Department of Planning, Lands and Heritage

Western Australian Planning Commission

We're working for Western Australia.

Shire of Dardanup

Wanju District Structure Plan

March 2020

Wanju
District Structure Plan

Disclaimer
This document has been published by the Department of Planning, Lands and Heritage on behalf of the Western Australian Planning Commission. Any representation, statement, opinion or advice expressed or implied in this publication is made in good faith and on the basis that the government, its employees and agents are not liable for any damage or loss whatsoever which may occur as a result of action taken or not taken, as the case may be, in respect of any representation, statement, opinion or advice referred to herein. Professional advice should be obtained before applying the information contained in this document to particular circumstances.

Published by the

Western Australian Planning Commission
Gordon Stephenson House
140 William Street
Perth WA 6000

Locked Bag 2506
Perth WA 6001

Published March 2020

website: www.dplh.wa.gov.au
email: corporate@dplh.wa.gov.au

tel: 08 655 18002
fax: 08 655 19001
National Relay Service: 13 36 77

This document is available in alternative formats on application to Communication Services.

Chairman of the WAPC – Foreword

The *Wanju District Structure Plan* and the *Waterloo Industrial Park District Structure Plan*, together, will guide an exciting new urban development and employment node for Greater Bunbury.

The endorsed plans were drafted in partnership with the Shire of Dardanup and incorporate feedback from the community and stakeholders after a thorough consultation period.

Major future regional growth centres must reflect the highest standards of contemporary land-use planning and execution to advance regional Western Australia's social and economic strengths.

The plan for the Wanju urban expansion area is ambitious and contemporary offering a range of multi-storey housing, an emphasis on a mix of uses, and extensive opportunities to walk, cycle and use public transport. A new town centre, schools, community hubs and district playing fields will provide great opportunities for local sporting and recreational activities.

Much consideration has been given to the positive environmental aspects of this new development.

The streets will be designed to be largely orientated on a north-south and east-west grid to maximise passive solar gain and act as key aspects of the public realm, encouraging people to connect with the outdoors.

The principles of water sensitive urban design and wetlands have also been incorporated to provide opportunities for water re-use. The Collie River and Millars Creek foreshores will be retained and enhanced to act as important ecological, recreational and surface water management corridors. Aboriginal heritage associated with the Collie River and the area south of South Western Highway will be respected.

This *Wanju District Structure Plan* considers the proposed alignment of the Bunbury Outer Ring Road to the east of the urban area providing a more permeable and connected urban extension, together with 100 hectares of additional developable land.

I am pleased to endorse this plan which will result in great outcomes for the people of the South West.

David Caddy
Chairperson

Shire President – Foreword

The *Wanju District Structure Plan* has been developed in partnership with the Western Australian Planning Commission and establishes the framework for the South West's newest urban centre.

Immediately to the south of Wanju is the proposed Waterloo Industrial Park which is a step closer with the release of the Waterloo Industrial Park District Structure Plan.

Set on 1,200 hectares to the east of the Eaton townsite, Wanju will be positioned wholly within the Shire of Dardanup. Planning for Wanju marks a turning point in the development of, not only our Shire, but also in the awareness of Greater Bunbury as Western Australia's second city. When fully developed, the urban expansion area of Wanju will be home to an expected population of up to 45,000 residents in up to 18,500 homes, accommodating a variety of different uses.

To develop Wanju from the ground up presents an incredible opportunity to create a vibrant and exciting environment that will be unlike anything we have in this area.

Imagine multi-use 'green' corridors providing space for surface water to move through the development and high quality public amenity and recreational space, including foreshores of the Collie River and Millar's Creek and district playing fields.

Of particular importance in planning for Wanju, is the development of close linkages to employment areas.The fulfilment of plans for the nearby Waterloo Industrial Park will be a major contributor to the achievement of this outcome.

The community has been involved in this project right from the beginning – even helping us choose the name 'Wanju' which means welcome in the local Noongar language. I look forward to welcoming you to Wanju.

Mick Bennett
Shire President

Executive Summary

The proposed new community of Wanju will be the focus for greenfield development in Greater Bunbury over the next 40 years with around 18,500 new dwellings. It will be designed as an innovative 'step-change' in the type and form of development traditionally built in the area. At its core will be an urban, mixed-use and relatively high-density environment with a heart and strong sense of being a distinct place in its own right.

Pedestrians, cyclists and public transport will be prominent on the streets and car trips will be fewer than in most car-based suburban development. Linear open spaces will connect the Collie River and Millars Creek foreshores, district playing fields and other areas of open space.

The site conditions, with a clay sub-soil resulting in a high perched water table, provide the opportunity for innovative and sustainable building construction techniques to be employed, and the provision of sustainable energy and water management measures to provide for a resilient future.

Given the lengthy development period it will be important that interim solutions are incorporated and that the development adapts to new technology and innovation over time.

Foundations of the new community

The *Greater Bunbury Strategy 2013* was carried out by the then Department of Planning to interpret State planning policy at the local level, and was endorsed by the Western Australian Planning Commission (WAPC). The Strategy considered several different alternatives for future growth of the Greater Bunbury sub-region. In the short to medium term, it identified significant opportunity for infill and redevelopment within the existing urban footprint including the Bunbury central business district (CBD) and the hinterland towns including Dardanup, Capel, Boyanup and Brunswick Junction.

After consideration of the potential alternatives, one greenfield urban expansion area was identified in the Waterloo district, east of the existing urban area of Eaton. In July 2015, following a public naming competition, the Shire of Dardanup chose the name 'Wanju', meaning 'welcome' in the local Noongar language, for the urban expansion area.

Draft Wanju district structure plans

The initial draft *Wanju district structure plan* (DSP) was published in April 2016 for a three month public consultation period. It represented an important stage in the planning process for Wanju, setting out the key planning aspirations, objectives and principles that the then Department of Planning and the Shire of Dardanup, working in partnership, were seeking from the development and provided the opportunity for all stakeholders, including those not previously involved in the planning process, to have their say.

The revised draft DSP represents an updated version of the April 2016 draft DSP taking into account:

- the proposed alignment change of the Bunbury Outer Ring Road from running through the DSP area to one that represents the eastern boundary of the urban extension, freeing up around 100 hectares of developable land within the DSP area
- the outcomes of the Department of Water and Environmental Regulation's pre-development water modelling for Wanju and Waterloo
- further relevant background studies that have been completed since the finalisation of the draft DSP, including the Landcape Vision Plan, Integrated Water Strategy, Service Needs Investigation report, revised Staging Plan, Water Servicing Report and Development Contribution Plan Scoping Report and
- comments received on the 2016 draft *Wanju DSP*.

Submissions on the revised draft Wanju DSP (2019) have been considered in updating the DSP together with the *District Water Management Strategy*.

Structure of the district structure plan

This DSP document is divided into two broad parts:

- **Part 1 –** implementation
- **Part 2 –** explanatory section and technical appendices.

Regional position

The DSP incorporates the high-level principles outlined in the *Greater Bunbury Strategy 2013* to guide the sub-region to a sustainable future, to create a plan for the future community of Wanju that is integrated with the rest of the sub-region, creative and innovative in its design, forward- looking and sustainable.

Figure A outlines Wanju's position in its sub-regional context and highlights the existing regional and sub-regional activity centres, employment centres and movement networks within Wanju's area of influence.

Principal planning requirements of Wanju

The development of Wanju provides many challenges and opportunities that will require consideration, resolution and delivery through its planning and development phases. Outlined below is an overview of the principal planning requirements in the implementation of Wanju.

1. Complementing existing facilities and services within Greater Bunbury

Wanju will need to establish itself within the Greater Bunbury sub-regional context, recognising Bunbury Central Business District (CBD) as the regional centre for the South West Region. It will also need to acknowledge, and not adversely affect, other existing and emerging sub-regional centres in Greater Bunbury that provide important employment, service and recreational resources.

In particular, adjoining suburbs of Eaton, Millbridge and Treendale; Eaton and Treendale activity centres; Bunbury CBD; the Port of Bunbury; the South West Health Campus; Edith Cowan University and the South West Institute of Technology campus; and the proposed Waterloo Industrial Park and other industrial estates be as well connected to and from Wanju by pedestrian, cycle, public transport and road networks as possible (Figure A).

2. Public access to the Collie River and Millars Creek foreshores

The Collie River foreshore, including the river's floodplain, Millars Creek foreshore and new district playing fields will provide extensive high quality public recreation areas within Wanju. They will offer informal recreation space for residents and visitors, opportunities for walking and cycling, formal playing fields, enable the conservation and enhancements of environmental and Aboriginal heritage assets of the foreshores, and integrated water management. Good public access to the foreshores will be a critical factor for the success of the development.

3. Integrated linear open spaces / multi-use corridors

Wanju will be criss-crossed by several linear open spaces / multi-use corridors of varying widths, dependent on the outcomes of the post-development water modelling. These will function as public open spaces providing safe and attractive landscaped pedestrian and cycling linkages, habitat corridors, and include integrated water management features such as drainage swales or other water-sensitive urban design features. They will also potentially offer space for other infrastructure. Existing trees will be retained where possible.

4. Water recycling and reuse

Total water cycle management is promoted to maximise the opportunity for water recycling, reuse and harvesting. In addition, water efficiency measures for both potable and non-potable water use are essential to manage the effects of an increasing demand from a growing population in a drying climate. Fit-for-purpose irrigation water will be used, where possible, for the reticulation of gardens, public open spaces and sports fields. Opportunities for centralized and de-centralized water recycling, reuse and harvesting systems to provide climate resilient sources will be encouraged and supported. Provision has been made for landscaped wetlands for the potential storage of recycled waste water, treated stormwater and/or abstracted groundwater.

5. Energy efficiency

An important feature of Wanju will be the efficient use of energy in terms of the construction of the development, the way that individual buildings operate and are used, and minimising local residents' need to travel by private car. Technology is moving particularly quickly in this field, especially in terms of the use of solar energy, the storage of that energy by batteries and the creation of energy from waste. For Wanju to be a success as a modern, twenty-first century living and working environment, it will need to embrace the emerging new technology and look for wider opportunities and synergies for Greater Bunbury.

6. Highway links

The success of Wanju will require a high degree of connectivity within the urban extension and also to the rest of Greater Bunbury. The construction of the Bunbury outer ring road (BORR) will be a key impetus to the development by providing inter-regional north-south links for Greater Bunbury. Wanju is proposed to be connected to the strategic highway network via two intersections from the west to the existing Forrest Highway and from South Western Highway by three connections from the south. Two grade-separated links over South Western Highway and railway line are proposed to connect Wanju with Waterloo and the planned BORR intersection within the industrial park.

7. Public transport

High-quality and regular public transport services linking Wanju with key activity attractors will be a fundamental ingredient for success. Bus and high occupancy priority lanes will be promoted at key intersections. All bus stops should incorporate shelters and be easily and safely accessible by residents within a 400 metre 'ped-shed'. A future Perth-Bunbury fast railway line will be safeguarded in the road reserve of the Forrest Highway and, in the meantime, the potential for a station within Wanju on the 'Australind' line (immediately south of the South Western Highway) be safeguarded. As Wanju develops the opportunities for a rapid public transport system should be explored.

8. Street network

The street network will be permeable and legible. The streets will be orientated in a grid pattern, predominantly north-south and east-west to maximise benefits for buildings from passive solar design. Street trees and other landscaping, integrated with water sensitive urban design, will be essential along all streets to provide shade and reduce the urban heat island effect. The encouragement of walking and cycling, access and options for people with disabilities or mobility difficulties through providing attractive and safe routes, will be fundamental to the success of Wanju.

9. Employment

The provision of employment space will be critical to give residents opportunities to live and work locally and thus achieving a significant level of employment self-sufficiency in Wanju. Employment will be concentrated in the town and local centres and along main public transport routes. The close proximity of Waterloo Industrial Park will assist in providing local employment opportunities.

10. Diversity and inclusiveness

It will be important for the new community to be inclusive and offer a variety of recreation, employment and living opportunities to a wide mix of people. To achieve social diversity, a key planning objective, a mix of residential densities, dwelling sizes, types and tenure will be required, including affordable homes, both on the open market and Department of Housing, to buy and rent, and part buy / part rent.

Table A: Key statistics and planning outcomes

Item	Data
Total area covered by district structure plan	**1,210 hectares**
Estimated potential number of dwellings (to be determined in detail by local structure plans)	**18,500**
Estimated number of high schools	2 public high schools 2 private high schools
Estimated number of primary schools	10 public primary schools 2 private primary schools
Estimated town centre floorspace (to be determined in detail by activity centre plans)	35,000 m^2 retail and 30,000 m^2 commercial
Estimated local centres (to be determined in detail by activity centre plans)	4 local centres 21,000 m^2 retail floorspace 18,000 m^2 commercial floorspace
Potential number of local jobs (in DSP area)	**4000** jobs
Areas identified as:	
Commercial and local and town centres	26 hectares
Integrator roads	57 hectares
Primary roads	44 hectares
Public open space	369 hectares
Rural	2 hectares
Public purpose – public primary education	41.5 hectares
Public purpose – public secondary education	21 hectares
Public purpose – private education	29 hectares
Public purpose – infrastructure	26 hectares
Emergency Services	0.3 hectares
Residential	594 hectares

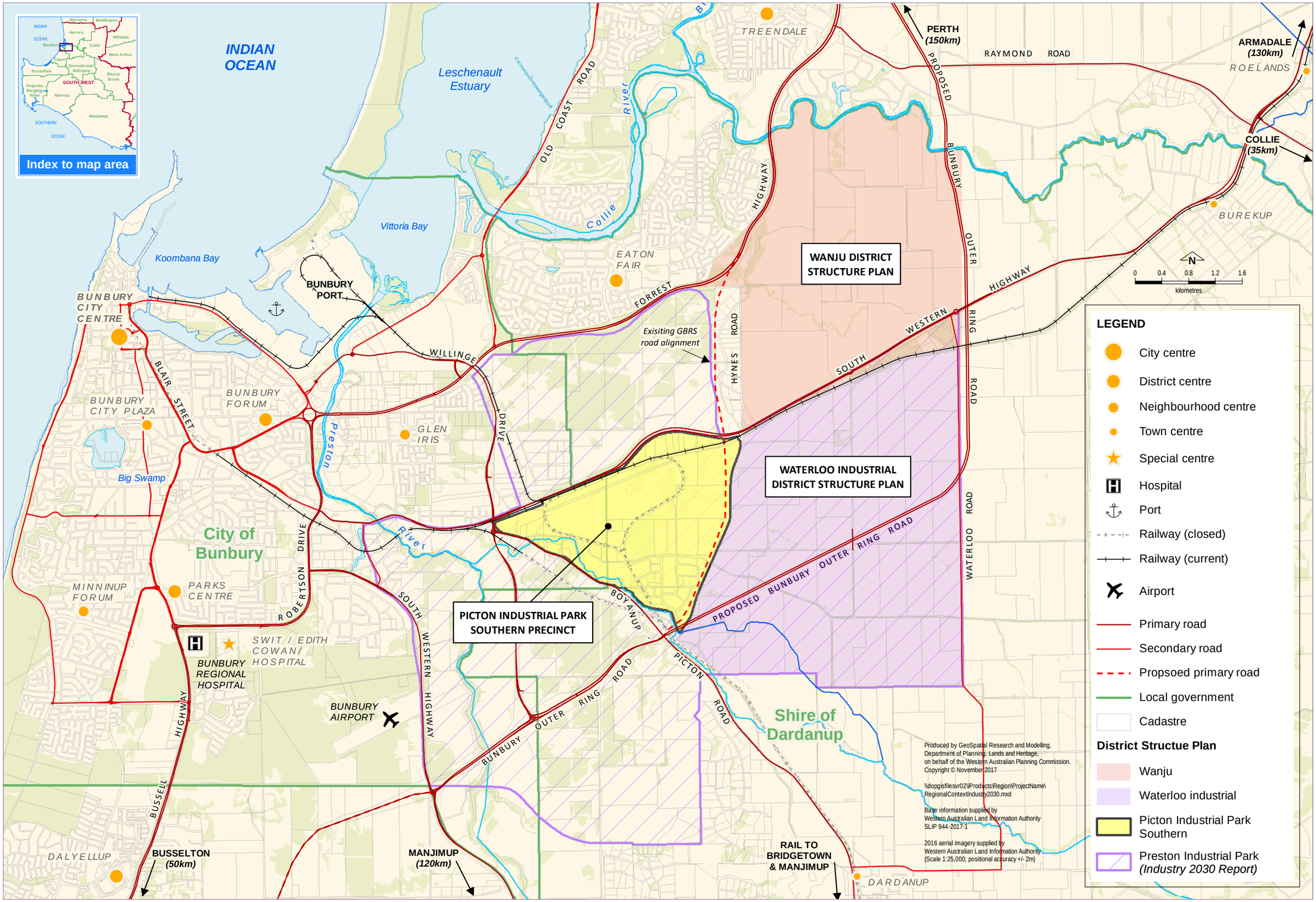


Figure A: Regional Context of Wanju

Table of Contents

List of Figures

List of Tables

Part One –
Implementation

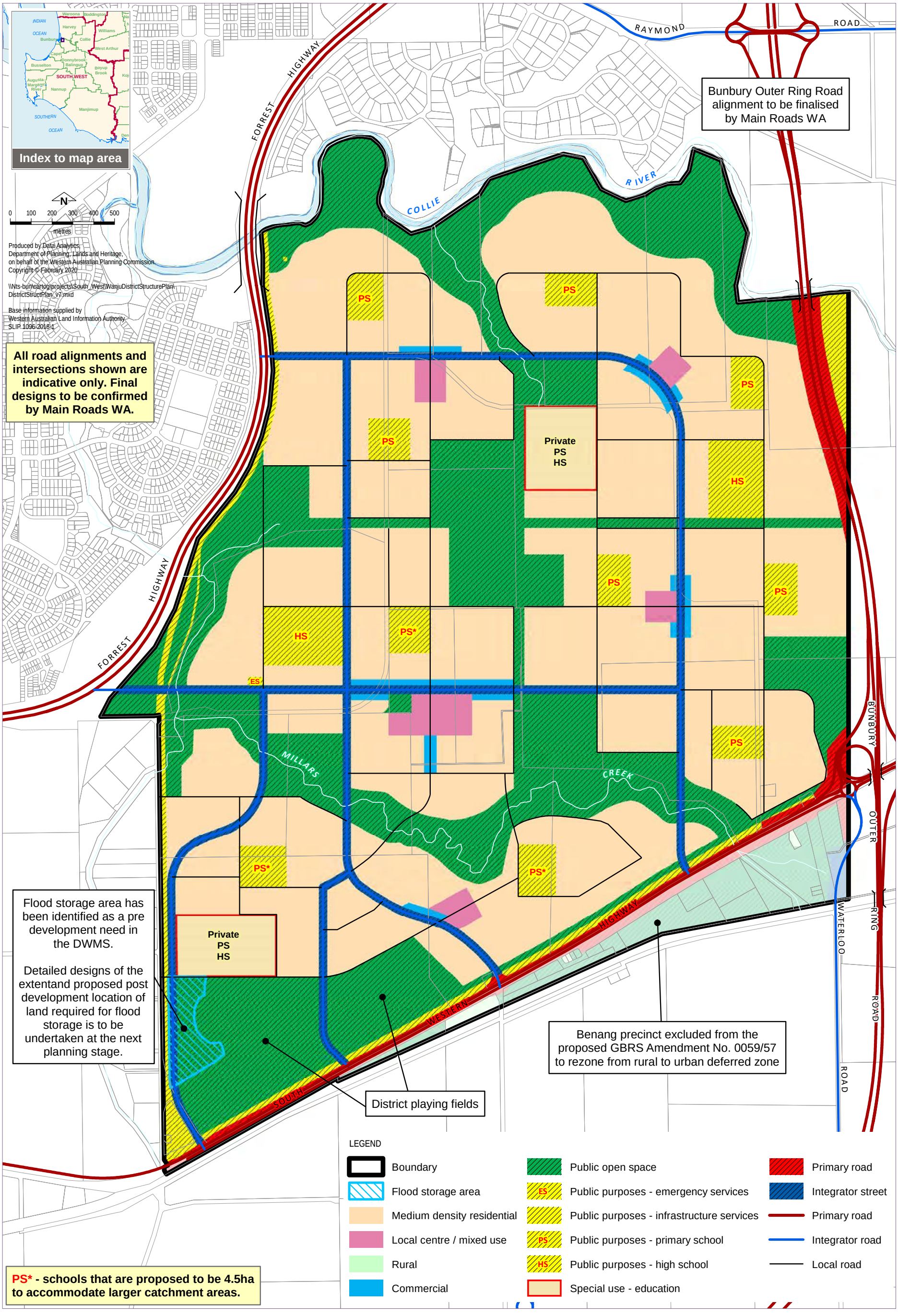


Figure 1.1: Wanju district structure plan

Wanju
District Structure Plan

Wanju concept plan

1 District structure plan area

The Wanju District Structure Plan (DSP) area is approximately 1200 hectares bounded by Collie River to the north, the existing urban areas of Millbridge and Eaton to the west, the existing Perth-Bunbury railway line to the south and a line immediately to the east of the northern extension of Waterloo Road (see Figure 1.1).

The Waterloo Industrial Park, located immediately south of the existing Perth-Bunbury railway line and the Wanju DSP area, is subject to the provisions of its own DSP (see Figure 1.2). An initial draft Waterloo Industrial Park DSP was published for consultation in May 2017 and a revised draft Waterloo Industrial Park DSP was advertised for comment in February 2019, in conjunction with the revised draft Wanju DSP.

2 Operation

The Wanju DSP came into effect following the endorsement by the Western Australian Planning Commission (WAPC).

3 Staging

A development of the size and scale proposed for Wanju will take several decades to complete. To divide the DSP area into more manageable parts this DSP identifies six distinct 'village' precincts (Figure 1.12). Development in each precinct will require the preparation of a local structure plan which, once completed, will need the endorsement of the WAPC. The town and local activity centres will require separate activity centre plans, also endorsed by the WAPC.

Development at Wanju will need to proceed in a logical and co-ordinated way. The village precincts developed initially will be required to ensure that strategic infrastructure can be provided in an integrated way across the whole of the development area and that the implications for infrastructure provision in other parts of the DSP area are resolved and implemented to the satisfaction of the WAPC before development commences.

The staging for the development has been considered by a Staging Plan, produced on behalf of the Department of Planning, Lands and Heritage (DPLH) by Planning and Infrastructure Consultants Integran. The *Staging Plan* has been informed by the outcomes from the Servicing Needs Investigation report and has helped inform the DSP.

4 Subdivision and development requirements

4.1 Proposed land-uses

Wanju will provide for a diversity of uses which will give future residents the opportunity to live, work, shop, recreate, socialise, be educated and access public transport and medical facilities within a comparatively short distance. To enable this to happen the mix of uses within Wanju is proposed to include residential, commercial, retail, education, recreation, open space, entertainment, health, tourism, hospitality and community uses. The intention is that they will complement existing activities in the rest of the sub-region, while bringing additional opportunities.

The close proximity and good accessibility to the proposed Waterloo Industrial Park, located immediately to the south of Wanju, will also help facilitate the mix of commercial, industrial and bulky-goods retail uses in the local area which, by their scale and nature, would generally be inappropriate to locate within Wanju. It will also encourage a high degree of employment self-containment within the combined Wanju and Waterloo development areas.

Table 1: Proposed land-uses and approximate areas

Proposed land use	Area (ha)[1]
Commercial and local and town centres	26
Integrator roads	57
Primary roads	44
Public open space	369
Rural	2
Public purpose – public primary schools	41.5
Public purpose – public secondary schools	21
Public purpose – infrastructure	29
Emergency services	0.3
Residential[2]	594
TOTAL	**1205**

[1] Numbers are subject to rounding.

[2] Excludes the town and local centres which will incorporate higher density residential.

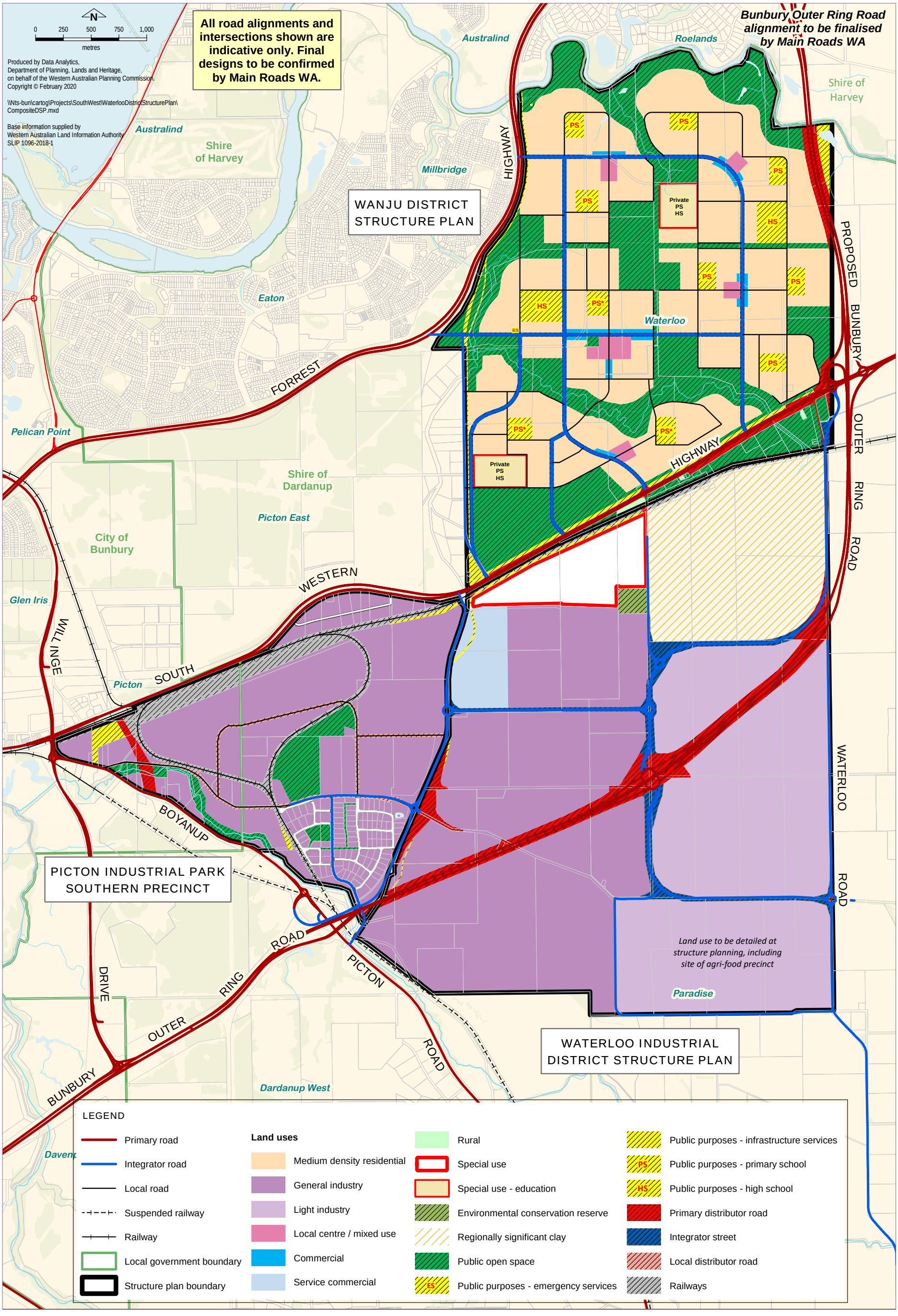


Figure 1.2: Composite Waterloo, Picton South and Wanju DSPs

4.1.1 Town centre

The Wanju town centre is proposed to be focused immediately south of Baudins Boulevard (Figure 1.3), with some commercial activity also fronting Baudins Boulevard. This position will help to maximise its accessibility and connectivity to the rest of Wanju. The town centre will provide mixed commercial, retail, servicing, community, entertainment, health, recreational and residential uses. It will form the principal activity centre in Wanju, and will represent a significant sub-regional centre within Greater Bunbury.

It is anticipated that the retail floorspace in the town centre could ultimately be 35,000 square metres, with up to a further 30,000 square metres of commercial floorspace. The precise floorspace figure will be determined through the activity centre plan, informed by a retail sustainability assessment, and will need to ensure that its size and scale does not adversely affect the existing retail hierarchy of Greater Bunbury.

As with the local centres the retail uses should occupy the ground floor parts of buildings with the potential for other uses, including residential, on the above floors. The size and scale of the town centre's retail and other commercial uses will need to be identified in detail in an activity centre plan for the area.

Off-street car parking is to be located to the rear of properties, and/or in multi-storey, decked, basement or roof-top car parks. On-street car parking within and close to the town centre will also be essential. Mall-based retail centres and large-scale surface car parking will not be permitted within Wanju.

The town centre activity centre plan will need to set out how servicing arrangements for retail and commercial premises will operate to ensure amenity of the residential properties is maintained.

More detail regarding the town centre is set out in the town centre precinct section, section 4.2.7.

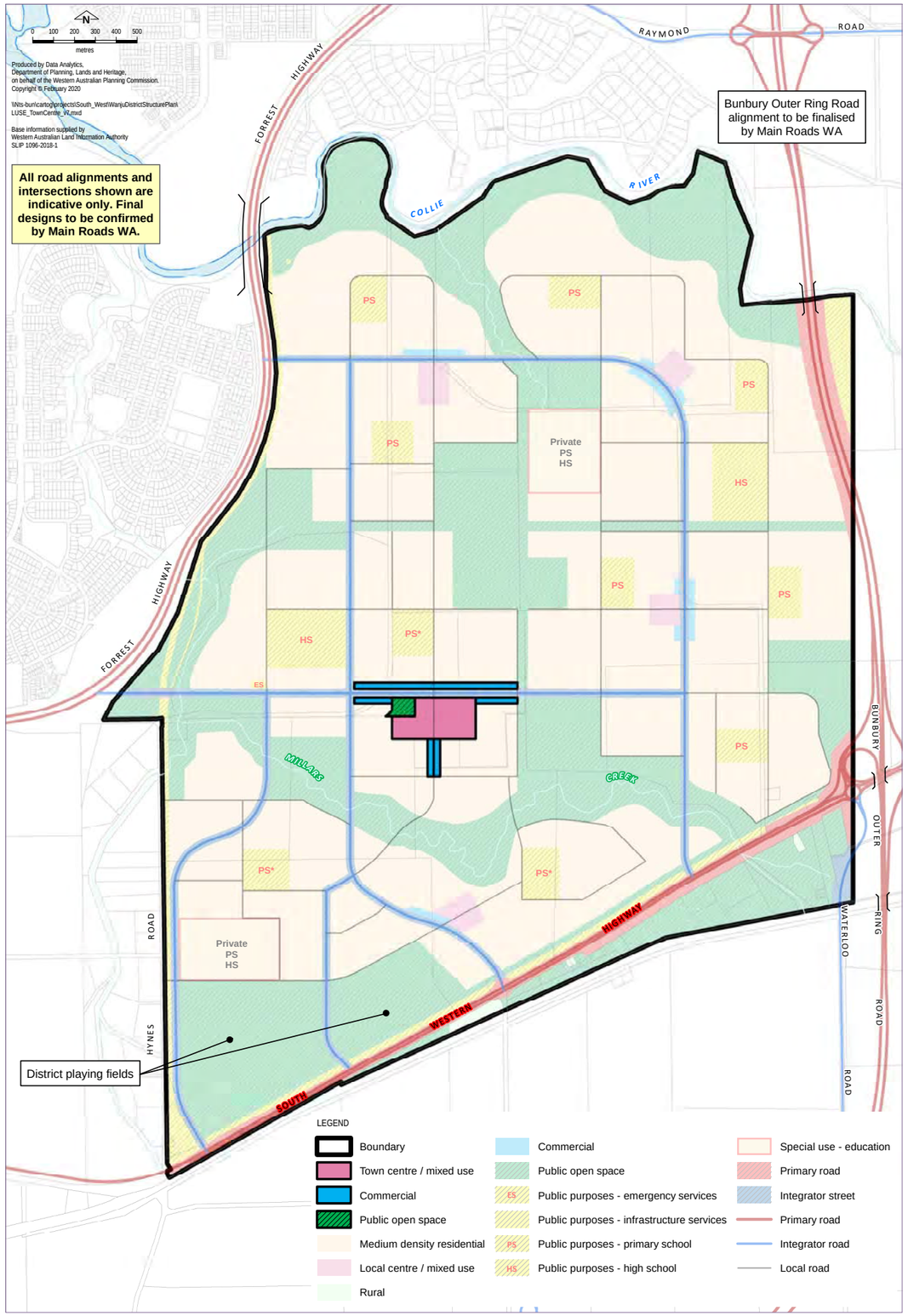


Figure 1.3: Proposed town centre

4.1.2 Local centres

A key requirement of Wanju will be a high degree of 'mixed-use' development with different uses in close proximity. Mixed-uses[3] will be most appropriately located within the town centre and local centres (Figure 1.4), where on-street parking will be available and access to public transport will be at its greatest. In the local centres zoning will allow for a range of compatible uses to co- locate adjacent to one another and also vertically within individual buildings.

The DSP does not specify the types of uses that could be established in such mixed-use areas. Market demand for residential and commercial uses will fluctuate over time and will depend partly on the progress of redevelopment in the rest of Greater Bunbury. Given the development of Wanju will take several decades to complete, it is unrealistic for the DSP to dictate the types of commercial uses, the amount of floorspace and the precise number of residential units that could be established within the mixed-use areas. However, it is envisaged that these uses will support the day-to-day needs of local residents.

Each local structure plan and activity centre plan will need to identify the location and broad types of uses that may be accommodated in the mixed-use areas of that individual precinct or activity centre. The activity centre plans will also need to set out how servicing arrangements for retail and commercial premises will operate to ensure amenity of the residential properties is maintained.

The densities for residential use within the mixed-use areas are generally expected to be in excess of 50 dwellings per hectare, although actual densities will vary and be dependent on the area and development potential of each individual site. This DSP assumes an overall average density of 55 dwellings per hectare in the mixed-use areas and this should be reflected by local structure plans.

[3] See glossary for mixed-use definition as set out in the *Planning and Development (Local Planning Schemes) Regulation 2015.*

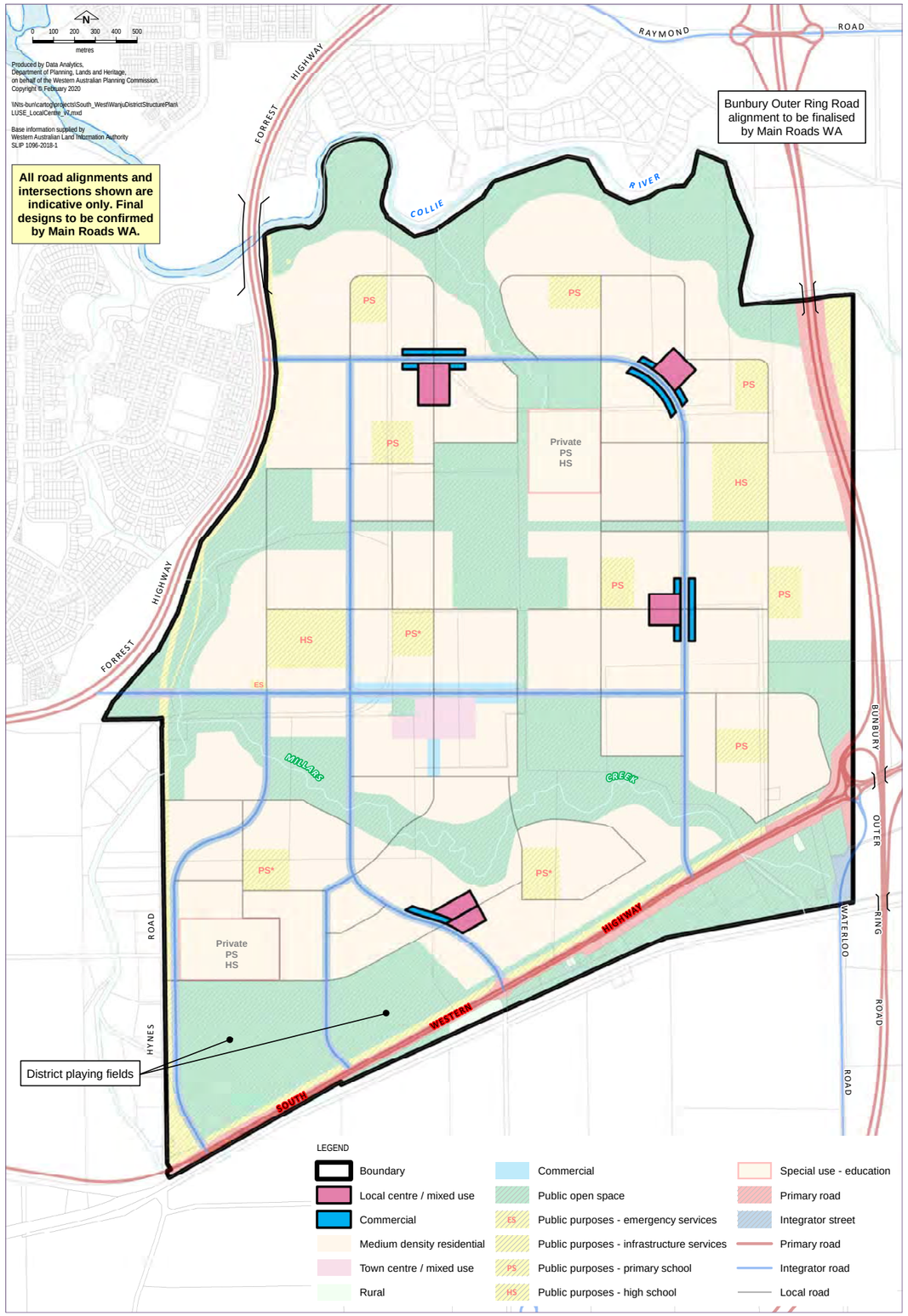


Figure 1.4: Proposed local centres

Wanju
District Structure Plan

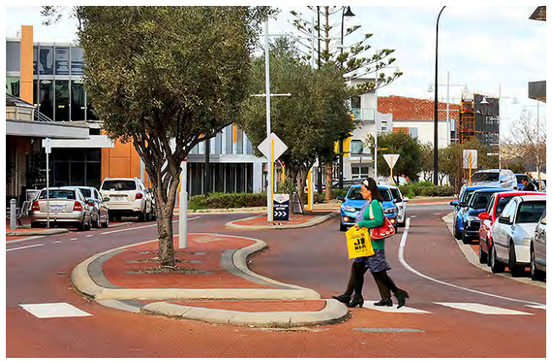
Existing policies and objectives relating to activity centres in Greater Bunbury are set out in the *Activity Centres for Greater Bunbury Policy* (2012). Activity centre plans, coordinating future subdivision, zoning and development, will need to be prepared for the activity centres and will need to be informed by retail sustainability assessments. The level of retail development at Wanju will need to not adversely affect the existing retail hierarchy of centres in Greater Bunbury.

It is proposed that there are four local centres strategically positioned off integrator A streets Carnabys Boulevard, Carters Boulevard and Wireless Boulevard, providing good access and pedestrian friendly environments.

The vast majority of Wanju's retail floorspace will be located either within the town centre or the local centres although limited retail floorspace may be able to be located outside these activity centres primarily along the principal integrator streets.

Off-street car parking should be located to the rear of properties or in basement, roof-top or decked car parks. On-street car parking in front and close to the local centres will also be essential. Mall-based retail development and large-scale surface car parking (more than 60 spaces) will not be supported.

Local centres should also be the location for other non-residential uses usually located in close proximity to transit and at the centre of a residential catchment, such as small-scale office and community facilities. Residential uses will be required within the local centres, particularly as such locations will benefit from the convenience of having transit, shopping and employment needs on their doorstep making them attractive for residential development.



4.1.3 Residential

Approximately 612 hectares are identified as the gross residential developable area, plus seven hectares in the town centre and 19 hectares in the local centres which could have a significant residential element. This amounts to around 459 hectares net residential area, which excludes land required for other uses such as public open space, roads, standard infrastructure and community infrastructure.

Residential development at Wanju will provide a diversity of housing with a range of housing types, densities and built-form character, including affordable housing to rent or buy and social housing.

There will, however, be an emphasis on more intensive residential development than typically created in adjacent urban fringe greenfield suburbs. This approach looks to ensure more sustainable outcomes, and will require well-designed streetscapes and open space, as set out in the *Wanju-Waterloo Landscape Vision Plan*, to compensate for the reduced area devoted to private garden space. As part of the residential mix, live-work units and a range of non-residential uses compatible with and complementary to residential development will, in principle, be permitted and encouraged. These may include corner stores, local cafés and community services.

The mix of types of housing proposed in the residential areas is to include: detached houses, semi- detached/row or terrace houses and low rise (2-3 storey) apartments. In the town and local centres low-rise (2-3 storey) to medium-rise (3-8 storey), and even some high-rise (9+ story) apartments will be encouraged. Single-storey residential development will not be permitted to ensure the sustainable use of land.

4.1.3.1 Aged and dependent persons accommodation

Purpose-built housing specifically for dependent persons, older persons, both for independent living and supported living care facilities, will be encouraged throughout the development. Such housing will be particularly appropriate at locations where higher densities are most appropriate due to good accessibility and proximity to services, facilities and public transport, that is within easy walking distance of the town and local centres.

4.1.3.2 Residential yield and densities

The overall density of residential development of Wanju in the developable area is expected to be sufficient to yield around 18,500 dwellings. The extent to which this figure is met will be dependent on a number of factors including technological advances, demographics and market conditions. This is considerably lower than the 28,600 dwellings envisaged in the *Greater Bunbury Strategy*. Future greenfield requirements in Greater Bunbury and the wider Bunbury Geographe sub-region are being contemplated through the Bunbury Geographe Sub-regional Strategy.

For the purposes of this DSP medium-density housing is defined as having densities up to 45 dwellings per hectare, with higher-density housing being 50 dwellings per hectare. Medium to high-rise apartments will be focused in the most accessible parts of Wanju, that is, in close proximity to services and facilities. This DSP does not identify definitive residential densities but an average residential density of 40 dwellings per hectare has been used for medium-density areas and 55 dwellings per hectare for higher-density areas. The local structure plans for each village precinct will refine the exact densities and building forms appropriate for each area.




Wanju
District Structure Plan

Multi-unit housing

Apartment	An apartment or flat is a self-contained housing unit that occupies one part of a multi-unit, multi-storey building. A studio apartment is small and combines the living room, bedroom and kitchen into a single large room with a separate bathroom. A penthouse is a luxury unit on the top floor/s of a multi-storey apartment building. Walk-up apartments are usually within a building that does not require a lift as it is no more than three storeys high.
Maisonette	A maisonette looks like a two to three storey stand-alone house but actually contains separate dwellings on a single lot. A maisonette is designed to enable independent dwellings to be built with their own entrances.

Ancillary dwellings

	A 'granny flat' is a small scale and self-contained dwelling on the same lot as, and usually detached from, the primary house. 'Fonzie flats' are small, self-contained dwellings usually located above a garage. These types of dwellings are additional to a primary house and cannot be subdivided from the primary dwelling.

Image courtesy of Mirvac WA, P/L

Apartments


Image courtesy of Department of Housing, Jonathan Lake Architects in association with Hassell Architects.

Walk-up apartments


Maisonette


Ancillary dwelling


Fonzie flat

Single houses

Traditional	A single or two storey house separated from other dwellings by at least half a metre. Between the 1920s and 1950s the trend was to build 'California' bungalows. These are usually single storey with gabled roofs and large pillars supporting a front verandah. They generally have three bedrooms and a separate living room. More recently there has been an increase in narrow block housing designs to increase the density of single housing.
Cottage	A small, single storey house with two or three bedrooms and a bathroom with bigger kitchen and living rooms as the main focal points of the house.

Semi-detached and attached houses

Semi-detached house	A house on its own grounds, joined to another house on one side only by a common wall.
Villa unit	A small house which may be attached, semi-detached or detached, within a group of similar dwellings usually arranged around a common driveway.
Terraced houses	Individual houses organised in rows with shared walls. Terraced houses are typically one to two storeys. A townhouse is a type of terraced house on multiple floors.


Image courtesy of Webb & Brown-Neaves

Narrow block housing design


California bungalow


Cottage


Semi-detached


Villa unit


Terraced houses


Townhouses

Potential types of housing at Wanju

4.1.4 Public open spaces

An integrated network of high-quality public open spaces (Figure 1.5) will be designed through a public open space strategy for Wanju. The public open spaces will be well landscaped, as set out in the *Wanju-Waterloo Landscape Vision Plan*, to give all residents of Wanju access to nature and outdoor sporting and recreational opportunities. As such, these public open spaces will contribute significantly to the quality of life, vitality, identity, community interaction and sense of place. The public open spaces should complement each other through innovative and site-responsive design.

The establishment of public open space will be subject to development contributions (Part 2 section 3.9 for more detail).

Public open space identified for Wanju in the DSP is comprised of:

- sport space – including the district sports playing fields and public school playing fields
- nature space – including parts of the Collie River and Millars Creek foreshores, areas around the wetlands and existing open areas in the Benang precinct
- recreation space - including public open space and multi-use corridors, which include parts of the Collie River and Millars Creek foreshores, and areas around the wetlands
- linear open space / integrated water management – including Millars Creek foreshore, areas around the wetlands.

The DSP will also require the provision of a mix of different sizes of public open space ranging from district parks (over five hectares in area), neighbourhood parks (1–5 hectares), local parks (0.4 – 1 hectare) and small parks (up to 0.4 hectare). Many of the three smaller types of parks could be provided by school playing fields and within linear open spaces. Some should also be situated within the town centre as urban town squares, and others could be set aside for community gardens to support community activity and local food production.

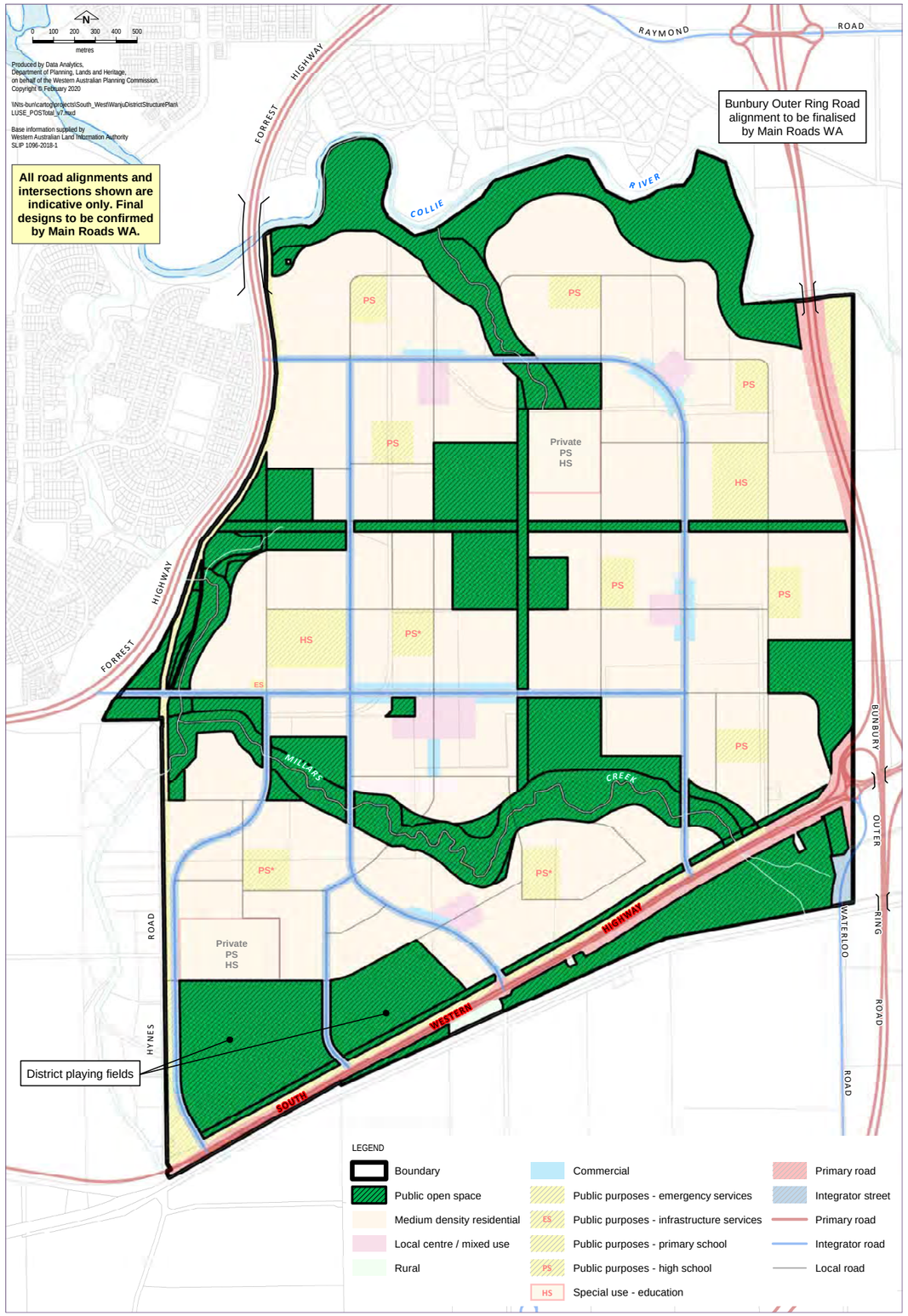


Figure 1.5: Proposed public open space and wetlands

Sport space

Recreation space

Nature space

4.1.4.1 District playing fields

Approximately 75 hectares will be set aside as district playing fields, predominately in the south-western corner of the DSP area (Figure 1.6). This area will accommodate the need for playing fields not only for the residents of Wanju but also of neighbouring suburbs in the northern part of Greater Bunbury. The district playing fields are proposed to be situated in this location for the following reasons:

- providing a buffer between the proposed residential areas of Wanju and the Waterloo Industrial Park and South Western Highway
- close proximity to major road network for easy access to the playing fields from beyond Wanju
- providing visual amenity along part of the South Western Highway
- providing drainage management during flood events.

The area is proposed to include both hard and grass courts, playing fields and other sporting facilities. A list of the sporting and recreation facilities that should be considered is set out in the *Bunbury-Wellington District Sports Facilities Plan* (2013) for the Department of Sport and Recreation. It will also encompass informal recreation opportunities and multi-use corridors connecting north to the Millars Creek foreshore. Some of the playing arenas will require floodlighting which will need to ensure that light spill is minimised.

The area will have a landscaped parkland feel and footpaths and cycle paths will traverse across it, between the playing fields. Traffic noise from the South Western Highway will be attenuated by landscaped noise buffers.

Shared facilities between different sports and multi-storey buildings, for example with change-rooms and storage on the ground floor and clubhouses on first floors, will be sought.

In addition, it is proposed that the public school playing fields will be available for public use outside of school hours. There will also be space within the Collie River foreshore available for playing fields.

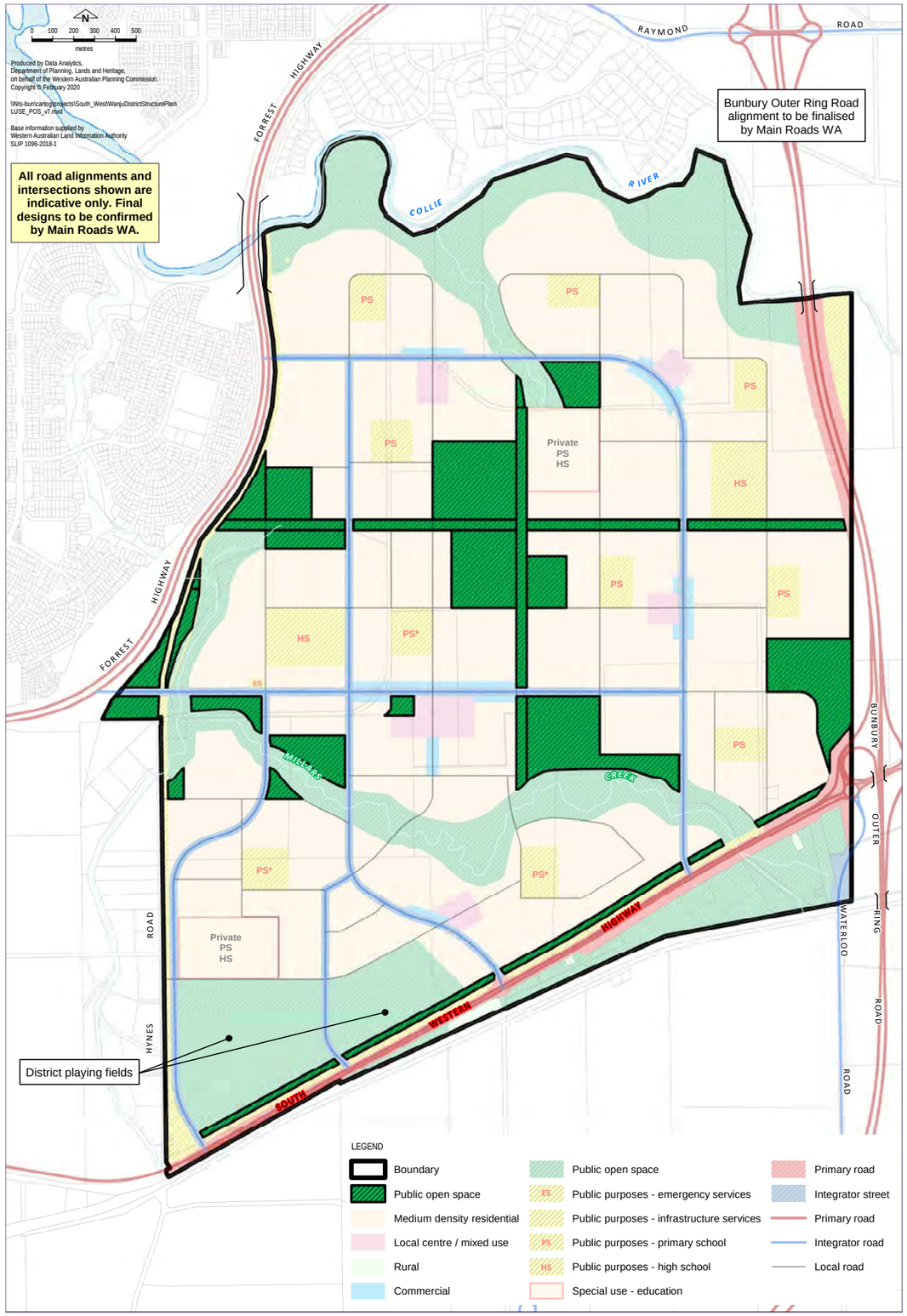


Figure 1.6: Proposed district playing fields

4.1.4.2 Proposed Collie River Foreshore

The Collie River foreshore within the DSP area, that is on the southern bank of the river (Figure 1.7), will be opened up for public access and managed for nature conservation and recreational purposes. This area will be of district-wide significance in terms of its recreational, environmental and heritage value and provide an important resource for the new community of Wanju. It is also one of the most significant parts of the DSP area in terms of Aboriginal heritage and this will need to be respected.

The DSP identifies approximately 83 hectares as part of the Collie River foreshore reserve. The width of the non-developable area that will make up the foreshore reserve will vary considerably at different locations along the river, from between 50 and 600 metres wide south of the high-water mark, depending on the width of the floodplain. Additionally, a minimum of a further 10 metres will generally also be required from the top contour of the river foreshore embankment to reduce the potential for erosion and offer pedestrian and cycle access where access to the riverbank is restricted due to the steep slopes.

There will be a need for appropriate pedestrian and cycle access east-west along the foreshore reserve and separate footpaths and cycle paths from the rest of Wanju linking to it. In some sections along the river, where the bank narrows, there may be the requirement for boardwalks.

On-street and off-street parking will need to be provided for visitors using motor vehicles. There will also be a requirement for sufficient public barbeques, public conveniences, benches, tables, children's play equipment, outdoor exercise equipment, playing fields and courts, grassed areas and a boat ramp should be provided at convenient locations along the reserve. Cafés, small-scale shops and other visitor facilities could be provided in close vicinity to the foreshore.

The existing riparian vegetation will require management and enhancement. This must be done alongside a detailed bushfire management plan as the area has been assessed as being a bushfire hazard area. Future development will need to reflect the bushfire regulations that are current at the time of construction.

There will need to be appropriate landscape and environmental enhancements to the river, its banks and the foreshore, and a foreshore management plan will be required to be produced for the area reflecting these enhancements, identifying the impacts, benefits and threats to the ecology and setting out the proposed management.

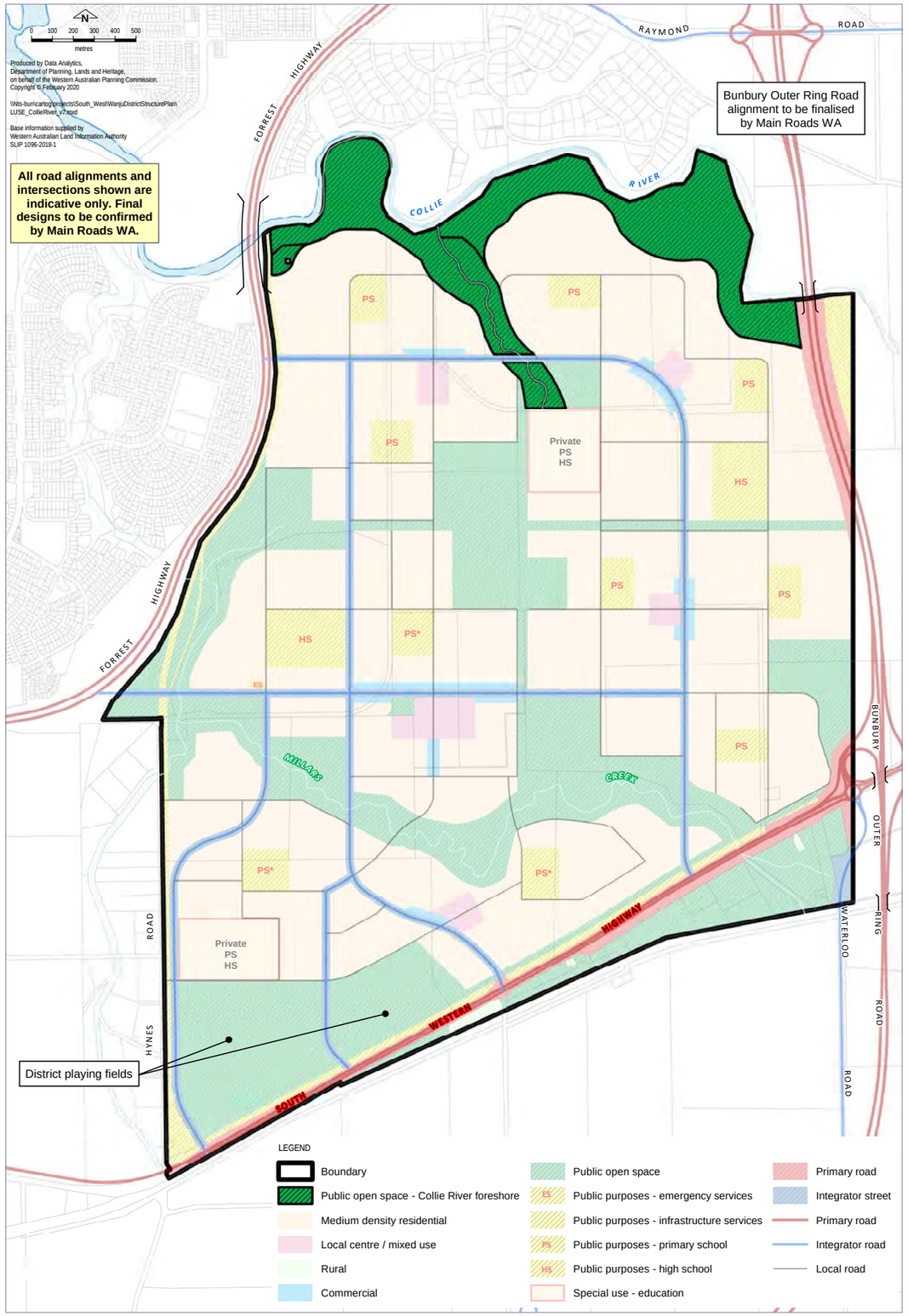


Figure 1.7: Proposed Collie River Foreshore

4.1.4.3 Millars Creek foreshore

Millars Creek and its foreshore, (Figure 1.8) will act as a multi-use corridor providing a focus for surface water management, recreation, walking and cycling. The character of the Millars Creek foreshore reserve in the new development will vary along its course. The width of the foreshore reserve will also vary and be dependent upon many factors, adequate bushfire hazard separation zones and appropriate foreshore vegetation rehabilitation. The foreshore width required to manage flooding is confirmed through the outcomes of the *District Water Management Strategy* (DWMS). The foreshore design and final form is to be in keeping with the *Landscape Vision Plan*, and will be further refined in a foreshore management plans, prepared concurrently with bushfire management plans, at subsequent planning stages. The current expectation is for a minimum width of 50 metres each side of the creekline.

It will be essential that its environmental and recreational benefits are maximised through the appropriate landscape and environmental enhancements and infrastructure provision. Appropriate pedestrian and cycle paths will need to be provided along the foreshore reserve, on both sides of the creek, as will separate footpaths and cycle paths linking the foreshore reserve to the urban areas.

The existing vegetation along the banks of the creek result in the area being identified in the bushfire risk assessment as a bushfire hazard area and any future development will need to reflect the bushfire regulations that are current at the time of construction.

On-street parking will need to be provided for visitors using motor vehicles and public barbeques, public conveniences, benches, tables, children's play equipment, outdoor exercise equipment and grassed areas. There will need to be appropriate landscape and environmental enhancements to the creek, its banks and foreshore.
A foreshore management plan will be required to be produced for the area identifying the impacts, benefits and threats to the ecology and setting out the proposed management.

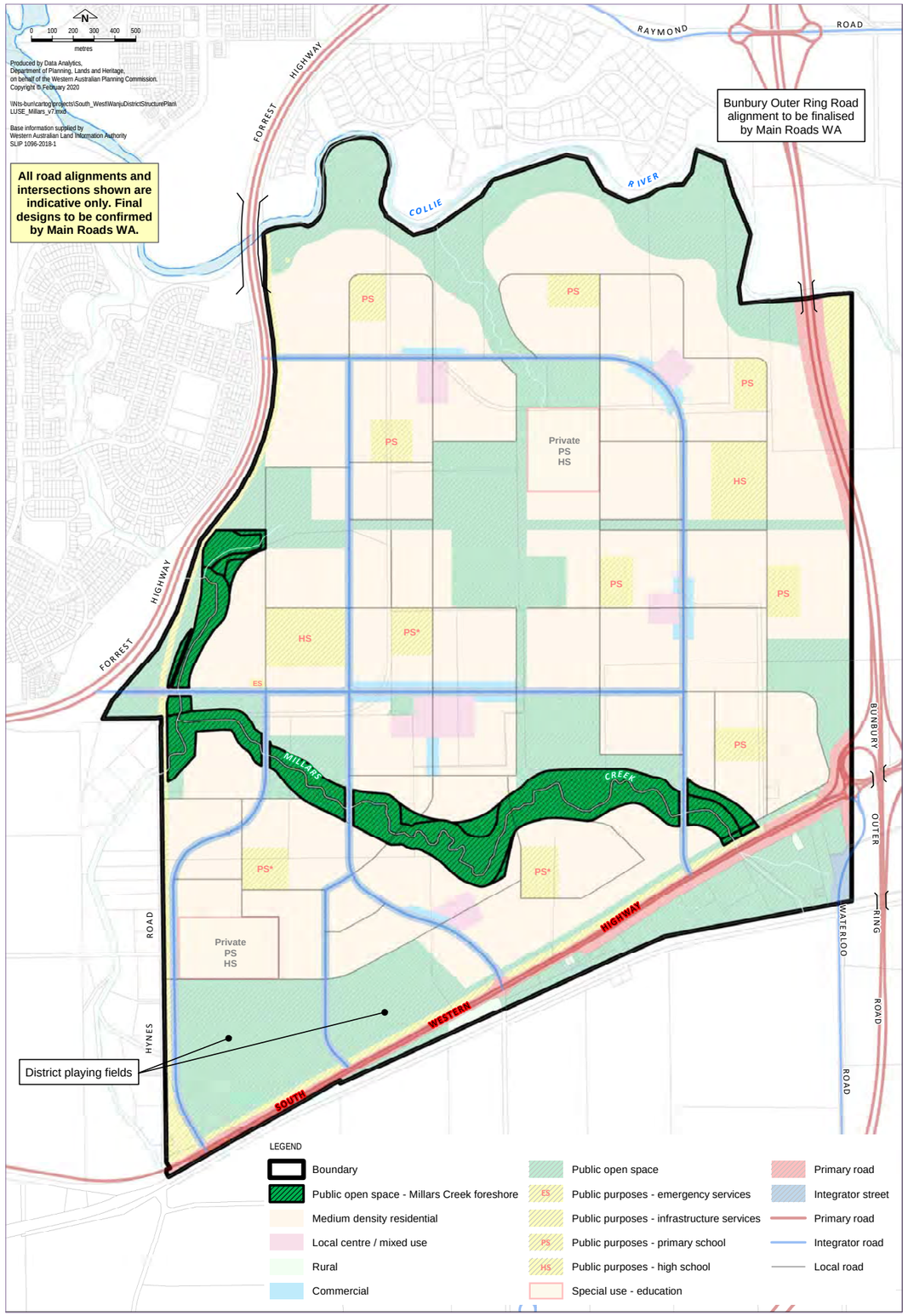


Figure 1.8: Proposed Millars Creek Foreshore

4.1.4.4 Wetlands

Wetlands were identified in the south-western corner of Wanju in the initial draft DSP (April 2016) for the management and storage of water before its re-use. With the realignment of the BORR the opportunity to use more of this area for development as part of the district playing fields becomes more straightforward, with the opportunity to consider other areas in the DSP as smaller detention basins for non-potable water that could be used to reticulate public open space.

4.1.4.5 Linear open space / multi-use corridors

A key characteristic of the urban form of Wanju will be linear open space corridors traversing the area. These corridors will predominantly be in a north-south and east-west alignment, generally between 400 and 500 metres apart, and varying in width from 20 metres up to potentially a maximum of 80 metres in some corridors.
The corridors will act as multi-use corridors and will be designed to contain swales, most of which are likely to be about 15 metres wide, and which will carry stormwater across the DSP area.

The management of the swales will be required to maintain environmental conditions and associated habitats for fauna and flora, and to protect people, property and infrastructure during extreme rainfall events.

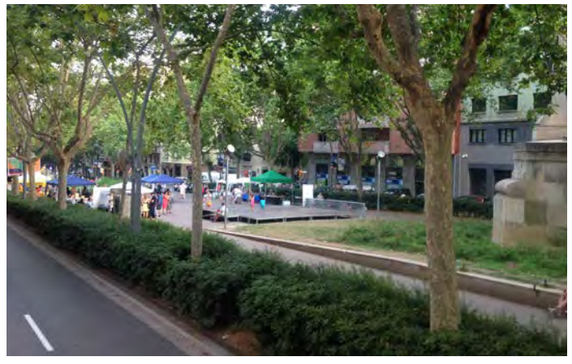
The proposed location of the corridors is set out on the DSP map (Figure 1.1).
The widths are determined through the findings of the water modelling exercises and the *District Water Management Strategy* (DWMS). This data confirmed the swale widths required to cope with regular rainfall events and the overall width required to manage the major rainfall events. The entire multi-use corridors and their adjoining roads may be used to safely manage major rainfall events, providing temporary detention and/or conveyance areas. The space in the multi-use corridors beyond the swales will also act as temporary capacity for significant rainfall events, with the streets adjacent to corridors also able to provide additional stormwater capacity in the event of exceptional rainfall.

In addition to their drainage function the corridors will provide important infrastructure, recreational, movement, amenity and potential ecological functions, reduce urban heat by providing shade and will help provide linkages between the Collie River and Millars Creek foreshores. The corridors will be generally bounded by streets.The corridors will involve a considerable land-take within the DSP area, 85 hectares, including land identified as buffers for the Forrest Highway, the BORR and South Western Highway. The area set aside for the multi-use corridors will need to be critically assessed once the final surface water modelling information is available. Where possible it will be important for a shared open space function to be accommodated within the multi-use corridors.

Other infrastructure provision along the corridors could include power, gas, potable water, treated water and wastewater.

The multi-use corridors will provide significant recreational and non-vehicular movement opportunities across Wanju, providing alternative paths away from streets. Separate pedestrian and cycle paths will be provided along most sections of the corridors and only where this is not possible will a dual-use (shared) path operate. The paths will be of sufficient width to comfortably allow for pedestrians, cyclists and other users to travel in tandem, for overtaking and for movements in both directions (Table 2). They will provide an alternative for movement along streets and their adjacent footpaths and cycleways.The paths will need to be well-lit during the hours of darkness and be designed so that users feel secure.

At different sections along the multi-use corridors the intention is that the green space will widen out to incorporate different types and size of public open space: district, neighbourhood and local. The corridors also should provide a significant amenity value to the local area through appropriate landscaping.



4.1.4.6 Other public open space

The gross sub-divisible area for residential development (including the town and local centres) identified in this DSP is approximately 612 hectares. Public open space of 370 hectares is specifically identified in the DSP including approximately 200 hectares of foreshore reserves. Another approximately 20 hectares of public school playing fields are proposed to be publicly accessible outside of school hours. In addition, at the local structure plan stage, detailed design will need to identify and set out a further level of local parks and urban open spaces that will contribute towards the 10 per cent minimum of gross sub-divisible developable area public open space requirement specified by the WAPC.

4.1.4.7 Water reticulation of open space

Some public open space, including the district sports fields and school playing fields, will require significant amounts of water throughout the dry summer months. Other areas of open space can be landscaped with water-wise plants or left as natural bushland, and therefore will require little or no additional watering during summer.

Given that groundwater allocations are fully or close to being fully allocated and the high cost of scheme water, it is essential that landscaping and playing fields requiring reticulation is done as cost effectively and as efficiently as possible, as set out in the Wanju and Waterloo Water Servicing report. Wanju needs to provide for mechanisms which allow large areas of open space to be reticulated by fit-for-purpose water such as recycled wastewater and harvested stormwater, with a preference for using climate resilient sources.

4.1.5 Educational institutions

Education and the education facilities, buildings and communities will be key focal points for the local communities that will make up the Wanju development. As such their location and design will need to be carefully considered and should be compliant with *Liveable Neighbourhoods* (WAPC). The design and configuration of schools will need to facilitate safety, surveillance and accessibility by foot, cycle, bus and car.

4.1.5.1 Public schools

The expectation is that at Wanju there will be the need to provide for ten State primary schools (kindergarten to Year 6) and two State senior high schools (Years 7 to 12). The residential densities achieved in the development will dictate whether all these public schools are required as the development proceeds. To provide flexibility on the capacity of the State primary schools a total of approximately four hectares is allowed for seven of the primary schools, including the playing fields, and the remaining three will be 4.5 hectares in area.

The proposed location of the schools is set out in the DSP (Figure 1.1 and in Figure 1.9), however, the final location within a precinct will be determined through the individual local structure plans. School playing fields are to be linked to other public open space and multi-use corridors to encourage walking and cycling to school.

For the efficient and effective use of land multi-storey school buildings will be strongly encouraged at Wanju, and consequently the area set aside for public schools in the DSP area is significantly reduced from what single-storey buildings would require.

Some of the primary and high schools may incorporate an element of special education and associated health facilities.

4.1.5.2 School playing fields

A minimum of one hectare grassed playing fields are to be provided adjacent to each of the State primary schools, thus at least 10 hectares across Wanju. A minimum of four hectares will be required for playing fields for each State high school, giving approximately a further eight hectares. These will provide for the active recreational needs for the schools' students and also the wider community.

Shared use of the school playing fields with community sporting groups will be sought. The joint use of the playing fields by the schools and residents of Wanju is appropriate given the prevalence of active public open space within the broader district and land-use efficiency gains that are achieved through joint facilities. A formal agreement will need to be entered into between the local government and education provider regarding the provision of a long-term commitment for the sharing of recreation facilities.

4.1.5.3 Private primary and high schools

Provision is made in the DSP for two co-located private primary and high schools to maximise the opportunity for shared facilities. There may be the desire for private school providers to incorporate places of worship and associated community facilities on their campuses to make them multi- functional. This multi-functional provision will be encouraged.

4.1.5.4 Higher education

Higher and further education facilities will be encouraged to located within the town centre, local centres and mixed-use areas but no specific provision is made in the DSP for such facilities given the proximity of existing facilities in Greater Bunbury.

4.1.6 Community Facilities

Community facilities, such as libraries, community centres, community gardens, community meeting spaces, not-for-profit community workspace, childcare facilities, places of worship and health facilities, will generally be located within the town centre or local activity centres where they are accessible to residents and co-located with other beneficial services. To ensure efficient use of space, meeting rooms, toilet facilities and car parking facilities could be shared between the different community users.

Many of the built community facilities may be able to be provided as part of a shared multi-functional space, for example school libraries could also function as community libraries. Some community facilities such as scout halls, community gardens and playgrounds could be accommodated within public open space.

The precise location of these community facilities will be identified within local structure plans.

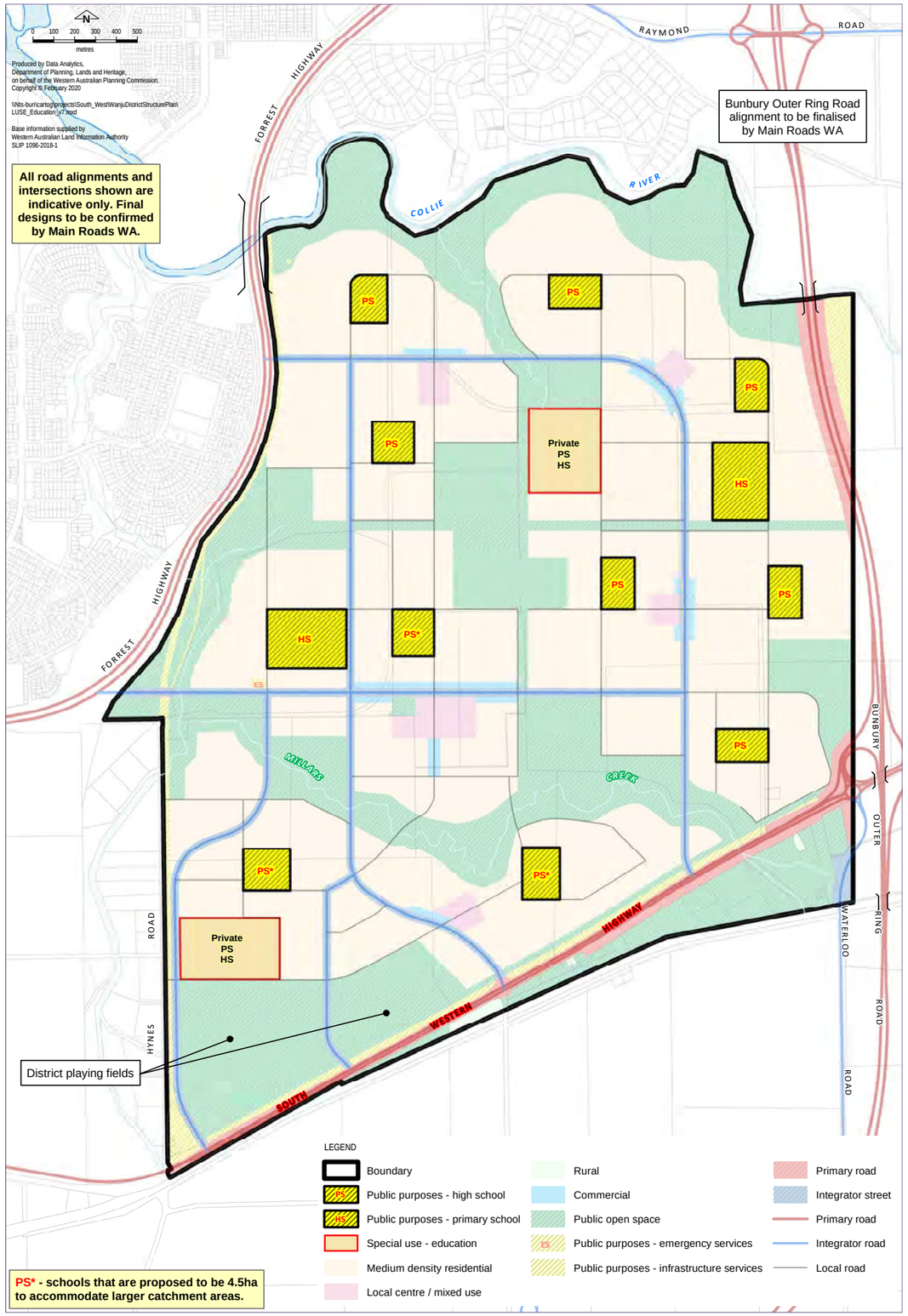


Figure 1.9: Proposed educational institutions

4.1.7 Movement and Transport

4.1.7.1 Walking

Wanju's streetscape will be designed to support walking as the preferred mode of transport. To achieve this, a significant and proportional investment will be required to ensure walking is a safe, enjoyable and practical experience for as many trips as possible.

Generous footpath widths will be required along both sides of all streets (Table 2). Such widths will allow for safe (both real and perceived) and socially engaging pedestrian movement and for the space to be shared with pushchairs, wheelchairs, gophers, less confident cyclists and dog walking. Street furniture including seating, bicycle and gopher parking, water fountains, shade and shelter, public art, attractive landscaping and on-street car parking will need to be integrated into an attractive and functional design. Appropriate street and footpath lighting, minimising crossovers and dropped kerbs are other important elements in making walking an attractive option.

Linear open space / multi-use corridors have been identified throughout Wanju and will provide dedicated pedestrian links, particularly providing off-street connections between schools, town and local centres and public open space.

The streetscape shall be designed so that pedestrians have priority at intersections with accessible pedestrian crossings required across primary streets, adjacent to bus stops and in close proximity to activity centres.

Streetscape designs, landscaping plans, water sensitive urban design and planning in the local structure plans must ensure that walking and footpaths, independent of cycling and cycle paths, are given the highest priority in the design of streets and public open spaces.

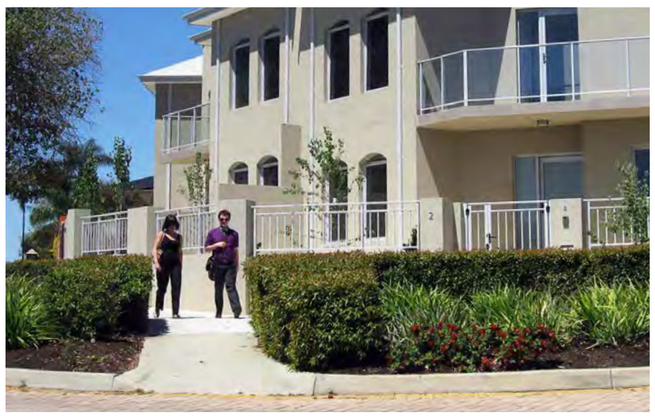


Table 2: Examples of types of paths

Type of Path	Users	Speeds anticipated	Widths
Cycle touring routes	Touring, fitness, commuters	Greater than 20 kilometres per hour	Sufficient for safe overtaking at speed, c. three to four metres
Recreational shared paths with separate paths for pedestrians	Short and long distance cyclists - share space with other wheeled modes	five–20 kilometres per hour	Sufficient for safe overtaking and side-by-side conversations, c. four metres
On-road lanes on integrator streets; separate from vehicles and pedestrians	Fitness, commuters high school students, other wheeled modes	five–20 kilometres per hour	Sufficient to accommodate overtaking and side-by-side conversations, c. two metres
Local bicycle routes, shared cycle and pedestrian paths within multi-functional corridors	Cyclists of all abilities – space shared with pedestrians	Walking pace to 10 kilometres per hour	Sufficient to accommodate overtaking and side-by-side conversations, c. four metres
Principal shared paths: on-street	Slow cyclists - space shared with pedestrians	Walking pace to 10 kilometres per hour	sufficient to accommodate overtaking and side-by-side conversations, c. four metres
Pavements within activity centres	Pedestrians and users of wheelchairs and gophers	Walking pace to 10 kilometres per hour	Sufficient to accommodate other uses, at least four metres

4.1.7.2 Cycling and other wheeled modes

Development at Wanju will be required to provide for all cyclists and their different needs, ranging from pre-primary age children to commuter cyclists who prefer quick travel times (Table 2). It will be important that the cycle paths that are incorporated in Wanju link to routes beyond its boundaries, reflecting the *Greater Bunbury Regional Bicycle Masterplan* (SWDC, 2012) and the *Bunbury-Wellington Cycle Plan 2050* (DoT).

Streets within Wanju should also be planned to accommodate increased numbers of people using not only bicycles but also mobility aids, such as gophers and wheelchairs. It is feasible that some on- road cycle lanes could be shared with users of mobility aids that can travel faster than walking speed. By providing for and inviting these modes onto the streets, those with mobility issues can travel further, for example to the local shops and community services and for social activities, without reliance on their own car or for others to pick them up.

Strategically placed end-of-trip facilities including bicycle and gopher parking, charging stations for electric bikes, wheelchairs and gophers, public toilets and change-rooms, lockers, water fountains will need correlating investment and maintenance. All cycle paths and lanes will need to be well lit.

The DSP identifies corridors where different types of paths could be provided. It is expected that these will be reflected in more detail in local structure plans, and integrated into landscaping plans and streetscape designs.

4.1.7.3 Local Streets

The primary internal streets of Wanju (Figure 1.10), the 'integrator' streets, will be the focus for the town centre, local centres, the mixed-uses, higher-density residential development and high-frequency public transport network. They will be attractive public spaces with high-quality street- scape landscaping, and which work well for:

- pedestrians of all ages and levels of mobility
- cyclists
- wheelchair and gopher users
- accessibility to public transport.

There will need to be regular opportunities for pedestrians and other non-car users to safely cross the primary streets, particularly in close proximity to bus stops and at junctions.

Most of the primary streets will be aligned north-south or east-west to assist with permeability and legibility through the area and with solar orientation of the buildings. Traffic-signal controlled junctions will be preferred to roundabouts to minimise land-take and to assist pedestrian and cyclist movements, and the inclusion of bus and high-occupancy lanes and cycle priority at major junctions is proposed.

The nature of the integrator streets will not generally accommodate direct vehicular access onto them, particularly from 'crossovers'. Local structure planning and development will need to ensure that buildings provide an outlook onto these main streets. The exchange between the built form and street activity should be encouraged through maximising the numbers of doors and windows to the street. Balconies at upper levels will provide surveillance onto the public space while providing residents with access to the views and vistas on the streets, parks and surrounds.

On-street parking will be required along these streets to provide good short-stay access to mixed- uses on the ground floor. For streets with a median strip there is the opportunity to incorporate a stormwater swale within a narrow landscape corridor provided there are places for pedestrians to cross the street, particularly adjacent to bus stops and at junctions.

To provide guidance for landscaping within Wanju and Waterloo a *Landscape Vision Plan* has been produced by the Shire of Dardanup in consultation with other stakeholders. The summary of the Plan's key principles for streetscape landscaping for Wanju and Waterloo are set out in Table 3.

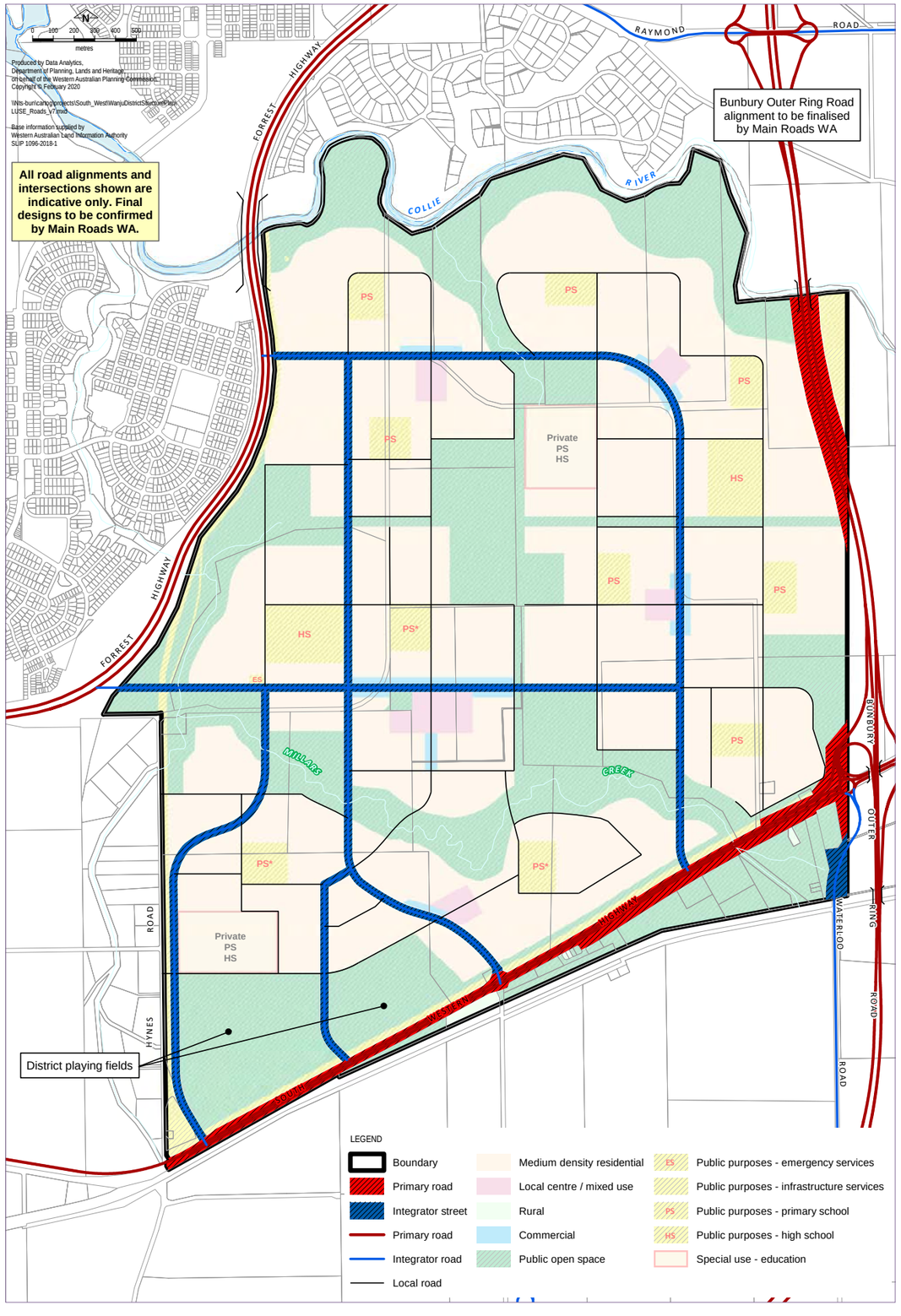


Figure 1.10: Proposed integrator streets and primary distributor roads

Table 3: Outline of Wanju and Waterloo Landscape Planning Design Principles

Landscape Element	Principle	Why
Street Tree width	Design open wide streets with a low building height to street width ratio to provide shade.	Tree canopies absorb more solar radiation during the day making it more pleasant for pedestrians.
Street orientation	Design for maximising solar passive heating and cooling by orientating most streets appropriately for Western Australian conditions.	Correctly oriented streets will be exposed to more solar radiation during the day (north facing).
Street sides	Solar radiation in summer has the most impact on south side of the east-west streets and the east side of the north-south oriented streets should be targeted for shade.	These sides are exposed to greater solar radiation throughout the day in summer.
Tree grouping	Cluster appropriate trees together with overlapping canopies to maximise shade.	Clustered trees deliver greater reductions in air temperature than isolated trees.
Tree spacing	Groups of clustered trees should be interspersed with open spaces.	Group clustered trees provide more shade during the day, while the open spaces will allow surface cooling at night.
Tree type	Provide sufficient water for trees during summer or plant water-wise trees. In addition, a mixture of tree types can build in resilience against climate temperature and rainfall / moisture changes.	Water stressed trees and or trees that have not been appropriately maintained can limit their water loss during the hot dry conditions and can lose their canopy. This can compromise evaporative cooling and shading.
Street trees on public land	Street tree placement should only occur on public land.	Management and retention of continuous tree canopies can be regulated on public land. Encourage private land owners to minimise removal of existing trees and vegetation at all stages of development.
In incumbent areas consider alternative greening	In streets that have constraints such as underground services or specific land uses that limit trees, consider greening on ground and walls.	Alternative greening to restrictive spaces that align to biophilic ideals. Where possible, consider designing so services are located separately from locations of street trees and vegetation. Designing for street trees without services means they will be healthier and less prone to being problems down the track.
Tall building area	In areas with tall buildings where trees are not appropriate, green walls or roofs should be considered and or appropriate landscaping for provision of shade and views around tall buildings.	Green walls can help reduce solar radiation and improve energy efficiency of buildings if designed appropriately for the climate.
Tree protection	AS 4970 Tree protection on development sites	

4.1.7.4 Rear and side laneways

It will be necessary for properties facing onto the integrator streets to have garaging at the rear of the properties via laneways to minimise the number of crossovers. Incorporating small lots off laneways with interesting architectural responses, such as row or terrace-style housing and, for larger multiple dwelling sites, residential frontage onto the laneways, will be required to create the fine grain of detail found in successful urban environments and to maximise activity and safety in laneways and encourage amenity.

4.1.8 Public transport

To ensure the early integration of more sustainable transport patterns in Wanju, it will be necessary for an accessible and efficient local public transport service to be in place from the initial stages of the development which integrates with, and enhances, existing local services currently operating in and around Greater Bunbury.

4.1.8.1 Local public transport

A high-quality and high-frequency public transport service is essential for connecting Wanju to the wider Greater Bunbury sub-region and ensuring that residents do not need to rely on their private cars for most journeys. Public transport services will include buses and potentially, in the medium to longer-term, an alternative rapid passenger transport system.

Buses will need to provide direct routes through Wanju, connecting the residential areas and local centres with the town centre, Bunbury CBD and other activity nodes. The potential for priority bus and high occupancy lanes in the vicinity of the key junctions of the integrator streets in Wanju and further afield will need to be explored. The proposed street alignment assists in creating a highly legible public transport spine through Wanju, around which higher density urban development can be concentrated.

In determining the desirable alignment of the bus network both within and surrounding Wanju the following will need to be considered:

- integration with the rest of the TransBunbury network beyond Wanju;
- requirement for a safe, attractive and integrated bus and train interchange;
- connection to surrounding activity centres such as Eaton Fair and Treendale and surrounding towns including Burekup, Dardanup and Brunswick Junction;
- creation of active walkable neighbourhood catchment areas for stops/stations (that is, maximising opportunities for catchments that have a high density of residential development or relatively intense commercial use the provision of bus services concurrently with the expansion of the urban area over time);
- provision of accessible bus stops providing safety, accessibility, shelter and adaptability to new technology such as real-time bus tracking and timetabling; and
- the proposed future Perth-Bunbury fast-train station serving as a regional interchange for the South West, and including the provision of adequate park and ride car parking facilities, ideally as a multi-storey facility.

The frequency and detailed routes of bus services will be determined by the provider, the Shire and the developer during the development stage. A principal bus alignment is suggested for Wanju focussed along integrator streets, including Baudins Boulevard, Carters Boulevard, Clifton Boulevard, Wireless Boulevard and Carnabys Boulevard (Figure 1.10).

Sufficient space will need to be safeguarded for the provision of a medium to long-term option of a rapid passenger transit alternative linking Wanju town centre with Bunbury CBD and other significant activity nodes within the sub-region.

4.1.9 Bunbury Outer Ring Road

The alignment of the proposed Bunbury outer ring road (BORR) has altered significantly since the initial draft Wanju and Waterloo DSPs were published. Main Roads Western Australia (MRWA) is proposing that the alignment of the BORR will be along the eastern boundary of the Wanju DSP area. There is no access proposed from Wanju directly onto the BORR although, in a recent change, Main Roads is now proposing a full interchange with South Western Highway.

Noise bunds will be required along edges of the BORR. Cycle paths alongside the BORR and cycle and pedestrian access across the junctions of the BORR will be important criteria in the detailed design.

4.1.10 Other regional roads

4.1.10.1 South Western Highway

In the vicinity of Wanju, and westwards into Bunbury, South Western Highway will be upgraded to a dual carriageway, subject to appropriate funding. Its role as a key inter-regional road linking Greater Bunbury with inland hinterland towns will be enhanced. It will provide the main highway access to Wanju from the south-west and east with three intersections proposed. Direct access is now proposed by Main Roads WA from South Western Highway into Waterloo Industrial Park.

4.1.10.2 Waterloo Road

Main Roads WA is now proposing that Waterloo Road will not extended north of South Western Highway into Wanju but will culminate at a roundabout with South Western Highway.

4.1.10.3 Forrest Highway

Following the construction of the BORR, the Forrest Highway will be one of the main accesses from Wanju and the rest of northern Greater Bunbury to the BORR, at an intersection to the north of the Collie River. There are proposed to be two intersections from Wanju onto Forrest Highway, one in the vicinity of the current Hynes Road junction and a second around 600 metres south of the Collie River.

4.1.12 Public utilities

It will be necessary for local structure plans to safeguard land and ensure other necessary provisions are met for the provision of essential public utilities and government services. These often need to be placed strategically within the site to provide appropriate accessibility while minimising the impact on surrounding land-uses.

Two public utility infrastructure corridors are identified. One corridor runs parallel to the western boundary of the DSP area adjacent to Forrest Highway and Hynes Road. The second runs along the eastern and southern boundaries of the DSP area, adjacent to the BORR and South Western Highway (Figure 1.11). Provision for these corridors will need to be reflected in all the local structure plans for the relevant precincts. The corridors are identified to safeguard land for the realignment of Western Power overhead transmission lines. This corridor will also need to contain noise buffers to lessen the impact of the adjacent railway line and future activities in the Waterloo Industrial Park, footpaths and cycle paths, landscaping, and be used as public open space.

A public utility corridor is also identified through the western side of the DSP area which contains an ATCO 200 millimetre gas pipeline and this corridor will need to be reflected in the local structure plans for the Fergus and Millars precincts.

Land may also be required to be set aside for water services, including waste water treatment, recycling and /or distribution. This may be identified within the Wanju DSP area, the Waterloo Industrial Park DSP area or potentially suitable sites beyond the DSP areas.

4.2 Local structure plan areas

This DSP divides Wanju into seven precincts (Figure 1.12), six of which are proposed development areas. The Benang precinct, between South Western Highway and the railway line, being a precinct where no urban development is proposed. Each development precinct will require a detailed local structure plan to be prepared, approved by the Western Australia Planning Commission.

The LSPs will need to demonstrate that they are informed by local water management strategies and more detailed site-specific surveys, where required. In addition, the town centre and local centres will require activity centre plans to be prepared prior to subdivision and development commencing.

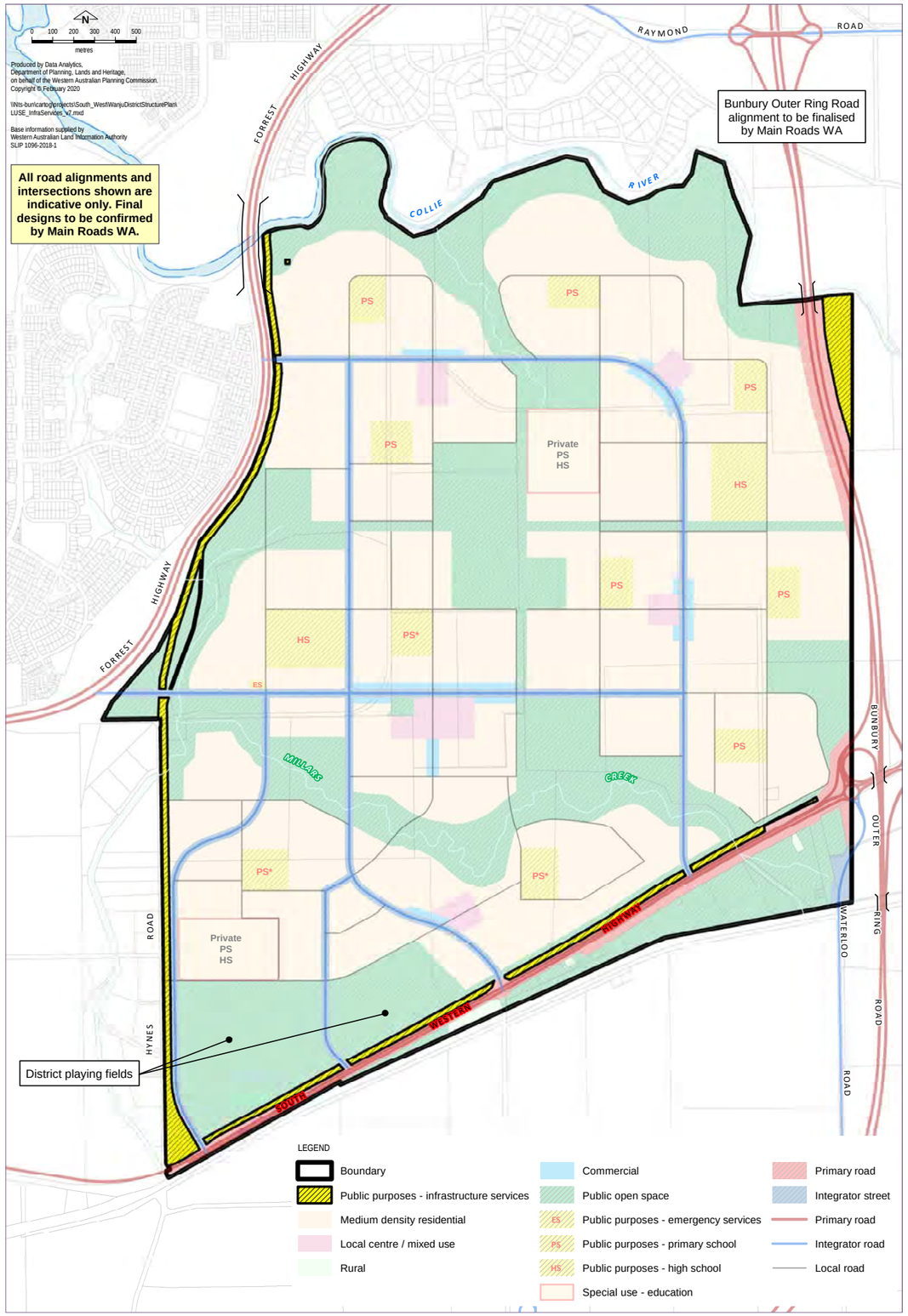


Figure 1.11: Proposed public utilities infrastructure

4.2.1 Local structure plan requirements

Above the standard local structure plan requirements, Wanju local structure plans will need:

1. to provide indicative densities for residential areas and building heights
2. to define boundaries for foreshore reserves
3. to identify a minimum of ten per cent public open space for the individual precinct and demonstrate/justify how this is calculated taking into account drainage requirements and regional open space
4. to ensure connections into shared paths and cycle networks in the Wanju DSP area and beyond
5. to ensure connections into the arterial drainage network in the Wanju DSP area and beyond, or acceptable interim solutions
6. to ensure connections into linear multi-use corridors identified in the Wanju DSP area
7. to identify local roads and ensure they connect to roads within other precincts where local structure plans have been endorsed
8. to be informed by an endorsed local water management strategy
9. to detail water servicing proposals, inclusive of fit-for-purpose water sources, that are in accordance with the principles outlined in the *Wanju and Waterloo Water Servicing Report* (GHD 2018)
10. to define locations for schools
11. to define locations for community infrastructure informed by a community development contributions plan
12. to define locations for standard infrastructure and public utilities corridors informed by a standard development contributions plan
13. be informed by a retail sustainability assessment which identifies appropriate retail and floor space allocations
14. to refine public transport routes and infrastructure
15. to be informed by a foreshore management plan and bushfire management plan, which are to align and be prepared concurrently
16. to ensure urban forms align with the requirements as outlined in the Landscape Vegetation Plan (Shire of Dardanup 2018).

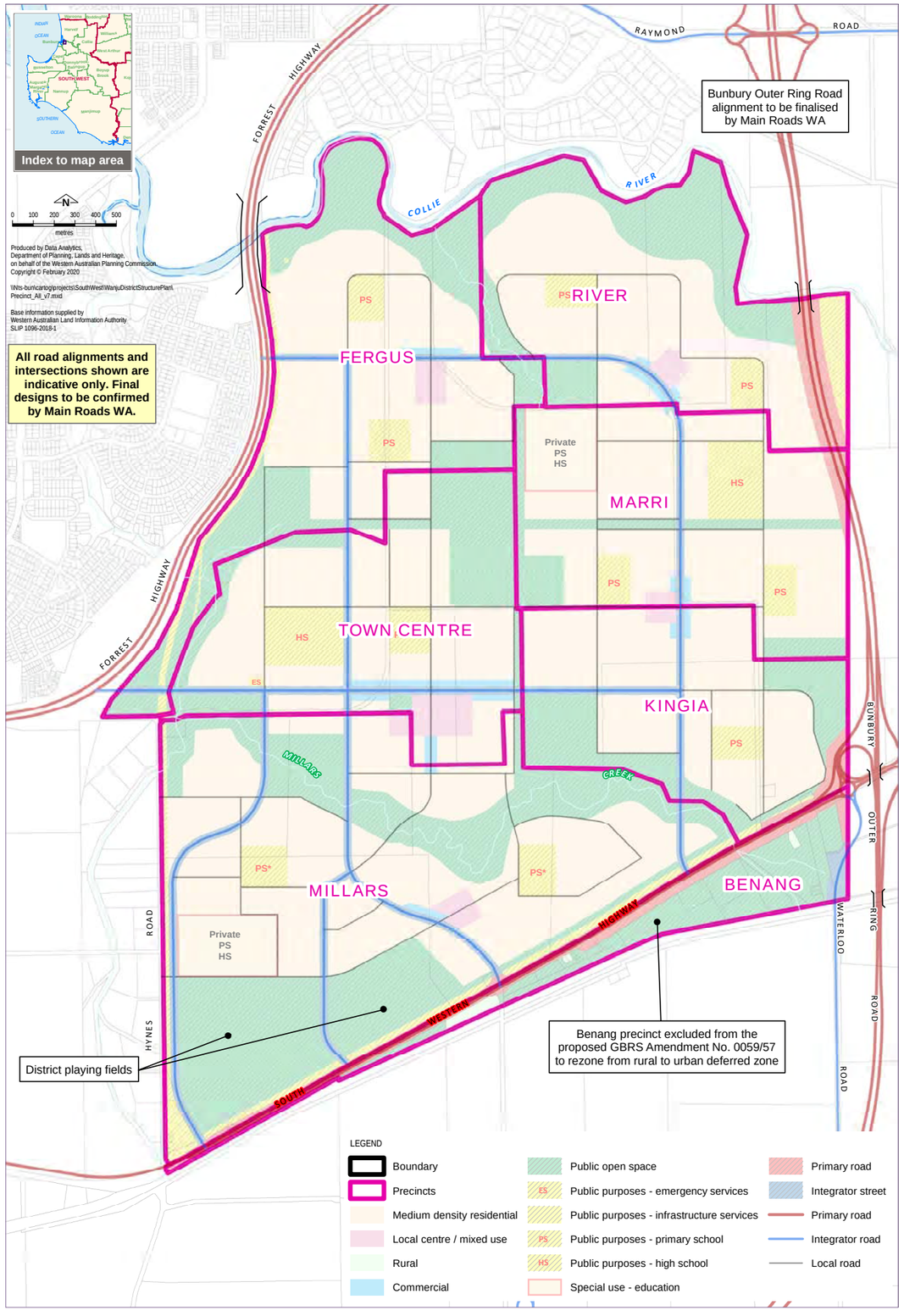


Figure 1.12: Precincts and local structure plan areas

4.2.2 Millars precinct

Introduction

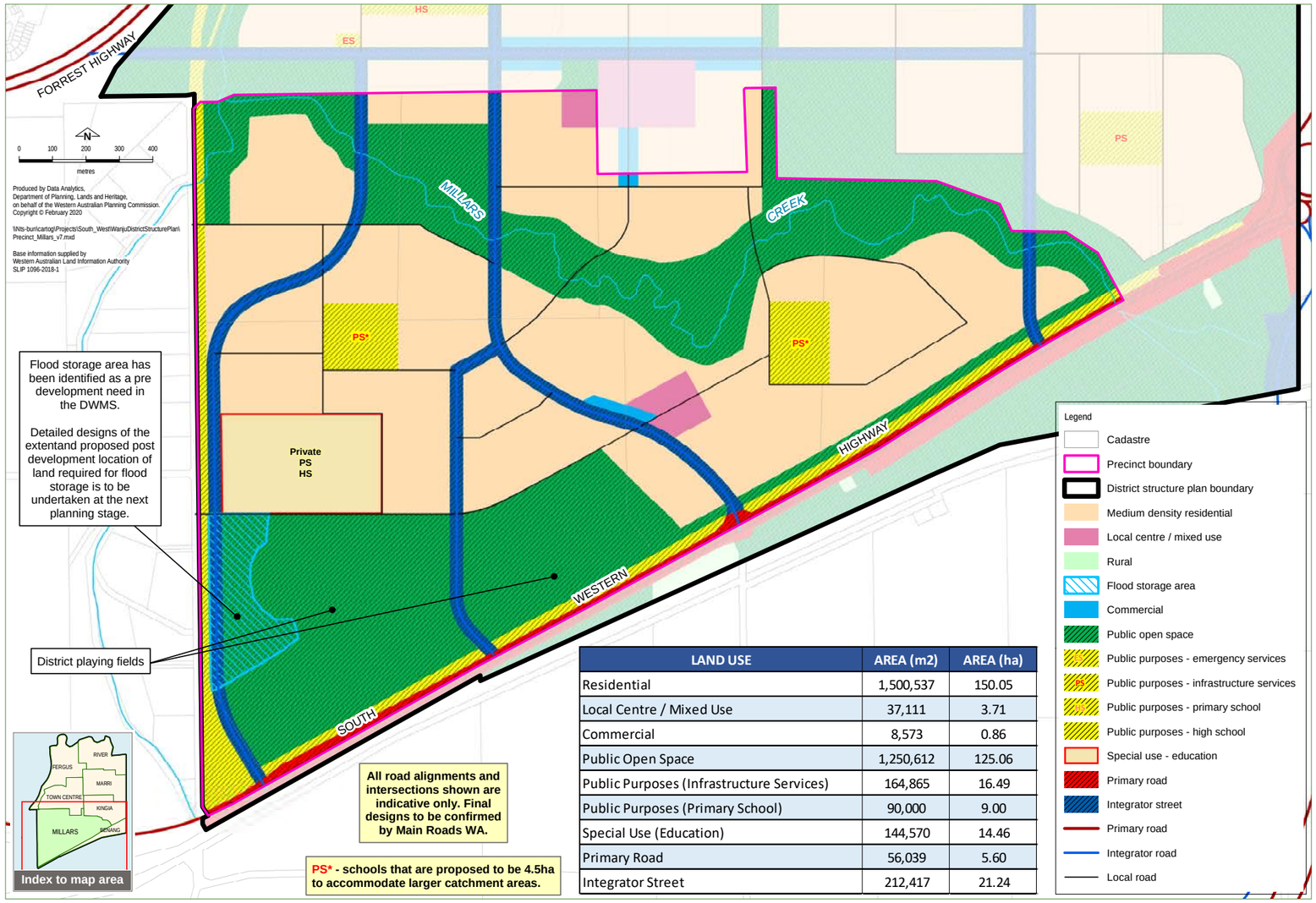
Millars precinct is identified as an area of 347 hectares. It is the expectation that this precinct will be the first stage of development at Wanju with access from South Western Highway and also via an improved Hynes Road junction off Forrest Highway.

A detailed local structure plan will be prepared for Millars precinct. Due to the proximity of the Millars Creek foreshore to proposed development a detailed bushfire risk management plan and foreshore management plan will also need to be carried out. An activity centre plan will be required to be prepared for the local activity centre.

The following details and requirements will need to be included by the local structure plan.

Precinct character

1. Ultimately there is proposed to be vehicle access to the precinct from South Western Highway via Clifton Boulevard and Carters Boulevard. Both Clifton Boulevard and Carters Boulevard will provide vehicle access over Millars Creek. No dwellings will have direct access onto South West Highway.
2. There will be landscaped noise buffer adjacent to South Western Highway, incorporating an infrastructure corridor containing Western Power 132 kV transmission lines, and a linear open space / multi-use corridor connecting to the Millars Creek foreshore, which may include integrated water management infrastructure.
3. Millars Creek foreshore, on the precinct's northern boundary, will provide a green landscaped corridor incorporating footpaths and cycle paths. The foreshore reserve will be separated from housing by a local road and development will need to reflect bushfire regulations current at the time.



LAND USE	AREA (m2)	AREA (ha)
Residential	1,500,537	150.05
Local Centre / Mixed Use	37,111	3.71
Commercial	8,573	0.86
Public Open Space	1,250,612	125.06
Public Purposes (Infrastructure Services)	164,865	16.49
Public Purposes (Primary School)	90,000	9.00
Special Use (Education)	144,570	14.46
Primary Road	56,039	5.60
Integrator Street	212,417	21.24

Figure 1.13: Millars precinct

Land uses

1. The land use of this precinct will be predominantly residential, with approximately 150 hectares of residential developable land (gross), 110 hectares net, producing around 4635 dwellings:
   - 875 dwellings @ 55 dph
   - 3760 dwellings @ 40 dph.
2. Millars Creek foreshore will be identified as a foreshore reserve. On the southern side of the watercourse the width of the foreshore is proposed to be a minimum of 50 metres wide, based on the outcomes of the DWMS. The width and design of Landscape Vision Plan and foreshore management plan and bushfire management plan, which are to align and be prepared concurrently.
3. Two state primary schools (9 hectares) are proposed, including shared public/ school playing fields.
4. A private primary and secondary school (15 hectares) is proposed
5. Approximately 17 hectares required for the infrastructure corridors along South Western Highway and the eastern boundary of the DSP area.
6. With a foreshore reserve along Millars Creek, the district playing fields immediately to the south west of the precinct (125 hectares), together with the public open space from the state primary school and an element of the linear open space/ multi-use corridors the precinct is well served with open space.
7. A local centre (4 hectares), plus a commercial area of one hectare, is identified centred around Wireless Boulevard. The local centre will be a focus for the precinct, providing for daily and weekly household shopping needs for the precinct, and include a mix of retail, service, commercial, health and office uses on the ground floors, and service, office or residential above.

Built form and building heights

1. The buildings will have a strong inter-relationship with the streets.
2. Most residential development will be green-title housing. There will be opportunities for higher density residential development along the primary streets and over-looking Millars Creek foreshore and district playing fields.
3. The built form will be based largely on a north-south grid street pattern, although close to Millars Creek the form will be more organic reflecting the geography of the creek line. The south-west to north-east orientation of South Western Highway will also be a factor in the street orientation within the precinct.
4. The use of rear lanes for vehicular access, particularly along Clifton Boulevard, Carters Boulevard and Wireless Boulevard, adjacent to the district playing fields and the multi-use corridors, is encouraged to reduce the number of crossovers, provide a continuous street frontage and minimise interruptions for pedestrians and cyclists.
5. It will be necessary for the local structure plan to have consideration of the guidelines concerning buffers on development associated with the regionally significant clay deposits and the brickworks south of the railway line in the Waterloo Industrial Park DSP area.

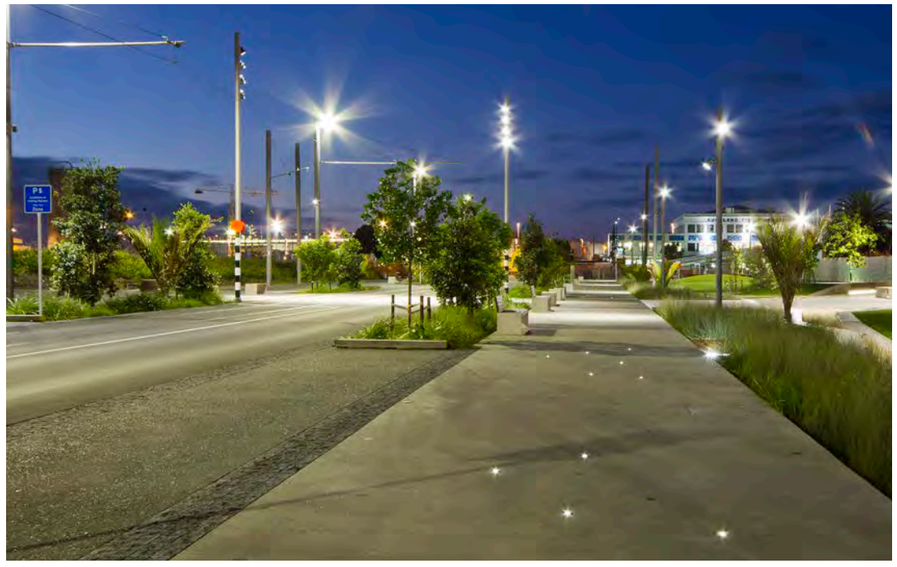


Photo courtesy: Development Auckland

Public realm

1. The precinct will have a green backdrop with Millars Creek along the northern boundary and the multi-use corridors to the south and east and running north-south through the middle of the precinct, and the multi-functional corridor along the southern boundary. There will need to be appropriate landscaping and environmental enhancement of Millars Creek and the foreshore, and a foreshore management plan will be required to be produced that reflects this, identifying the impacts, benefits and threats to the community and ecology and setting out the proposed management.
2. Footpath and cyclepath links along and across the Millars Creek foreshore and the multi-use corridors will help provide access to services and facilities in the areas further north.
3. Excellent pedestrian and cyclist links will be provided to the district playing fields with connections to inter-regional bicycle paths identified in the *Greater Bunbury Regional Bicycle Master Plan* (SWDC, 2012).
4. Street trees and landscaping will help provide a landscaped feel to all streets.

Table 4: Land-uses Millars precinct

Total area	347 ha
Commercial / local centre	5 ha
District distributor road	21 ha
Primary road	6 ha
Public Open Space	125 ha
Public purposes - public primary education	9 ha
Public purposes - private education	15 ha
Public purposes - infrastructure	17 ha
Total non-residential uses	**197 ha**
Gross residential area	**150 ha**
Net residential area	**110 ha**
Potential dwelling yield	**4635 dwgs**

Photo courtesy: Development Auckland

4.2.3 Kingia precinct

Introduction

A detailed local structure plan will be prepared for Kingia precinct and will be required to carry out a detailed bushfire risk management plan and foreshore management plan due to the proximity of the Millars Creek foreshore to proposed development. An activity centre plan will be required to be prepared for the local activity centre which is partially within this precinct.

The following details and requirements will need to be included by the local structure plan.

Precinct character

1. This precinct will be 'urban' in character in the vicinity of the integrator streets, Baudins Boulevard and Carters Boulevard and around the local centre, and more 'suburban' in other areas with medium-density residential development.
2. These key streets will provide the primary public transport routes, on-street cycle lanes separated from moving vehicles and opportunities for mixed uses and higher density residential in close proximity.
3. Linear open space/multi-use corridors will retain existing trees and incorporate swales and other drainage infrastructure.
4. Other local streets will also be set out in a grid pattern to provide permeability and legibility. They will be orientated principally north-south and east-west to take advantage of passive solar design.
5. Street trees and landscaping will be provided along all streets and will be integrated with on- street car parking and will provide a landscaped feel and attractive public spaces.
6. Millars Creek and its foreshore will provide a vital green public space and will be identified as a foreshore reserve. The width of the foreshore in this precinct is proposed to be a minimum of 50 metres wide, depending on site conditions and drainage requirements. The width and design of the foreshore will be established in the local structure plan informed by the foreshore management plan and landscape management plan.

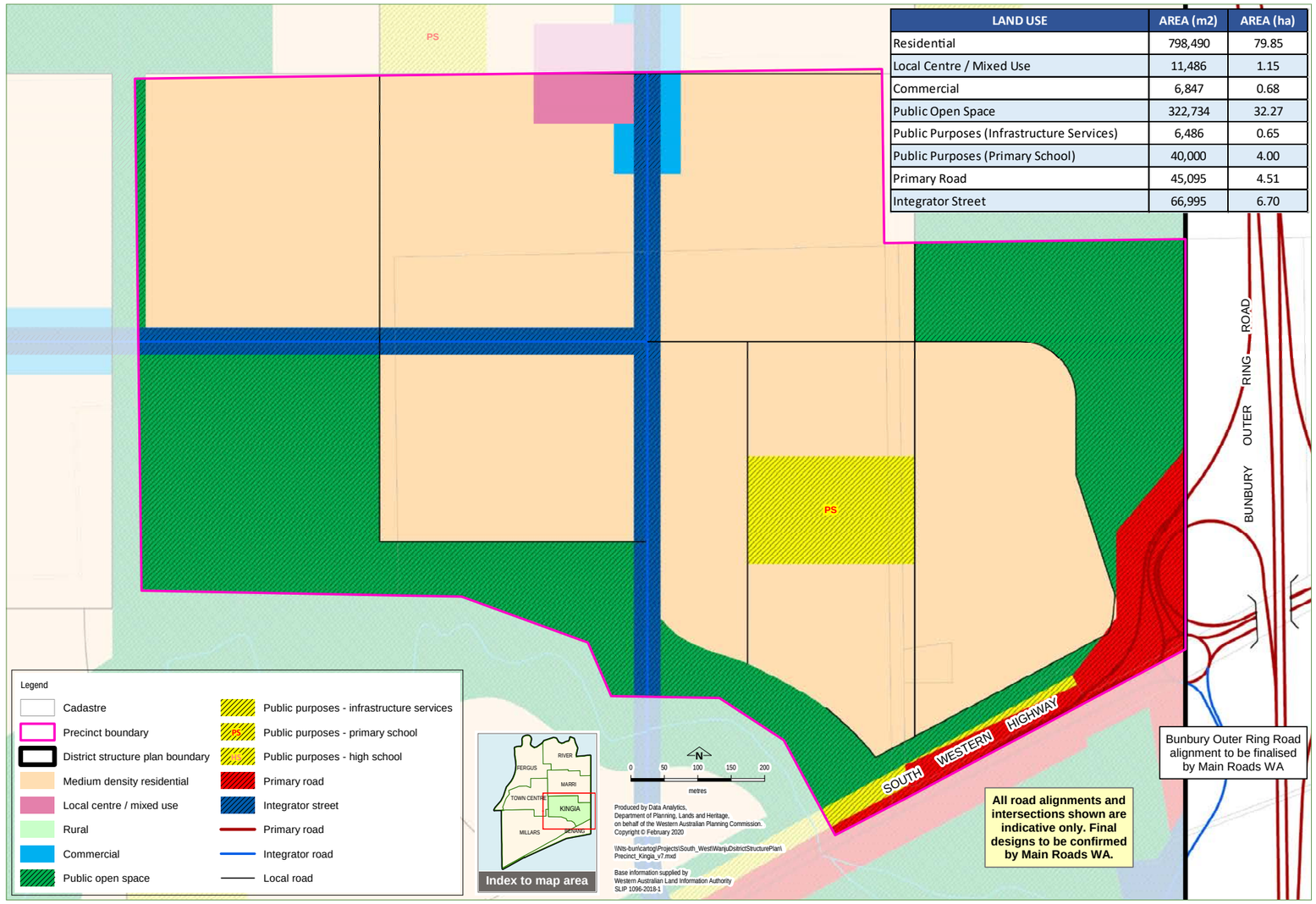


Figure 1.14: Kingia precinct

Land uses

1. Residential uses will be the most common and significant land use within the precinct with approximately 80 hectares of residential developable land (gross), 60 hectares (net), which could produce around 2540 dwellings:
   - 500 dwellings @ 55 dph
   - 1920 dwellings @ 40 dph.
2. A local centre (four hectares in total) is identified adjacent to Carters Boulevard, split between the Kingia precinct and Marri precinct. The local centre will be a focus for the precinct, providing for daily and weekly household shopping needs, and include a mix of retail, service, commercial, health and office uses on the ground floors, and service, office or residential above.
3. It is proposed that there is one State primary school (four hectares) located in the south-eastern quadrant of the precinct. There are two State primary schools proposed immediately to the north of this precinct in the Marri precinct.

Built form and building heights

1. In the medium-density residential areas the built form will be predominantly town and terraced houses on lots of between 250 and 350 square metres.
2. The use of rear lanes for vehicular access particularly along Baudins Boulevard, Carters Boulevard, Waterloo Boulevard and the multi-use corridors is encouraged to reduce the number of crossovers and provide a continuous street frontage and minimise interruptions for pedestrians and cyclists.
3. The local centre will consist of multi-storey buildings also have a focus on the streets with most parking provided at the rear of the shops, away from the streets and building frontages, or in basements or in decked car parks. Building heights will generally be a minimum of two storeys with higher buildings encouraged, particularly in and around the local activity centre and Carters Boulevard and Baudins Boulevard.

Public realm

1. The precinct will have a green backdrop with Millars Creek along its southern boundary. A foreshore management plan will be required identifying the impacts, benefits and threats to the community and ecology and setting out the proposed management, including appropriate landscaping and environmental enhancement of Millars Creek and its foreshore.
2. The streets will be attractive public areas with an emphasis on providing for pedestrian, cycling and other non-car movements.
3. Street trees and landscaping will be an important component of ensuring a well landscaped feel to the precinct.
4. Green multi-use corridors, incorporating dual-use paths, swales and public open spaces, will traverse the precinct, helping provide connectivity to the town centre, other local centres, district playing fields and river corridors. Some of the swales will be incorporated within the median of streets.
5. An infrastructure corridor containing Western Power 132-kV transmission lines will run north- south immediately adjacent to eastern boundary of the DSP and along South Western Highway. A noise bund along the eastern boundary will be required to reduce noise from the Bunbury outer ring road.
6. On-street car parking is to be integrated into the streetscape, with street trees and landscaping providing shade and visually reducing the dominancy of the parked cars on the streetscape.

Table 5: Land-use Kingia precinct

Total area	130 ha
Commercial / Local centre	2 ha
Integrator road	7 ha
Primary road	5 ha
Public open space	32 ha
Public purpose - public education	4 ha
Public purpose - infrastructure	1 ha
Total non-residential uses	**52 ha**
Gross residential area (including mixed-use areas)	**80 ha**
Net residential area (including mixed-use areas)	**60 ha**
Potential minimum dwelling yield	**2540 dwgs**

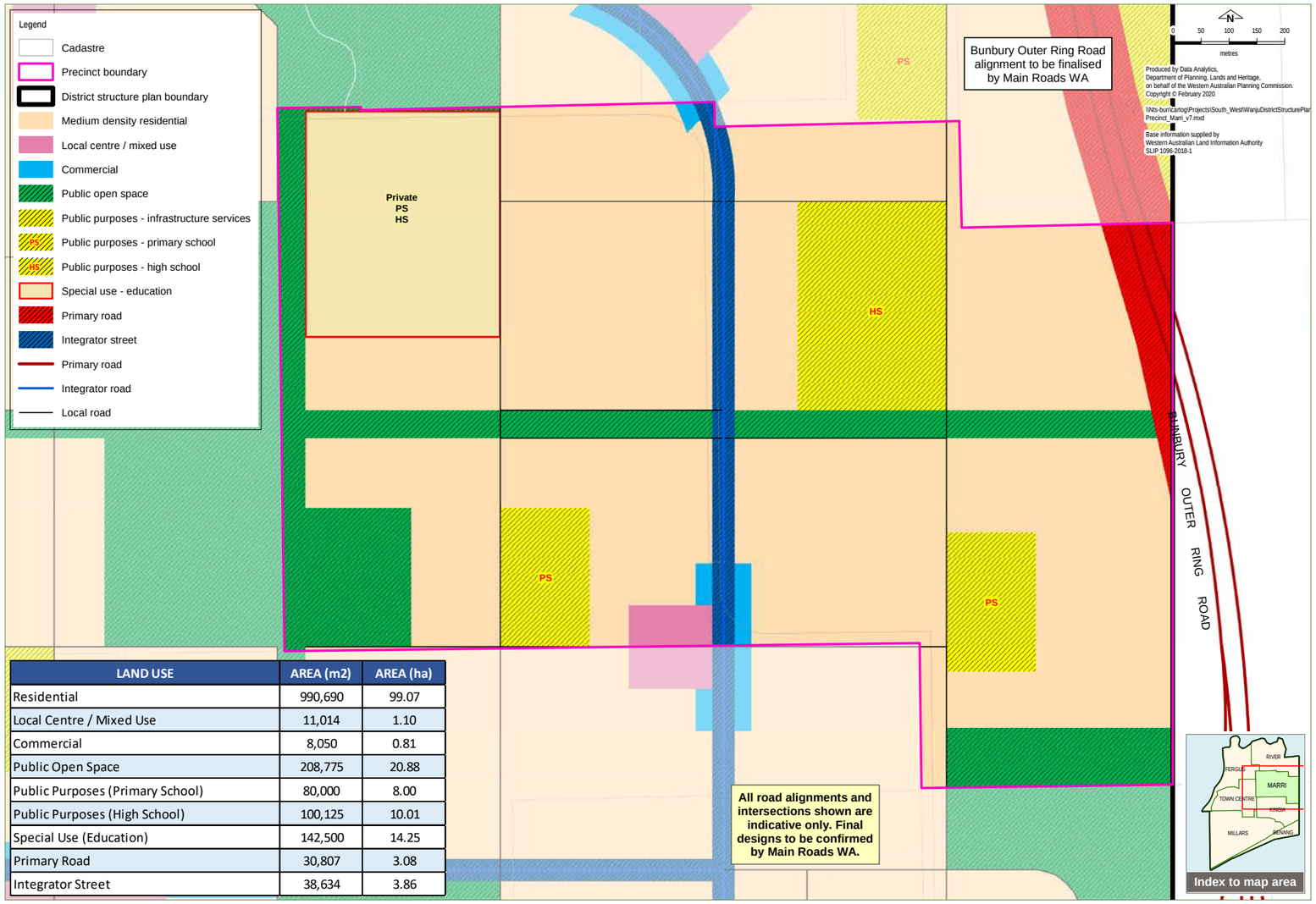
4.2.4 Marri precinct

Introduction

A detailed local structure plan will be prepared for this precinct. An activity centre plan will be required to be prepared for the local centre which is partially within this precinct. The following details and requirements will need to be included by the local structure plan.

Precinct character

1. The precinct will be predominantly residential in character with a more urban, higher density character in the vicinity of the local centre and along Carters Boulevard.
2. There will be grid street pattern across the precinct, predominantly orientated in north-south and east-west directions.
3. Two State primary schools (eight hectares) are proposed with shared public/school playing fields.
4. One State high school (10 hectares) are proposed with shared public/school playing fields.
5. One private school, primary and high, (14 hectares)
6. Approximately 21 hectares is identified as public open space, including areas designated as linear open space/multi-use corridors for recreational space and integrated water management.



LAND USE	AREA (m2)	AREA (ha)
Residential	990,690	99.07
Local Centre / Mixed Use	11,014	1.10
Commercial	8,050	0.81
Public Open Space	208,775	20.88
Public Purposes (Primary School)	80,000	8.00
Public Purposes (High School)	100,125	10.01
Special Use (Education)	142,500	14.25
Primary Road	30,807	3.08
Integrator Street	38,634	3.86

Figure 1.15: Marri precinct

Built form and building heights

1. Buildings will have a strong inter-relationship with the streets.
2. The built form will be based on largely on the north-south and east-west grid street pattern.
3. Building heights generally a minimum of two storeys, with some higher density residential development adjacent to Carters Boulevard.

4. Most residential development will be detached and semi-detached (two-storey) houses but there will be opportunities for higher density in the vicinity of Carters Boulevard with some low-rise and mid-rise apartment blocks.
5. The local centre immediately adjacent to Carters Boulevard will be a focal point for the precinct.
6. Along the eastern boundary of the precinct will be a multi-use corridor. A separate infrastructure corridor will be required running parallel to Waterloo Road and incorporating Western Power 132 kV transmission lines.

Land uses

1. The land use of this precinct will be predominantly residential, with approximately 99 hectares of residential developable land (gross) (74 hectares net) which could produce around 3100 dwellings:
   - 600 dwellings @ 55 dph and
   - 2520 dwellings @ 40 dph.
2. A local centre (two hectares) is identified around the adjacent to Carters Boulevard, split between the Kingia precinct and Marri precinct. The local centre will be a focus for the precinct, providing for daily and weekly household shopping needs, and include a mix of retail, service, commercial, health and office uses on the ground floors, and service, office or residential above.
3. The use of rear lanes for vehicular access to properties, particularly those fronting Carters Boulevard and the multi-use corridors, is encouraged to reduce the number of crossovers, provide a continuous street frontage and minimise interruptions for pedestrians and cyclists.

Public realm

1. The precinct will have a green backdrop with the multi-use corridors along its eastern and western boundaries. A noise bund along the eastern boundary will be required to reduce noise from the Bunbury outer ring road.
2. Footpath and cyclepath links along the multi-use corridors will help provide access to services and facilities in the other precincts.
3. Street trees will help provide a landscaped feel to all streets, with existing trees retained where possible.
4. On-street car parking is to be integrated into the streetscape, with street trees and landscaping providing shade and visually reducing the dominancy of the parked cars on the streetscape.

Table 6: Land-uses Marri precinct

Total area	162 ha
Commercial / local centre	2 ha
Integrator road	4 ha
Primary road	4 ha
Public open space	21 ha
Public purpose - public primary education	8 ha
Public purpose - public secondary education	10 ha
Public purpose - private education	14 ha
Total non-residential uses	**63 ha**
Gross residential area	**99 ha**
Net residential area	**74 ha**
Potential minimum dwelling	**3100 dwgs**

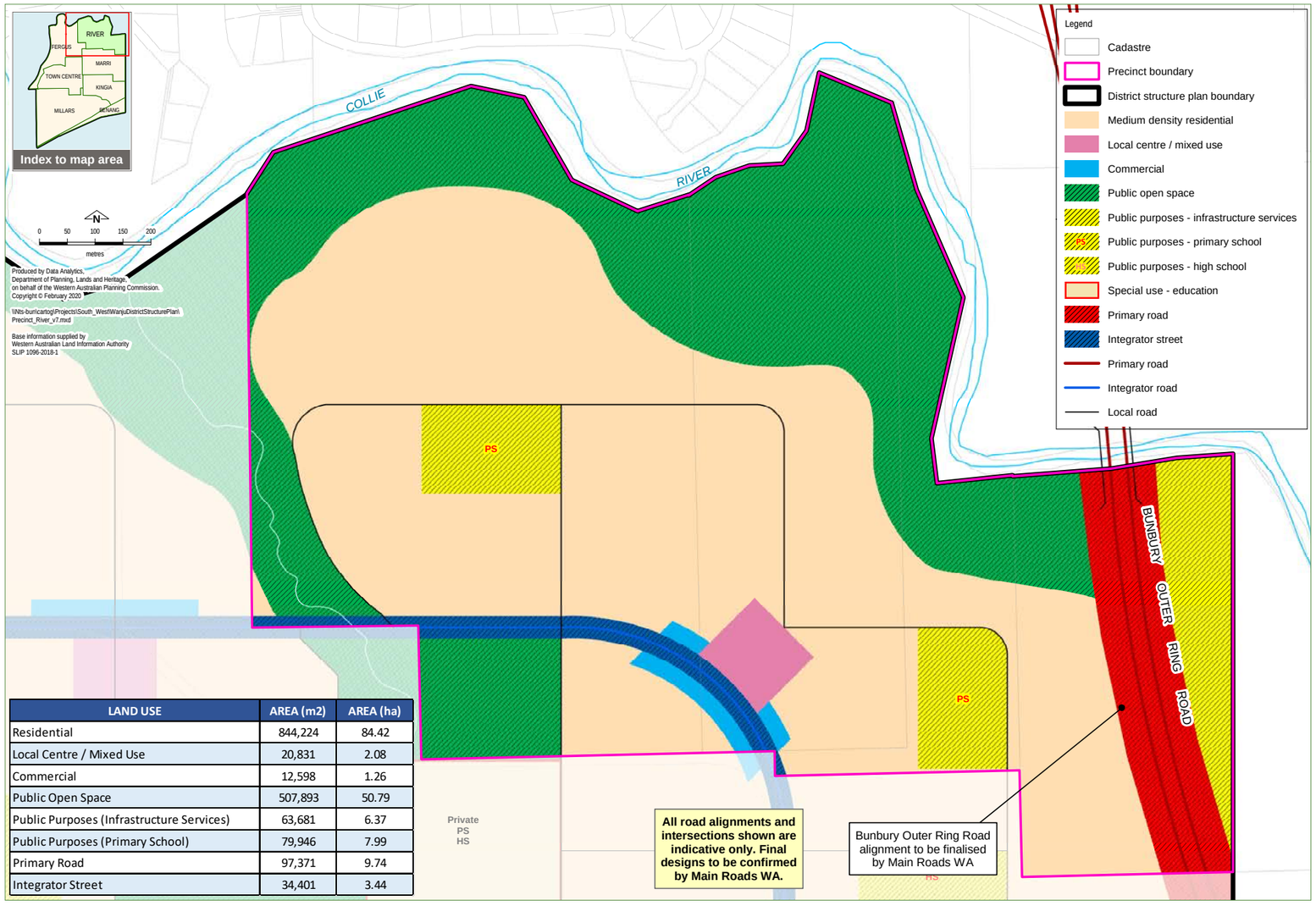
4.2.5 River precinct

Introduction

A detailed local structure plan will be prepared for this precinct and will be required to carry out a detailed bushfire risk management plan and foreshore management plan due to the proximity of the Collie River foreshore to proposed development. An activity centre plan will be required to be prepared for the local centre. The following requirements will need to be included by the local structure plan.

Precinct character

1. The precinct will be predominantly residential in character with a more urban, higher density character towards the south of the precinct around the local centre identified along Carnabys Boulevard / Carters Boulevard.
2. The Collie River foreshore on the northern boundary of the precinct will provide a green landscaped corridor incorporating footpaths and cycle paths. The foreshore reserve will be separated from housing by a local road and development in the vicinity will need to reflect the bushfire regulations current at the time. It will include undevelopable land to be ceded to the State Government as a foreshore reserve. The width of the foreshore reserve has been determined by the flood plain and the outcomes of DWER's Collie River flood study. It will generally be a minimum of 50 metres wide, with some areas potentially up to 600 metres wide.



LAND USE	AREA (m2)	AREA (ha)
Residential	844,224	84.42
Local Centre / Mixed Use	20,831	2.08
Commercial	12,598	1.26
Public Open Space	507,893	50.79
Public Purposes (Infrastructure Services)	63,681	6.37
Public Purposes (Primary School)	79,946	7.99
Primary Road	97,371	9.74
Integrator Street	34,401	3.44

Figure 1.16: River precinct

3. There will need to be appropriate landscaping and environmental enhancement along the Collie River foreshore. The foreshore will be an important relaxed and informal recreational open space for local residents and visitors with public barbeques, tables and benches, grassed areas, children's play space, and walking, cycling and interpretation trails along the river banks. There will be pedestrian and cycle links to the Collie River foreshore via the linear open space/multi-use corridors and a pedestrian underpass under the BORR adjacent to the Collie River providing a pedestrian and cycle connection to Millbridge.

4. Carnabys Boulevard and Carters Boulevard will be high-frequency public transport corridors, linking the precinct with the town centre and areas further afield.
5. There will be opportunities for recreational activities based around the Collie River, including an outdoor amphitheatre, fishing platforms, interpretive trails, and small-scale retail and eating establishments. These can be set out in more detail in the local structure plan.

Land uses

1. The land use of this precinct will be predominantly residential, with approximately 84 hectares of residential developable land (gross) (63 hectares net), which should produce around 2670 dwellings:
   - 550 dwellings @ 55 dph and
   - 2120 dwellings @ 40 dph.
2. A local centre (three hectares) is identified around the adjacent to Carnabys Boulevard. The local centre will be a focus for the precinct, providing for daily and weekly household shopping needs, and include a mix of retail, service, commercial, health and office uses on the ground floors, and service, office or residential above.
3. There may be opportunities for limited mixed-use development adjacent to the Collie River foreshore reserve which could include some retail and services catering for the day-to-day needs of residents and visitors.
4. The southern parts of the precinct, in particular, are well suited to aged and dependent persons' housing and facilities, due to the proximity to the local centre and public transit axis.
5. There is 51 hectares of public open space identified in the precinct most of which will be part of the Collie River foreshore.
6. Two state primary schools (8 hectares), with shared public/school playing fields.
7. Additional public opens space may be identified in the local structure plan as required to meet the precinct's public open space requirements beyond that of the school playing fields.

Built form and building heights

1. There will be mix of medium-density detached and semi-detached residential houses and higher density attached houses and low-rise and mid-rise apartment blocks in this precinct. To achieve the overall densities being sought the average lot size will be less than 300 m^2, and properties will generally need to be a minimum of two storeys.
2. Use of rear lanes for vehicular access, particularly along Carnabys Boulevard and other integrator streets and the linear open space/multi-use corridors, is encouraged to minimise crossovers and provide a continuous street frontage and minimise interruptions for pedestrians and cyclists.
3. Building heights will be encouraged to be greater than two storeys along Carnabys Boulevard and within close walking distance of the local centre.

Public realm

1. There will be a predominantly north-south and east-west street grid pattern across the precinct, with a more organic pattern in the vicinity of the Collie River foreshore area and multi-use corridors which are not aligned in a grid pattern.
2. Buildings to have a strong relationship with the streets with rear lanes providing vehicle access to garages at the rear of residential properties encouraged, particularly along Carnabys Boulevard.
3. Street trees and landscaping will need to be provided along all streets to provide a green landscaped ambience to the public realm and to provide shade.
4. The Collie River foreshore will be an important focus for the precinct and wider Wanju. It will provide nature space and informal and formal recreational space, and the opportunity for the recognition of Aboriginal heritage such as interpretative trails.

Table 7: Land-uses River precinct

Total area	166 ha
Commercial / local centre	3 ha
Integrator road	3 ha
Primary road	13 ha
Public open space	52 ha
Public purposes - public primary education	8 ha
Total non-residential uses	**81 ha**
Gross residential area	**85 ha**
Net residential area	**64 ha**
Potential minimum dwelling yield	**2670 dwgs**

4.2.6 Fergus precinct

Introduction

A detailed local structure plan will be prepared for this precinct and will be required to carry out a detailed bushfire risk management plan and foreshore management plan due to the proximity of the Collie River foreshore and existing remnant vegetation to proposed development.

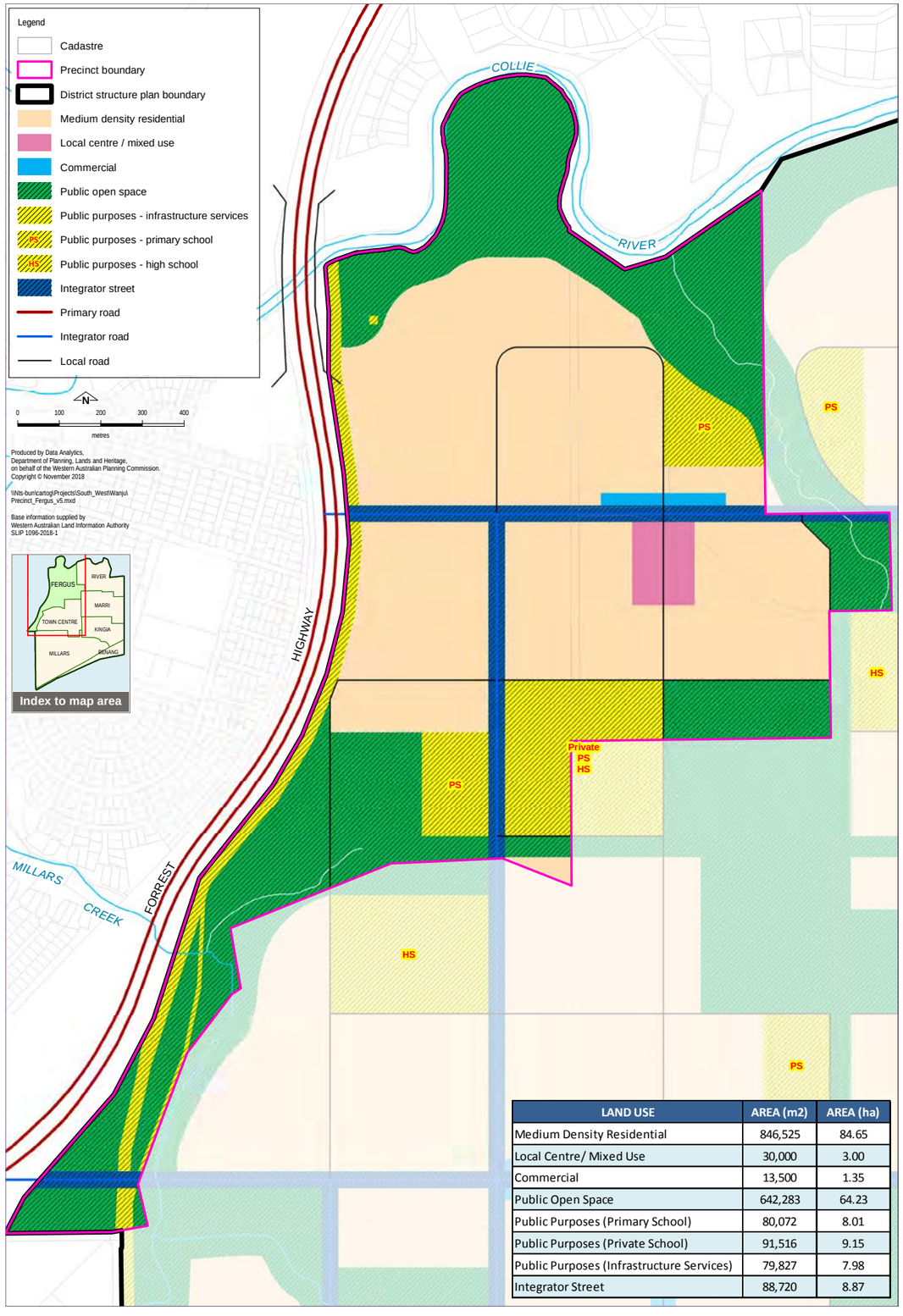
The following details and requirements will need to be included by the local structure plan.

Precinct character

1. The precinct will be predominantly residential in character.
2. The precinct will have as a backdrop the Collie River and the wetland that runs northwards into the Collie River. These will act as attractive landscaped recreational, water management and natural environment corridors. Existing mature trees are to be retained where possible and appropriate.
3. The precinct's western boundary will be the road reserve for Forrest Highway. A noise buffer will be required to protect residential development from traffic noise from Forrest Highway.
4. The existing Forrest Highway will provide an important access route into, and from, Wanju to the rest of Greater Bunbury and the BORR. There will be a pedestrian underpass of Forrest Highway on the southern bank of the Collie River.
5. Rapid transit stops are proposed along Clifton Boulevard and Carnabys Boulevard.

Land uses

1. Land use in this precinct will be predominantly residential, with approximately 94 hectares of residential developable land (gross) (70 hectares net) which could produce about 2910 dwellings:
   - 550 dwellings @ 55 dph
   - 2360 dwellings @ 40 dph.
2. A local centre (four hectares) is identified adjacent to Carters Boulevard. The local centre will be a focus for the precinct, providing for daily and weekly household shopping needs, and include a mix of retail, service, commercial, health and office uses on the ground floors, and service, office or residential above.



LAND USE	AREA (m2)	AREA (ha)
Medium Density Residential	846,525	84.65
Local Centre/ Mixed Use	30,000	3.00
Commercial	13,500	1.35
Public Open Space	642,283	64.23
Public Purposes (Primary School)	80,072	8.01
Public Purposes (Private School)	91,516	9.15
Public Purposes (Infrastructure Services)	79,827	7.98
Integrator Street	88,720	8.87

Figure 1.17: Fergus precinct

3. Two state primary schools (eight hectares), with the school playing fields also being used as public open space for organised sport and for informal recreation.
4. The Collie River foreshore, on the northern boundary of the precinct, will provide a green landscaped corridor incorporating footpaths and cycle paths. The foreshore reserve will be separated from housing by a local road and development in the vicinity will need to reflect the bushfire regulations current at the time. It will include undevelopable land to be ceded to the State Government as a foreshore reserve. The width of the foreshore reserve has been determined by the flood plain and the outcomes of Department of Water and Environmental Regulation's Collie River flood study. It will generally be a minimum of 50 metres wide, with some areas potentially up to 600 metres wide.
5. An infrastructure corridor of about one hectare will be required along the alignment of the ATCO high-pressure gas pipeline and Western Power 132-kV transmission lines which run north – south along the western boundary of the precinct.

Built form and building heights

1. Dwellings will be predominantly two to four-bedroom (two-storey) houses.
2. Residential lots will generally be between 250 and 350 square metres in area.
3. Building heights will be predominantly two-storey, with some higher apartment blocks, including areas in close proximity of Carnabys Boulevard and Clifton Boulevard.

Public realm

1. Buildings will need to have a strong relationship with the streets with rear lanes providing vehicle access to garages at the rear of residential properties encouraged, particularly along Carnabys Boulevard and Clifton Boulevard.
2. Street trees and landscaping, integrated with water sensitive urban design, will need to be provided along all streets, with existing trees retained wherever possible.
3. The design of the connection with Forrest Highway will be important to ensure that the impact on neighbouring residential and other uses of traffic and noise is kept to a minimum. Appropriate landscaping of the environs of the Forrest Highway will be important to providing an attractive residential environment.

Table 8: Land-uses Fergus precinct

Total area	187 ha
Commercial / local centre	4 ha
Integrator road	9 ha
Public open space	64 ha
Public purposes - public private education	8 ha
Public purposes - infrastructure	8 ha
Total non-residential uses	**94 ha**
Gross residential area (including mixed-use areas)	**93 ha**
Net residential area (including mixed-use areas)	**70 ha**
Potential minimum dwelling yield	**2910 dwgs**

4.2.7 Wanju town centre precinct

Introduction

A detailed local structure plan will be prepared for this precinct and an activity centre plan for the town centre itself, prior to development taking place. The local structure plan will be required to carry out a detailed bushfire risk management plan and foreshore management plan due to the proximity of the Millars Creek foreshore and existing remnant vegetation to proposed development.

The following requirements will also need to be included by the local structure plan.

Precinct character

1. The Wanju town centre precinct will contain the principal activity centre, immediately north of Baudins Boulevard, which will be a destination in its own right. When completed the town centre will act as a 'sub-regional centre', as defined in the Activity Centres for Greater Bunbury Policy, serving a sub-regional catchment.
2. There will be provision for a mix of urban uses and building forms and for medium-density residential development.
3. Attractive public spaces will act as key focal points for the community, allowing pedestrians to meet.
4. Streets will predominantly have a grid pattern operating in a north-south to east-west orientation and there should be the opportunity for some pedestrian-only streets in the heart of the town centre.
5. A strong sense of permeability and legibility will be required throughout the precinct with an emphasis on wide footpaths and separate cycle paths to enable safe, enjoyable pedestrian, cyclist, wheelchair and gopher movements and reduce car dependence.
6. Buildings will have a highly developed inter-relationship with the streets, with front doors and windows facing the street and overlooking of public spaces.

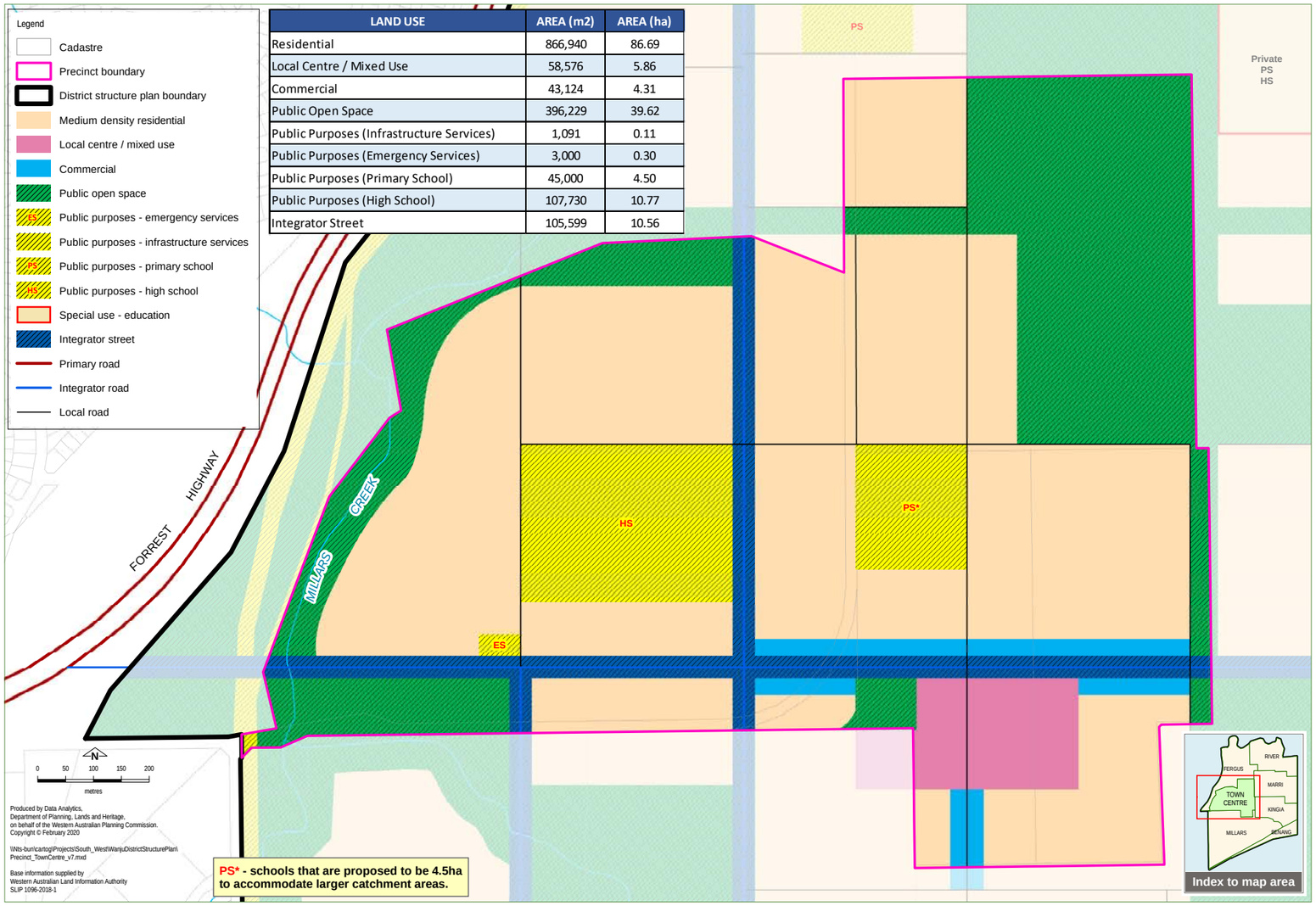


Figure 1.18: Wanju town centre precinct

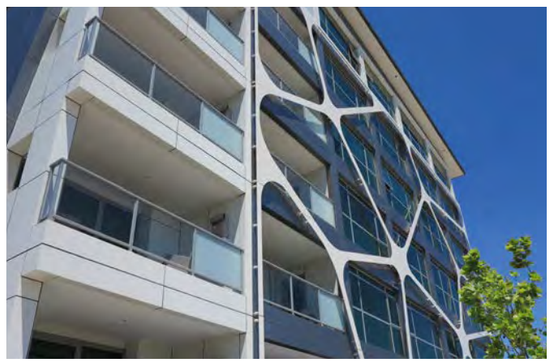
7. Street trees and landscaping, integrated with water sensitive urban design, will provide shade and shelter and soften the urban environment, with existing trees retained where possible.
8. The north-south Clifton Boulevard and east-west Baudins Boulevard will be key streets and will be designed as boulevards with wide pedestrian and cycle paths and will be fundamental components of the public transport network.
9. Linear open space / multi-use corridors will provide public open space, drainage management and pedestrian and cycle routes across the precinct.
10. Areas of high-quality remnant vegetation will be retained and enhanced, including:
    - a ten hectare public open space containing clay plan vegetation, linked to a north-south linear open space / multi-use corridor and
    - the existing mature trees within the Clifton Rd reserve to be incorporated into a linear open space / multi-use corridor feature running north-south through the precinct.
11. Public car parks will be predominantly multi-storey or decked. On-street car parking will be integrated into the streetscape. Private garaging associated with businesses or housing to be provided at the rear of buildings or within the buildings' footprint, such as on roof-tops or in basements.

Land uses

1. Within the town centre, with an approximate land take of 10 hectares including residential uses above, provision will be made for mixed-uses including:
    - commercial uses, such as offices, banks, other professional services, shops, cafes, restaurants and taverns
    - local government offices
    - community buildings including library, meeting rooms
    - sports facilities
    - hotel
    - public and private medical and health related practices and
    - public car parking.
2. 87 hectares of residential developable land (gross) (65 hectares net), including the mixed-use town centre, producing around 2840 dwellings:
    - 1960 dwellings @ 40 dph and
    - 880 dwellings @ 55 dph.
3. One public primary schools and school playing fields (4.5 hectares), for use outside of school hours as public open space for organised sport and for informal recreation.
4. Public open space (40 hectares) including natural open space to conserve the claypan habitat and remnant vegetation situated to the north of the town centre and foreshore reserve for Millars Creek.

Built form and building heights

1. Buildings will be required to be multi-storey in height, with an aspiration of three storeys or more, particularly in and close to the town centre. Buildings designed to accommodate mixed uses will need to be adaptable to allow for change in use over time.
2. The urban environment in close proximity to the town centre will be required to have a higher residential density (average of 55 dph).
3. Buildings will be required to front onto streets with vehicle parking, bin storage and servicing via rear laneways wherever possible, particularly along Baudins Boulevard and Clifton Boulevard and the multi-use corridors.
4. There will need to be access to the main retail and commercial uses via car parking at the rear but it is crucial that pedestrian access from the street is emphasized and encouraged.
5. Non-residential buildings will be energy and water efficient and provide end-of-trip facilities for cyclists and pedestrians.



Public realm

The following requirements will need to be included by the local structure plan:

1. A grid street pattern, in a north-south and east-west orientation, allowing for permeability and connectivity, particularly for pedestrians, cyclists and individuals with mobility difficulties.
2. Streets to provide a pedestrian, cycle and public transport priority with footpaths and cycleways separated from moving vehicles.
3. Streets to be designed to allow opportunity for cafes, restaurants and shops to use the footpath for alfresco space.
4. Street trees, shop awnings and potentially green walls are to provide shade and shelter and reduce urban heat island effect.
5. Multi-use green corridors, incorporating linear open space and drainage swales, running north-south and east-west, will provide a green landscape back-drop to the town centre. They will provide a focus axis for off-street pedestrian and cycle movements and for pocket parks with children's play areas and public seating.
6. The proximity of Millars Creek foreshore reserve to the town centre provides the opportunity for active and passive recreational activities, and excellent pedestrian and cycle linkages and a landscaped environment at the southern end of the town centre.
7. Rapid public transit routes and stops along key corridors through the town centre, including a potential light-rail route, connecting Wanju with other key locations in Greater Bunbury.

Table 9: Land-uses Wanju town centre precinct

Total precinct area	163 ha
Commercial / town centre	10 ha
Integrator road	11 ha
Public open space	40 ha
Public purposes - public primary education	4 ha
Public purposes - public secondary education	11 ha
Total non-residential uses	**76 ha**
Gross residential area (including mixed-use areas)	**87 ha**
Net residential area (including mixed-use areas)	**65 ha**
Potential minimum dwelling yield	**2840 dwgs**

4.2.8 Benang precinct

Introduction

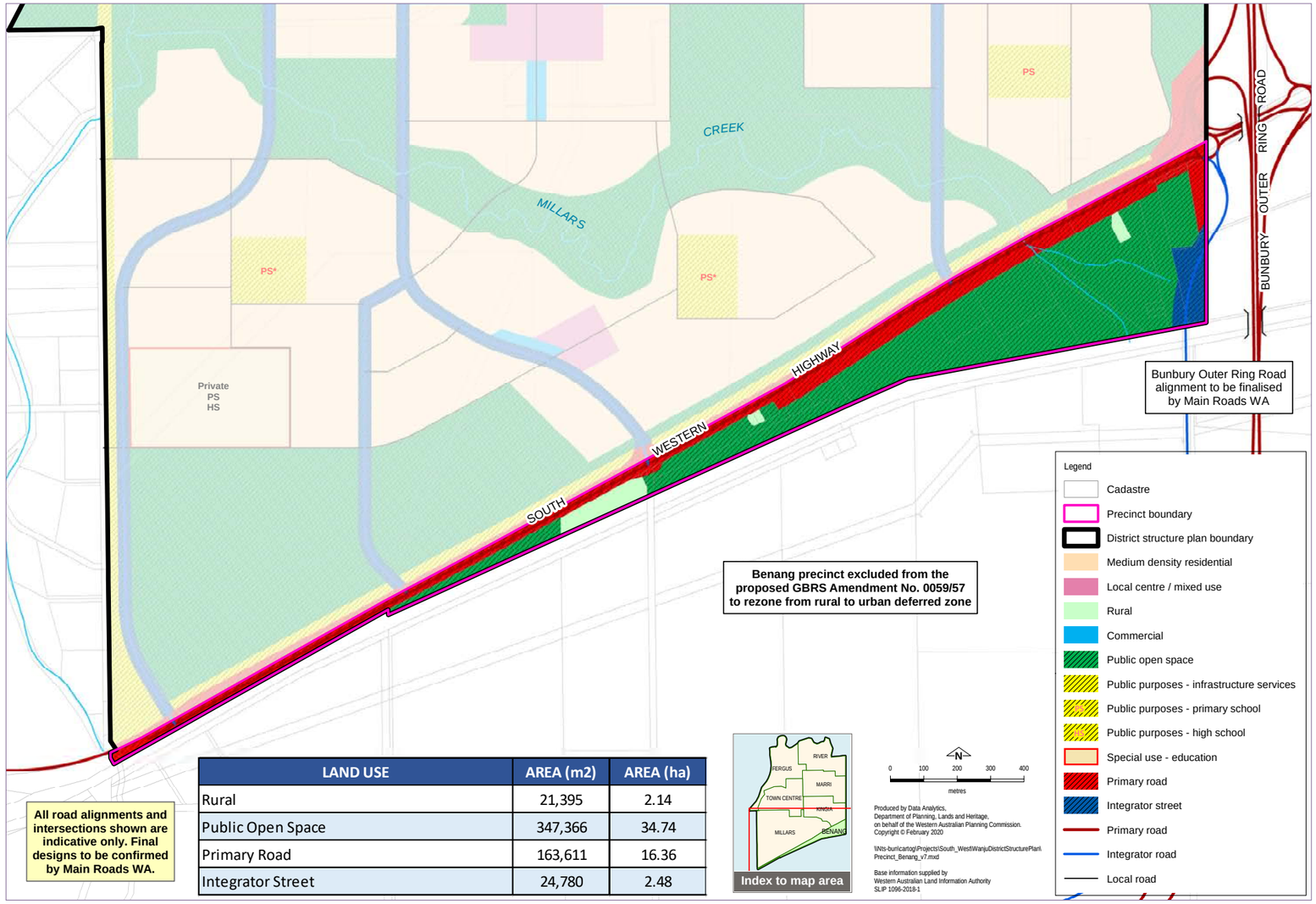
A detailed local structure plan will be prepared for this precinct and will be required to carry out a detailed bushfire risk management plan due to the proximity of existing remnant vegetation.
The following requirements will need to be included by the local structure plan.

Precinct character

1. This precinct will represent a predominantly green buffer between the urban development area of Wanju to the north and the Waterloo Industrial Park to the south.
2. The existing drainage line linking into Millars Creek runs through the eastern end of the precinct.
3. The character of the precinct is not proposed to change from its current form.
4. Waterloo Rd and the intersection of Waterloo Rd and South West Highway are to be upgraded in the long term to improve traffic movements and safety.

Land uses

1. The precinct is predominantly made up of remnant vegetation and there is a presumption against clearing of remnant vegetation within this precinct.
2. There are some existing residential properties within the area.



LAND USE	AREA (m2)	AREA (ha)
Rural	21,395	2.14
Public Open Space	347,366	34.74
Primary Road	163,611	16.36
Integrator Street	24,780	2.48

Figure 1.19: Benang precinct

Built form

1. No additional buildings are proposed in the precinct.

Public realm

1. Hynes Road, at the western end of the precinct, and Waterloo Road, at the eastern end of the precinct, are proposed to be ultimately grade-separated over South Western Highway and the railway line, linking Wanju with the proposed Waterloo Industrial Park.

Table 10: Land-uses Benang precinct

Total area	56 ha
Integrator Road	2 ha
Public open space	35 ha
Primary Road	16 ha
Rural	2 ha
Total non-residential uses	**56 ha**
Gross residential area	**0 ha**
Net residential area	**0 ha**

5 Local Development Plans

Local Development Plans are plans setting out specific and detailed guidance for a future development to coordinate and assist in achieving better built-form outcomes. They are to be used in a limited number of situations across Wanju and not as a means of lowering the residential densities set out in the DSP.

It will be for the local structure plans to identify where local development plans will be required.

6 Other requirements

Significant standard infrastructure will have to be provided upfront, including realignment of existing power transmission lines, bridges and provision of arterial drainage infrastructure. Staging and pre-funding of this infrastructure will need to be successfully managed for the development to proceed in timely fashion. These details will need to be determined once a developer is involved and a development contributions plan finalised to ensure the costs are shared fairly and reasonably between the developer, landowner, investors, local, State and federal government.

These elements are extremely difficult to implement in a piecemeal fashion. Some site and drainage remediation works may cross ownership boundaries, which will require a coordinated approach between landowners and government agencies. Given the level of fragmented ownership and the extent of infrastructure requirements for the development, implementation will need to be closely coordinated.

Significant up-front costs will be essential for infrastructure, including drainage and power lines. Further information will be available from the Servicing Needs Assessment, the Staging Plan, and in the final version of the DSP based on this Assessment.

7 Additional Information

This final DSP been informed by additional work being carried out by Main Roads WA with respect to the Bunbury outer ring road, and the post-development water modelling work which has helped inform the District Water Management Strategy (DWMS).

Part Two –
Explanatory section

1 Planning Background

1.1 Introduction and purpose

The DSP has been produced in line with the *Planning and Development (Local Planning Schemes) Regulations 2015* and associated *Structure Plan Framework* (August 2015). It will guide land-use and infrastructure planning in Wanju and aims to provide for sustainable development, while protecting and enhancing the area's heritage and landscape. It represents the first step in establishing a detailed land-use framework for the area and provides for the major structural elements, including major roads, strategic open space network, commercial and mixed-use areas, and environmental conditions.

The DSP will be used by the Western Australian Planning Commission (WAPC), the Department of Planning, Lands and Heritage (DPLH), local governments, State Government agencies, landowners and the community to provide greater certainty about future development in the area and help inform further detailed local structure plans for different precincts of the area and activity centre plans for the town and local centres. Planning decision makers will need to give 'due regard' to the DSP when making decisions on the subdivision and development of land within the DSP area.

The DSP looks to:

- provide a clear vision for the new community
- provide a land-use and infrastructure framework for the sustainable development and growth of Wanju
- establish the planning rationale for rezoning of land for residential, commercial and mixed-use development in designated locations as required to meet increased demand, and for land release
- give clarity to landowners and investors purchasing land as to intended future land uses
- identify precincts which will require local structure plans to be prepared in conjunction with key stakeholders, and then approved by the Shire of Dardanup and endorsed by the WAPC
- assist the Shire of Dardanup and other infrastructure providers, including Western Power, drainage, water supply and wastewater utility companies, and Main Roads to identify priorities for provision of new servicing and infrastructure to meet the future Wanju community's needs.

1.2 Land description

1.2.1 Location

The Wanju District Structure Plan (DSP) area is located approximately 12 to 15 kilometres east of the Bunbury CBD (Figure A). Wanju lies wholly within the Shire of Dardanup, with its northern boundary coinciding with the Shire of Harvey's southern boundary along the Collie River.

1.2.2 Area and land use

The DSP area includes an area of 1200 hectares of largely flat cleared farmland (see Figure 2.1) that is prone to seasonal inundation, due to the high perched water table, and is serviced by a network of rural drains managed by the Water Corporation. Some of the paddocks receive irrigated water via Harvey Water's irrigation channel network. Millars Creek traverses the DSP area in a south-east to north-westerly direction and discharges into the Collie River just over 500 m to the west of the DSP area boundary. The Collie River represents the DSP area's northern boundary.

1.2.3 Legal description and ownership

The DSP area is made up of a number of private landholdings, see Figure 2.2. There are 24 major landholdings contained within the developable area, that is, the area north of South Western Highway, including land owned by a handful different private family landowners and State Government agencies. In the precinct to the south of South Western Highway, which is of Aboriginal cultural and biodiversity significance, most of the land is in State ownership.

Wanju
District Structure Plan

Figure 2.1: Aerial photograph of Wanju DSP area

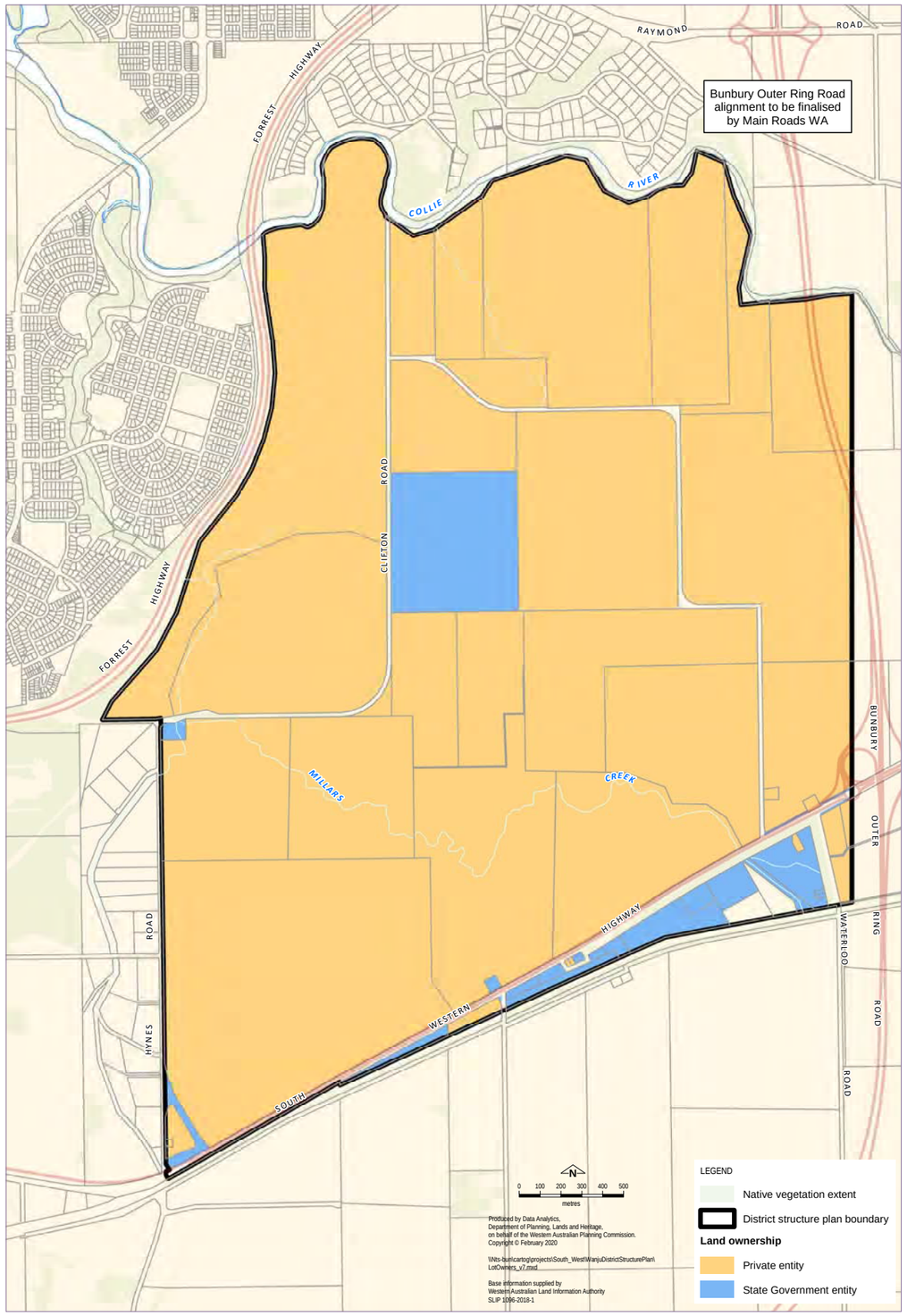


Figure 2.2: Cadastral plan

1.3 Planning framework

1.3.1 Zoning and reservations

The DSP area is currently zoned rural in the *Greater Bunbury Region Scheme* and the *Dardanup Local Planning Scheme*.

1.3.2 Regional and sub-regional structure plan

The *Greater Bunbury Structure Plan*, associated with the *Greater Bunbury Strategy 2013*, applies to the DSP area and details the urban expansion area.

1.3.3 Planning strategies

The WAPC-endorsed *Greater Bunbury Strategy 2013* identified 'East of Eaton', now called 'Wanju', as the primary urban expansion area and Waterloo as the primary industrial expansion area, respectively, for Greater Bunbury. This followed the consideration and testing of various development options during the development of the *Greater Bunbury Strategy*.

Wanju was selected as the preferred urban expansion area by the WAPC in the endorsed *Greater Bunbury Strategy 2013* due to a number of factors, including:

- its proximity to Bunbury CBD
- good transport links to Bunbury CBD and other employment areas
- area is contiguous to the established residential area of Eaton and the employment areas of Waterloo and Preston
- the development of the Waterloo Industrial Park and Wanju are expected to facilitate co- servicing and produce a number of synergies in terms of infrastructure
- the provision of efficient and safe transport options, including walking, cycling and public transport, can be provided to adjacent residential and employment areas
- it can provide a high degree of urban containment and provide for up to 28,600 dwellings
- infrastructure providers supported this location
- the Perth-Bunbury fast passenger train station and regional park and ride facility is to be provided within the area and will provide a catalyst to the desired high-density urban form
- the development area is clearly bounded
- compared to other areas considered, Wanju has few environmental constraints, such as remnant vegetation, flood risk, bushfire, mosquitos and storm surges.

The *Shire of Dardanup Local Planning Strategy* was adopted by the council on 12 March 2014 and published in April 2015 by the Shire of Dardanup. The strategy identifies the Wanju DSP area as a major urban expansion area.

1.3.4 Planning policies

State Planning Policies (SPPs), the *State Planning Strategy* and the *Liveable Neighbourhoods* policy document have been taken into account in developing the DSP. These are set out in Appendix Two.

1.3.5 Other approvals and decisions

There are no other approvals or planning decisions that significantly affect this DSP.

1.3.6 Pre-lodgement consultation

The Department of Planning, Lands and Heritage, in conjunction with Shire of Dardanup, has prepared the draft Wanju and Waterloo Industrial Park DSPs.
The preparation of the DSPs has been overseen and coordinated by:

- a project team, with representatives from the Shire of Dardanup's development and engineering directorate and officers from the Department of Planning, Lands and Heritage
- a working group, also with representatives from the shire, together with other key stakeholders, including the South West Development Commission (SWDC), Department of Water and Environmental Regulation (DWER) and LandCorp.

The DSP has been produced following meetings with, and input from, key Government agencies and specialist consultants working on behalf of the Department of Planning, Lands and Heritage, and the Shire of Dardanup. Information collected at these meetings, as well as from site visits and analysis, has been combined to enable the identification of opportunities, constraints and key issues affecting each area.

In formulating the DSP, alternative scenarios were tested and revised. The DSP has been refined through discussions with the project team, working group and the Shire of Dardanup councillors. This will be further refined based on the outcomes of the statutory consultation.

In developing the DSP, the following has been taken into account:

- the *Greater Bunbury Strategy* (2013) themes
- the *Shire of Dardanup Local Planning Strategy* (2015)
- views of State and local government authorities and agencies to gain a clear insight of the likely local needs and aspirations for Wanju
- learning from development proposals around Australia and other parts of the world
- environmental, heritage, transport, engineering, and socio-economic investigations specific to Wanju and Waterloo
- current SPPs, the State Planning Strategy and the *Liveable Neighbourhoods* document.

2 Site conditions and constraints

2.1 Biodiversity and natural area assets

Being predominantly cleared farmland, the DSP area offers relatively little biodiversity and natural area assets. There are no Ramsar listed sites or Wetlands of National Importance within the site or immediate surrounds. Surface water from the site drains into the Leschenault Estuary, approximately four km to the west, which is an important bird habitat and is recognised for its ecological importance under international migratory bird agreements. The *Leschenault Estuary water quality improvement plan* (DoW 2012) provides an approach to improve the estuary's current water quality (and that of the streams and rivers in its catchment), and to prevent further deterioration.

Due to the paucity of biodiversity those natural assets that do exist in the area take on even greater significance than they might otherwise and will need to conserved and enhanced. The most significant areas are the Millars Creek and Collie River foreshores, and the remnant vegetation areas between South Western Highway and the existing Perth-Bunbury railway line. A *Flora and Fauna Survey* was produced for Wanju and Waterloo by consultants GHD in 2014. A summary of the information produced by this report is set out in Appendix Four.

2.2 Landform and soils

The landform and soils of the DSP area are particularly significant for the future development of Wanju. The topography is a very gently sloping plain (one to 750 slope), falling from 15 metres AHD in the south-east to 11 metres AHD in the north-west corner. The area has a few topographic depressions and small isolated rises.

As part of the background for the Wanju and Waterloo DSPs, a *Geotechnical Survey Report* on soils was compiled by Soilwater Consultants (2014). The study identified that due to heavier soils and high groundwater levels, this area is considered to have wetland characteristics. In winter and spring considerable surface water is present in the area, with low-lying areas and drainage lines consistently filled with water. This perched system is ephemeral and will need to be managed appropriately with the proposed urban development.

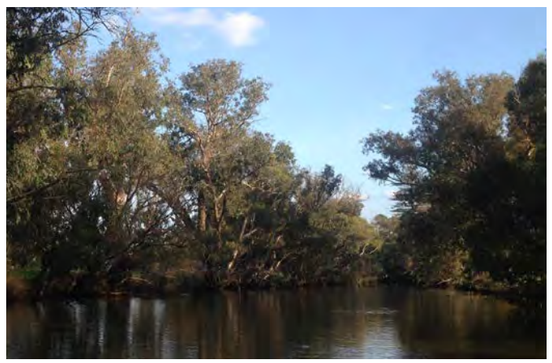
The soils of Wanju, and Waterloo, have high moisture contents and Soilwater Consultants' desktop Geotechnical Assessment classifies them as Class P, with footings having a greater propensity to damage and footing design must take the conditions into account. However, the assessment suggests that the classification could be improved to Class M with the utilisation of some fill material.

The desk-top Geotechnical Assessment, carried out by Soilwater Consultants (2014), of the DSP area (and Waterloo DSP area) looked at potential geotechnical risks and issues associated with the conditions which may impact on the proposed development. This broad assessment is being supplemented by a detailed Geotechnical Survey.

Acid sulphate soils occur throughout the Swan Coastal Plain, including the DSP area. The acid sulphate soil (ASS) risk mapping indicates 'high to moderate risk' within three metres of the surface associated with the Collie River, with the remainder of the DSP area mapped as 'moderate to low risk'.

Future detailed studies may be needed to determine the status of the soils in particular areas, especially in any peaty wetland systems or where coffee rock/iron hardpan is found. Sand dune rises are unlikely to have a significant ASS risk, however, this has not been delineated in the broad- scale mapping.

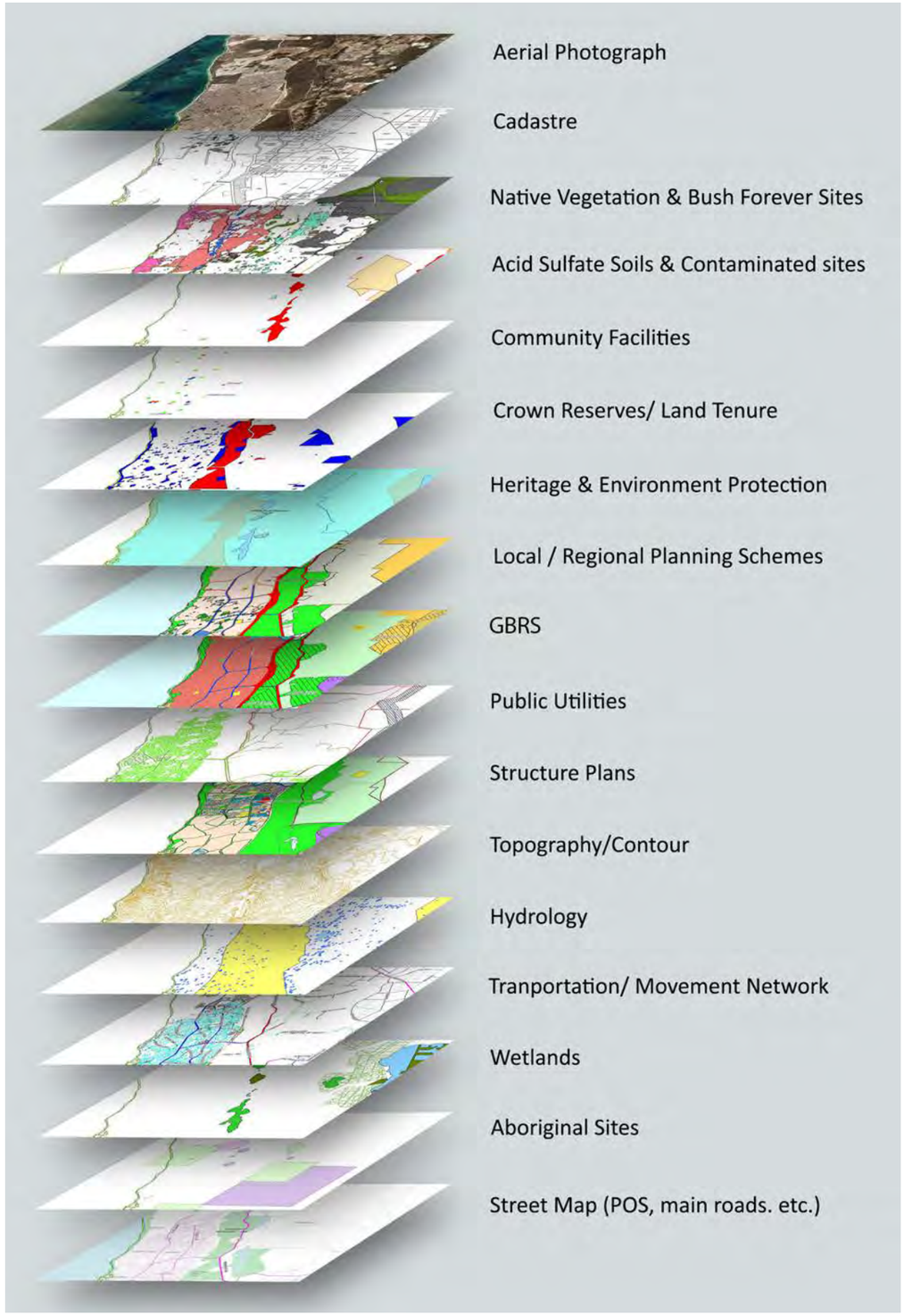
ASSs do occur in deeper sediments but these are unlikely to be influenced by any surface development, including deep sewage lines.



2.3 Groundwater and surface water

The Wanju DSP area lies within the Collie River catchment and the Millars Creek catchment. In addition, there are a number of irrigation channels operated by Harvey Water and other rural drains managed by the Water Corporation.

In the south-east corner of the DSP area, Millars Creek is connected to the Victory Drainage system. The Victory Drain (which runs adjacent to Waterloo Road) takes much of the surface flow upstream of the Waterloo DSP area into Millars Creek. On the western boundary of the DSP areas, the Vindictive Drain also discharges to Millars Creek.



2.3.1 Surface Water

Wanju is located within the Collie Surface Water Allocation Area/Lower Collie Tributaries sub-area. Water licensing in this area is managed by the Department of Water and Environmental Regulation under the *Rights in Water and Irrigation Act 1914*. The Department's *Lower Collie Surface Water Allocation Plan* (2015) sets out how much surface water can be abstracted from each resource per year (the water allocation limits). The plan also outlines how the department manages abstraction through licensing now and into the future.

There are three surface water resources within the Wanju DSP area:

- the Lower Collie tributary resource 8, for which there is no allocation
- the Lower Collie tributary resource 9, for which there is 2,000 kL available
- the Lower Collie tributary resource 10, for which there is 400,000kL available.

It is important to note that water would need to be pumped or diverted from the Collie River during periods of high flow (generally winter time), which will result in the need for significant storage to allow summer-time use.

There will be a requirement to obtain a permit for any works that will interfere with the bed or bank of a watercourse within the Wanju DSP area. Permits are not required by the Department of Water and Environmental Regulation for works associated with Harvey Water irrigation channels or Water Corporation rural drainage. However, the permission of Harvey Water or Water Corporation is required.

Surface water from Wanju discharges into the Collie River, which is a management area declared under the *Waterway Conservation Act 1976*. This management area is protected due to the importance of the Leschenault Inlet downstream, which has high social and environmental values. The Department of Water and Environmental Regulation published the *Leschenault Estuary water quality improvement plan* (DoW, 2012) that provides actions related to water quality that need to be considered in the development of Wanju.

Photos courtesy: Cathie Derrington

2.3.2 Flooding and inundation

Regional-scale flooding from the Collie River is confined to within the foreshore area, and while 'back-flooding' may occur within the Millars Creek system the Wanju DSP area is elevated above the regional-flood levels.

However, localised flooding within the Millars Creek catchment needs to be carefully considered and managed. The concentration of area's rainfall in winter and spring results in this system being seasonal in nature, apart from the areas irrigated by Harvey Water drains.

The flat nature of the area means there is sheet flooding across it after extended rainfall, especially true in late winter once the soil is waterlogged, meaning the ability for water to permeate into the soil profile is greatly reduced. Under these conditions, the water tends to sheet across the site until it reaches the constructed rural drainage network.

Large portions of the plain will also receive shallow seasonal inundation in late winter and early spring. The inundation is largely due to the duplex soil holding groundwater close to the surface. This inundation was historically more widespread, however, the creation of the rural drainage network has allowed the water to be moved downstream more quickly and thus reduced the area and depth of inundation.

The Millars Creek catchment discharges downstream through the residential suburb of Millbridge, before joining the Collie River. The foreshore in Millbridge has been designed to have a high degree of public access and interaction and it is important to avoid detrimentally impacting this. Therefore, flooding in Millars Creek cannot be increased post development.

2.3.3 Groundwater Resources

Wanju is located within the Bunbury Groundwater Area. Water licensing in this area is managed by the Department of Water and Environmental Regulation under the *Rights in Water and Irrigation Act 1914*. Groundwater is a low cost water source for surrounding sectors in the area. The department's *South West groundwater areas allocation plan* (2009) sets out how much groundwater can be abstracted from each resource per year (the water allocation limits). The plans also outline how the department manages abstraction through licensing for now and into the future.

There are three resources underlying Wanju comprising the Superficial Swan, Leederville and Yarragadee South. The Leederville and Yarragadee South resources are fully allocated at the time of publishing, and there is approximately 220,000 kL available in the Superficial Swan.

Wanju
District Structure Plan

The superficial aquifer consists of different superficial formations. The Guildford clay is the dominant formation across Wanju but it is an aquitard and is unlikely to yield water of any significance. The underlying sands of the Yoganup formation may provide a potential source of groundwater. The formation was deposited along the base of the Whicher Scarpe and while existing bores appear to have intersected the Yoganup formation inside the Wanju DSP area, it is not clear how far west the formation extends. As such the yields and water quality of the superficial aquifer are likely to be highly variable across the Wanju DSP area.

Groundwater levels largely follow the general slope of the land. This has produced contours that fall in a north-westerly direction, except for localised drawdown due to the incised waterways. Over much of the site, groundwater is likely to be between the surface to one metre below in the winter/spring peak, due to the clayey/loamy nature of the underlying soil and flat landform. Some small sand rises are likely to have over 1.5 metres of separation to groundwater with the biggest separation to the maximum recorded groundwater depth being 2.46 metres.

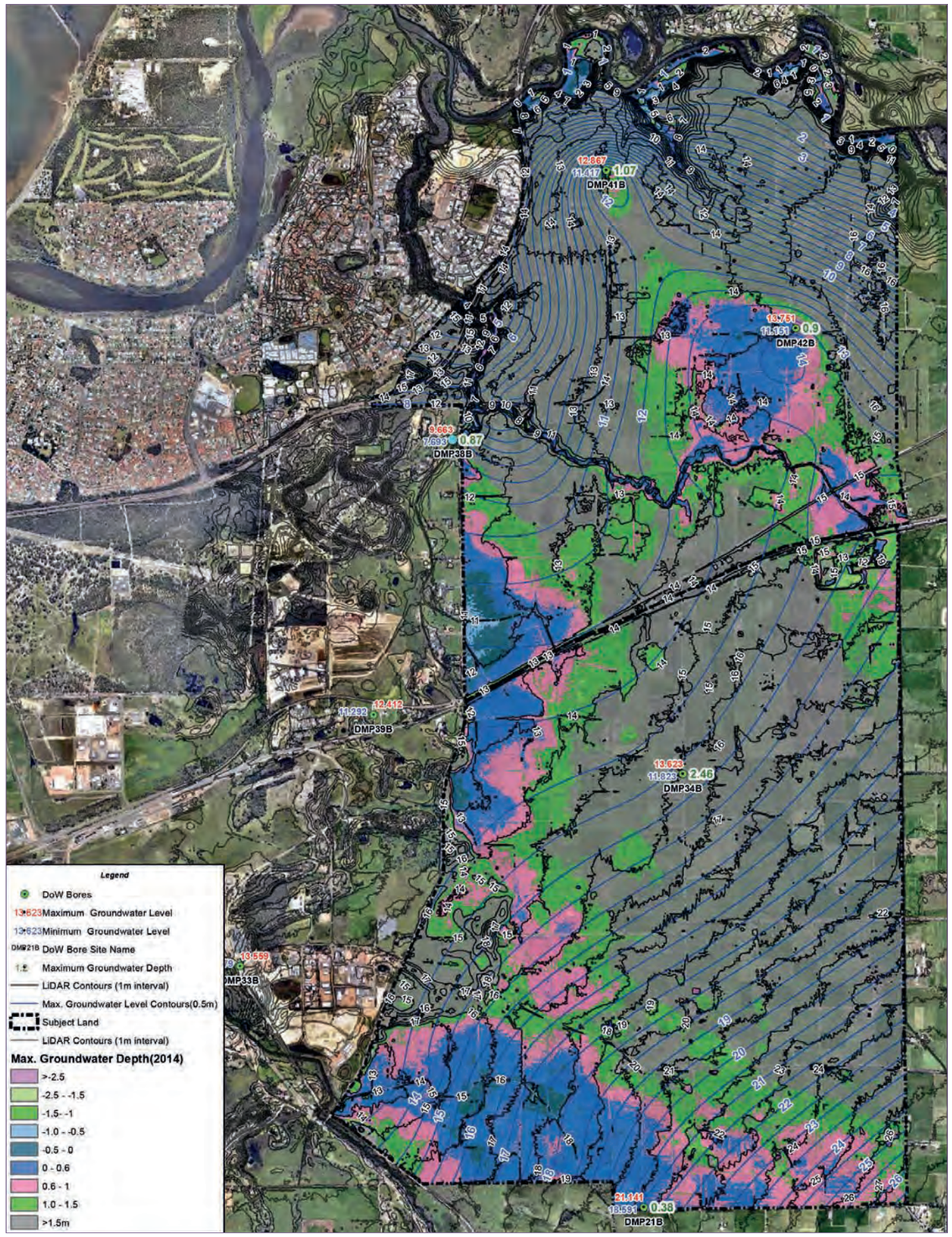


Figure 2.3: Depth to groundwater

2.4 Bushfire hazard and risk management

As part of the background work for this DSP (and the Waterloo DSP), Strategen *Environmental Consultants carried out a Strategic Bushfire Hazard Level Assessment* for the urban and industrial expansion areas based on the criteria set out in SPP3.7 and its Guidelines. It identified the vegetation classes and slope that influences the bushfire risk at Wanju (Figure 2.4).

This assessment outlines that the DSP area is located within a 'Moderate' bushfire hazard area, with small areas of 'Extreme' hazard (Figure 2.5). The assessment of post-development bushfire hazards identifies:

> *"Wanju DSP will retain areas of 'Extreme' bushfire hazard within some areas of Public Space, including areas subject to revegetation. An opportunities and constraints assessment has identified development areas adjacent to these areas of 'Extreme' hazard and mechanisms for ensuring that development is sited and designed to manage bushfire risks."* (See Figure 2.6).

Proposed post-development bushfire hazards can be managed subject to implementation of the following recommendations identified in the BHL Assessment, ensuring that:

1. all development within Wanju will be limited to areas of 'Low' or 'Moderate' bushfire hazard:
   - implementation of managed active recreation areas within Public Space-habitable development interface and/or perimeter roads
   - school development areas be designed to have capacity to achieve additional internal building setbacks from adjacent classified vegetation
   - implementation of perimeter roads at the interface of medium-density residential development areas and classified vegetation within public space near the western boundary of the DSP.
2. detention basins and drainage swales:
   - revegetation be designed to ensure that no additional non-compliant bushfire risk is introduced
3. landscaping:
   - prepare a 'Landscape principles and vision plan' to ensure that bushfire hazards and urban amenity requirements are considered.
4. vehicle access:
   - implementation of access arrangements in the short, medium and long-term duration of development will need to ensure that all occupiers and visitors are provided with at least two vehicular access routes at all times.

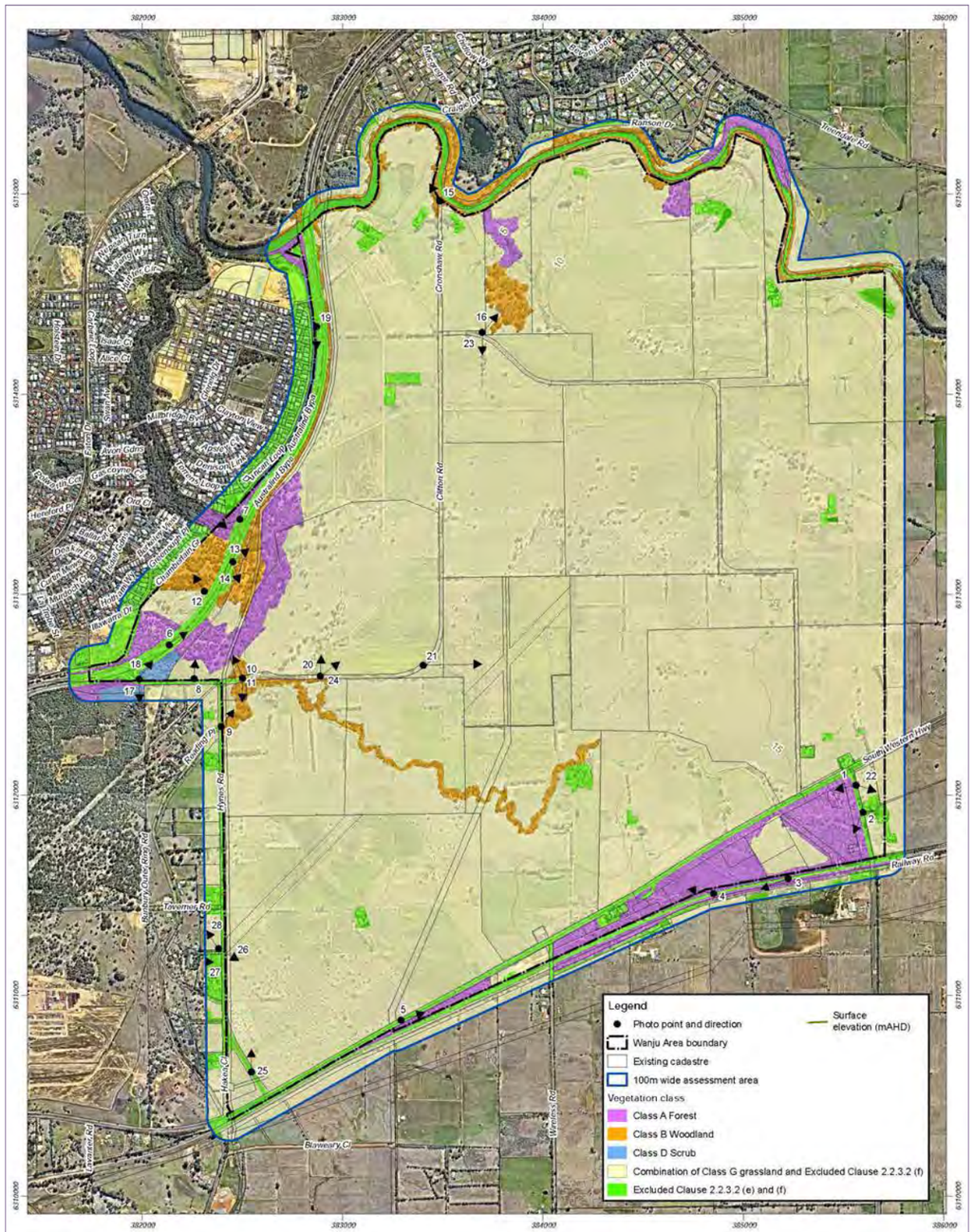


Figure 3: Wanju: Vegetation class and effective slope

Figure 2.4: Vegetation class and effective slope

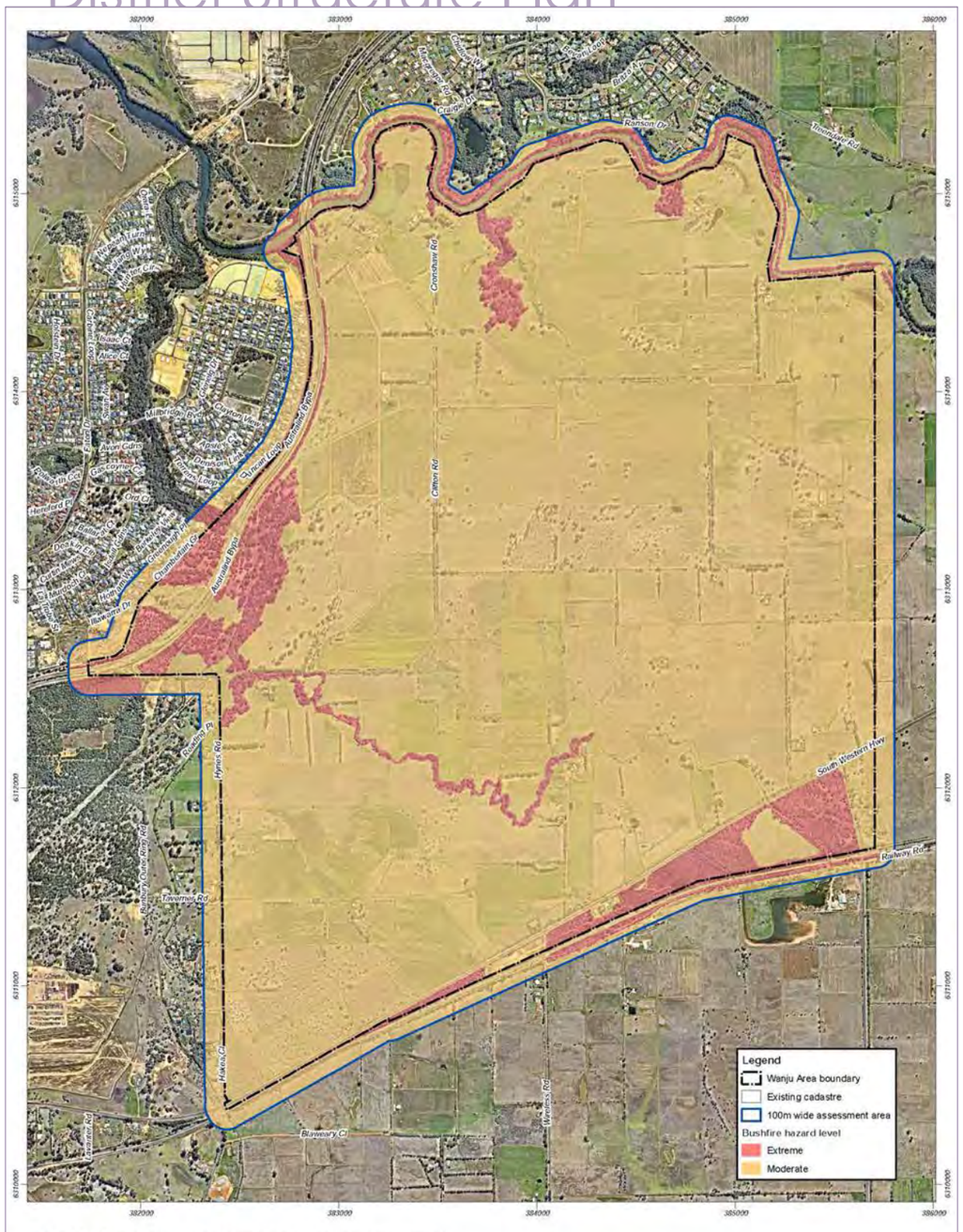


Figure 6: Wanju: Pre-development hazard level assessment

Figure 2.5: Pre-development bushfire hazards

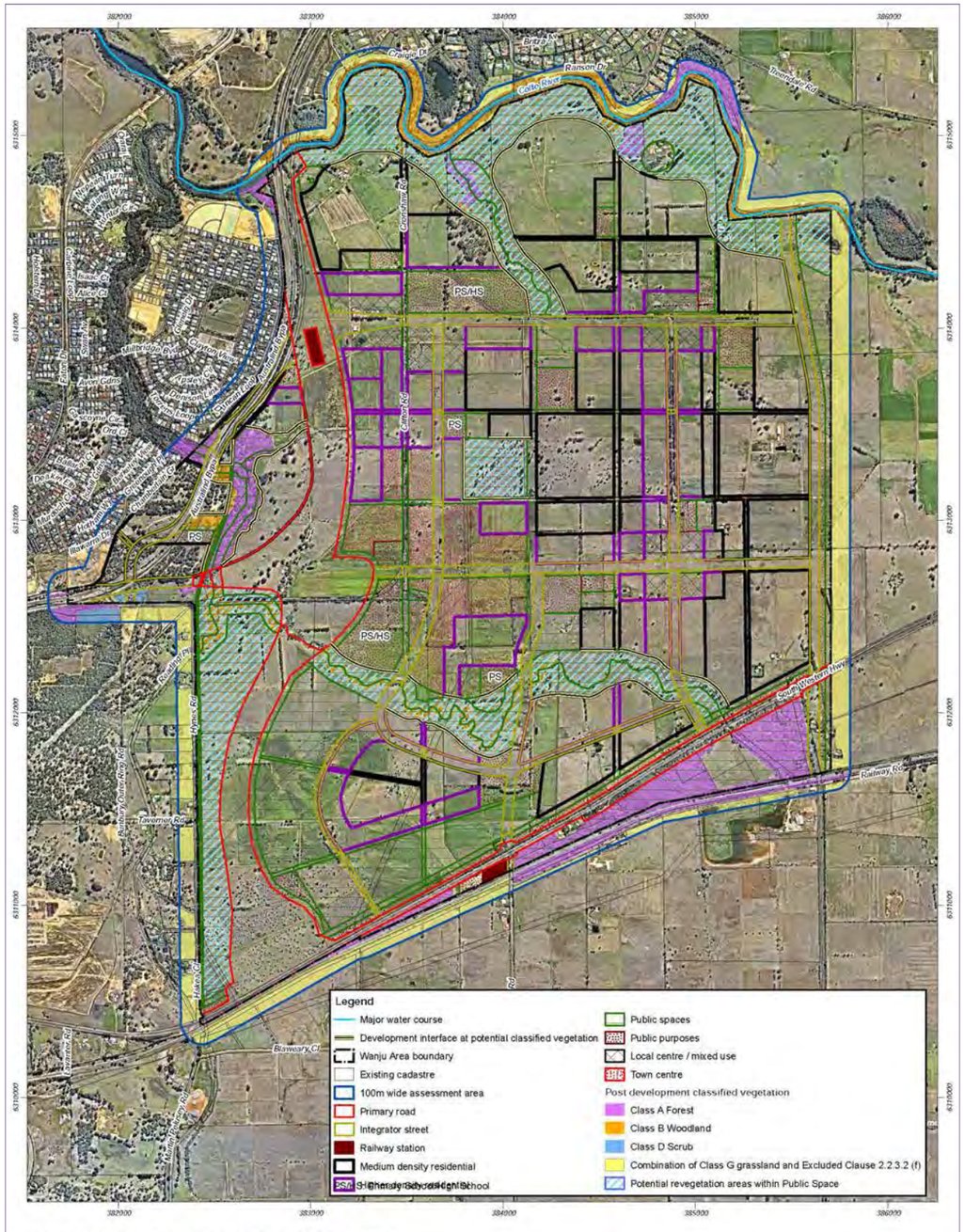


Figure 9: Wanju: Post development bushfire hazards

Figure 2.6: Post-development bushfire hazards

5. water supply:

- implementation of reticulated water supply.

Local structure plans which include, or are adjacent to, the Collie River or Millars Creek foreshore areas will be required to be supported by a detailed foreshore management plan, bushfire hazard level assessment and bushfire management plan. These plans must be developed at the same time to ensure that the long-term future foreshore conditions are taken into account and that the foreshore requirements are not adversely impacted as a result of bushfire requirements.

2.5 Heritage

2.5.1 Aboriginal Heritage

Archaeological evidence confirms that Aboriginal people have inhabited the Swan Coastal Plain and the adjoining Darling Scarp for more than 40,000 years. Archaeological sites around Bunbury include historical sites, man-made structures, skeletal materials/burials and stone artefact scatters.

Ethnographic and historical documents highlight the importance of watercourses to Noongar land- use patterns, ceremonial cycles and mythological tracks. As part of the background evidence for this DSP, an *Ethnographic and Archaeological Heritage Assessment* was compiled by Big Island Research (2014).

The study shows that there have been some limited archaeological finds to the western side of the Waterloo Industrial Park DSP area but these are not considered significant, see Figure 2.7.Two DAA sites are recognised along water courses within the DSP area: the Collie River (DAA 16713) and a portion of Millars Creek (DAA 4865).

The wedge-shaped Benang precinct (DAA site 17775) is a well-known former Aboriginal camping/community/residential site. The value of the land to the local Aboriginal people warrants it being protected from unsympathetic development. Any disturbance within this area would require ministerial consent via S.18 of the *Aboriginal Heritage Act*.

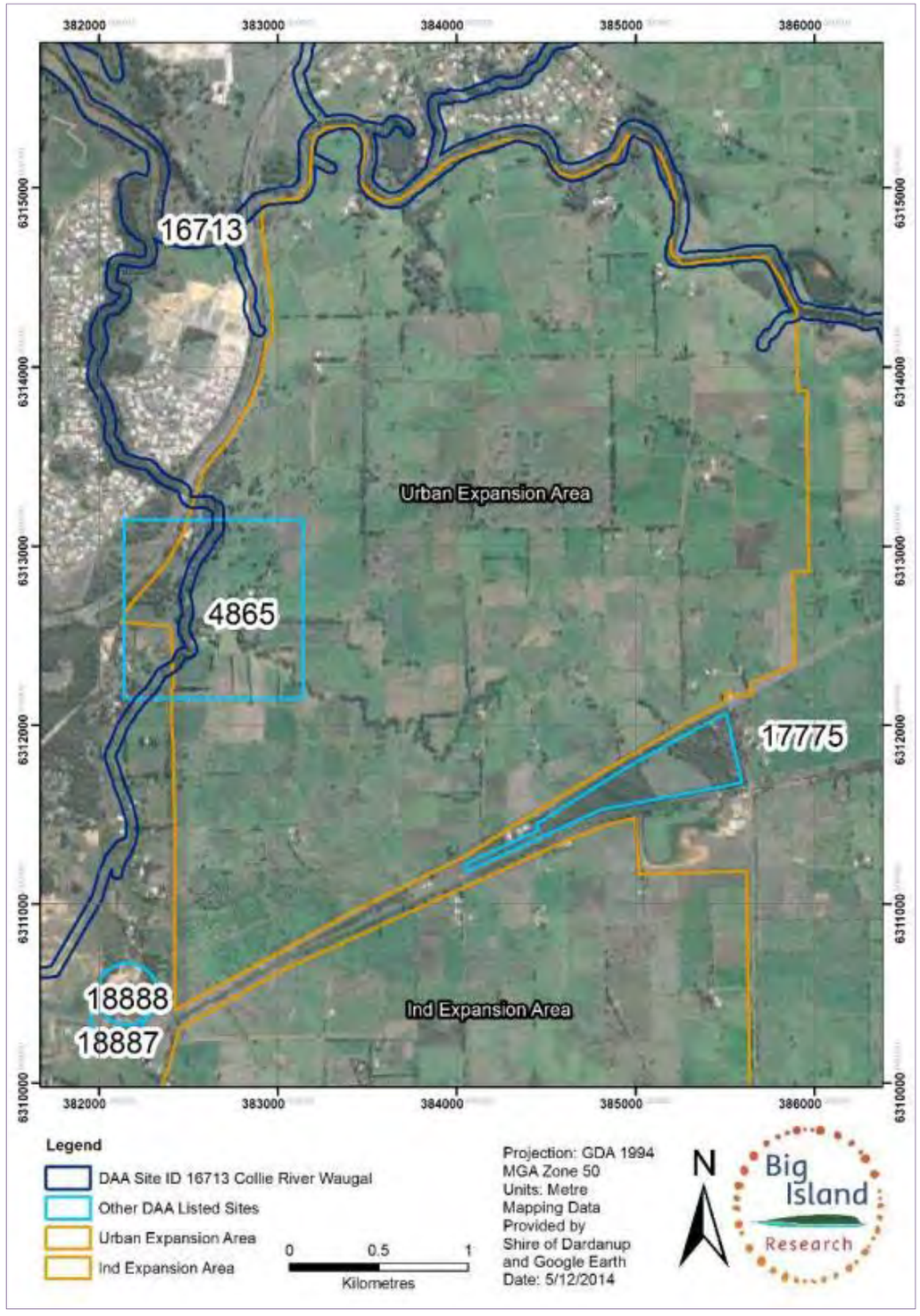


Figure 2.7: Aboriginal heritage sites

2.5.2 European heritage

The Greater Bunbury area was originally settled by Europeans in the 1830s with the DSP areas settled from the 1890s and subsequently cleared for agricultural use. In the 1890s the Perth-Bunbury railway line was completed and in 1933 construction of the Wellington Dam finished, allowing irrigation of the area.

The large expanse of private rural holdings (Figure 2.8) means that the majority of the DSP area has not been used for public activities. The Collie River has been used for a range of recreational activities, including boating, fishing and canoeing. Due to the predominately private ownership along the banks of the river, the main access and activity is upstream of the DSP area. The wetland associated with the Waterloo Nature Reserve is used for bushwalking and other nature appreciation activities.

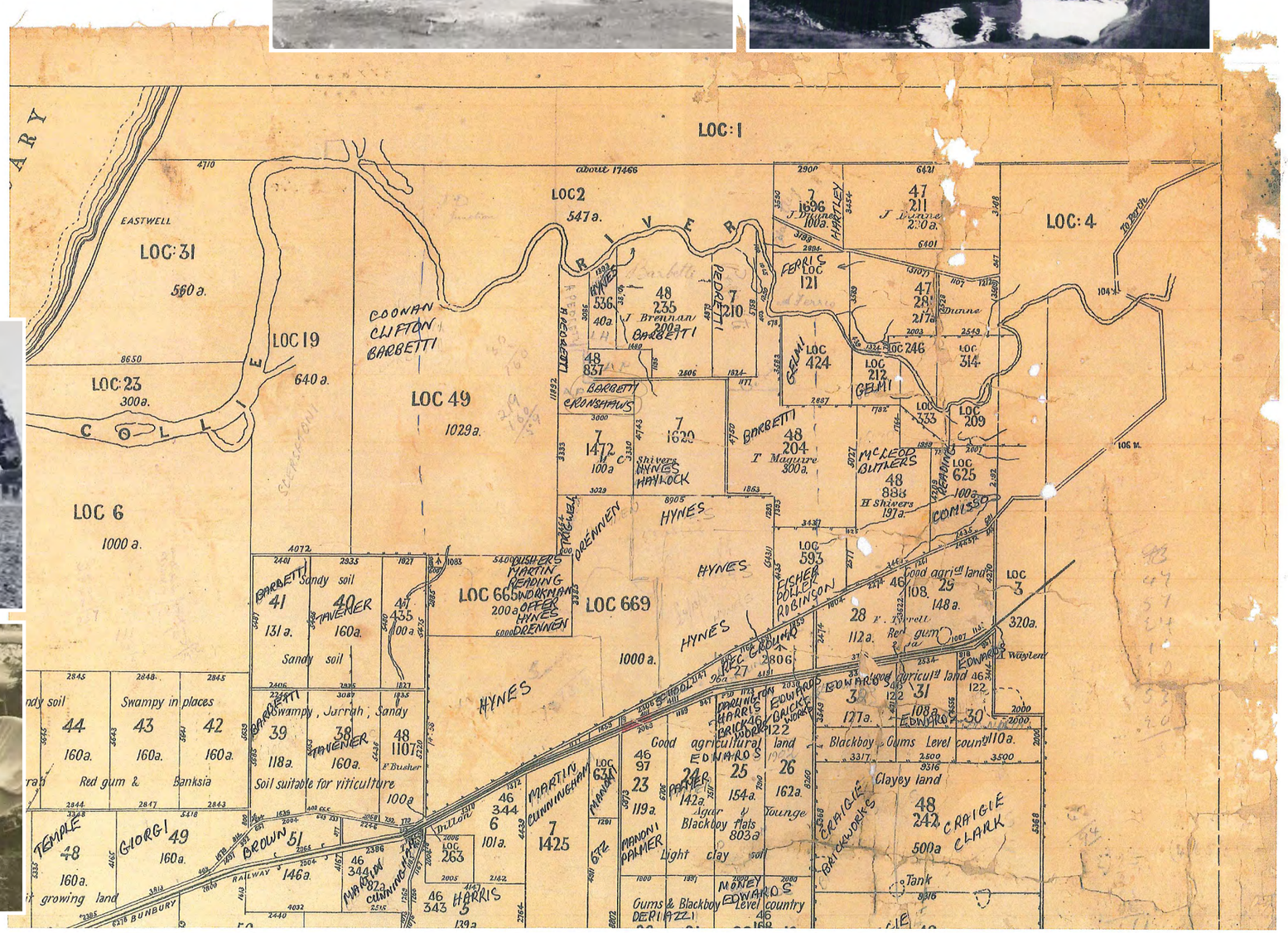


Figure 2.8: Historic cadastre boundaries in the Wanju and surrounding area

Photos and map courtesy: Hynes Family

2.6 Foreshores

2.6.1 Collie River

Although degraded, due to weed encroachment and historic grazing, the Collie River and its foreshore within the DSP area does provide in-situ habitat as well as a link for both aquatic and riparian fauna. This contributes to it as having high ecological value (Flora and Fauna Report).The 2008 *Collie River Action Plan* classed the river as 'c-grade' due to the large presence of weeds and areas of erosion present, or prone to erosion.

There is one part of the southern bank of the Collie River where the incised banks stretch southward into the DSP area, probably due to an old waterway back cutting into the plain. There are some small areas of river flats also associated with the river floodplain that sit between the incised banks and the main river channel.
Side channels and wetlands are also associated with these floodplain areas.

2.6.2 Millars Creek

Millars Creek traverses the DSP area in a south-east to north-westerly direction and discharges into the Collie River just over 500 metres to the west of the DSP area boundary. In the south-east corner of the DSP area the creek is not well defined and there is little remnant vegetation associated with it. However, as the creek flows downstream through the central and western portions of the DSP area the channel becomes more incised and remnant vegetation more significant.

2.7 Strategic mineral resources

There are no identified strategic mineral resources within the Wanju DSP area. However, there is a regionally significant clay resource located in the north-east of the Waterloo DSP area, and also east of Waterloo Road, Figure 2.9. This resource is identified in the *Strategic Minerals and Basic Raw Materials Resource Policy* (2005) of the Greater Bunbury Region Scheme.

The Department of Mines, Industrial Regulation and Safety (DMIRS) has indicated that the current Environmental Protection Authority (EPA) guidelines recommend a separation distance of 300 to 500 metres between clay extraction and urban development, and between 300 metres and 1 km between a clay brick works and urban development, depending on the scale of the brickworks. For the purposes of this DSP it is assumed that the maximum buffer guideline distances can be reduced to an extent that does not impinge on the urban development of Wanju but this is an issue that will need to be resolved through the relevant local structure plan following discussions with DMIRS, EPA and the brickwork operators.

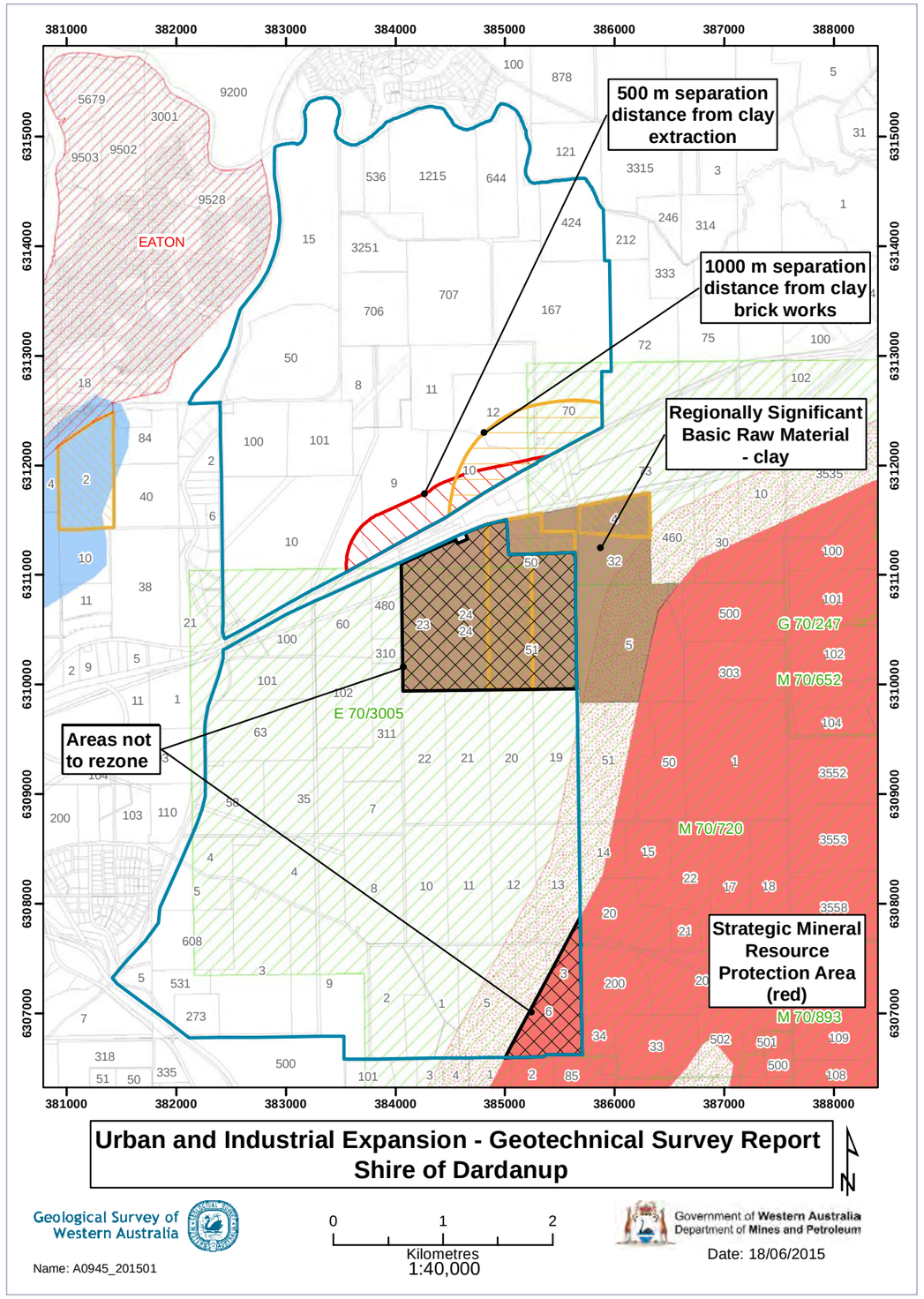


Figure 2.9: Strategic mineral resource and maximum guideline buffers

2.8 Strategic Priority Agricultural Land

The majority of the DSP area, and the upstream catchments, are identified as strategic priority agricultural land by the Greater Bunbury Region Scheme *Strategic Agricultural Resource Policy* (2005), Figure 2.10. Much of this area is irrigated by Harvey Water and drained by Water Corporation drains. The effectiveness and efficiency of water management, to maintain agricultural practises, in the whole catchment cannot be detrimentally affected during the staged and final complete implementation of by the development proposed in the DSP areas.

The loss of the strategic priority agricultural land was recognised as a constraint by the *Greater Bunbury Strategy* in determining that Wanju and Waterloo were the most appropriate locations for strategic greenfield development in the sub-region. However, there is the opportunity for additional agricultural land outside the DSP areas to be irrigated to offset the loss of the irrigated farmland in the DSP areas.

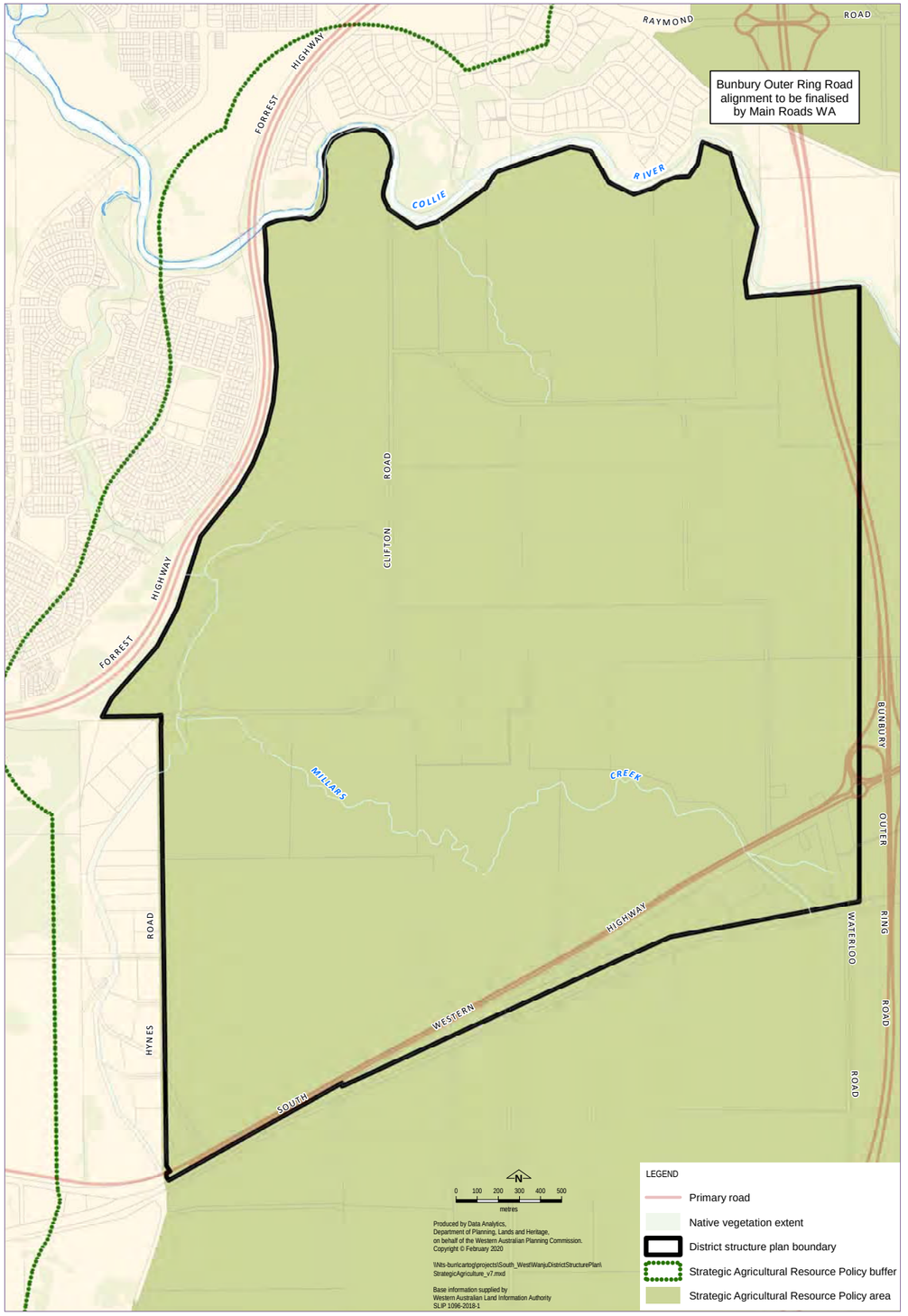


Figure 2.10: Strategic agricultural resource policy

3 Land Use and subdivision requirements

3.1 Land use

The philosophy underlying the DSP is to deliver high-quality environmental and social outcomes while ensuring that development remains economically viable. Wanju is proposed to be a development that enables the residents to live locally by having access to a wide range of local facilities, services, jobs, educational and recreational opportunities within an attractive, low- carbon and water-sensitive environment.

The implementation of Wanju will have regard to the following fundamental objectives:

- commercial and mixed-use buildings within activity centres, with active building fronting the streets and public realm
- adaptable buildings for the provision of mixed-uses, including places of employment and the integration of civic and community land uses
- a high degree of employment self-containment within Wanju and Waterloo
- a variety of medium to higher housing densities and a range of residential types that will accommodate a mixture of household types
- a high-quality public realm and built-forms where pedestrians and cyclists have priority
- a high-frequency public transport system that provides access across most of Wanju to the town and local centres and other key activity attractors in Greater Bunbury
- a unique sense of place that reflects its location in the South West
- a network of people-friendly public open spaces and green infrastructure linkages
- water sensitive and energy efficient design
- 'future-proofing' the development by allowing for flexibility over time.

3.2 Public open space

The provision of public open space will be particularly important within Wanju due to the relatively high residential densities being proposed. The public open spaces will include not just the green recreational and natural spaces but streets and footpaths. The public open spaces will help in achieving a unique sense of place for Wanju by encouraging:

- legible, vibrant and distinct street environments
- family-friendly public spaces
- adaptive open spaces
- diverse recreational opportunities
- natural green corridors of high amenity
- pedestrian-orientated environments with attractive and direct walking and cycling links, particularly connecting the town centre and local centres, Collie River foreshore, Millars Creek foreshore and district playing fields.

3.3 Residential

Neighbouring development in the suburbs of Millbridge, Eaton, Treendale and Kingston are dominated by single-storey detached houses. Wanju offers an opportunity to significantly increase the diversity of housing types, reflective of the changing demographic trends in the twenty-first century and urban consolidation objectives.

It is expected that a mix of densities and dwelling types will be provided throughout the DSP area to ensure a diversity and vitality of residential environments. Specific residential densities will be established as part of the local structure plans for each precinct, with variations dependent on the local context within the precinct and best practice at that time.

Such higher densities are considered necessary to support the urban form and structure planned for Wanju, in accordance with the *Greater Bunbury Strategy 2013* and to maximise the efficient and effective use of land. The housing form will support urban consolidation, public transport and sustainability objectives.

3.4 Movement networks

Suburban low-density residential development in Greater Bunbury over the past 50 years or more has largely encouraged car travel and discouraged walking, cycling and public transport use. Redevelopment of existing urban areas at higher densities, and higher-density greenfield development and mixed-use development, such as at Wanju, will encourage and assist a modal shift away from the car, while recognising that the car will remain an important transport mode.

Also, the rise of personal computer use and increase in broadband speeds will offer the opportunity for reducing the number of trips required to be made. Working from home and on- line shopping is likely to continue to increase in popularity, also reducing the need to travel.

Fundamental to a successful intensive, mixed-use development is the provision of a safe, legible and effective movement network for all users. The key ideas behind planning for travel and movement into, out of, and within Wanju include:

- most local residents, workers and students do not need to rely on private vehicles for most local trips through having high quality and frequent public transport service and attractive walking and cycling alternatives
- a highly connected pedestrian and cyclist network that is amenable to users and provides good access to local destinations and connections to the wider sub-regional network
- the safeguarding of space for the future provision of a rapid public transport option connecting Wanju to Bunbury CBD and other parts of Greater Bunbury, and an efficient bus service to key activity generators in Greater Bunbury and other centres in the South West Region
- accommodation of the needs of an ageing population, such as the adequate provision of public benches and seating at regular intervals throughout the development, including at all bus stops
- provision for alternative modes of transport, including electric bicycles, electric wheelchairs, gophers, skateboards, and rollerblading
- balancing the function and impacts of regional and local transport
- an internal street hierarchy with connections to the wider sub-regional network which disperses traffic
- provision of attractive and comfortable pedestrian and cyclist networks that include street trees and landscaping, integrated with water sensitive urban design, to provide shade and reduce the urban heat island effect.

3.5 Water management

Wanju will be a water-sensitive development, which will be achieved by applying water management in accordance with the principles of *Better urban water management* (WAPC, 2008). This will ensure integrated land and water planning to provide social amenity, environmental protection and resilience to climate change (including water supplies), through the adoption of water sensitive urban design and green infrastructure.

Set out below is a summary of the main points of the individual strategies set out in the *Integrated Water Management Strategy* (which will be updated in the District Water Management Strategy).

Drainage Management

i. Bioretention systems, detention basins, wetlands and an extensive swale network will capture and treat stormwater flows. All flows leaving the site, up to the one per cent AEP event, are to match the pre-development rate, or as determined by the District Water Management Strategy (DWMS).

ii. Residential and commercial lots will have a direct connection to the storm water pipe system, after storage is exceeded on the lot.

iii. On-lot storage is in accordance with Shire of Dardanup's guidelines.

iv. All finished floor levels will be designed to maintain a clear separation of 300 millimetres between the habitable floor levels and the one per cent average event period (AEP) flood level, generated on site.

v. All finished floor levels will be designed to maintain a clear separation of 500mm between the habitable floor levels and the one per cent average event period (AEP) event flood level of the site's waterways and major swales that transport flows from upstream catchments.

vi. The flows from upstream that interact with the DSP area are to be controlled based on the outcomes of the *District Water Management Strategy* (DWMS).

Groundwater and Acid Sulphate Soil Management

i. Inflows to the groundwater are to be treated through bio-retention media and plants within the basin and swales to improve the quality of water prior to it entering the groundwater.

ii. A subsoil drainage system, interconnected with the swale network, will be used to control groundwater levels.

iii. All groundwater-level management is to focus on fill minimisation.

iv. Subsoil drainage systems are to incorporate amended filter media around them to treat groundwater prior to it entering the subsoil pipe.

v. All groundwater discharged from sub-soil drains will be further treated through the vegetation within the system.

Sustainable Water Servicing

i. All houses, industrial, commercial and community buildings to be connected to rainwater storage devices where practical. These are to be plumbed to provide internal and external non-potable water.

ii. All houses to be connected to a potable reticulated water main to provide security of supply.

iii. All houses and commercial buildings to be connected to a reticulated sewage main.

iv. Wastewater treatment and reuse is to be investigated in more detail as part of the first Local Structure Plan to provide a long-term, climate independent non-potable water source. This is to be undertaken either by the developer or as an independent report financed through a development contribution scheme.

v. Non-potable water may come from a variety of sources including water from Wellington Dam, some stormwater harvesting and treated wastewater. Detailed investigations are to be undertaken to determine suitable solutions prior to development beginning.

vi. Provision of awareness-raising material on water-saving measures to residents and businesses.

vii. Landscaping on private lots to be in accordance with waterwise landscaping principles, as directed by the Shire of Dardanup.

Water Dependent Ecosystem Management

i. New waterway habitat will be created within the swale network running through Wanju.

ii. The swales will vary from formal structures, through to native planted swales and in some locations living streams. These will be complemented with other native plantings within the multi-use corridors.

iii. New wetland habitats are to be created to potentially improve water quality flowing from the DSP area. These may also be used for water storage and mixing of water sources prior to reuse.

iv. Existing native wetland vegetation is to be retained wherever possible, by incorporating it into public open space or reserves. These areas will also be enhanced as appropriate with revegetation and weed control.

v. Collie River and Millars Creek are to be protected within foreshore reserves. These are to be rehabilitated to enhance the ecological functioning of the waterways while providing public access and recreation opportunities.

vi. Foreshore Management Plans are to be developed for both the Collie River and Millars Creek.

vii. The WSUD elements used on site will treat stormwater and groundwater, improving the water quality prior to it entering downstream ecosystems.

Monitoring and Maintenance

i. Pre-development monitoring of surface water and groundwater is to build on the works undertaken by the Department of Water and include both level and quality. This is either to be done as part of LWMS or as part of a separate overall study.

ii. Monitoring is to be undertaken through the construction phase of each stage for surface water, groundwater and acid sulphate soil disturbance.

iii. Post-development monitoring is to consider surface and groundwater quality, ecosystem enhancement and WSUD structural performance.

Implementation and Governance

i. Drainage and Irrigation governance is to be established to provide guidance on the movement of water across the DSP area while development is progressing.

ii. Developers are to undertake detailed LWMSs and UWMPs for their relevant stage to provide the necessary information for management of water across the site.

iii. Servicing agreements and a service provider are to be established prior to development beginning.

iv. The Shire of Dardanup, Department of Planning, Lands and Heritage, and Department of Water and Environment Regulation will provide guidance, direction and assistance so that the targets outlined in the final *District Water Management Strategy* (when published) are able to be realised.

Fill Management

i. Fill minimisation is to be a key objective in all developments within the DSP area.

ii. Utilisation of techniques such as a close network of subsoils and swales are to be investigated to minimise groundwater mounding and control groundwater rise.

iii. Sealed stormwater systems with heavier fill are to be investigated for higher density areas to manage infiltrations to the groundwater.

iv. Infrastructure that can be built within and on top of minimal fill are to be preferentially used to reduce fill requirements.

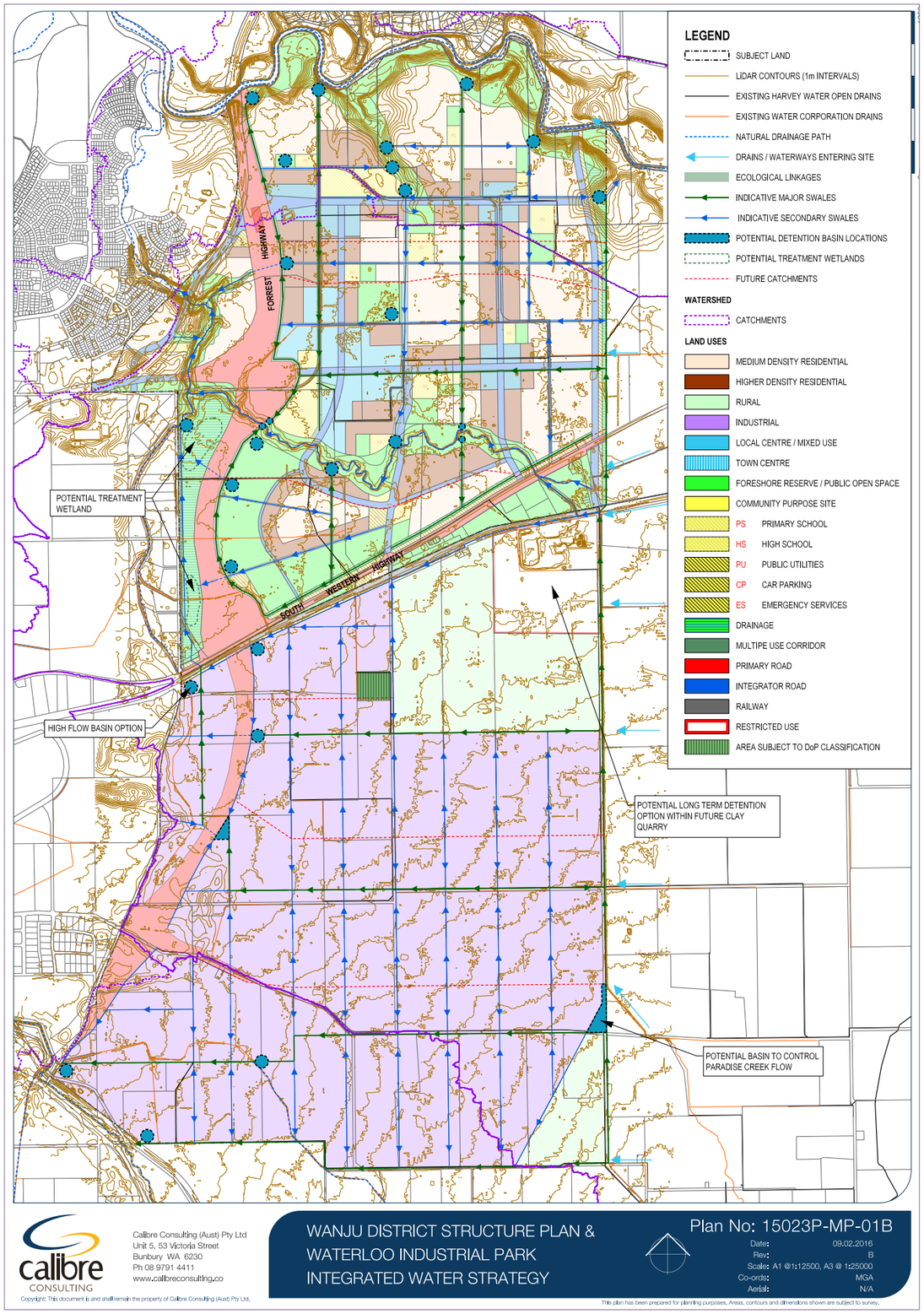


Figure 2.11: Integrated water strategy plan

Figure 2.12: Typical residential lot and swale layout for Wanju (IWMS, 2015)

3.6 Education facilities

The Department of Education has recommended identification of nine State primary schools (kindergarten to Year Six) and three State high schools (Years Seven to 12) at Wanju. The number of schools required takes into account the significant number of smaller dwellings proposed, which is likely to reduce the numbers of families with school-aged children living in the area compared with similar surrounding greenfield suburbs but also to provide sufficient flexibility into the future.

The intention is that schools will act as community hubs and that the playing fields will be publicly accessible for organised sporting activities outside of school hours.

3.7 Activity centres and employment

To provide local residents with the opportunity to maximise access, local facilities and services and for Wanju to be self-contained as possible in terms of employment, a town centre and three local centres are proposed. To meet with the urban design aspirations for Wanju, the intention is that the centres will be mixed-use with retail and commercial uses occupying buildings that are predominantly street-based in their built form, with other uses, including residential, above.

The emphasis will be the public streets and the buildings fronting onto the streets. Large-scale retail formats or large expanses of surface car parking will not be permitted.

Employment uses will be restricted to non-industrial and service commercial uses which will be located within the Waterloo Industrial Park.

3.8 Infrastructure coordination, servicing and staging

Major infrastructure within or adjacent to the DSP area that will require significant engineering includes:

- the BORR, and associated cycleways and noise attenuation buffers
- the Perth-Bunbury fast train railway line, potentially in the median of the Forrest Highway, and possible link to Koombana North
- a dual-carriageway upgrade of South Western Highway
- urban water management including stormwater collection and disposal, water quality management, responsive drainage and establishing stormwater and/or groundwater re-use opportunities, such as third pipes and landscaping
- realignment of Western Power transmission lines and incorporation of electricity terminal linking with the transmission lines
- creation of multi-use open space corridors
- infrastructure associated with public transit provision.

Significant standard infrastructure will have to be provided prior to residential development, including realignment of existing power lines, bridges and provision of arterial drainage infrastructure. Staging and pre-funding of this infrastructure will need to be successfully managed for the development to proceed in a timely fashion. A development contributions plan will be required to be finalised to ensure the costs are shared fairly and reasonably between the developer, landowner, investors, local, State and federal governments.

These elements are extremely difficult to implement in a piecemeal fashion. Some site and drainage remediation works may cross ownership boundaries, which will require a coordinated approach between landowners and government agencies. Given the level of fragmented ownership and the extent of infrastructure requirements for the development, implementation will need to be closely coordinated.

The provision of the infrastructure is considered as part of the Staging Plan and further information on infrastructure provision is set out in the *Servicing Needs Assessment*.

3.9 Water Servicing

It is the responsibility of a developer to appoint a service provider(s) (water, wastewater, drainage and/or non-potable water) for their development. Traditionally the appointment has defaulted to the established service providers within proximity of the development area (Water Corporation, Aqwest or Busselton Water), however, in a few cases the land developer have chosen a private licensed service provider.

Work commissioned by the Department of Water and Environmental Regulation (Wanju and Waterloo Water Servicing, GHD, 2018) indicates that there is no clear water service provider(s) for Wanju and Waterloo. One wastewater and two water service provider (WSP) licences currently exist over the DSP areas, held by Water Corporation and Aqwest. Both potable water service providers have some potable water infrastructure in the broad vicinity of the development, but this is largely reticulation-sized pipes.

In addition, the Water Corporation is a drainage and irrigation service provider and Harvey Water is a non-potable water supply and irrigation service provider in the area. There are also opportunities for new water service providers in the area.

The GHD Wanju and Waterloo Water Servicing report, commissioned by the Department of Water and Environmental Regulation, highlights the key planning instruments for embedding water servicing principles into development at Wanju:

- the Shire of Dardanup Local Planning Scheme (LPS), providing a statutory framework to achieve updated water servicing principles
- the endorsed Wanju District Structure Plan (DSP), setting out the strategic planning framework to achieve updated water servicing principles, and
- the Wanju and Waterloo District Water Management Strategy (DWMS), which will provide an implementation framework to achieve updated water servicing principles.

The report also recommended the following water servicing principles for Wanju and Waterloo:

1. As a primary approach, water service providers and developers are required to incorporate leading- edge water service solutions, including consideration of integrated water-cycle management solutions, in their infrastructure planning.
2. Optimal water-service solutions will be proven by a triple bottom-line assessment of viable options; and shown to be financially viable, wherein there is a means of recovering costs through charges.
3. Long-term water-servicing needs will be consistently, fairly and equitably defined for residential, commercial, industrial and community customers, based on a robust whole-of-water-cycle balance that takes into account the best available climate forecasts.
4. Development of optimal water-servicing solutions will be completed for local structure planning and enable timely implementation at subdivision stage. Staged implementation will not limit the ability to deliver the optimal water service solutions for the entire development area.
5. Optimal water service solutions will be resilient, flexible and adaptable to external factors, including drying climate, water policy reforms, changes in demand profiles, commercial servicing options and emerging technologies.
6. As staged development progresses, there will be opportunities for beneficial collaboration between multiple water service providers, in any part of the water cycle.

3.10 Development contribution arrangements

Development contributions can be sought for items of infrastructure required to support the development of an area. These can include the standard infrastructure requirements of:

- land contributions for public open space, foreshore reserves, schools and roads
- infrastructure for water, sewerage, drainage works, electricity supply infrastructure and other public utilities
- all roads, footpaths, shared paths and traffic works within a subdivision
- monetary contributions for standard water, sewerage and drainage headworks for off-site major infrastructure works
- community infrastructure such as libraries, community halls and sports facilities.

A development contribution plan will be produced to outline the development contribution arrangements for Wanju. This will be formalised as an amendment to the local planning scheme and, once approved, effectively forms part of the local planning scheme hence ensuring statutory compliance.

The local authority will have responsibility as custodian and administrator of the development contribution plan, including the formal collection of contributions and their expenditure, in accordance with the development contribution plan. This work could be outsourced by the council. A key component of the development contribution plan will be the infrastructure cost schedule.

3.11 Other requirements

3.11.1 Built form

Wanju is considered to be an appropriate location for relatively high built forms given:

- the emphasis on the efficient and effective use of land
- the comprehensive and strategic approach to planning for Wanju compared to ad-hoc individual developments which provides the opportunity to locate medium-rise development in appropriate locations
- the opportunities it presents for high-quality public transport and mixed-use development
- being relatively separate from existing communities and dwellings. Only a relatively small transition area is likely to be required between the new development at Wanju and existing dwellings in Eaton and Millbridge that abut Wanju.

Key considerations in planning for higher built forms through the development of local structure plans and built-form guidelines will be required to ensure that street-level interface is at a human scale and that height transition areas are provided adjacent to existing residential communities.

3.11.2 Alternative construction methods

Residential building construction on the Swan Coastal Plain over the past 50 years has relied predominantly on single-storey brick and tile construction on a sand-fill base. As a consequence, a tried and tested residential construction industry in south-west Western Australia has been operating over many years, providing the benefits of a well-established system of operation.

However, this type of construction is unlikely to be able to continue as the mainstream form of delivery into the future as the availability, and therefore the cost, of sand fill continues to rise. This will, however, provide the opportunity for other methods of construction to compete with the traditional brick-and-tile.

The expectation at Wanju is that the level of fill will be restricted to the minimum required to meet with the stormwater management proposed for the area and that to allow this to happen light-weight construction will be predominant throughout the development. Light-weight constructed homes can range in appearance from ultra-modern to traditional weatherboard and there is an enormous variety of claddings and finishes available. They lend themselves to the creation of homes with high environmental credentials and diverse openings for passive solar heating, natural light and ventilation.

The availability of a local timber in the South West of Western Australia provides the opportunity for such timber to be employed widely in the building of Wanju. This will also add to the potential for buildings to offer a local distinctiveness to Wanju.

Given the ground conditions of the area, currently predominantly Class P soils with a high perched groundwater table sitting above a clay sub-soil, and the aspiration of keeping fill volumes to a minimum, it is envisaged that light-weight building construction techniques will need to be employed across much of the development area. The background geotechnical study and advice on the potential for light-weight construction, Alternative Construction Systems for Wanju Project (2016), provides additional background and support for this approach (see Appendix 3).

3.10.3 Landscape

One of the general planning principles for Wanju is the provision of trees and other landscaping, integrated with water sensitive urban design, along all streets to provide shade and reduce the urban heat island effect, together with high quality and well landscaped public spaces.

To provide more detail on the implementation of such a landscape vision for Wanju the Department of Water and Environmental Regulation, in conjunction with the Department of Planning, Lands and Heritage and the Shire of Dardanup, has produced a Landscape Vision Plan for Wanju and Waterloo (2018).

Table 10 provides an outline of the key landscape principles and their justifications for streetscape landscaping for Wanju and Waterloo.

Table 11: Wanju and Waterloo Landscape Design (*Landscape Vision Plan*, 2018)

Landscape Element	Landscape Principle	Justification
Street Tree width	Design open wide streets with a low building height to street width ratio to provide shade.	Wide open streets are exposed to greater solar radiation, increasing daytime temperatures. Tree canopies absorb more solar radiation during the day making it more pleasant for pedestrians.
Street orientation	Orientate streets for WA solar passive conditions maximising solar passive heating and cooling.	Correctly oriented streets will be exposed to more solar radiation during the day, north facing.
Street sides	Solar radiation in summer has most impact on south side of east-west streets and east side of north-south streets, and these should be targeted for shade.	These sides are exposed to greater solar radiation throughout the day in summer.
Tree grouping	Cluster appropriate trees together with overlapping canopies to maximise shade.	Clustered trees deliver greater reductions in air temperature than isolated trees.
Tree spacing	Groups of clustered trees should be interspersed with open spaces.	Group clustered trees provide more shade during the day, while the open spaces will allow surface cooling at night.
Tree type	Provide sufficient water for trees during summer or plant water-wise trees. A mix of tree types can be more resilient against climate changes.	Water stressed trees and or trees not appropriately maintained can limit their water loss during summerand can lose their canopy. This can compromise evaporative cooling and shading.
Street trees on public land	Street tree placement should only occur on public land.	Management and retention of continuous tree canopies can be regulated on public land. Encourage private land owners to minimise removal of existing trees and vegetation.
In incumbent areas consider alternative greening	In streets that have constraints such as underground services or specific land uses that limit trees, consider greening on ground and walls.	Alternative greening to restrictive spaces that align to biophilic ideals. Design so services are located separately from street trees and vegetation so they will be healthier and less prone to being problems for utility companies.
Tall building area	In areas with tall buildings where trees are not appropriate, green walls or roofs should be considered and or appropriate landscaping for provision of shade and views around tall buildings.	Green walls can help reduce solar radiation and improve energy efficiency of buildings if designed appropriately for the climate.
Tree protection	AS 4970 Tree protection on development sites	

Glossary

Acid sulphate soils

Acid sulphate soils (ASS) are naturally occurring soil sediments containing sulphide minerals, predominantly pyrite (an iron sulphide). Potential acid sulphate soils (PASSs) are benign acid sulphate soils in an undisturbed state below the watertable. However, when these are oxidised by exposure to air or other oxidising agents, such as nitrate from fertiliser, the sulphides can react to form sulphuric acid. Exposure to air can occur when soils are drained, excavated or the water table is lowered. Other complex secondary reactions can also occur, including mobilisation of metals. When PASSs have been disturbed and there is evidence of oxidation the soils become actual acid sulphate soils. Disturbance of PASSs can cause the iron sulphides to oxidise. Disturbed PASS materials can result in contamination of shallow groundwater with high concentrations of dissolved iron and aluminium as well as other trace metals.

Activity centre plan

Planning policy document that guides the types of land uses and overall development intended to occur within an activity centre, that is a town centre or local centre. It can detail land use, infrastructure requirements, environmental assets, residential densities, built form, infrastructure and access arrangements.

Class P soils

Class P soils occur on a 'problem' site which can includes soft soils, such as soft clay or silt, soils subject to erosion, reactive sites subject to abnormal moisture conditions, or sites which cannot be classified otherwise. They occur on approximately 70 per cent of the building sites in Australia.

Crossovers

Vehicle driveways to individual properties.

District structure plans

Planning policy document prepared by local government or the WAPC applying to several suburbs and which provides the basis for zoning and lead to more detailed structure planning through the preparation of a local structure plan.

Due regard

'Due regard' has been cited in a number of legal cases, including *Tah Land Pty Ltd v Western Australian Planning Commission (2009)* WASC 196, where the Supreme Court held that:

- 'due regard' implies something greater than mere 'regard' and
- The decision-maker has a mandatory obligation to consider that document or planning instrument when making a decision on an application to which the particular document or instrument relates.

In giving 'due regard' to an approved structure plan, a decision maker has an obligation to give consideration to the objectives, intent and information contained within the structure plan when determining an application within a structure plan area.

Foreshore reserves

The WAPC may require provision of a foreshore reserve where a subdivision includes land abutting a watercourse or water body. Such reserves will be required to be shown on the survey documents either as a Reserve for Recreation or a Reserve for Foreshore Management, dependent upon the use to be made of the land, and vested in the Crown under the provisions of Section 20A of the *Town Planning and Development Act*. The land in the reserve is to be ceded to the Crown free of cost and without payment of compensation by the Crown.

The required width of a foreshore or coastal reserve varies according to the size of the watercourse or body of water and the condition of its banks, shore or coastline. As a general rule in the case of river or lake foreshores, a reserve of 30 m width is required, but each application is examined in detail. Where, for topographical or other reasons, such as protection of a floodway, a greater or lesser width is considered necessary or desirable in the public interest, such a width may be specified. (Policy DC 2.3, WAPC, 2002).

Where the WAPC considers that a foreshore reserve is to be given up as a condition of subdivision, the area of foreshore so required will not be included in the gross subdivisible area on which the public open space requirement is assessed and will be in addition to the land required for public open space.

Future proofing

Ensuring that development is designed to be able to accommodate unknown future changes.

Integrator streets

Key internal streets with either two or four lanes of traffic, operating as public transport corridors and usually with on-street cycle lanes and separate dual-use paths. These streets have frequent connections to smaller-scale local streets to provide connectivity and permeability. See Liveable Neighbourhoods document for detailed definitions of different types of integrator streets: http://www.planning.wa.gov.au/Liveable-neighbourhoods.asp.

Local development plans

Is a mechanism for coordinating and assisting in achieving better built form outcomes by linking lot design to future development in the following circumstances:

- lots less than 260 m^2 in area and irregularly-configured lots
- lots where specific vehicle access and egress control is required
- lots abutting public open space
- local and neighbourhood centres
- lots identified as accommodating a future change of use
- lots with particular site constraints
- addressing noise buffer and amelioration requirements.

Local structure plans

Planning policy document prepared by local government, landowners or their representatives, which is consistent with a district structure plan. It deals with residential density, subdivision and the coordination of infrastructure at a neighbourhood scale. Local structure plans are not intended to determine built form, which should be dealt with by local development plans (LDPs).

Mixed use

Zoning which includes a wide variety of active uses on street level which are compatible with residential and other non-active uses on upper levels. It allows for the development of a mix of varied but compatible land uses such as housing, offices, showrooms, amusement centres, eating establishments and appropriate industrial activities which do not generate nuisances detrimental to the amenity of the district or to the health, welfare and safety of its residents.

Ramsar

The Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Swale

A surface channel designed for conveying water.

Western Power

A State Government-owned corporation charged with providing businesses and people with electricity. The company builds, maintains and operates the electricity network in south-west Western Australia.

Acronyms and abbreviations

AHD	Australian height datam
ASS	acid sulphate soils
bbq	barbeque
BORR	Bunbury outer ring road
c.	circa (approximately) CBD central business district
DAA	Department of Aboriginal Affairs
DBCA	Department of Biodiversity, Conservation and Attractions
DCP	development contribution plan
DER	Department of Environment Regulation
DPI	Department of Planning and Infrastructure
DoP	Department of Planning
DoW	Department of Water (up to July 2017)
DWER	Department of Water and Environmental Regulation (from July 2017)
DSP	District structure plan
DWMS	district water management strategy
DPAW	Department of Parks and Wildlife
dph	number of dwellings per hectare (density)
EPA	Environmental Protection Authority
GBRS	Greater Bunbury Region Scheme
GI	Gigalitre (1000 megalitres, or one billion litres)
MRWA	Main Roads Western Australia
IWMS	integrated water management strategy
IBRA	Interim Biogeographical Regionalisation for Australia
kl	kilolitre
kV	kilovolts
MUCs	multi-use corridors
NBN	national broadband network
PASS	potential acid sulphate soils
POS	public open space
ppm	parts per million
ROS	regional open space
SWDC	South West Development Commission
SWPIF	South West Regional Planning and Infrastructure Framework
SPP	State Planning Policy
TEC	threatened ecological community
WAPC	Western Australian Planning Commission
WSUD	water sensitive urban design

References

Background reports

Alternative Construction Systems for Wanju Project 2016 (Engenuity)

Bushfire Hazard Level Assessment - Wanju, Waterloo and Picton South District Structure Plans 2017 (Strategen)

Ethnographic and Archaeological Heritage Assessment Report 2014 (Big Island Research)

Flora and Fauna Survey 2014 (GHD)

Geotechnical Survey Report 2014 (Soilwater Consultants)

Integrated Water Strategy 2016 (Calibre Consulting)

Landscape Vision Plan 2018 (Shire of Dardanup)

Servicing Needs Assessment 2016 (Integran)

Strategic Overarching Bushfire Risk Management Plan 2015 (RUIC)

Revised Wanju Staging Plan 2018 (Integran)

Wanju and Waterloo Water Servicing 2018 (GHD)

Other Documents

Bunbury-Wellington District Sports Facilities Plan Stage 2, 2013 (Davis Langdon)

Draft Bunbury-Wellington 2050 Cycling Strategy (DoT, 2018)

Greater Bunbury Regional Bicycle Masterplan 2012 (TME)

Appendices

Appendix 1 – Existing Planning and Regulatory Framework

Planning history

The DSP area is currently zoned rural in the *Greater Bunbury Region Scheme* and the Dardanup Local Planning Scheme. Various options were considered in terms of accommodating additional new development within the Greater Bunbury sub-region. The endorsed *Greater Bunbury Strategy 2013* identified 'East of Eaton', now called 'Wanju', as the primary urban expansion area.

Planning policy analysis

Wanju was selected as the preferred urban expansion area by the WAPC, in the endorsed *Greater Bunbury Strategy 2013*. It was selected as the preferred location due to a number of factors including:

- its proximity to Bunbury CBD
- good transport links to Bunbury CBD and other employment areas
- area is contiguous to established residential area of Eaton and the employment areas of Waterloo and Preston
- the development of the Waterloo Industrial Park and Wanju are expected to facilitate co- servicing and produce a number of synergies in terms of infrastructure
- the provision of efficient and safe transport options, including walking, cycling and public transport, can be provided to adjacent residential and employment areas
- it can provide a high degree of urban containment and provide for up to 28,600 dwellings
- infrastructure providers have supported this location
- the Perth-Bunbury fast passenger train station and regional park and ride facility is to be provided within the area and will provide a catalyst to the desired high-density urban form
- the development area is clearly bounded and
- compared to other areas considered Wanju has few environmental constraints, such as remnant vegetation, flood risk, bushfire, mosquitos and storm surges.

State Planning Strategy 2050

The Western Australian State *Planning Strategy 2050* (WAPC, 2014) aims to guide sustainable development of the state for the next four decades. It supports *Perth and Peel @ 3.5 million* (WAPC, 2015), *Directions 2031 and Beyond* (WAPC, 2010), the State Planning Policy 3 *Urban Growth and Settlement* (WAPC, 2006) and the various recent planning reform initiatives of the WAPC. One of the fundamental goals is to facilitate co-ordinated and sustainable economic development. To achieve this goal a suitable and affordable supply of land needs to be made available for development to meet the long-term needs of people across the State.

Planning and Development (Local Planning Schemes) Regulations 2015

The Regulations were gazetted on 1 September 2015 and came into effect on 19 October 2015. They replaced the *Town Planning Regulations 1967* (as amended). The Regulations govern the way local planning strategies and local planning schemes are prepared, consolidated and amended.To assist with the implementation of the Regulations.

Relevant State Planning Policies (SPPs)

State Planning Policy (SPP) 1 State Planning Framework Policy Variation 2 (WAPC, 2006) and Draft SPP1 Variation 3 (WAPC, October 2016)

State Planning Framework unites existing State and regional policies, strategies and guidelines within a central framework which provides a context for decision-making on land use and development in Western Australia. It informs the Commission, local government and others involved in the planning process on those aspects of State level planning policy which are to be taken into account, and given effect to, in order to ensure integrated decision-making across all spheres of planning.

SPP 2 Environment and Natural Resources Policy (WAPC, 2003)

The objectives of this overarching SPP are:

- to integrate environment and natural-resource management with broader land-use planning and decision-making
- to protect, conserve and enhance the natural environment
- to promote and assist in the wise and sustainable use and management of natural resources.

SPP 2.9 Water Resources (WAPC, 2006)

SPP 2.9 requires land use planning to contribute to the protection and wise management of water resources by ensuring planning takes into account total water cycle management and water sensitive urban design principles.

SPP 3 Urban Growth and Settlement (WAPC, 2006)

The objectives of this policy are:

- to promote a sustainable and well planned pattern of settlement across the State, with sufficient and suitable land to provide for a wide variety of housing, employment, recreation facilities and open space.
- to build on existing communities with established local and regional economies, concentrate investment in the improvement of services and infrastructure and enhance the quality of life in those communities.
- to manage the growth and development of urban areas in response to the social and economic needs of the community and in recognition of relevant climatic, environmental, heritage and community values and constraints.
- to promote the development of a sustainable and liveable neighbourhood form which reduces energy, water and travel demand while ensuring safe and convenient access to employment and services by all modes, provides choice and affordability of housing and creates an identifiable sense of place for each community.
- to coordinate new development with the efficient, economic and timely provision of infrastructure and services.

SPP 3.6: Development Contributions for Infrastructure (WAPC, 2009)

The SPP sets out the principles and consideration applying to development contributions for the provision of infrastructure required to accommodate new development.

SPP 3.7 Planning in Bushfire Prone Areas (WAPC, December 2015)

SPP 3.7 sets out the planning hierarchy and information required at each stage of the planning process in relation to development in bushfire prone areas and for areas identified as bushfire prone areas a bushfire hazard level assessment is required.

SPP 4.2: Activity Centres for Perth and Peel (WAPC, 2010)

SPP 4.2 specifies broad planning requirements for the planning and development of new activity centres in Perth and Peel. However, for regional centres where it is applicable and relevant, such as in Greater Bunbury, the policies set out in the SPP can be used.

Draft SPP 7.1 Liveable Neighbourhoods (WAPC, November 2016)

Liveable Neighbourhoods is the WAPC's primary design guideline and policy document for structure plans and subdivisions on greenfield and large infill sites. It promotes an urban structure of walkable neighbourhoods accessed through an efficient and interconnected movement network. An updated draft version of *Liveable Neighbourhoods* was published by the WAPC in November 2016 for public comment. The planning principles set out in this DSP reflect the objectives and principles set out in *Liveable Neighbourhoods*.

Local Planning Strategy

Shire of Dardanup Local Planning Strategy (2015)

The Shire of Dardanup's Local Planning Strategy was adopted by the council on 12 March 2014 and published in April 2015 within the Shire of Dardanup. The main objectives of the local planning strategy are to set out the Shire's broad vision and longer-term directions for land use and development, and to provide a strategic direction for the preparation of Local Planning Scheme No.9.

Statutory Planning Context

Greater Bunbury Region Scheme

The Greater Bunbury Region Scheme (GBRS) came into effect on 29 November 2007 applying to the area comprising the City of Bunbury and Shires of Capel, Dardanup and Harvey. It sets out the proposed land-use zoning for uses within the region and provides the legal basis for planning in the Greater Bunbury sub-region. The current GBRS zone for the DSP area is rural, the exception being the Primary Regional Road reserve for the initial alignment for the Bunbury Outer Ring Road and South Western Highway.

Shire of Dardanup Town Planning Scheme No.3

The Town Planning Scheme for the Shire of Dardanup looks to zone land in the Shire for the purposes set out in the Scheme. It looks to consolidate the urban areas of Dardanup, Burekup and Eaton and control the building in those areas of new structures between or adjacent to existing buildings. The scheme will need to be reviewed following the endorsement by the WAPC of the district structure plan.