

The subdivision for residential and special residential uses within this zone is not supported as these intensive uses are incompatible with agricultural activities, as is currently the case with the existing conflict discussed in Section 0.

As it currently stands, Council will not recommend approval to any subdivision proposal for lots smaller in area than 6ha, and in such other cases will only recommend approval where it can be convinced that the proposed subdivision will enhance rather than detract from the viability of the lots for Intensive Horticultural purposes and where a water supply service is assured.

Council will oppose any development which will result in a diversion of land from horticultural or plantation production except those developments which are essential for the continued effective operation of the plantation concerned and which developments will remain incidental and subservient to the principal use of the land for horticulture.

That the construction of additional accommodation on Intensive Horticulture and Plantation properties be approved, on the basis of:

- (a) Where a property is in excess of 4ha and less than 10ha to a maximum of two dwelling units.
- (b) Where property is in excess of 10ha then, there is permitted two dwelling units for the first 10ha and thereafter additional unit for each additional 10ha viable rural property.

Actions

- This land shall be respected as priority agricultural land in the Planning Strategy and Scheme; and
- Development of policy providing guidance to applicants on subdivision of land within the zone. Items addressed in the application should consider aspects including soil type, water availability, spray drift, and potential crops suitability.

g. Extent of Flooding

It is proposed that all floodways that currently do not appear in TPS 10 to be added through either an amendment or the scheme review process. The extent of 1:100 year floodways is indicated on Plan 1.

Definitions

A floodplain is a portion of a river valley situated adjacent to the river channel which is covered with water when the river overflows its banks during major river flows (all typically flood-prone land).

Floodways are areas of the floodplain where a significant discharge of water occurs during a flood. They are often aligned with naturally defined channels. Floodways are the areas that even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood level.

Objectives

- To protect the existing floodway from development which will alter the flow of water during major flooding events; and
- To protect infrastructure and development from flooding.

Considerations

Carnarvon townsite, Kingsford in particular, is subject to the intermittent flooding of the Gascoyne River. The land use framework of the Structure Plan defines the '100 Year ARI Extent of Flooding After Flood Mitigation Works'. Until a major flooding event, the exact 'floodway' cannot be defined. Ultimately, the floodway and floodplain have limited development potential other than the growing of crops or agistment of animals, and all development will require assessment by the Department of Water and the Shire.

Policy position

Floodway development

Development (i.e. filling, building, etc.) that is located within the floodway and is considered obstructive to major river flows is not acceptable as it will increase flood levels upstream. Essentially, development in the floodway should be avoided. This is the general framework for most structure plans of a similar context. New buildings and lots should be situated outside of active floodway areas. The Department of Water typically assess any development that does occur within flood prone areas. For more information refer to Department of Water's reference material; *Water facts WF14 - Floodplain Management (2009)*.

Flood Fringe Development

Development (i.e. filling, building, etc.) that is located within the flood fringe is considered acceptable with respect to major river flooding. However, a minimum habitable floor level of 0.50 metres above the adjacent 100 year flood level is recommended to ensure adequate flood protection. Accordingly, new subdivisions and dwellings within the flood fringe are to incorporate minimum habitable floor levels of 0.50 metres above the adjacent 100 year ARI flood level.

Fencing

Fences should be located away from active flow areas (floodway). In fringe flow areas break-away panels or gaps under fences are essential in reducing the probability of debris build-up. Where possible, fencing should be aligned parallel to the flow of the flood. Furthermore, fencing should not be used to redirect the flood flow onto other properties.

Onsite Wastewater Treatment

The Department of Water provides advice regarding the location of conventional systems (e.g. septic tanks, soak wells and leach drains) as well as alternative treatment systems (e.g. aerobic treatment units) near sensitive water resources. For more information refer to tables 1-5 in the Department's *Water Quality Protection Note 70 - Wastewater Treatment and Disposal - Domestic Systems* (2010).

Actions

- Write policy provisions for floodway management and onsite water treatment;
- Shire of Carnarvon Town Planning Scheme to be amended to reflect policy provisions; and
- Special Control Areas be introduced to the Shire of Carnarvon Town Planning Scheme, where applicable to implement floodways.

h. Community Use

Definition

A land use focused on providing community benefits, including a school, community activity centre or a place of worship.

Objectives

- To foster a strong sense of community.
- To establish the area around the Carnarvon Community College as an educational hub for the immediate and regional community.

- To ensure the timely provision of community infrastructure based upon population thresholds.

Considerations

Educational facilities are an important part of Carnarvon's community infrastructure. The Carnarvon Community College represents the amalgamation of two primary schools and potentially the high school, depending on State funding. Stages one and two comprise of a new pre-primary, primary and general school facilities, while stage three comprises new high school learning areas and a full size oval as well as the refurbishment of existing buildings. A new trade training centre specialising in metal fabrication and building construction is also planned in stage one. Ideally this could link closely with the proposed industrial precinct to the south.

Population growth and changing demographics will place pressure on existing services in the future. For instance, the population Australia wide is ageing. This may lead to a greater demand for aged care facilities and allied services. If these are not provided locally, due to feasibility or other reasons, then it is likely to result in older people (and other people who are dependent on health and associated services) moving away from Carnarvon. This should be taken into consideration when planning for specific facilities. At the District Structure Plan level, no site has been identified but ideally it would be part of the Marmion Street redevelopment as proposed earlier on. Several others sites in Carnarvon are being prepared/investigated for aged care/independent living accommodation.

Policy position

Ensure that adequate sites are available to meet community needs for community services and facilities in appropriate and accessible locations.

Actions

- Enable the efficient use of sites by allowing a broad range of uses appropriate for the location on sites;
- Focus educational land uses in East Carnarvon to assist in creating an education hub; and
- Shire of Carnarvon Town Planning Scheme to be amended to reflect proposed land uses.

i. Open Space

Definition

Open space is any open piece of land that is reserved for the purpose of formal and informal sport and recreation, preservation of natural environments, provision of green

space and urban storm water management.

Objectives

- To provide and develop a range of open space types to meet the active and passive needs of residents, visitors and workers;
- To create a comprehensive network of walking and cycling routes to foster more sustainable modes of travel;
- To create an attractive urban environment, with a strong sense of place, through the provision and landscaping of open space;
- To ensure that places of Aboriginal cultural heritage significance are integrated into the open space network where appropriate;
- To provide space within the Structure Plan area dedicated to Aboriginal cultural heritage interpretation; and
- To ensure that landscape treatment and the retention of different landform elements add and enhance the interpretation of Aboriginal cultural heritage.

Considerations

Liveable Neighbourhoods, identifies four levels of open space; regional, district, neighbourhood and local. However, considering this is a District Level Structure Plan and there are few local parks, neighbourhood and local have been combined.

Regional

- Festival Grounds

District

- Wise Park
- Western Floodway Reserve (flood free)
- Floodway Reserve (drainage as well as restricted access for walking)
- Camarvon Community College Ovals (not counted as part of 10% POS contribution).

Local

- Levee Bank Reserve (a Scheme Reserve for the levee banks, not POS)
- Pocket parks (refer to point 8 in Figure 51)



Figure 51. Open Space Map including surrounding regional and district open space

Table 4. Open Space Calculation

DESCRIPTION	HECTARES
Gross area	780.35
Deductions	
Carnarvon Community College	8.13
Existing road reserves (primary distributors)	19.03
Power Station	1.67
Tourist Accommodation	15.08
Service/Commercial	29.44
Intensive Horticulture	159.02
Industrial	74.69
Airport and Associated Development	15.09
Telecommunications Site	5.67
Gross Subdivisible area	452.53
Public open space @ 10 per cent	45.25
Public open space contribution	59.89
Unrestricted public open space sites	33.88
Wise Park	5.25
Festival Grounds	11.66
Western Floodway Reserve (flood free)	16.64
Local Open Space	0.33
Restricted use public open space sites	nil
Floodway Reserve (solely for drainage)	17.16
Allowable area (20%)	11.98

Policy position

The Shire considers that the current supply of open space is adequate and for subdivision requiring POS contributions, the Shire would look favourably on cash-in-lieu contributions which would assist in the maintenance of the existing open space networks. The provision of open space complies with Liveable Neighbourhoods Policy.

Actions

The Council has recommended several community recreational initiatives as part of this project including:

- Upgrading of Wise Park through measures such as reticulation of lawn areas, installation of adventure playground and installation of public amenities such as toilet facilities;
- Incorporating new tennis courts at the Festival Grounds based on co-location principles and sharing of club facilities; and

- Incorporating a new skate park at the Festival Grounds based on co-location principles.

j. **Airport and Associated Development**

Definition

Land dedicated to and associated with the proposed airport.

Objectives

- To improve air transport experience for Carnarvon residents, business travellers and tourists;
- To improve freight transport facilities and the potential for direct air access to interstate and international food markets;
- To allow for air transport services to the mining industry including, for example, fly-in and fly-out services for contractors and staff; and
- To provide facilities for the safe, efficient and economic handling of aircraft, passengers, freight and related services and support facilities.

Considerations

The land dedicated to this land use reflects aviation safety requirements involved with the take-off and landing of aircraft.

Policy position

Any form of development within this zone is not permitted without consultation with the responsible aviation authorities.

Actions

- Shire of Carnarvon Town Planning Scheme to be amended to reflect proposed land use.

3.3.3. BUFFERS

Navigational Aid Equipment

The CASA Manual of Standards Part 139 - Aerodromes requires that VHF Omni-directional Radio Range (VOR) buffers are measured 1500m from the centre of the VOR antenna. Development proposals between 100m and 1500m from the centre of the VOR antenna that exceed an angle of elevation of 2.0°, measured from ground level at the centre of the VOR antenna, require assessment by a VOR technical authority. 300m from the antenna, the height limit (10.5m) is not considered to be a constraint on development. Within 100m the VOR and 150m of the Non-Directional Beacon requires very limited interference as per CASA standards. Buffer heights are detailed in the figure below.



Figure 52. Navigational aid equipment height limits (Hames Sharley, 2014)

Obstacle Limitation Surface

The Obstacle Limitation Surfaces (OLS) are a series of surfaces that set the height limits of objects around an aerodrome. They are established in accordance with International Civil Aviation Organisation (ICAO) specifications, as adopted by Australia's Civil Aviation Safety Authority (CASA). Obstacles penetrating above the OLS are considered a hazard to aircrafts and will need to be marked and/or lit, unless removed.

The hatched area in Figure 53 is within what is called the Inner Horizontal Surface, this has a height limit of 45m above the elevation of the runway. Please note that the runway alignment shown is the proposed alignment, not the existing.



Figure 53. Obstacle Limitation Surfaces (Hames Sharley, 2014)

Dampier to Bunbury Natural Gas Pipeline corridor

The Dampier to Bunbury Natural Gas Pipeline (DBNGP) corridor is located within the structure plan area (as shown in yellow below). Section 41 of the *Dampier to Bunbury Pipeline Act 1997* requires approval from the DBNGP Land Access Minister for any work to be undertaken. The DBNGP corridor easement is approximately 15m wide and is a feeder line to the existing Carnarvon power station. Once the new Mungullah Power Station (also gas generated) is completed, Carnarvon power station will be decommissioned and transformed to a network substation. Thus it is envisioned that the easement and pipe infrastructure will be redundant and closed. On this basis, it is anticipated the easement will not restrict development in the future. As the Mungullah Power Station is located adjacent to the pipeline corridor no major realignment works are required.

Until this occurs, Department of Lands have advised that a 300m notification area currently exists. The 300m notification area has been defined to ensure that consultation occurs with the pipeline owners regarding certain rezoning proposals in the vicinity of the high pressure gas transmission pipeline to ensure that any changes to the pipeline location classification in accordance with AS2885 are identified.

Whilst the WAPC's Planning Bulletin 87 High Pressure Gas Transmission Pipelines in the Perth Metropolitan Region does not apply to the study area, the same principles should apply, including ensuring that the existing depth of cover over the full length of the DBNGP corridor is not to be reduced. Battering and/or retaining up to the corridor boundary is acceptable subject to there being no adverse drainage or hydrology impacts. There shall be no cutting works permitted within the DBNGP corridor.

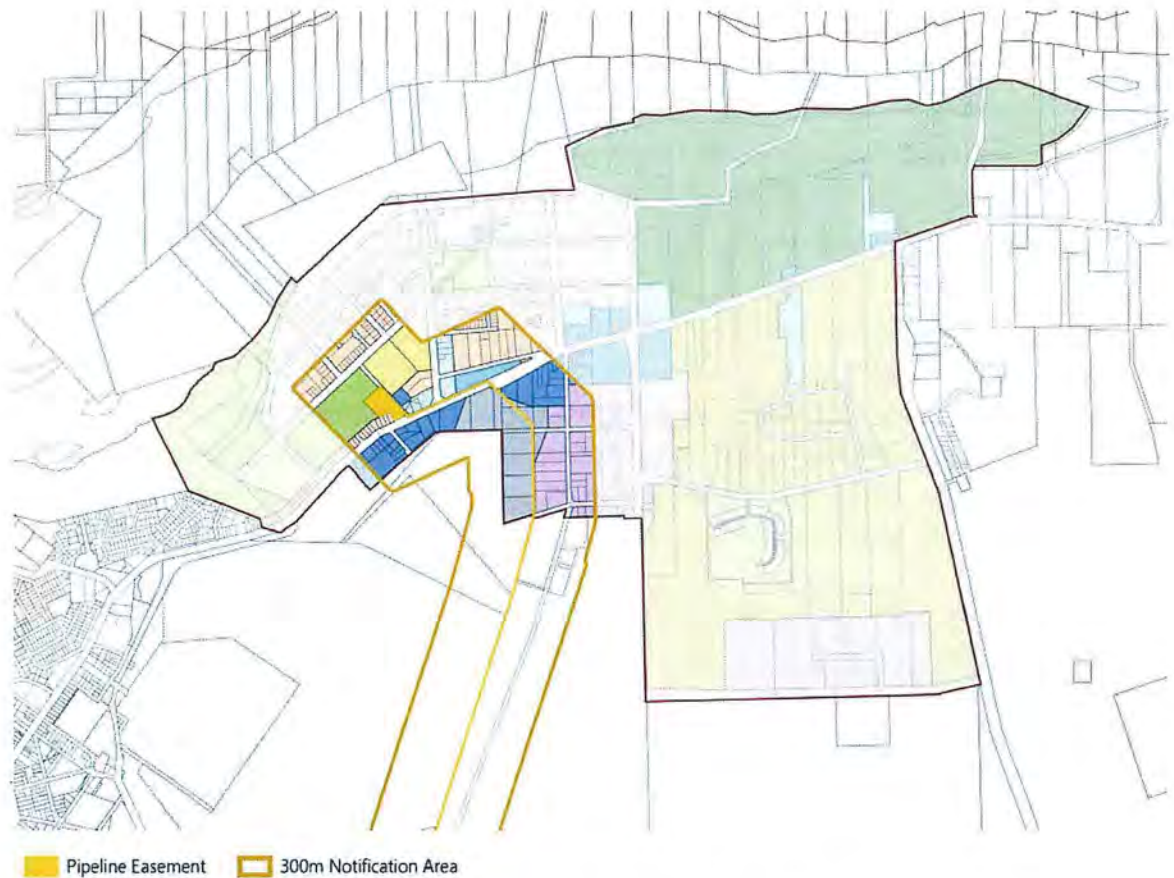


Figure 54. Dampier to Bunbury Natural Gas Pipeline corridor (Hames Sharley, 2014)

Residential and Horticultural Conflict - Spray Drift from Horticultural Uses

There are two common situations that typically cause land use conflict between Residential and Horticultural areas:

1. When urban development is proposed in the vicinity of horticultural land that is zoned 'Rural' and is expected to remain productive; or
2. When horticultural areas are zoned for urban development, however, development may be delayed because the owners are not contemplating subdivision.

The most common conflicts that occur from these situations result from agricultural land uses which cause noise, dust, odour and chemical spray drift. Dust, odour and noise are considered to have minimal impact on residential areas. Spray drift has been highlighted as the major issue in this instance. Management practices to minimise its impact must be considered to reduce land use conflict.

The Environmental Protection Authority (EPA) produced a generic buffer distance of 300-500m for broad scale operations of Market Gardens, Orchards, Turf-farms and Lawns, and Vineyards. Buffer design may be influenced by various factors including chemical type, application method,

air movement, the site itself, proposed land uses, and the adjacent or nearby land-use characteristics. The 300m buffer can be reduced to 40m separation distance, where a vegetative buffer has been adequately designed, implemented and maintained according to Department of Health Policy - *Guidelines for Separation of Agricultural and Residential Land Uses*, which is largely based on the Queensland policy of the same name. For residential subdivision in the vicinity of agricultural areas the Structure Plan uses the WAPC Planning Bulletin Number 63 - *Policy for Dealing with Potential Conflicts Between Residential Subdivision and Market Gardens in East Wanneroo* as guidance as well.

Where vegetated buffers are proposed, development applications should include a landscape plan including the extent of the buffer, the location, a list of the species of proposed vegetation and spacing requirements. Ownership details of the vegetated buffer and a maintenance plan outlining the responsible party must also be identified.

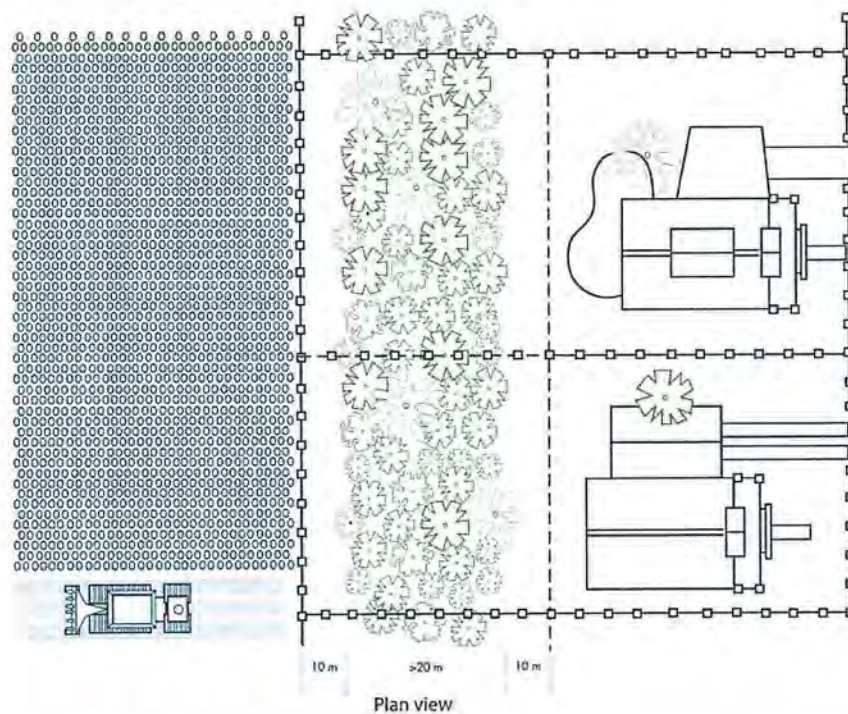


Figure 55. Spray Drift Vegetated Buffer Area (Source: Department of Natural Resources 1997)

3.4. MOVEMENT NETWORKS

The Structure Plan recognises the importance of Robinson Street as the main distributor road for the town, providing the 'spine' for through movement in and out of Carnarvon. It also proposes that Marmion Road be retrofitted to become an 'Activity Corridor' with improved streetscape and density. The existing road layout has been retained within the Structure Plan, with the introduction of new access roads where required.

3.4.1. STRATEGIC DIRECTIONS

- To provide access to a wide range of transport options for residents, workers and visitors to Carnarvon.
- To encourage pedestrian and cycling activity along Marmion, Gascoyne and Robinson Streets by improving pedestrian permeability, walkability and experience.
- To improve linkages between centres and other destinations (such as open space, residential areas, and Carnarvon Community College) with a focus on priority access for pedestrian and cycling activity.
- To improve the flow of Robinson Road, whilst creating a safe pedestrian and cycle environment.

Robinson Street Duplication Options

The community has expressed interest in extending the duplication of Robinson Street from Campbell Way in Carnarvon through East Carnarvon and Kingsford to the North West Coastal Highway (approximately 3.5km). Given that Robinson Street is a State road under MRWA responsibility, the Shire of Carnarvon does not have jurisdiction over duplication decisions. MRWA currently does not have plans to complete this duplication as the traffic volumes of around 8,000vpd, as recently recorded, were well below the 20,000vpd that triggered duplication in a similar situation in Dampier. The duplication may be considered in future with growth in traffic volumes. Alternative options such a third lane to assist with turning manoeuvres are also being explored. Furthermore, the 2012 Western Australian Planning Commission Draft Gascoyne Regional Planning & Infrastructure Framework rated the dual carriageway extension as a low priority.

East Carnarvon Primary School Expansion

The Department of Education, in collaboration with the Shire of Carnarvon and the State Government, aims to consolidate the three public schools in the Carnarvon/East Carnarvon area: East Carnarvon Primary School, Carnarvon Primary School and Carnarvon Senior High School into a new K-12 school - the Carnarvon Community College. The merged Carnarvon School Campus will be constructed in three stages: stage one is the only one to have secured funding at the time of writing. The expansion will cover the full block between Marmion Street, Gascoyne Road, Iles Road and Robinson Street, all of which have time based 40km speed limits during school hours.

The school had approximately 400 enrolments and 50 staff in 2013, are expecting 520 in 2014 and over 800 enrolments and over 100 staff following stage three.

Currently parents do not usually park on Marmion Street due to the narrow nature of the street (despite there being no parking restrictions in place). Staff predominantly park in the off-street car park off Marmion Street. School buses pick up students on Marmion Street and enter Robinson Street via the T-intersection with Angelo Street, which alleviates the Marmion Street and Robinson Street intersection, which is often congested by parental traffic. It should be noted that there is no school crossing or supervisors and the students informally cross Marmion Street with the aid of a centre median.

Stage 1 of the expansion will provide the school with approximately 120 on-site parking bays. Part of this is a new car park under construction within the Gascoyne Road reserve that will serve as a pick-up/drop-off area for the primary school students as well as provide parking for up to 31 vehicles.

Shawmac Consulting has undertaken a traffic study for the Stage 1 school expansion and concluded that the anticipated traffic generated from the school site development will be comfortably accommodated by the road network and that the projected traffic volumes of the streets adjacent to the school are estimated to be well within the practical road capacities.

Condition of Footpaths and Cycle Routes

There are currently no formal on-road or off-road cycling facilities in and around East Carnarvon and Kingsford. It is understood that cyclists currently use the road or the footpaths where the width is adequate. There is an existing fenced enclosure providing secure parking for approximately 20 bicycles at the school. Whilst installation of new bicycle racks is planned, there are no provisions for any additional end of trip facilities within stages 1 -3 of the school expansion.

Pedestrian pathways are sporadic in East Carnarvon and Kingsford. Some residential areas have footpaths on both sides of the street; some have single side footpaths and some have none at all. Figure 56 below highlights the pedestrian network in the school precinct.

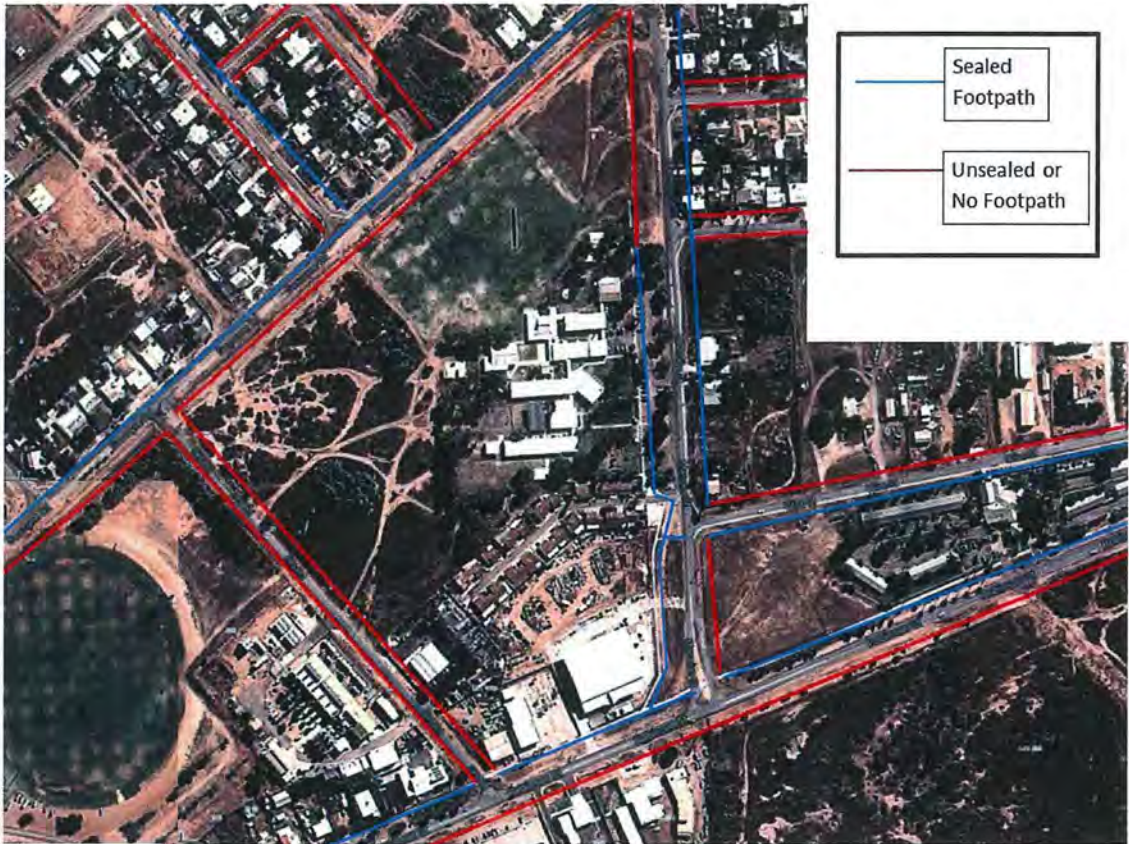


Figure 56. Pedestrian Network in the proximity of the school

In the proximity of the school currently there are 1.9m wide footpaths in selected sections of Marmion Street and 1.5m wide footpaths on the northern side of Gascoyne Road. Robinson Street has an approximately 2m wide footpath on the northern side of the road between Morgantown/Carnarvon to the IGA supermarket in East Carnarvon. These streets connect the local residential areas with key nodes such as the school, shopping areas and the sporting facilities on Robinson Street at the western end of East Carnarvon.

According to the report 'Traffic Engineering and Management' (Ogden and Taylor), the desirable width for off-road shared bicycle/pedestrian paths is 2.5m minimum. Therefore the footpaths in Robinson Street are suitable for this dual purpose. However, the remaining access roads that actually have footpath infrastructure in East Carnarvon and Kingsford (particularly around the school north of Robinson Street) are only suitable for pedestrian usage.

Despite the lack of sealed footpaths in much of the study region, the majority of streets are accessible by grass or gravel walkways that do allow pedestrians to travel off the roadway. Given the low volume of traffic the majority of access roads would carry, on-road bicycle usage would generally be considered acceptable. However, within the school region, it would not be suitable

to have children using the roads at peak times during parental pickup which sees an influx of car traffic in these roads surrounding the school.

3.4.2. MOVEMENT HIERARCHY

The movement hierarchy for the Structure Plan is presented in Figure 57 and incorporates Primary Distributors, District Distributor Integrators, Neighbourhood Connectors and Access Streets. Traffic is distributed more evenly through a hierarchy of streets, reducing pressure at major intersections. URS Australia have assessed the structure plan and have determined that the existing network can cater for the proposed traffic that will be generated by the density of development. While the capacity of the road network is considered to be adequate for the future development, the road reserves have also been reviewed and are wide enough to cater for future expansion (if required).



Figure 57. Structure Plan Movement Hierarchy (Includes 50 year+ Indicative Long Term Vision for Carnarvon Airport Precinct)

Robinson Street - District Distributor Integrator

As previously stated, traffic volumes on Robinson Street are predicted to be around 8,300 vehicles per day. This places Robinson Street in the class of District Distributor Integrator as per *Liveable Neighbourhoods*.

District Distributor Integrators form a finer grain of routes than Primary Distributors, with frequent connections to local streets. They carry a low percentage of trucks and are usually part of bus routes. On-street bike lanes and separate dual-use paths are usually required. Integrators through centres typically will have at least one clear travel lane in each direction, and a parking and/or manoeuvring lane. Volumes above 15,000 vehicles per day need detailed design to manage traffic at intersections, facilitate bus movement and deal with parking and access.

To better reflect the distinct areas along Robinson Street the following sections have been developed.



Figure 58. Sections along Robinson Street that reflect nearby character

Residential Area

Objectives

- Retention of wide road reserves – to retain the character of East Carnarvon, ideally to a 20m wide road reserve;
- To improve residential address;
- Create a safe attractive pedestrian environment;
- Reduce crossovers from roads for smooth traffic flow; and
- Reduce the residential verge area to encourage residents to landscape and improve them.

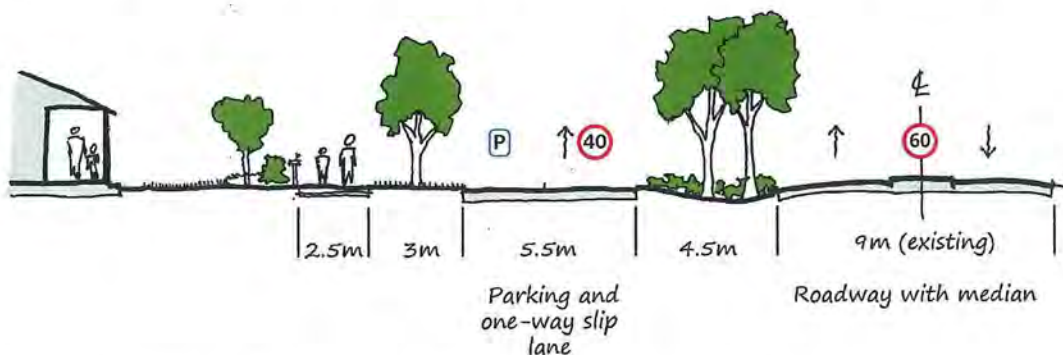


Figure 59. Possible Robinson Street Residential Sketch Strategy (showing half reserve).

Horticultural and Native Bush Area

Objectives

- To introduce amenity to large verges with tree and revegetation planting;
- To create a comfortable and safe dual use park;
- Locate utilities for least visible impact to road users;
- Provide a dual use path in safe and visible alignment; and
- Use landscape to provide shade to path and as a windbreak.

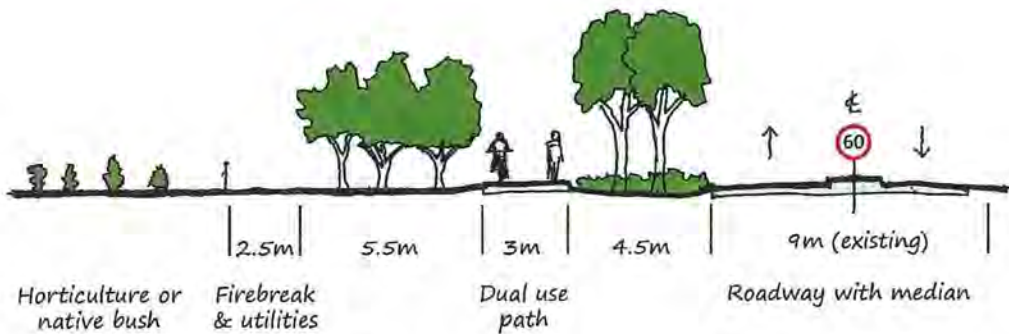


Figure 60. Possible Robinson Street Horticultural and Native Bush Sketch Strategy (showing half reserve).

Other considerations for future structure planning and road design:

- Share crossovers to lots, where possible, to reduce turning locations on the street;
- Provide lighting for dual use paths; and
- Consider recreation trail and cycle commuting users, include destinations such as school and Festival Grounds.

Commercial/Service/Retail Area

Objectives

- To separate shopping and stopping traffic from general through traffic;
- Create footpath access to tenancies; and
- To slow traffic for cycle friendly access.



Figure 61. Possible Robinson Street Commercial/Service/Retail Sketch Strategy (showing half reserve).

Other considerations for future structure planning and road design:

- One way slip road and angle parking could be an alternative;
- Provision of parking to be to Australian Standards requirements;
- Encourage/ require better front landscape treatment on premises; and
- Consider a consolidated signage strategy for improved streetscape.

Neighbourhood Connectors

It is recommended that Marmion Street be designed as a Neighbourhood Connector. Neighbourhood Connectors are suitable to operate at 50 km/h and carry less than 3000 vehicles per day.

The design illustrated below (Figure 62) is for a lower volume neighbourhood connector, and incorporates a shared path and parking. Typically, this is suitable for a residential environment with low parking turnover. Detailing of the design to visually narrow the street (e.g. including trees in parking lane, painted parking line), together with other speed control mechanisms can be used to limit typical operating speeds to less than 50 km/hr. Bus stops can be incorporated in the travel lane against the kerb. A 2-2.3m shared path can be provided on at least one verge in lieu of on-street cycle lane. Verge width (including parking) can often be reduced from 6.2m to 5.5m with indented parking, to reduce overall reserve width to 18.0m.

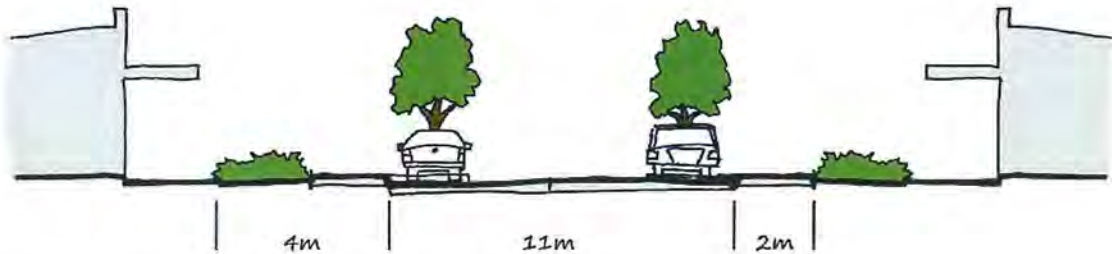


Figure 62. Possible Marmion Street Section north of town centre

Marmion Street Town Centre

Objectives

- To create a recognisable 'Activity Corridor' environment;
- To provide a slow and safe traffic area; and
- To facilitate cycle commuting to school and shops.

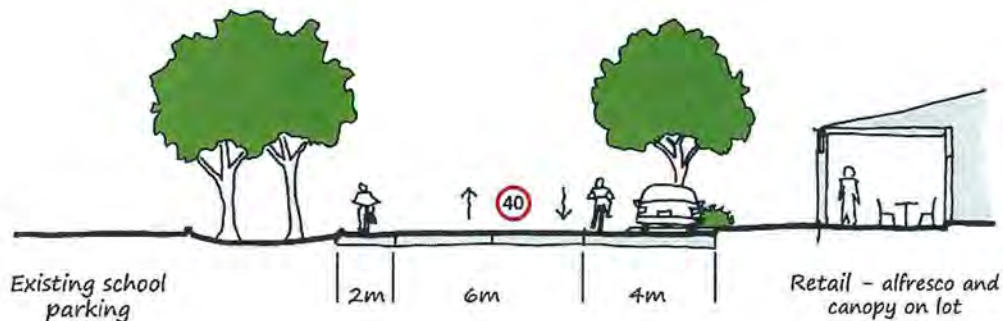


Figure 63. Possible Marmion Street Section Sketch Strategy (showing half reserve).

- Retain school car parking to half the street reserve;
- Include cycle lanes;
- Street trees in car parking alignment; and
- Require development of continuous shade and shelter inside lot for alfresco extension of footpath.

Other considerations for future structure planning and road design

- Turning lane into school car park area;
- Pedestrian crossing locations to take priority over vehicular design considerations; and
- Retail design guidelines to address the street with active and social spaces.

Higher Order Access streets

Higher Order Access streets are to accommodate shared pedestrian, bike and vehicular movements. The requirements of adjacent land uses should be supported through street design. Access Streets have varied formats to suit a range of typical conditions in predominantly residential areas at different densities, and with different traffic volumes.

Access Street B is a wider undivided street for situations with increased parking and/or traffic demand. Most existing and indicative streets as shown on the Structure Plan will be Access Street C

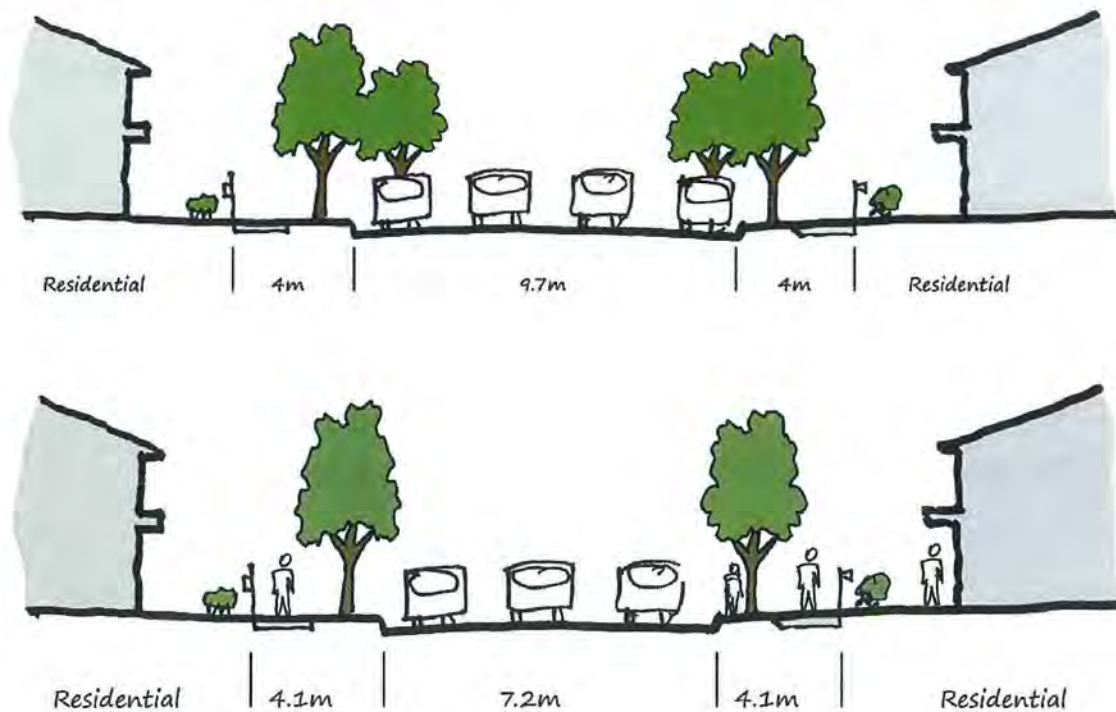


Figure 64. Access Street B and Access Street C profiles

Concept for Gascoyne Road

Objectives

- Utilise large verge area for optimum amenity and active transport;
- Retain offset carriageway (closer to residential);
- Allow for angle parking near sports pavilions;
- Design verges with hydrozoning principles for efficient resource use; and
- Integrate path with sporting area using tree-lined avenue to delineate spaces.



Figure 65. Possible design to address wide road reserve on Gascoyne Road (showing half reserve).

Other considerations:

- Possible separate bike and pedestrian paths to include jogging circuit to open space; and
- Consider school access for intersection design.

3.4.3. WALKING AND CYCLING PATHS

A walking and cycling network has been proposed which connects key nodes and minimises the number of pedestrian and vehicle conflict points. Two significant links are an east-west link from Wise Park to the Carnarvon Town Centre and a north-south link along Marmion Street to assist in creating a main street environment.

The concept plans for these shared paths are shown in orange in Figure 66.

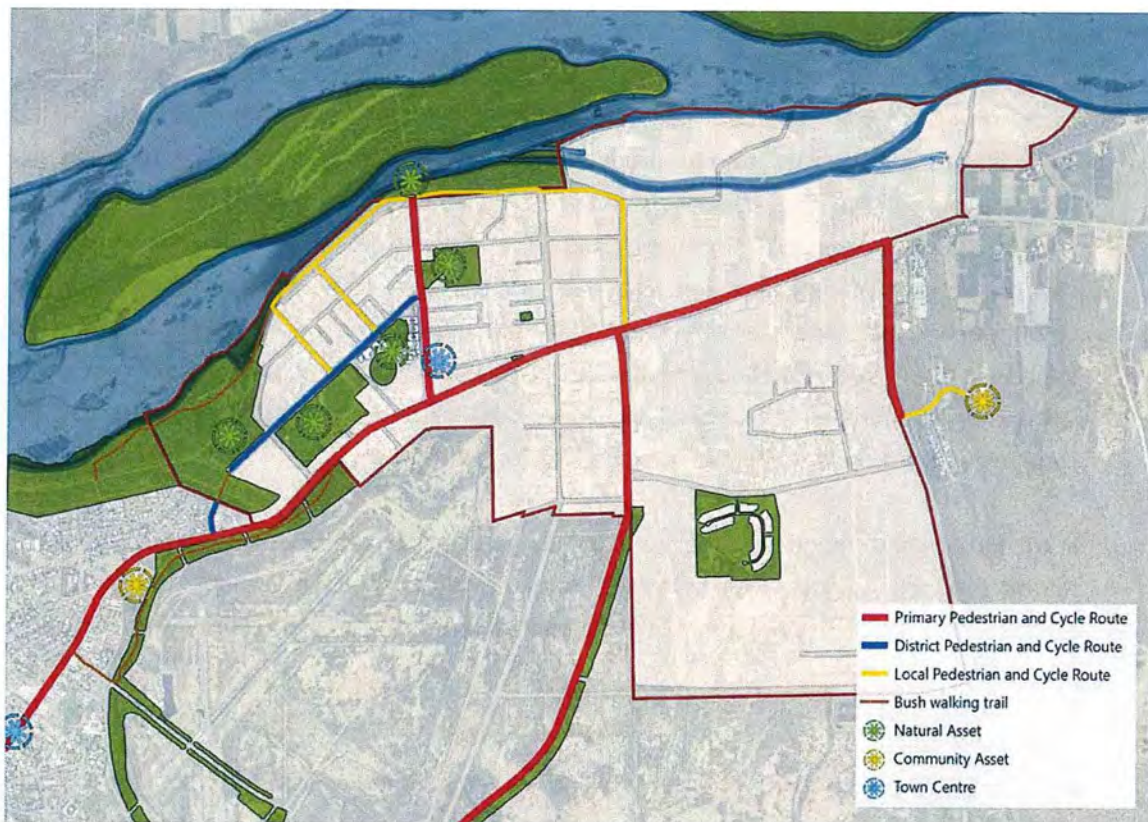


Figure 66. Pedestrian and Cycle Network

3.5. EDUCATION FACILITIES

Current WAPC and Department of Education (DoE) guidelines require the provision of one primary school for every 1500 lots. In the case of the project area however, the DoE has indicated that there is existing capacity at the proposed Carnarvon Community College which is the amalgamation of two primary schools and the high school. The project involves planning to develop the site into a new K-12 School, divided into three stages. Stages one and two comprise new pre-primary, primary, and general school facilities while stage three comprises new high school learning areas and a full size oval as well as the refurbishment of existing buildings. A new trade training centre specialising in metal fabrication and building construction is also planned in stage one. As discussed in Section 3.3.2, it would be beneficial to establish an education and community hub around the school using co-location principles.

In the future, should another school be required, there is sufficient capacity within the Carnarvon Airport Precinct designated for community use to include a primary school. In addition, the completion of the Carnarvon Community College will leave the Carnarvon Primary School vacant.

3.6. EMPLOYMENT

Encouraging the development of new jobs and employment industries which meet the needs of the local community is a key component of the Structure Plan. The Shire is proposing to conduct an economic needs assessment for Carnarvon. This will determine demand for particular land uses and may result in changes to land uses in the structure plan to reflect this. However, an estimated 500 jobs will be generated through the town centre proposal.

3.7. INFRASTRUCTURE COORDINATION AND SERVICING

The following information within this section has been provided by URS Australia.

3.7.1. WATER AND WASTEWATER

The Water Corporation is the water and wastewater management authority for Carnarvon.

Scheme water is accessible through existing water mains for the Structure Plan area and current licensed allocation is adequate to cater for the current system demands. Within the Structure Plan area there is some existing capacity but water mains will need to be upgraded as development progresses. It is understood that the Water Corporation have allocated funds to upgrade services due to the current low level of growth in the area.

In terms of funding, the principle followed by the Water Corporation for the delivery and funding of new infrastructure required to service proposed subdivision or development is one of "user pays". The infrastructure required and associated costs may include:

- Water and sewerage reticulation;
- New headworks assets;
- Upgrading of existing water or wastewater assets that are deemed to be triggered by new development.
- Projects to protect existing water or wastewater assets affected by new development.
- Land to locate new assets on being ceded free of cost.
- Headworks contribution for water and wastewater.

Sewage is treated at the Carnarvon Sewage Treatment Plant, located on Babbage Island Road. As discussed, except for several properties along Robinson Street, there is no reticulated sewerage system for the site. The nearest access point to the existing reticulated sewerage system is No.2 Pump Station located on Robinson Street, west site. Mungullah Village in Boor Street has a private pump station and rising main to deliver wastewater to the No.2 Pump Station. Waste water pump stations shall be required to be delivered and funded by developers/proponents.

Based on Water Corporation conceptual long term planning, gravity sewer has been planned for the Structure Plan area and the relocation of the wastewater treatment plant to a site close to Oyster Creek Road. The long term planning will be periodically reviewed and may change depending on the timing of development proposals. The current planning arrangement indicates a reticulated sewer system to a new pump station and then a pressure main to the new water treatment plant. It is understood that the Water Corporation have allocated funds to upgrade services due to the current low level of growth in the area. Funding for the provision of reticulated sewerage is not scheduled by the Water Corporation at this time.

In particular, the Water Corporation have undertaken a review of the existing wastewater reuse scheme in Carnarvon, which has generally shown that it has potential to take more treated wastewater for reuse subject to:

- Reuse treatment upgrades including installation of new filtration and chlorine disinfection unit, in order to meet DoH and DoW requirements; and
- Increased population growth in the town providing additional inflow into the existing wastewater treatment plant (WWTP).

A review of the WWTP is due to commence in the near future and will consider, where possible the preference to maximise reuse in Carnarvon and potentially defer large capital cost solutions such as building an additional storage dam at the new WWTP site.

The planning review of the WWTP shall consider if the flows from East Carnarvon and Kingsford area can be accepted at the existing WWTP and disposed of via the reuse irrigation scheme, or expansion of. If the flows are able to be accepted, then the location for the discharge/connection point of pressure main may then be reviewed.

3.7.2. POWER SUPPLY

The power generation and power reticulation authority in the Carnarvon area is Horizon Power. There is an existing power station at the corner of Robinson Street and Iles Road and current power generation comprises a dual fuel diesel/gas powerhouse.

Horizon Power has stated they intend to decommission and remove the existing power station six months after Mungullah Power Station is commissioned (scheduled for 2014). The new power station will have a capacity of 18 megawatts (Equivalent of 18000 kVA) from five diesel and five gas fired generators. The gas fired generators are the prime units providing power to Carnarvon and the diesel generators will assist the gas units during peak periods. Two high voltage electricity feeder cables have been installed underground connecting the Mungullah Power Station to the Carnarvon electricity distribution switch room.

The study area will have access to Horizon Power 22kV Network Assets. The design After Diversity Maximum Demand (ADMD) for residential lots in Carnarvon is 6 kVA and commercial/industrial is 200kVA per hectare respectively. Based on the estimated lot yield of 1400 from section 3.3, a minimum load requirement of approximately 8400 kVA is required (an additional 5900 kVA). Meanwhile, for commercial and industrial development a load requirement of around 21,500kVA is required to cater for an estimated 107ha in commercial, retail and industrial development. It is important to note that these figures include current estimated demand. Only an estimated 6600

kVA is estimated for the proposed commercial and town centre land uses. For residential lots alone, it will utilise approximately 47 percent capacity of the new 18 megawatts power station. For development of the commercial and industrial areas, in addition to the development of the Carnarvon Airport Precinct Structure Plan, will require further upgrade to the new power station. Recent energy studies indicate that current power supply capacity in Carnarvon will be an issue and further upgrades are required to service the development. However, details of development plans arising from the Structure Plan should be submitted to Horizon Power to determine the load requirements versus current power supply load. Considering their recent investment, Horizon Power currently do not have plans to upgrade or replace the newly constructed power station.

There is currently no formal plan to replace overhead power lines with an underground reticulated network in the Carnarvon region but Horizon Power are retrofitting services where it is possible with available funds. According to Horizon policy, all new subdivisions should be underground developments to ensure security and reliability of power supplies.

3.7.3. TELECOMMUNICATIONS

Telstra is the main telecommunications service provider for residential communication in the town of Carnarvon.

Indicative National Broadband Network (NBN) fibre rollout plan of NBN Co indicates that Carnarvon will receive some fibre or wireless coverage. The list is based on initial planning done by NBN Co which may be subject to change following more detailed planning and design work. The indicated roll out areas consists of Carnarvon, East Carnarvon, South Carnarvon, Kingsford and Morgantown.

Details of development plans arising from the Structure Plan should be communicated to the relevant telecommunications service provider so that staging of development of the site area can be integrated with their planning and development.

3.7.4. GAS

The Dampier to Bunbury Natural Gas Pipeline (DBNGP) corridor passes through the western part of the study area, and delivers gas to the existing Carnarvon Power Station.

At this stage, the existing gas pipeline corridor will remain even when the old power station is decommissioned (see Section 2.1.4). The buffer zone for the existing corridor is 300 m wide and the proponent of any works planned within this corridor would need to submit an application to the Department of Lands. The Department of Lands' *Land Use Guidelines for the DBNGP Corridor 2013* should be consulted for any planning of works within this corridor until further changes has been made to DBNGP corridor.

There is no reticulated gas network in Carnarvon and no plans to extend the existing DBNGP to cover domestic supply. All gas appliances within the town are supplied by bottled gas.

3.7.5. EARTHWORK REQUIREMENTS

For this section, also refer to Section 2.3 Landform and Soils.

For the development in the East Carnarvon and Kingsford region, further detailed geotechnical investigation would be required to determine the site classification in accordance with *Australian Standard AS 2870-2011 Residential slabs and footings*, and to ascertain the suitability of this site and the drainage management required for residential or mixed use development. All earthworks should be carried out in accordance with current *Australian Standard AS3798 Guidelines on earthworks for commercial and residential developments*. Detailed environmental and site contamination investigations are also required during the planning stage of the development arising from the Structure Plan. For development close or within the acid sulfate soil area, there will be a need for assessment in accordance with the Western Australia Planning Commission (2008) *Acid Sulfate Soils Planning Guidelines* and the Department of Environment and Conservation *Identification of Acid Sulfate Soils and Acidic Landscapes* and the *Acid Sulfate Soils Guidelines Series*. Allowance should be made for the preparation of a dust and soil erosion management plan during the planning phase of any development arising from this Structure Plan.

In East Carnarvon a number of existing lots have already been developed and on visual inspection there are no significant differences between the earthworks on the developed and that required on the undeveloped lots. Therefore, it is not anticipated that the development of these lots will require major earthworks, but this will need to be confirmed by geotechnical investigation.

3.7.6. LEVEE REQUIREMENTS

East Carnarvon is completely enclosed by a levee system that runs from Robinson Street north around East Carnarvon, and then along Boundary Road, finishing just north of the intersection between Boundary Road and Boor Street. Kingsford and Lewers Island have no direct protection from inundation during flood events.

A number of levees are being constructed to direct flood water away from the horticultural land north and south of the river. These works will provide an indirect benefit to Kingsford and Lewers Island by directing floodwater into the Nickol Bay flats (an area to the east of Brown's Range) and away from the main flow passing north of Brown's Range. The levees planned are all designed to have a 0.5m freeboard in coping with a 1 in a 100 flood event.

The Structure Plan complies with the recommendations of the *Ningaloo Coast Regional Strategy* (2004) that no dwelling areas be located adjacent to any levee. This is to reduce the risk of property damage in the unlikely case of levee failure or overtopping. The Strategy also recommends appropriate residential infill in existing residential areas within flood levee banks. The proposed land use framework aims to infill existing residential areas. Future upgrades or maintenance of existing levee works will need to take consideration of rising sea levels and refer to *SPP 2.6 State Coastal Planning Policy*.

3.7.7. DRAINAGE NETWORK INFRASTRUCTURE REQUIREMENT

The storm water drainage from the development area will need to be designed and construction in accordance with Department of Water, Department of Transport and Shire of Carnarvon in line with their Local Planning Strategy once completed. However, it is anticipated that stormwater runoff will be controlled via typical methods utilised in Carnarvon. All lots will need to be graded so runoff can be retained on site and then disposed of through a suitable drainage network.

Roads will require earth working to ensure stormwater runoff is adequately controlled and conveyed to the open drain. Culverts will need to be installed under all roads entering the development. These will be sized to accommodate the design flows from the catchment area. Stone pitched outlets and kerb openings will be constructed at all locations where stormwater is to enter the drain from the development site.

4. IMPLEMENTATION

4.1. IMPLEMENTATION PROCESS

The following details the implementation process that may be followed to meet the Structure Plan's objectives.

4.1.1. UTILISATION OF A DEVELOPMENT CONTRIBUTION PLAN

A Development Contribution Plan (DCP), in accordance with State Planning Policy 3.6, should be seen as a vehicle through which district wide and/or precinct wide infrastructure costs may be recouped equitably as land is developed. This Structure Plan does not include a DCP, however, the Shire is currently evaluating the applicability of using such a tool.

District Infrastructure

Likely infrastructure needs, derived predominantly from the Structure Plan, may be separated into the following categories:

1. Bicycle and pedestrian systems such as Dual Use Paths;
2. District drainage/ multiple use corridors;
3. Service infrastructure including, as appropriate, road, water, sewer, drainage and power undergrounding and/or reticulation;
4. Planning, infrastructure and water management studies including preparation of this district structure plan; and,
5. Open space and community facility improvements.

The infrastructure items listed above are intended to be representative only, however are based on Section 3.7.

DCP Statutory Base

The DCP is required to be incorporated as a Schedule into the Shire of Carnarvon's Town Planning Scheme (TPS). Before this can happen, however, the TPS needs to be amended to insert text provisions to enable the incorporation of DCPs. Amending the Scheme to allow for the incorporation of contribution plans and inclusion of the East Carnarvon and Kingsford Development Contribution Plan (ECKDCP) as a schedule to the Scheme may be progressed concurrently. The ECKDCP will become a schedule to the Scheme and will include the area of application and any precincts, scope of works, contribution methodology and period of operation.

Scope of Works – Traditional Infrastructure

The following types of work are generally eligible for inclusion in the DCP:

- Land for road widening
- Land for Public Open Space
- Land for District Open Space
- Land for other public works
- Road construction (extra and over subdivisional road)
- Sewer pump station and distribution works
- Ground level works on all categories of open space
- DCP preparation costs including structure planning, water management strategies and associated studies
- DCP operation cost estimate

Area of DCP Application

The area of operation of the DCP may be included in the DCP as plan Development Control Area 1 (DCA1) in TPS No.10. It is likely DCA1 will encompass all residential, mixed use, tourist, commercial and industrial land within the Structure Plan.

Given the variety of land uses contained in DCA1, it will be appropriate to identify precincts based on infrastructure need and, where appropriate, land use. This approach allows for precinct based DCPs to be incorporated into a broad based parent DCP. Common infrastructure and administration costs may then be apportioned between precincts without affecting precinct specific cost recoupment.

Implementation Timing

Given the need for TPS amendments to enable the Structure Plan DCP, it will be important for the amendment process to be considered a priority. Once the DCP amendments to the TPS are advertised, there is a case to class the DCP as being seriously contemplated and thus supporting the imposition of conditions on subdivision and/or development approvals. This ensures development may proceed prior to the DCP becoming operational. Alternatively, the DCP may be implemented through inclusion in the new Local Planning Scheme No. 13 when being drafted.

To provide infrastructure certainty in terms of cost and responsibility, a DCP Report is required before the ECK DCP can become operational. The DCP Report will identify eligible works at the district and precinct levels, collection and cost review methodology and apportion of DCP contribution costs. The DCP Report will also prioritise works.

4.2. STAGING OF DEVELOPMENT

4.2.1. SHORT TERM

The Structure Plan provides the opportunity to communicate and clearly articulate the future vision for the area to the community. Short term improvements have the ability to create excitement and engagement early on in the process, without requiring significant capital expenditure.

Key initiatives

Action	Responsible Authority	Timeframe
Finalise review and implementation of new Planning Scheme and Strategy.	Shire	1 - 2 years
Improvement of the entry into town through an entry statement at the North West Coastal Highway turn off.	Shire in consultation with MRWA	0 - 1 year
Investigate and prepare Developer Contribution Plan including detailed scope for infrastructure works, predominantly sewer.	Shire in consultation with infrastructure providers	0 - 2 years
Investigate and prepare built form guidelines for Robinson and Marmion Streets that reflects the Carnarvon vernacular.	Shire	0 - 1 year
Streetscape beautification along Robinson and Marmion Streets through the introduction of street trees, widening of footpaths and more street furniture.	Shire in consultation with MRWA	0 - 2 years
Landscape improvements around Chinaman's Pool.	Shire in consultation with DPAW	0 - 2 years
Liaise with property owners to encourage development along Marmion and Robinson Streets in accordance with the Structure Plan.	Shire	On-going
Undertake feasibility study and consultation to investigate relocation of Council and Main Roads Depots.	Shire and MRWA	0 - 2 years
Creation of walking trail along the Gascoyne.	Shire	0 - 1 year
Encourage low scale tourism development around Chinaman's Pool.	Shire	On-going

4.2.2. MEDIUM TERM

The formal method of implementation will be through the Local Planning Scheme. This will require the preparation of a Scheme Amendment, or inclusion into the draft LPS 13 to embed the Structure Plan's strategic planning direction and DCP provisions. The Shire of Carnarvon will be responsible for compiling the provisions, undertaking a scheme amendment and administering the DCP.

The staging of development within the Structure Plan area will be guided by access to sewer and the relocation of the WWTP south of HMAS Sydney Memorial Drive to allow for greater capacity and long term security. Based on the Water Corporation's *Carnarvon – Conceptual Planning Long Term Scheme (2010)* gravity sewer will connect to a pumping station located near the school. It is anticipated that the wastewater will be pumped through the proposed pressure main to the new wastewater treatment plant. It should be noted that there is no budget currently assigned to undertake this work as yet. An indicative layout plan has been developed to provide guidance to the detailed design that needs to take place.

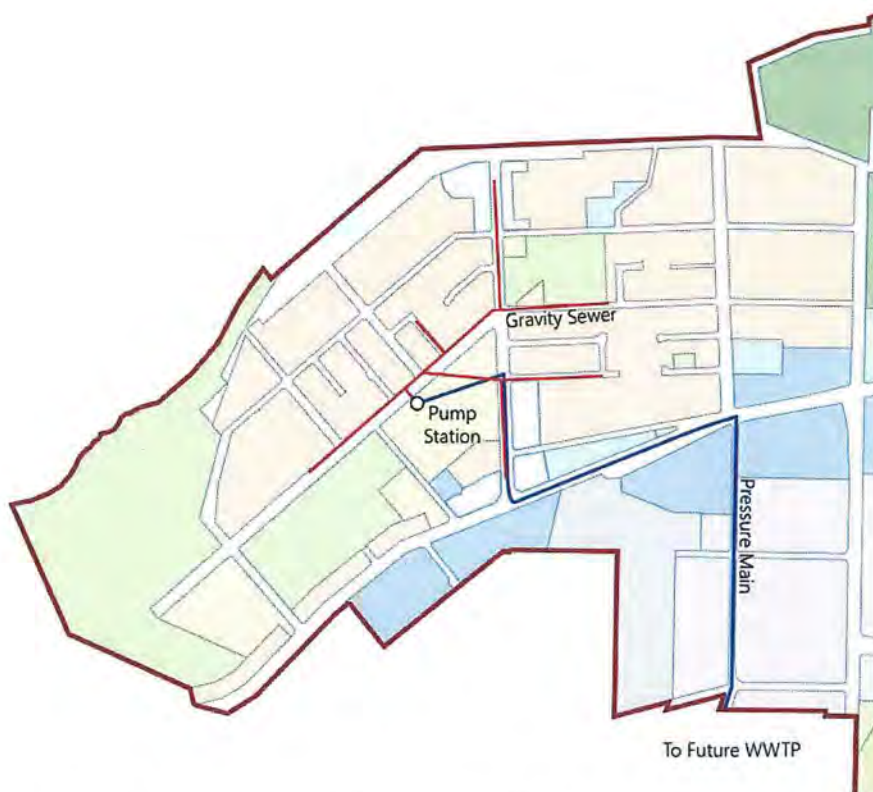


Figure 67. Indicative sewer alignments to facilitate Stage 1 (subject to detailed design)

Key initiatives

Action	Responsible Authority	Timeframe
Seek the support of the Water Corporation to relocate the WWTP to secure a long term option and work with the Water Corporation to provide sewer to East Carnarvon.	Shire and DoW	5 years
Landscaping improvement of Wise Park and creation of residential lots fronting park (upon connection to sewer).	Shire	3 - 5 years
Encourage a denser form of tourism development around Chinaman's Pool upon completion of sewer works.	Shire	5 - 7 years
Facilitate increased residential development upon completion of sewer works.	Shire	5 - 10 years
Fostering links with the transport logistics sector to leverage off the Carnarvon Airport Precinct Structure Plan and strategic regional location.	Shire, MRWA, DoT	On-going
Prepare a District Water Management Strategy.	Shire and DoW	3 - 5 years

The rate of development will be dependent upon market demand for lots. However, it is envisaged that the first stage of the Structure Plan will be fully developed over a 5 to 10 year period.

The focus of stage one is illustrated in the figure below.



Figure 68. Stage 1 Focus Area (10 Year Vision)

4.2.3. STAGED SUBDIVISION

As discussed, the Structure Plan area contains significant levels of land fragmentation. In order to ensure that subdivision occurs in a coordinated manner and does not restrict surrounding lots from further subdivision potential; subdivision plans will need to demonstrate how they comply with the Structure Plan. This may require the use of temporary cul-de-sacs or forward works being undertaken by the Shire/applicant, with the costs distributed among the benefiting landowners.

Whilst there is a general presumption against battle-axe lots, in order to achieve the objectives of the Structure Plan, and based on existing on-ground improvements, some battle-axe lots are considered appropriate. Where this is the case, it is preferable that the access leg be jointly used by adjoining neighbours where possible to reduce the number of vehicle crossovers and improve the streetscape.

The area is considered to have an abundant amount of public open space and where subdivision requires a 10% contribution, cash-in-lieu will be accepted by the Shire.

4.2.4. MONITORING AND REVIEW

The timeframe of the Structure Plan extends to between 15 and 20 years and will be regularly monitored and reviewed to reflect relevant policies. The Shire considers it important that the Structure Plan remains relevant. Accordingly, it will be regularly monitored and reviewed to reflect National, State, regional and local objectives.

The Structure Plan should be reviewed at least every five years in keeping with reviews of the local planning scheme. The review will take into account changes in development trends, community aspirations and any modifications to the State Planning Framework. Additionally, the Structure Plan may be reviewed and revised as required. Any proposed changes will be subject to community and stakeholder consultation.

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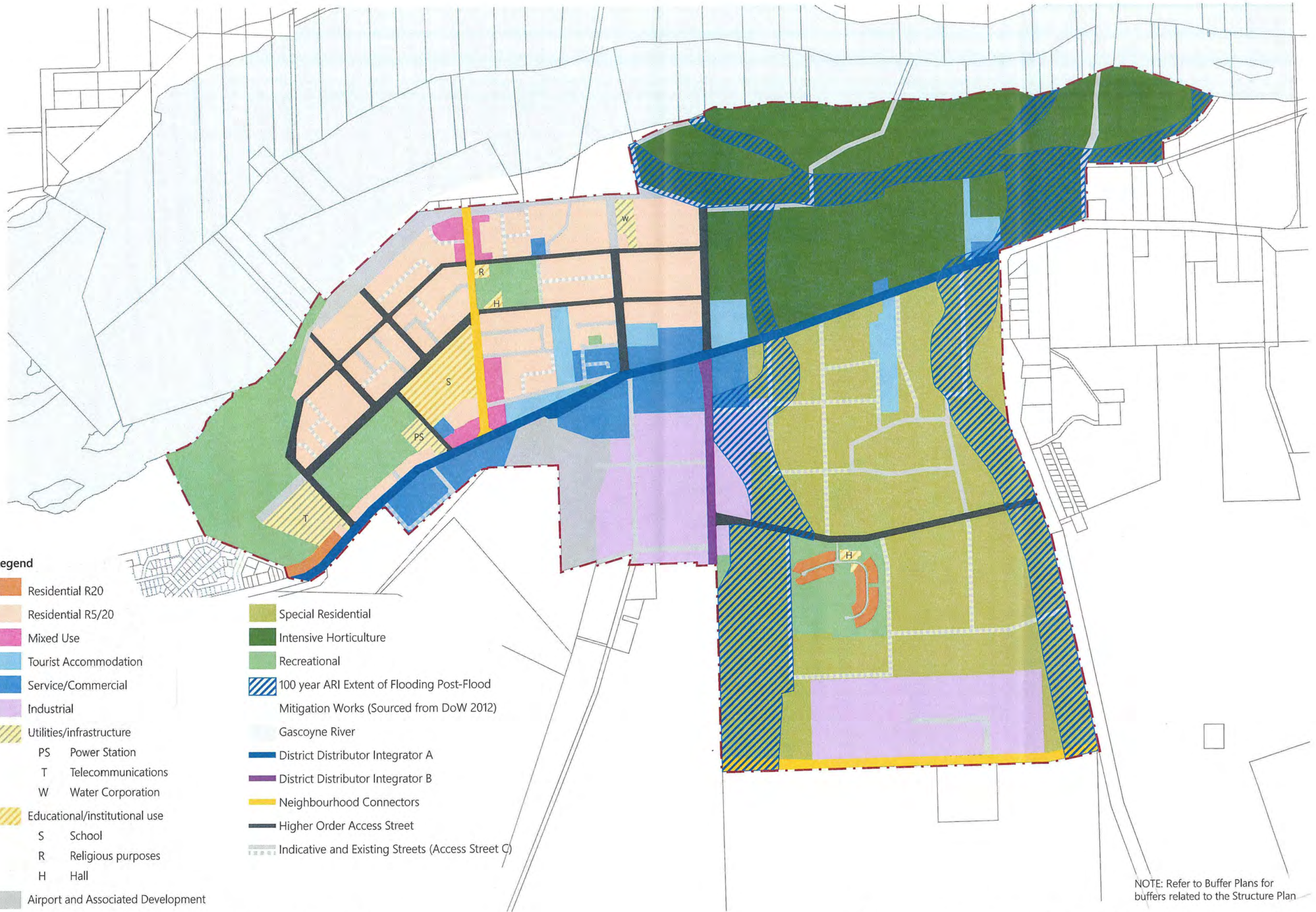
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Appendix 1

- Plan 1 – East Carnarvon and Kingsford Structure Plan
- Plan 2 – Navigational Aid Equipment Height Limits
- Plan 3 – Dampier to Bunbury Natural Gas Pipeline Corridor and Buffer
- Plan 4A – Existing Obstacle Limitation Surfaces Buffer Plan
- Plan 4B – Proposed Obstacle Limitation Surfaces Buffer Plan



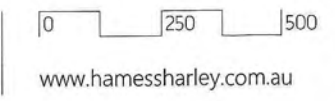
Legend

- Residential R20
- Residential R5/20
- Mixed Use
- Tourist Accommodation
- Service/Commercial
- Industrial
- Utilities/infrastructure
- Special Residential
- Intensive Horticulture
- Recreational
- 100 year ARI Extent of Flooding Post-Flood Mitigation Works (Sourced from DoW 2012)
- Gascoyne River
- District Distributor Integrator A
- District Distributor Integrator B
- Neighbourhood Connectors
- Higher Order Access Street
- Indicative and Existing Streets (Access Street C)
- PS Power Station
- T Telecommunications
- W Water Corporation
- Educational/institutional use
- S School
- R Religious purposes
- H Hall
- Airport and Associated Development

NOTE: Refer to Buffer Plans for buffers related to the Structure Plan

Plan 1 - East Carnarvon and Kingsford Structure Plan

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Plan 2 - East Carnarvon and Kingsford Structure Plan - Navigational Aid Equipment Height Limits

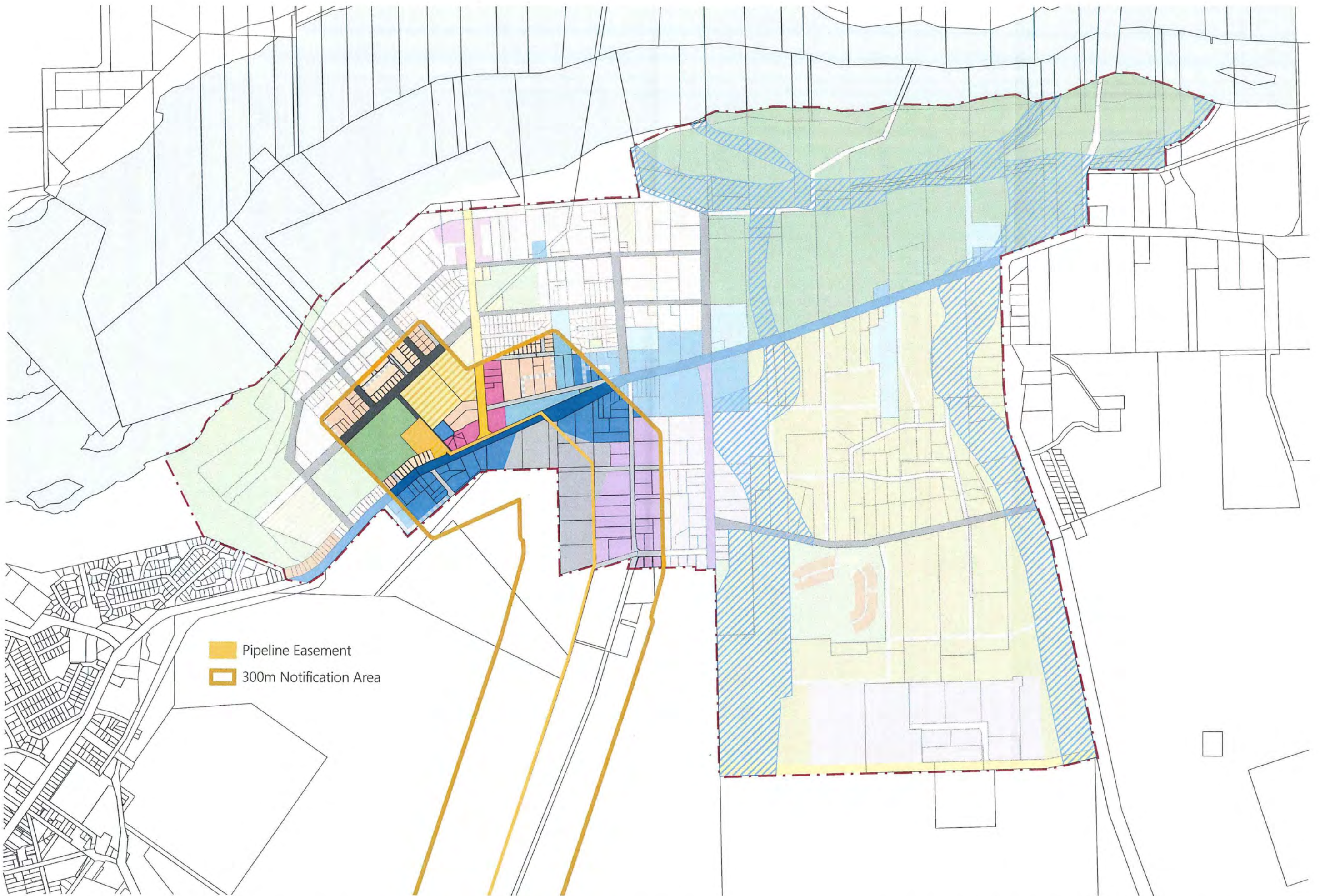
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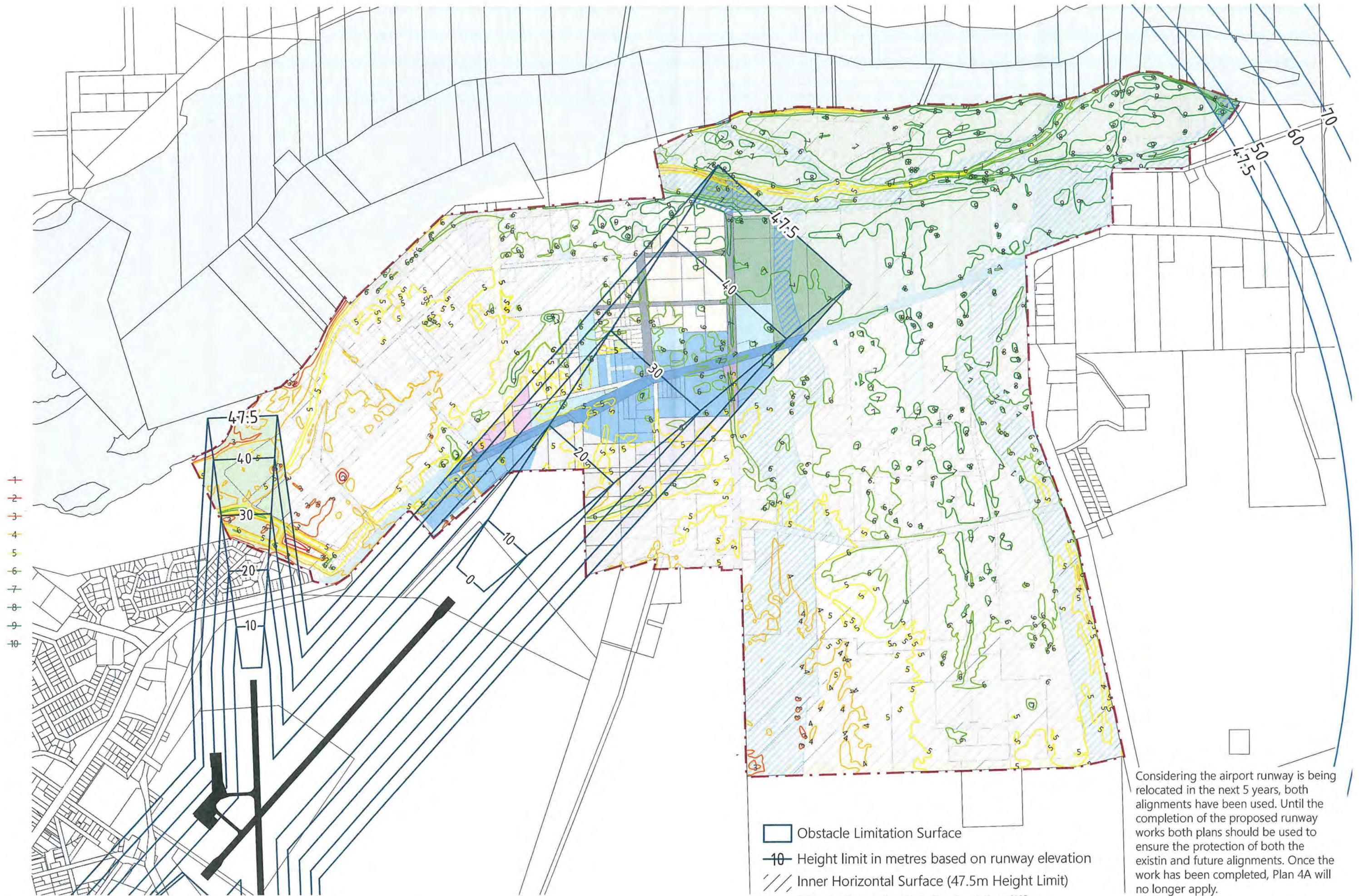


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




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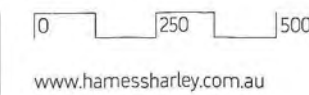
Plan 4A - East Carnarvon and Kingsford Structure Plan - Existing Obstacle Limitation Surfaces Buffer Plan

PATH : 42903 East Carnarvon and Kingsford Structure Plan\03 Production\01 Design\Raw graphics master files

-  Obstacle Limitation Surface
-  10 Height limit in metres based on runway elevation
-  20
-  30
-  40
-  Inner Horizontal Surface (47.5m Height Limit)

OLS based on Carnarvon Airport Master Plan - Connell Wagner 2005

Considering the airport runway is being relocated in the next 5 years, both alignments have been used. Until the completion of the proposed runway works both plans should be used to ensure the protection of both the existin and future alignments. Once the work has been completed, Plan 4A will no longer apply.



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Date: 30/10/2015

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Considering the airport runway is being relocated in the next 5 years, both alignments have been used. Until the completion of the proposed runway works both plans should be used to ensure the protection of both the existin and future alignments. Once the work has been completed, Plan 4A will no longer apply.

Plan 4B - East Carnarvon and Kingsford Structure Plan - Proposed Obstacle Limitation Surfaces Buffer Plan

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