Wheatbelt
Regional Profile

Background and context report
to support the
Wheatbelt Land Use Planning Strategy

Draft for public comment

April 2011

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1 Introduction

1.1 The Wheatbelt region

The Wheatbelt region is defined by the Planning and Development Act 2005 and includes 43 local governments from West Arthur in the south-west, Dandaragan in the north-west, Lake Grace in the south-east and Yilgarn in the north-east.

The Wheatbelt covers 155,256 km^2 and is generally to the east of the Perth metropolitan area. The region extends more than 350 kilometres to the east of Perth and 425 kilometres north to south, and comprises about 200 kilometres of coastline to the north of Perth. Refer to Map 1 – Study area and Map 2 – Land tenure.

The Wheatbelt has a population of approximately 75,000 people that is widely dispersed. Half the Wheatbelt population is spread across more than 30 towns, the largest urban centre is Northam and other major settlements include Moora, Merredin and Narrogin. The other half live in villages of less than 200 people and on rural properties.

The Wheatbelt has traditionally been and continues to be the principal agricultural and farming heartland of the State, comprising almost half of all agricultural production with more than a third of the community being engaged in agricultural industries.

The Wheatbelt region is also within the Southwest Australia Biodiversity Hotspot, an area recognised internationally for its high level of species diversity that are under threat from human-induced disturbance.

The primary cause of biodiversity loss in the Wheatbelt is the historical clearing of native vegetation for agricultural expansion. It has been estimated that 90-94 per cent of the Wheatbelt has been cleared for primary production, industry and settlements, which has caused widespread land degradation in the Wheatbelt. Salinity remains one of the greatest threats to industry, the environment and physical infrastructure such as roads, railways and towns in the Wheatbelt, with more than a third of the land area of some Wheatbelt local governments potentially at risk of salinity.

The Wheatbelt has a chronically constrained water supply, as the vast majority of the Wheatbelt relies on water from the integrated water supply system that supplies Perth, the South-West and the Goldfields, and there are currently no known drinkable groundwater resources to ensure the sustainability of established industries and future communities.

1.2 Background and purpose

The purpose of this regional profile is to present the background and context to provide the rationale for preparing the strategies, actions and policies in the Wheatbelt Land Use Planning Strategy.

The regional profile builds on the Towards a Wheatbelt Regional Strategy — Directions Paper' (Directions Paper) released in August 2009. The Directions Paper was a precursor to a regional strategy, and was the basis for stakeholder consultation and input on the content and directions on land use planning matters in the Wheatbelt.

The Wheatbelt Land Use Planning Strategy will provide the strategic direction for the region, including specific policy direction, strategies and actions for land use planning in the region. The strategy intends to plan for people and population in the region, protect the natural and cultural environment of the region, facilitate economic development across the region, consider settlements and land supply needs, and provide evidence on regional infrastructure issues.

The State Planning Strategy 1997 identified the need to prepare a regional planning strategy for the Wheatbelt region to focus on the Avon Arc. The Avon Arc Sub-Regional Strategy was endorsed in 2001 and provided regional planning guidance for the Shires of Gingin, Chittering, Toodyay, Northam, York, Beverley and Brookton. The Western Australian Planning Commission (WAPC) endorsed a proposal to review the Avon Arc Sub-Regional Strategy in December 2007.

Other than the Avon Arc Sub-Regional Strategy, it was considered there was a lack of regional planning guidance for the wider Wheatbelt and it was proposed that the review of the Avon Arc Sub-Regional Strategy be expanded to address the whole Wheatbelt region to provide better guidance on the application of State planning policy within the region, among other benefits.

The WAPC endorsed the preparation of a regional strategy for the Wheatbelt planning region in April 2009 and it is intended the strategy will form part of the State Planning Framework. The purpose of the regional strategy for the Wheatbelt is to:

- Provide a leadership document that guides decision-making in the region;
- Apply State Planning Policy and establish the WAPC policy position on growth and population change and development challenges facing the region;
- Provide a framework for urban growth, rural settlement, environmental protection and rural and regional planning;
- Provide more detailed spatial planning where required in high-growth shires; and
- Identify key economic, social and environmental drivers and their likely implications.

1.3 Regional opportunities and challenges

The Wheatbelt Land Use Planning Strategy needs to respond to the key opportunities and challenges in the region, which includes:

- Climate change — the impacts of a drying climate and the westward movement of cereal-based agriculture and new industries such as tree farming (for harvest or the environment);
- Development pressure on areas fringing the metropolitan region (peri-urban areas) and planning generally for urban and rural settlements;
- Population trends including a shift from inland to western areas of the region;
- Land degradation caused by extensive historical clearing of the region, pressure on agricultural land and threats to significant natural resources;
- Protecting areas of regional biodiversity value;
- Water availability for domestic, commercial and industrial uses;
- The key role the Wheatbelt plays in sustaining the State's agricultural economy;
- Providing infrastructure to a relatively small and geographically dispersed population with limited capacity for economies of scale;
- Providing diverse economic and employment options to retain current residents and attract more people; and
- Recognising the historical and cultural role of the region.

2 Planning context

2.1 The State context

Western Australia has a long tradition of activity in the agricultural and mining sectors, which requires a broad suite of supporting industries and manufacturing sectors for processing and related primary and secondary businesses. Despite the fiscal value of production in the Wheatbelt appearing comparatively low in percentage terms (< 5 per cent), the Wheatbelt has a significant role in Western Australia as the principal agricultural region, and is fundamental to sustaining both the State and national economy. The current statistics indicate that Wheatbelt activity comprises almost half of all agricultural production in Western Australia, including half of productivity in crops and pastures, a third of livestock (disposals), two-fifths of livestock products activity, and one-fifth of WA's fisheries production value, as shown in Figure 1 on Page 4.

To put this in a national context, Western Australia contributes 54 per cent of total cereals and gains, 20 per cent of total meat, 11 per cent of horticulture produce and 10 per cent of wool.

The State context for the Wheatbelt extends beyond statistical indicators, as the Wheatbelt plays host to a number of important infrastructure services for the State, including:

- Major interregional and interstate transport linkages;
- Water supply — several major public drinking water source areas with a significant supply to the metropolitan area and the water pipeline to the Goldfields;
- Grain freight;
- Energy - the South West Interconnected System provides a total supply to approximately 840,000 properties, of which Emu Downs Wind Farm near Cervantes supplies the equivalent of 50,000 properties, with plans to expand, and the Collgar Wind Farm under construction near Merredin forecast to supply the equivalent of 125,000 properties;
- Land availability and affordability — the region offers opportunities for industry and for those finding the metropolitan area increasingly expensive and restrictive.

The Wheatbelt is influenced by activities occurring in adjoining regions, as summarised in Figure 2.

Figure 1: WA economic profile

Regions	Agriculture 07/08				Mining 08/09	Forestry 07/08	Fishing Value 07/08	Manufacturing (Turnover) 06/07	Livestock 06
	Total	Crops & Pastures	Livestock	Livestock Products					Expenditure (domestic)
Gascoyne	1.0	0.8	2.0	0.7	0.2	0.0	15.1	0.1	5.2
Goldfields-Esperance	10.7	12.1	7.1	5.9	8.9	0.0	3.4	1.7	6.5
Great Southern	17.0	15.8	19.4	22.1	0.0	2.9	1.6	0.8	4.7
Kimberley	2.2	0.8	10.2	0.0	1.0	0.0	3.2	0.1	7.3
Mid West	6.4	6.6	6.3	4.7	3.1	0.0	40.2	0.6	6.6
Peel	2.2	1.5	5.5	2.0	3.5	9.8	2.0	5.7	4.1
Pilbara	0.7	0.0	4.6	0.0	47.8	0.0	2.8	5.1	6.6
South West	8.8	7.3	8.5	20.9	2.8	73.7	2.4	6.1	17.9
Wheatbelt	45.3	49.7	28.9	38.0	1.8	0.0	19.4	1.2	5.5
Regional WA	94.4	94.8	92.4	94.3	98.9	86.3	90.1	21.2	64.4
Perth Western Australia	5.6	5.2	7.6	5.7		13.7	9.9	78.8	35.60
Total Value ($), Fishing, Fishing ($ 000) Mining & Manufacturing ($mill)	**7,135,824,898**	**5,323,781,945**	**1,121,023,452**	**691,019,501**	**71310.50**	**100,333,000**	**315,900**	**45,048**	**3288.3**

Figure 2: Adjoining region activity

Perth and Peel	Mid-West
The metropolitan region is fundamentally driven by regional growth. The primary activities in Perth and Peel are manufacturing, fishing, tourism and some agriculture. The Western Trade Coast at Cockburn Sound is the State's major industrial asset, designed as Australia's gateway to global industry and trade. There are several other significant industrial estates and business parks in Perth and Peel. There is increasing activity in the north - Wangara Enterprise Park and the business district south of Joondalup known as the Quadrangle, which is securing Joondalup's position as a strategic regional centre for Perth's north-west corridor. The Kemerton Industrial Park near Bunbury is a major resource processing area with plans to improve access via a rail link from Kemerton to the Port of Bunbury.	The activities in the Mid-west are primarily mining, agriculture, fishing and tourism. These activities are predominantly for export markets, placing significant emphasis on the freight routes. The mineral deposits in the Mid-West are geographically dispersed, and establishing a rail network is considered pivotal to the region's development. The bulk of the current iron ore mines in the Mid-West are in relatively close proximity to the main regional centres on the coast - Geraldton, Greenough and Dongara, although majority of mining employees are normally on a fly-in-fly-out basis from Perth. The majority of anticipated inland resource developments are in the north east of the region. The Mid-West Development Commission retains a Major Projects Summary and a Mining Register for operations and projects being developed.
Goldfields-Esperance	**Great Southern**
The Goldfields-Esperance region currently has the second largest mining activities, by value, in WA. The mining activity is principally for gold and nickel, and is located in the central and northern parts of the region. The Goldfields-Esperance region has the third largest agricultural activities, predominantly wheat, barley, wool and livestock. The mineral products and agricultural goods are primarily freighted by road and rail to the Esperance Port for export, including from the Koolyanobbing iron ore mine north of Southern Cross. The Super Pit is the biggest mining centre in Australia, and is likely to finish production in 2021. It is currently seeking innovative closure proposals (in addition to regulatory obligations). Kalgoorlie-Boulder is a major transport hub and supply centre, with excellent connections intra- and inter-state. Tourism is on the rise, particularly in the coastal areas, but also the nature-based tourism west of Ravensthorpe and the outback Goldfields (including the Outback Way project).	The Great Southern is the second largest producer of agricultural commodities in WA, and is dominated by wool, broad acre cropping and livestock production. In the past 20 years, the region has diversified into timber production, horticulture and viticulture activities. The wine making and horticultural produce in the Great Southern is particularly increasing in popularity. The majority of the region's produce is exported through the Port of Albany. The Great Southern is also experiencing increased tourism activities, especially in the coastal areas and nature-based recreation. The Lower Great Southern is the administrative, economic and cultural centre of the Great Southern. A Lower Great Southern Strategy was prepared in 2007, which includes a suite of recommended objectives and actions to maximise trade and development opportunities for the Port of Albany and securing the Albany ring road for access to the port.

2.2 The Diverse Wheatbelt

The Wheatbelt is a large and diverse region, encompassing a range of environments, social and economic characteristics. Opportunities and constraints differ greatly across the region, especially when comparing regions supported by different industries, such as agricultural towns in the inner Wheatbelt with crayfishing towns on the coastal strip. These varying characteristics do not necessarily overlap spatially to form consistent and meaningful sub regions.

2.2.1 Environmental diversity

The physical environment of the Wheatbelt region varies significantly. There are the dune systems and limestone-based sandy plains of the coastal region; the cereal-producing central parts of the region where rainfall is generally lower than in the coastal region, salinity is a problem for farming, and native vegetation has been extensively cleared; and there are the dry eastern reaches of the region with their granite rock formations, temperate woodlands and dependence on grazing and mining. Finally, in an arc immediately north-east, east and south-east of Perth lies the undulating river valley regions that are popular with visitors and weekenders, and which are under pressure for rural small lot subdivisions due to proximity to the metropolitan area and the perceived amenity provided by the visual landscape and historic townsites.

The key aspects of environmental diversity across the Wheatbelt region are:

- Geography - climate, geology, landform, and relative proximity to the coast;
- Environment - variations in biodiversity, river catchments, rainfall, and underground water availability.

This diversity in the physical environment causes significant variations in the challenges that are faced in land use planning. For example, a significant issue impacting planning decisions is the variation of annual rainfall quantity, location and access to groundwater supply, and the availability of reticulated water for supplying human settlements.

Map 10 - Water resources illustrates the water operational areas and other water supply features of the Wheatbelt region and the locations of the annual rainfall isohyets. The provision of drinking water via roof collection and a rainwater tank as a sole alternative water supply, where reticulated water is not available, is generally not considered a viable option in areas with a rainfall of less than 550 mm per year. Clearly therefore, for all Wheatbelt areas to the east of the 550 mm isohyet availability of a water supply via scheme water, groundwater or another alternative will be critical to decision making.

2.2.2 Economic diversity

The economic basis of different parts of the Wheatbelt can be directly linked to the physical characteristics, weather climate, geology, or proximity to the coast or metropolitan region. Section 2.1 – The State Context and Section 5 – Regional Economy describe the economic profile of the Wheatbelt, but generally the variations across the region can be summarised as follows:

- Nature of primary industry: different parts of the Wheatbelt rely more on one industry than another, such as tourism, agriculture, mining, or proximity to Perth's employment opportunities.
- Public and private sector investment decisions: for example, the outcomes of the grain freight network will impact on different parts of the Wheatbelt, given the various impacts on costs and time for transport logistics.

2.2.3 Social diversity

There are many ways in which social characteristics vary in the Wheatbelt region, for example the following elements:

- Population change - tendency for population growth close to Perth, changing population in remote parts of the Wheatbelt, and changes in population characteristics such as a trend to ageing populations or a fall in the 15 to 40 year age group.
- Infrastructure availability and service provider priorities.
- Impact of weekender and tourism population.

An important example of varying social opportunities and challenges in the region, and probably the most critical of the issues affecting the Wheatbelt population, is access to services and infrastructure. Figure 3 and Figure 4 show the settlements of the Wheatbelt and the services available in the settlements, overlain with illustrative catchments for those settlements. Figure 3 shows regional centre catchments for high level social infrastructure, indicating a one-hour drive and a two-hour drive. Figure 4 shows half hour drive catchments to sub-regional centres for lower level social infrastructure such as Year 12 schooling or a district hospital. Both Figures also indicate a two-hour drive catchment to the Perth metropolitan area for alternative services, retail and recreation opportunities.

Figure 3 and Figure 4 clearly show those areas of the Wheatbelt that face limited access to services and infrastructure, and also show those areas with good access to a number of centres and to Perth metropolitan area. While some parts of the Wheatbelt, such as in the north and east of the region, have limited access to services or supporting social infrastructure; other parts of the region, particularly those within the two-hour drive catchment of Perth, have good access to services and infrastructure and

Figure 3: Wheatbelt Social Diversity - Regional centre catchments for high-tier social infrastructure

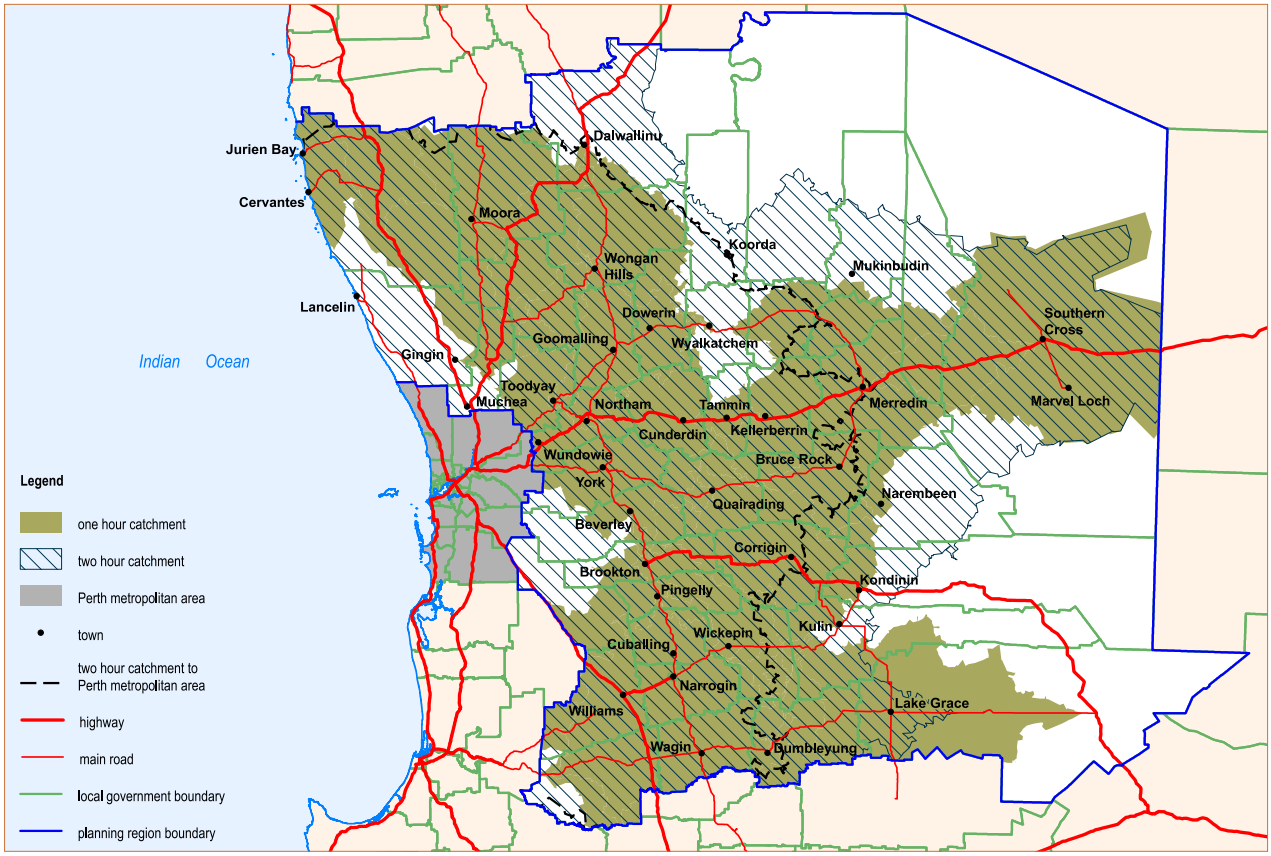
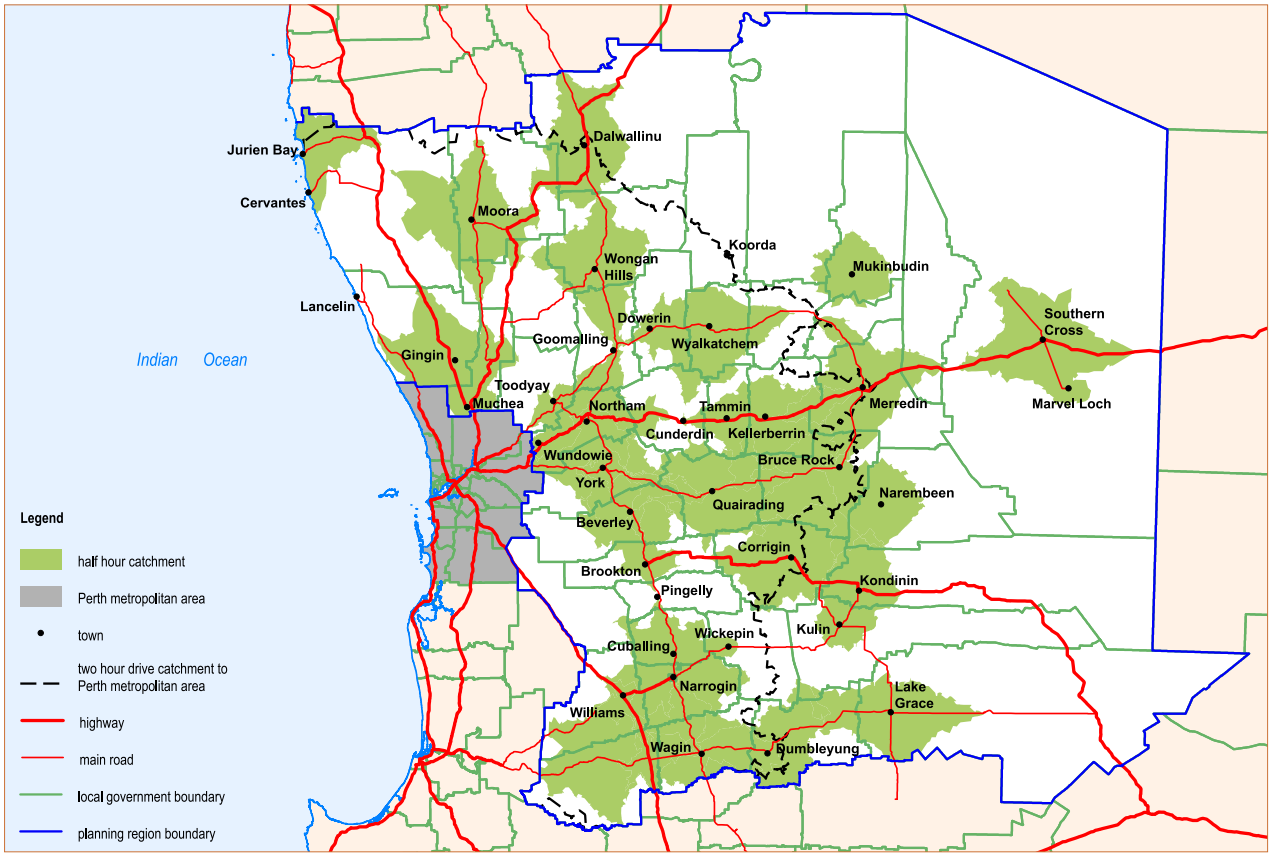


Figure 4: Wheatbelt social diversity - Sub-regional centre catchments for lower-tier social infrastructure



are experiencing significant growth pressure from people that see the benefits of living outside of the metropolitan region but close enough to access facilities and services easily. From a land use planning perspective an awareness of the variances across the region in accessibility to social infrastructure is critical to understanding how to plan for different places and communities, and the varying pressures that different parts of the region are facing.

2.2.4 Governance

Administrative boundaries within the Wheatbelt region are formulated in different ways, with different government agencies and organisations choosing different alignments for their sub-regional boundaries. Generally there seems to be two main approaches:

- Spatial arrangement - such as centring sub regions on the four regional centres of Moora, Northam, Merredin and Narrogin; centring them on the location of the relevant agency's regional offices; or basing them on local government boundaries or a sense of similarity in the issues faced by different groups of local governments, as in the case of WA Local Government Association zones and Regional Organisation of Councils.
- Environmental character - such as sub regions based on river catchments; sub-regions based on similarities of climate, landform and vegetation; or, as in Tourism WA's approach, dividing the region based on overall environmental themes. The Wheatbelt is included in three Tourism WA regions: the "Coral Coast", the "Golden Outback" and "Experience Perth".

Figure 5 shows the Regional Organisation of Councils administration groupings. Overlain on this plan is an example of how the Wheatbelt could be divided into sub regions by basing each on one of the five regional centres. The map illustrates the difficulties involved with governance of such a large and diverse region when the different administrative groups divide the region in different ways.

2.2.5 Strategy formulation

While the Wheatbelt is defined as one planning region by the *Planning and Development Act 2005*, it is important to recognise that it is a large and varied region, with a diversity of environments, communities and administrative issues.

The Directions Paper divided the Wheatbelt into two main sub regions — the North-west Wheatbelt and the Eastern Wheatbelt. This division was made on the basis that the North-west Wheatbelt is subject to greater growth and development pressures than the rest of the region. It is recognised that such an approach to the region's diversity was too simplistic, and there is a need to reflect the great diversity of the Wheatbelt, and the range of opportunities in different parts of the region.

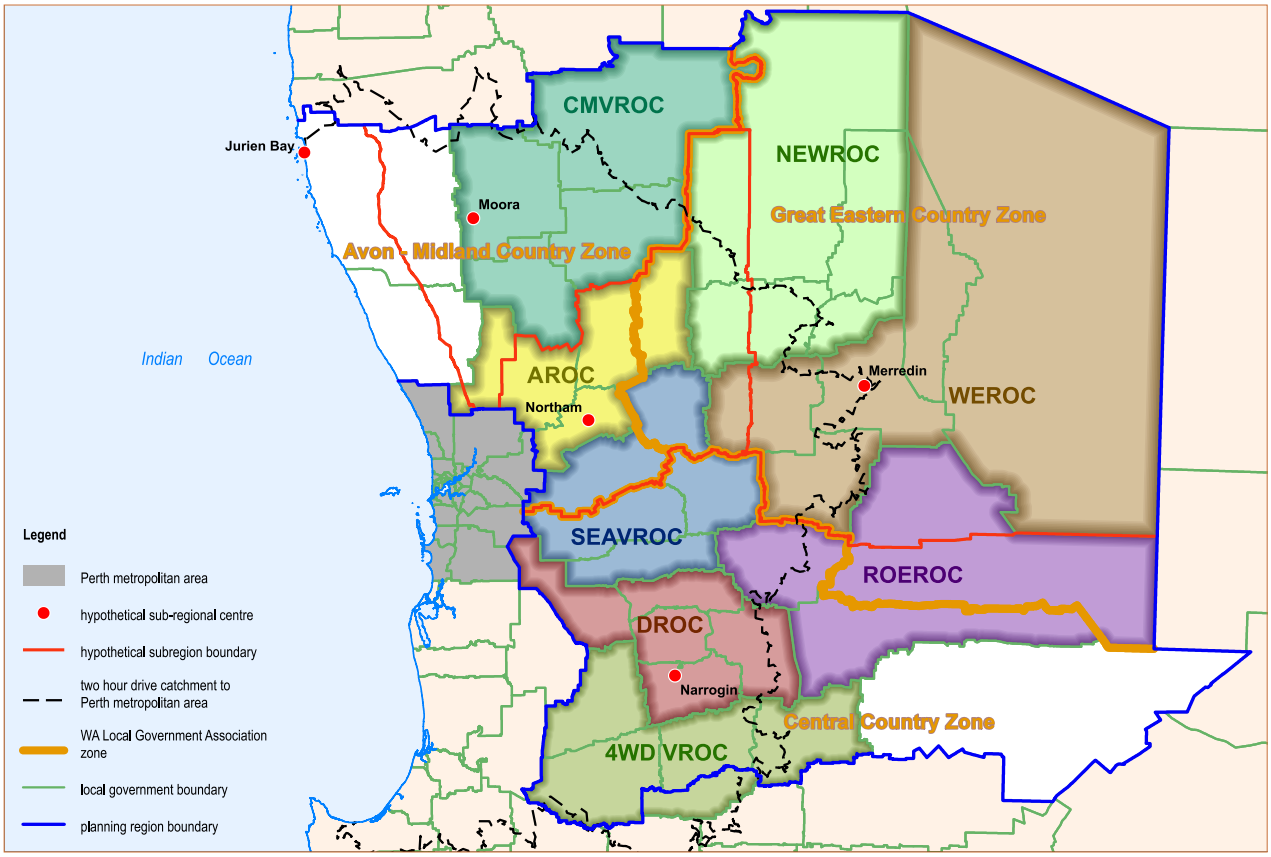
As this summary of the diversity of the Wheatbelt region has shown, the region could be split into sub regions in a different way for almost every one of the issues that might be considered relevant to the regional land use planning strategy. The "Northwest" and "Eastern" Wheatbelt split used in the Directions Paper was just one way of dividing the region for planning purposes, but there are many other sub-regional boundaries that could be drawn, depending on the issue under consideration.

The aim of the regional land use planning strategy is to identify practical and implementable objectives and strategies for the region, - some of which relate to specific issues, and others specific localities. Sometimes the responsibility for implementation of a strategy will lie with area-specific agencies, such as local government authorities, sometimes with issue-specific agencies, such as the Department of Planning, Water or Environment and Conservation.
The challenge for the regional land use planning strategy is to present the objectives and strategies in a well-defined, user-friendly and non-contentious way. On this basis, it has been determined that an issues-based approach to strategy formulation and implementation would be preferable, rather than a standard sub-regional approach.

The specific features and characteristics of the different parts of the region will be addressed throughout the strategy on an issue-by-issue basis. There will be circumstances where sub-regional boundaries are drawn, based on the issue under consideration, in order to make it clear which part of the region a policy applies to. However, these sub-regional divisions are not going to be consistent throughout the strategy, and are used only where relevant to the particular challenge or opportunity under consideration.

The regional land use planning strategy does not identify planning sub-regions to relate to all aspects of the strategy. Instead, strategies and objectives are identified based on specific issues and opportunities, and are attached to different localities in the Wheatbelt as relevant.

Figure 5: Wheatbelt governance diversity - regional organisation of councils



2.3 State planning framework

The State Planning Framework is established by State Planning Policy 1 and provides existing and ongoing land use planning policies which affect the Wheatbelt. The preparation of the Wheatbelt Land Use Planning Strategy needs to include consideration of the relationship and application of these policies to understand the aspects already addressed and to focus on those aspects which need particular consideration, treatment or clarification in the Wheatbelt.

State planning policies

The State planning framework comprises a number of State planning policies. A summary of how the State planning policies apply generally to the Wheatbelt and the specific relevance of the policies in the preparation of the regional strategy is contained in Appendix A - State Planning Framework, and includes:

State Planning Policies

- SPP2. Environment and Natural Resources
- SPP2.4 Basic Raw Materials
- SPP2.5 Agricultural and Rural Land Use
- SPP2.6 State Coastal Planning Policy
- SPP2.7 Public Drinking Water Source Policy
- SPP2.9 Water Resources
- SPP3 Urban Growth and Settlement
- SPP3.4 Natural Hazards and Disasters
- SPP3.5 Historic Heritage Conservation

- SPP4.1 State Industrial Buffer Policy
- SPP4.3 Poultry Farms Policy
- SPP5.2 Telecommunications Infrastructure
- SPP5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning.

Operational Policies

- DC1.1 Subdivision of Land — General Principles
- DC1.3 Strata Titles
- DC1.4 Functional Road Classification for Planning
- DC1.5 Bicycle Planning
- DC1.7 General Road Planning
- DC1.8 Canal Estates and Other Artificial Waterway Developments
- DC3.4 Subdivision of Rural Land
- DC4.1 Industrial Subdivision
- DC4.2 Planning for Hazards and Safety
- Visual Landscape Planning in Western Australia Nov 2007.

State Planning Strategy

The current State Planning Strategy was published in 1997, and is under review. In addition to the State-wide planning principles, the State Planning Strategy establishes strategies and actions for the planning regions. Refer to Map 3 – State Planning Strategy — Wheatbelt region.

The vision for the Wheatbelt in the State Planning Strategy is as follows:

> *"In the next three decades, the Wheatbelt Region will be characterised by a range of expanded towns linked by improved transport and commuter links to Perth. A range of consolidated service centres will grow throughout the region. The Wheatbelt will become an area of innovation in agriculture, environmental management and the development of downstream processing of agricultural and mining products. The region will develop stronger inter-regional, intra-regional and interstate linkages for both road and rial. Extensive rehabilitation of environmental damage to farmlands in the region will be undertaken."*

2.4 Existing regional, local and other plans and strategies

Existing regional strategies

The following provides an overview of the existing regional strategies in the Wheatbelt. A detailed overview of the future status of these regional strategies is contained in Section 9.

Avon Arc sub-regional strategy	In 2001 the WAPC released the Avon Arc sub-regional strategy. This strategy covered the shires of Beverley, Brookton, York, Northam, Toodyay, Chittering and the non-coastal part of the Shire of Gingin. The purpose of the strategy was to provide a regional framework for long-term land use in the Avon Arc, particularly for shires without current local planning strategies and schemes. An audit of the Avon Arc sub-regional strategy was undertaken in 2004 and found that approximately 70 per cent of the possible directions had been completed. Since the AASS was prepared, local planning strategies have been developed for the Shire of Chittering (2004), Shire of Northam (2004), Shire of Toodyay (2007), and the Shire of York (2007). The Shire of Gingin has a draft local planning strategy and the shires of Beverley and Brookton share a district rural strategy. These documents set out the vision and objectives for each district, and provide guidance on which rural residential areas are to be developed.
Central Coast regional strategy	This strategy was released in 1997 and covers the coastal parts of the shires of Gingin, Dandaragan, Carnamah and Coorow (the latter two are outside the Wheatbelt study area) and adjacent marine areas to 5 km offshore. The strategy had a 10-year planning horizon (to 2007). Despite this it is still regarded as a useful guide for decision-making and is actively used by several local governments in the absence of updated strategic documents. Consideration of the marine environment will not be addressed in the WLUPS.
Gingin Coast structure plan	The Gingin Coast Structure Plan was released in 2006 and covers the coastal part of the Shire of Gingin not covered by the Avon Arc sub-regional strategy. The structure plan aims to guide development in the study area.

Local planning in the region

Of the 43 local governments in the region, 42 operate local planning schemes, and 15 local planning strategies to provide strategic guidance for decision-making. Once the Wheatbelt land use planning strategy is finalised, local planning strategies and schemes will be required to be consistent with its directions.

Other plans and strategies

Other organisations may develop strategies from time to time that apply to the region. Existing strategies include Avon River Basin 2050, Wheatbelt Development Commission Strategic Plan and the Avon Catchment Council Natural Resource Management Strategy. These documents are key references in the region and have been reviewed in compiling this regional profile.

3 People and population

This section discusses major population characteristics and trends for the Wheatbelt, including current and projected populations, and population distribution across the region.

3.1 Population

Understanding population pressures and trends, profile and distribution is necessary to plan on a regional level, enabling governments to plan for infrastructure, service provision and land release, and for business to better prepare for changing demand.

The Australian Bureau of Statistics (ABS) conducts a census of population and housing every five years. This data is used by a range of users to understand the dynamics and trends in places where people live, work and travel. The Wheatbelt consists of two ABS statistical divisions: the Midlands (northern Wheatbelt) and the Upper Great Southern.

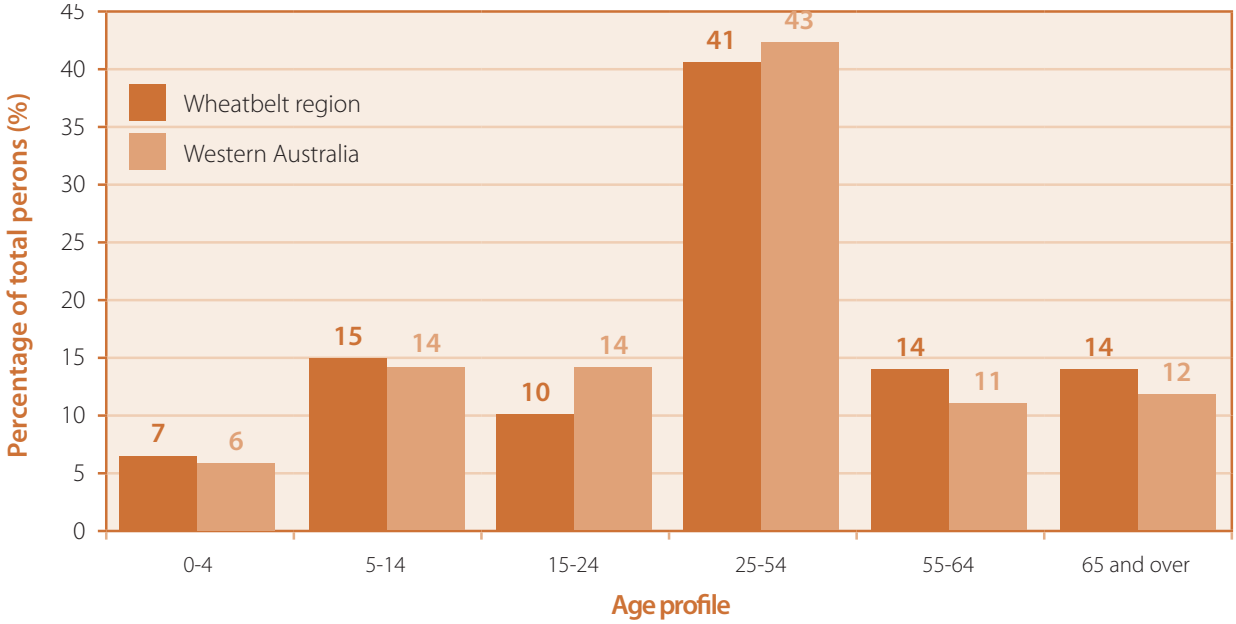
The DoP prepares long-term population projections for the WAPC, and these projections are prepared every five years and include projections by age and sex for the resident populations (at local government level).

3.2 Demographic profile

At the 2006 Census, the population (place of usual residence) of the Wheatbelt region was 68 127 people. Approximately 4.5 per cent of people in the Wheatbelt are indigenous Australians, compared to 2.3 per cent of all Australian people.

The age profile of the Wheatbelt is similar to the Western Australian average. The major differences are that the region has 5 per cent less young people than the Australian average (aged 5 to 24) and 5 per cent more older people (aged over 55). This is shown in greater detail in Figure 6. Approximately 30 per cent of people employed in the Wheatbelt are engaged in the farming industry - in grain, sheep and cattle

Figure 6: Wheatbelt and WA age profile, 2006 Census



Source: Australian Bureau of Statistics, census of population and housing 2009

farming. The second highest employer is school education, which comprises about 6 per cent of the workforce.

3.3 Population trends

Figure 7 shows estimated resident population data for the period 2001 to 2008 from the ABS. Over the period 2003 to 2008 the region grew at a rate of 0.2 per cent, which is lower than that of the State over the same period, at 2.1 per cent.

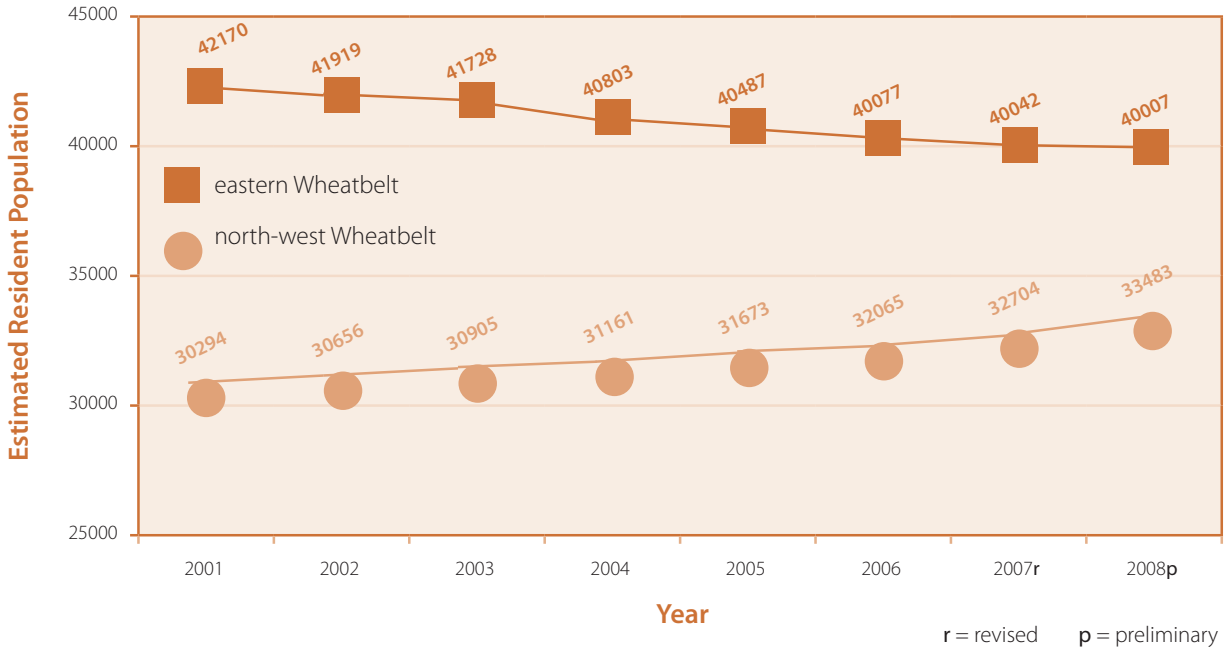
When combined, the north-west Wheatbelt shires recorded an annual average growth rate of 1.6 per cent, while the remaining local governments experienced a decline in population, at an annual rate of -0.8 per cent. Of all local governments in the Wheatbelt region, the Shire of Chittering recorded the highest average annual growth rate over the period 2003 to 2008, at 5.3 per cent.

The WAPC population projections indicate that the Wheatbelt region is expected to grow at a rate slightly slower than that of the State in the next 20 years. It is expected that the region will accommodate somewhere in the vicinity of an additional 16,000 people, of which most will be accommodated in the north-west Wheatbelt. Figure 8 and Figure 9 show how the Wheatbelt population is expected to grow in the future.

While the region as a whole is expected to grow, considerable variation is anticipated when investigating the data at a sub-regional and local government level.

The north-west Wheatbelt is expected to grow at a rate higher than that of the State, while many of the remaining local governments are expected to maintain a steady population or experience decline. Coastal development in the shires of Dandaragan and Gingin are anticipated to result in growth, with growth also anticipated for the shires of Chittering,

Figure 7: Wheatbelt estimated resident population



Source: Australian Bureau of Statistics

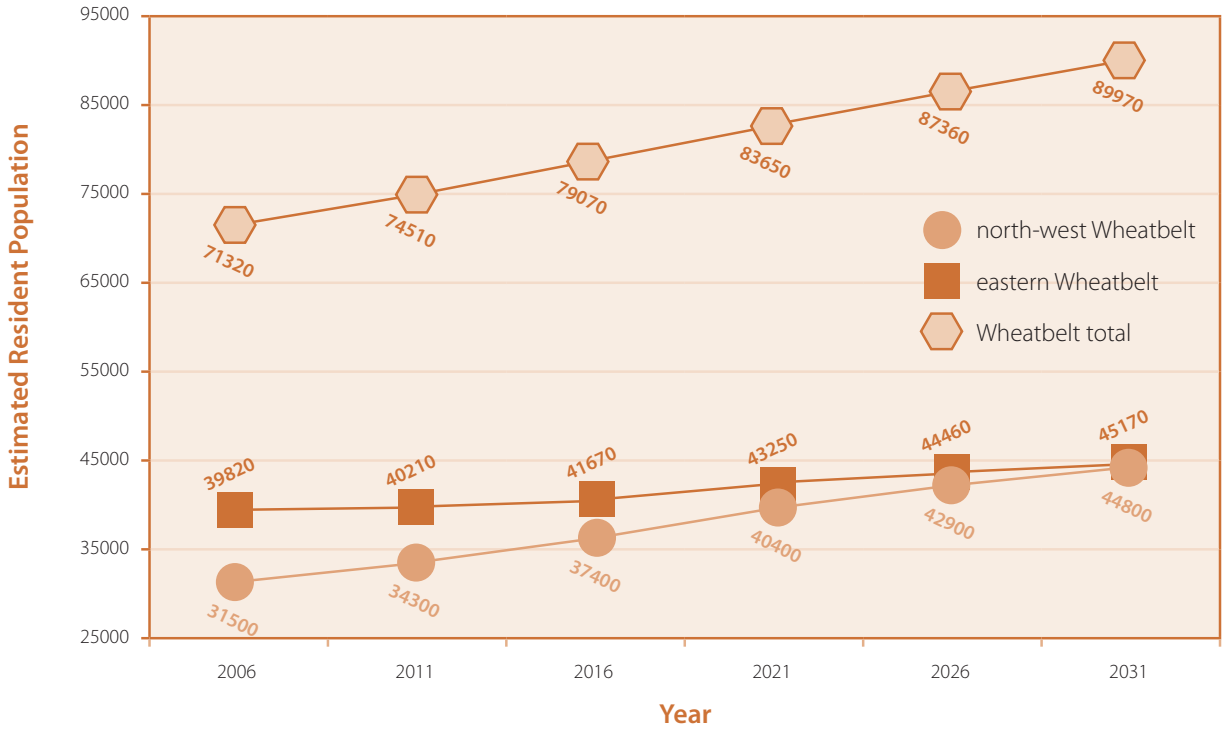
Figure 8: Summary of projected population in the Wheatbelt and WA

Area	Projected population 2009[1]	Projected population 2014[1]	Projected population 2019[1]	Projected population 2029[1]	Average annual growth 2009-2014 (%)	Average annual growth 2009-2019 (%)	Average annual growth 2009-2029 (%)
Wheatbelt region	72 900	77 200	81 900	88 900	1.2	1.2	1.0
Wheatbelt as % of WA population	3.39	3.34	3.31	3.22	na	na	na
Western Australia	2 145 000	2 310 100	2 472 600	2 754 700	1.5	1.4	1.3

[1] Projection for resident population

Source: Western Australia Tomorrow, Western Australian Planning Commission (2005)

Figure 9: Population projections for the Wheatbelt



Source: Western Australian Planning Commission, WA Tomorrow, 2005

Figure 10: Wheatbelt age-sex profile 2004

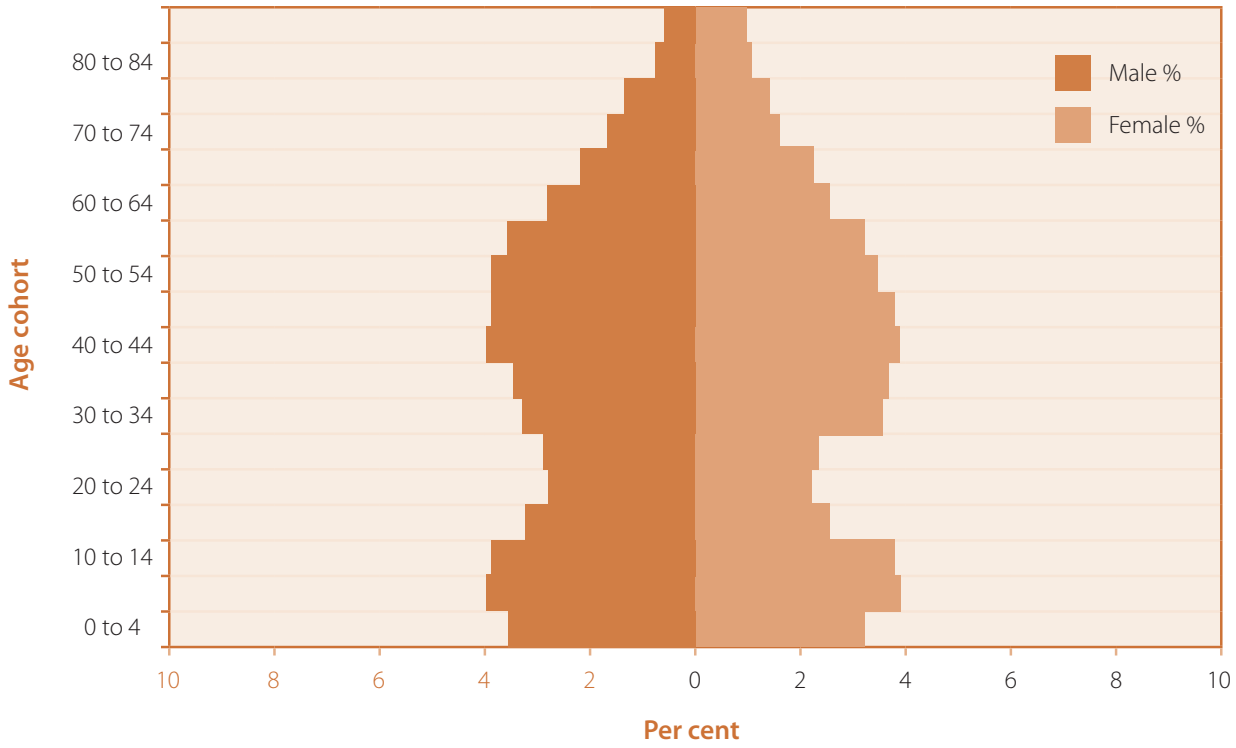
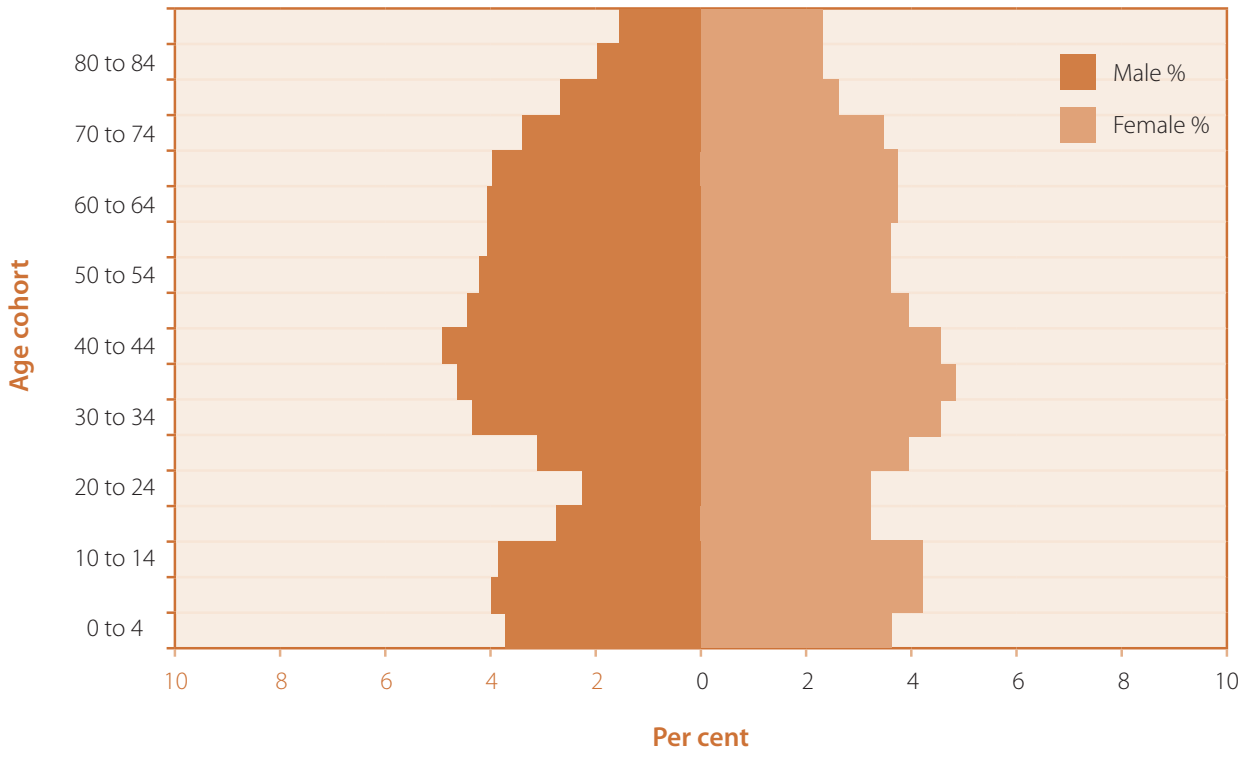


Figure 11: Wheatbelt age-sex profile 2031



Toodyay, Northam and York, driven by proximity to the metropolitan region and the continuing tree change phenomenon. Other areas to the east and south of the Wheatbelt are anticipated to decline in population prior to their population stabilising.

The Wheatbelt currently has a higher median age than many other regions across the State. Over the next 20 or so years, it is anticipated the median age will increase further in line with general (ageing) population trends. The projected age-sex profile for 2031 shows a marked increase in the proportion of the population above the age of 60 when compared to the profile for 2004 (Figure 10 and 11).

The implications of an ageing population are the proportion of the community available to participate in the labour force, and the nature of demand for community and health services.

4 Settlements and land supply

4.1 Overview

Based on WAPC population projections, the Wheatbelt region is expected to grow by approximately 16,000 people over the next 20 years (2011-2031). Using an average household size of 2.5 persons per dwelling, this equates to a requirement for 6400 additional dwellings over this period.

The purpose of this section is to analyse the existing settlements and existing land supply in the Wheatbelt to identify where additional land is required to meet the demand, for both housing and related commercial and industrial activities. Land requirements take into account the area of land already identified for development to realistically determine shortfalls or oversupply in the market. Further investigation is required, however. While there may be an oversupply of urban land in some areas, various obstacles may prevent development of existing appropriately zoned land, such as natural constraints (vegetation, water supply, topography, flooding) or lack of owner intent or land tenure, for example native title.

The analysis of the Wheatbelt has been divided into seven sub regions, as shown in Map 4 – Wheatbelt land supply sub regions, and described below:

Coastal Wheatbelt

- Dandaragan
- Gingin

Avon Arc

- Beverley
- Brookton
- Chittering
- Northam
- Toodyay
- York

Outer Arc

- Cunderdin
- Dowerin
- Goomalling
- Moora
- Quairading
- Victoria Plains
- Wongan Ballidu

South-eastern

- Corrigin
- Kondinin
- Kulin
- Lake Grace
- Narembeen

South-western

- Cuballing
- Narrogin
- Pingelly
- Wandering
- Wickepin
- Williams
- West Arthur
- Wagin
- Dumbleyung

North-eastern

- Dalwallinu
- Koorda
- Mount Marshall
- Mukinbudin
- Nungarin
- Trayning
- Wyalkatchem

Great-eastern

- Bruce Rock
- Kellerberrin
- Merredin
- Tammin
- Westonia
- Yilgarn

4.2 Settlements

The Wheatbelt region has a relatively small population which is hosted in more than 40 towns and more than 210 villages, townsites and settlements. Half the Wheatbelt population lives in the towns, and the largest regional centre is Northam, with a population of 6009 people and other regional centres include Narrogin (4238), Merredin (2550) and sub-regional centres including Moora (1605), Toodyay (1069), Wagin (1427) and York (2008).

Section 3 provides a detailed overview of the population projections for the Wheatbelt region, and shows that the Wheatbelt is expected to accommodate an additional 15,460 people from 2011 to 2031. As shown in Figure 12, the majority of growth is expected to occur in the Avon Arc and Coastal subregions. In the Coastal subregion, the major growth areas will be Jurien Bay and Lancelin. The Avon Arc subregion is expected to accommodate nearly half the growth in the Wheatbelt. The major growth areas will be Chittering, Toodyay, Northam and York. The growth in York and Northam is expected to occur in the townsites, whereas the growth in Chittering will occur in the existing zoned rural living areas. Growth in Toodyay is a combination of townsite and rural living.

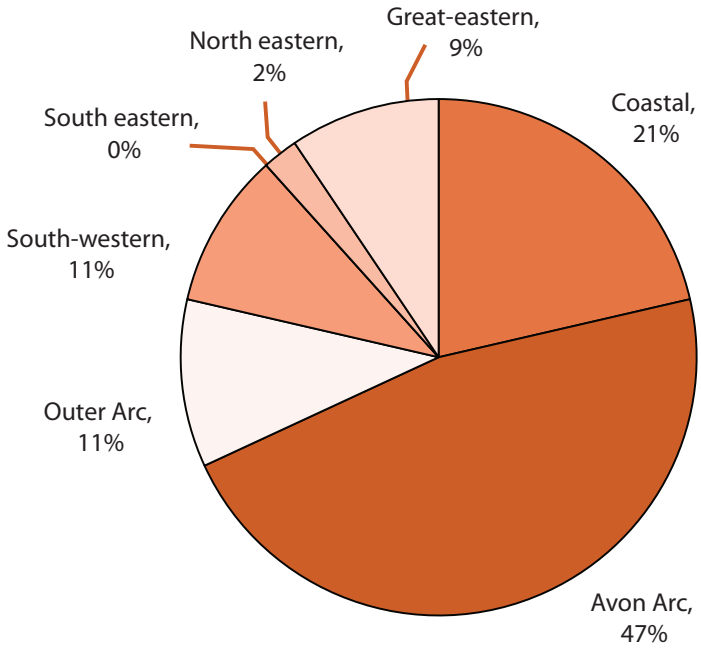
Growth in the Outer Arc subregion is predicted to be steady, and likely to accommodate 10 per cent of the total growth predicted for the Wheatbelt, with activity shared across the towns of Moora, Wongan Hills, Goomalling, Cunderdin and Dowerin. There are significant existing residential approvals in Cunderdin, which requires further investigation and monitoring.

The South-western subregion growth is expected to occur primarily in the regional centre of Narrogin. The other shires in the South-western are currently projected to experience a population decline.

Dalwallinu is the focus for growth in the North-eastern subregion, and there is anecdotal evidence of burgeoning activity in Dalwallinu, which requires further investigation and monitoring.

Merredin is likely to be the principal place in the Great-eastern subregion driving the growth.

Figure 12: Wheatbelt projected population growth by land supply sub regions



Source: WA Tomorrow 2005

4.2.1 Settlement hierarchy

The sustainability of settlements is well acknowledged as important for communities and regional economic development. The *State planning framework, State Planning Policy 3 - Urban Growth and Settlement*, in particular provides for the consolidation and development of established settlements which offers the optimum support for strong, diversified and resilient communities with access to employment, community services and recreation. Support for existing settlements also concentrates increasing scarce and competitive access to investment for the improvement of services and infrastructure

The dispersed Wheatbelt population creates a challenge for the sustainability of settlements and equity in access to essential services. While rural towns and settlements are in need of growth promotion strategies, there is also the need to balance the focus of growth promotion with strategies for directing the growth to the most liveable and sustainable locations.

The settlement strategy aims to take advantage of the benefits a settlement hierarchy can provide for the regional community, while acknowledging the role that a large number of settlements play in the function of the region.

The settlement hierarchy for the Wheatbelt region takes into account population, regional function, services and facilities, and defined as follows:

- ***Regional centre*** - towns which act as the major economic centres in the region, functioning as a service centre, transport hub and contains high level of services and facilities which provide for the resident community and the region, including tertiary education centres, regional hospitals and a range of government services and also are major employment centres. Population range — at least 5000 people.
- ***Sub-regional centre*** - towns which act as significant economic centres in the region, providing for the resident community and the surrounding districts, with possibly a district high school and/or a small hospital/health care service. Population range - up to 5000 people.
- ***Rural Town*** - towns which contain local services and facilities and may act as the administrative centre for the Shire. Population range - generally up to 1000 people.
- ***Rural villages*** - a small rural town and a place where people live and there a small range of commercial activity; that is, shops, pub, roadhouse. Some rural villages may host the administrative centre for a shire or other unique feature. Generally does not have a school. Population range - generally approximately 250 people.

- ***Settlements/gazetted townsites*** - place where people live and there is very limited commercial activity; that is, general store, roadhouse. Some gazetted townsites may have been dismantled as settlements. Population range - generally approximately 250 people.
- ***District*** - place recognised as a locality outside a town, population may be dispersed in rural residential areas. Population range - variable depending on location and economic activity.

The settlement hierarchy for the Wheatbelt and a summary of the centres and settlements in each local government within each sub-region is contained in Appendix B.

4.3 Land supply - current

This section provides an analysis of land supply in selected major centres and growth areas in the Wheatbelt and the balance of each subregion. It includes information on the trends, approvals, vacant lots and vacant zoned land.

4.3.1 Recent lot creation

Lot creation data shows that the majority of activity has occurred in the Coastal Wheatbelt and the Avon Arc subregions. Commercial lot activity has been confined to one or two lot subdivisions in existing town centres. Of note is the steady demand for industrial lots in smaller townsites, such as Wongan Hills and Dalwallinu.

Wheatbelt region - residential final approvals (2004-05 to 2008-09)	
Top 5 localities (suburbs)	Top 5 local governments
Jurien Bay (725)	Dandaragan (749)
Northam (172)	Northam (172)
York (130)	York (130)
Gingin (45)	Gingin (51)
Narrogin (38)	Merredin (36)

2009-10 and 2010-11 up to 26 Aug 10	
Residential final approvals (by LG)	
Chittering	51
Corrigin	34
Gingin	24
Northam	19
York	17

Wheatbelt region - rural living final approvals (2004-05 to 2008-09)	
Top 5 localities (suburbs)	Top 5 local governments
Lower Chittering (299)	Chittering (422)
Jurien Bay (246)	Gingin (260)
Nilgen (108)	Dandaragan (246)
Chittering (93)	Toodyay (70)
Karakin (69)	Wandering (58)

2009-10 and 2010-11 up to 26 Aug 10	
Rural living final approvals	
Local governments	
Gingin	13
Cunderdin	11

Source: Department of Planning Internal Database (preliminary data only)

4.3.2 Subdivision approvals (in-hand)

An analysis of subdivision activity, excluding rural subdivision, has shown that the following major approvals are in place in the major growth areas in the Wheatbelt. The likelihood of these approvals proceeding to lot creation is variable, however, it gives an indication of where activity is occurring.

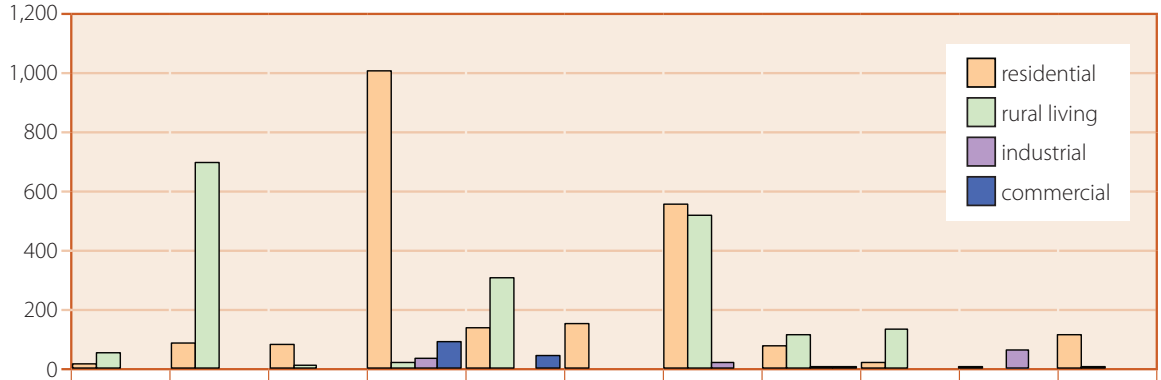
Residential approvals in the Shire of Chittering are confined to the Bindoon townsite consolidation area identified in the shire's local planning strategy. In the Shire of Dandaragan, residential approvals are nearly all in Jurien Bay, with the exception of 91 lots in Cervantes and the commercial approvals relate to a proposed tourist development in Jurien Bay.

In the Shire of Gingin, the majority of residential and rural living approvals are in and around the Gingin townsite.

Northam, as the Wheatbelt's regional centre, has strong lot activity and ongoing industrial activity centred around the Avon Industrial Park east of Northam. Rural living activity has also been adjacent to the Northam townsite, with steady activity in the centres of Wundowie and Bakers Hill.

Toodyay's activity is evenly split between the townsite and a major rural living precinct to the west of the townsite. The rural living approval in Williams is a southern extension to the townsite. York's activity has been confined to the townsite, and limited due to a lack of service infrastructure and structure planning to guide development. Should structure planning be resolved, there is a strong demand for rural living lots to the north of the townsite, and in the Mount Hardey precinct south-east of York townsite.

Figure 13: Wheatbelt subdivision approvals



	Beverley	Chittering	Dunderdin	Dandaragan	Gingin	Narrogin	Northam	Toodyay	Williams	Wongan-Ballidu	York
residential	16	87	81	1,014	138	150	561	76	20	6	115
rural living	51	701	11	18	307	0	520	114	134	0	6
industrial	0	0	0	31	0	0	19	7	0	60	0
commercial	2	0	0	92	42	0	0	4	2	2	0

no of lots with preliminary approval, 1-3 years

Note: commercial lot approvals include tourism lots. For the chart above, this represents tourism approvals in Jurien Bay (Dandaragan) and Lancelin (Gingin).

Source: Department of Planning Internal Database (preliminary data only, as at 26 August 2010)

4.3.3 Coastal subregion

The coastal subregion is expected to experience strong growth over the next 20 years — projected to grow by 3300 people and absorb 20 per cent of the region's growth. Development is expected to be focussed on Jurien Bay and Lancelin.

Future developments include Lancelin South (Gingin Amendment 93) which can provide for up to 1000 dwellings and Moore River south, which may provide for up to 2000 dwellings. Growth may be accelerated in these shires should a major employment development occur - Jurien has extensive tracts of zoned land, and the coastal Wheatbelt is believed to have water sources that could be developed to meet demand.

The completion of the Indian Ocean Drive from Lancelin to Jurien Bay may promote growth and activity in the coastal area of the Wheatbelt, which is equally close to Perth, but not as contested as the south-west of the State. Without an economic base, this development is likely to focus on the tourism sector.

Other opportunities in the subregion include alternative energy projects which may feed into the Neerabup to Moolyanooka component of the Mid-West Energy project.

4.3.4 Avon Arc subregion

The Avon Arc subregion is projected to be the major growth area for the Wheatbelt over the next 20 years and is expected to grow by 7200 people, which is nearly half the region's likely growth. WAPC projections have been outpaced by growth in the Avon Arc, particularly due to high growth in the shires of Chittering and Northam.

Chittering

Growth in the Shire of Chittering has been averaging 5 per cent in recent years. The majority of growth is for rural living developments. Future rural living development should consolidate around the Bindoon area where there is access to reticulated water. There is also a need to service the proposed Muchea Employment Node, which is near the intersection of the Brand and Great Northern Highways, mainly south of the West Australian Meat Industry Authority site. The absence of a reticulated water supply in the lower part of the Chittering Shire is likely to present an ongoing management issue for the shire, and place pressure on scheme water through water carting, which is prevalent in the district. Future development in this area is likely to slow, as large estates such as Maryville enter their final stages.

Figure 14: Coastal sub region lot activity and vacant lots

Local Govt / suburb	Residential approvals as at 26 Aug 10		Rural living approvals as at 26 Aug 10		Vacant lots	
	preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	Residential (zones)	Rural Living (zones)
Dandaragan	-	-	-	-	-	-
Jurien Bay	319	20%	-	-	396	169
Cervantes	93	6%	-	-	-	-
Gingin	-	-	-	-	204	570
Lancelin	11	1%	-	-	-	-
Guilderton	6	0%	-	-	-	-
Gingin	93	6%	331	21%	-	-

Source: Department of Planning Internal Database (preliminary data only)

Northam

Northam's growth should be generally split between the town of Northam and rural living growth around Northam, Wundowie and Bakers Hill. Current approvals around Wundowie and Bakers Hill do not currently match projections, but a number of rural living amendments have been approved around these centres which will increase development pressure in the area.

Toodyay

Growth in Toodyay is generally split between townsite growth and rural living west of the townsite and this is expected to continue.

York

The majority of York's growth has been in the townsite, however, there is potential for growth of rural living areas east of York in the Mt Hardey-Gwambygine area.

Beverley and Brookton

Growth in Beverley and Brookton is projected to be minimal, however, both shires are close to Perth and are well-placed to attract future development. Approval figures are unlikely to represent activity in Beverley and Brookton, as both shires have smaller rural lots, which are being reconfigured for rural living purposes, but are not zoned as such. It is likely these shires will come under increasing development pressure, which isn't currently reflected in the WAPC projections.

Figure 15: Avon Arc subregion lot activity and vacant lots

Local Govt / suburb	Residential approvals as at 26 Aug 10		Rural living approvals as at 26 Aug 10		Vacant lots	
	preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	Residential (zones)	Rural Living (zones)
Beverley	-	-	-	-	-	-
town	16	1%	-	-	-	-
country	-	-	51	3%	-	-
Brookton	11	1%	-	-	-	-
Chittering	-	-	-	-	3	20
Bindoon	75	5%	122	8%	-	-
Lower Chittering	-	-	119	8%	-	-
Chittering	-	-	221	14%	-	-
Muchea	9	1%	49	3%	-	-
Northam	-	-	-	-	125	11
town	347	22%	417	27%	625	57
Wundowie	20	1%	11	1%	-	-
Bakers Hill	8	1%	60	4%	-	-
Toodyay	-	-	-	-	95	0
town	76	5%	-	-	-	-
country	-	-	-	-	-	-
York	113	7%	6	0%	359	49

Source: Department of Planning Internal Database (preliminary data only)

4.3.5 Outer Arc subregion

The Outer Arc generally fringes the Avon Arc, and is an area predicted to have slight, but steady growth over the next 20 years. It is projected to accommodate an additional 1650 people, which is approximately 10 per cent of the region's growth. Growth is predicted around the sub-regional centre of Moora, but towns like Wongan Hills, Dowerin, Goomalling and Cunderdin are experiencing steady activity, which is expected to continue.

Figure 16: Outer Arc subregion lot activity and vacant lots

Local Govt / suburb		Residential approvals as at 26 Aug 10		Rural living approvals as at 26 Aug 10		Vacant lots	
		preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	Residential (zones)	Rural Living (zones)
Cunderdin	Cunderdin	81	5%	11	1%	-	-
Dowerin	Dowerin	23	1%	-	-	-	-
Goomalling	Goomalling	10	1%	16	1%	-	-
Moora	Moora	4	0%	-	-	89	16
Victoria Plains	Calingiri	2	0%	-	-	-	-
Wongan Ballidu	Wongan Hills	20	1%	-	-	40	28

Source: Department of Planning Internal Database (preliminary data only)

4.3.6 South-western subregion

Growth in the South-western subregion will be driven by the subregional centre of Narrogin, where growth is expected to absorb 10 per cent of the region's future population. There has been steady subdivision activity in the town, with two pending subdivisions in the order of 50 lots apiece likely to be progressed.

Smaller towns such as Pingelly, Wickepin, Cuballing and Williams are likely to experience ongoing though modest growth.

Wandering shire is in close proximity to the Boddington gold mine and may experience future growth as a result. It is also adjacent to the metropolitan and Peel regions and is a likely to be a future focus for rural living development.

The rural living proposal in Williams is a southern extension of the townsite.

Figure 17: South-western subregion lot activity and vacant lots

Local Govt / suburb		Residential approvals as at 26 Aug 10		Rural living approvals as at 26 Aug 10		Vacant lots	
		preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	Residential (zones)	Rural Living (zones)
Cuballing		-	-	-	-	109	3
Narrogin	Narrogin	45	3%	-	-	-	-
Pingelly		7	0%	-	-	-	-
Wandering		57	4%	-	-	-	-
Wickepin		11	1%	-	-	-	-
Williams	Williams	-	-	134	9%	-	-

Source: Department of Planning Internal Database (preliminary data only)

4.3.7 South-eastern subregion

There is limited subdivision activity in the South-eastern subregion. Several of the shires in this area are projected to experience population decline largely as a result of decreases in rainfall and the impact this has had on farming communities, combined with an ageing population.

Steady but slight growth is predicted to occur in the towns of Corrigin (33 residential lots created in 2009), Hyden and Narembeen.

Figure 18: South-eastern subregion lot activity and vacant lots

Local Govt / suburb		Residential approvals as at 26 Aug 10		Rural living approvals as at 26 Aug 10		Vacant lots	
		preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	Residential (zones)	Rural Living (zones)
Corrigin	Corrigin	-	-	-	-	18	16
Kondinin	Hyden	11	1%	-	-	-	-
Narembeen	Narembeen	8	1%	-	-	-	-

Source: Department of Planning Internal Database (preliminary data only)

4.3.8 North-eastern subregion

The North-eastern subregion is predicted to be driven by steady growth in Dalwallinu, which is strategically placed on the Great Northern Highway as one of the last major centres before more remote areas to the north.

However, many of the other shires in this subregion may experience population decline in the next 20 years, largely as a result of decreases in rainfall and the impact this has had on farming communities, combined with an ageing population.

There has been recent activity in Dalwallinu through residential proposals, but also an industrial subdivision which sold out very quickly.

Predicted growth in the Shire of Mount Marshall would most likely be in the town of Bencubbin.

Figure 19: North-eastern subregion lot activity and vacant lots

Local Govt / suburb		Residential approvals as at 26 Aug 10		Rural living approvals as at 26 Aug 10		Vacant lots	
		preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	Residential (zones)	Rural Living (zones)
Dalwallinu	Dalwallinu	37	2%	-	-	-	-
Mount Marshall		-	-	-	-	-	-
Mukinbudin	Mukinbudin	18	1%	-	-	-	-
Wyalkatchem	Wyalkatchem	-	-	-	-	35	1

Source: Department of Planning Internal Database (preliminary data only)

4.3.9 Great-eastern subregion

Growth in this subregion is projected to be minimal due to changes in rainfall and the impact this has had on farming communities. Combined with an ageing population, it is likely that a number of communities in the area will experience population decline. The Great Eastern Highway passes through this subregion, and presents ongoing economic opportunities for communities adjacent to the highway.

Having said that, this subregion includes the town of Merredin, which is a regional centre with a good level of servicing that is expected to accommodate approximately 10 per cent of the region's growth in the next 20 years. In addition, the Merredin windfarm project south of the town may accelerate activity in Merredin.

There are also pending subdivision applications and amendments for Kellerberrin and Bruce Rock that may result in growth, despite the projections indicating otherwise.

Figure 20: Great-eastern subregion lot activity and vacant lots

Local Govt / suburb		Residential approvals as at 26 Aug 10		Rural living approvals as at 26 Aug 10		Vacant lots	
		preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	preliminary approvals with 1-3 yrs remaining	% of Wheatbelt approvals	Residential (zones)	Rural Living (zones)
Bruce Rock		-	-	-	-	-	-
Kellerberrin		-	-	-	-	-	-
Merredin	Merredin	34	2%	-	-	108	0
Tammin		-	-	-	-	-	-
Westonia		-	-	-	-	-	-
Yilgarn		-	-	-	-	-	-

Source: Department of Planning Internal Database (preliminary data only)

4.4 Land supply assessment

The existing land supply analysis forms the basis to assess the capacity of each subregion to accommodate growth and where additional land is required to meet demand. As mentioned previously, further investigation is required at the local level to confirm the assessment, as site or other constraints may be preventing development from occurring.

The assumptions for calculating population capacity or potential lot yield is based on:

- Residential - 9 dwellings per hectare (usually 9-12)
- Rural living - 0.25 dwellings per hectare (4 ha lots)
- Household size - 2.5 people per dwelling (WA State average, 2006 Census)

Broadly, across the Wheatbelt region as a whole, to accommodate an additional 16,000 people over the next 20 years, 320 dwellings are required on average per year. As discussed in Section 4.3 and shown in Figure 2, 4548 lots are currently approved for residential or rural living purposes, with the potential to accommodate approximately 11,370 people, which provides residential lots for a projected 14 years. As shown in Figure 21, there are 3146 vacant lots in major centres, with the potential to accommodate approximately 7865 people, which provides residential lots for a further projected nine years. Additionally, based on existing vacant zoned land, there are 94,336 lots, with the potential to accommodate approximately 235,839 people, which equates to a projected 295 year supply.

Figure 21: Land supply assessment summary

Sub region	Projected new population 2011-2031	Dwellings required	Av No of dwellings/year		Existing approvals		Vacant lots		Zoned vacant land	
			No.	% increase	dwellings	people	dwellings	people	dwellings	people
Coastal	3300	1320	66	38	1477	3692	1339	3348	22,281	55,702
Avon Arc	7200	2880	144	41	2247	5617	1344	3360	19,857	49,644
Outer Arc	1650	660	33	17	98	245	173	433	16,376	40,940
South-western	1510	604	30	-	304	730	112	280	6971	17,428
South-eastern	10	4	1	-	-	-	34	85	6365	15,913
North-eastern	340	136	7	7	-	-	36	90	7999	19,998
Great eastern	1450	580	204	-	-	-	108	270	14,486	36,215
Total	15,460	618,413	485	-	4548	11,370	3146	7,865	94,336	235,840

Source: Department of Planning Internal Database (preliminary data only)

Figure 22: Land supply assessment summary (major approvals)

Subregion	Major approvals (LGs)	residential	rural living	
Coastal		**1152**	**325**	**1477**
	Dandaragan	1014	18	1032
	Gingin	138	307	445
Avon Arc		**855**	**1392**	**2247**
	Beverley	16	51	67
	Chittering	87	701	788
	Northam	561	520	1081
	Toodyay	76	114	190
	York	115	6	121
Outer Arc		**87**	**11**	**98**
	Cunderdin	81	11	92
	Wongan-Ballidu	6	0	6
South-western		**170**	**134**	**304**
	Narrogin	150	0	150
	Williams	20	134	154
	TOTAL	2,551	1,997	4,548
	Lots remaining	2,137	1,907	4,044
	% with 3+ yrs to clear	76%	85%	-

Source: Department of Planning Internal Database (preliminary data only)

Figure 23: Land supply assessment summary (vacant land)

Subregion	Local government/ suburb	based on projections		Vacant zoned land (ha)		Potential yield		Projected new population 2011-2031
		Av. No. of dwellings required per year	% of Wheatbelt demand	Residential	Rural living	Potential dwelling yield	Potential population yield from zoned vacant land (2010)	
Coastal				**2340**	**4873**	**22,281**	**55,702**	**3300**
	Dandaragan	-	-	-	-	-	-	-
	Jurien Bay	30	8%	396	169	565	1413	-
	Cervantes	10	3%	-	-	-		-
	Gingin	-	-	204	570	774	1935	-
	Lancelin	20	5%	-	-	-	-	-
	Guilderton	10	3%	-	-	-	-	-
	Gingin	10	3%	-	-	-	-	-
Avon Arc				**1790**	**14,998**	**19,857**	**49,644**	**7200**
	Beverley	No growth projected		-	-	-	-	-
	town	-	-	-	-	-	-	-
	country	-	-	-	-	-	-	-
	Brookton	2	1%	-	-	-	-	-
	Chittering	-	-	3	20	23	58	2000
	Bindoon	15	4%	-	-	-	-	-
	Lower Chittering	15	4%	-	-	-	-	-
	Chittering	10	3%	-	-	-	-	-
	Muchea	-	-	-	-	-	-	-
	Northam	-	-	-	-	-	-	-
	town	40	10%	625	57	682	1705	-
	Wundowie	20	5%	-	-	-	-	-
	Bakers Hill	20	5%	-	-	-	-	-
	Toodyay	-	-	95	0	95	238	2100
	town	20	5%	-	-	-	-	-
	country	20	5%	-	-	-	-	-
	York	40	10%	359	49	408	1020	-

Outer Arc				**1786**	**1223**	**16,376**	**40,940**	**1650**
	Cunderdin	4	1%	-	-	-	-	-
	Dowerin	3	1%	-	-	-	-	-
	Goomalling	3	1%	-	-	-	-	-
	Moora	20	5%	89	16	105	263	-
	Victoria Plains	3	1%	-	-	-	-	-
	Wongan Ballidu	12	3%	-	-	-	-	-
South-western				**707**	**2429**	**6971**	**17,428**	**1510**
	Cuballing	3	1%	-	-	-	-	-
	Narrogin	40	10%	-	-	-	-	-
	Pingelly	no growth projected		-	-	-	-	-
	Wandering	4	1%	-	-	-	-	-
	Wickepin	no growth projected		-	-	-	-	2,000
	Williams	1	0%	-	-	-	-	-
South-eastern				**703**	**141**	**6365**	**15,912**	**10**
	Kondinin	4	1%	-	-	-	-	-
	Narembeen	slight decline projected		-	-	-	-	-
North-eastern				**886**	**84**	**7999**	**19,998**	**340**
	Dalwallinu	12	3%	-	-	-	-	-
	Mount Marshall	3	1%	-	-	-	-	-
	Mukinbudin	3	1%	-	-	-	-	-
Great-eastern				**1609**	**23**	**14,486**	**36,215**	**1450**
	Bruce Rock	slight decline projected		-	-	-	-	-
	Kellerberrin	no growth projected		-	-	-	-	-
	Merredin	40	10%	-	-	-	-	-
	Tammin	1	0%	-	-	-	-	-
	Westonia	slight decline projected		-	-	-	-	-
	Yilgarn	no growth projected		-	-	-	-	-
TOTALS				**19,643**	**47,541**	**94,336**	**235,839**	**15,460**
(Centres)				*2206*	*940*	*3146*	*7865*	-

Source: Department of Planning Internal Database (preliminary data only)

4.5 Land use planning implications - residential land supply

The settlements and land supply assessment has shown that there are few, if any, land supply constraints for accommodating the projected growth for the Wheatbelt within the existing approvals and zoned land. It is acknowledged that actual supply constraints may be experienced at a site specific level, following further investigation, particularly water supply.

In the Coastal subregion, the major growth areas will be Jurien Bay and Lancelin.

The Avon Arc subregion is expected to accommodate nearly half the growth in the Wheatbelt. The major growth areas will be Chittering, Toodyay, Northam and York. The growth in York and Northam is expected to occur in the townsites, whereas the growth in Chittering will occur in the existing zoned rural living areas. Growth in Toodyay is a combination of townsite and rural living.

Growth in the Outer Arc subregion is predicted to be steady, and likely to accommodate 10 per cent of the total growth predicted for the Wheatbelt. There are significant existing residential approvals in Cunderdin, which requires further investigation and monitoring.

The South-western subregion growth is expected to occur primarily in the regional centre of Narrogin. The other shires in the South-western are currently projected to experience a population decline.

Dalwallinu is the focus for growth in the North-eastern subregion, and there is anecdotal evidence of burgeoning activity in Dalwallinu, which requires further investigation and monitoring.

Figure 24: Industrial and commercial land supply assessment (vacant lots)

Subregion	Local Govt/ suburb	Commercial/ business	Industrial
Coastal		**20**	**13**
	Gingin (shire)	1	11
	Jurien Bay	19	2
Avon Arc		**25**	**50**
	Chittering (shire)	0	0
	Northam (balance)	2	17
	Northam (town)	6	32
	Toodyay (shire)	8	0
	York	9	1
Outer Arc		**18**	**33**
	Moora	6	22
	Wongan Hills	12	11
South-western			
	Narrogin	6	8
South-eastern		**14**	**36**
	Corrigin	1	12
	Merredin	7	23
	Wyalkatchem	6	1
	TOTAL	**83**	**140**

Source: Department of Planning Internal Database (preliminary data only)

Merredin will be the principal place in the Great-eastern subregion for growth.

4.6 Commercial and Industrial land supply assessment

Similar to the land supply assessment for residential capacity, the commercial and land supply assessment calculates the capacity of each subregion to accommodate commercial and industrial growth and development, and identify where additional land is required to meet demand.

4.6.1 Existing commercial and industrial land supply

Figure 24 presents a summary of existing land supply (vacant lots) for the major growth centres and centres in the Wheatbelt with notable activity.

4.6.2 Recent commercial and industrial lot creation

Figure 13 illustrates preliminary subdivision approvals for industrial and commercial lots. These approvals are categorised in Figure 25. Figure 26 describes industrial final approvals from 2004-05 to 2008-09 and 2009-10 up to 26 August 2010. The majority of activity is happening in the Coastal Wheatbelt. The creation of industrial lots in smaller townsites, such as Wongan Hills and Dallwalinu in the Outer Arc is also notable. The Avon Arc activity is primarily in Northam, which is taken as occurring in the Avon Industrial Park.

Figure 25: Industrial and commercial subdivision major approvals

Subregion	Local Govt/ suburb	Industrial	Commercial
Coastal Wheatbelt		**31**	**134**
	Dandaragan	31	92
	Gingin	0	42
Avon Arc		**26**	**6**
	Beverley	0	2
	Chittering	0	0
	Cunderdin	0	0
	Northam	19	0
	Toodyay	7	4
	Narrogin	0	0
	York	0	0
Outer Arc		**60**	**2**
	Wongan-Ballidu	60	2
South-western		**0**	**2**
	Williams	0	2
	TOTAL	145	149
	Lots remaining	134	149
	% with 3+ yrs to clear	99%	100%

Source: Department of Planning Internal Database (preliminary data only)

Figure 26: Industrial final approvals

Wheatbelt region - industrial final approvals (2004-05 to 2008-09)	
Top 5 localities (suburbs)	Top 5 local governments
Dalwallinu (11)	Northam (21)
Grass Valley (11)	Dalwallinu (11)
Merredin (10)	Merredin (10)
Northam (8)	Dandaragan (6)
Cervantes (5)	Narembeen (4)

2009-10 and 2010-11 up to 26 Aug 10	
Industrial final approvals	
Local governments	
Wongan	8
Quairading	1

Source: Department of Planning Internal Database (preliminary data only)

4.6.3 Land use planning implications - commercial and industrial lot supply

There are 167 commercial lots and 145 industrial lot approvals in hand and 83 vacant commercial lots and 140 vacant industrial lots. Together with current approvals for industrial lots, the lot supply of commercial and industrial land equates to 7.5 years of supply, based on a 20 year average and 6.6 years of supply, based on a 5 year average. The average over the past 20 years equates to 15 industrial lots per annum.

The activity is predominantly occurring in Dalwallinu, Dandaragan (Jurien Bay), Northam, Moora, Wandering.

The Muchea employment node is located at the intersection of the Brand Highway and Great Northern Highway in the Shire of Chittering. The Western Australia Meat Industry Association Livestock Centre is located within the 1113 hectare future industry node. A draft structure plan provides a framework for development of the node in the long-term and guidance on management of constraints related to the presence of basic raw materials and important environmental values.

The demand for commercial and industrial land is likely to increase, particularly incidentally to the growth in metropolitan Perth. There is no immediate land supply shortage for industrial lots, however, appropriate areas for expansion in line with areas of demand need to be identified.

5 Regional economy

5.1 Introduction

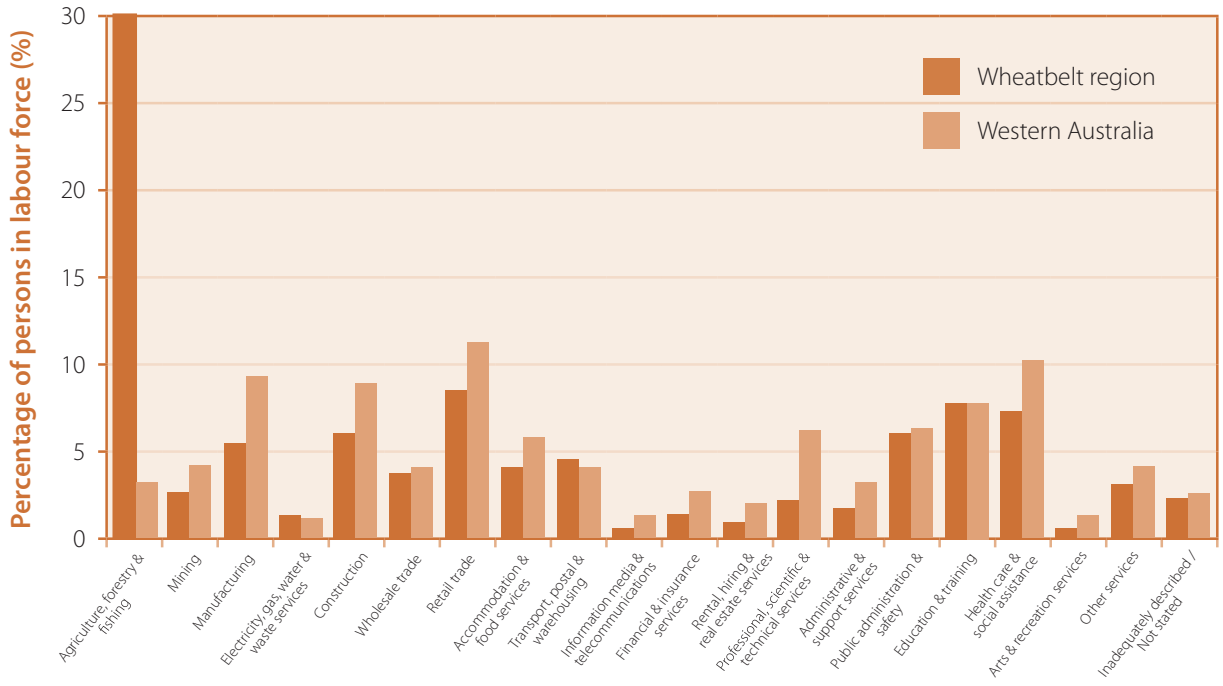
The regional economy of the Wheatbelt is almost entirely based on primary production, dominated by broadacre farming of wheat and livestock, particularly sheep. An overview of the productivity in the Wheatbelt is in Section 2.1, which illustrates that the Wheatbelt region is the principal contributor of agricultural commodities in the State. Primary production is also the basis for most other economic activity in the region, including manufacturing, servicing, trade and transport. Mining and tourism are also notable in the regional economy, but comparatively less than other parts of the State.

At the time of the 2006 Census, just under one-third of Wheatbelt workers are employed in the agriculture, forestry and fishing industries. This differs markedly to the proportion of the labour force employed in these industries across the State, at less than 5 per cent, as shown in Figure 27. Other significant industries of employment in the region include retail, education and training, health care, public administration and construction.

5.2 Agricultural land and primary production

Agriculture, and therefore agricultural land, is fundamental to the region's economy. Government State planning policy has historically sought to protect land identified as priority agricultural land from conflicting development such as housing and rural-living settlements. This policy responded to the growing pressure for rural living subdivisions particularly in the peri-urban areas around major cities and towns. This policy is evolving, with a refocus on protecting rural land for primary production generally, related rural industries and for appropriately locating other uses which cannot usually be established in town.

Figure 27: Wheatbelt region labour force - industry of employment



Source: Australian Bureau of Statistics, census of popultion and housing, 2006

Planning for continuing primary production in the Wheatbelt needs to consider the various sub-industries: grains industry, animal industry and horticulture, and also biophysical, infrastructure and social issues, which are addressed in the following section.

Land use planning implications

In the Wheatbelt, the key land use planning implications are the protection of agricultural soils of Gingin, Dandaragan, Chittering, Toodyay, Northam, York and Wandering from incompatible land uses. The competition for access to land along the western margins/higher rainfall area of the Wheatbelt is expected to increase due to expanding population and the change of rainfall in the eastern areas forcing agricultural production west.

The land use planning implications for agricultural land and primary production are broad and the key planning policy for securing rural land for primary production is covered by State Planning Policy 2.5 - Agricultural and Rural land Use Planning and Development Control Policy 3.4 - Subdivision of Rural Land.

5.2.1 Grains industry

Grain production, including wheat, lupins, barley, oats and canola seed is expected to prevail as the dominant primary industry in the region for the foreseeable future. The Western Australian grain industry covers a geographic area from Geraldton in the north, to Albany in the south, and out to Newdegate and Beacon in the east.

Approximately 10 million tonnes (nearly 80 per cent) of grain produced in Western Australian is exported each year (up to 15 million tonnes in a good year). The grain is handled by nearly 200 receival bins, connected to a network of road and narrow and standard-gauge rail (approximately 60 per cent transported by rail) connecting to the four export grain ports: primarily to Fremantle (48 per cent), Albany (24 per cent), Geraldton (8 per cent) and Esperance (20 per cent). Refer to Map 5 – Wheatbelt economic resources.

Challenges for grain production centre on the impact of climate change on rainfall in eastern areas (and therefore the threat of reduced productivity for grain), and competing access to land along the western margins. Refer to Map 6 – Average rain in Western Australia – Wheatbelt region (1900 - 2007) and Map 7 – Average rain in Western Australia – Wheatbelt region (1976 – 2005).

In response, the Department of Agriculture and Food (DAFWA) is focusing efforts on increasing the productivity and efficiency of the grains industry in higher rainfall areas for improved yields per hectare. This means increasing yields on existing cropping areas and overcoming constraints to production on the marginal soil types, while maintaining production levels in low rainfall areas.

Land use planning implications

The primary land use planning implication of the continued productivity of the grains industry is the need to protect broad acre farming land, that is to protect broadacre farming land. The changing rainfall trends is a major challenge for maintaining productivity and also exacerbating potential land use conflicts in higher rainfall areas. Related to these issues, is the proportion of the region's economy based on the grain industry presents a strength, as well as a vulnerability.

The land use planning implications for the grains industry is covered by State Planning Policy 2.5 - Agricultural and Rural land Use Planning and Development Control Policy 3.4 - Subdivision of Rural Land.

5.2.2 Animal industry

The animal industry includes sheep, beef, pork, poultry at the broad scale and intensive animal production. DAFWA has estimated that the beef and sheep meat industries are the largest and have the greatest economic development potential in the medium term in terms of current and potential international market demand.

The challenge for the beef industry in southern parts of WA is the lower profitability due to primary producers often being a smaller scale/secondary part of a private enterprise. DAFWA are supporting the restructure and development of the industry, including review of the beef industry supply chain, increased scale of operations and processing with the aim of also increasing the profitability of the beef industry. The development of the beef industry will also assist in overcoming the weakness identified in the southern parts of the WA of over-reliance on the domestic market. Specifically, DAFWA is looking to create feedlots and precincts (Agribusiness Precincts) in southern WA.

The sheep market comprises sheep-meat and wool production. DAFWA has reported that the sheep-meat market, though mature, is strong, and the demand for sheep-meat in the export market has

been increasing substantially. However, the demand for wool has been and is decreasing. The challenge for sheep production is that WA has the highest Merino population in the world, and wool and sheep-meat production is integrated for Merino farmers; that is the profitability of wool production is integral to the economic viability of sheep-meat. DAFWA reports that the viability of moving to non-Merino meat breed flocks has a number of issues yet to be resolved, and until it is resolve, overall sheep-meat production growth potential is moderate.

Poultry, pork and dairy industries predominantly supply the local market and have potential for expansion in step with population growth and demand. Dairy and pork also supply to the South-East Asian market, and growth in these exports is expected.

While the economic prospects for the animal industry are significant, the challenges for the industry are parallel to the grains industry: changing rainfall patterns, water availability and land use conflicts and competition.

Resilience of the broadacre animal industry to drought can be improved by identifying locations for the temporary confinement of stock into localised areas, thereby enabling the short-term provision of feed. This option is generally not available in proclaimed water areas. This occurs on an operational level, and is not expected to have a land use planning implication for the region.

The Wheatbelt is ideal to support increased intensive animal production based on the availability of grain as a major food source and proximity of the region to markets. The Department of Agriculture and Food is progressing a number of mid-sized feedlots primarily through the western shires (Dandaragan, North Gingin, Moora, Victoria Plains and Toodyay), and there is the possibility that a mega feedlot facility (> 50 000 head) may be developed.

The flow-on effect of increased intensive animal production is the development and expansion of secondary processing (food or other) in the region.

Land use planning implications

The productivity and resilience of the animal industry to a large extent occurs outside the State government land use planning processes, and is not expected to have regional land use planning implications per se, because many of these types of uses are permitted on rural land.

The primary land use planning implication for the animal industry is the location of DAFWA's identified agribusiness precincts, including intensive animal production, buffers and essential service needs of the industry, and secondary processing (food or other) from intensive animal farming. This is expected to impact Dandaragan, North Gingin, Moora, Victoria Plains and Toodyay.

DAFWA is working towards the release of two agribusiness precincts. The land use planning response to the precincts will be developed when DAFWA completes the project and releases the precincts.

5.2.3 Horticulture

Major horticultural development is expected to occur through the western shires of Dandaragan and Gingin, with the potential to supply the Perth market. Based on current water allocation, horticultural production could increase in these shires by 30-50 per cent. Further water resource investigations and consideration of other water requirements; for example, for urban settlements and mining, could support substantial additional horticultural development, as will the development of water efficiency technology.

Expansion of horticulture requires access to power (alternative power sources such as wind or solar could be used), transport networks and initial processing infrastructure. There may be opportunities for shared capacity hubs where multiple businesses use combined infrastructure for initial processing. Dandaragan or Jurien may be suitable locations based on proximity to production areas.

There may also be some potential for targeted horticulture in the inland Wheatbelt. Unscoped water supplies exist around the Darkan, Kokoby and Capitela valley areas, and may present an opportunity for small scale horticultural development. Development in these areas is more likely to be niche.

The change in land use from broadacre agriculture to horticulture has implications for planning and management, and the transition needs to be planned to maximise production for both industry sectors. For example, chemical applications in horticulture can be constrictive on surrounding broadacre activities.

DAFWA is working towards establishing strategic horticulture precincts in areas north of Wanneroo (Gingin, Dandaragan, Moora and Victoria Plains). The strategy for these precincts is scheduled for release in the next two to three years.

Land use planning implications

The horticulture precincts in the Wheatbelt are of State significance, however the expansion of horticulture, particularly in the shires of Gingin and Dandaragan, needs to be carefully managed as the current water allocations are over-subscribed. The land use planning process can assist with site selection and protecting the selected sites against land use conflicts, in particular, providing a land use planning response to facilitate the horticulture precincts, when DAFWA strategy is complete.

5.3 Commercial fisheries

Commercial fisheries in the Wheatbelt is based primarily on the West Coast rock lobster industry. The annual production of the West Coast rock lobster managed fishery (between Shark Bay and Cape Leeuwin) is Australia's most valuable single-species fishery. However, the management of this fishery is causing the industry to scale back, both the number of pots licensed and the time of year when the fishery may operate.

The potential for fishery industry development in the Wheatbelt is limited to related enterprises such as aquaculture. Aquaculture is recognised by the National Aquaculture Council as vital to the future of the Australian economy and the supply of Australian seafood, and has identified a number of broad industry and institutional changes required to assist the growth of the industry. There are currently no aquaculture projects in the Wheatbelt, and there are only two in the West Coast Bioregion (Cockburn Sound and Flinders Bay). Development work for the industry is assessing the suitability of offshore areas for aquaculture, and there is also the potential for offshore areas within the West Coast Bioregion.

Land use planning implications

There are no regional land use planning implications for the fisheries industry in the Wheatbelt, as the fisheries industry is capped and aquaculture remains an emerging industry.

5.4 Tourism

The natural environment is the main attraction for tourists in the Wheatbelt and includes landscape features such as the Pinnacles and Wave Rock, nature-based recreation on the coast, waterways and wildflowers. There is a growing market for agri-tourism and farm gate touring including wineries, olive groves, orchards, honey producers and nut growers. There are also cultural and heritage experiences for visitors such as New Norcia and York. A number of trails cross through the region including the Bibbulman Track and the Munda Bindi Trail, as well as local tourist and heritage trails.

Wheatbelt
Regional Profile

The economic development of the tourism industry relies on the availability or supply of appropriate infrastructure. While private investors invests in some infrastructure, the public sector has a role in providing basic infrastructure and utilities such as road, power, water, sewerage, electricity and telecommunications. Tourism WA has developed "destination development strategies" for the five tourism regions in WA to highlight key requirements for developing tourism, including where tourism infrastructure is required.

A summary of the destination development strategies relevant to the Wheatbelt is summarised as below.

The Draft Revised Planning Bulletin 83 - Planning for Tourism (2010) sets the policy position of the WAPC for subdivision, development and scheme amendment proposals for tourism purposes. The revision to the Planning Bulletin 83 provides for a more strategic and flexible approach to tourism planning than previously, and recommends that the where tourism is significant within a locality or region the local planning strategy includes a detailed tourism component. The tourism component would ideally identify tourism precincts, priority tourism sites and tourism sites. In areas where a local planning strategy is yet to be prepared, the draft revised Planning Bulletin provides guidance for assessment.

A provisional list and mapping of strategic tourism sites was created during the review of the Planning Bulletin, but not pursued. While the list of strategic tourism sites has no status, the places on the list are available to be considered for the Wheatbelt land use planning strategy. Refer to Map 5 – Wheatbelt economic resources.

The coastal areas of the Wheatbelt, including Jurien Bay, Cervantes and Guilderton, are considered to be under growth pressure and are areas where tourism planning is a priority for local government through local planning strategies. Caravan parks in particular are perceived to be under pressure as many are in locations that make them attractive for redevelopment. In some instances, redevelopment for higher value visitor accommodation, such as chalets and apartments, is able to occur under the existing scheme zoning. It is important to try to protect existing budget accommodation such as caravan parks. Where the need has been identified, local planning strategies can offer an opportunity to identify suitable sites for new budget accommodation and support appropriate developments.

The proximity of many tourist attractions to Perth makes it difficult to accurately measure the tourism market in the Wheatbelt, due mostly to day trippers and the small size of accommodation operators.

Destination development strategies

Tourism destination region	Priorities
Experience Perth	• Sunset Coast Subregion (Gingin Shire) - likely period of development assoc with Indian Ocean Drive (need for accommodation) • Avon Valley Subregion - generally stable, growing/opportunity for agri-tourism
Coral Coast (Cervantes and Jurien Bay Subregion)	• Includes Dandaragan Shire • Seen as having significant scope for development (especially accommodation - high end and camping) • Significant gaps in power and sewerage facilities limits opportunities for development • Indian Ocean Drive expected to increase visitation and stimulus for private investment
Golden Outback (Wheatbelt subregion)	• Includes east of Avon Arc • Seen as having limited development or expansion (sufficient supply needs enhancement) • Opportunities for improvement over the longer term • Attractions to enhance: wildflowers, history and local produce.

Source: Tourism WA

However, tourism is expected to continue to expand in the Wheatbelt, although its future relies on the protection and enhancement of the region's natural attractions and landscapes.

Land use planning implications

The regional land use planning implications for the tourism industry relate to protecting areas of tourist appeal, particular the natural features and landscape. The protection of these is discussed in Section 6.

The provisional strategic tourism sites identified on Map 5 – Wheatbelt economic resources could be highlighted on the strategy map for particular attention and supported by an action for local planning strategies to consider the needs of the tourism industry and establish a framework for decision-making on tourism proposals consistent with Destination Development Priorities and revised Planning Bulletin 83.

The implications of the revised Planning Bulletin 83 need to be determined when released, including interpretation of guidance on tourist zoned land or recommendations for local governments to establish a tourist zone where appropriate. Planning Bulletin 83 is also expected to provide guidance on how to manage sites set aside for tourism purposes in regard to permanent residential uses.

5.5 Mining and basic raw materials

Mining is an exceptionally large part of Western Australia's economy, forming more than half of the total value of production and 35 per cent of manufacturing, of which a large proportion is associated with mining. As described in Section 2.1, the mining industry in the Wheatbelt is a small proportion of the Western Australia economy comprising about 2 per cent (and just over 1 per cent of manufacturing) of the total State production value.

The key opportunity in the Wheatbelt for taking advantage of the economic benefits of the mining industry is to maximise opportunities of its close proximity for servicing to existing mining hubs in the State, particularly in the Mid-West and the association of the Wheatbelt with metropolitan Perth.

The Wheatbelt region contains a diverse range of mineral resources and has numerous prospective tenements and activities Map 8 – Wheatbelt mining sites and mineral resources and Figure 28. The primary material mined in the Wheatbelt is iron ore, which is sourced in the eastern part of the Wheatbelt (Koolyanobbing and nearby areas). The main commodities in the Wheatbelt are summarised as follows:

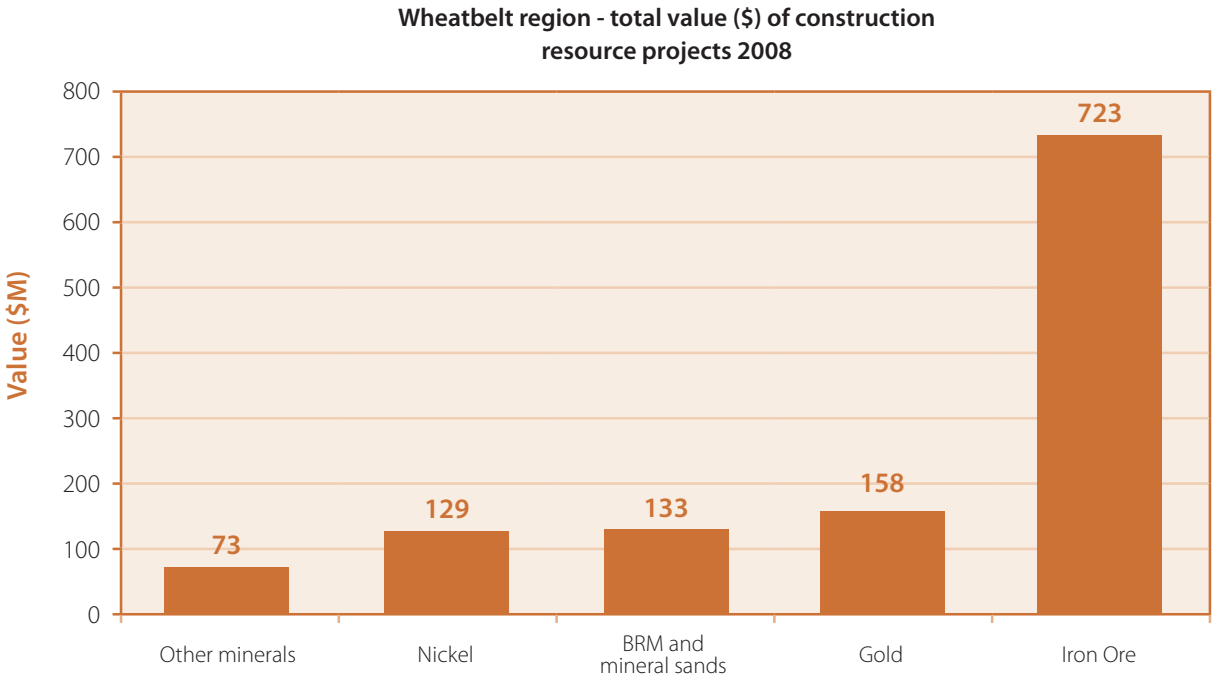
- ***East*** - contains mainly gold, iron ore, salt, nickel and gypsum deposits, with the majority of operating mines located in the Shire of Yilgarn (Koolyanobbing, Mt Jackson and Windarling deposits).
- ***Central*** - contains mainly gypsum, clay and magnesite deposits. The majority of operational mines in this area occur in the northern central region, and are mainly salt and gypsum mines.
- ***Western*** - contains clays, construction materials and bauxite-alumina deposits, with the majority of operational facilities in the shires of Northam and Toodyay.
- ***North-west*** - contains deposits of construction materials such as limestone and limesand and also heavy mineral sands. Coal and phosphate deposits are also found in the northern portion of the Shire of Dandaragan. Minerals used for the production of titanium dioxide pigment are mined at Cooljarloo in the Shire of Dandaragan, and processed at Chandala, in the Shire of Gingin. This Tiwest Joint Venture project is Australia's largest titanium dioxide pigment producer.

Basic raw materials (BRM), including sand, clay, hard rock, limestone and gravel are in demand both from within the Wheatbelt region and to service the Perth metropolitan area. BRM are essential to development, and is used in construction, road building and agriculture. Significant deposits of basic raw materials are located on private land. These areas are excluded from the *Mining Act 1978* and must be extracted through extractive quarry licenses issued by local government authorities.

The Department of Mining and Petroleum is currently mapping areas with significant deposits of basic raw materials. The focus of this work to date has been in the South-West. However, there is some mapping available for the Wheatbelt, but it is limited to the coastal areas. Refer to Map 5 – Wheatbelt economic resources.

This BRM work that underway is also being supplemented by a review of SPP2.4 Basic Raw Materials. The review of basic raw materials is due to be released for advertising and is expected to recognise agricultural lime as a material worthy of protection by the policy. Agricultural lime is primarily used as an alkaline stabiliser for farms that use high amounts of acidic fertilisers, assisting to stop

Figure 28: Wheatbelt mineral production, 2008



Source: Department of Mines and Petroleum

acidification and the further loss of agricultural land. Given the role of agriculture in the Wheatbelt, this inclusion in SPP2.4 will be beneficial for protection and supply.

Land use planning implications

Mining operations can occur anywhere including outside the planning process. A key land use planning implication associated with mining is the availability of zoned and serviced land for construction and service industries.

The regional land use planning implications for the mining industry are limited until such time as hard data is available about where demand for servicing hubs might be in the Wheatbelt. Currently these statistics are not available. In the interim, encouraging the attraction of support for the mining industry can be created through continuing to recognise strategic industrial sites and monitoring demand for industrial land in the Wheatbelt. Refer to Section 4.6 and Section 5.6.

Existing legislation and State planning policies facilitate mining activity, and protects basic raw materials. If the review of SPP2.4 and the Department of Mining and Petroleum leads to a regional land use planning strategy response, this will be developed at the time. Similarly, responses required in local planning strategies will be facilitated.

5.6 Industry and manufacturing

Industry and increased manufacturing is an economic opportunity for the Wheatbelt. The Wheatbelt, particularly the north-western and western parts, have an advantageous proximity to Perth and other economic activities (e.g. mining as discussed in Section 5.5 above). The growing metropolitan region presents an opportunity for increased industry and manufacturing in the Wheatbelt, as industrial uses are driven to available and/or affordable industrial land.

At a regional level, the Avon Industrial Park features 203 ha of industrial land in a total park area of 473 ha. The estate is located 18 km east of Northam and 116 km east of Perth. The site was chosen for its ease of access and proximity to major transport routes, including the Trans-Australian rail line and Great Eastern Highway. The Avon Industrial Park currently accommodates an agricultural chemicals manufacturer, manufacturers of a range of polyethylene tanks for rural and industrial uses, machinery services for the resources sector, and an electrical contractor.

Structure planning is also underway for the proposed Muchea Employment Node, which is located approximately 45 km from Midland on the Great Northern Highway. This site is approximately 1000 ha in size and currently accommodates the Western Australian Meat Industry Association saleyards. Development of this site is a long-term proposal, as there are significant servicing issues to address, including water supply, staging and developer contributions.

Land use planning implications

Industry and manufacturing activities are expected to be accommodated in Wheatbelt towns. If the activity is associated with primary production, it is possible that it may be located on rural land. Refer also to Section 4.6.

5.7 Tree farming and plantations

Tree farming for paper and wood products and carbon sequestration plantation projects may have positive economic and environmental impacts for the region.

Forestry opportunities research (Australian Bureau of Agricultural and Resource Economics) indicates that most (two-thirds) of the potential for tree farming occurs in high rainfall zones, and that trends are indicating that it is the less productive parts of the higher rainfall areas which are likely to be converted into forestry. Very little tree farming and plantations are projected to occur on irrigated agricultural land.

There is some concern about tree farming presenting a potential threat to agricultural production, particularly for carbon sequestration projects, which result in a permanent change in land use away from food production.

It is intended that plantation opportunities for harvesting tree crops for paper and wood products, biomass production for fuel and carbon sequestration are encouraged in the Wheatbelt. Relevant land use planning guidance is needed, but that which is not burdened by an undue degree of planning control.

The Forest Products Commission has advised that there are no current major forestry activities for the Wheatbelt. Further to this, in seeking information about where potential forestry activities are likely to occur within the Wheatbelt, to inform an appropriate land use planning response, it was advised that there are potential species for any situation (except saline).

The Forest Products Commission also reiterated concerns about the effect the planning process has for tree farming and plantations, particularly uncertainty and costs. These issues need to be responded to at the State level to avoid regional differences, and are expected to be included in the review of SPP2.5 as well as a future revision of *Planning Bulletin 56 - Farm Forestry Policy*.

Land use planning implications

The regional land use planning implications for the forestry and plantation industry is about the need to support diversification of the rural economy. Tree farms are a supported use on rural land, but not on prime agricultural land and not preferable in Wheatbelt coastal areas. The WAPC policy for tree farming is provided for in the review of SPP2.5

5.8 Emerging or niche industries

There is a wide scope for other emerging or niche industries in the Wheatbelt. For example organic farming, DAFWA has produced "strategic opportunities" in WA plus a suite of supporting documents. The areas identified in the Wheatbelt for emerging and niche industries include Moora, along the Darling Scarp from Gingin to Harvey and the Perth Hills (west of York).

However, some of which are not appropriate in urban settings, and yet may face difficulties establishing in rural areas due to the current zone permissibilities. The use of rural land may be suitable for establishing alternative industries and diversifying the economic base of the region

Land use planning implications

The land use planning implications for diversifying industry in the Wheatbelt region comprise a number of elements. Firstly, the planning framework should recognise primary production as opposed to agricultural production as suitable on rural land.

Secondly, the planning framework should recognise that rural land can accommodate a broad range of rural land uses. Some local planning schemes may require clarification for uses not listed (zoning table in planning schemes). However, the Wheatbelt has 12 million hectares of rural land, which is a major asset for accommodating emerging and niche industries. There is a need to promote the flexibility and range of land uses that can be contemplated on rural land.

5.9 Conclusion

Primary production is the principal economic base for the Wheatbelt and is also the basis for most other economic activity in the region. The economy is directly impacted by external influences, which are to a large extent uncontrollable, particularly rainfall, climate change and market fluctuations. The Wheatbelt is also vulnerable to the fact that the benefits of the general economic growth and boom times in the State (and the nation) do not actively filter into the region. In fact, the resource boom, principally in the Pilbara, is attracting workers to highly paid employment. This has negative influences on the Wheatbelt, but not only the Wheatbelt, as labour and skill shortages are reported across Western Australia and are predictable in times of high economic growth.

Developing a suite of solutions to skill shortages in the Wheatbelt is beyond the scope of a land use planning strategy. Through its strategic direction, the land use planning strategy supports economic development and facilitates economic opportunities. The role of the land use planning strategy is to identify and protect region specific resources, maximise flexibility for emerging industries and economic diversification, and assist in the provision of efficient and essential infrastructure. However, market forces determine when and how activities occur.

6 Natural resources and environment

6.1 Biodiversity

The Wheatbelt region is part of the Southwest Australia Biodiversity Hotspot, an area recognised internationally for its high level of species diversity. Natural areas in the Wheatbelt are also highly valued by the community, particularly as a focus for tourism and recreation. There has been extensive biodiversity loss in the Wheatbelt from the historical clearing of native vegetation for agriculture, and more recently for housing and infrastructure.

The biodiversity of many natural areas in the Wheatbelt continues to decline due to the effects of fragmentation. Biodiversity loss is exacerbated by dry land salinity, altered hydrology, grazing, introduced plants and animals, dieback, inappropriate fire regimes, and climate change.

The Wheatbelt contains many important biodiversity assets, including nationally significant wetlands (refer to Section 6.2), rare flora and threatened fauna. The WA Biodiversity Audit (2002) identified many areas of conservation significance occurring in the Wheatbelt, including tumulus springs and limestone caves on the Swan Coastal Plain; Eucalyptus woodlands, granite outcrops, gypsum dunes, Toolibin Lake, Yorkrakine Rock, Dryandra Woodland, the Pingelly area and the Wongan Hills area in the Avon Wheatbelt; and Lake Cronin in the Western Mallee subregion.

The six most extensively cleared biogeographic regions of Western Australia occur in the Wheatbelt planning region, as shown in Figure 29 and Appendix C. There are no local government areas in the Wheatbelt that have more than 30 per cent of the original native vegetation cover remaining, and many local government areas have less than 10 per cent of the original native vegetation cover remaining (refer Appendix C). Consequently, the Wheatbelt has a higher proportion of threatened species and communities than other parts of Western Australia (refer to Appendix D).

Generally, a very low proportion (less than 1 per cent in many local government areas) of the original native vegetation cover is protected in reserves managed by the Department of Environment and Conservation (DEC) (refer to Appendix C). While there are significant biodiversity assets in the conservation reserves (Figure 30), many other assets are located on private property and are at risk from land use and development.

Some local government areas, including the shires of Gingin and Dandaragan, which are experiencing pressure for land use change and development, contain extensive areas of native vegetation outside of DEC reserves (refer Appendix C). The preparation of local biodiversity strategies is a high priority to guide land use planning in these local government areas.

Priorities for biodiversity conservation

The Perth Biodiversity Project (2010) has undertaken a regional prioritisation of "local natural areas" for conservation in the Wheatbelt, using data on native vegetation extent, Beard vegetation associations, occurrence of threatened species and communities, wetlands, and the size of vegetation patches. Local natural areas are "unprotected" areas of native vegetation that exist outside of DEC reserves, which have been categorised according to the following criteria:

Regionally significant

- *Highest conservation value:* contains a Beard vegetation association that has less than 10 per cent of its original extent remaining or rare flora/fauna species or threatened ecological community or significant wetland in a patch size of less than 20 ha.
- *High conservation value:* contains a Beard vegetation association that has 10-30 per cent of its original extent remaining or priority flora/fauna species or priority ecological community or other wetland in a patch size of less than 20 ha.
- *High priority for further investigation:* contains rare flora/fauna species or priority flora/fauna species in a patch size of greater than 20 ha.
- *At risk of becoming threatened:* contains a Beard vegetation association that has 30-40 per cent of its original extent remaining.

Locally significant

- *Locally significant natural area:* contains a Beard vegetation association that has more than 40 per cent of its original extent remaining.

Refer to Figure 31 – Regional prioritisation of natural areas for conservation.

Figure 29: Native vegetation extent and local government growth areas

See attached A3 pdf file

Figure 30: DEC reserves and rarity of Beard vegetation associations in biogeographic subregions

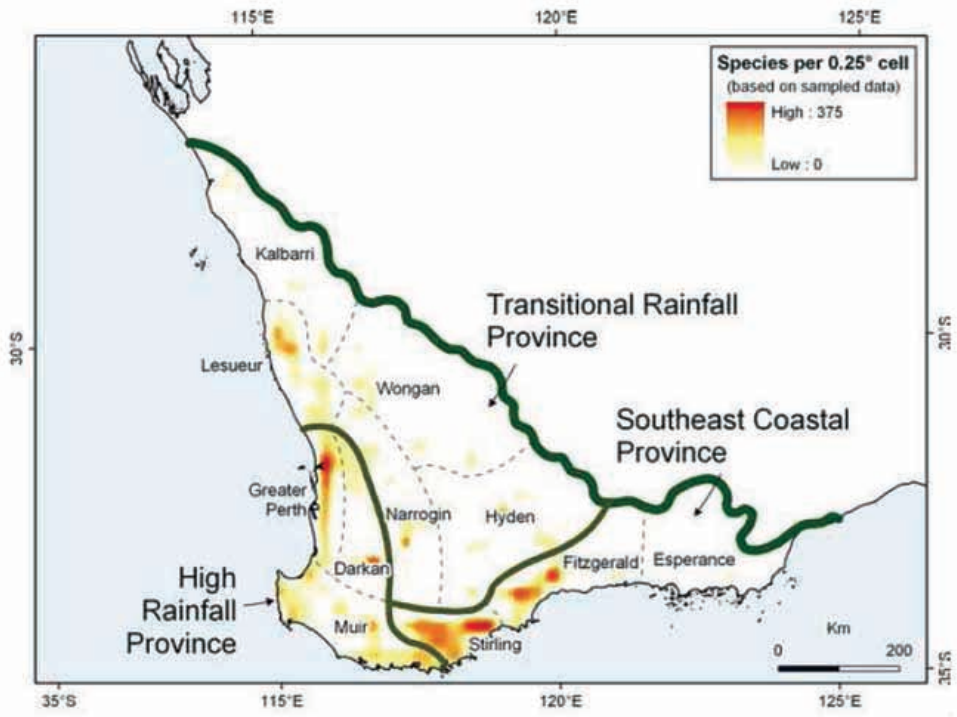
See attached A3 pdf file

Figure 31: Regional prioritisation of natural areas for conservation

See attached A3 pdf file

Figure 32: Biodiversity hotspots in Southwest WA

(a) Species Richness



(b) Species Endemism

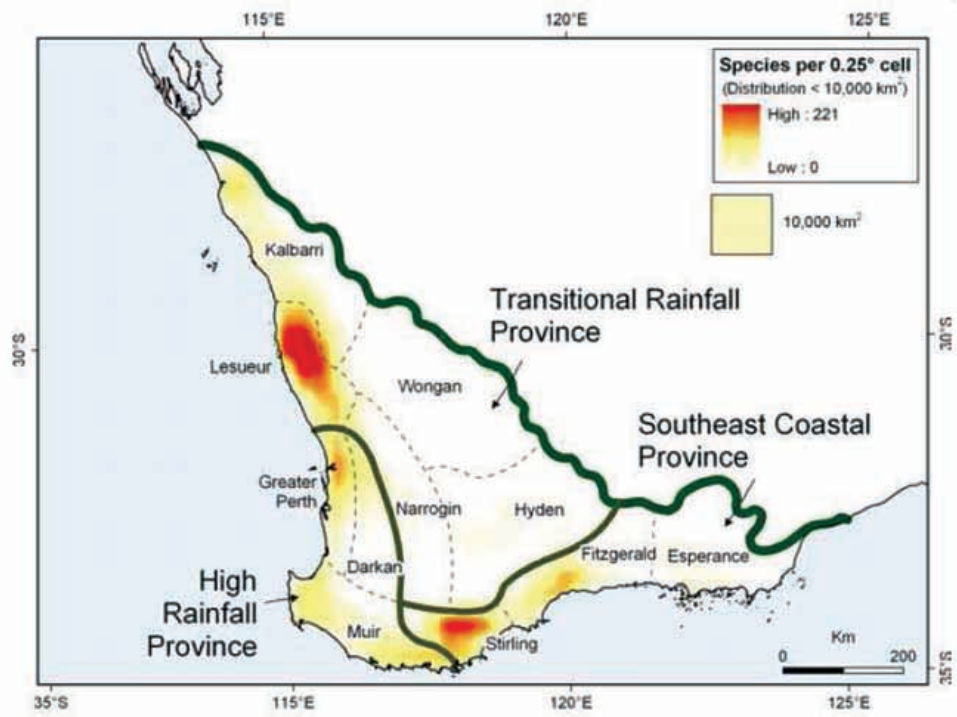


Figure 33: Native vegetation, wetlands and waterways

See attached A3 pdf file

Figure 34: Vegetation connectivity in the northwest portion of the Wheatbelt planning region

See attached A3 pdf file

Overall, the regional prioritisation of natural areas in Figure 31 shows that some larger natural areas in the western and far eastern portions of the Wheatbelt planning region are protected for conservation, and most of the smaller natural areas remaining in agricultural zones are regional priorities for conservation, based on existing information. It is important to note that more detailed information on biodiversity is required to more effectively prioritise natural areas for conservation. This is particularly important in the coastal areas, where a biodiversity hotspot has been identified in the Lesueur area due to the number and uniqueness of flora species that occur there (Figure 32).

Regional ecological linkages should also be identified to assist conservation planning in the Wheatbelt. Areas of native vegetation, wetlands and waterways provide important connectivity between habitats across the landscape (Figure 33). The biodiversity contained in large DEC reserves is supported by smaller patches of native vegetation that exist in nearby areas of public and private land. Road reserves often contain the only remaining native vegetation in highly cleared agricultural zones, and are important for maintaining connectivity between natural areas in the Wheatbelt.

The Perth Biodiversity Project (2010) has analysed the connectivity between patches of native vegetation in the Wheatbelt (Figure 34). Land use planning should seek to avoid further clearing and fragmentation of native vegetation; improve the statutory protection of natural areas that are important for maintaining connectivity; and provide for revegetation in areas that have been extensively cleared.

Biodiversity legislation and policy framework
Biodiversity conservation in Western Australia is governed by four key pieces of legislation:

- The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which provides for the protection of matters of national environmental significance, including listed threatened species and communities, listed migratory species, and Ramsar wetlands of international importance (refer to Appendix 2).
- The *Wildlife Conservation Act 1950*, which provides for the protection of threatened species, including declared rare flora and specially protected fauna (refer to Appendix 2).
- The *Conservation and Land Management Act 1984* (CALM Act), which provides for the protection of all land under the control of the Conservation Commission including State Forest, national parks, conservation parks and nature reserves.
- The *Environmental Protection Act 1986* (EP Act), which provides for the protection of native vegetation and environmentally sensitive areas, and establishes requirements for environmental impact assessment and clearing permits.

In addition, the main environmental policies relevant to biodiversity conservation through land use planning in the Wheatbelt planning region are:

- Environmental Protection Authority (EPA) Position Statement No. 2 Environmental Protection of Native Vegetation in Western Australia, which provides an overview of the EPA's position on the clearing of native vegetation in Western Australia, with particular reference to clearing in the agricultural area of Southwest WA.
- EPA Guidance Statement No. 10, which provides guidance for planning schemes and proposals potentially impacting on regionally significant natural areas within the System 6 region.
- EPA Guidance Statement No. 33 Environmental Guidance for Planning and Development Part B, which provides guidance for addressing biodiversity conservation through the land use planning.
- EPA Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia and No. 56 Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia, which establish standards and protocols for surveys that should accompany planning schemes and proposals.

Importantly, biodiversity conservation is not limited to the protection of threatened species by DEC or the assessment of impacts by the EPA. The *Planning and Development Act 2005* and State Planning Policy No. 2 *Environment and Natural Resources Policy* establish biodiversity conservation as a valid consideration through land use planning. Local governments can address biodiversity in local planning strategies and schemes, by identifying areas of conservation significance and implementing strategies to improve the statutory protection and consideration of biodiversity through land use planning.

More information on the legislative and policy framework for biodiversity conservation through land use planning is available in part two of the Directions *Paper on the Integration of NRM into Land Use Planning* (WAPC 2010).

Biodiversity projects

The South West Australia Ecoregion Initiative (SWAEI), a project coordinated by WWF in collaboration with various State government departments, non-government organisations and research institutions, has identified "areas for conservation action" that occur within the Wheatbelt. These areas will be the focus of more detailed planning for investment in biodiversity conservation activities into the future, and should be acknowledged through land use planning.

At the subregional scale, the Avon Natural Diversity Program (2007) has prioritised Beard vegetation associations for conservation within the Avon NRM region. Further survey and conservation planning is required at the subregional scale, particularly for the Swan Coastal Plain north of Moore River, and for the Dandaragan Plateau. Vegetation surveys for these subregions could adopt a similar methodology to that established for the Geraldton Regional Flora and Vegetation Survey (WAPC 2010).

Land use planning for biodiversity conservation

Land use planning has an important role in achieving biodiversity conservation outcomes, by identifying and protecting natural areas with significant biodiversity values (in conservation reserves and zones); directing development away from these areas (through appropriate zoning and subdivision design); and controlling the impacts of land uses on these areas (in accordance with development requirements of the scheme).

Strategic planning at a regional to subregional scale is particularly important as it allows the consideration of biodiversity early in the land use planning process, at a scale that is consistent with the natural extent of biodiversity assets, and is more effective in dealing with cumulative impacts of individual planning proposals. The prioritisation of natural areas that was undertaken by the Perth Biodiversity Project (2010) and presented earlier in this section, will guide strategic planning for biodiversity conservation, and should be supplemented with more detailed information obtained from subregional flora and vegetation surveys in the future.

Strategic regional planning is important to provide a context for planning by local governments, which are encouraged to prepare local biodiversity strategies and integrate biodiversity considerations into local planning strategies and schemes. The Shire of Chittering is the first local government in the Wheatbelt planning region to have a council-endorsed local biodiversity strategy, which identifies indicative high conservation value areas. The Shire of Chittering Town Planning Scheme No. 6 contains a "Conservation" reservation; a "Rural Conservation" zone with provision for conservation covenants; a "Landscape Protection" special control area; and development requirements that address native vegetation retention in rural living zones.

Land use planning implications

The key land use planning implications for biodiversity in the Wheatbelt are:

- Minimising the impacts of urban, industrial and rural residential development on natural areas;
- Planning for biodiversity conservation that is not limited to threatened species but based on adequate representation of vegetation types and connectivity across the landscape; and
- Improving the protection of natural areas on public and private land, through mechanisms such as conservation reserves, zones and covenants.

Planning for biodiversity conservation in WA tends to be based on subregions defined through the Interim Biogeographic Regionalisation of Australia (IBRA), of which 10 are located (wholly or partially) in the Wheatbelt. However, land use planning decisions in WA are based on local planning schemes for local government areas, of which 42 are located in the Wheatbelt planning region.

In order to assist the integration of biodiversity considerations into land use planning in the Wheatbelt planning region, four "biodiversity planning units" have been identified (refer to Map 9 – Environment and culture, based on broad vegetation units and associated planning issues:

- *Coastal:* Predominantly kwongan heath in the western portions of the Shires of Dandaragan and Gingin, which is recognised for its high species richness and endemism. The main land use planning issue for biodiversity in this area is the clearing of native vegetation to establish new residential areas.

- *Hills:* Predominantly forest and woodland in the western portions of the shires of Chittering, Toodyay, Northam, York, Beverley, Brookton and Wandering. The main land use planning issue for biodiversity in this area is rural residential subdivision and development.
- *Wheatbelt:* Includes most local government areas in the Wheatbelt planning region, where native vegetation has been extensively cleared. The focus for land use planning in this area is retention of remaining native vegetation and strategic revegetation to restore ecological function.
- *Woodlands:* Includes the north-west portion of the Great Western Woodlands (the largest remaining temperate woodland on Earth) in the shires of Mount Marshall, Yilgarn, Kondinin and Lake Grace. Land use planning should seek to support conservation of this internationally significant natural area.

6.2 Water and catchment management

Rural townsite expansion, rural residential development, and agricultural industries have the potential to impact on water resources. These forms of land use and development may lead to increased stormwater run-off, pollution of wetlands and waterways, increased number of storage dams, recreational pressures, and increased water consumption. It is therefore important that the appropriate management of water resources be integrated into land use planning.

State Planning Policy 2.9 Water Resources (SPP 2.9) provides guidance to planning decision makers regarding the protection and management of water resources. The policy outlines key measures to be addressed through regional and local planning in order to protect, conserve and enhance significant water resources; assist in ensuring the on-going availability of suitable water resources; and promote and assist in the management and sustainable use of water resources.

Key issues for water resources in the Wheatbelt planning region relate to catchments, waterways, wetlands, floodplains, urban water management and water supply.

Catchments and waterways

The majority of the Wheatbelt is within the Avon River Basin, which extends east of the Darling Scarp approximately 500 kilometres. The Avon River Basin includes the catchments of the Avon, Yilgarn and Lockhart River systems. Refer to Map 10 - Water resources. Extensive clearing of the Wheatbelt since European settlement has altered water quality within the catchment resulting in once fresh or near fresh waterways becoming saline, with subsequent adverse affects on wildlife and land for farming. Protection of fringing vegetation, and revegetation in areas that have been degraded, is important to maintaining the health of the river system.

The Moore-Hill Basin borders the Avon River basin to the north. The portions of the basin lying within the Yilgarn Plateau are characterised by numerous salt lakes located in broad flat valleys, which in high rainfall events flood and flow into the main river system. West of the Gingin and Darling escarpments, drainage flows in an east to west direction within well defined drainage lines into the Moore and Hill Rivers. In 1999, three significant flood events occurred in the town of Moora, situated alongside the Moore River, which resulted in massive flood damage and social disruption within the town. In the South West corner of the region lies the Blackwood Basin, Murray Basin and a small portion of the Collie River Basin.

In order to assist waterways management and land use planning, the Department of Water has undertaken foreshore assessments of the Avon River's tributaries, and is currently preparing a catchment management plan for the Mortlock River. Also, Wheatbelt NRM group is currently developing a database of high value river pools in the Avon catchment, which are significant water dependent environments that should be considered through land use planning.

Wetlands

Wetlands are important natural resources that perform hydrological and ecological functions. Wetlands are highly productive ecosystems supporting a diversity of flora and fauna and are often important features in the landscape offering a wide range of recreational activities such as bushwalking and swimming. The Wheatbelt contains a large diversity of wetlands including fresh and saline wetlands as well as salt lakes.

Until recently, there was limited information available regarding the location and condition of wetlands in the Wheatbelt. Mapping and evaluation of wetlands within the region, funded by the Avon Catchment Council (now Wheatbelt NRM group) with the support of the Australian and State governments, has produced a database showing the location and condition of over 20,000 wetlands.

The protection and management of wetlands in the Wheatbelt is supported by the following environmental legislation and policies:

- *Environment Protection and Biodiversity Conservation Act 1999* - wetlands of international importance (listed under the Ramsar Convention) are a matter of national environmental significance protected under this Act.
- *Environmental Protection Act 1986* - Ramsar listed wetlands, nationally important wetlands, and wetlands listed under the Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998 are declared by the Minister for the Environment as Environmentally Sensitive Areas under this Act.
- *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998* - Koojedda Swamp in Northam is listed for protection under this policy.
- *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* - applies to the Shires of Gingin and Chittering.

The region contains a number of wetlands that have international and national significance. Nine wetlands in the Wheatbelt planning region are listed in the Directory of Important Wetlands in Australia. Refer to Map 10 - Water resources. Toolibin Lake, located in the Shire of Wickepin, is also included on the Ramsar Convention's List of Wetlands of International Importance. Toolibin Lake is the only large Casuarina obesa dominated wetland remaining in the inland agricultural region of SW Australia; it is a threatened ecological community, and it provides important breeding habitat for a wide range of waterbirds.

Toolibin Lake is also recognised as a Natural Diversity Recovery Catchment. Under the State Salinity Action Plan (now the State Salinity Strategy) the State Government established a Natural Diversity Recovery Catchment Program to help recover and protect significant natural areas, particularly wetlands, from salinity. Part of the Buntine-Marchagee Natural Diversity Recovery Catchment is also located inside the Wheatbelt planning region, in the Shire of Dalwallinu.

Floodplains

Floodplain management is an important consideration in land use planning in order to minimise risk to people and property, protect environmental values, and ensure that the conveyance of floodwaters is not impeded. Mapping of floodplains within the region is available for the Moore River in the townsite of Moora, and for the Avon River in the townsites of Beverley, York, Northam and Toodyay as well as some rural locations. The mapping identifies floodway and flood-fringe areas.

The floodplain is the extent of the land near a waterway that may be flooded. The Department of Water further differentiates between the floodway (the river channel and the portion of the floodplain that forms the main flow path for floodwaters once the main channel has overflowed), and the flood fringe (the area outside of the floodway that is affected by flooding but where development could be permitted).

Development that is located within the floodway is not considered acceptable, as it would increase the flood levels further upstream. Development within the flood fringe is considered acceptable, however, a minimum habitable floor level of 0.5 m above the adjacent 100 year flood level is recommended to ensure adequate flood protection (refer to EPA Guidance Statement No. 33). Where floodplain mapping is not available, proposals will need to demonstrate that development adjacent to waterways will not impact on flood levels further upstream.

6.3 Land management issues

6.3.1 Salinity

Salinity is one of the greatest threats to land resources within the Wheatbelt region. Increases in salinity brought about by human influence can adversely impact biodiversity and agricultural productivity, and can cause widespread damage to buildings and infrastructure.

The State of the Environment Report (2007) estimates that more than 70 per cent of Australia's dry land salinity occurs in WA, with more than 14,000 ha being lost to salinisation each year. Five of the ten WA local authorities that experience the most salinity occur in the Wheatbelt region: Koorda, Nungarin, Wongan-Ballidu, Wyalkatchem and Goomalling (SoE, 2007). The satellite-based Land Monitor Project concluded that about a quarter of the Wheatbelt is low lying and vulnerable to salinisation, with extensive areas of broad valley floors at risk of developing shallow water tables. A further 14 per cent of the Wheatbelt has been designated as "valley hazard", which is defined as low lying areas susceptible to degradation by hydrologic processes such as salinity, waterlogging, inundation and flooding.

In the Wheatbelt, extensive clearing of deep rooted perennial vegetation with shallow rooted annual crops and pastures has altered the natural water regime, increasing the level of recharge into the groundwater system and raising water levels. Salinisation occurs when the rising water table brings salts that are naturally stored within the landscape to the surface. Further clearing of native vegetation exacerbates the problem.

Wheatbelt
Regional Profile

The relatively flat nature of the Wheatbelt landscape has prevented surface and groundwater discharge from occurring at rates that would be sufficient to remove accumulated salt. Areas most at risk of salinity are those located in low lying valley floors adjacent to waterways and wetlands where discharge occurs. Refer to Map 11 - Salinity risk.

According to the draft Western Australian Salinity Review (August 2010), recent drying climatic conditions may have moderated the magnitude, severity of expression and/or development of salinity at the surface, but wet years will occur, possibly episodically, so that recharge and renewed discharge will continue to expand the areas affected by dry land salinity. The eventual extent of salinity remains as previously predicted, although it may take longer to reach this point. Variations in rainfall events may provide time for intervention to have a greater positive impact. The salinity review also predicts increasing regional differences in the expression of salinity and its consequences, reflecting both changing climate, and the length of time since land was cleared.

Deep drainage has been increasingly used as an option to address dry land salinity across the Wheatbelt. This system works by constructing drains that are deep enough to intercept the watertable, causing groundwater to seep into the drains. This reduces the watertable adjacent to drains, therefore reducing water-logging and salinity levels in the soil.

Deep drainage has negative environmental consequences as saline water is relocated downstream rather than being addressed. The location and design of deep drainage needs to be regulated, to minimise its impacts. In 2007 the Wheatbelt Drainage Council was established to investigate governance arrangements associated with the deep drainage network and to develop a framework to enable a responsible and accountable approach to the planning, implementation and management of drainage in the context of catchment water management.

A draft policy framework for inland drainage was released in March 2008. The Department of Planning is continuing to liaise with the Wheatbelt Drainage Council in respect to this issue.

Currently a Notice of Intent needs to be lodged with the Commission of Soil and Land Conservation at least 90 days before drains are constructed. If the discharge point is likely to affect any waterway or wetland, approval needs to be obtained from the Department of Water.

Land use planning implications

- Future development proposed for areas identified as being at risk of shallow saline watertables needs to be assessed in terms of water storage, waste disposal, roads and construction of buildings.
- Statutory planning mechanisms that are designed to prevent or reduce salinity need to be flexible enough to address the dynamic character of salinity conditions. Ideally there needs to be mechanisms that prevent new expressions of salinity from occurring, as well as mechanisms that remediate existing salinity.
- Increased fragmentation of land, through the creation of smaller lots, makes it more difficult to address salinity in a holistic manner.
- Information needs to be available to both rural and townsite land owners that identifies areas at risk of salinity, such as high recharge or discharge areas.
- Regional, district and local water management strategies should address salinity, including both rural and townsite salinity, potential impacts of deep drainage in response to salinity, and acidification of water supplies and drainage.

6.3.2 Townsite salinity

The risk of salinity impact in many townsites within the Wheatbelt is often significant as townsites were historically located low in the landscape. Another cause is the disruption to the natural water balance within townsites relative to the wider catchment. This occurs due to increased recharge of groundwater through the import of scheme water, the irrigation of parks, gardens and sporting grounds, the use of septic tanks and leach drains, the disruption to surface and subsurface drainage flows due to the presence of impermeable surfaces (roofs, paving, roads), stormwater run-off, other man-made structures which impede or divert water flows, and stormwater runoff.

There are a number of examples of community projects to manage townsite salinity watertable, the majority of which have been funded through DAFWA's Rural Towns - Liquid Assets program. The table below lists those towns within the region that are part of this program.

Bakers Hill	Moora
Beverley	Mukinbudin
Brookton	Narembeen
Bruce Rock	Narrogin
Corrigin	Pingelly
Dandaragan	Trayning
Dowerin	Wagin
Goomalling	Wandering
Kellerberrin	Wongan Hills
Koorda	York
Merredin	

Groundwater investigations have been undertaken for a number of the townsites within the program to determine which recharge zones are most likely to be causing groundwater rise within the towns. Management options are then identified to help reduce the risk of increased salinity within the townsite. Where recharge within the townsite has been identified as the predominant cause of groundwater rise, options for reducing risk include:

- Reducing the quantity of scheme water used; for example, through the use of rainwater tanks plumbed into dwellings and use of recycled water for park irrigation;
- Checking for and mending leaks from water pipes, pools, dams and drains;
- Replacing septic systems with sewer systems;
- Ensuring that new developments reduce water input, water output and water demand, maintain a natural water cycle balance, and reduce the amount of potable water brought onto site, by rainwater collection and water re-use;
- Strategic revegetation; and
- Protection of remnant vegetation.

Land use planning implications

- Groundwater studies, such as those conducted under DAFWA's Rural Towns — Liquid Assets program, should be considered when developing settlement strategies for towns at risk of salinity. Settlement planning, including expansion of urban areas, must take into account ground and surface water hydrology, particularly in "at risk" areas.
- The development of settlements should be directed away from areas of saline land, areas with a high watertable or areas at risk of rising groundwater.
- Development guidelines are required for areas at risk of shallow saline watertables.
- Care is needed in the location of infrastructure such as roads, as these can impede surface and groundwater flows.
- Removal of native vegetation should be avoided.

6.3.3 Soil acidification and acid sulphate soils

According to the National Action Plan for Salinity and Water Quality and Natural Heritage Trust program 2003-2009 Final Report (WA Agriculture Authority, 2010), soil acidity is a major degradation threat to soils. Acidic soils cause significant losses in crop production and restricted crop choice, with reduced plant growth leading to increases in erosion and nutrient leaching. Soil acidification occurs due to a gradual increase in the hydrogen iron content of the soil, generally caused by agricultural practices including application of nitrogenous fertilisers (State of the Environment Report, DEC, 2007). Unchecked acidification can result in nutrient-deficient soils and accumulation of toxic materials. It may also cause subsurface soil acidification, which is much more difficult to address.

The State of the Environment Report (2007) quotes estimates that two-thirds of the agricultural Wheatbelt is affected by surface soil acidity or is at risk of acidification. This proportion is much greater than the amount of land affected by dry land salinity. Estimates for the Avon River Basin indicate that about 93 per cent of surface soils and 83 per cent of subsurface soils have a moderate to high risk of acidification.

The primary current means of addressing soil acidification is by application of lime. However, farmers are only using about half the quantity of lime required to maintain existing acidity levels. Application of very large quantities of lime is not a sustainable in the long term. Modification of agricultural practices needs to be considered.

A different issue is that of acid sulphate soils, which are naturally-occurring areas of iron sulphites, are usually found in a layer of waterlogged soil or sediment, and are benign in their natural state. However, once exposed to the atmosphere they oxidise, producing sulphuric acid, iron precipitates and concentrations of dissolved heavy metals such as aluminium, iron and arsenic (Acid Sulfate Soils Planning Guidelines, WAPC, 2008).

Acid sulfate soils may be found in some parts of the Wheatbelt where salinisation has occurred, and are also likely to be associated with wetlands in the coastal parts of the region. They are known to occur where there are groundwater discharge features, such as near Brookton and Beverley. Exposure of acid sulfate soils can have a number of adverse environmental impacts, as well as corrosion of engineering works and infrastructure, such as bridges and culverts.

Acidic drainage has the potential to cause serious harm to wetlands. Acidification of ground and surface water supplies has been observed in parts of the Wheatbelt. In the west Avon region this is a potential issue for development of on-farm water supplies.

Land use planning implications

- Areas that exhibit acid sulfate soils should not be disturbed, for instance, through earthworks associated with infrastructure.
- Proposals for coastal marinas and canal estates require referral to DEC, as technical management of acid sulfate soils is not feasible in these cases, due to the complex natural process that occur in areas where these soils occur.

6.3.4 Bush fire protection

Bush fire protection is an especially significant land planning issue in those parts of the region in which residential development is occurring in hilly areas with remnant native vegetation; for example, Avon Arc including the Avon and Chittering valleys, as well as development in vegetated coastal areas. In such areas, the risk to life and property is increased. Further, bush fire protection measures can have adverse environmental impacts, such as soil erosion and altered drainage patterns resulting from construction of fire breaks in steep terrain, and the removal of vegetation from around dwellings.

Conversely, measures designed to address land degradation issues, such as de-stocking and revegetation of understorey species, may increase bush fire hazard over time, to a level beyond that which was predicted in the planning phases of a subdivision proposal.

According to the WAPC's Planning Guidelines: Planning for Bush Fire Protection edition 2 (2010), there is a need to address bush fire protection at various stages of the planning process, to provide an appropriate level of protection to life and property and to avoid inappropriately located or designed land use, subdivision and development on land where a bush fire risk is identified.

Land use planning implications

- The WAPC's Planning Guidelines: Planning for Bush Fire Protection needs to be referred to at all stages of the planning process, to minimise risk of bush fires.
- The environmental impacts of implementing the guidelines need to be considered in decisions regarding proposals in bushfire-prone areas.

6.4 Coastal planning

Several broad level strategies/structure plans have been undertaken for the coastal areas of the Wheatbelt in the past few years; for example, the Shire of Dandaragan's Strategic Plan (2007) and the Gingin Coast Structure Plan (2006). These include some material on coastal planning and management matters. However, studies that focus specifically on coastal planning and management matters are all due for review. These comprise: Central Coast Regional Profile (1994), the Shire of Dandaragan Coastal Plan (1999), and the Shire of Gingin Coastal Management and Implementation Plan (2000). There are also a number of plans for local sites that are more detailed in their content, such as DEC's Wedge and Grey Masterplan (2002) and the Cervantes Foreshore Enhancement Project, which is currently being drafted.

The State's coastline is being studied to investigate differences in sediment movement along the region's coastline. A study of the regions' coast, outlined further below, takes into account the predicted impacts of climate change, focussing on the classification of coastal landforms and their relative susceptibility to change. Examples of coastal landforms that are typical of the region include offshore limestone reefs, islands and stacks; tombolos (sand spits that connect islands to the mainland) and other sandy promontories including salients and cuspate forelands); and dune systems and features such as barrier dunes and mobile sand sheets.

The region's islands and offshore reefs currently provide a degree of protection for the shoreline and are responsible for the formation of accretion landform features. Nevertheless, the impacts of climate change on the region's landforms need to be taken into account in planning for development along this coastline.

6.4.1 Assessment of coastal risk study

The region's coastal area is under considerable development pressure, while simultaneously being potentially at risk of coastal instability and susceptibility to environmental change such as rising sea level.

Consultants were commissioned by the Department of Planning EnviroPlanning project to provide information to assist in coastal planning in the region. The aim of this strategic coastal planning study was to assess the risk of environmental change along the coast. The risk assessment was intended to be consistently applicable at all planning scales, to be relevant to a range of risk aversion or mitigation measures, and guide potential land use. The full report comprises a background report to this regional strategy and as such will be available separately.

The consultants recommended the following objectives with respect to coastal land:

1. That natural resource management units be identified at scales commensurate with the regional and local planning scales recommended by the WAPC (2003);
2. That the geology and Holocene landforms be described for each planning unit;
3. That the physical features in each planning unit be compared so that different planning and management requirements can be determined;
4. That a framework for the indicative assessment of coastal risk be developed, thereby promoting consistency across all planning scales; and
5. That the framework be applied at both broad scale strategic and local planning scale levels to tertiary coastal compartments and large sediment cells.

Sediment cells

The investigation of the study area's coastal geomorphology resulted in the identification of 36 'sediment cells' (refer to Map 12 - Coastal planning - wheatbelt region and Appendix E). A sediment cell is a stretch of coast, including the near-shore and marine environments, within which the movement of sediment is largely self contained, moving between source areas and sinks. The identification of the sediment cells and their boundaries is based on

landforms, orientation of the beach, and the presence of key environmental features, such as blowouts. Sources of sediment include areas of coastal erosion, while sediment sinks include areas where sediment has moved sufficiently offshore that it is not returned to the shore. Similarly, sands blown onshore from a beach to form coastal dunes may be lost from the active sediment cell.

Concepts of susceptibility, instability and indicative risk of coastal environmental change

The study applies two related concepts, susceptibility and instability, to each sediment cell. The ratings for these two concepts are combined into an overall "indicative risk" rating for coastal environmental change.

Susceptibility refers to the potential for change to geological features such as reefs, the configuration and orientation of the shoreline, and sand features along the shoreline. For example, whether beaches are perched on a hard rock base. If a landform system is susceptible to change it is highly likely that it is comprised of or supports unstable, mobile landforms. Instability refers to current changes to the land surface. Criteria relate to hardness of rock, beach profile, type of dune ridge, and amount of vegetation cover.

Indicative risk of coastal environment change is based on a combination of future susceptibility to coastal change, and current coastal instability. This overall risk is one element to assist in determining areas that are suitable for future development. The indicative risk of change to landforms comprising each sediment cell, and the implications for planning and management, are obtained from Map 12 - Coastal planning - Wheatbelt region and the associated table in Appendix E.

Study outcomes

Map 12 - Coastal planning — Wheatbelt region and the following table indicates that 23 of the region's 36 sediment cells have a "low" or "low to moderate" risk of coastal environmental change, while eight are at 'moderate' risk. The highest risk category in the region is "moderate to high", and this exists in five sediment cells: Manakoora Sand Patch to Green Reef, south of Ledge Point; the two cells at Lancelin; Magic Reef to Wedge Island; and South Hill River to South Booka Valley, straddling the mouth of the Hill River south of Cervantes. In each of the moderate-to-high risk category cells, the instability rating is greater than the susceptibility rating; that is, the risk is more related to the existing instability of the coastal landforms, rather than susceptibility to potential changes to the shoreline and its features; for example, as a result of climate change.

Indicative risk of environmental change	Implications for development
Low	Coastal risk not considered a constraint to development
Low - Moderate	Coastal risk may present a low constraint to development
Moderate	Coastal risk may present a moderate constraint to development
Moderate - High	Coastal risk is likely to be a significant constraint to development

Land use planning implications

The land use planning implications of the risk assessment that appear in Map 12 - Coastal planning - Wheatbelt region are accompanied by potential land use planning measures that may be used to help the adaptation to long-term predicted shoreline movement and other impacts of climate change; for example, storm surge, and include:

- designation of Special Control Areas, or similar, in town planning schemes for those coastal areas that have been assessed as being at 'moderate' or 'moderate to high' risk of coastal instability and susceptibility to change. There would be a requirement for further, more detailed assessment of coastal trends before consideration of subdivision or development, including infill development;
- zoning that designates uses which would allow the foreshore land to be used in a flexible manner, such as tourist uses with the potential to include 'dispensable' private recreation spaces eg tennis courts seaward of the development setback line;
- subdivision layout that enables all buildings to be constructed entirely landward of the development setback, such as layouts that incorporate narrow lots at right angles to the coast, or larger shoreline frontage lots;

- where existing roads are seaward of a setback line, ensuring that road access to private land is available from the inland side of the land; and
- consolidating existing settlement nodes and confining further coastal development to these will enable potential future coastal instability to be addressed in the most efficient manner, for example, if a decision is made to install engineering works in order to protect property.

6.4.2 Increased recreational use of the coastline

Indian Ocean Drive

The last link in the central west coast's Indian Ocean Drive was completed in mid 2010. It connects Lancelin and Cervantes, through Defence Force land and Nambung National Park, creating a continuous coastal route northwards from Perth's coastal suburbs to Jurien Bay and beyond. The opening of this road will result in an increased number of visitors to the region's coastal settlements and other recreation sites, including recreational sites not currently accessible to two-wheel drive vehicles, such as Grey, Wedge Island and a number of smaller sites that are or were previously occupied by squatter shacks. It will also enable off-road vehicle users to gain easier access to illegal sites such as steep vegetated dunes and exposed mobile sand sheets, thus increasing the rate of destabilisation of these fragile landforms.

Squatter shacks

By 2001 all squatter shacks were removed from the Shire of Dandaragan's Crown reserves and sites have been rehabilitated and some developed for day-use recreation. A very popular low-key camping area has been developed at Sandy Cape. Large numbers of shacks remain on Crown land under the control of DEC at Wedge (350 shacks) and Grey (185 shacks). Some of these shacks are permanently occupied by retirees who require affordable housing.

The removal of shacks from DEC land is subject to ministerial agreement. The Government is currently waiting for further information and will consider all issues in developing policy and regulation in relation to the shacks. Options being considered include environmental and day-to-day management of the sites, and more public access. Professional fishers will be provided with leases on which to construct semi-permanent dwellings which must comply with building codes.

Pressure for further boating facilities, especially for recreational use

The region's coastal towns provide facilities for both commercial and recreational fishing, including a harbour at Jurien Bay, 173 moorings and seven ocean boat ramps. However, only the ramp at Jurien Bay is accessible to two-wheel drive vehicles; the others all comprise ocean access across sandy beach. There is seasonal pressure on the facility at Jurien Bay, with 'ramp rage' becoming a more common occurrence at this high quality ramp, which has no capacity for expansion.

There are no plans for further harbours in the region, although improvements to existing facilities are being considered. The pressure is for facilities for smaller boats, such as provision of more boat ramps and upgrading of existing ramps. Regardless of the long-term future of the commercial fishing industry in the region, it is likely that recreational boating use will continue to increase, given the region's proximity to Perth, and the improved accessibility that will result from the completion of Indian Ocean Drive.

Land use planning implications

If permanent residents of squatter settlements move to nearby coastal settlements, this may result in increased demand for affordable long term housing or tourist accommodation within existing coastal settlements, or pressure for further low-key camping facilities, such as those at Sandy Cape.

Provision for an increased number of boats, especially small boats, needs to be considered in planning for the region's coastal areas.

6.5 Landscape

Landscape is an integral part of the region's identity. The term 'Wheatbelt' is synonymous with gently rolling, wide open fields of grain extending to the distant horizon, punctuated by glistening salt lakes, stark white solos, occasional rock outcrops and solitary gum trees by the roadside. Other parts of the region - its coast, forested hills and interior extensive woodlands - also have easily identifiable public images.

Landscape provides visible evidence of a region's well-being, such as showing signs of environmental problems; for example, salinity and loss of biodiversity, and if they are being addressed through revegetation efforts. Landscape also shows how well towns present a cared-for appearance. Natural features such as rock outcrops and salt lakes should be visible and possibly accessible to the public and if the landscape is an attraction that helps to keep residents in the region, and encourages tourists to visit.

6.5.1 Landscape character units

There are four different landscape character units in the region (refer to Map 13 – Landscape character, features and routes). These provide the basis of analysis and strategies.

Coastal

A low-lying sandy plain with scattered wetlands and elevated coastal dune systems parallel to the coast. The Brand Highway and roads that access coastal settlements provide elevated views across the plain towards the coast, where long, gently curved beaches are broken by low limestone headlands. The coastline is dotted with prominent mobile dunes and sand sheets. The landscape is generally devoid of trees, other than along water courses such as the Moore River. The extensive sandplain heath vegetation, or Kwongan, is renowned for its floristic diversity and is an important tourist attraction in the wildflower season.

Hills

The portion of the region that lies immediately northeast, east and southeast of the Perth metropolitan area comprises a dissected, undulating landscape with steep, v-shaped river valleys, such as the Avon and its tributaries, and occasional domed granite outcrops. Extensive remnant forests are dominated by jarrah and marri, with portions of wandoo and powderbark woodland. Unbroken forests east and southeast of Perth are largely contained within protected drinking water catchments, while the landscape to the north of the forested water catchments is a mixture of remnant forest and land cleared for agriculture, including horticulture. The major roads that pass through the hills landscape (Albany, Brookton, Great Southern, Great Eastern and Great Northern Highways, and Toodyay Road), provide enclosed and often canopied views across this undulating portion of the region's landscape.

Central Wheatbelt

The majority of the region comprises the wheatbelt plateau, an expansive, gently undulating landscape dominated by agricultural uses, principally cereal crops or grazing, and extensively cleared of native vegetation. Scattered remnant trees, domed granite

outcrops, chains of saline wetlands and salt lakes, and small towns with prominent grain silos are examples of dominant individual landscape features. The landscape is viewed from the Great Southern, Great Eastern and Great Northern Highways, as well as a network of mostly narrow, often straight, rural roads. Some roads are bordered by remnant trees such as wandoo, York gums and salmon gums, creating canopied or framed views across the otherwise open landscape. The amount of remnant vegetation in the landscape varies, with more extensive areas closer to the hills landscape, along roadsides in the south and in conjunction with chains of salt lakes. Some portions of this landscape comprise extensive areas with almost no remnant vegetation.

Interior woodlands

The gently sloping plain that lies east of the central wheatbelt supports tall woodland of salmon gum, gimlet, mallee, wattle and sheoak and is largely used for grazing and some mining activities. There are few roads to provide views of this landscape, the principal one being the Great Eastern Highway. Views tend to be enclosed within the woodland vegetation.

Land use planning implications

The landscape character units in the Wheatbelt region are considerably varied, and warrant a different approach to landscape protection and enhancement in each.

6.5.2 Landscape values

The region

At a broad regional level, the landscapes that appear to be the most widely valued by the community are the coast, and the hills area adjacent to Perth, especially the Chittering and Avon valleys. Wildflower enthusiasts also value the colourful diversity of the coastal plain's Kwongan heath vegetation.

However, all of the region's landscape character units display visual character that is probably valued to some degree by residents and visitors, even if it is not the primary impetus for moving to or visiting the area, as the coastline, Kwongan heath wildflowers or hills landscapes may be.

It is likely that there are particular individual portions of the coast, hills, central wheatbelt and interior woodlands which the community values more highly than the remaining landscape. These would be areas that contain, for example: steeper topography (Avon Valley); prominent water elements such as lakes and rivers; diverse natural bushland (Kwonga); diverse agricultural or intensive land uses (Chittering valley orchards); and historic buildings and other structures such as the Avon Valley towns of York and Toodyay.

Much of the coastline and the Kwongan heath of the coastal plain are protected by inclusion within Crown reserves such as national parks. The hills landscape is protected by a combination of reserves, clearing controls on private land, and local planning that attempts to reduce the visual impacts of new development, for example, through the use of landscape protection through designation of special control areas.

Throughout each of the region's four landscape character units there are individual landscape features that are important. They may be typical, iconic features such as the silos of the central Wheatbelt, or they may be features that are valued due to their scarcity within the broader landscape, for example, mature trees along roadsides in an otherwise cleared landscape.

Coastal landscape

Valued landscape features within the coastal plain landscape are natural rather than cultural, and include: rocky headlands or islands, sandy promontories, prominent dunes, river mouths and estuaries, mobile sand sheets, karst formations, lakes, rocky breakaways, individual or massed plants that stand out from the Kwongan or cleared pasture; for example, flowering Christmas trees, tall-stemmed hakeas, banksia, wattle. Other admired features are of a detailed nature and are only observed from close quarters; for example, shells on beaches and individual wildflowers such as orchids.

Hills landscape

Valued landscape features in the hills comprise both natural and cultural features. Natural examples include: open water bodies such as river pools or lakes, granite or laterite rock outcrops, trees with distinctive trunks such as wandoo, or mature specimens of marri or jarrah. Cultural features include: orchards, vineyards, equestrian properties, historic towns and individual buildings, exotic trees such as poplars and pines.

Central Wheatbelt

As with the hills landscape, valued features in the central wheatbelt comprise both natural and cultural landscape components. Natural examples include: salt lakes bordered by colourful surrounding heath vegetation; rounded granite rock outcrops such as Wave Rock; roadside trees with colourful trunks such as wandoo, powderbark, or salmon gum, or with unusual form such as the umbrella-shaped salmon gum. Cultural features include regional towns with prominent heritage buildings such as hotels and railway stations; structures such as windmills, silos and building ruins, and associated exotic vegetation.

Interior woodlands landscape

Natural features dominate this landscape. Examples include roadside trees with unusual characteristics such as the colourful, fluted or shiny trunks of gimlets.

Land use planning implications

There is a need to review the effectiveness of measures currently available to ensure the long-term protection of valued landscapes and individual landscape features. Measures include: setbacks from roads, location of public open space where it can include landscape features, siting of building envelopes, restrictions on vegetation clearing, and efforts to retain valued roadside vegetation.

6.5.3 Regionally significant views and viewing experiences

Views that may be considered significant at the regional level include: continuous views experienced from scenic travel routes, the interstate passenger railway, the Avon River (from watercraft), and individual views from lookout points.

The coastal landscape is very visually accessible. Views of the coastal dune systems, and glimpses of the ocean, are obtained from Indian Ocean Drive, and the open Kwongan heath landscape with its profusion of wildflowers is readily seen from Brand Highway and roads linking through to the coast. Both the Indian Ocean Drive and Brand Highway were designed in such a way that viewing opportunities are maximised; for example, Brand Highway was built in an elevated position in the landscape, therefore providing extensive views westwards across the coastal plain.

Views in the hills landscape are more enclosed and diverse. Roads that provide continuous views of valued landscapes include the popular Chittering Road, a scenic drive that follows the Brockman River, and roads between York and Toodyay that provide views of the Avon Valley. However, the most dramatic terrain along the Avon Valley is best viewed either from watercraft (in winter) or from the passenger train that passes through the valley, as there are no continuous roads through this section. Examples of individual views of regional importance include

York as seen from Mt Brown and Mt Bakewell, or lookouts over the Avon Valley; for example, Bald Hill. Streetscape views such as at Toodyay and York are also important. These towns provide views that combine cultural features (heritage buildings) with a backdrop of dramatic natural features (steep slopes of the Avon Valley).

Tourism WA has identified a number of scenic routes through the central wheatbelt landscape. These routes may include interesting roadside vegetation, views of granite rock outcrops or salt lakes, or may pass through towns that provide attractive streetscape views. Isolated granite outcrops and other hills provide locations for lookouts, such as at Mt O'Brien near Wongan Hills.

Land Use Planning Implications

Regionally important views need to remain visible and not be inadvertently screened out by planted vegetation or buildings, either along roadsides or on adjacent properties. Care needs to be taken with the siting and design of new structures, for example, within rural residential areas, to retain the quality of views. Measures to reduce the prominence of development should focus on careful siting and design of new development. Screen planting is not the preferred option as it is less reliable in the long term.

Measures to enhance users' experience of existing scenic travel routes should be considered; for example, reducing speed limits, and creating passing lanes, vehicle pullover bays and lookout points. New opportunities may be created where landscape features of likely interest are not currently accessible; for example, through new picnic sites, lookouts or walk trails.

New land uses such as large-scale windfarms or solar collectors, or extensive tree farms planted for biofuels or carbon sequestration, may alter the visual character of the region, as may new mines and associated infrastructure. There may also be cumulative changes in existing uses or land management practices, such as increased revegetation throughout agricultural areas.

These uses have the potential to adversely impact on the valued landscape character or views, or they may further detract from those areas already considered in need of enhancement. Alternatively, if they are well-designed and the community has a positive attitude towards them, they may be considered as adding diversity and interest to the landscape, as has occurred elsewhere in WA, such as at Albany and Walkaway.

7 Heritage and culture

7.1 Native title

The *Native Title Act 1993* provides for the recognition and protection of Aboriginal and Torres Strait Islander people's native title rights and interests. The act provides a process to determine whether native title exists and protects the existing rights of governments, industry and the general public. The act also provides ways to negotiate and enter into agreements regarding future public works and business activity on land or waters where native title rights and interests are affected.

Certain government actions, such as grants of freehold or other exclusive tenures to other parties, have been found to extinguish native title. Claims for native title cannot be made over areas where native title has been extinguished; for example, land held in freehold or exclusive tenure in developed areas. There has been a considerable degree of uncertainty regarding land supply in relation to the act and this has affected many communities in regional Western Australia.

The South West Aboriginal Land and Sea Council, the native title representative body under the Native Title Act 1993, lodged the Single Noongar Claim in 2003 on behalf of 218 Noongar families. This is a native title claim that covers Noongar Country (Refer to Map 2 – Land tenure) which is in the south-west of Western Australia. The council and the Noongar people lodged this claim because the Noongar people were one society and had maintained this society. A single claim ensured that all Noongars could benefit and be proud of their heritage, traditions and their country.

On 19 September 2006, after a preliminary hearing of the claim dealing with the metropolitan area, Federal Court Judge Justice Wilcox ruled that native title had survived in those parts of the Perth metropolitan area where it had not been extinguished by government dealings and private ownership. Shortly after the decision was handed down the State and Commonwealth governments lodged an appeal. This appeal was heard in April 2007 by three Federal Court judges and is yet to be determined. The decision was made on the basis that the Noongar people have maintained their connection with the whole of their country in south-west Western Australia, and have continued their traditions and practices.

7.2 Indigenous heritage and culture

Aboriginal people have lived in the region for more than 45 000 years. It is recognised that the Noongar people are the traditional owners of the south-west of WA, which covers most of the Wheatbelt region. Noongar law and culture is intrinsically linked to land. Distinct Noongar tribal groups have continuing connection to different lands in the region.

Aboriginal occupation of the land has established many important mythological sites which include natural features such as waterholes, rivers, hills and rock formations where people, animals and characters left traces of their journey across the landscape. Other sites have been used for thousands of years for ceremonies to mark important events or for 'increase' sites to 'keep the land alive'. Often these places are interconnected and form trails through the landscape, called 'songlines' in English. Songlines are tracks that have associated ceremonial songs which explain how a place was created and the laws for living or moving through that place.

The *Aboriginal Heritage Act 1972* provides for the identification and protection of Aboriginal sites throughout Western Australia. There are approximately 800 registered sites in the Wheatbelt region, particularly in areas that have been disturbed through urban or agricultural activity. It is estimated that there is a similar number of sites in more remote or less travelled areas.

The Act requires that management or research on Aboriginal sites be subject to permission under section 18 from the Aboriginal Cultural Materials Committee, an advisory body to the Minister for Indigenous Affairs. Permission usually is conditional on the approval and involvement of the Aboriginal custodians of the site, and on the input of a professional heritage conservator.

Sometimes Aboriginal sites also are popular recreation or tourism sites. For example, granite outcrops, watercourses and waterholes may contain cultural material or burial sites. This may lead to site damage by traffic and pedestrian impact, loss of vegetation, pollution, graffiti or litter. In such cases, management may be required.

The involvement of Aboriginal people in the management of their heritage is very important. There is a need for sensitivity in the treatment of cultural material, which often can be ensured only by the involvement of a heritage consultant.

Development of vacant land may require clearance under the *Aboriginal Heritage Act 1972*. However, it is important to note that there will be sites in the region capable of registration under the act, which may not have formal registration. Regardless of their status in terms of registration, these sites have the same level of protection under the act.

Land use planning implications

The consideration of indigenous heritage and culture is an important component in land use planning decision making. Through land use planning, there is a need to protect and honour Aboriginal sites without them being degraded.

Similarly, there is the need to incorporate Aboriginal heritage sites and other places of importance in environmental/cultural corridors.

For both these implications, there is the need for the most appropriate way to involve Aboriginal people in land use planning in the Wheatbelt.

7.3 Non-indigenous heritage

Non-indigenous heritage is managed in Western Australia through the *Heritage of Western Australia Act 1990*. This act establishes a State register of heritage places, and also requires local governments to prepare local municipal heritage inventories to record heritage places that are locally important, but are not on the State Register.

In the Wheatbelt, there are hundreds of places listed on the State register. The table below provides a summary of non-indigenous heritage places register in the Wheatbelt (Heritage of WA Act 1990).

Figure 35: Registered heritage places in the Wheatbelt

Shire	Number of registered sites	Shire	Number of registered sites
Bruce Rock	4	Narembeen	2
Chittering	3	Narrogin (T)	10
Corrigin	1	Northam	32
Cuballing	3	Nungarin	4
Cunderdin	4	Pingelly	2
Dalwallinu	1	Tambellup	2
Dandaragan	1	Toodyay	9
Gingin	9	Trayning	1
Goomalling	2	Victoria Plains	2
Kellerberrin	4	Wagin	7
Kondinin	1	Westonia	1
Kulin	2	Wickepin	1
Lake Grace	2	Wongan-Ballidu	4
Merredin	8	Wyalkatchem	3
Mingenew	1	Yilgarn	5
Moora	5	York	26
TOTAL			**162**

Source: Heritage Council of WA, 2009 State Register of Heritage Places

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The towns of Toodyay and York have been recognised by the National Trust as 2 of only 10 'historic towns' throughout the State, and the only ones located in the Wheatbelt. Detailed statutory controls are already in place to protect their heritage values.

Nearly all Wheatbelt towns contain individual historic buildings and other structures, such as railway stations, hotels and general stores. Efforts of local authorities to improve the appearance of their towns through townscape programs, have led to enhanced streetscapes; for example, with the addition of colourful median strip flowerbeds.

It is important that both places on the register and places that are locally important are recognised and protected and that a list of these places is regularly updated.

Land use planning implications

The recognition of places and areas of heritage significance is provided for in the existing land use planning framework.

The key additional land use planning implication relates to the emerging cultural corridor for pioneering history. The progress of this initiative needs to be monitored for developing a regional land use planning response.

8 Infrastructure

8.1 Transport

8.1.1 Roads

An extensive national, State and local road network serves the Wheatbelt region. The most important links include the Great Northern Highway, Great Eastern Highway, Brand Highway and the Albany Highway. Overall the Wheatbelt has more than 43,000 kilometres of road, of which 11,370 kilometres, or less than 30 per cent, are sealed. The roads have both intra-region and inter-region functions, including carrying local general traffic, tourist traffic and freight.

Planning for a safe road network

Road safety is a major public health issue in Western Australia. Road crash statistics shows that the number of road crashes tends to increase in proportion to the number of vehicle kilometres travelled. Land use planning plays a role in reducing the crash statistics by reducing the kilometres travelled between services. The urban design form in towns could be geared towards achieving proximity, permeability and connectivity to activity node centres.

The physical separation between different road users can enhance safety. The segregation of high speed regional traffic from low speed local traffic can aid in reducing conflicts for both vehicular movements and for cyclist and pedestrian movements. The use of alternative freight routes to divert regional traffic away from town centres is an effective method to segregate the two types of traffic. At the same time, the posted speed in town centres can be lowered to provide a safer and walkable road environment, hence better catering for the need of residents.

Road freight

In 2009, the rail network handled about 50 per cent of the grain tonnages to ports. Previously, rail transport moved on average around 60 per cent of grain tonnages per year. This decrease in rail patronage has been mainly associated with firstly the grain operatives consolidating their grain receival sites over the last few years and secondly, the Australian Railroad Group discontinuing train operations on rail lines that are not economically competitive.

Consequently, the distance travelled on road by grain freight has increased and is likely to keep on increasing. Some of the freight task will be transported directly to port by road where it is economically justifiable. Hence, a mode shift between road and rail in grain transport is happening. New freight movement patterns will be established to cater for the changing destinations for the freight tasks.

There will be consequential implications for road network maintenance. The Strategic Grain Network Study (2009) has highlighted the need for increased funding for road maintenance as certain rail lines are discontinued from operations. With the redistribution of the grain freight on the road network, the routes previously taken by freight vehicles to transport grains from fields to grain bins may change. Main Roads Western Australia (MRWA) will be monitoring and reviewing the grain freight routes as appropriate. From a land use planning viewpoint, possible changes in traffic mix and some congestion in regional town centres will require careful management to minimise social and economic costs.

Short and long term road network operation and planning (Operational issues)

Many of the region's roads are near the end of their optimum economic lives. A large proportion of the road network is sub standard compared with the function that they are undertaking. This is reflected in narrow pavements and shoulders widths, poor shoulder treatments and widths, road geometry and pavement conditions. These are current and short term concerns for the operational efficiency and safety of the Wheatbelt road network.

Furthermore, the narrow-gauge grain railway network is under review with the intent of continued rail operations on rail lines that are only commercially viable. At the same time the Cooperative Bulk Handling Group (CBH), which is the major grain freight operator in the Wheatbelt, has been undertaking a centralisation program for their grain silos. These two events will have an impact on the current road network as grain freights are redirected towards the remaining operating grain bins.

However, funding for road maintenance and improvements are constrained. All the required road improvement works cannot be undertaken simultaneously. Main MRWA has a prioritised list of

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Northam is located along the Great Eastern Highway (which links Perth to the Goldfields) and is connected via the Northam-Pitharra Road to the Great Northern Highway to the north. To the south, Northam is connected to the Great Southern Highway via the Northam-York Road. It is also in close proximity (less than 100 kilometres) to the Perth Metropolitan area, making it a strategic location supporting the mining developments in the Mid-West and Goldfields-Esperance regions and its continued role in agricultural production.

York is located about 97 km east of Perth and is one of the oldest inland towns in Western Australia. A major CBH grain receival bin is located south of the townsite and linked to the York-Merredin railway line. During harvest seasons significant road freight movements directed to this bin.

Recent road network planning study identified potential issues with freight movements within York's town centre and the historical part of Blandstown (DPI, 2007). An alternative freight route corridor to deviate heavy vehicle traffic from these sensitive localities has been discussed and is being considered. Furthermore, the grain terminal has recently been expanded in capacity to handle more grain tonnages. This is in line with CBH grain bin consolidation strategy and will likely result is an increase road freight movements in the area during future grain harvest seasons.

Brookton and Wagin have problems with heavy vehicles traffic commuting through the town centre, and have been identified to investigate the need for an alternative freight route to deviate heavy vehicles away their respective town centres, without the creation of a new transport corridor such as a town bypass.

New Norcia is located about 132 km north of Perth. It is serviced by the Great Northern Highway which runs through the middle of the town. The travel speed is reduced from 110 kph to 60 kph in the town centre to accommodate for the land uses on both sides of the highway.

Given the town's history, purpose and very old buildings, it is an attraction for visitors. Visitors need to cross the highway frequently to access all the places of interest as the historic destinations are located on both sides of the highway. Noise and vibrations from through traffic are of concerns to the local residents. The Benedictine community has been offering strong support for a new bypass and indicated the town's potential for a tourism precinct. The proposed alternative route to the existing highway will offer a reduced freight time for regional trips, a safer environment for the community and an increased development potential for New Norcia.

Resource deposits

There are state mineral resource provinces and mineral deposits throughout the region. The supply chains for the mining inputs and outputs at the moment are either road freight or rail freight or a combination of both with destinations to Kwinana, Bunbury and Albany as destinations Ports. The development and extraction of resource sites will impact on road and rail freight in the region.

Indian Ocean Drive

Along the Western Australian coastline, the Lancelin to Cervantes coastal road project (the last incomplete section of Indian Ocean Drive) has been opened to traffic in September 2010. MRWA has been responsible for the construction and delivery of around 75 km of new sealed road from just south of Lancelin to the existing Pinnacles Drive. This road plays an important part in the future development of the region. It will reduce travel time between Lancelin and Cervantes by about half an hour. It will also relieve traffic from Brand Highway, which is a significant freight road, by offering an attractive alternative scenic route for local and tourist traffic. The provision of this new road infrastructure will provide additional capacity to the existing road network in anticipation of future population and economic growth in that part of Wheatbelt. The construction work is scheduled for completion in 2011, but is likely to finish earlier.

maintenance projects and has a funding strategy in place to cater for these operational needs. When funding is available, the works are prioritised and undertaken. The freight route network will also need to be reviewed to accommodate changes in the anticipated freight movement patterns. The Strategic Grain Freight Network study (2009) concluded that additional funding will need to be directed towards road maintenance programs as a result of the redistribution of road grain freight as mentioned above.

Refer to Map 5 – Wheatbelt economic resources for grain receival bin locations and Map 14 – Transport and infrastructure for the permit route and restricted access vehicles network.

Establishing Road Reserve Protection Mechanism

Land use planning identifies land required for long-term transport infrastructure to meet anticipated community transport needs in line with forecasted population and economic growth. Transport corridors may be identified many years before the land is actually acquired for construction to begin. In the metropolitan area, there is a long-standing practice of protecting these future transport corridors and nodes in the form of reservations using the statutory provisions of the Metropolitan Region Scheme (MRS). The Western Australian Planning Commission (WAPC) provides funding to meet the State's obligations in respect of any injurious effect to private property owners from the impact of these reservations. Unlike the existing funding mechanism of the Metropolitan Region Improvement Tax (MRIT), the Wheatbelt does not have a funding strategy.

Past experience indicates that local governments are generally reluctant to incorporate reservations for regional transport infrastructure in their local planning schemes, particularly because many of them do not have the income to meet claims for compensation.

In the Wheatbelt region, land reservation requirements identified for long term infrastructure planning including road reserves, should be protected until such time when funding becomes available for the land acquisition and compensation to occur. According to current practice, the service providers, both government and private, will be required to fund their land acquisition process for their respective infrastructure needs.

Perth-Darwin National Highway

For many years, planning work has been in progress to develop a transport route for the Perth Darwin National Highway (PDNH) that will service long-term transport needs between the Perth metropolitan area, Western Australia's North West and the Northern Territory. This work has been and will continue to be undertaken by the federal and State governments as a joint planning initiative.

The national highway currently follows the Great Northern Highway (GNH) alignment. Main Roads WA is currently investigating the long term needs for the highway with a 20 to 30 year planning horizon, which is divided into two sections:

- The northern section between Brand Highway, Muchea and Calingiri Road, north of Bindoon.
- The southern section between Maralla Road Bullsbrook and Brand Highway, Muchea.

A planning study has been undertaken which defines the reservation and land requirements for the future deviation of the Perth Darwin National Highway (Great Northern Highway) east of the Bindoon townsite. The planning is required to protect a highway reservation for construction some time in the future and provide more certainty to landowners. This has been undertaken in consultation with directly affected landowners and other key stakeholders, including the Shire of Chittering. There is no funding committed to construct the proposed highway deviation.

Unlike land reserved under the Perth Metropolitan Region Scheme, there is no State acquisition and compensation mechanism to address early acquisition of land required for the highway. As a long-term proposal, funding for acquisition is expected only within two years of the project commencing construction. As a result, there is a need for agencies to work co-operatively to develop mechanisms for securing long-term strategic road alignments while ensuring affected landowners are not unreasonably inconvenienced.

Perth-Adelaide Highway

The Perth–Adelaide road corridor extends for 2657 kilometres from the Kewdale intermodal freight terminal in Perth to the Adelaide statistical division boundary at the Gawler River (the point at which the Adelaide urban AusLink corridor takes over). It is the fourth longest road corridor on the AusLink network. The key links in the Perth–Adelaide road corridor are:

- Roe Highway from Tonkin Highway to the Great Eastern Highway;
- Great Eastern Highway from the Roe Highway interchange to Coolgardie;
- Coolgardie–Esperance Highway between Coolgardie and Norseman;
- Eyre Highway from Norseman to Port Augusta; and
- Port Augusta to Port Wakefield Road and Port Wakefield Road to its intersection with the Salisbury Highway, Adelaide.

The corridor includes the urban approaches to Perth and Adelaide, links some of Australia's richest mining and agricultural areas to international markets and provides a vital lifeline for many remote communities. The corridor has a key role in supporting export-oriented industry, the social and economic integration of Western Australia with Australia's eastern States and the integration of regional and remote communities along the corridor with their State capitals.

Interstate freight is forecast to grow at 3.0-3.5 per cent a year and double over the next 20-25 years. This is around the same rate as national projections. Rail is expected to continue to be the dominant mode for long-distance freight and bulk transport with road dominating intrastate transport and specific niche markets and sea transport providing an alternative for interstate containerised cargo.

In the Wheatbelt, the Great Eastern Highway and east-west railway line forms part of the Perth-Adelaide corridor. It is estimated that the corridor has sufficient capacity to manage expected growth for the next 25 years. An exception to this is the approach of the highway into metropolitan Perth, which is affected by growth in both Perth's eastern suburbs and the Shire of Northam. With this growth, the Great Eastern Highway will become more contested and potentially limit freight movements. Another exception is the likely growth in rail transport west of Kalgoorlie, which may require upgrades to the rail network in order to manage increases in grain, freight, passenger and mineral loads.

As with the Perth-Darwin National Highway, proposed upgrades and alignments for the Perth-Adelaide corridor are long term in nature and will be subject to future funding and possibly realignments. Within the Wheatbelt, the most significant pressure points on

the corridor are within the Shire of Northam. As such, there is a need to minimise additional access points to the highway and ensure that planning decisions reinforce the role of the highway as a freight network of national significance.

Land use planning implications

The majority of the Wheatbelt towns are built on the strategic freight network, and therefore it is an ongoing issue to balance the efficiency of the freight task with the viability of the towns and the amenity of the towns. There is a need to balance the favourable consideration of alternative freight routes to divert freight traffic from regional town centres to achieve liveable communities and good freight outcomes.

A funding mechanism for early acquisition outside a region scheme should be established at structure plan or scheme amendment stage of the planning process considering all land use development to ensure that infrastructure can be suitably and equitably funded. This is important because the use of road reserves is being increasingly contested. Guidelines demonstrating the level of information required for transport assessments are available from the WAPC website.

8.1.2 Rail

The rail network consists of a combination of standard and narrow gauge lines. The standard gauge line forms part of the east-west line that runs from Fremantle to the eastern states. The 2300 kilometre narrow gauge line forms the grain rail network that services the region.

As described above the rationalisation of receival points and the deregulation of the grain market contributed to the declining use of the narrow gauge network for grain freight movements and is attributed to the diversion of export grain freight task onto road. Refer to Map 14 – Transport and infrastructure for the rail network tier 1, 2 and 3.

In 2007, the Grain Infrastructure Group, comprised of grain infrastructure providers and State government agencies, reported to the State Government on options for infrastructure upgrade of the grain freight supply chain. Since this report was released, a number of structural changes has occurred in the grain industry. In this context, the State Government has established the Strategic Grain Network Committee to review options to support infrastructure upgrading of the grain freight supply chain in the new environment.

At the end of 2009, the Strategic Grain Network Committee released a report elaborating the findings of the study. The report main findings were:

- Transport of grain on road has been on the increase;
- The deregulation of grain export marketing arrangements has resulted in the operators in the industry to seek the cheapest option to transport grain to ports;
- Much of the rail network is in need of re-sleepering at an estimated cost of $258 million for all the current railway lines;
- In the Kwinana south zone, rail services are uncompetitive compared to road transport. This will potentially result in some rail lines being ceased from operations. The government will be required to invest in road upgrading to handle the freight shift from rail to road;
- Rail operations are commercially viable for Kwinana North and Albany zones;
- The heavy vehicle permit network system will need to be reviewed to reflect the mode shift and changes in road freight movement patterns; and
- Long term planning should investigate the benefits of a potential railway line between Brookton and Kwinana.

From a strategic viewpoint, the mode shift from rail to road will have an impact on the traffic volume, mix and directional flow in the existing road network. However, from a rail freight perspective, there is potential for future congestion on the existing rail line between Avon and Kwinana as the consolidation of rail lines occurs. There is interest within some local governments for considering a feasibility study for a new rail corridor between Brookton and Kwinana.

Land use planning implications

Ongoing amenity issues for the management of crossing and access between the freight network and private property.

8.1.3 Aviation

The Wheatbelt region is serviced by more than 35 airstrips, airfields and airports. The standard of the aviation facilities varies greatly, however, the majority are publicly accessible. The management of the aviation facilities is generally undertaken by local government or an aero club.

Wheatbelt
Regional Profile

The key aviation industries in the Wheatbelt are aviation training, general aviation, (including charter services) and tourism aviation (skydiving, ballooning, gliding). Aviation facilities in the region are also used by the emergency services (Royal Flying Doctor Service and Fire and Emergency Services Authority).

The airports at Cunderdin, Merredin, Northam and Wyalkatchem are the focus of aviation training. These airfields provide pilot and engineer training and there is capacity for the provision of aviation training to be expanded in the Wheatbelt.

Northam, York, Beverley and Cunderdin are the main focus for tourism aviation, with skydiving at York, ballooning at Northam and gliding at Beverley and Cunderdin.

Southern Cross is the main airport in the region used predominately for charter flights, particularly those associated with fly-in fly-out (FIFO) operations servicing mining and exploration activities. These flights utilise up to 19-seat turboprop aircraft.

The principal funding source for the upgrading of aviation facilities in Western Australia is the Regional Airports Development Scheme (RADS). RADS's funding comprises monies from the Royalties for Regions Scheme and subsidies. The RADS funding round is administered by the Department of Transport each financial year.

While there has been significant investment in aviation infrastructure in the region, there is currently no State aviation strategy, in which to consider future development of the region's aviation industry. The Wheatbelt Aviation Strategy Ministerial Taskforce has released a report which notes the lack of policy direction from the State about general aviation and pilot training and identifies a need for a comprehensive industry development plan.

However, an aviation strategy with a focus on the development of infrastructure to support the various facets of the aviation industry in the region is required. Consideration of the impacts of the future development of aviation infrastructure on the adjoining land uses and town infrastructure is also required.

The Department of Transport has identified that in the medium and long term, a second general aviation airport, to complement the operations at Jandakot, may be required. Jandakot Airport is the only general aviation airport in the Perth metropolitan region and, as suggested in the Jandakot Draft Master Plan 2009, it will reach its theoretical capacity of 514,650 fixed-wing movements during 2027/28. From recent information provided to Department of Transport, the Master Plan forecasts have already been exceeded, which together with the growth in WA's economy and outlook could potentially mean that the capacity being reached well prior to 2027/28. The need to set aside land reserves and undertake the appropriate planning has been identified and needs to be considered.

Land use planning implications

There is a need to identify a new site or upgrade an existing site for a general aviation airport in the Wheatbelt. The State agencies and local governments, particularly those local governments bordering the Perth metropolitan area should be included in any site assessment for a second general aviation airport to ensure compatible and strategic land use planning outcomes.

The potential for the growth in aviation training and facilities in the Wheatbelt, however, there are no current known land use planning implications, as this it is dependent on industry development which is largely market driven.

There is a need to ensure that development does not impact or impinge on existing airport operations and facilities. It is suggested that the principles in the SPP 5.1 Land Use Planning in the Vicinity of Perth Airport are relevant and applicable.

8.1.4 Public transport

Three passenger rail services operate in the Wheatbelt region. The Avon Link provides a commuter service between Northam and Midland, five days a week. The Merredin Link provides services between Merredin and East Perth three days a week. The *Prospector* train between Kalgoorlie and East Perth has a number of stops in the Wheatbelt and it operates seven days a week, with two services on Mondays and Fridays. The region has an established public transport network linking with Perth.

A 'public transport strategy' is being prepared by the Public Transport Authority. This document is expected to be completed and considered by the government.

8.2 Water supply and wastewater infrastructure

Water supply and wastewater infrastructure are fundamental for supporting and sustaining development within the region's communities and for industry. Water supply in particular is under increasing pressure and demand.

8.2.1 Water supply

The *Western Australian Water Services Licensing Act 1995* was devised as an act to establish a scheme for the licensing of water services and to confer functions on the Economic Regulation Authority (ERA) in respect of that scheme among other matters. All organisations providing water supply (potable and non-potable), sewerage, irrigation or drainage services in a controlled area, must hold a licence. Under the Act, the ERA specifies the areas in which water service providers must hold a licence. These are known as controlled areas.

If a water service is being provided outside a controlled area, it is not necessary for the service provider to hold an operating licence. However, the Act makes it an offence to provide a water service without first notifying the ERA. This enables the ERA to advise the Minister of Water Resources so a new controlled area can be declared if necessary.

The ERA regulates and licenses the provision of water services, the DoW manages and protects natural water resources and allocates water rights to providers of water services and to users, and utilities such as the Water Corporation (or other licensed providers) supply reticulated water to customers. The DoW is currently developing a new water services bill to consolidate and modernise the existing water services statutes, and a State water strategy is under development.

The majority of reticulated water in the Wheatbelt is supplied through the integrated water supply system (IWSS), which also delivers water to Perth, the South West region and Kalgoorlie-Boulder. This water supply system provides water to 1.5 million of the 1.9 million people living in Western Australia, distributing approximately 150 GL of water. Water from this supply system comes from dams on the Darling Range, groundwater and the Perth sea water desalination plant in Kwinana. Future water supplies may be derived from a range of sources, including smarter use of water, water trading with irrigators, desalination, groundwater, surface water, catchment management, on-site collection and water recycling.

Outside of the IWSS, settlements are dependent on a range of independent water sources, primarily from groundwater sources, each of which faces a number of vulnerabilities and constraints in their capacity. There are a number of existing public water drinking sources in the Wheatbelt and associated water source protection plans. The public drinking water sources are indicated on Map 15 – Water infrastructure.

Figure 36 outlines the current Water Corporation water and wastewater service capacity and planning. It is a summary of information provided by Water Corporation on selected towns in the Wheatbelt, where the majority of growth is expected to occur. The Water Corporation has plans in various stages for the majority of the towns (where information was provided), and either has the current capacity or there are no identified capacity constraints to respond to growth and planning projects. There are a number of places where investigation is required, constraining development to various degrees and timeframes.

Water Corporation is also undertaking a "Water Forever" project which is a 50-year plan for providing sufficient water for South West WA, Perth and surrounding areas, including the Goldfields and Agricultural region pipeline. The project investigates how the Water Corporation will provide a sustainable water services across WA, including reducing water use, increased water recycling and new ways of sourcing water. The Water Forever project anticipates that no new water sources will be required until about 2020. Of relevance to the Wheatbelt, Water Forever proposes a desalination plant near Gingin-Jurien, and proposes a new groundwater source near the Moore River, as illustrated in Figure 37.

Water for domestic use is a valuable resource, and in the Wheatbelt planning region, the challenge is to improve "fit-for-purpose" supply and use of precious water resources. Alternatives to traditional reticulated public drinking water supply include:

- Internal use - rainwater collected on-site; external third-pipe non-potable water sources such as on-site bores, other than potable water supplied from a licensed water service provider, and approved for use inside a dwelling.
- External use - the above sources, as well as recycled grey water and water supplied from a licensed water service provider approved for use outside a dwelling.

Although there are a variety of alternative water supply options potentially available, the most common water source proposed by proponents is the use of rainwater stored in tanks from a roof catchment. Many local planning schemes also stipulate a minimum tank size required to service residential water requirements where reticulated water is unavailable or cost prohibitive, ranging in size

Figure 36: Wheatbelt water planning - Water Corporation (land supply sub-regions)

Subregion	Town/ suburb	Town/ suburb		Source	Capacity	Planning	Land use implications
Coastal Wheatbelt	Dandaragan	Jurien	Water	Stand alone bore system	WC plans to establish new borefields to cater for future growth	WC to respond to growth triggers/planned projects	No constraints
			Wastewater	WWTP	WC plans for WWTP expansion	WC to respond to growth triggers/planned projects	No constraints
	Gingin	Lancelin	Water	Stand alone bore system	WC expects to meet growth projections	WC completed interim upgrade planning. Full planning review to be undertaken.	No constraints
			Wastewater	Lancelin WWTP	WWTP able to cater for growth	WC plans for infill sewerage, capital subject to Treasury funding. Construction of Seabird WWTP yet to be scheduled	No constraints
		Gingin	Water	Stand alone bore system	**Close to capacity**	**No planning in place to cater for growth**	**Constrained - requires investigation** **(3-5yr lead time)**
			Wastewater	No WC or LGA reticulated service	Unknown	WC Plans for service provision including new WWTP, funding yet to be allocated	**Constrained - requires investigation**
Avon Arc	Chittering	Bindoon-Chittering	Water	Water trading agreement (ground water source)	WC capacity assessment underway	WC plans to respond to capacity assessment underway	Unknown - requires investigation
			Wastewater	No WC or LGA reticulated service	Unknown	Unknown	Unknown - requires investigation
	Northam	Northam	Water	Service tanks fed directly from Goldfields pipeline	Unknown	Unknown	No constraints
			Wastewater	Northam WWTP	Existing capacity limitations/blockages. Overall design capacity able to cater for growth	WC planning to allow design capacity to be utilised	Unknown - requires investigation

Avon Arc (cont.)	Toodyay	Toodyay	Water	Service tanks fed directly from Goldfields pipeline, including pipeline duplication	WC expects to meet growth projections, including anticipated future rural residential subdivision	WC undertaken conceptual planning to identify infrastructure requirements including tank sites and major pipe routes	No constraints
			Wastewater	Toodyay WWTP	Unknown	WC plans for wastewater scheme expansion in line with growth	No constraints
	York	York	Water	Service tanks fed directly from Goldfields pipeline	**Short-term capacity constraint**, due to booster pumps and reserve storage issues. Not expected to constrain long term development	WC plans for wastewater scheme expansion in line with growth	**Short-term (5yrs) constraint**
			Wastewater	York WWTP	Unknown	WC plans to construct new tank, scheduled for completion about 2015	No constraints
Outer Arc	Moora	Moora	Water	Local Kolburn borefield, stored in holding tank	WC capacity assessment yet to be undertaken	WC will need to respond to capacity assessment	**Constrained - requires investigation** **(3-5yr lead time)**
			Wastewater	Moora LGA	Unknown	Unknown	Unknown - requires investigation
South-western	Narrogin	Narrogin	Water	Great Southern WSS (Harris Dam)	Unknown	WC planning underway to expand storage facilities	No constraints
			Wastewater	Narrogin WWTP	WC expects to cater for growth projections	WC planning underway to improve disposal facility	No constraints
Great-eastern	Merredin	Merredin	Water	Service tanks fed directly from Goldfields pipeline	WC expects to meet growth projections	Unknown	No constraints
			Wastewater	Merredin WWTP	Capacity in short-term, requires upgrade in the medium term (3-5 years)	**No planning in place to cater for growth**	**Constrained in medium term - requires investigation** **(3-5yr lead time)**

NB. Water Corporation provided the following information on areas identified as where the majority of growth is expected to occur.

Figure 37: Future water source options

Source: Water Forever - Towards Climate Resilience

from 90,000 to 120,000 litres. However, the provision of a potable water supply via roof collection and a rainwater tank as a sole alternative water supply is not considered a viable option in areas with a rainfall of less than 550 mm per year.

Further investigation into the supply of water via rainwater is required to re-examine the assumptions made when determining whether rainwater is a suitable alternative, including:

- Minimum tank size required to provide a reliable water supply throughout the year;
- Impacts of climate change on the amount, frequency and reliability of rainfall;
- Determination of the average catchment area for existing rural residential properties; and
- Consideration of the average water consumption for rural residential properties (as opposed to relying on metropolitan water consumption figures).

Land use planning implications

State Government policy currently lacks clear direction in respect to water supply issues. The WAPC believes that availability of water should drive planning for the Wheatbelt. The regional land use planning strategy for the Wheatbelt should be able to identify areas where water availability is constrained or absent and steer development away from them. The process for water supply and land use planning appears to be a more iterative process, where the water supply agency undertakes capacity assessments to respond to growth triggers and planned projects.

The Department of Water policy provides for landholders that hold water allocation licences to trade or transfer all or part of their allocation to another user. One of the big challenges for the future will be to provide direction for priorities for water allocation, particularly where there are competing interests for the water. Planning and water agencies need to work together to ensure scarce water resources are allocated in the most just and sustainable way.

The significant land use planning implications for the availability of water supply in the short-term are Gingin, York and Moora. Water Corporation has identified these capacity issues and acknowledges that further investigation is required.

The water supply issue in Gingin has the potential to affect more than urban water supplies. Constrained water resources in Gingin may mean that horticultural uses will be under threat from water supply shortages and/or water supply prices. The Department of Water and the Department of Agriculture and Food will need to work in partnership for the sustainability of the horticultural industry in this area, which, among other forums, is expected to form part of the horticultural precinct project discussed in Section 5. The Water Corporation is considering a desalination plant near Gingin-Jurien which is expected to alleviate the water supply shortages, however, a site for the desalination plant is not known.

Generally, it is expected that future reticulated water supplies will be derived from a range of sources and new technologies, including smarter use of water, water trading with irrigators, desalination and water recycling. Due to the limitation on the water supply in the Wheatbelt, particularly where there is a demonstrated demand for further development and limited capacity in existing water allocations, it may be necessary to explore ways to undertake fit-for-purpose solutions, including the possibility of creating low water use areas.

8.2.2 Wastewater treatment

Wastewater schemes help facilitate the protection of public water supplies and underground water resources, minimise health risks to the community, and protect the environment by minimising eutrophication of streams and wetlands.

While the Water Corporation is the largest wastewater license holder in the State, several Wheatbelt shires of Brookton, Dalwallinu, Dowerin, Dumbleyung, Goomalling, Koorda, Lake Grace, Moora, Victoria Plains, Wickepin and Yilgarn also hold sewerage and non-potable water licenses (Figure 38).

Reticulated sewerage is considered a superior method of treating wastewater than conventional septic tanks and leach drains, and for this reason government policy, primarily through the draft Country Sewerage Policy, limits the intensity of development in areas that cannot be serviced by reticulated sewerage networks. Typically, this occurs by restricting subdivision to a minimum lot size of 2000 m^2 in towns where there is a sewerage system in place, where the subject site cannot be connected, and to 1000 m^2 where a sewerage system does not exist. Some local governments have expressed concern that limiting the intensity of development based on the availability of sewer has been an obstacle to the growth.

Figure 38: Wastewater treatment services

Reticulated sewer		Shire
Water Corporation	Local government	
Beverley	Brookton	Badgingarra
Cervantes	Williams	Gingin*
Corrigin	Dalwallinu	Guilderton*
Cunderdin	Dowerin	Bindoon*
Jurien Bay	Dumbleyung	Muchea*
Kellerberrin	Goomalling	Wannamal
Lancelin	Koorda	Cuballing
Ledge Point	Lake Grace	Wandering
Meckering	Moora	Bruce Rock*
Merredin	Calingiri	Kalannie
Mukinbudin	Southern Cross	Kukerin*
Narembeen	Marvel Loch	Kondinin*
Narrogin		Hyden*
Newdegate		Kulin*
Northam		Varley
Pingelly		Burracoppin
Quairading		Mount Magnet
Seabird		Beacon*
Toodyay		Bencubbin*
Wagin		Nungarin*
Wickepin		Tammin*
Wongan Hills		Trayning
Wundowie		Kununoppin
Wyalkatchem		Darkan*
York		Westonia
		Harrismith
		Tincurrin
		Koolyanobbing (private operator)

* *Schedule 2 Draft country Sewerage Policy - locations with public health and/or environmental constraints for onsite wastewater disposal*

The aim of the Water Corporation's Infill Sewerage Program is primarily to address environmental and health issues through targeting existing lots with septic tanks. Several Wheatbelt towns have benefited from the program as a by-product of the program has been facilitating development and growth. However, the program has been deferred due to the State Government's direction to save on capital costs.

Wheatbelt Development Commission (WDC) has a Water Working Group (WWG), chaired by Paul Tomlinsons. The WWG has been established by the WDC to strategically focus on water and related matters. The main objective of the WWG is to develop partnerships with infrastructure providers, the regulator and regional stakeholders to ensure the adequacy of water and sewerage infrastructure and services in the Wheatbelt. The WWG facilitates improved planning and decision making for water and sewerage in the Wheatbelt region, and provides advice to the Commission and other State government agencies on Wheatbelt relevant water and sewerage related matters. The WWG also monitors State and national developments in relation to water and sewerage, as applicable to maximising development opportunities in the Wheatbelt region. However, there has been no known input from the WWG into Department of Planning land use planning processes in the Wheatbelt.

Figure 36 outlines the current Water Corporation water and wastewater service capacity and planning. It is a summary of information provided by Water Corporation on selected towns in the Wheatbelt, where the majority of growth is expected to occur. The Water Corporation has plans for wastewater treatment plant upgrades in various stages for the majority of the towns (where information was provided), and either has the current capacity or there are no identified capacity constraints to respond to growth and planning projects. There are a number of places where investigation is required. However, only Gingin has a short-term constraint for wastewater service provision upgrade, and only related to the need for funding yet to be allocated. Merridin is constrained in the medium term.

Land use planning implications

The draft country sewerage policy requires reticulated sewerage for all subdivisions unless certain discretionary provisions apply. Even though reticulated sewers may be available in some towns such as York, it does not extend to all parts of the town, and this is a constraint to development in some Wheatbelt towns. From a land use planning perspective, the Department of Planning needs to continue working in conjunction with the Water Corporation to promote maximising existing sewer infrastructure.

Additionally, there are options for undertaking fit-for-purpose solutions in appropriate locations, including smaller systems and alternative treatment methods. The Economic Regulation Authority (ERA) licences sewerage scheme operating areas. In assessing licence applications, the ERA determines whether the applicant has the financial and technical ability to operate the service and whether the application is in the public interest. There may be scope for more local governments and the private sector to operate sewage treatment schemes in areas where the lack of this service is a major constraint to development. This could apply to smaller areas that are serviced by traditional decentralised sewage treatment systems (such as a single subdivision), providing that licensing, environmental and water requirements can be met and satisfactory containment of odour can be achieved. However, for local governments operating small systems, there can be challenges for meeting licensing requirements. There may be no capacity to extend the services due to the high cost and limited return due to low demand for land, and low price of land.

8.2.3 Urban water management

Better Urban Water Management (BUWM) released by WAPC in 2008 was developed to aid the integration of land use and water planning systems, consistent with SPP 2.9. Application of the guidance provided by BUWM will ensure consideration of total water cycle management at an appropriate scale and level of detail at the various stages of the planning process. The approach outlined in BUWM should be applied to all new greenfield and urban expansion projects, including proposals involving significant land use change. The document promotes a risk based approach to ensure relevant issues are considered at a scale consistent with the level of decision making, and to an extent that addresses the significance of the issue and possible risk to the community and environment. Only those issues specific to the site and its surrounds require investigation and discussion.

Under the State Water Plan, provision is made for the development of regional water plans in order to implement the policy objectives of the State at a regional level. Regional water plans provide an overview of the major water issues within the region, provide a vision for the future and set management objectives and actions in order to achieve the vision. The development of a regional water plan for the Wheatbelt region is not currently recognised in the Department of Water's business plan; however in the interim, BUWM outlines policy principles and design criteria that should be applied to all development within the region. Where significant land use change is proposed, compliance with the policy principles and design criteria must be demonstrated in accordance with the BUWM framework.

In order to assist the implementation of BUWM, Wheatbelt NRM has received State NRM Program funding for the "Water Management for Avon Arc Towns" in 2010/11. The project involves mapping of water dependent ecosystems, stormwater catchments and drainage networks; monitoring of water quality from outlets discharging to water dependent ecosystems; modelling and analysis of the impacts of existing and proposed land uses on water quantity and quality; and development of water management strategies, particularly improvements to stormwater infrastructure. This project will help the shires of York, Northam and Toodyay to integrate land and water management planning, consistent with the BUWM framework. The focus into the future will be to improve the coordination of planning and infrastructure provision in response to stormwater management issues.

8.3 Energy supply

8.3.1 Existing and proposed power services

Reliable and well maintained energy supply is critical to the economic development of the Wheatbelt region.

The Wheatbelt is supplied with energy by the South West Interconnected System (SWIS), which consists of nearly 96000 kilometres of powerline and 14000 substations, servicing the area from Kalbarri to Kalgoorlie and Albany. The network is divided into the bulk transmission network and 13 distribution load areas. The Wheatbelt region is serviced by the north and east country load areas.

The East Country load area covers primarily Wheatbelt areas to the east of the Perth metropolitan area and supplies a mixture of rural, water pumping, mining, and residential loads.

Growth in power demand was slow prior to 2007, increasing at a rate of less than one per cent per year. Since 2007, load growth has increased substantially due to the mining and resources boom and is now forecast to average approximately four per cent per year over the next five years.

Current approved projects include:

- Increasing the capacity of Sawyers Valley substation to 132 kV (scheduled completion by Q4 2010); and
- Increasing the reliability of supply to Baandee, Carrabin, Cunderdin, Kellerberrin, Merredin and Yerbillon through construction of a second 132 kV transmission line from Merredin terminal to Merredin substation (scheduled completion Q4 2011).

Long term solutions for network weaknesses include:

- Capacitor upgrades to Northam substation by 2014;
- Conversion of Wundowie substation to 132 kV, operation by 2017;
- A rebuild of the Cannington Terminal-Mundaring Weir-Sawyers Valley-Wundowie-Northam, 66 kV line to 132 kV after 2020;
- Construction of a Muchea to Northam 132 kV line to provide supply for the Toodyay and Chidlow area by 2030; and
- Construction of two new zone substations at Toodyay and Chidlow by 2030.

Figure 39 illustrates the existing and planned major transmission and distribution infrastructure for the East Country load area.

The North Country load area services the northern area of the Wheatbelt region and parts of the Mid West region and extends approximately 150 kilometres east of the coast. This load area supplies a range of mining and industrial loads, as well as many rural centres in the Wheatbelt region.

The North Country network was designed to supply small distributed loads and as such, infrastructure limitations in this load area have resulted in zero capacity to connect new large industrial customers. Load growth is forecast to average more than 6 per cent per year over the next five years. To address capacity limitations, Western Power is currently planning the *Mid West energy project - Stage 1* (refer to Figure 40) a double circuit 330 kV line from Neerabup to Eneabba and a new 330 kV terminal at Three Springs. Stage 1 of the project is due to be completed in March 2013. Completion of this project is anticipated to alleviate capacity restrictions in the area and support industry and mining growth in the region. It will be one of the most important infrastructure projects in Western Australia and is needed to facilitate the connection of new power generation projects such as wind farms to the SWIS. Smaller scale infrastructure upgrades planned for 2010-14 will address localised capacity issues at Lancelin, Jurien Bay and Wongan Hills.

Figure 41 illustrates the existing and planned major transmission and distribution infrastructure for the North Country Load Area.

8.3.2 Energy reliability

The majority of power outages experienced by customers in the Wheatbelt region are caused by transmission; (for example, damage to power lines from storm events and fires), and not the generation or the ageing of network infrastructure. Reliability issues should be treated as a separate issue to capacity issues. Small scale distributed generation is increasingly seen as a potential solution to power supply reliability issues. Distributed generation has the potential to increase the reliability of power supply to individual users when in conjunction with power from the SWIS.

Distributed generation opportunities typically consist of roof top solar arrays with or without the ability to feed power back to the grid, and can act as both a power source and a localised backup in the event of a power outage.

Figure 39: Power supply - East Country load area

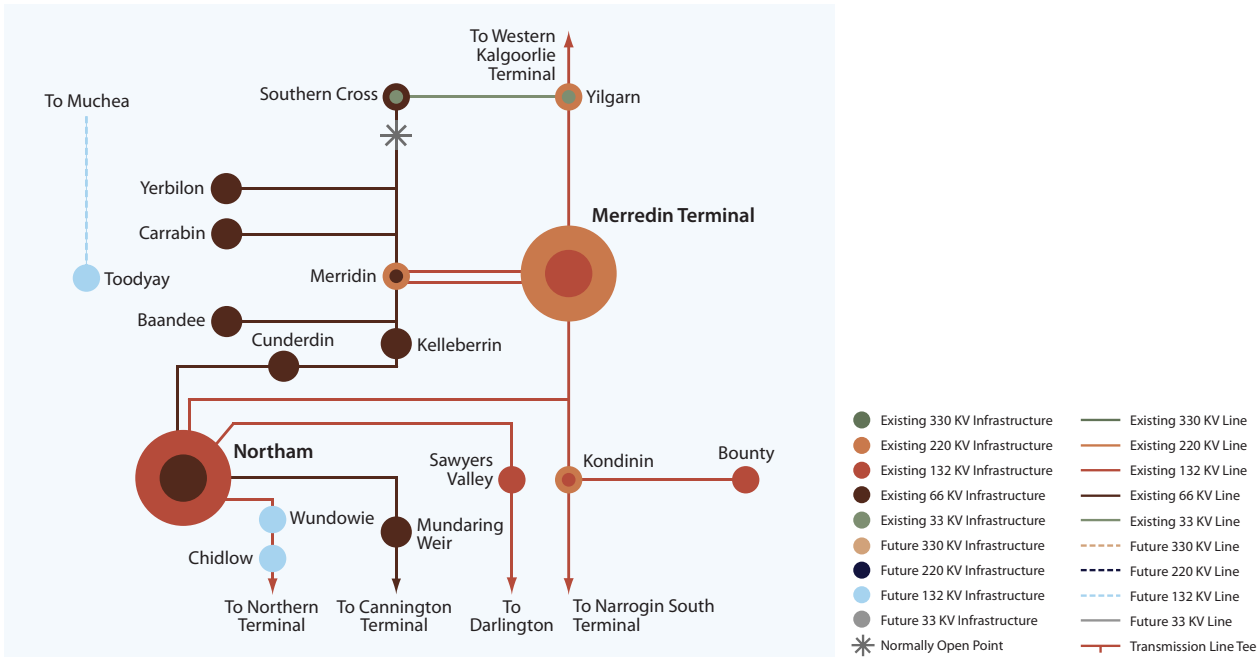


Figure 40: Mid West Energy Project

At present, Solar PV rebates are not available to business owners, which includes farm owners. Distributed generation is supported in principle by State government agencies, however, solar rebates are a federally funded policy. Western Power and their controlling body, the Office of Energy both support attempts to introduce distributed generation.

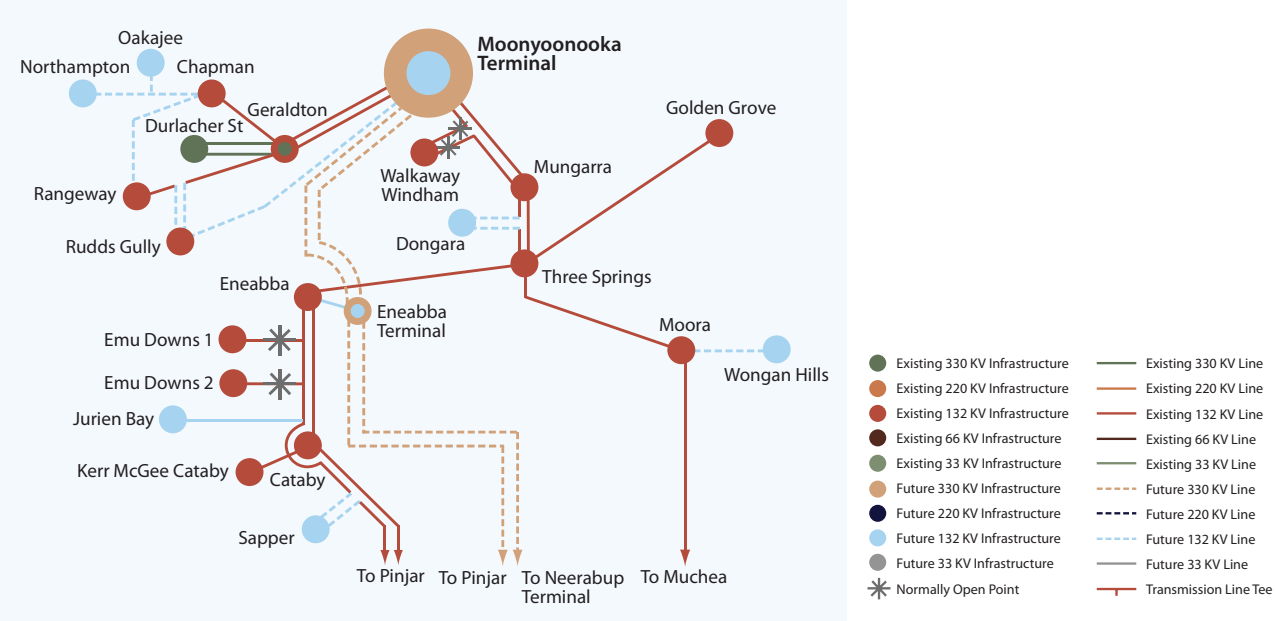
The Office of Energy is currently preparing the State Energy Initiative, *Energy2031*, due to be completed by early 2011, and is likely to lend support to distributed generation. The State Energy Initiative is pitched at a high level and is not expected to include content specific to the Wheatbelt region. However, the current regulatory structure supports demand management and distributed generation, and the Office of Energy encourages Western Power to pursue them.

8.3.3 Energy capacity

Energy infrastructure is constructed with a target capacity, however, the supply of energy is delivered incrementally for efficiency and to minimise costs. A high but steady level of infrastructure utilisation is not typically enough to support investment in infrastructure upgrades if growth and demand beyond this capacity is not projected. Additionally, in places with high utilisation, there may be sufficient capacity which is constrained by the lack of installation of supplementary infrastructure such as a new voltage regulator to raise the deliverable capacity.

Western Power reports there are some capacity limitations in the Wheatbelt. Typically in regions like Northam, only 50-80 per cent of existing capacity is utilised, whereas utilisation of 80 per cent capacity is

Figure 41: Power supply - North Country load area



more typical in outer areas of the network. Exceeding 80 per cent of the network capacity would trigger an upgrade. However, infrastructure upgrades are not constructed until demand is demonstrated and the full capacity of existing infrastructure is not delivered until demand exists, as the Economic Regulatory Authority does not recognise investment in advance.

Infrastructure upgrades and capacity increases can be expected in locations where the drivers for demand are strong and where growth beyond the capability of the existing infrastructure is projected. These are most likely to be in high growth areas directly supporting the mining industry. In scenarios where actual growth exceeds projected growth, Western Power believes the pace of change in the Wheatbelt provides sufficient time to accommodate the unexpected additional demand.

8.3.4 Renewable energy opportunities

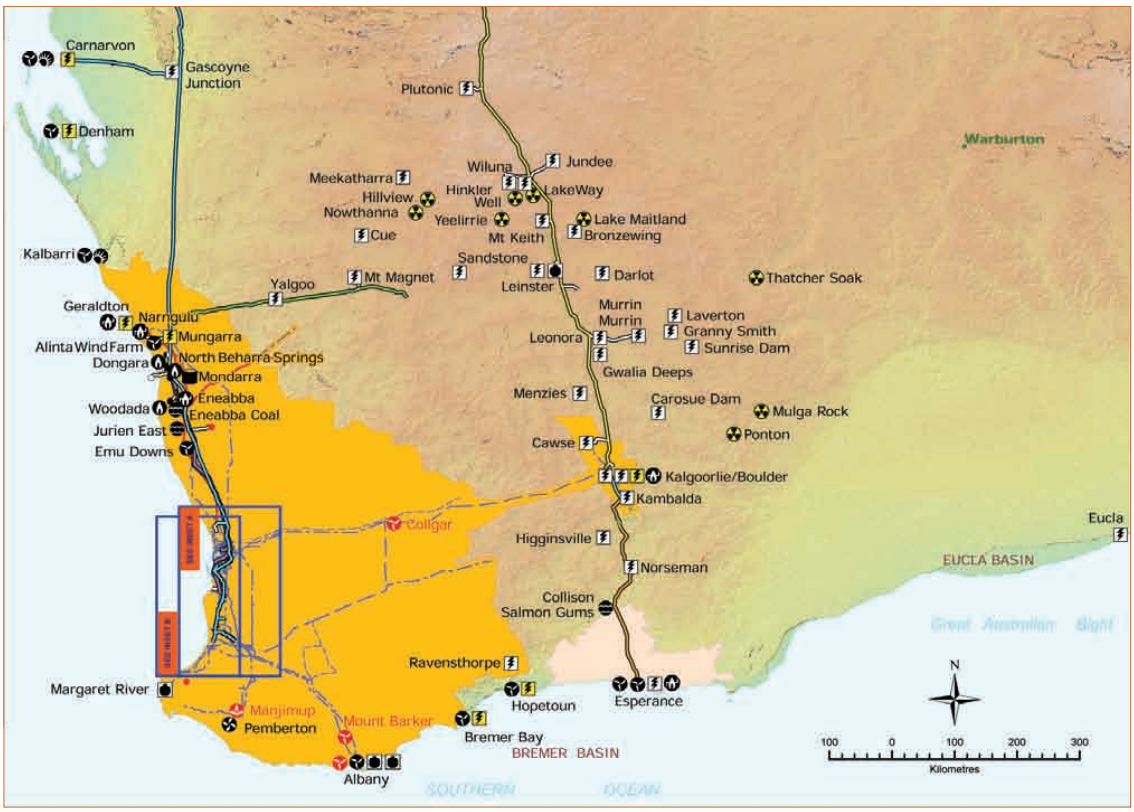
Renewable energy resources, particularly sun and wind are abundant in Western Australia, and there are also several areas where biomass, hydro, wave, tidal and geothermal energy resources are potentially available.

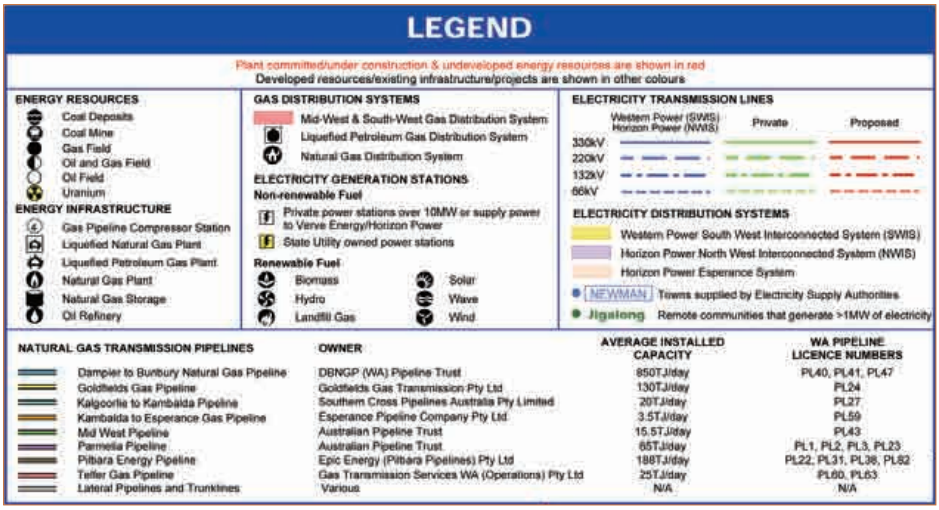
Western Power provides the connection and distribution of energy, which is generated by specific generating companies (for example Verge Energy, Alinta), which may source the energy from renewable generators. In the Wheatbelt, the current renewable energy generator is the Emu Downs Wind Farm (refer Figure 42). In the 2008/09 financial year, renewable power accounted for five per cent of power consumed from the SWIS. Of this, 65 per cent was wind power, 1.7 per cent was solar PV, 20 per cent was hydro and 13 per cent was bio energy.

Western Australia is a prospective location for new renewable energy development, if the challenges of integrating high levels of new (intermittent) renewable energy generation into the State's main electricity grid are overcome. This is being investigated and addressed by the Renewable Energy Working Group.

The WA State government (and the federal government) has established initiatives to encourage innovation and to support renewable energy technologies, including the Low Emissions Energy Development Fund for investment into geothermal, bioenergy and clean coal technologies as well as renewable energy technologies (wind, wave, tidal and solar).

Figure 42: WA energy resources and infrastructure





Source: http://www.energy.wa.gov.au/cproot/2204/2/OOE_Map_2010_web.pdf

However, costs and other challenges need to be considered in facilitating greater use of renewable energy for electricity generation. Similarly, for commercial success, the generator needs to be technically developed, marketable, competitive and have the support of a resource base. In WA, technologies for solar hot water, bioenergy-based, co-generation and large wind energy are mature and marketable. Other renewable energy technologies are in various stages of technological development and market competition. The Office of Energy has published a Renewable Energy Handbook (September 2010) which provides practical guidance and information on renewable energy projects.

However, Western Power reports that the capacity of the SWIS to absorb increasing levels of intermittent generation such as wind and solar is limited due to its relatively small scale and lack of interconnection with other electricity markets. While Western Power is committed to increasing renewable generation, the longer term solution is likely to entail the provision of base-load renewable energy, coupled with increased energy efficiency and embedded renewable energy and storage.

Large scale renewable plants are likely to be restricted to areas with close proximity to existing and planned high voltage power lines. Future investment is likely to occur along the Perth to Kalgoorlie and Perth to Geraldton lines, for example a wind farm at Badgingarra is planned to deliver 130 MW (equivalent to 80 000 homes). The proposed site is 5 km north of the Emu Downs Wind farm, and is expected to be commissioned in late 2012 depending on Western Powers' Mid West Energy Project. The Collgar Wind Farm, 25 km south east of Merredin, commenced in August 2010 and is projected to have the capacity to support approximately 125,000 homes.

Small scale renewable distributed generation is likely to be restricted to off grid installations as the capacity of local power line networks limits their ability to feed power back into the grid.

Land use planning implications

Planning Bulletin 67 provides guidance on interpreting wind farm or wind energy facilities as a discretionary use (local government approval and advertising) where it is a "use not listed" in planning schemes.

Notwithstanding the potential impact of a renewable energy project on the environment and the need to refer the proposal to the Environmental Protection Agency, it may be appropriate to provide guidance for other renewable energy projects which do not fit within a definition in the planning scheme to be assumed as being considered a discretionary use.

8.4 Telecommunications

Effective telecommunications infrastructure is essential to underpin the region's economy, particularly access to broadband internet services. The former Department of Industry and Resources prepared Western Australia - A Connected Community: State communications policy, which is administered by the Department of Commerce and intends to address communications requirements in Western Australia.

The Department of Commerce recognise the importance of having effective, affordable and advanced communications and the importance of strategic planning for it, however, there is limited influence through the land use planning framework.

WA State government produced a Telecommunications Needs Assessment in 2003, and another assessment was announced mid-2010. The key priority areas for telecommunications services are predictably rural WA, as regional, rural and remote Western Australians, particularly in the north of the State, have the most disadvantaged access to telecommunications services, among other things, in Australia. The new State Telecommunications Needs Assessment is aimed at revising the State communications strategy and to maximise opportunities arising from federal initiatives.

Land use planning implications

There are limited influences from the land use planning system to improve the national telecommunications agenda. Realistically, it works in reverse; the role of Commonwealth telecommunications infrastructure influences the development of regions.

8.5 Social and community infrastructure

Social and community infrastructure for the purposes of this regional profile and for the Wheatbelt land use planning strategy includes health, education, training, emergency services, social housing and police. It includes both physical infrastructure such as buildings and land as well as the State service functions such as health care providers, teachers and police officers. Community infrastructure often includes sporting and recreation facilities, community centres child care and

after school centres, libraries and cultural facilities, and while these are fundamental for communities and important, they are predominantly locally provided and have not been considered in the regional context.

The adequacy of social and community infrastructure affects the ability to create or sustain healthy communities. At the same time, for social and community infrastructure to be adequate, it needs to be capable of having sufficient and equitable funding. The delivery of social and community infrastructure needs to service the existing community and should also be factored into the feasibility and planning for future communities through development proposals and projects.

The supply of social and community infrastructure in the Wheatbelt is challenging, particularly due to relative pressures in other regions in Western Australia. The intent of many land use planning strategies is to ensure suitable land supply for social and community infrastructure. However, land use planning for the supply of social and community infrastructure particularly in the Wheatbelt region context is only a small part of social and community infrastructure provision. It is important that the land use planning strategy extends to protecting the liveability, health and education of Wheatbelt communities, particularly those that are rural and remote. However, the supply of sufficient physical infrastructure and land does not necessarily mean there is adequate service and facilities. The biggest consideration and influence on the adequacy of supply is the specific service functions and changing methods of delivery that are occurring in the various sub-sectors, particularly links to services provided in larger communities, as explained in the following sections.

8.5.1 Health

Healthy communities and the provision of health-related services is no longer simply the supply of primary health services, as there is a greater emphasis on public health generally, for example through active lifestyles and creating sustainable communities. Government support and policy is only one aspect of healthy communities. Similarly, the government is not the only provider of health services in the Wheatbelt.

The Department of Health identifies the following key public health areas that should be considered in all planning components:

- Communicable disease prevention and control
- Disaster management
- Chronic disease prevention
- Environmental health
- Radiation safety
- Mosquitoes and other vector borne disease
- Water (drinking, wastewater, reuse of treated wastewater, environmental/recreational water)
- Buildings
- Chemical (including pesticide) exposure
- Public amenity.

Public health issues, including water supply or mosquito control, as well as creating viable sustainable communities are addressed by a suite of policies and strategies, for example:

- Environmental Protection Act 1986
- Environmental Protection Policies
- Health Act 1911 (soon to be replaced by a new Public Health Act)
- Environmental Health, Environment and Water regulations
- Liveable Neighbourhoods
- State planning policies (urban growth and settlement, public drinking water, water resources etc).

The key health-related facilities and services in the Wheatbelt region funded by the government' for example, Commonwealth and WA Department of Health) comprises 21 hospitals, 19 community and public health services, four nursing posts, four aged care service facilities, three health services centres and two mental health centres. The major (regional) hospitals are located in Narrogin, Merredin and Northam. Refer to Map 16 – Social and community infrastructure.

The Wheatbelt Development Commission (WDC) is leading a "Wheatbelt Health Planning Initiative" comprising a partnership with the Wheatbelt Western Australia Local Government Association Zones, WA Country Health Service (Wheatbelt region) and the Wheatbelt General Practice with the mandate to consider health issues affecting the region. This partnership is known as the Wheatbelt Health MoU (Memorandum of Understanding) Group. The WDC advertised a request for quotation for the initiative to under community engagement for future health service in the Wheatbelt. The aim of the project appears to more about developing a model of care that fits the Wheatbelt community rather than the potential to create significant land use planning implications. However, it is acknowledged that the Wheatbelt faces challenges in health provision

associated with the changing methods of health care delivery.

Land use planning implications

The Department of Health is reviewing health care delivery in the Wheatbelt and there is the potential for change. There may be land use planning implications associated with this review. The release of the review will be monitored and any land use planning implications arising from the review will be responded to.

8.5.2 Education and training

Education and training are essential for sustainable communities, and is about the schooling of children and the education and training to increase the capacity of communities for employment and business opportunities which economic and regional development relies on.

The Department of Education (DEd) focuses on the education quality of schools and this is manifesting itself into the aggregation and consolidation of schools with the benefit of scale for greater services and opportunities. The DEd has found that high quality education is extremely challenging, if not impossible, to deliver to smaller communities, but remains committed to providing appropriate education to the whole community. The service delivery method for DEd education services is the Hub and Spoke Model. The hubs are the existing large schools at Merredin, Narrogin, Northam and Central Midlands (Moora), the spokes being the smaller schools which effectively act as a campus associated with the larger schools. Therefore, it is the intention of DEd to retain as many viable school sites as possible as close as possible to the students, and the maximum catchment radius for access is a 1.5 hour bus ride from home to school. Some towns may have schools amalgamated, for example, there are plans to amalgamate the north and south primary schools in Merredin.

In the Wheatbelt, there are no plans to establish any new schools, including in areas with a growing population. Population growth per se does not necessarily create the demand for a new school. There may be a new school established as identified in the Lancelin to Ledge Point Overall Structure Plan. However, DEd have advised that it is very unlikely that this area will have the required enrolment demand (1000-1200) to support a new secondary school. Furthermore, the existing Development Control Policy 2.4 (School Sites) provides criteria and thresholds for establishing new schools and the associated land requirements, for example:

- Primary schools 1:1500-1800 housing units (4 ha land requirement)
- Secondary schools 1:4-5 primary schools (6-10 ha land requirement)
- TAFE 1:60,000-70,000.

As the demand for any new education facilities would be associated with a major new land development, there is adequate scope to respond to demand for new schools during the preparation of the Structure Plan.

The Department of Training and Workplace Development (DTWD) has found that CY O'Connor College is working hard to retain its range on offer. CY O'Connor College major campus is in Northam, and while it has a broad mix on offer, it is competing with the specialist range and greater level on offer at the much larger campus in Midland. The training facilities in Narrogin and Merredin have strong student numbers, but the facilities are considered to be inadequate size and the wrong type to provide training needs. The DTWD considers there is a need for a new site in Narrogin, of approximately two hectares and that Merredin needs investment to improve the training opportunities particularly for auto-electrics to service the mining industry. These projects have not been successful in receiving commitment from Treasury.

DTWD acknowledges the potential for the aviation industry in the Wheatbelt, although it does not have any confirmed proposals or potential projects on specific sites or areas.

Land use planning implications

There is no specific regional land use planning implications for education or training in the Wheatbelt. DEd does not have any capital works proposals for any new facilities in the Wheatbelt, and do not anticipate the need for more land for expanding existing school sites.

DTWD have identified the need for new training site of approximately two hectares in Narrogin, although land availability in Narrogin is not the barrier for establishing one.

The potential to provide flexibility in the use of rural land for education and training type proposals where

appropriate may assist in removing any perceived barriers or delays for establishing projects.

8.5.3 Housing

Housing as social infrastructure is about providing residences and supporting facilities for various community needs, including aged accommodation, Aboriginal and regional housing and a range of special needs groups. The provision and style of social housing is determined by set eligibility requirements and criteria governed by the Department of Housing (Housing Authority).

The Department of Housing manages the need for social housing through a Land Demand Model (LDM). The housing services waiting list categories applicant type and priority which informs the LDM. The LDM is for the whole of Western Australia and is controlled by local government area to monitor the surplus or deficit of housing service supply. The LDM informs the Land and Housing Development Directorate's land development and acquisition program, which has a four-year rolling program to guide land release and new developments, combining population projections and household size data with conditional lot approval information.

Using this series of housing service management tools, it has been concluded that the majority of the state is generally well supplied with social housing, except the Kimberley area which has a moderately high shortfall (approx 1000 lots). The Metropolitan and Peel regions have a major shortfall in some parts, but surplus in others. Currently, there is a minimal shortfall of social housing (defined as 0-499 lots) in the Wheatbelt region as a whole, and there is a surplus in a couple of the mid-Wheatbelt local government areas.

The Department of Housing considers the allocation of social housing is modest in the Wheatbelt, except for Northam, and it is monitoring demand in Merredin and Narrogin.

Land use planning implications

There is no land use planning implications for the Wheatbelt strategy. The Department of Housing comprehensively monitors and manages the supply of housing which ties into land release and developments.

8.5.4 Police

WA Police are working towards service delivery improvements across the State, particularly in addressing the tyranny of distance which affects the ability to adequately serve the community whilst also maintaining officer safety. WA Police are finding there needs to be a great deal of flexibility in service delivery, depending on location, and frequently the most effective and efficient method is through state-of-the-art mobile response units (vehicles).

At the same time there is also a general move to rationalise police stations, although there are no plans to close any shopfronts in the Wheatbelt and it is intended to maintain a high civic presence.

Land use planning implications

WA Police are preparing a 10-year plan which includes investment priorities for approval by Treasury. Any land use planning implications arising from the outcomes of the WA Police Plan will be responded to.

8.6 Regional waste management

Objectives for waste management centre on waste avoidance, resource recovery and minimisation of waste to landfill. Population size and geographical location impact on the practicality and viability of waste collection and recycling services. In non-metropolitan areas 83 per cent of waste generated was disposed to landfill, as opposed to 71 per cent in metropolitan areas.

Waste regulation and management

Local strategic planning for waste has been well advanced through preparation of strategic waste management plans by local government that align with the State's vision of towards zero waste. Through the Zero Waste Planning Development Scheme local governments are encouraged to consider regional alliances in waste service delivery, in recognition of substantial environmental, economic and social benefits, including improving economies of scale and enabling the sharing of resources, equipment and services. In addition, the Waste Authority (the State's peak body on waste) is developing a State waste strategy which will set targets for waste reduction, resource recovery and diversion of waste from landfill.

Waste management in the Wheatbelt

Wheatbelt
Regional Profile

Strategic waste management plans have been prepared for all Wheatbelt local governments and approved by DEC. Eight plans cover 42 local governments and a further two plans have been developed for individual shires according to the following groupings:

- Central Midlands Regional Organisation of Councils - Shires of Chittering, Dalwallinu, Moora, Victoria Plains (lead), Wongan-Ballidu.
- Goomalling group - Shires of Dowerin, Goomalling (lead).
- Wheatbelt East Regional Organisation of Councils - Shires of Bruce Rock, Kellerberrin, Merredin (lead), Nungarin, Tammin, Westonia, and Yilgarn.
- North Eastern Wheatbelt Regional Organisation of Councils - Shires of Koorda, Mt Marshall, Mukinbudin, Trayning (lead), and Wyalkatchem.
- Avon group - Shires of Northam (lead), and Toodyay.
- ROE Regional Organisation of Councils - Shires of Corrigin, Kondinin (lead), Kulin, Narembeen.
- South-East Avon Regional Organisation of Councils - Shires of Beverley, Brookton, Cunderdin, Quairading and York (lead).
- Wagin group - Shires of Cuballing, Dumbleyung, Lake Grace, Narrogin, Town of Narrogin, Shires of Pingelly, Wagin (lead), Wandering, West Arthur, Wickepin, Williams and Woodanilling.
- Shire of Dandaragan.
- Shire of Gingin.

The plans consider the specific needs of each local government while looking for opportunities for regional collaboration, including initiatives to establish regional strategic landfill sites and the conversion of small sites with limited capacity into transfer stations. Where relevant, they may consider new locations with the capacity to meet long-term waste needs, the separation of waste, establishment or expansion of recycling and processing operations, and improved recycling systems.

Future volumes and the life span of facilities will be affected by waste minimisation initiatives and service delivery models. Regional waste plans generally acknowledge the potential benefits of landfill consolidation and the construction of transfer stations to service communities, but most identify a need for external funding to support projects. Some funding is available from the Waste Authority.

Proximity to the Perth metropolitan area has led to suggestions there may be economic development opportunities for the Wheatbelt to accept and manage metropolitan waste or develop specialist waste treatment operations. This needs to be considered in the context of waste minimisation goals and the State vision of towards zero waste.

Future regional landfill sites

Amendment 104 to the Shire of Gingin Town Planning Scheme No. 8 rezoned a portion of rural land to special use for the purposes of a regional waste management facility. The facility will accept waste from the Shire of Gingin and the surrounding shires. It will also service parts of the metropolitan region. Associated uses being considered include the extraction of landfill gas to generate power and alternative technology being explored. The proponent intends to utilise bioreactor technology and re-mining and re-processing of inert waste to extend the life of the landfill beyond its conventional 25-life to about 50 years.

Initially the annual waste acceptance is estimated at 100,000 tonnes per annum, increasing at a projected rate of 5 per cent per annum.

It is recognised that Gingin's strategic location relative to the metropolitan region and the economic opportunities it presents make it a suitable location for a regional waste management facility. This is consistent with the principles and strategies reflected in the Waste Strategy for Western Australia.

The Shires of Chittering, Dalwallinu, Moora, Victoria Plains, Wongan-Ballidu, Goomalling, Toodyay, Northam and Dowerin have formed a regional council for the purpose of owning and running a regional waste site. Investigations have begun identifying a suitable site within the shires, initially focusing on a site on land west of Calingiri.

The shires of Wagin, Cuballing, Dumbleyung, Lake Grace, Narrogin, Wandering, West Arthur, Williams, Wickepin, Woodanilling and Town of Narrogin are also currently investigating a suitable site for a regional waste disposal.

Land use planning implications

There are no specific land-use planning implications for regional waste management in the Wheatbelt. Waste management needs to be strategic, consolidated, licensed and well managed.

Local planning strategies and schemes should acknowledge existing and any future proposed waste facilities and protect the appropriate buffers.

9 Review and status of existing regional strategies

9.1 Introduction

A review of the existing strategies was undertaken to determine their future status within the context of the Wheatbelt Land Use Planning Strategy (WLUPS). It was found that the three strategies have served their purpose and that the majority of the guiding principles and land use considerations within the existing strategies will be reflected in the WLUPS.

The WLUPS will therefore supersede the Avon Arc Sub-Regional Strategy and the Central Coast Regional Strategy.

The WLUPS will update and establish a revised WAPC policy position on the following land use planning considerations that are reflected in the existing strategies and are applicable to the entire Wheatbelt region:

- A settlement hierarchy for the Wheatbelt
- Priority infrastructure requirements and assessment of the suitability of regionally significant infrastructure
- Natural resource management
- Identification and protection of conservation or recreation areas
- Protection of important landscapes
- Coastal management and development guidance
- Rail freight transport
- Regional road network
- Impact of metropolitan growth on the Wheatbelt
- Emerging alternative energy supply opportunities
- Ground and surface water allocation
- Indigenous heritage and culture
- Updated policy context.

9.2 Avon Arc sub-regional strategy

The Avon Arc Sub-Regional Strategy (AASS) released in 2001 was identified as an action in the State Planning Strategy (1997), and was prepared by the Western Australian Planning Commission under the guidance of a regionally based Steering Committee and Technical Advisory Group.

Study area

The strategy covers the shires of Beverley, Brookton, York, Northam, Toodyay, Chittering and the non-coastal part of the Shire of Gingin. The study was driven by issues associated with increasing development pressure in the study area and the need to retain rural character.

Purpose

The purpose of the AASS was to provide a regional framework for long-term land use in the Avon Arc, particularly for shires without current local planning strategies and schemes.

Since the AASS was prepared, local planning strategies have been developed for the Shire of Chittering (2004), the Shire of Northam (2004), Shire of Toodyay (2007), and the Shire of York (2007). The Shire of Gingin has a draft local planning strategy. The Shires of Beverley and Brookton are without local planning strategies.

Strategy structure and recommendations

Part 1 – Strategy framework
Part 2 – Explanatory notes

Part 1: Strategy framework

Guiding principles

The guiding principles established for the AASS are:

1. Facilitating development that improves regional economy, amenity and lifestyle
2. Directing settlement growth to be economically, socially and environmentally sustainable

3. Coordinating services and infrastructure in an orderly manner
4. Recognising agriculture as a significant land use and economic activity
5. Preserving the cultural heritage of the region
6. Encouraging tourism activities which provide a net benefit to the region
7. Facilitating the efficient and timely extraction of basic raw materials and mineral resources and subsequent rehabilitation
8. Conserving and enhancing the natural environment
9. Improving the landscape values
10. Promoting, protecting and expanding a regional greenway system
11. Promoting employment, training and research opportunities
12. Integrating and coordinating of policies and actions across agencies and community groups.

The guiding principles are still current and equally applicable at a Wheatbelt planning region level. It is anticipated that they would be reflected in the WLUPS and do not need to be retained as specific to the Avon Arc subregion.

The exception may be guiding principle 12 (integrating and coordinating of policies and actions across agencies and community groups). This is a point of distinction between the AASS and the WLUPS, which is particularly focused on strategies and actions that can be implemented through the land use planning system.

Recommendation - The guiding principles should be amalgamated into the WLUPS and this section of the AASS superseded.

Strategic policy framework

The strategy policy framework identified 10 general land uses:

1. Settlement
2. Commerce and industry
3. Tourism
4. Landscape
5. Agriculture
6. Infrastructure and services
7. Transport
8. Cultural heritage
9. Natural environment
10. Resource extraction.

Each land use included an objective, strategy, comments, guidance for implementation, issues and actions, and agency responsible for implementation. The issues and action were assigned a priority and timeframe for implementation. The actions and a desktop assessment of their ongoing relevance are attached (Appendix F - Review of Avon Arc sub-regional strategy - strategy policy framework).

The land use categories, objectives and strategies appear to be broadly applicable at a Wheabelt planning region level and it is anticipated that they would be reflected in the WLUPS. Some of the issues and actions attached to the land use categories are at a scale that is most relevant to the Avon subregion. Appendix F identifies which of these are relevant to be included in the WLUPS and which have been superseded or addressed via the preparation of policy and planning documents subsequent to the AASS.

Recommendation - The text in this section is useful for development of the WLUPS. Areas which need to be retained or advanced by the WLUPS are identified in Appendix F.

Land use plan

The land use plan guides the use, development and management of land within the Avon Arc. It divides the study area into seven land use planning units based on physiographic zones and the Avon Arc Regional Greenway system:

1. Swan Coastal Plain
2. Gingin Scarp and Foothills
3. Dandaragan Plateau
4. Darling Uplands/Plateau
5. Darling Range Eastern Slope
6. Avon Valley and Zone of Rejuvenated Drainage
7. Avon Valley Catchment and Zone of Ancient Drainage.

Each unit has a vision and guidance for land use activities.

The seven land units that make up the Avon Arc (and their visions and guidance statements) should be included in the WLUPS.

It is recommended that they are validated prior to release of the draft WLUPS for public comment to ensure there are no major variations as a result of local planning mechanisms which have been developed and endorsed by the WAPC since the AASS was released.

Part 2 – Explanatory notes

Part 2 contains background and regional context to the strategic policy framework. In some instances, this information will have been superseded by changes in planning and government policy, population, and growth projections, or the implementation of infrastructure proposals since the AASS was prepared. However, in many instances, the local context contained in the background information will retain some relevance which, due to the variation in size of the study area and, therefore, the scale of information, will not be replaced by the WLUPS.

The advancement of spatial growth plans for local governments included in the AASS has been identified as future work under the WLUPS. This will provide an opportunity for more detailed consideration of the information in the AASS.

The relevance of use of the background and explanatory notes contained in the AASS should be determined on a case by case basis, and in the context of changes associated with that issue since the AASS was prepared.

Strategy implementation

In 2004 the (then) Department for Planning and Infrastructure (DPI) developed a comprehensive implementation review process which included reconvening of the Steering Committee and Technical Advisory Committee (Avon Arc Implementation Committee.) It included Councillor representation from each local government, DPI and the Wheatbelt Development Commission. The role of the committee was to direct and oversee implementation and strategy review. The committee last met in December 2005 to discuss water infrastructure issues. Meetings were discontinued when the Chairman was not re-elected at local government elections.

Advanced planning since the AASS

A considerable number of issues in the AASS have been dealt with through the development and implementation of local planning strategies, amendments to local planning schemes and individual/joint government department projects. For example:

- The inclusion of model scheme text heritage provisions in local planning schemes;
- The development of the Avon Industrial Park (Stage 1) by infrastructure providers, LandCorp and relevant government agencies; and
- The identification of areas of local agricultural significance by local governments through local planning strategies taking into consideration land capability and agricultural viability.

Review and auditing

December 2004

An audit of the AASS was undertaken in December 2004 by O'Brien's Planning Consultants via interviews with local governments and State government agencies to determine the number of action items that had been implemented. This concluded that approximately 70 per cent of the possible directions within the strategy were found to have been completed and the eight local government authorities had a relatively high level of implementation of the strategy after three years. Of the 136 priority actions items with local government as the lead agency 9 are not applicable and should be excluded; 24 are required by statute; eight are being monitored on an ongoing basis therefore of the remaining 127 implementable items; 82 had or were being implemented (64.6 per cent) and 45 had not been implemented (35.4 per cent).

Of the 38 action items allocated to State Government authorities, 26 had been implemented, two had been partially implemented and 10 had not yet been implemented. The review found the review process complicated by a number of changes in State Government departments and staff changes resulting in new staff unaware of their agencies being identified to implement actions.

September 2007

The DPI met separately with the Shires of Chittering, York, Northam, and Toodyay, at which local government concerns about peri-urban development pressures were highlighted. This included:

- High demand for fully serviced lifestyle lots in close proximity to the metropolitan region
- Regional waste management
- Deficiencies in infrastructure coordination
- Future upgrade in rail infrastructure for grain cartage.

Other issues raised by local governments included a lack of potable water supplies for future residential development, deficiency in availability of primary school and community facilities, lack of coordination between infrastructure providers, deficiencies in office space to supply regional demand and lack of public transport services to Northam.

Conclusion

The AASS will be superseded by the preparation of the WLUPS. The WLUPS will update or establish a revised WAPC policy position on matters including:

- The Chittering New Town proposal
- The identification and protection of important landscapes
- An appropriate settlement hierarchy
- Priority infrastructure requirements
- Road and rail freight transport
- Planning for potable water schemes.

9.3 Central coast regional strategy

The Central Coast Regional Strategy (CCRS) was released in 1997 with a 10-year planning horizon. It was prepared by the Western Australian Planning Commission under the guidance of a regionally based Steering Committee and Technical Advisory Group.

Study area

The Central Coast region refers to the area between the coast and the Brand Highway within the Shires of Irwin, Coorow, Carnamah, Dandaragan and Gingin and the adjacent marine areas to approximately five km offshore. Only the shires of Gingin and Dandaragan are within the Wheatbelt planning region.

An assessment of the ongoing relevance of the CCRS considers only the shires of Gingin and Dandaragan, as the only shire's within the Wheatbelt region. Further, the area within the Shire of Gingin has been superseded by the Gingin Coast Structure Plan (2006).

Purpose

Due to its proximity to Perth the central coast is under pressure to provide urban, employment, recreation and tourism opportunities for a growing resident population and visitors. Major issues prompting the strategy include access, protection and use of the coastline; the need for new road connections between Greenhead and Lancelin; the future use and management of the large amount of public land; and the impact of metropolitan development on the future of the region.

Despite the 10-year planning horizon, the CCRS has been regarded as a useful guide for decision-making and it is understood it has continued to be referred to by local government in the absence of updated strategic documents.

Strategy structure and recommendations

Guiding principles

The guiding principles established for the CCRS are:

1. Ecologically sustainable development - Promote ecologically sustainable development in the planning of the region to enhance the quality of life for residents and visitors, both now and in the future.
2. Regional identity - Recognise the regions distinct cultural and natural character and its community networks to provide a positive identity and image for the region.
3. Managing natural resources - Promote careful management of natural systems, including areas identified with conservation values to ensure maintenance of essential life-supporting resources such as clean air, water and soil and biological diversity.
4. Facilitating development of community facilities and social services - Protect and enhance the quality of life for all residents by facilitating the development of community facilities and social services, providing for fair and equal access to opportunities and encouraging greater community involvement in planning processes.

5. Fostering economic development and promoting diversification - Promote economic diversification of the region as a basis for economic development.
6. Coordinating and integrating regional planning and development - Promote a coordinated and integrated approach to regional planning and development through the involvement of all three levels of government to prevent duplicated and contradictory decisions-making.

The guiding principles are equally applicable at a Wheatbelt planning region level as they are to the central coast. It is anticipated that they would be reflected in the WLUPS and do not need to be retained as specific to the central coast.

Recommendation - This section of the CCRS can be superseded, with the guiding principles reflected by the WLUPS.

The policy framework

The policy framework sets out the major issues identified during the study and includes objectives and 120 implementation actions under the broad areas of:

- Settlement
- Resource development
- The natural environment
- The coastline.

A summary of the policy framework and matters which may require inclusion in the WLUPS is provided in Appendix G. The issues and associated actions are typically broad and apply across the subregion rather than in specific locations. Some have been superseded or addressed via changes in policy or the preparation of planning documents subsequent to the CCRS. Some require an updated WAPC position. A substantial number are outside the scope of the land use planning system.

Attempts to audit these actions were undertaken in 2002 and again in 2004 via gatherings of key stakeholders, and on both occasions discussion recognised the need for updated information across a number of areas.

Recommendation - The policy framework is outdated both with regards to local information and the operating policy context. The issues and actions are wide ranging and many have been superseded or addressed via changes in policy and planning documents subsequent to the CCRS. However, there are a number of specific matters the WLUPS should establish a WAPC position on. It is recommended that the policy framework is superseded by the WLUPS and endorsed local planning strategies developed since the CCRS. However, the WLUPS should establish:

- An updated settlement hierarchy;
- An intention to prepare spatial growth plans for Dandaragan and Gingin in the future (2011);
- The impact of metropolitan growth (on the Wheatbelt;
- A position on future development at North Head;
- The need for, and potential location of strategic industrial sites (in the Wheatbelt);
- The identification and advancement of horticultural development areas in the Shires of Gingin and Dandaragan;
- Emerging alternative energy supply opportunities;
- Updated policy context and natural resource management information; and
- Direction on coastal setbacks.

The land use plan

The land use plan sets out the preferred use of land and includes the following land uses:

1. Rural (grazing)
2. Existing or future conservation
3. State forest
4. Vacant crown land
5. Other uses on land managed by public authorities
6. Townsites
7. Defence training area
8. Ocean

9. Potential development nodes
10. Industry
11. Roads
12. Rural landscape amenity.

There are a number of significant developments and land use changes not reflected in the land use plan, for example the Ardross Estate development south of Jurien Bay, the Lancelin South development proposal, the advancement of rural residential estates around Jurien Bay, and the construction of Indian Ocean Drive.

The land use plan has been superseded by subsequent planning documents and implementation of significant developments.

Catchments and planning units

Based upon the five major surface water catchments in the region, the CCRS uses a catchment management approach to identify a substantial number of land planning units. Planning units are defined within each of these catchments with a location plan, outline of planning unit features, major issues and planning considerations, land uses to be encouraged and recommended planning and management guidelines.

The five surface water catchments are:

1. Gnangara Coastal Catchment
2. Moore River Coastal Catchment
3. Cataby Coastal Catchment
4. Hill River Catchment
5. Eneabba Catchment.

It is expected that the scale of information included for each planning unit would have proved very useful particularly for local decision making. Some of the descriptions of natural features and soil and water characteristics may have an ongoing relevance. However, as with the planning framework, the planning and management guidelines do not reflect a substantial number of developments and land use changes, drafted local planning strategies and scheme amendments.

The planning unit guidelines have been superseded by subsequent planning documents and implementation of significant developments.

Review and auditing

Key stakeholders were brought together in 2002 and again in 2004 to consider the relevance of the CCRS and issues that may warrant a strategy review. Feedback received during this period includes:

- The need for a whole-of-government commitment to the strategy;
- A lack of progress on some action items, a need for clarity about responsible organisations, and a reassessment and prioritisation of the overall number of actions; and
- The need to incorporate policy and plans that have occurred since the CCRS was prepared, including:
  - The draft Basic Raw Materials Strategy for the Central Coast region
  - The Jurien Bay Marine Park Management Plan
  - The Northern Agricultural Region NRM Strategy
  - Relevant coastal management plans.
- The need for updates to a number of particular proposals and locations including:
  - The inclusion of Agricultural lime routes
  - The status of the Breton Bay industrial centre
  - Indian Ocean Drive and the impact on the function and role of the existing road network
  - Proposals associated with the Lancelin Defence Training Area
  - Implementation progress with the State Squatter Policy
  - The addition of Sandy Cape as a recreation and tourist node
  - The removal of Gum Tree Bay as a potential commercial al fishing location
  - Aspects of the recommendations of the individual planning units
  - Updates on Wilbinga as a future industrial site - now an A class conservation reserve.
- An update of policy and planning mechanisms (such as the introduction of local planning strategies which supersede local rural strategies).

Conclusion

The CCRS will be superseded for shires within the CCRS area in the Wheatbelt planning region by the preparation of the WLUPS.

9.4 Gingin coast structure plan

The Gingin Coast Structure Plan (GCSP) was released in 2006 with a time horizon to 2031. It was prepared by the Western Australian Planning Commission under the guidance of the Gingin Coast Structure Plan Steering Committee and Community Advisory Group.

Study area

The Gingin Coast Structure Plan covers the coastal part of the Shire of Gingin not covered by the Avon Arc Sub-Regional Strategy — a 50 km stretch of coast in the Gingin Shire, bounded by Brand Highway on the east. It includes an area of 2220 km2.

Purpose

The structure plan aims to guide development in the study area driven by development pressure arising from the proximity to Perth, and the need to ensure a sustainable supply of groundwater to service emerging economic activity including agriculture, horticulture, residential and tourism uses.

The strategy considered low, medium and high growth scenarios and predicts a population of between 7500 and 16,000 by 2031. The plan identifies Lancelin as a major local centre with a population of between 2000 and 10 000. The Structure Plan encourages the consolidation of existing settlements, which assumes growth and infill where appropriate.

The structure plan supersedes previous strategic planning directions contained in Central Coast Regional Strategy.

Strategy structure and recommendations

The document includes the study background and the structure plan, which includes a spatial land use map, structure plan growth scenario and guidelines for implementation of the structure plan.

Key assumptions underpinning development of the structure plan

- Gingin Coast area will continue to be influenced by, and be an integral part of, the Perth Metropolitan Region;
- Employment and economic sustainability will continue to be a key factor in the rate of development in the Gingin area;
- Development should be congruent with the provision of physical and community infrastructure to meet the needs of the populations and in the context of sustainability;
- Environmental management will be undertaken to achieve and maintain ecological sustainability; and
- Existing settlements currently fulfil a substantial role of providing non-permanent accommodation in the form of holiday houses.

The Key assumptions remain relevant and are mostly equally applicable at a Wheatbelt region planning level. The first assumption is also relevant for the Avon Arc and the assumption that existing settlement contains substantial non-permanent accommodation is also relevant for other townsites such as Cervantes and Jurien Bay.

Key directions of the structure plan

- A large portion of the study area will remain in extensive agricultural use or as nature reserves beyond the current planning horizon;
- Consolidation of the existing settlements assumes levels of growth and infill where appropriate and urban expansion adjacent to existing townsites (in line with projected populations for each townsite as outlined in a settlements hierarchy for the Gingin Coast study area);
- Future urban development will be in two types of location — areas adjacent to existing urban settlements that are suited for, or already approved for urban development and, if suitable,

areas denoted priority resource locations in SPP 2.4 Basic Raw Materials following resource extraction;

- The potential provision of a small scale service centre(s)/employment node(s) in the southern part of the study area to serve the limited local demand and through traffic without compromising the potential for sustainable growth and development of the commercial and industrial activity in the existing townsites;
- Areas indicated as rural may not be available for agriculture uses due to constraints such as native vegetation clearing and/or for horticultural use due to limited groundwater availability;
- Water supply (priority 1-3) source protection areas are identified;
- The potential to continue the Avon Arc Green Link along Gingin Brook Road is acknowledged and should be further investigated to establish how it should be treated and managed; and
- The potential for vegetation protection in botanical linkages between reserves and multi-use areas is identified.

These directions remain relevant and will be reflected in proposed Town Planning Scheme No. 9 and the Local Planning Strategy. Water supply source protection areas and Avon Arc Green link are significant at a regional level and may be incorporated into the WLUPS.

Existing land uses

Existing land uses in the study area broadly include, rural, Department of Environment and Conservation estate, defence training land, a future power site, residential, urban settlements (Lancelin, Ledge Point, Seabird and Guilderton), rural residential (Woodridge, Sovereign Hill, Redfield Park, Seaview Park Estate, Ocean Farm), basic raw materials, regionally significant wetlands and vegetation and marine and coastal activities.

The defence training land is still in use and Western Power still retain ownership of the Breton Bay site, however, there are currently no plans for a power generation facility.

The structure plan refers to plans for future residential development in the vicinity of Lancelin and Guilderton townsites. These are represented on the structure plan as *townsite expansion investigation area*. Lancelin South is the subject of Amendment 93 and an outline development plan. There are currently no plans for further residential development in the area identified near Guilderton.

Implementation

Implementation is assisted by table 4.4, which identifies issues, strategies, considerations and recommendations to advance the implementation of the structure plan.

Review and auditing

The structure plan has not yet been formally reviewed. As the structure plan was endorsed in 2006 it is not due for a review until 2011. Structure plans generally have a 25-year horizon.

Shire of Gingin comments

Correspondence received from Shire of Gingin on 29 October 2008 requested a review of the GCSP to include proposals which respond to the needs of the community, particularly in the lower sector and address social economic problems associated with rural residential zones establishments (three located along Perth/Lancelin Road).

The Shire was advised in January 2009 that given the structure plan was endorsed in 2006, and a review is recommended every five years, it is considered premature to review the structure plan and that matters raised could be addressed in the Local Planning Strategy.

Shire of Gingin Draft Town Planning Scheme No. 9 and draft local planning strategy

The development of TPS No. 9 and the LPS has been a considerable task due to various contentious issues. The Shire of Gingin has been granted approval to advertise both the TPS and LPS.

The GCSP was developed in consultation with the town planning scheme and local planning strategy. The TPS and LPS will be consistent with the GCSP, however, they will need to be edited to remove reference to the GCSP as both documents will supersede the structure plan.

Conclusion

The structure plan map will remain in place until such time that the Shire of Gingin Local Planning Strategy is adopted. Given the passage of time, the LPS should be generally consistent with the structure plan map and other endorsed plans.

The WLUPS will update or establish a revised WAPC policy position on matters covered in the GCSP background information, that are relevant at a Wheatbelt planning level including:

- An appropriate settlement hierarchy for the Wheatbelt;
- Coastal development and setbacks, for existing and proposed development; and
- Priority infrastructure requirements.

List of acronyms and measurements

ABS	Australian Bureau of Statistics
CSIRO	Commonwealth Scientific and Industrial Research Organisation
ERA	Economic Regulation Authority
DEC	Department of Environment and Conservation
DoP	Department of Planning
DoT	Department of Transport
DoW	Department of Water
IWSS	Integrated Water Supply System
NRM	Natural Resource Management
TAFE	Technical and Further Education
WALGA	Western Australian Local Government Association
WAPC	Western Australian Planning Commission
WRS	Wheatbelt Regional Strategy
WWF	World Wildlife Fund

ha	hectare
GL	gigalitre (one gigalitre = 1 000 000 000 litres)
GWh	gigawatt per hour
km	kilometre
km	kilometre
km^2	square kilometre
kL	kilolitre (one kilolitre = 1 000 litres)
kV	kilovolt
kV/ha	kilovolts per hectare
ML	megalitre (one megalitre= 1 000 000 litres)
MW	megawatt
m	metre
m^2	square metre
mm	millimetre

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Appendix A

State planning framework

The State planning framework comprises a number of State planning policies. A summary of how the state planning policies apply generally to the Wheatbelt and the specific relevance of the policies in the preparation of the regional strategy is summarised in this table.

State Planning Policies

	Title	Specific relevance in the preparation of the regional strategy	Generally apply to the Wheatbelt
1	State Planning Framework Policy (February 2006)	**Environment** • Protect areas and sites with significant historical, architectural, aesthetic, scientific and cultural values from inappropriate land use and development • Adopt risk management approach to avoid or minimise environmental degradation and hazards. **Community** • Accommodate future growth • Provide land for community resources (places of employment, open space, education, health, cultural and community services) **Economy** Support economic development through the provision of land, facilitating decisions and resolving land use conflicts, by: • Providing suitable zoned and serviced land for industry, business and other employment and wealth generating activities. • Protect agricultural land resources from inappropriate uses • Avoiding land use conflicts • Provide sites for tourism accommodation and facilities **Infrastructure** • Set aside land for the construction of future transport routes and essential services • Protect key infrastructure - ports, airports, roads, railways, service corridors • Prevent development in areas which are not well serviced	

Appendix A

	Title	Specific relevance in the preparation of the regional strategy	Generally apply to the Wheatbelt
2	Environment and Natural Resources Policy (June 2003)	**Water Resources** • Protect, wetlands, waterways, estuaries, marine environments, gazetted public drinking water source areas. • Setbacks between developments and foreshores. • Identify floodways and land affected by 1:100yr flood events **Air Quality** • Conflict between sensitive land uses. **Soil and Land Quality** • Capability of the land to accommodate different land uses and development. • Identify existing and potential areas affected by salinity, ASS and other severe degradation problems and facilitate measures for promoting vegetation retention, replanting in groundwater recharge areas and prevention of inappropriate development. **Biodiversity** • Protect areas of high biodiversity and conservation value (in addition to the conservation estate) - identify these in regional strategies. • Measures to minimise adverse direct and indirect impacts. • Mechanisms for protection including planning controls or conservation covenants. • Support the use of management plans. **Agricultural Land and Rangelands** • Protect and enhance area of agricultural significance. • Natural resource capability of rangelands and agricultural lands. • Diversity compatible land use activities in agricultural areas. **Minerals, Petroleum and BRM Resources** • Identify and protect important mineral resources. • Identify and protect Basic Raw Materials.	

	Title	Specific relevance in the preparation of the regional strategy	Generally apply to the Wheatbelt
		Marine Resources and Aquaculture • Identify areas of significance for commercial fishing and aquaculture. • Minimise adverse impacts on areas of significance for commercial fishing. **Landscape** • Identify and safeguard landscapes with high values. • Siting criteria to protect the valued landscapes. **GGE and Energy Efficiency** • Retention of existing veg, reveg in subdivision. • Support alternative energy generation. • Adopt adaptation measures to respond to climate change.	
2.4	Basic Raw Materials (July 2000)	Limited.	SPP2.4 is under review. Basic raw materials includes: • sand (including silica sand); • clay; • hard rock; • limestone (including metallurgical limestone); • gravel; and • other construction and road building materials. Objectives are to identify the location and extent of known BRM resources of State or regional significant with appropriate buffer areas and to protect from incompatible development. Main application is for local planning schemes.

Appendix A

	Title	Specific relevance in the preparation of the regional strategy	Generally apply to the Wheatbelt
2.5	Agricultural and Rural Land Use Planning (March 2002)		SPP2.5 is under review Current specific/applicable policy positions: • Protect agricultural land for non-agricultural uses • Identify agricultural priority areas • Provide a guide for future land use, zoning and subdivision and development within the settlement areas Proposed policy: • Discouraging land use not complementary to agriculture • Prohibiting the unplanned fragmentation of rural land • The rezoning of rural land for rural living purposes and the fragmentation of rural land into smaller landholdings will not be supported, except where it is provided for in a planning strategy endorsed by the WAPC • General presumption against the clearing of land for rural living purposes. • Food processing precincts close to services and freight routes, and with adequate buffers will generally be considered an industrial use and should be zoned accordingly • Tree farming for harvest is considered an intensive agricultural land use and is subject to the appropriate development control provisions in a local planning scheme • Non-harvest tree farming is considered a permanent change of land use and results in a loss of land for agriculture. Therefore, proposals for this type of land use should be considered in this context • Definitions

	Title	Specific relevance in the preparation of the regional strategy	Generally apply to the Wheatbelt
2.6	State Coastal Planning Policy (amended December 2006)		• Distinguishes between coastal foreshore reserves and development setbacks for physical processes • Building height limits (generally a max of 5 storeys) WAPC Position statement (September 2010) on changes to the physical processes (coastal) setbacks rationale, based on a revised seal level rise change of 0.9m (from 0.38m). The impact of this increased figure is increasing the total setback for the general guide from 100m to 150m.
2.7	Public Drinking Water Source Policy (June 2003)	• Regional strategies to identify Public Drinking Water Source Areas • WRC Water Quality Protection not on land use compatibility and public drinking water source areas.	Applies to public drinking water source areas (eg. Mundaring, Canning Dam, Collie River - Map 6 of Directions Paper)
2.9	Water Resources (December 2006)	Existing and future surface and groundwater drinking water catchments and sources to be identified Recommended minimum requirements (for strategies): • Identify water resources • Allocate a priority/hierarchy of significance for the water resource (relative to the regional significance) • Identify appropriate setbacks/buffers	Links to water resources in SPP 2) Includes recommendations for Local scheme/ strategies: • Buffers (subdivision/development) • Water sensitive urban design • Stormwater management
3	Urban Growth and Settlement (March 2006)	Regional strategies should: • Identify land required for future transport routes, infrastructure, community services and facilities. • Transport and other infrastructure with off-site impacts should be separated from residential and other sensitive uses. • Infrastructure and service providers need to be consulted early in the process to ensure that service delivery is co-ordinated with new development.	Sustainable communities • A strong, diversified and sustainable economic base with assured access to jobs and employment; • Sufficient and suitable serviced land in the right locations for housing, employment, commercial, recreational and other purposes, coordinated with the efficient and economic provision of transport, essential infrastructure and human services. Urban growth and settlement • Speculative proposals for new urban subdivision and development in areas not identified in regional and local planning strategies and land release plans will not generally be supported.

Appendix A

	Title	Specific relevance in the preparation of the regional strategy	Generally apply to the Wheatbelt
			Coordination of services and infrastructure • Planning for new growth and settlements should be co-ordinated with the cost-efficient provision of infrastructure and services such as roads, public transport, water supply, sewerage, electricity, gas, telecommunications, drainage, open space, schools, health and recreational facilities. Mange rural-residential growth (generic) Planning for Aboriginal communities
3.4	Natural Hazards and Disasters (April 2006)		• Flood • Storm surge • Coastal erosion • Bush fires • Landslides and other land movements
3.5	Historic Heritage Conservation (May 2007)		• Heritage Council is responsible for identifying, assessing and registering places of State significance • Development control principles (into local planning schemes)
4.1	State Industrial Buffer Policy (May 1997)		Considerations for development applications
4.3	Poultry Farms Policy (December 1998)		Considerations for development applications
5.2	Telecommunications Infrastructure (March 2004)		Guiding principles for the location of telecommunications infrastructure.
5.4	Road and Rail Transport Noise and Freight Considerations in Land Use Planning (September 2009)		• Identifies primary freight roads and rail routes. • Establishes noise criteria • Identifies measures to reduce road and rail transport noise
4.1	State Industrial Buffer (Amended) (Draft) (July 2009)		New industrial areas Regional planning strategies need to identify buffer areas around major existing or proposed industrial areas and infrastructure.
	Metropolitan Freight Network (Draft) (May 2005)		• Protect metropolitan freight network • Affects adjoining shires which are in the Wheatbelt • Achieved through local planning scheme zoning and special control areas.

Operational Policies

	Title	Description/Application
General		
1.1	Subdivision of Land - General Principles (June 2004)	Administration for subdivision
1.3	Strata Titles (June 2009)	For strata title proposals
1.4	Functional Road Classification for Planning (June 1998)	Road classification system for use in planning new road networks
1.5	Bicycle Planning (July 1998)	To improve the safety and convenience of cycling, in conjunction with residential subdivisions
1.7	General Road Planning (June 1998)	Establishes requirements for land contributions
1.8	Canal Estates and Other Artificial Waterway Developments (February 1999)	Recommended requirements for schemes and subdivision.
Rural		
3.4	Subdivision of Rural Land (February 2008)	Under Review (as part of SPP2.5) Current Measures: • Subdivision of rural and agricultural land for rural-residential and rural-smallholdings to be planned through the regional planning strategy • Water connection (for lots <4ha) • Conservation lots of biodiversity and natural heritage • Homestead lots Draft measures (rural living and more intensive agriculture uses in rural areas): • Reticulated water supply generally required for all rural living development • Reliability of alternative water supplies in areas with rainfall > 550mm/pa • Broadacre farming greater than 200ha in size • Conservation lot requires relevant agency to provide advice the new lot has environmental values • Homestead lots only considered in the wheatbelt • Subdivision for carbon sequestration may be considered provided a carbon covenant is in place for >50yrs and the proposed vegetation is native to Western Australia • Guidance for alternative water supply

Appendix A

	Title	Description/Application
Industrial and commercial		
4.1	Industrial Subdivision (July 1988)	Subdivision and development principles/requirements
4.2	Planning for Hazards and Safety (June 1991)	Principles for development, but generally provided for by environmental impact assessment processes
Environment and amenity		
	Visual Landscape Planning in Western Australia Nov 2007	Planning context in regional strategies - • Provide the broad framework • Identify landscapes of regional significance which can be used to underpin planning controls in region and local schemes

Appendix B

Wheatbelt settlements

Wheatbelt settlement hierarchy

Regional centres	Sub-regional centres	Rural town	Rural villages	Settlements	
Northam*	Toodyay*	Bakers Hill	Beacon	Aldersyde	Kulja
Narrogin*	Wagin*	Beverley*	Bencubbin*	Amery	Kulyaling
Merredin*	York*	Bindoon*	Calingiri*	Ardath	Kunjin
Moora*	Lancelin (future)	Brookton*	Cuballing*	Arthur River	Kununoppin
Jurien Bay (future)		Bruce Rock*	Darkan*	Baandee	Kweda
		Cervantes	Dumbleyung*	Babakin	Kwelkan
		Corrigin*	Guilderton	Badgingarra	Kwolyin
		Cunderdin*	Kondinin*	Badjaling	Lake Biddy
		Dandaragan*	Koorda*	Baladjie	Lake Brown
		Dalwallinu	Kulin*	Balkuling	Lake Camm
		Dowerin*	Ledge Point	Ballidu	Lake King
		Gingin*	Marvel Loch	Beejoording	Lake Magenta
		Goomalling*	Mukinbudin*	Belka	Lomos
		Kellerberrin*	New Norcia	Bendering	Longreach
		Lake Grace*	Nungarin*	Benjabbering	Mandiga
		Muchea	Tammin*	Bilbarin	Manmanning
		Narembeen*	Trayning*	Bimbijy	Marvel Loch
		Pingelly*	Westonia*	Bindi Bindi	Mawson
		Quairading*	Wickepin*	Bodallin	Meckering
		Southern Cross*	Williams*	Bolgart	Meenaar
		Wandering*	Wubin	Bonnie Rock	Miling
		Wongan Hills*	Wyalkatchem*	Boodarockin	Mimegarra
		Wundowie		Boolading	Minnivale
				Bowelling	Mogumber
				Budjarra	Mollerin
				Bullaring	Moodiarrup
				Bullfinch	Moonijin
				Bullock Rock	Moorine Rock
				Bungulla	Moorumbine
				Buniche	Moulyinning
				Bunketch	Mount Hardey
				Buntine	Mount Jackson
				Burabadji	Mount Kokeby
				Burakin	Mount Palmer
				Burracoppin	Mouroubra
				Burran Rock	Mungedar
				Doodlakine	Papanyinning
				Dudinin	Piawaning

Appendix B

Regional centres	Sub-regional centres	Rural town	Rural villages	Settlements	
				Duggan	Piesseville
				Dukin	Pindaree
				Dunedin	Pingaring
				Duranillin	Pithara
				Dwarda	Pumphreys Bridge
				Ejanding	Quardanoolagin
				Elabbin	Quindanning
				Emu Hill	Radburys Station
				Erikin	Regans Ford
				Eujinyn	Rossmore
				Gabbin	Seabird
				Garratt	Shackleton
				Gibb Rock	South Kumminin
				Gillingarra	Spring Hill
				Glenvar	Tincurrin
				Grass Valley	Toolibin
				Green Head	Ulva
				Greenhills	Varley
				Grey	Wadderin
				Gwambygine	Walgoolan
				Harrismith	Wannamal
				Highbury	Warrachuppin
				Hildawn	Warralakin
				Hillman	Watheroo
				Hillview	Welbungin
				Hines Hill	West Toodyay
				Holt Rock	Westdale
				Hyden	Wialki
				Jennacubbine	Wogarl
				Jilbadgie	Wundowie
				Jitarning	Wyening
				Jubuk	Yalbarrin
				Kalannie	Yarding
				Karlgarin	Yealering
				Kauring	Yelbeni
				Kirwan	Yellowdine
				Kokardine	Yerecoin
				Kondut	Yilliminning
				Konnongorring	Yorkrakine
				Koojan	Yornaning
				Koolyanobbing	Yoting
				Korbel	Youndegin
				Korrelocking	
				Kukerin	

Wheatbelt Local Government areas, centres and settlements

Sub-region	Local governments	LG Admin centre	Settlements and localities (based on gazetted townsite data)	Population (2006 Census)	Regional function
Coastal Wheatbelt	Dandaragan	*Dandaragan*		416	Rural town
			Cervantes	503	Rural town
			Jurien Bay	1173	Regional centre (Future)
			Padburys Station	n/a	Settlement
			Mungedar	n/a	Settlement
			Nambung	n/a	Settlement
			Chelsea	n/a	Settlement
			Grey	n/a	Settlement
			Green Head	n/a	Settlement
			Mimegarra	86	Settlement
			Pindaree	n/a	Settlement
			Badgingarra	249	Settlement
			Regans Ford	n/a	Settlement
	Gingin	*Gingin*		531	Rural town
			Lancelin	666	Sub-regional Centre (future)
			Ledge Point	156	Rural village
			Guilderton	146	Rural village
			Budjarra	n/a	Settlement
			Seabird	98	Settlement
Avon Arc	Beverley	*Beverley*		848	Rural town
			Mawson	n/a	Settlement
			Mount Kokeby	n/a	Settlement
			Westdale	n/a	Settlement
	Brookton	*Brookton*		576	Rural town
			Aldersyde		Settlement
			Nalya		Settlement
			Kweda		Settlement
			Kulyaling		Settlement
	Chittering	*Bindoon*		740	Rural town
			Muchea	493	Rural town
			Wannamal	360	Settlement
			Chittering	n/a	Settlement

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Sub-region	Local governments	LG Admin centre	Settlements and localities (based on gazetted townsite data)	Population (2006 Census)	Regional function
Avon Arc (cont.)	Northam	*Northam*		6009	Regional centre
			Bakers Hill	637	Rural town
			Wundowie	944	Rural town
			Grass Valley	n/a	Settlement
			Spring Hill	n/a	Settlement
			Meenaar	n/a	Settlement
			Clackline	n/a	Settlement
	Toodyay	*Toodyay*		1069	Sub-regional centre
			Beejoording	n/a	Settlement
			West Toodyay	n/a	Settlement
	York	*York*		2088	Sub-regional centre
			Greenhills	n/a	Settlement
			Cold Harbour	n/a	Settlement
			Mount Hardey	n/a	Settlement
			Gwambygine	n/a	Settlement
			Kauring	n/a	Settlement
Outer Arc	Cunderdin	*Cunderdin*		686	Rural town
			Bullock Rock	n/a	Settlement
			Meckering	116	Settlement
			Youndegin	n/a	Settlement
	Dowerin	*Dowerin*		352	Rural town
			Manmanning	n/a	Settlement
			Moonijin	n/a	Settlement
			Minnivale	n/a	Settlement
			Amery	n/a	Settlement
			Ejanding	n/a	Settlement
	Goomalling	*Goomalling*		499	Rural town
			Konnongorring	n/a	Settlement
			Burabadji	n/a	Settlement
			Rossmore	n/a	Settlement
			Jennacubbine	n/a	Settlement
	Moora	*Moora*		1605	Sub-regional centre
			Longreach	n/a	Settlement
			Watheroo	n/a	Settlement
			Nisden	n/a	Settlement
			Miling	n/a	Settlement

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Wheatbelt
Regional Profile

Sub-region	Local governments	LG Admin centre	Settlements and localities (based on gazetted townsite data)	Population (2006 Census)	Regional function
Outer Arc			Bindi Bindi	n/a	Settlement
			Coomberdale	n/a	Settlement
			Dalaroo	n/a	Settlement
			Koojan	n/a	Settlement
	Quairading	*Quairading*		596	Rural town
			Yoting	n/a	Settlement
			Balkuling	n/a	Settlement
			Dangin	n/a	Settlement
			Doodenanning	n/a	Settlement
			Pantapin	n/a	Settlement
			Badjaling	n/a	Settlement
	Victoria Plains	*Calingiri*			Rural village
			Bolgart	n/a	Settlement
			Gillingarra	n/a	Settlement
			Mogumber	n/a	Settlement
			New Norcia	n/a	Rural village
			Piawaning	n/a	Settlement
			Wyening	n/a	Settlement
			Yerecoin	n/a	Settlement
	Wongan Ballidu	*Wongan Hills*		745	Rural town
			Ballidu	n/a	Settlement
			Burakin	n/a	Settlement
			Cadoux	n/a	Settlement
			Glenvar	n/a	Settlement
			Kirwan	n/a	Settlement
			Kokardine	n/a	Settlement
			Kondut	n/a	Settlement
			Northwich	n/a	Settlement
South-western	Cuballing	*Cuballing*		335	Rural village
			Papanyinning	n/a	Settlement
			Yornaning	n/a	Settlement
	Dumbleyung	*Dumbleyung*		223	Rural village
			Kukerin	n/a	Settlement
			Moulyinning	n/a	Settlement
			Duggan	n/a	Settlement
			Nippering	n/a	Settlement

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Sub-region	Local governments	LG Admin centre	Settlements and localities (based on gazetted townsite data)	Population (2006 Census)	Regional function
South-western (cont.)	Narrogin (T)/(S)	*Narrogin*		4238	Regional centre
			Yilliminning	n/a	Settlement
			Nomans Lake	n/a	Settlement
			Highbury	n/a	Settlement
	Pingelly	*Pingelly*		814	Rural town
			Moorumbine	n/a	Settlement
			Dattening	n/a	Settlement
	Wagin	*Wagin*		1427	Sub-regional centre
			Piesseville	n/a	Settlement
	Wandering	*Wandering*		355	Rural town
			Pumphreys Bridge	n/a	Settlement
			Dwarda	n/a	Settlement
	Wickepin	*Wickepin*		244	Rural village
			Harrismith	n/a	Settlement
			Toolibin	n/a	Settlement
			Tincurrin	n/a	Settlement
			Yealering	n/a	Settlement
	Williams	*Williams*		338	Rural village
			Congelin	n/a	Settlement
			Quindanning	n/a	Settlement
	West Arthur	*Darkan*		203	Rural village
			Arthur River	n/a	Settlement
			Boolading	n/a	Settlement
			Bowelling	n/a	Settlement
			Cordering	n/a	Settlement
			Duranillin	n/a	Settlement
			Hillman	n/a	Settlement
			Moodiarrup	n/a	Settlement
South-eastern subregion	Corrigin	*Corrigin*		688	Rural town
			Bilbarin	n/a	Settlement
			Bullaring	n/a	Settlement
			Kunjin	n/a	Settlement
			Jubuk	n/a	Settlement
			Lomos	n/a	Settlement
	Kondinin	*Kondinin*		311	Rural village
			Hyden	281	Settlement
			Karlgarin	n/a	Settlement
			Bendering	n/a	Settlement

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Wheatbelt
Regional Profile

Sub-region	Local governments	LG Admin centre	Settlements and localities (based on gazetted townsite data)	Population (2006 Census)	Regional function
South-eastern subregion	Kulin	*Kulin*		353	Rural village
			Dudinin	n/a	Settlement
			Holt Rock	n/a	Settlement
			Pingaring	n/a	Settlement
			Jitarning	n/a	Settlement
	Lake Grace	*Lake Grace*		507	Rural town
			Lake King	n/a	Settlement
			Newdegate	n/a	Settlement
			Lake Magenta	n/a	Settlement
			Varley	n/a	Settlement
			Lake Camm	n/a	Settlement
			Lake Biddy	n/a	Settlement
			Buniche	n/a	Settlement
			Neendaling	n/a	Settlement
	Narembeen	*Narembeen*		469	Rural town
			Wadderin	n/a	Settlement
			Gibb Rock	n/a	Settlement
			Wogarl	n/a	Settlement
			Emu Hill	n/a	Settlement
			South Kumminin	n/a	Settlement
North-eastern subregion	Dalwallinu	*Dalwallinu*		593	Rural town
			Wubin	146	Rural village
			Buntine	n/a	Settlement
			Dunedin	n/a	Settlement
			Hildawn	n/a	Settlement
			Kalannie	n/a	Settlement
			Pithara	n/a	Settlement
			Hillview	n/a	Settlement
			Nugadong	n/a	Settlement
			Bunketch	n/a	Settlement
	Koorda	*Koorda*		260	Rural village
			Mollerin	n/a	Settlement
			Kulja	n/a	Settlement
			Narkal	n/a	Settlement
			Dukin	n/a	Settlement
					Settlement

Appendix B

Sub-region	Local governments	LG Admin centre	Settlements and localities (based on gazetted townsite data)	Population (2006 Census)	Regional function
North-eastern subregion (cont.)	Mount Marshall	*Bencubbin*		160	Rural village
			Beacon	184	Rural village
			Bimbijy	n/a	Settlement
			Mouroubra	n/a	Settlement
			Cleary	n/a	Settlement
			Wialki	n/a	Settlement
			Gabbin	n/a	Settlement
			Mandiga	n/a	Settlement
			Welbungin	n/a	Settlement
	Mukinbudin	*Mukinbudin*		281	Rural village
			Bonnie Rock	n/a	Settlement
			Lake Brown	n/a	Settlement
	Nungarin	*Nungarin*		142	Rural village
			Elabbin	n/a	Settlement
			Chandler	n/a	Settlement
			Kwelkan	n/a	Settlement
			Burran Rock	n/a	Settlement
	Trayning	*Trayning*		122	Rural village
			Kununoppin	n/a	Settlement
			Yelbeni	n/a	Settlement
	Wyalkatchem	*Wyalkatchem*		344	Rural village
			Benjabbering	n/a	Settlement
			Cowcowing	n/a	Settlement
			Korrelocking	n/a	Settlement
			Nalkain	n/a	Settlement
			Nembudding	n/a	Settlement
			Yorkrakine	n/a	Settlement
Great-eastern subregion	Bruce Rock	*Bruce Rock*		513	Rural Town
			Belka	n/a	Settlement
			Shackleton	n/a	Settlement
			Yalbarrin	n/a	Settlement
			Ardath	n/a	Settlement
			Babakin	n/a	Settlement
			Eujinyn	n/a	Settlement
			Yarding	n/a	Settlement
			Kwolyin	n/a	Settlement
			Erikin	n/a	Settlement

Appendix B

Wheatbelt
Regional Profile

Sub-region	Local governments	LG Admin centre	Settlements and localities (based on gazetted townsite data)	Population (2006 Census)	Regional function
Great-eastern subregion	Kellerberrin	*Kellerberrin*		866	Rural town
			Doodlakine	n/a	Settlement
			Baandee	n/a	Settlement
	Merredin	*Merredin*		2550	Regional centre
			Burracoppin	n/a	
			Collgar	n/a	Settlement
			Hines Hill	n/a	Settlement
			Korbel	n/a	Settlement
			Muntadgin	n/a	Settlement
			Nangeenan	n/a	Settlement
			Nokaning	n/a	Settlement
			Nukarni	n/a	Settlement
			Ulva	n/a	Settlement
	Tammin	*Tammin*		168	Rural village
			Bungulla	n/a	Settlement
	Westonia	*Westonia*		213	Rural village
			Boodarockin	n/a	Settlement
			Carrabin	n/a	Settlement
			Walgoolan	n/a	Settlement
			Warrachuppin	n/a	Settlement
			Warralakin	n/a	Settlement
	Yilgarn	*Southern Cross*		710	Rural town
			Baladjie	n/a	Settlement
			Bodallin	n/a	Settlement
			Bullfinch	n/a	Settlement
			Colreavy	n/a	Settlement
			Corinthia	n/a	Settlement
			Garratt	n/a	Settlement
			Jilbadgie	n/a	Settlement
			Koolyanobbing	n/a	Settlement
			Marvel Loch	98	Rural village
			Moorine Rock	n/a	Settlement
			Mount Jackson	n/a	Settlement
			Mount Palmer	n/a	Settlement
			Noongar	n/a	Settlement
			Quardanoolagin	n/a	Settlement
			Yellowdine	n/a	Settlement

* Local government administration centre

Appendix C

Biodiversity statistics for the Wheatbelt

The biodiversity statistics were provided by the Perth Biodiversity Project (2010) and are based on native vegetation extent data sourced from DAFWA (2009). They have been included in the Wheatbelt Land Use Planning Strategy to assist local governments with the preparation of local biodiversity strategies and local planning strategies.

The table below contains statistics on the proportion of the original extent of native vegetation remaining and protected in each local government area in the Wheatbelt planning region.

Local government area*	Proportion of original native vegetation extent remaining (%) [1]	Proportion of original native vegetation extent protected in DEC reserves (%) [2]	Local natural areas (ha) [3]
Shire of Beverley	12.89	9.22	24081.22
Shire of Brookton	8.94	4.11	18245.61
Shire of Bruce Rock	3.51	0.62	20043.82
Shire of Chittering	12.29	0.89	44244.10
Shire of Corrigin	2.47	0.11	22077.72
Shire of Cuballing	8.64	3.63	17268.39
Shire of Cunderdin	2.32	0.01	12159.98
Shire of Dalwallinu	10.94	0.41	197826.17
Shire of Dandaragan	12.89	5.19	177550.05
Shire of Dowerin	4.22	0.54	12070.61
Shire of Dumbleyung	7.22	1.66	25561.85
Shire of Gingin	16.02	6.79	102289.68
Shire of Goomalling	5.41	0.07	29252.17
Shire of Kellerberrin	9.34	1.31	15357.68
Shire of Kondinin	16.71	1.03	365958.19
Shire of Koorda	8.72	0.40	46281.45
Shire of Kulin	10.73	3.93	43714.62
Shire of Lake Grace	8.35	3.53	150415.86
Shire of Merredin	11.32	1.82	35161.50
Shire of Moora	6.21	1.38	46312.22
Shire of Mount Marshall	23.83	11.34	330094.95
Shire of Mukinbudin	15.26	2.56	85967.65
Shire of Narembeen	4.72	0.45	30380.17
Shire of Narrogin	5.63	1.70	23137.67
Shire of Northam	18.00	4.09	26210.71
Shire of Nungarin	11.26	2.68	16104.98
Shire of Pingelly	6.70	2.24	14823.72

Local government area*	Proportion of original native vegetation extent remaining (%) [1]	Proportion of original native vegetation extent protected in DEC reserves (%) [2]	Local natural areas (ha) [3]
Shire of Quairading	2.90	0.24	17298.87
Shire of Tammin	2.42	0.37	7824.24
Shire of Toodyay	23.98	10.94	46888.01
Shire of Trayning	7.01	0.30	19410.07
Shire of Victoria Plains	5.61	0.13	39606.26
Shire of Wagin	7.67	0.66	26379.14
Shire of Wandering	18.28	13.94	28068.92
Shire of West Arthur	15.95	5.28	58831.35
Shire of Westonia	13.17	2.94	91068.42
Shire of Wickepin	3.23	0.46	21013.18
Shire of Wongan-Ballidu	3.18	0.34	19728.38
Shire of Woodanilling	9.40	0.41	20792.19
Shire of Wyalkatchem	2.45	0.24	11964.90
Shire of Yilgarn	13.10	3.59	1799358.91
Shire of York	17.64	11.62	25976.37

[1] Orange coloured cells identify local government areas with less than 30% of the original native vegetation extent remaining, and red coloured cells identify local government areas with less than 10% of the original native vegetation extent remaining. The 30% and 10% thresholds are defined in national and State policies on native vegetation protection and biodiversity conservation (Environment Australia 2001; EPA 2000, 2008).

[2] Yellow coloured cells identify local government areas with less than 1% of the original native vegetation extent protected in DEC reserves.

[3] Green coloured cells identify local government areas with more than 100,000 ha of local natural areas. Local natural areas have been defined by the Perth Biodiversity Project as 'unprotected' natural areas that exist outside of DEC reserves, which are the focus of local biodiversity strategies prepared by local governments (Del Marco *et al.* 2004).

[#] Blue coloured cells identify local government areas under greatest pressure for land use change and development, and therefore the highest priority for preparation of local biodiversity strategies. The Shire of Chittering has a Council endorsed local biodiversity strategy which it is taking into consideration through the review of its local planning strategy.

Appendix C

The table below contains statistics on the area and proportion of the original extent of Beard vegetation associations remaining and protected in each IBRA subregion in the Wheatbelt planning region.

Avon Wheatbelt P1

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
7	344.62	5.12	1.48	0.77	4.35
8	2476511.55	36511.09	1.47	3182.32	33328.77
36	2106491.72	67160.03	3.19	9242.33	57917.70
37	317.05	112.96	35.63	0.00	112.96
48	14.13	1.39	9.80	0.00	1.39
125	3859951.20	63138.33	1.64	1399.85	61421.68
128	850733.19	16944.54	1.99	1899.86	15044.69
131	208773.86	4695.44	2.25	177.53	4517.90
141	2504407.62	74999.90	2.99	1135.99	73863.91
142	-	61810.14	-	1919.34	59890.80
145	8048.66	494.94	6.15	0.00	494.94
147	8418.61	3499.79	41.57	2504.88	994.91
221	10546.00	5271.34	49.98	386.62	4884.71
314	1168.93	1168.93	100.00	0.00	1168.93
325	24356.61	7664.89	31.47	0.00	7664.89
352	3802654.94	72874.62	1.92	5502.16	63359.19
356	12982.30	2112.11	16.27	100.78	2011.33
357	43.26	21.63	50.00	0.00	21.63
380	92646.10	3522.65	3.80	262.68	3259.97
392	7459.24	311.08	4.17	0.00	311.08
412	2457.81	209.03	8.50	0.00	209.03
413	374.97	86.62	23.10	0.00	86.62
420	224719.37	17129.67	7.62	1644.97	15293.01
435	1278957.02	28756.43	2.25	3782.08	23631.34
437	872758.10	144728.58	16.58	2577.77	141566.28
511	479057.56	11703.38	2.44	2917.82	8785.56
519	24061.74	4906.65	20.39	0.00	4906.65
536	22338.67	3945.50	17.66	1290.91	2654.59
538	710.67	51.67	7.27	0.00	51.67
551	4640629.18	41324.13	0.89	3119.94	38204.20
552	22708.83	11186.18	49.26	0.00	11186.18
631	1290328.50	44347.01	3.44	1395.69	36641.86

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
676	1491764.51	30120.60	2.02	391.05	29729.55
694	1190931.76	5257.01	0.44	765.44	4491.57
696	2698.91	914.18	33.87	90.22	823.96
698	11188.64	2073.38	18.53	68.85	2004.52
936	2994.98	131.81	4.40	0.00	131.81
945	70519.59	4489.25	6.37	1421.68	3067.57
946	17475.36	1283.30	7.34	56.73	1226.57
949	109.30	15.42	14.11	0.00	15.42
950	137.96	26.88	19.48	23.07	3.81
951	163229.48	11120.16	6.81	1919.65	9200.51
954	37154.23	1554.48	4.18	328.60	1225.88
955	932867.37	8053.12	0.86	753.89	7299.23
956	127684.31	3380.41	2.65	1149.15	2231.26
959	9701.60	2571.17	26.50	791.41	1779.77
960	26106.69	1111.48	4.26	0.00	1111.48
961	3351.29	330.32	9.86	73.64	256.67
988	671797.42	19000.16	2.83	3257.41	15322.45
1023	4385795.33	26363.26	0.60	2085.33	24277.88
1024	5363591.50	72889.53	1.36	3958.37	68931.17
1025	3470.23	1072.83	30.92	0.00	1072.83
1041	4468.41	757.05	16.94	241.20	515.84
1048	33347.29	4848.76	14.54	29.73	4819.03
1049	7508265.01	36351.73	0.48	2986.60	33365.13
1053	85320.52	2425.35	2.84	360.98	2064.37
1055	760663.97	14911.64	1.96	1078.51	13833.13
1056	42125.59	4039.02	9.59	993.94	3045.07
1057	726378.88	14380.01	1.98	2799.43	11580.58
1058	18718.76	264.31	1.41	0.00	264.31
1059	2259.69	10.01	0.44	0.00	10.01
1061	341772.89	18475.85	5.41	5335.43	13140.42
1062	135063.00	9234.86	6.84	1683.55	7551.31
1063	962.07	404.04	42.00	1.06	402.98

Appendix C

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
1065	1725.05	447.99	25.97	390.52	57.47
1067	12057.08	4141.68	34.35	1.70	4139.99
1068	74912.53	33591.17	44.84	2603.58	30987.59
1080	701.16	75.55	10.77	0.00	75.55
1081	15142.28	2673.99	17.66	423.02	2250.97
1143	196235.74	4199.33	2.14	111.55	4087.78
1147	42251.85	691.72	1.64	53.85	637.87
1148	16.96	16.96	100.00	0.00	16.96
1154	78041.89	3632.47	4.65	261.42	3371.05
1198	20141.38	8323.88	41.33	0.00	4143.57
1271	836.89	495.26	59.18	0.00	495.26
1413	8745552.35	140768.94	1.61	10802.10	129917.04
2048	1249.85	93.60	7.49	0.00	93.60
2081	37211.50	2346.06	6.30	0.00	2346.06
3041	3029.17	254.12	8.39	20.28	233.85

Avon Wheatbelt 2

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
3	5507.23	875.96	15.91	0.00	875.96
4	216834.48	1974.70	0.91	86.92	1881.89
5	114440.81	9526.11	8.32	6224.31	3301.80
7	719586.85	17211.84	2.39	155.54	17056.30
8	5396.81	398.49	7.38	0.00	398.49
13	238.69	67.19	28.15	0.00	67.19
25	53509.57	2106.58	3.94	30.91	2075.67
31	100.37	8.71	8.68	0.00	8.71
37	25073.64	962.80	3.84	176.38	786.42
47	3855.92	1715.68	44.49	764.61	951.07
48	16448.49	1495.44	9.09	221.58	1273.86
49	195.96	103.58	52.86	0.00	103.58
125	301924.88	2658.77	0.88	1564.61	1094.17
126	49.72	7.48	15.05	0.00	7.48
128	78076.32	2928.19	3.75	329.00	2599.19
131	33.22	0.90	2.72	0.00	0.90
142	1344664.17	17912.69	1.33	334.85	17577.85
352	5739380.20	37710.26	0.66	721.34	36746.16
392	324.91	28.61	8.80	0.00	28.61
511	531.04	67.08	12.63	0.00	67.08
516	503.30	42.42	8.43	0.00	42.42
551	66514.74	1604.92	2.41	20.06	1584.86
631	23626.01	1801.02	7.62	0.00	1801.02
676	391.87	38.20	9.75	0.00	38.20
694	1132703.42	6947.45	0.61	806.51	6140.94
936	426.50	53.43	12.53	0.00	53.43
938	97.81	20.65	21.11	0.00	20.65
946	411984.46	6864.12	1.67	687.14	6176.98
947	339902.78	12746.23	3.75	5327.58	7397.52
948	2879.83	442.56	15.37	6.64	435.93
949	44106.23	1296.88	2.94	56.76	1240.12
950	358.56	260.03	72.52	0.00	260.03
951	851.28	19.85	2.33	12.25	7.60
952	175797.85	6102.04	3.47	3662.70	2439.33
953	9440.96	747.81	7.92	238.69	509.12
954	609.42	60.10	9.86	0.00	60.10

Appendix C

Avon Wheatbelt 2 (cont.)

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
955	214071.40	4820.86	2.25	341.46	4479.39
956	2.09	0.00	0.22	0.00	0.00
959	10.40	1.00	9.58	0.00	1.00
962	62.30	5.48	8.80	0.00	5.48
967	1398200.07	31237.93	2.23	384.10	30853.83
968	1496.76	396.97	26.52	115.87	281.10
988	108366.03	8938.00	8.25	322.87	8615.13
1004	8103.98	2560.96	31.60	7.24	2553.72
1022	455.87	191.08	41.92	0.00	191.08
1023	-	141953.49	-	13792.10	128144.66
1024	339564.73	7316.27	2.15	551.47	6764.80
1025	366.93	30.27	8.25	0.00	30.27
1031	410.65	98.32	23.94	0.00	98.32
1036	274.06	51.30	18.72	3.97	47.32
1040	96.11	8.45	8.79	0.00	8.45
1041	5087.81	798.29	15.69	77.26	721.03
1042	268.78	54.36	20.23	0.00	54.36
1044	815.22	21.57	2.65	0.00	21.57
1046	861.18	83.65	9.71	0.00	83.65
1048	8065.05	728.50	9.03	0.00	728.50
1049	2296814.34	20571.69	0.90	260.04	20308.20
1053	12596.39	741.12	5.88	492.37	248.75
1073	100424.94	5951.89	5.93	2691.55	3260.34
1074	9243.36	2588.11	28.00	1435.75	1152.36
1075	45948.18	1299.55	2.83	348.64	950.91
1080	10791.66	602.91	5.59	0.00	602.91
1083	20744.36	3709.74	17.88	644.67	3065.06
1091	715.23	292.91	40.95	1.23	291.68
1092	307802.98	8189.08	2.66	172.76	8016.32
1093	13688.79	1586.42	11.59	433.47	1152.95
1094	27360.83	597.16	2.18	6.68	590.47
1147	214699.77	3379.97	1.57	94.49	3285.48
1149	404.30	52.17	12.90	0.00	52.17
1200	301.26	83.89	27.85	0.00	83.89
2047	1461.80	920.29	62.96	456.18	464.11
2048	4612.78	423.99	9.19	12.45	411.54
3041	16078.30	1584.48	9.85	91.76	1492.73

Dandaragan Plateau

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
3	1218.51	363.68	29.85	0.00	363.68
4	13938.54	1141.67	8.19	160.45	936.59
7	56.12	12.28	21.88	0.00	12.28
31	2527.83	742.63	29.38	179.26	563.37
37	1598.49	704.37	44.06	1.41	702.96
125	581.49	124.51	21.41	0.00	124.51
142	190.78	24.23	12.70	0.00	24.23
352	2882.12	362.38	12.57	0.00	362.38
694	38.09	18.20	47.77	11.87	6.33
949	101973.08	16131.57	15.82	1756.55	14375.02
952	116483.98	4269.71	3.67	0.00	4269.71
965	178.17	73.64	41.33	0.00	73.64
987	45.82	12.01	26.21	0.00	12.01
988	1371.27	892.38	65.08	0.00	892.38
999	306398.74	9653.04	3.15	99.83	9553.21
1008	129.99	16.00	12.31	0.00	16.00
1009	1.60	0.34	21.10	0.00	0.34
1014	207.55	22.67	10.92	0.00	22.67
1015	47590.98	6193.39	13.01	936.48	5256.91
1017	15778.66	2365.75	14.99	2.46	2363.29
1018	112.99	24.97	22.10	0.00	24.97
1019	1492.69	373.84	25.04	0.00	373.84
1020	10519.60	1548.72	14.72	16.57	1118.93
1023	9.79	1.06	10.87	0.00	1.06
1027	78493.61	23151.13	29.49	6789.00	16362.13
1030	82248.00	6513.33	7.92	264.68	6248.65
1031	22978.75	4905.91	21.35	766.17	4139.74
1035	3410.18	358.98	10.53	0.00	358.98
1036	170965.71	31436.75	18.39	15600.65	15836.10
1038	1714.16	382.14	22.29	0.00	382.14
1039	1789.72	1220.10	68.17	866.54	353.56
1040	2679.54	743.52	27.75	12.64	730.87

Appendix C

Fitzgerald

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
3	113.76	28.29	24.87	0.00	28.29
8	433.69	37.82	8.72	0.00	37.82
31	213.72	201.62	94.34	201.41	0.21
47	2337145.46	196152.22	8.39	122433.57	73718.66
48	18737.85	2160.40	11.53	141.71	2018.69
51	1153.60	528.32	45.80	120.17	408.14
125	16709.12	1053.05	6.30	731.91	321.14
126	15802.36	2431.51	15.39	774.43	1657.09
128	1997.74	438.08	21.93	189.85	248.23
129	17678.26	2195.70	12.42	439.78	1755.92
142	2684.53	351.70	13.10	0.00	351.70
352	91362.51	6587.31	7.21	10.78	6576.53
511	34.95	34.95	100.00	34.95	0.00
516	1095975.41	182814.78	16.68	82097.87	100716.90
519	275897.49	35527.09	12.88	1653.44	33873.65
552	3288.06	3196.69	97.22	0.00	3196.69
676	426.79	77.12	18.07	10.14	66.98
934	24987.76	3843.99	15.38	987.03	2856.96
936	696.64	255.58	36.69	0.00	255.58
938	162624.69	13687.86	8.42	1209.38	12478.49
965	20401.55	3242.83	15.90	1551.17	1691.66
967	39402.60	2754.31	6.99	337.87	2416.44
968	54563.17	17567.99	32.20	17354.59	213.40
987	1788.73	801.35	44.80	745.15	56.21
992	678.69	678.69	100.00	678.69	0.00
1075	1615.32	149.99	9.29	0.00	149.99
2048	1182.24	1099.69	93.02	0.00	1099.69

Leseur Sandplain

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
4	10672.23	2046.19	19.17	362.11	1684.07
7	4135.13	1504.75	36.39	128.80	1375.95
31	28.47	12.19	42.83	12.03	0.16
49	165657.26	13558.90	8.18	3192.66	10366.24
125	17238.71	5714.34	33.15	5477.98	236.36
126	1776.61	432.33	24.33	292.02	140.31
129	5591.79	1818.57	32.52	1244.99	573.58
142	26249.10	872.79	3.33	19.67	853.12
352	25599.62	1994.99	7.79	435.75	1559.24
377	252414.18	62709.74	24.84	47460.82	15248.92
392	6534.95	1327.12	20.31	275.14	1051.98
420	308.35	0.74	0.24	0.00	0.74
551	16853.45	1513.23	8.98	314.34	1198.88
631	9055.67	1872.12	20.67	1795.42	76.70
694	689114.14	55096.71	8.00	30190.28	24868.21
936	2801.86	165.96	5.92	27.09	138.86
946	5958.39	800.43	13.43	0.00	800.43
988	1848.68	880.83	47.65	795.58	85.25
999	1094.66	416.01	38.00	21.33	394.68
1026	34275.92	10648.24	31.07	5560.69	5087.55
1029	5413.88	2127.75	39.30	1498.16	629.59
1030	3847.75	2780.94	72.27	2086.63	694.31
1031	482578.13	83533.41	17.31	35882.64	47650.77
1032	16633.17	6594.36	39.65	5127.45	1466.91
1034	1762.67	1104.99	62.69	648.13	456.86
1035	1582.40	133.95	8.47	9.78	124.17
1036	555.09	190.99	34.41	163.89	27.11
1039	269.40	143.09	53.11	115.48	27.61
1044	634.77	206.52	32.53	13.33	193.18
1149	14216.41	814.27	5.73	189.72	624.55

Appendix C

Northern Jarrah Forest

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
3	-	733546.09	-	611248.00	116574.16
4	-	201421.06	-	57005.04	139500.57
5	228313.63	18288.07	8.01	14641.79	3646.29
7	154893.12	6653.95	4.30	234.63	6419.32
13	153.40	150.49	98.11	150.49	0.00
25	40.96	9.10	22.22	0.00	9.10
37	5269.83	704.31	13.37	245.23	459.08
48	151.08	26.05	17.24	11.07	14.98
49	5049.80	1241.69	24.59	1093.93	147.76
51	63.00	63.00	100.00	63.00	0.00
128	33276.02	4110.71	12.35	3009.03	1101.68
142	37.29	5.81	15.57	0.00	5.81
352	442161.45	6907.12	1.56	1639.18	5265.18
694	152.38	7.51	4.93	0.00	7.51
936	306.38	119.91	39.14	0.00	119.91
946	22856.62	4100.59	17.94	3739.20	361.39
947	15.79	15.22	96.36	15.22	0.00
949	8522.42	440.92	5.17	31.91	409.01
952	1069.42	147.29	13.77	98.22	49.08
965	226.56	8.74	3.86	0.00	8.74
968	575666.62	53375.13	9.27	31998.66	21376.47
973	241.90	100.64	41.60	74.07	26.57
987	99.84	23.27	23.31	0.00	23.27
992	25183.63	3279.47	13.02	235.53	3043.94
1002	360.84	357.67	99.12	357.67	0.00
1003	90195.04	7953.91	8.82	3860.20	4093.71
1004	1657.19	1621.76	97.86	1614.15	7.62
1005	512.07	138.77	27.10	0.00	138.77
1006	179501.99	22011.61	12.26	9970.27	12041.33
1009	18.21	0.41	2.27	0.00	0.41
1017	1203.24	92.53	7.69	8.97	83.55
1019	57.60	13.31	23.10	0.00	13.31
1020	628.65	115.59	18.39	0.00	85.88
1023	117634.81	3284.19	2.79	1478.95	1805.24
1027	549.33	98.05	17.85	0.00	98.05
1030	471.97	42.70	9.05	13.64	29.06
1036	378.83	84.55	22.32	5.76	78.79

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
1043	5091.94	1544.34	30.33	0.00	1544.34
1073	1540.47	226.09	14.68	51.28	174.81
1114	49140.55	7794.25	15.86	6690.82	1072.47
3003	332027.32	39512.93	11.90	14406.13	19948.61

Appendix C

Perth

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
3	200946.23	2853.82	1.42	223.13	2177.90
4	91704.54	2020.65	2.20	152.37	1415.03
6	1520551.26	14013.50	0.92	2690.06	7057.34
37	126891.72	4926.64	3.88	2024.38	2580.12
48	9970.82	2661.96	26.70	721.25	1940.71
51	3675.62	779.69	21.21	0.00	32.05
125	112773.21	2450.16	2.17	1409.18	696.56
126	23930.02	769.89	3.22	87.59	314.38
129	72413.11	9425.77	13.02	4983.35	4362.24
676	2508.84	367.34	14.64	15.43	351.90
949	1475191.93	105187.66	7.13	36700.08	39476.67
965	5177.60	1462.36	28.24	962.19	149.40
968	1769527.39	9795.65	0.55	1339.66	7383.57
973	2510.03	564.16	22.48	179.42	384.74
998	1067725.59	19366.38	1.81	5007.91	8104.58
999	1524.28	165.93	10.89	0.00	165.93
1007	421376.97	21340.30	5.06	1173.37	16785.87
1008	8858.05	1186.76	13.40	0.09	1186.67
1009	199918.96	2977.81	1.49	64.44	2617.71
1010	1209.26	94.74	7.83	0.00	94.74
1011	2531.29	765.24	30.23	6.52	197.83
1012	507.62	125.09	24.64	0.00	125.09
1013	455.15	61.81	13.58	0.00	61.81
1014	81675.00	22904.49	28.04	11556.34	11348.14
1015	3683.50	404.17	10.97	43.56	360.61
1016	1496.54	417.61	27.90	0.00	417.61
1017	418.24	186.02	44.48	0.00	186.02
1018	97569.84	2585.88	2.65	35.79	1581.65
1020	65.47	4.20	6.42	0.00	4.20
1026	175246.95	54820.61	31.28	29748.94	25071.66
1027	265.67	170.45	64.16	85.29	85.16
1028	702.69	317.35	45.16	122.57	194.77
1029	136644.31	48900.67	35.79	18501.96	30398.70
1030	228381.09	79637.59	34.87	11027.63	68609.95
1031	4739.24	444.21	9.37	4.86	439.35
1035	23.71	10.50	44.30	0.00	10.50
1136	96210.95	3823.94	3.97	132.76	3691.18
1181	27715.49	3709.80	13.39	1502.80	2207.00

Southern Jarrah Forest

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
3		919756.78		696277.69	220553.98
4	5306438.94	92142.08	1.74	5337.15	86804.93
31	7.62	7.62	100.00	7.62	0.00
37	7185.96	1166.12	16.23	1071.00	95.12
47	5923.25	861.75	14.55	199.04	662.71
48	43751.36	4697.12	10.74	106.06	4591.06
49	173.96	138.88	79.83	138.86	0.02
51	139200.16	8047.27	5.78	2327.93	5719.34
125	3507.96	293.53	8.37	0.00	293.53
126	99497.52	2751.67	2.77	1628.10	1123.57
128	12843.98	2810.01	21.88	2636.65	173.37
129	856.68	163.48	19.08	148.97	14.51
938	2906.07	428.49	14.74	0.00	428.49
946	431.05	109.10	25.31	0.00	109.10
949	243.99	120.90	49.55	0.00	120.90
965	450.93	450.93	100.00	450.93	0.00
967	205222.31	7895.99	3.85	298.59	7597.40
968	550134.99	17635.20	3.21	3233.00	14402.20
973	8819.01	1471.37	16.68	0.00	1471.37
987	5105.37	544.12	10.66	0.00	544.12
999	34576.29	3142.23	9.09	1737.07	1343.42
1002	25014.29	12497.37	49.96	12455.06	42.31
1003	2053.97	1055.26	51.38	602.29	452.97
1017	34621.16	9059.99	26.17	8017.12	1042.87
1023	630.31	40.40	6.41	0.00	40.40
1034	59.72	37.93	63.53	0.00	37.93
1051	842.76	5.47	0.65	0.00	5.47
1073	11795.61	802.35	6.80	29.61	772.74
1114	39975.34	4378.53	10.95	2417.28	1909.89

Appendix C

Tallering

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
18	404836.98	101209.25	25.00	0.00	81588.17
19	26829.34	8943.11	33.33	0.00	8943.11
36	748.96	337.35	45.04	86.25	251.10
39	9567.31	9567.31	100.00	0.00	4576.30
41	286.34	286.34	100.00	0.00	0.00
125	854362.05	102594.41	12.01	173.12	100180.65
128	26924.15	6731.04	25.00	0.00	6731.04
141	105706.04	21141.21	20.00	26.56	21114.65
142	46359.10	9268.86	19.99	0.00	9268.86
169	130.37	43.46	33.33	0.42	43.04
202	135185.99	45062.00	33.33	0.00	27008.86
221	56739.32	18913.11	33.33	0.00	18913.11
256	127262.07	63631.04	50.00	29662.42	33968.62
314	1047.48	1047.48	100.00	0.00	1047.48
337	2783.54	2783.54	100.00	0.00	2783.54
352	42809.79	14268.40	33.33	0.00	13995.04
357	110859.73	36953.24	33.33	0.00	36953.24
380	31.82	15.91	50.00	8.79	7.13
411	47504.02	11876.01	25.00	0.00	11876.01
412	20251.25	5062.81	25.00	0.00	5062.81
414	121475.78	30368.94	25.00	0.00	27893.29
415	62875.81	31437.90	50.00	0.00	10301.94
416	1119380.85	223876.17	20.00	12164.70	211711.47
420	5538359.19	614974.59	11.10	262.25	491919.22
435	128.45	128.45	100.00	0.00	128.45
437	35261.40	5875.52	16.66	3309.67	2565.84
483	1003942.83	200788.57	20.00	22415.20	178373.36
551	8130.79	4065.40	50.00	52.08	4013.32
631	1072.69	526.91	49.12	172.44	4.58
676	68674.68	22841.30	33.26	0.00	15151.05
936	3538.16	1769.08	50.00	0.00	1408.62
1063	1073.87	1073.87	100.00	644.20	429.67
1198	24970.39	10897.96	43.64	0.00	10479.50
1413	816.46	179.88	22.03	0.00	148.20
2081	114160.67	18966.59	16.61	100.05	17769.27

Western Mallee

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
7	342.47	136.11	39.74	0.00	136.11
8	289229.04	4404.10	1.52	887.37	3516.72
25	202.43	48.09	23.75	0.00	48.09
37	5530.18	2169.16	39.22	864.52	1304.65
41	41313.69	8409.88	20.36	4531.81	3878.07
47	169064.09	17127.36	10.13	4603.15	12524.21
48	1305.67	272.49	20.87	250.27	22.22
59	25.45	2.16	8.48	0.00	2.16
125	1321044.75	12497.91	0.95	4508.52	7989.39
126	63.97	12.43	19.43	0.00	12.43
128	305655.22	14894.10	4.87	5142.41	9751.69
129	36.50	5.63	15.43	0.00	5.63
131	780257.23	9890.06	1.27	1144.01	8746.05
141	382.19	35.71	9.34	0.00	35.71
142	72949.29	1290.76	1.77	300.57	990.19
352	5948.61	558.18	9.38	0.00	558.18
380	103079.75	14349.06	13.92	10457.27	3891.79
486	190753.28	63584.43	33.33	9806.41	53778.01
511	1117088.55	52027.32	4.66	9465.27	42562.06
516	201218.31	6560.95	3.26	412.11	6148.84
519	-	764613.48	-	194716.46	569897.02
551	521.18	262.07	50.28	0.00	262.07
552	31116.33	9847.46	31.65	23.48	9823.98
676	8060.36	616.24	7.65	78.85	537.39
934	2329.79	274.17	11.77	0.00	274.17
936	357903.82	27596.32	7.71	7298.80	20297.52
938	143207.17	6074.72	4.24	68.09	6006.64
939	120.30	6.01	4.99	0.00	6.01
941	23442.78	3696.79	15.77	1787.45	1909.35
945	706728.94	25924.63	3.67	2410.07	23514.56
953	15127.52	2484.67	16.42	148.35	2336.32
955	74994.79	2379.52	3.17	665.97	1713.54
959	24674.98	3091.48	12.53	958.01	2133.47
960	1269951.61	29260.44	2.30	10361.87	18898.58
961	156671.29	4674.37	2.98	2779.05	1895.32
966	7084.51	1371.78	19.36	0.00	1371.78
967	22744.33	963.97	4.24	40.75	923.22

Appendix C

Western Mallee (cont.)

Beard vegetation association	Original extent (ha)	Current extent (ha)	Proportion of original extent remaining (%)	Current extent in DEC reserves (ha)	Local natural areas (ha)
968	6.37	0.87	13.61	0.00	0.87
1005	530.48	86.84	16.37	0.00	86.84
1023	511651.53	4685.85	0.92	235.83	4450.03
1068	36.80	34.89	94.80	0.00	34.89
1075	4134730.11	78362.79	1.90	27775.10	50587.69
1076	10.92	10.92	100.00	10.92	0.00
1079	20230.26	6140.67	30.35	3181.32	2959.35
1092	1904.43	54.63	2.87	0.00	54.63
1093	1409.07	56.52	4.01	0.00	56.52
1094	259313.33	6141.48	2.37	89.74	6051.75
1098	27327.14	4705.74	17.22	1929.80	2775.93
1148	16339.32	5446.39	33.33	1979.19	3467.20
1200	1137951.53	22593.44	1.99	2017.72	20575.72
1271	207.07	30.72	14.84	30.72	0.00
1413	99776.11	16000.00	16.04	964.22	15035.79
2048	2510677.43	152593.72	6.08	23624.23	128969.48

Note: Yellow coloured cells identify Beard vegetation associations with less than 30% of the original native vegetation extent remaining, and orange coloured cells identify Beard vegetation associations with less than 10% of the original native vegetation extent remaining. The 30% and 10% thresholds are defined in national and State policies on native vegetation protection and biodiversity conservation (Environment Australia 2001; EPA 2000, 2008).

Appendix D

Threatened species and communities in the Wheatbelt

The list below includes the threatened species and communities occurring in the Wheatbelt planning region (sourced from DEC, 2010).

Threatened species and communities highlighted in the tables below are listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as matters of national environmental significance.

Threatened ecological communities and Priority ecological communities

Community identifier	Common name	DEC category
Alluvial soils of the upper Blackwood River	Woodlands and shrublands of the alluvial soils of the upper Blackwood River	Priority 1
Avon Pools	Deep pools of the Avon Botanical District	Priority 1
Banksia yellow-orange sands	Banksia woodland of the Gingin area restricted to soils dominated by yellow to orange sands	Priority 2
Canegrass	Perched clay wetlands of the Wheatbelt dominated by *Eragrostis australasica* and *Melaleuca strobophylla*	Priority 1
Claypans with shrubs over herbs	Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs	Priority 1
Coomberdale chert hills	Heath community on chert hills of the Coomberdale Floristic Region	Endangered
Die Hardy	Die Hardy Range/Diemels vegetation complex (banded ironstone formation)	Priority 1
Duladgin Ridge	Duladgin Quartzite Ridge	Priority 3
Finnerty Range	Finnerty Range vegetation complexes (banded ironstone formation)	Priority 1
Gp200-170	*Petrophile chrysantha* low heath on Lesueur dissected uplands (Gp200-170)	Priority 2
Granite communities of the northern Jarrah Forest	Granite communities of the northern Jarrah Forest	Priority 3
Helena and Aurora Range	Helena and Aurora Range vegetation complexes (banded ironstone formation)	Priority 1
Highclere Hills	Highclere Hills (Mayfield) vegetation complex (banded ironstone formation)	Priority 1
Ironcaps	Ironcap Hills vegetation complexes (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill)	Priority 3
Koolyanobbing	Koolyanobbing vegetation complex	Priority 1
Lesueur-Coomallo M2	Lesueur-Coomallo Floristic Community M2 (*Melaleuca preissiana* woodland)	Priority 1
Lesueur-Coomallo D1	Lesueur-Coomallo Floristic Community D1 (Species-rich low heath dominated by *Allocasuarina microstachya*)	Critically Endangered
Limestone ridges (SCP 26a)	*Melaleuca huegelii - Melaleuca acerosa* (currently *M. systena*) shrublands on limestone ridges (Gibson et al. 1994 type 26a)	Endangered
Low level sandplains	*Banksia prionotes* and *Xylomelum angustifolium* low woodlands on transported yellow sands	Priority 1
Melaleuca thicket	Dense Melaleuca thickets with emergent *Eucalyptus erythronema* var. *marginata* and *Eucalyptus transcontinentalis*	Priority 1

Appendix D

Threatened ecological communities and Priority ecological communities (cont.)

Community identifier	Common name	DEC category
Mortlock Flats	Salt Flats Plant Assemblages of the Mortlock River (East Branch)	Priority 1
Mottlecah	Wheatbelt Mottlecah dominated heathland on deep white sands	Priority 1
Mound Springs SCP	Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)	Critically Endangered
Mount Dimer	*Mount Dimer vegetation complexes (banded ironstone formation)*	Priority 1
Mount Jackson	Mount Jackson Range vegetation complexes (banded ironstone formation)	Priority 1
Muchea Limestone	Shrublands and woodlands on Muchea Limestone	Endangered
NTHIRON	Perth to Gingin Ironstone Association	Critically Endangered
Parker Range System	Plant assemblage of the Parker Range System	Priority 3
Pteridium fernland	Wheatbelt Allocasuarina huegeliana over Pteridium esculentum communities	Priority 2
Saline Seeps	Natural organic saline seeps of the Avon Botanical District	Priority 1
SCP07	Herb rich saline shrublands in clay pans	Vulnerable
SCP15	Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain	Vulnerable
SCP20a	*Banksia attenuata* woodland over species rich dense shrublands	Endangered
SCP23b	Northern *Banksia attenuata - Banksia menziesii* woodlands	Priority 3
SCP29a	Coastal shrublands on shallow sands	Priority 3
SCP29b	Acacia shrublands on taller dunes	Priority 3
Tamma-Dryandra-Eremaea shrubland	Tamma-Dryandra-Eremaea shrubland on cream sands of the Ulva Landform Unit	Priority 1
Thetis-microbialite	Stromatolite community of stratified hypersaline coastal lake - Lake Thetis	Vulnerable
Toolibin	Perched wetlands of the Wheatbelt region with extensive stands of *Casuarina obesa* and *Melaleuca strobophylla*	Critically Endangered
Wandoo woodland over dense low sedges	Wandoo woodland over dense low sedges of *Mesomelaena preisii*	Priority 1
Windarling	Windarling Ranges vegetation complex (banded ironstone formation)	Priority 1
Wongan Hills System	Plant assemblages of the Wongan Hills System	Priority 4
Wooded waterbird wetlands	Wooded wetlands which support colonial waterbird nesting areas	Priority 2

Rare fauna

(excludes priority fauna and other specially protected fauna)

Class	Common name	Species name	DEC listing	Rank
Mammals	Boodie (Shark Bay)	*Bettongia lesueur lesueur*	Declared threatened fauna	VU
Mammals	Woylie	*Bettongia penicillata ogilbyi*	Declared threatened fauna	EN
Birds	Australasian Bittern	*Botaurus poiciloptilus*	Declared threatened fauna	EN
Birds	Muir's Corella	*Cacatua pastinator pastinator*	Declared threatened fauna	EN (VU EPBC)
Birds	Forest Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	Declared threatened fauna	VU
Birds	Baudin's Black-Cockatoo	*Calyptorhynchus baudinii*	Declared threatened fauna	EN (VU EPBC)
Birds	Carnaby's Black-Cockatoo	*Calyptorhynchus latirostris*	Declared threatened fauna	EN
Birds	Recherche Cape Barren Goose	*Cereopsis novaehollandiae grisea*	Declared threatened fauna	VU
Mammals	Pig-footed Bandicoot, Kantjilpa	*Chaeropus ecaudatus*	Declared threatened fauna	EX
Reptiles	Lancelin Island Skink	*Ctenotus lancelini*	Declared threatened fauna	VU
Reptiles		*Cyclodomorphus branchialis*	Declared threatened fauna	VU
Mammals	Chuditch	*Dasyurus geoffroii*	Declared threatened fauna	VU
Reptiles	Leatherback Turtle	*Dermochelys coriacea*	Declared threatened fauna	VU
Reptiles	Western Spiny-tailed Skink	*Egernia stokesii badia*	Declared threatened fauna	VU (EN EPBC)
Fish	Western Mud Minnow	*Galaxiella munda*	Declared threatened fauna	VU
Arachnids	Shield-backed Trapdoor Spider	*Idiosoma nigrum*	Declared threatened fauna	VU
Arachnids	Yorkrakine Trapdoor Spider	*Kwonkan eboracum*	Declared threatened fauna	CR
Mammals	Banded Hare-wallaby, Mernine	*Lagostrophus fasciatus fasciatus*	Declared threatened fauna	VU
Birds	Malleefowl	*Leipoa ocellata*	Declared threatened fauna	VU
Mammals	Greater Stick-nest Rat, Wopilkara	*Leporillus conditor*	Declared threatened fauna	VU
Birds	Southern Giant Petrel	*Macronectes giganteus*	Declared threatened fauna	EN
Mammals	Bilby, Dalgyte, Ninu	*Macrotis lagotis*	Declared threatened fauna	VU
Mammals	Numbat, Walpurti	*Myrmecobius fasciatus*	Declared threatened fauna	VU
Mammals	Long-tailed Hopping Mouse, Koolawa	*Notomys longicaudatus*	Declared threatened fauna	EX
Mammals	Big-eared Hopping Mouse, Noompa	*Notomys macrotis*	Declared threatened fauna	EX
Insects	Arid Bronze Azure Butterfly	*Ogyris subterrestris petrina*	Declared threatened fauna	CR
Mammals	Crescent Nailtail Wallaby	*Onychogalea lunata*	Declared threatened fauna	EX
Mammals	Dibbler	*Parantechinus apicalis*	Declared threatened fauna	EN
Mammals	Western Barred Bandicoot, Marl	*Perameles bougainville bougainville*	Declared threatened fauna	EN

Appendix D

Rare fauna (cont.)

Class	Common name	Species name	DEC listing	Rank
Mammals	Black-flanked Rock-wallaby	*Petrogale lateralis lateralis*	Declared threatened fauna	VU
Birds	Night Parrot	*Pezoporus occidentalis*	Declared threatened fauna	CR (EN EPBC)
Mammals	Red-tailed Phascogale, Kenngoor	*Phascogale calura*	Declared threatened fauna	EN
Mammals	Brush-tailed Phascogale, Wambenger	*Phascogale tapoatafa ssp.* (WAM M434)	Declared threatened fauna	VU
Birds	Western Rosella (inland ssp)	*Platycercus icterotis xanthogenys*	Declared threatened fauna	VU
Mammals	Broad-faced Potoroo	*Potorous platyops*	Declared threatened fauna	EX
Reptiles	Western Swamp Tortoise	*Pseudemydura umbrina*	Declared threatened fauna	CR
Mammals	Western Ringtail Possum	*Pseudocheirus occidentalis*	Declared threatened fauna	VU
Mammals	Heath Mouse, Dayang	*Pseudomys shortridgei*	Declared threatened fauna	VU
Birds	Western Whipbird (western heath subsp)	*Psophodes nigrogularis nigrogularis*	Declared threatened fauna	EN
Birds	Australian Painted Snipe	*Rostratula benghalensis australis*	Declared threatened fauna	VU
Mammals	Quokka	*Setonix brachyurus*	Declared threatened fauna	VU
Arachnids	Minnivale Trapdoor Spider	*Teyl sp (*BY Main 1953/2683, 1984/13)	Declared threatened fauna	CR

Conservation codes: VU = vulnerable; EN = endangered; CR = critically endangered; EX = presumed extinct

Declared rare fauna

(excludes priority flora)

Species name
Acacia anomala
Acacia aphylla
Acacia aristulata
Acacia ataxiphylla subsp. *magna*
Acacia auratiflora
Acacia brachypoda
Acacia caesariata
Acacia chapmanii subsp. *australis*
Acacia cochlocarpa subsp. *cochlocarpa*
Acacia cochlocarpa subsp. *velutinosa*
Acacia denticulosa
Acacia depressa
Acacia forrestiana
Acacia insolita subsp. *recurva*
Acacia lanuginophylla
Acacia lobulata
Acacia pharangites
Acacia pygmaea
Acacia sciophanes
Acacia splendens
Acacia subflexuosa subsp. *capillata*
Acacia vassalii
Acacia volubilis
Acacia wilsonii
Allocasuarina fibrosa
Allocasuarina tortiramula
Andersonia gracilis
Anigozanthos bicolor subsp. *minor*
Anigozanthos viridis subsp. *terraspectans*
Asterolasia nivea
Banksia aurantia
Banksia catoglypta
Banksia cuneata
Banksia fuscobractea
Banksia ionthocarpa subsp. *chrysophoenix*
Banksia mimica
Banksia oligantha

Species name
Banksia serratuloides subsp. perissa
Banksia serratuloides subsp. serratuloides
Banksia sphaerocarpa var. *dolichostyla*
Boronia adamsiana
Boronia capitata subsp. *capitata*
Boronia revoluta
Caladenia bryceana subsp. *bryceana*
Caladenia dorrienii
Caladenia drakeoides
Caladenia graniticola
Caladenia huegelii
Caladenia lodgeana
Caladenia williamsiae
Calectasia pignattiana
Chamelaucium sp. Cataby (G.J. Keighery 11009)
Chamelaucium sp. Gingin (N.G. Marchant 6)
Chorizema humile
Chorizema varium
Conospermum densiflorum subsp. *unicephalatum*
Conostylis drummondii
Conostylis rogeri
Conostylis seorsiflora subsp. *trichophylla*
Conostylis wonganensis
Cyphanthera odgersii subsp. *occidentalis*
Darwinia acerosa
Darwinia carnea
Darwinia foetida
Daviesia cunderdin
Daviesia dielsii
Daviesia euphorbioides
Daviesia microcarpa
Diuris drummondii
Diuris micrantha
Drakaea confluens
Drakaea elastica

Species name
Eleocharis keigheryi
Eremophila glabra subsp. *chlorella*
Eremophila nivea
Eremophila pinnatifida
Eremophila resinosa
Eremophila scaberula
Eremophila subteretifolia
Eremophila ternifolia
Eremophila vernicosa
Eremophila verticillata
Eremophila virens
Eremophila viscida
Eucalyptus absita
Eucalyptus argutifolia
Eucalyptus balanites
Eucalyptus brevipes
Eucalyptus crispata
Eucalyptus crucis subsp. *crucis*
Eucalyptus dolorosa
Eucalyptus johnsoniana
Eucalyptus lateritica
Eucalyptus leprophloia
Eucalyptus pruiniramis
Eucalyptus recta
Eucalyptus rhodantha var. *rhodantha*
Eucalyptus steedmanii
Eucalyptus suberea
Eucalyptus synandra
Frankenia conferta
Frankenia parvula
Gastrolobium appressum
Gastrolobium diabolophyllum
Gastrolobium glaucum
Gastrolobium graniticum
Gastrolobium hamulosum
Glyceria drummondii
Goodenia arthrotricha
Goodenia integerrima
Grevillea althoferorum subsp. *fragilis*

Appendix D

Declared rare fauna (cont.)

Species name
Grevillea batrachioides
Grevillea bracteosa subsp. *bracteosa*
Eremophila subteretifolia
Eremophila ternifolia
Eremophila vernicosa
Eremophila verticillata
Eremophila virens
Eremophila viscida
Eucalyptus absita
Eucalyptus argutifolia
Eucalyptus balanites
Eucalyptus brevipes
Eucalyptus crispata
Eucalyptus crucis subsp. *crucis*
Eucalyptus dolorosa
Eucalyptus johnsoniana
Eucalyptus lateritica
Eucalyptus leprophloia
Eucalyptus pruiniramis
Eucalyptus recta
Eucalyptus rhodantha var. *rhodantha*
Eucalyptus steedmanii
Eucalyptus suberea
Eucalyptus synandra
Frankenia conferta
Frankenia parvula
Gastrolobium appressum
Gastrolobium diabolophyllum
Gastrolobium glaucum
Gastrolobium graniticum
Gastrolobium hamulosum
Glyceria drummondii
Goodenia arthrotricha
Goodenia integerrima
Grevillea althoferorum subsp. *fragilis*
Grevillea batrachioides
Grevillea bracteosa subsp. *bracteosa*
Grevillea calliantha
Grevillea christineae

Species name
Grevillea corrugata
Grevillea curviloba subsp. *curviloba*
Grevillea curviloba subsp. *incurva*
Grevillea dryandroides subsp. *dryandroides*
Grevillea dryandroides subsp. *hirsuta*
Grevillea elongata
Grevillea flexuosa
Grevillea humifusa
Grevillea involucrata
Grevillea pythara
Grevillea scapigera
Guichenotia seorsiflora
Gyrostemon reticulatus
Hakea aculeata
Hakea megalosperma
Haloragis platycarpa
Hemiandra gardneri
Hemiandra rutilans
Hemigenia ramosissima
Isopogon robustus
Jacksonia pungens
Jacksonia quairading
Jacksonia velveta
Lasiopetalum rotundifolium
Lechenaultia laricina
Leucopogon obtectus
Leucopogon spectabilis
Lysiosepalum abollatum
Macarthuria keigheryi
Marianthus paralius
Melaleuca sciotostyla
Microcorys eremophiloides
Muehlenbeckia horrida subsp. *abdita*
Muelleranthus crenulatus
Myriophyllum lapidicola
Paracaleana dixonii
Patersonia spirifolia
Philotheca basistyla
Philotheca falcata

Species name
Philotheca falcata
Philotheca wonganensis
Pityrodia axillaris
Pityrodia scabra
Ptilotus fasciculatus
Ptychosema pusillum
Pultenaea pauciflora
Rhagodia acicularis
Rhizanthella gardneri
Ricinocarpos brevis
Roycea pycnophylloides
Rulingia sp.Trigwell Bridge (R.Smith s.n. 20.6.89)
Spirogardnera rubescens
Stylidium coroniforme subsp. *coroniforme*
Stylidium merrallii
Stylidium semaphorum
Symonanthus bancroftii
Synaphea quartzitica
Tetratheca aphylla subsp. *aphylla*
Tetratheca aphylla subsp. *megacarpa*
Tetratheca deltoidea
Tetratheca erubescens
Tetratheca harperi
Tetratheca paynterae subsp. *cremnobata*
Tetratheca paynterae subsp. *paynterae*
Thelymitra dedmaniarum
Thelymitra psammophila
Thelymitra stellata
Thomasia glabripetala
Thomasia montana
Thomasia sp. Green Hill (S. Paust 1322)
Tribonanthes purpurea
Verticordia carinata
Verticordia fimbrilepis subsp. *fimbrilepis*
Verticordia hughanii
Verticordia staminosa subsp. *staminosa*
Verticordia staminosa var. *cylindracea*
Verticordia staminosa var. *erecta*

Appendix E

Indicative risk of coastal environmental change

The table below provides a summary of the indicative risk of coastal environmental change for sediment cells along the Wheatbelt region's coast (shires of Gingin and Dandaragan). Adapted from Damara (2011).

Cell	Indicative risk	Species name	Risk assessment factors
1	Wreck Point to Two Rocks	Low	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Resilient natural system occasionally requiring minimal to moderate maintenance.
2	Two Rocks to North Two Rocks	Moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses require occasional major or regular moderate stabilisation work.
3	North Two Rocks to South Moore River	Low-moderate	Structurally sound geologic or geomorphic feature. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
4	South Moore River to Moore River	Low-moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
5	Moore River to Seabird	Moderate	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
6	Seabird to Eagles Nest Bluff	Low-moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
7	Eagles Nest Bluff to Second Bluff	Low	Structurally sound geologic or geomorphic feature. Resilient natural system occasionally requiring minimal to moderate maintenance.
8	Second Bluff to South First Bluff	Low-moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
9	South First Bluff to Manakoora Sand Patch	Low-moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.

Cell	Indicative risk	Species name	Risk assessment factors
10	Manakoora Sand Patch to Green Reef	Moderate-high	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Management responses require occasional major or regular moderate stabilisation work.
11	Green Reef to Ledge Point	Low-Moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
12	Ledge Point to South Pacific Reef	Moderate	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
13	South Pacific Reef to Edward Island	Moderate	Structurally sound geologic or geomorphic feature. Management responses require occasional major or regular moderate stabilisation work.
14	Edward Island to Lancelin Island	Moderate-high	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Management responses require occasional major or regular moderate stabilisation work.
15	Lancelin Island to Dide Point	Moderate-high	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Management responses require occasional major or regular moderate stabilisation work.
16	Dide Point to Narrow Neck	Low-Moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
17	Narrow Neck to Magic Reef	Moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses require occasional major or regular moderate stabilisation work.
18	Magic Reef to Wedge Island	Moderate-high	Extensive structural features are unsound and require detailed assessment of coastal hazards and risks. Management responses require occasional major or regular moderate stabilisation work.
19	Wedge Island to North Wedge	Moderate	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
20	North Wedge to South Grey	Low-Moderate	Structurally sound geologic or geomorphic feature. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
21	South Grey to Grey	Low	Structurally sound geologic or geomorphic feature. Resilient natural system occasionally requiring minimal to moderate maintenance.

Cell	Indicative risk	Species name	Risk assessment factors
22	Grey to Boggy Bay	Low-Moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
23	Boggy Bay to Kangaroo Point	Low-Moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
24	Kangaroo Point to Hansen Head	Low-Moderate	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Resilient natural system occasionally requiring minimal to moderate maintenance.
25	Hansen Head to Thirsty Point	Low-Moderate	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Resilient natural system occasionally requiring minimal to moderate maintenance.
26	Thirsty Point to Black Head	Low-Moderate	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Resilient natural system occasionally requiring minimal to moderate maintenance.
27	Black Head to South Hill River	Low-Moderate	Structurally sound geologic or geomorphic feature. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
28	South Hill River to South Booka Valley	Moderate-high	Extensive structural features are unsound and require detailed assessment of coastal hazards and risks. Management responses require occasional major or regular moderate stabilisation work.
29	South Booka Valley to Island Point	Moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses require occasional major or regular moderate stabilisation work.
30	Island Point to Middle Head	Low-Moderate	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Resilient natural system occasionally requiring minimal to moderate maintenance.
31	Middle Head to Pumpkin Head	Low-Moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
32	Pumpkin Head to North Head	Low	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Resilient natural system occasionally requiring minimal to moderate maintenance.

Appendix E

Cell	Indicative risk	Species name	Risk assessment factors
33	North Head to Sandland	Low-Moderate	Structurally sound geologic or geomorphic feature but may require resolution of metocean processes under S2 of SPP 2.6. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
34	Sandland to Sandy Point	Moderate	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Management responses are required in response to rare major events, occasional moderate events or frequent minor events.
35	Sandy Point to South Fisherman	Low-Moderate	Some structural features are unsound and require detailed assessment of coastal hazards and risks. Resilient natural system occasionally requiring minimal to moderate maintenance.
36	South Fisherman to Fisherman Islands	Low	Structurally sound geologic or geomorphic feature. Highly resilient natural system requiring minimal or no maintenance.

Appendix F

Review of Avon Arc sub-regional strategy - Strategy policy framework

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
2.1 Settlement					
Support the development and consolidation of existing nodal urban settlements.	There are social, economic and environmental benefits in consolidating and enhancing existing settlements. To take advantage of these benefits a settlement hierarchy has been developed whereby growth can be directed.	1. Population growth to be directed towards existing urban settlements of Gingin, Bindoon, Muchea, Toodyay, Wundowie, Northam, York, Beverley and Brookton. 2. The Avon Arc settlement hierarchy of regional, district and local service centres and villages to be reflected in local government planning policy. 3. Quantify the need, size, timing and infrastructure requirements for a "new town" in the Shire of Chittering.	Growth to occur in existing settlements through the consolidation of nodes. Local governments to prepare housing strategies to provide for expansion of urban settlements. * Siting of rural residential and rural smallholding developments not to compromise the expansion of urban settlements. Avon Arc settlement hierarchy: *Regional service centre* Northam *District service centre* Chittering New Town Toodyay York *Local service centre* Wundowie Beverley Brookton Gingin B indoon *village centre* Muchea Bakers Hill * New settlement proposals to be assessed against: • The need for future urban land; • Distance from major transport infrastructure • Topographical suitability; • Demonstrated attainment of employment self-sufficiency;	WAPC, LG, WDC MSR	WAPC policy position contained in SPP3. Housing strategies to be implemented via local government local planning strategy. WAPC policy position contained in SPP 2.5. WLUPS will establish an appropriate settlement hierarchy policy . New settlement proposals unlikely to be supported as projected population can be accommodated in existing settlements.

			• Conformity with aims of the Liveable Neighbourhoods Community Design Code, particularly as it relates to employment, transport and community design. Development of a "new town" should be staged to ensure that requirements of urban sustainability are met.		WLUPS will establish current WAPC position of Chittering new town proposal.
Provide a variety of lifestyle choices through innovative and quality settlement design.	People are attracted to the Avon Arc for different lifestyle choices. This Strategy encourages and facilitates improved housing choice and affordability.	1. Provide innovation in settlement design to complement the landscape and environment. 2. Offer a range of housing and lifestyle choices.	Proposals for clustered rural residential settlements should be promoted to retain a greater proportion of land for agriculture and conservation purposes. * Identify sites for aged accommodation. * Provide a range of lot sizes within existing settlements. * Housing choice for various socioeconomic groups to be offered.	WAPC, LG.	WAPC policy position contained in SPP2.5. Aged accommodation identified in LPS and WLUPS will also address the shortage. To be implemented via local government local planning strategy. To be implemented via local government local planning strategy.
Encourage development away from small rural lots through controls in local government town planning schemes.	This strategy supports the control of development on small rural lots within the Avon Arc through provisions in town planning schemes. This will address issues of fragmentation of land, unplanned growth, health and public safety, and unplanned growth in undeveloped but gazetted townsites.	1. Development to be directed away from small rural lots.	Restrict development within agriculture zoned areas to agriculture related uses. * Limit residences on farm holdings. * Support residential and commercial development to lots that have frontage to a government gazetted and maintained road. * Building setbacks on rural zoned lots should be a minimum of 30 metres from each boundary. * Support local governments in the preparation and implementation of guided and resumptive development schemes to rationalise lots within remnant townsites	LG, WAPC	To be implemented via local government town planning scheme. To be implemented via local government town planning scheme. To be implemented via local government town planning scheme. To be implemented via local government town planning scheme. WLUPS to establish current WAPC position and guide implementation through local planning.

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
Direct rural residential developments and rural smallholdings to appropriate areas to ensure wider community, environmental and economic benefits.	This strategy encourages rural residential and rural smallholding developments close to existing townsites, or other suitable locations which take account of the landscape, agriculture, employment, topographical and transport factors	1. Rural residential and rural smallholding developments to be located in appropriately identified areas in endorsed local planning strategies. 2. Rural residential and rural smallholding developments to be supported only where they address and meet economic, social and environmental criteria.	* Rural residential and rural smallholding development to be promoted and supported only in close proximity to Consolidated Urban Settlements.. * Rural residential and rural smallholding developments to be supported were they show a demonstrated social and economic interrelationship with consolidated urban settlements. * Rural residential and rural smallholding developments should not be permitted on land of high capability for agriculture. * Rural residential and rural smallholding subdivisions using a cluster style may be considered where they offer opportunities to maintain agricultural production and support environmental protection * Proposed rural residential and rural small holding developments must address: • Fragmentation of land suitable for production of agriculture and rural land use; • Efficiency of essential services and infrastructure provision; • Visual intrusion into the landscape; • the spread of weed and animal pests; • Fire risks; • Clearing.	LG, WAPC	WAPC policy position contained in SPP 3. WAPC policy position contained in SPP 3. WAPC policy position contained in SPP 2.5. WAPC policy position contained in SPP 2.5. WAPC policy position contained in SPP 2.5.
2.2 Agriculture					
Encourage agriculture where compatible with environmental capabilities and other regional planning objectives.	Agriculture is a major economic activity in the Avon Arc. Planning strategies should recognise that agriculture and agriculture related activities are the predominant use throughout the Avon	1. Planning strategies to identify significant agricultural land and ensure that agriculture remains the predominant use in those areas	* WAPC and AGWEST to identify areas of State and regional agricultural significance within the Avon Arc. * Local governments to identify areas of local agricultural significance taking into consideration land capability and agriculture viability. (Note: WAPC rural policy establishes the criteria for identification of areas of agriculture significance).	LG, WAPC, AGWEST	Mapping in SPP 2.5 focuses on intensive agriculture and horticulture. Mapping will be reviewed as part of review of SPP2.5. To be implemented via local government local planning strategy.

		* Local rural strategies to encourage the continued use of agricultural land for agriculture purposes * Apply restrictions on the subdivision of productive agricultural land. Where the productive and sustainable agriculture capability of a more intensive agriculture proposal has been demonstrated, subdivision may be considered. * No more than one residential dwelling per lot to be supported, except for farm management purposes			Local Rural Strategies superseded by local government local planning strategy. WAPC policy position contained in SPP 2.5. To be implemented via local government town planning scheme.
Arc and ensure that incompatible uses do not place unnecessary restrictions on this economic activity. In the long term there may be changes in the use of agriculture land and the Strategy should be sufficiently flexible to allow these changes to occur. Rural uses other than broadacre agriculture can be viable, complementary and compatible with agriculture settings. These include farm stays, poultry farms, piggeries, kennels, feedlots and animal processing.	2. A general presumption against rural residential within agriculture areas to be operative.	* Local planning strategies to discourage rural residential and rural-smallholdings within agriculture areas * Rural residential developments to address the criteria set out in the settlement strategies	LG, WAPC, AGWEST, EPA.	LPS will identify future rural residential areas. Rezoning of rural land will generally not be supported unless land identified in LPS. WAPC policy position contained in SPP 2.5. Local government LPS establish suitability and criteria.	
	3. Local planning strategies to maximise agriculture land availability by ensuring that non-agriculture uses are set back to avoid land use conflicts or prohibit agriculture or agriculture-related uses from being located on adjacent lots.	* Determine appropriate setbacks for non-rural uses (note: EPA Policy recommends 300m).		To be implemented via local government local planning strategy and town planning scheme.	
	4. Local planning strategies to identify opportunities for rural industries and any potential conflicts.	* Land use conflicts to be managed through identification and planning of areas for rural industries on areas of low capability for agriculture * Policy measures to minimise off-site impacts through buffers, site designs, boundary treatments and landscaping		To be implemented via local government local planning strategy Buffers identified in local planning strategy and impacts considered during development approval process.	

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
			* Rural uses with off-site impacts to be AA or SA uses in local town planning schemes * Impacts on surface and groundwater, landscape/ scenic values, and fire risks to be closely monitored and controlled * Local schemes to incorporate WAPC policies including *SPP No. 5 - Poultry Farm Policy*, particularly in relation to buffer provision * Development proposals to take into consideration EPA guidelines for buffer distances for particular rural uses such as piggeries and feedlots		To be addressed in local government town planning scheme. Impacts of development managed and monitored by local government. Superfluous requirement. Superfluous, Local Government consideration at DA stage.
Safeguard the operations of existing and future special uses and public facilities requiring a rural location.	Various public uses and installations, such as water treatment plants, waste disposal, prisons and utility corridors may need to be located in rural areas.	1. Planning guidance to protect special uses and public facilities from incompatible land uses to be incorporated in local government planning policy.	* Town planning schemes and rural strategies to identify and protect sites for existing special uses and allow for siting of future special public uses. * Incompatible development should be avoided within buffer zones around special uses.	LG	Identified in TPS and LPS To be implemented via local government local planning strategy To be implemented via local government local planning strategy Identified in TPS and LPS. Management by LG at DA stage.
Work with relevant agencies and community groups to minimise fire risk.	Fire represents a considerable risk for residents in rural communities. Managing bushfire risks can be assisted by regional and local planning. Fire safety education is an essential component in efforts that aim to minimise harm and mitigate damage that results from fire.	1. Plan for and manage bush fire risks within the rural areas of the Avon Arc. 2. Develop fire safety as a key issue for the development of a safer Avon Arc.	* Local governments to prepare bushfire management strategies in consultation within relevant agencies, community groups and other interested parties. * Where appropriate development and subdivision proposals to prepare bushfire management strategies. * Develop a regional perspective on bushfire risk for the Avon Arc. * Include Fire Safety in school education curricula. * Deliver appropriate fire safety educational materials to school children in the Avon Arc. * Encourage community groups to become active in the development and dissemination of fire safety education.	LG, FESA, CALM LG, EDWA, FESA	Completed. WAPC policy position contained in Covered in SPP 3.4 and Planning for Bush Fire Protection guidelines. To be considered in WLUPS. Beyond scope of land use planning. Beyond scope of land use planning. Beyond scope of land use planning.

			* Encourage the installation of appropriate smoke alarms in all residential and commercial buildings in rural areas		Beyond scope of land use planning. All houses require installation at smoke alarms when constructed or sold.
2.3 Natural Environment					
Ensure that the ecological integrity, biodiversity and productivity of the environment are maintained or enhanced for the benefit of present and future populations.	Protect and maintain existing species of flora and fauna especially through the protection of remnant vegetation and intact ecological habitats.	1. Protect and preserve the biodiversity of flora and fauna in the Avon Arc.	* Update System 6 as approved by Cabinet. * Update System 4 and 6 consistent with current process as set out in System 6.	AGWEST, LG, WAPC, EPA, CALM, ARMA, WRC.	The State was divided into 12 systems in the late 70s by the conservation by reserve committee. Biodiversity and its protection will be considered and updated in the WLUPS.
			* Clearing of remnant vegetation should be supported only for safety or for specific development requirements that would not threaten the presence of rare and threatened flora, fauna and ecological communities.		Superfluous. Approval required from DEC for clearing of native vegetation.
			* Local government to provide appropriate mechanisms within town planning schemes to preserve and enhance remnant vegetation.		Implemented as a condition of development approval through local government town planning scheme.
			* Commissioner of Soil Conservation to assess areas greater than 1ha before approval to clear vegetation.		Superfluous. Approval required from DEC for clearing of native vegetation.
			* Require fencing of remnant vegetation where appropriate		Implemented as a condition of development approval through local government town planning scheme.
		2. Encourage revegetation of local species of flora along waterways, uplands, ridges and steeply sloping country.	* Prepare a regional revegetation plan aimed at protecting waterways, uplands, ridges and steep slopes.		Beyond scope of land use planning and WLUPS.
			* Require an increase in vegetation cover as part of development approval.		Implemented via local government town planning scheme..
			* Local governments to prepare plans to establish environmental corridors along roads, service corridors, wetlands and where they link existing blocks of remnant vegetation or Avon Arc regional greenway system.		May be beyond capacity and expertise of local government.
			* Support catchment management groups in applications for funding for revegetation programs.		Beyond scope of land use planning and WLUPS.

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
Promote land use and development compatible with safeguarding water and air resources so they are conserved and maintained and their quality protected.	Ground and surface water are extremely valuable and scarce commodities within the Avon Arc. Watercourses generally are sensitive areas and require sound management for their protection. Air is an important resource for all forms of life.	1. Current and potential groundwater and surface catchment areas to be managed and protected as a strategic resource.	* Continue to prioritise and manage ground and surface water resources for future water supply. * Local planning policy to incorporate Water and Rivers Commission Priority 1, 2 and 3 water supply catchment policy areas and compatible land use compatibility for: Priority 1 Julimar Brook, Helena River Goldfields and Agriculture, Canning River, Wungong Brook. Priority 2 Gooralong Brook. Priority 3 Gingin Brook, Ellen Brook, Brockman River, Wooroloo Brook. * Proposed land use changes in the shires of Gingin and Chittering to have regard to the Gingin Groundwater Area Water Allocation Plan. * Revegetate water catchments to improve water quality. * Protect Paleo Channels through appropriate land uses.	WRC, LG, WAPC, DEP	WLUPS to establish current WAPC position on ground and surface water. WAPC policy position contained in SPP 2.7 public drinking water supply areas. WAPC policy position contained in SPP 2.9 Water Resources. Beyond scope of land use planning. Paleo channels not identified or discussed in Avon Arc Strategy.
		2. Local planning documents to include guidelines to protect and manage rivers and wetlands.	* Measures to be incorporated in local planning policy to protect wetlands include: • Foreshore reserves along wetlands; • secure land adjacent to wetlands by landowner agreement; • Control of stock along wetlands; • Retention and planting of vegetation adjacent wetlands; • General prohibition of houses and leach drains within 100m of wetlands; • Control on drainage and stormwater run-off into wetlands; • Control on the application of fertilisers and pesticides and discharge of nutrients and other pollutants adjacent to wetlands;		To be implemented via local government local planning strategy. Wetlands will also be considered by WLUPS.

		3. Ensure that air quality is protected	• Retention of vegetated buffer zones along permanent wetlands to prevent adjacent land uses from degrading water quality by means of polluted surface run-off. * Prepare management plans for conservation category wetlands. * Local planning policy to incorporate river floodplains and 1:100 year floodways to minimise the risk of potential flooding of developed areas. * Encourage non air polluting land uses. * Monitor air quality. * Encourage local employment work opportunities to minimise journeys to work.		Completed. Flood plains and 100 year flood levels identified in local government local planning schemes and strategies. Development proposals assessed on merit and adequate controls in place via DEC licensing. Beyond scope of land use planning. To be implemented via local government local planning strategy.
Safeguard land and soil and manage salinity and other degradation processes.	Land degradation is a major issue that has the potential to destroy the quality of life in the Avon Arc. It is therefore imperative that land degradation processes be minimised.	1. Promote land uses which protect land and soil from further degradation, while restoring and rehabilitating areas affected by these processes.	* Support the implementation of the Western Australian Salinity Action Plan. * Plan and manage the rehabilitation of salt affected areas in consultation with the local community. * Protect land and soil from overuse and degradation through the maintenance of existing vegetation, including State forests. * Develop a management plan to identify areas where large-scale revegetation is appropriate. Employ principles of catchment management in planning for revegetation.	LG, AGWEST, EPA, CALM.	Completed. Beyond scope of land use planning, issue will be acknowledged in WLUPS Will be addressed in WLUPS. Beyond scope of land use planning, issue will be acknowledged in WLUPS .

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
Consolidate and protect Core Greenbelt areas and manage other greenway systems and linkages as part of the Avon Arc regional greenway system.	The Avon Arc has a large and diverse system of core greenbelt areas made up of CALM estates and defence training areas. It is important that these areas be managed in a sustainable manner and that links be created to connect the Core Greenbelt for the future use of the community as conservation and recreational areas.	1. Support the intent of CALM's Regional Management Plan - northern forest region. 2. Establish an Avon Arc regional greenway System to include and connect features of particular conservation and recreation interest with core greenway areas. 3. Identify appropriate land uses that complement the principles of the Avon Arc regional greenway system on freehold land. 4. Develop an integrated recreational trail network as part of the botanical and green linkages.	* CALM management plans identify future management and use of its estates. These include the long-term use of Julimar Forest to become a Conservation Park. * Local planning documents to identify and protect the intent of the Avon Arc regional greenway system, incorporating the linear river valley greenway, botanical linkages and minor riverine linkages, including: • Avon Valley Gorge; • The Avon River pools; • Ellen Brook; • Bobakine Hills; • Mt Bakewell; • Mt Brown; • The Needling Hills; • Mt Dale; • The Yenyenning Lakes; • Sundry Reserves; and • The Greenhills historic site. * Local governments to prepare policies and planning controls to identify appropriate land uses within or near the Avon Arc regional greenway system. * Progressively upgrade and allow community access to disused transport corridors/alignments.	LG, WAPC, CALM, MSR.	WLUPS to incorporate or establish a position of Core Greenbelt areas and Avon Arc regional greenway system. Completed by all Shires except Gingin.

Promote the communities' involvement in environmental groups and rehabilitation of the natural environment.	Encourage community involvement in environmental groups and projects to maintain or improve environmental processes and repair the effects of degradation.	1. Support private and public landowners to achieve conservation and landscape protection objectives while maintaining other economic activities.	* Actively support opportunities for agreements with private landowners that manage private land for conservation objectives.	LG, CALM, AGWEST, EPA, WAPC	May be identified in local government strategic plan for the future. Beyond scope of WLUPS.
2.4 Landscape					
To maintain the open character of the rural landscape within the Avon Arc and conserve and enhance land with special conservation or landscape value.	Rural land includes areas of special landscape and conservation value. These areas contribute significantly to the land resources, ecological balance and quality of life for the community. The areas of high landscape values are shown in Figure 20 landscape management priority areas.	1. Planning of rural land to have regard to the landscape management priority areas.	* The objectives of the priority management areas are: *Visual Management Area A - Highest Priority* Development or changes of land use should be designed to have no negative visual impact and a positive overall impact as far as practical to an observer. *Visual Management Area B and C - Moderate to High Priority and Moderate Priority* Development or changes in land use may be visually apparent, as far as practical, but not dominant in the landscape. *Visual Management Area D and E - Moderate to Low Priority - Lowest Priority* Development or changes of land use may be visually dominant. Where development and existing land use is currently dominant, further change could acceptably continue to dominate over natural landscape features. Development and land use change should in: *Priority A Areas:* • Have regard to natural form, line, colour and texture of the area. • Be designed to have its negative impact ameliorated within a 5-year period • Consider maintenance of existing remnant vegetation of the highest priority.	WAPC, LG.	WLUPS will update or establish a revised WAPC policy position on landscapes. This position will be reflected in local government local planning strategies.

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
			Priority B and C Areas: • Be designed, as far as practical, to be visually apparent but not dominant in the landscape. • Be assessed against appropriately devised criteria that reinforces the essential landscape and environment value of the landscape taking into consideration existing form, line, colour and texture of the area. Priority D and E Areas: • Comply with suitable landscape design principles and endeavour to reflect the existing pattern of the landscape. • Be sited to cause least negative visual impact. This includes infrastructure, roads and other public utilities. * Local governments to include landscape strategies for rural areas in local planning documents, taking into consideration the landscape management priority areas. * Subdivision of regionally significant landscapes should generally not be supported. * Development to be site sensitive. * Development to consider sites where visual impacts are in harmony with the area's character, maintain the value of adjacent conservation areas and avoid the steeper and higher slopes. * Wherever possible roadside vegetation should be retained and natural vegetation replanted.		WLUPS will update or establish a revised WAPC policy position on landscapes. This position will be reflected in local government local planning strategies.
		2. Proposed land use change and subdivision should not visually affect the appearance of the rural landscape.			

2.5 Cultural Heritage					
Objective					
To understand, appreciate and protect local cultural diversity	The Heritage of Western Australia Act, 1990 requires the identification and preservation of locally significant places.	1. Significant places and items must be identified and recorded on a Municipal Inventory as part of the Heritage of Western Australia Act, 2. Give due regard to Municipal Inventories when making regional planning decisions	1990 requirements. * Municipal Inventories to be completed and forwarded to Heritage Council of Western Australia. * Municipal Inventories to be annually updated. * Municipal Inventories to be reviewed every four years. * Local governments to include model scheme text heritage provisions into town planning schemes. * Consideration to be given to municipal inventories when determining development and subdivision applications.	LG, HCWA	Municipal inventories and their review addressed in local government town planning schemes.
To acknowledge and conserve places and items of social value significant in the development of the community's identity.	Places of social significance enhance a sense of place and help foster an awareness of the community's heritage.	1. Conservation policies should be formulated for places assessed and acknowledged as socially significant.	* Consideration to be given to conservation policies when assessing development and subdivision applications, including the impact approval may have on socially significant places.	LG, HCWA, WAPC	Beyond scope of WLUPS. Town planning scheme requires local government to consider heritage and conservation at DA stage.
To preserve places and items which are historically significant to the Avon Arc region.	Places and items which hold significance for the history of the Avon Arc need to be preserved as they assist in contextualising aspects of the region's past and foster a sense of continuity.	1. Prepare and implement conservation strategies/ management plans. 2. Uses on or around historically significant places must be complementary, or at least compatible.	* Advice from accredited heritage professionals to be sought in using the most appropriate methods. * Regular monitoring to be carried out to assess the condition of historic buildings. * Local government to assess the compatibility of developments with regard to the interface between the built environment and its surroundings.	LG	Beyond scope of WLUPS. Town planning scheme requires local government to consider heritage and conservation at DA stage. Beyond scope of WLUPS Beyond scope of WLUPS. Town planning scheme requires local government to consider heritage and conservation at DA stage.

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
To conserve places and buildings with aesthetic significance or value.	Places with aesthetic value should be preserved as they help to enhance the beauty of a locality. This may include buildings with special architectural value or a particular precinct.	1. The surrounding street and/or landscape of a building should be given due consideration within development assessments. 2. Regard should be given to all tenets of architecture in assessing architectural value of the existing and proposed built environment. 3. Seek expert advice when determining appropriate preservation methods for a place or precinct.	* Expert advice to be sought in regard to the aesthetic significance of individual places and appropriate preservation methods. * Townscape precinct studies to be compiled where necessary. * New developments to be in harmony with the existing urban form. * Regular monitoring to be carried out to assess the condition of buildings.	LG, HCWA	Considered during development and review of municipal inventory. To be implemented via local government local planning strategy. Town planning scheme requires local government to consider impacts of new development on existing streetscapes and buildings. Beyond the scope of land use planning and the WLUPS.
To understand, appreciate and protect indigenous heritage.	Investigation and conservation of places, items and folklore which are significant to local and indigenous cultures should be undertaken as it is an important aspect of the history of the Avon Arc region.	1. Research by, or in conjunction with, indigenous peoples should occur to clearly record and document heritage value. 2. An understanding and appreciation of the difference between indigenous and other cultures is required.	* Relevant interest groups should be involved in the identification and management of heritage sites. * An approved recording system to be formulated and established in conjunction with local communities. * Acknowledgement to be given to all aspects of a place's heritage, including non-European. * Registers and listings to acknowledge a site's multiple significance.	LG, MPC	Indigenous heritage and culture will be considered in development of WLUPS.

		3. Recognition of indigenous culture and rights to land by the *Native Title Act, 1993* and incorporation of Aboriginal people in the management, planning and development of land which may be subject to native title.	* Monitor the progress of native title registration and resolutions. * Negotiations with native title claimants for development or land use change in areas which may be subject to native title should be commenced. * Formally include Aboriginal people in decision-making processes regarding the management, planning and development of land which may be subject to native title.		
To protect and enhance tourism opportunities through the acknowledgement and continued use of heritage as a resource.	Due to its rich cultural heritage, the Avon Arc region is a tourist attraction. Conservation of this heritage will help develop a sustainable and viable tourist industry.	1. The places and items of cultural heritage of the Avon Arc region, should, wherever practicable, be promoted as a tourism asset. 2. Tourism operators should be encouraged to preserve the natural fabric of heritage places and items.	* Events and festivals to publicise the region's culture. * Attention to be given to new formats and impressions for promotion of the region. * Local governments to prepare development policies which allow the development and alteration of heritage places for tourism purposes in specified circumstances.	WATC, LG	Beyond the scope of land use planning.
2.6 Tourism					
Preserve the surrounding natural environment and the aesthetics of the area while encouraging tourists to visit the area.	Areas within the Avon Arc are very popular for nature-based tourism which should be facilitated and supported. However, the natural environment is fragile and any tourist measures should enhance and protect the environment upon which they depend.	1. Encourage and support nature-based tourism ventures in the Avon Arc. 2. Prepare guidelines for development within areas of recreational uses.	* Develop guidelines to which nature based tourist groups should have regard. * Facilitate access for a diverse range of user groups within natural areas, including elderly and disabled persons. * Closely monitor the effect visitors have on the environment, especially during peak seasons. * Limit the impact of local developments on the landscape of the Avon Arc through consideration of planning conditions within high landscape amenity areas.	WATC, WAPC, LG, AAD, CALM	Beyond scope of land use planning. TPS requires LG to consider impacts of new development on existing landscapes. Further guidance will be provided in WLUPS.

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
		3. Develop appropriate visitor management sites in relation to their surrounding environment.	* Determine appropriate siting and design of visitor management facilities. * Educative information should be provided to tourists to facilitate knowledge of the Avon Arc region. * Any visitor management signs, structures or facilities should take into consideration their impact on the surrounding environment. * Transport routes accessing visitor sites should consider all possible users, ranging from coaches to small cars in relation to the type of road and the parking area provided.		Beyond scope of land use planning Beyond scope of land use planning Signs controlled by local government local laws and town planning scheme. A consideration for local government in planning road upgrades and parking.
2.7 Transport Strategy					
Improve road and rail access and amenity to service the community infrastructure requirements of the Avon Arc. Facilitate safe and efficient road transport systems.	Transport within and between townsites for locals and visitors should be safe and efficient. This includes access to the Avon Arc from other regions (such as Perth). Transport planning should acknowledge the intra and interregional linkages particularly in matters such as education, health, employment, and industry.	1. Facilitate nodal settlements to encourage public transport usage. 2. Investigate and identify potential major road connections.	* Promote walkable urban neighbourhoods, including clustered Rural residential area, to reduce car dependence for access to employment, education, retail and community facilities. * Multiple-use paths should be provided for walking, horse riding, cycling and other such uses. (See also natural environment re strategies for trail networks outside urban areas.) * Road alignment from the Avon Arc to Guilderton and Lancelin, (including through to Cervantes and Jurien) to be finalised and programmed. * Proposed alignments and time frame for the Perth-Darwin and Perth-Adelaide National Highways within the region to be finalised and programmed. * Issues associated with national highways (e.g. Great Eastern Highway) not covered by Orange Route and Perth-Darwin National Highway to be resolved. * Southern access alignment of the Avon Arc green link to be finalised and programmed.	MRWA, DOT, WDC, FESA, LG, Westrail	Implemented though WAPC policy liveable neighbourhoods. Implemented though WAPC policy Liveable Neighbourhoods. Completed. Completed. Completed. WLUPS will update.

		3. Identify and upgrade as necessary the various components of the Avon Arc green link (shown on the schematic land use plan, Figure 1) to improve east-west linkage. 4. Encourage the use of commuter rail services as a major mode of transport in the Avon Arc.	* A regional perspective is required when assessing the transport strategy for the Avon Arc, incorporating linkages between townsites and the Perth metropolitan region. * Upgrade of the components of the Avon Arc green link to be based on the principles as outlined in Section 3.7.3. * AvonLink rail service to be promoted as an important interurban linkage to the Perth metropolitan region. * Prospector and shopper rail services to be supported as an important connector through-service. * Long-term provision to be allowed for a commuter link to Chittering "new town" and Gingin townsite from Perth.		WLUPS to establish current WAPC position on this matter. WLUPS to establish current WAPC position on this matter. Completed. WLUPS to establish current WAPC position on this matter.
Facilitate safe and efficient road transport systems.	All safety measures should be considered in relation to routes and construction of roads to provide a safer and more efficient road network for travel within the Avon Arc	1. Broad consideration of measures to alleviate the incidence of road accidents.	* Danger spots need to be identified and addressed, using data indicating accidents which have occurred within the Avon Arc. * Slower speeds through the periphery and within townsites need to be determined and enforced. * Roads surrounding school zones need to be safe and well maintained, with adequate signage and slower speeds.	DOT; LG, MRWA	Completed. Beyond the scope of land use planning. Beyond the scope of land use planning.
Provide for compatible land uses near air facilities.	There is currently no commercial air transport within the Avon Arc region, or in the entire Wheatbelt. However, there are two RAAF bases adjacent to the region.	1. Land use planning around airports and aerodromes to take into consideration the activities and longer term use of facilities.	* Improve existing aerodrome facilities at Beverley to cater for recreational demands.		The WLUPS will consider the merits and implications of further investment in aviation infrastructure to support aviation industry.

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
			* Develop a planning framework to minimise conflicts between RAAF flight training operations and siting of land uses. * Provision to be made for helicopter ambulance transport requirements. * Development of tourist air activities, such as hot air ballooning, gliding and parachuting should reflect amenity and safety considerations.		Completed. Implemented via local government local planning strategy. Relevant industry standards would ensure safety considered. Amenity considered by local government at DA stage.
Adequate freight routes to be developed and maintained for commerce and industry.	About 10 million tonnes of grain is transported through the Wheatbelt region each year. Chemicals, fuel, minerals (for example, limesands) and livestock require transportation in addition to general freight.	1. Plan freight routes on a regional basis taking into consideration the type of goods transported, distance of routes and safety 2. Further consideration of the impact of heavy freight movement.	* Investigate possible future freight road and rail alignments. Routes should be planned to provide the most efficient route between major places of departure and destination. * Construct main freight routes to sustain heavy traffic requirements. Any transport infrastructure must account for the transport requirements of the region and freight traffic passing through the Avon Arc to inter/intra- state destinations. * Provision for dangerous goods routes with adequate safety measures are required to minimise the hazard of transporting dangerous goods for residents and other road users * Identify and analyse the risk associated with the transport of dangerous goods through the Avon Arc. * Develop a network of safe routes for the transport of dangerous goods in bulk containers. * Regulate the transport of dangerous goods to avoid potential risk conflicts with particular land uses.		Completed WLUPS to establish current WAPC position on this matter. WLUPS to establish current WAPC position on this matter. Completed. Completed. Transport of dangerous goods regulated by Department of Mines and Petroleum.

2.8 Commerce and Industry					
Promote opportunities for economic development.	By expanding existing businesses and encouraging new businesses to the area, growth will be fostered and the economic base of the Avon Arc will be strengthened	1. Encourage economic development in the Avon Arc by promoting a wide range of business activities and a flexible planning system.	* Identify economic (or other) incentives for businesses to expand in the Avon Arc. * Encourage the relocation of business and commerce to Avon Arc based on comparative advantage. * Planning process to consider concessions and infrastructure incentives to facilitate new businesses to the area. * Land use planning to facilitate and support different and flexible options for economic development.	DOCAT; LG, WDC	Completed. Beyond the scope of WLUPS. Strategies to encourage the relocation of businesses can be implemented by local government. WLUPS to establish current WAPC policy on this matter.
Provide options for development of rural industries within the Avon Arc.	The major industry within the Avon Arc is agriculture. The expansion and diversification of agriculture within the Avon Arc should be supported, along with downstream processing of agriculture products..	1. Plan for the development of rural industry throughout the Avon Arc, including the siting of infrastructure and the linkages to the metropolitan region.	* Identify areas considered appropriate for rural industry, including stockyards, grain silos, abattoirs and feedlots. * Rural industry infrastructure needs to be strategically sited within the region, with proximity to existing infrastructure and transport routes being of prime importance. * Determine appropriate internal buffers to ameliorate off-site impacts from rural industries. * Land use planning to facilitate the development of rural industries, including, but not necessarily restricted to, equestrian centres, kennels, horticulture and nature based tourism.	WDC, LG	To be implemented via local government local planning strategy. Will be considered by WLUPS. Also implemented via local government local planning strategy. To be implemented via local government local planning strategy. To be implemented via local government local planning strategy.
Identify options for industrial development within the Avon Arc.	The Avon Industrial Park has been identified for strategic regional industrial development. It is acknowledged, issues which require assessment. Future land use and the impact on the surrounding environment are crucial.	1. Identify possible sites suitable for industrial development on a regional basis.	* Undertake a regional analysis of the availability and demand for industrial land within the Avon Arc. * Provision of industrial land to be assessed by its impact on the natural environment, economic benefit and community acceptance.	DRD, LG, MRWA, DOT, Office of Energy, LandCorp WDC, Westrail, OWR.	Will be undertaken in WLUPS. To be implemented via local government local planning strategy and will also be considered by WLUPS.

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
			* Siting of industrial land needs to consider: • Available infrastructure; • Proximity to existing power supplies; • Proximity to an employment base; • Proximity to major constructed transport routes, be it road or rail; and • Environmental impact.		Strategic land use planning considerations for local government local planning scheme and strategy.
			* Facilitate the timely provision of serviced industrial land before development pressures.		To be implemented via local government local planning strategy and will also be considered by WLUPS.
		2. Promote and develop the Avon Industrial Park as the strategic regional industrial site for the Avon Arc.	* Plan for both road and rail freight transport at the Avon Industrial Park to facilitate its potential development as an inland port.		To be considered by WLUPS.
			* Facilitate and co-ordinate development of the Avon Industrial Park through infrastructure providers and government agencies.		Completed by WDC and Water Corporation. Awaiting Western Power.
2.9 Infrastructure					
Objective					
Efficiently and progressively develop and service urban land.	The main constraint to settlement growth is the provision of "hard" infrastructure services such as water, sewerage, power and telecommunications.	1. Facilitate the provision of essential "hard" infrastructure to accommodate urban growth.	* Encourage development to locate in areas with developed infrastructure.	WAPC, Water Corporation, LG, EPA	To be considered by WLUPS or Wheatbelt Development Commission.
			* Prepare a Land Development Program for the Regional Service Centre of Northam.		Completed.
			* Develop Government wastewater schemes where not currently provided in the urban settlements.		Issues to be advanced via WLUPS.
			* Upgrade the coverage of wastewater schemes through infill sewerage programs by liaison with Office of Water Regulation on program timetable.		Issues to be advanced via WLUPS.

			* Upgrade planning for potable water schemes. Planning to commence for Muchea, Northam.		Completed.
		2. Pursue a resolution to constraints to regional infrastructure development.	* Planning review for potable water schemes to be progressed for Beverley (2001/2), Bindoon (2001/2), Gingin (2001/02). * Develop an integrated local and regional waste management strategy for the disposal and re-use of waste materials generated both within and outside the region. (Waste 2020 Strategy). * Review options for upgrading of the capacity of the Goldfields and Agriculture Water Supply Scheme. * Review standard headworks charges. * Provide a complete mobile and data transmission communication service within the Avon Arc. * Establish multi-purpose service corridors for the location of new service infrastructure and roads.	Water Corp. Telstra	WLUPS to establish current WAPC position on this matter. Regional and local waste management strategies have been completed. WLUPS to establish current WAPC position on this matter. Completed. WLUPS to establish current WAPC position on this matter. Will be investigated in WLUPS.
Telecommunications within the Avon Arc region to be improved.	Quality telecommunication services within the Avon Arc should be provided, which will build upon the lifestyle and location advantages which the Avon Arc offers.	1. Facilitate the provision and upgrading of telecommunications within the Avon Arc.	* Areas most in need of communication development should be identified to enable a needs analysis to be undertaken. * Consideration needs to be given to strategic areas to develop communication facilities (such as mobile towers). * The types of telecommunication services required should be assessed - for instance, mobile telephone access, Internet service providers. * The possibility of decreased rates for regional users should be considered, as high costs disadvantage users.	ACA	Will be investigated in WLUPS. Will be investigated in WLUPS. Will be investigated in WLUPS. Beyond the scope of land use planning.

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
Address the concerns arising from rural restructuring by innovative solutions.	The loss of services through the rationalisation of government and private infrastructure provisions can have serious consequences for the local communities affected by these decisions.	1. Coordinate services across the Avon Arc so that they complement and provide facilities for residents throughout the Avon Arc.	* Provide joint use of community buildings to facilitate delivery of a range of services across the Avon Arc. * Facilitate the development of "one stop" shared / common government offices in small centres. * Continue to maintain existing infrastructure and community facilities for use. * Promote the further use of innovative public access to telecommunications, such as "telecentres" and ensure adequate education provisions. * Prepare a recreational hierarchy to provide a coordinated range of services across the Avon Arc for the use of all residents.	LG, WDC	To be implemented via local government polices. To be facilitated by WDC. Will be investigated in WLUPS. Beyond the scope of land use planning. Will be considered by the WLUPS.
Provide improved education facilities that benefit the growth of the whole community.	Foster a sense of community through acknowledging the central role that schools play in rural towns.	1. Maintain and improve schools in the Avon Arc to provide both an education service and a sense of community.	* Plan for the expansion and associated infrastructure requirements of tertiary and vocational training. * Encourage the joint use of schools and community facilities to facilitate the delivery of a range of services. * Facilitate communication between local governments and the Education Department to provide innovative ideas for schooling. * Promote a regional and central education centre in the Avon Arc providing a range of TAFE and international schools. * Provide access to primary schools in all Avon Arc urban settlements. * Promote TAFE education through the use of telecentres located in urban settlements. * Continue to encourage the siting of international business and cultural schools within the Avon Arc.	Education Dept, LG. Tertiary Education Sector	Will be investigated in WLUPS. Will be investigated in WLUPS. Will be considered by the WLUPS. Will be considered by the WLUPS. Will be considered by the WLUPS. Will be considered by the WLUPS. Will be considered by the WLUPS. A matter to be progressed by WDC.

Provide a range of reliable health services that are easily accessible for all residents in the Avon Arc.	Access to basic health services for settlements in the Avon Arc, with linkages to regional health services at Northam Regional Hospital and Swan District Hospital, is essential for the development of viable local communities.	1. Identify and prioritise health service programs to meet the projected change in population and demographic structure throughout the Avon Arc.	* Avon and Western Health Services to coordinate a structured health service that enables ease of access to residents across the Avon Arc. * Prepare health service management plans to cover the shires of Gingin and Chittering to meet projected population growth. * With assistance from the Western Australian Centre for Remote and Rural Medicine provide adequate general practitioner coverage in the main urban settlements in the Avon Arc. * Support consultation between Avon and Western Health Services and local governments to maintain and provide a range of aged services clustered in major settlements spread across the Avon Arc.	HDWA, LG, WACRM, Avon Health Services, Western Health	Will be considered by the WLUPS. Beyond scope of land use planning. Beyond scope of land use planning and WLUPS. Will be considered by the WLUPS.
2.10 Resource Extraction					
Objective					
To promote mineral, petroleum and basic raw material extraction that is compatible with the surrounding natural environment and residential settlements.	Extraction and mining activities can have a dramatic impact on the natural landscape and environment of the Avon Arc. It is important that these activities are managed in such a way that impact on the natural and human environment within the Avon Arc is minimal and in balance with community benefits arising from these activities.	1. Provide for the extraction of basic raw materials, petroleum and minerals while protecting community amenity.	* Determine appropriate internal buffers to ameliorate off-site impacts from extractive industries and where blasting occurs. * Wherever possible, proponents to use ameliorative measures to mitigate against noise, dust and visual disturbance such as:- • Embankments to mitigate noise; • Use of dense areas of vegetation to assist in the attenuation of dust; • Vegetation retained for use as visual screening as well as protecting conservation values; and • Planting of vegetation. * Acknowledge and consult with EPA/DEP regarding the EPA Policy that requires proponents to mitigate against the generation of dust from mine and extraction sites on biophysical environments.	EPA, DME, LG, DRD, CALM	To be implemented via local government local planning strategies. These measures would be part of conditions of approval or licensing. These measures would be part of conditions of approval or licensing.

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
			* A new development adjoining an extractive industry site, or vice versa, to provide appropriate buffers.		Buffers to be identified in local planning strategy or at development approval stage for new extractive industries.
		2. As part of the extraction/ development / mining application the proponent to provide adequate access to mine and extraction sites.	* The location and design of access should consider: • Visual factors - unless specifically directed by local government no direct line of sight into the quarry from any public road; • Safety factors - that is egress and access of vehicles on public roads; • Erosion and drainage factors - where practical, follow the contour and avoid steep slopes wetlands and significant sites of vegetation.	DOT, LG, MfP	Considered at application stage.
		3. Develop environmental management plans for rehabilitation of sites once extraction and mining has ceased.	* Rehabilitation Management Plans to be produced as part of the condition of Extraction Licence or Mining Lease. * Environmental bonds may be required to guarantee acceptable rehabilitation standards are achieved.	DME, EPA, LG	Requirement of Extraction licence or mining lease.
To identify, plan and manage the future extraction of basic raw materials.	It is important to identify future locations of basic raw materials and plan for their extraction prior to the sterilisation of the resource through an incompatible change of land use.	1. Investigate and identify locations of basic raw material resources.	* Any development to take into consideration the Avon Arc Basic Raw Material and Mineral Location Map and Basic Raw Material Policy. * Known resources to be shown in local government planning schemes through location zoning. * Identify the location of basic raw material resources for local usage. * The provisions of the basic raw materials policy to be included in local government town planning schemes. * Extend the basic raw materials policy review to cover the whole of the Avon Arc.The shires of York, Beverley and Brookton to be incorporated into the study area during the next five- year review.	MfP, DME, LG MfP, DME, LGA	WAPC policy position contained in SPP 2.4 Implemented by local government local planning strategies. Completed. Unnecessary. WAPC policy position contained in SPP 2.4 Review of SPP2.4 being undertaken.

			* Continue to identify and record basic raw material resources and document strategic sites.		
Protect the accessibility of basic raw materials resources for development and infrastructure requirements.	An adequate and ready supply of basic raw materials is needed to provide for infrastructure and development opportunity and ensure cost-effective programs of capital and building works.	2. Prepare Local Extractive Industry Plans.	* Local Extractive Industry Plan to be prepared and incorporated into town planning schemes or local laws.	LG, MfP	To be implemented by local government local planning strategies.
			* Proponents to submit Management Plans for particular extractive industry sites.		To be implemented through local government town planning schemes.
		1. Access to known basic raw materials should be protected.	* Identify the location of known basic raw materials resources in local government planning schemes.	LG, DME	To be implemented by local government local planning strategies.
			* Town planning schemes to designate compatible land uses near known resources.		To be implemented by local government town planning schemes.
		2. Where basic raw materials have been identified, encourage staged or sequential development.	* Local governments to liaise with proponents to develop a program outlining the timing of the extraction to avoid sterilisation of the resource.	LG	To be considered by local government at approval stage.
Minimise land use conflicts with mineral and petroleum exploration and mining.	Mining and exploration of minerals is covered by the Mining Act and petroleum by the Petroleum Act. Such mining activities should, wherever possible, be sequentially staged so that development follows the operations. Otherwise valuable mining opportunities will be sterilised.	1. Provide continued access for minerals exploration and extraction on the basis of environmental acceptability.	* Proposals for mining activities which may cause significant environmental impact to be referred to the EPA for consideration.	MfP, DME, EPA, LG	To be implemented by local government town planning schemes.
			* Acknowledge the Memorandum of Understanding between DME and DEP for the referral of mining applications to the DEP that are located 2 km or less from a townsite, conservation areas and wetlands.		To be reiterated in WLUPS.
			* Development to take into consideration the Basic Raw Materials and Mineral Location Map.		To be implemented by local government town planning schemes
			* Show known mineral resource locations on the basic raw material and mineral location map. Periodically review the basic raw materials and mineral location map.		

Strategy	Comment	Guidance for implementation	Issues and actions	Agency	Review/comment
			* Where mineral resources have been identified, encourage the timely exploration of land for mineral resources ahead of development for residential, tourism and conservation areas or other incompatible uses. Consultation to occur between local and State Government officers on sequential development to maximise post-mining benefits. * Encourage the exploration of land within the Avon Arc to identify significant resources. The exploration of resources within the Avon Arc should be expedited to prevent future land use conflicts close to growth areas.	DME, MfP, LGA, DRD	To be implemented by local government local planning strategies. Completed.

Appendix G

Central Coast Regional Strategy – Overview of the policy framework

Policy framework	Comments	Matters for WLUPS/ requiring a WAPC policy position
Settlement		
Population	Population data is outdated. The CCRS recognises the challenges of short term populations (including squatters and holiday home ownership) which are not reflected in ABS figures, but do contribute to demand for services and facilities. The number of squatters contributing to this situation has reduced substantially with two remaining settlements.	Updated population data.
Hierarchy	Includes an established hierarchy of towns in the region which will be incorporated and/or updated by the WLUPS. The WLUPS will consider land needs of this region in more detail in subsequent work via the future preparation of spatial growth plans (beyond 2010). Local planning strategies are also an important mechanism to consider and plan for future land requirements based on growth expectations.	Updated settlement hierarchy. Intention to prepare spatial growth plans for Dandaragan and Gingin in future (2011).
Relationship to metropolitan growth	Considers the impact of metropolitan growth on the future of the central coast. These issues will be included in the WLUPS.	Impact of metropolitan growth on the Wheatbelt.
Squatters	Squatter issues have been largely superseded. All squatter shacks have been removed from Crown reserves in the Shire of Dandaragan. Remaining shacks at Grey and Wedge remain are due for removal during 2011, however this is still subject to ministerial agreement.	Coastal management issues.
Development nodes	Identifies potential coastal development nodes for recreation and tourism activities and commercial fishermen (not suitable for townsites or freehold land release). Includes: Grey, Wedge, and North Head. Recommends development node plans.	Coastal management and development issues, including a position on future development at North Head.
Rural residential	Recognises pressure for rural residential development, and the need for planning via local rural strategies. This matter is addressed via SPP 2.5 as the State policy context for rural residential development and implemented via local planning strategies.	
Commerce and industry	Suggests most local needs can be accommodated within existing towns, although new centres may be required to support emerging horticulture and aquaculture. Proposes a possible new service industry site and aerodrome between Ledge Point and Seabird. Also includes long standing but unresolved proposals for major sites and deepwater ports at Breton Bay or Wilbinga. These proposals are outdated and no longer under consideration.	Intention to prepare spatial growth plans for Dandaragan and Gingin in future (2011). The need for, and potential location of regional/ strategic industrial sites.

Appendix G

Policy framework	Comments	Matters for WLUPS/ requiring a WAPC policy position
Road network	Recognises the importance of Brand Hwy and its role in separating interregional traffic (road trains) from coastal settlements. Issues surrounding the need for and alignment of a coastal road to connect Lancelin to Dongara are superseded by the planning and construction of Indian Ocean Drive (to be completed in 2010).	Updated assessment of the regional road network.
Other infrastructure	Considers the infrastructure needs of the area. This is likely outdated due to subsequent development and growth. Local infrastructure issues would be reflected in local planning strategies.	Updated assessment of the suitability of regionally significant infrastructure.
Defence Training Area	Recognises a continuation of defence training for a ten year period, following which a desire to reassess this as ongoing activity given proximity of residential growth, and a site selection process for alternative sites. Is this superseded?	Any action required by WLUPS?
Resource development		
Agricultural development	Suggests emerging agricultural activity in Dandaragan and Gingin as a result of metropolitan growth. This is considered a major economic opportunity subject to resolution of environmental impacts and soil and water relationships.	WLUPS will identify and advance consideration of horticultural development areas in the Shires of Gingin and Dandaragan.
Fisheries	Recognises the importance of commercial and recreational fishing activity, and the potential for aquaculture development. The information is superseded by changes in fishing policy and the relative economic importance of this activity to the area.	Updated economic activity information and considerations of the infrastructure needs of economic sectors including fishing.
Minerals and BRM	Issues surrounding mineral and basic raw material identification and protection are superseded by the Central Coast Basic Raw Materials Study and a review of SPP 2.4 (BRM) both of which to be implemented via local planning strategies. Recognised potential for alternative and renewable energy developments have occurred in the area since the CCRS. Recognise emerging alternative energy supply opportunities.	Update the policy context and location of regionally important mineral and basic raw materials.
Tourism	The importance of tourism to the area, the need to balance its growth with environmental sensitivities, and the need for supporting infrastructure and facilities are all still relevant matters which can be considered and addressed via local planning strategies.	
Natural environment		
Land environments	Important local features and management challenges can be included in local planning strategies. Regional level natural resource management issues will be updated by the WLUPS.	Updated policy context and natural resource management information.
Marine environment	Identifies a number of marine precincts and associated issues, including management approaches. Consideration of the marine environment will NOT be addressed by the WLUPS, but has been subject to additional consideration via the Jurien Bay Marine Park and work of DEC and the MPRA.	
Coast	Complex issues associated with use and management of the coast are both regional and local. Issues associated with coastal setbacks, facilities and coastal developments are largely superseded by policy changes.	Update policy context and coastal setback considerations.

Maps

Appendix A

Appendix A

Wheatbelt
Regional Profile

Map 1: Study area

See attached A3 pdf file

Appendix A

Map 2: Land tenure

See attached A3 pdf file

Map 3: State planning strategy - Wheatbelt region

See attached A3 pdf file

Appendix A

Map 4: Wheatbelt land supply sub-regions

See attached A3 pdf file

Map 5: Wheatbelt economic resources

See attached A3 pdf file

Appendix A

Map 6: Average rain in Western Australia - Wheatbelt region (1900 - 2007)

See attached A3 pdf file

Map 7: Average rain in Western Australia - Wheatbelt region (1976 – 2005)

See attached A3 pdf file

Appendix A

Map 8: Wheatbelt mining sites and mineral resources

See attached A3 pdf file

Map 9: Environment and culture

See attached A3 pdf file

Appendix A

Map 10: Water resources

See attached A3 pdf file

Map 11: Salinity risk

See attached A3 pdf file

Appendix A

Map 12: Coastal planning - Wheatbelt region

See attached A3 pdf file

Map 13: Landscape character, features and routes

See attached A3 pdf file

Appendix A

Map 14: Transport and infrastructure

See attached A3 pdf file

Map 15: Water infrastructure

See attached A3 pdf file

Appendix A

Map 16: Social and community infrastructure

See attached A3 pdf file