

November 2008

Mid-West infrastructure analysis



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Contents

1	Executive summary	v	6	Demographic considerations	42
1.1	Opportunities and challenges	v	6.1	Population numbers and trends	42
1.2	Summary of recommendations	vi	6.2	Factors involved in estimating population numbers	44
1.3	Key issues requiring attention	vii	6.3	Population and dwellings	45
2	Introduction	1	6.4	Population projections	46
2.1	Introduction to the Mid-West	1	6.5	Sustainability	50
2.2	The need for this study	1	7	Settlement capacity	51
2.3	Scope of work	2	7.1	Geraldton (City of Geraldton-Greenough)	52
2.4	Project methodology	2	7.2	Kalbarri (Shire of Northampton)	57
2.5	Governance and decision-making	3	7.3	Dongara and Denison (Shire of Irwin)	60
2.6	Local government perspectives	3	7.4	Northampton (Shire of Northampton)	63
3	Regional resource overview	6	7.5	Green Head (Shire of Coorow)	66
3.1	Major resource projects	6	7.6	Leeman (Shire of Coorow)	69
4	Infrastructure evaluation	13	7.7	Horrocks (Shire of Northampton)	72
4.1	Oakajee estate	13	7.8	Gregory (Shire of Northampton)	75
4.2	Transport	14	7.9	Mullewa (Shire of Mullewa)	78
4.3	Aviation	20	7.10	Mingenew (Shire of Mingenerew)	81
4.4	Water	21	7.11	Three Springs (Shire of Three Springs)	84
4.5	Energy	24	7.12	Eneabba (Shire of Carnamah)	87
4.6	Communications	28	7.13	Morawa (Shire of Morawa)	90
4.7	Social and community infrastructure	29	7.14	Perenjori (Shire of Perenjori)	93
5	Land supply and development activity	33	7.15	Yalgoo (Shire of Yalgoo)	97
5.1	Residential	33	7.16	Carnamah (Shire of Carnamah)	99
5.2	Industrial	37	7.17	Population data – other Mid-West centres	101
5.3	Infrastructure corridors	40	8	References	102
5.4	Oakajee-Narngulu corridor	40	9	List of acronyms used in this report	103
5.5	Tourism and recreation	41	10	List of submissions received	104

Tables & maps

Table 1	Summary of recommendations	vii
Table 2	Future infrastructure projects identified for the Mid-West	xiv
Table 3	Summary of Mid-West resource projects (committed/under consideration)	9
Table 4	Weld Range direct shipping iron ore project	10
Table 5	Karara magnetite project	11
Table 6	Coolimba power project	12
Table 7	Mid-West road user table	18
Table 8	Mid-West highest priority road projects	19
Table 9	Public water reserves in the Mid-West	22
Table 10	Water requirement per project per annum	23
Table 11	Future profile of Geraldton Hospital – Regional resource centre	29
Table 12	Area of developed and undeveloped residential zoned land	34
Table 13	Area of developed and undeveloped industrial zoned land	37
Table 14	Estimated resident populations	42
Table 15	Regional population numbers	43
Table 16	Population and dwelling counts Mid-West local governments	45
Table 17	Population projections by local government	46
Table 18	Direct and indirect workforce assumptions	47
Map 1	Mid-West settlement hierarchy	
Map 2	Major resource locations	
Map 3	Mid-West services	
Map 4	High priority road projects	
Map 5	Water Corporation network	

Figures

Figure 1	Power supply and demand based on natural growth load 1997 to 2016	26
Figure 2	Conditional approvals – residential lots 1997-98 to 2006-07	35
Figure 3	Final approvals – residential lots 1997-98 to 2006-07	35
Figure 4	Building approvals 2001-02 to 2006-07	36
Figure 5	Conditional approvals – industrial lots 1997-98 to 2006-07	39
Figure 6	Final approvals – industrial lots 1997-98 to 2006-07	39
Figure 7	Mid-West Population Projections - Various Options	49

1 Executive Summary

1.1 Opportunities and challenges

The purpose of this study is to provide government with recommendations to address the critical infrastructure issues currently facing the Mid-West, and issues that are anticipated by industry and local communities. The report also examines and provides broad estimates for factors such as employment, population and social infrastructure, which may arise as a result of direct and indirect impacts of resource industry growth in the region.

The economy of the Mid-West is primarily based on the mining, agriculture, fishing and tourism industries and makes a significant contribution to the Western Australian economy. The global resources boom underpinned by solid global economic growth and robust demand from China for the State's major commodities has resulted in significant resource-based business opportunities in the Mid-West. A number of major Western Australian commodities have experienced large price increases, for example, iron ore and grain.

While it is important for the region to capitalise on new business opportunities, in any economy diversification plays an important role in shoring up the ability to respond and accommodate challenges. Importantly, there will be a need to find diversification in the mining industry, and more broadly across the economy as a whole, over the medium to long term.

With the proposed development of the Oakajee deepwater port and industrial estate (driven by the high volume hematite iron ore projects), it is anticipated that significant activity surrounding this new port will inadvertently place increasing pressure on existing townsites. It is anticipated that Geraldton, in particular, will need to cater for this growth, as it is currently the population hub for the region.

Geraldton plays an important role in the provision of essential services and social infrastructure for the greater Mid-West region and will, more importantly, continue to do so with the emergence of new projects in the surrounding areas. A number of inland local governments also consider that the anticipated resource developments in the region could be leveraged to attract new employment and business opportunities to existing towns.

With new major projects comes an increase in the regional workforce, and this potential workforce will have a direct impact on the size of the regional population. The effect on the local communities will predominantly be gauged by the proportion of the use of fly-in-fly-out workers in comparison with the number of resident employees. This study has attempted to analyse the real impact of this perceived growth.

The bulk of the current iron ore mines in the Mid-West are located in relatively close proximity to the main regional centres located on the coast such as Geraldton, Greenough and Dongara. This, in itself, raises the question as to whether there is a necessity for the upgrade of these urban centres in order to allow them to become a residential hub for existing and prospective mine workers. Mining employees, who may normally be on a fly-in-fly-out basis from Perth, can be attracted to reside in such towns. The attraction of being located at driving distance to their workplace, coupled with having access to the range of facilities to which they have become accustomed, would mean that Geraldton (amongst other coastal Mid-Western towns) could become the new base for drive-in-drive-out and fly-in-fly-out workforces in the Mid-West region and, dependent on its infrastructure capacity, the north-west of the state.

This study examines some of the existing and planned projects, both resource and infrastructure based in the Mid-West region and the respective impacts they will have on the economies of their relevant shires, the region and the state of Western Australia. It also includes an analysis of the likely growth paths in Mid-West towns and settlements.

In determining the infrastructure requirements, assistance has been sought from servicing agencies. Many of the agencies have developed infrastructure plans for the region, and these documents will be referenced throughout this study. Further input has been received from the WAPC's Infrastructure Coordinating Committee.

The areas examined in this report include the following:

- transport: public transport, aviation, ports and roads;
- water: potable supply and distribution, alternative sources and sewerage;
- energy: electricity distribution, alternative generation, gas supply and distribution and policy factors;
- communications: telecommunications, policy issues, ie broadband network;
- social and community: health, education, social services, housing and community infrastructure;
- land supply: industrial and residential land supply; and
- settlement: settlement capacity and revitalisation.

1.2 Summary of recommendations

When considering the future of the Mid-West, it is imperative to appreciate that the region's economy is predominantly based around export markets. This places significant emphasis on the freight routes throughout the Mid-West and the need for land to be used in a manner which does not inhibit the optimal use of the port facilities in the region. For a more cohesive road and rail system to be implemented the key will be strong collaboration between individual proponents who share the common interest in development of the region.

There is mounting need for the Mid-West infrastructure solution to be managed and implemented using methodologies which integrate both private and public contribution. This will ultimately work to avoid delays in the implementation of the works, which are currently being experienced, and also to ensure that the maximum amount of lead-time is exploited for the acquisition of resources and funding for all relevant parties.

With the increasing awareness of the crucial nature of ensuring sustainability in infrastructure and development, there needs to be a more balanced view of the social aspect in this particular planning process. Significant emphasis on the economic and environmental aspects does, indeed, work towards achieving a sustainable future for the Mid-West region. When projecting potential industrial growth and its impacts on a specific region, the impact on local communities must be given further consideration. The flow-on effects of potentially prosperous activities in the region should provide social benefits to the subsequent growing population base.

Consultation with key local government contacts in the Mid-West region allowed on-ground perspectives of critical stakeholders to be examined. With a coastal shift of the Mid-West population being experienced, particularly over the preceding ten years, shires with declining counts of usual residents are concerned with the implications of this trend.

With reference to the demography of the region, it seems highly viable that the shires of Geraldton-Greenough and Irwin will provide the base for the majority of population expansion in the Mid-West region. The current service accessibility, residential potential and benign climate of these local government areas, would mean that workers with operations based in the greater Mid-West region could engage in a fly-in-fly-out or drive-in-drive-out arrangement to their respective mines and base their usual residence in these coastal localities.

Should rapid development occur in the Mid-West, government needs to ensure that any preventable barriers to entry are identified, isolated and addressed. In particular, state government departments will need to assess scheme amendments, rezoning applications and structure plans in a timely manner.

1.3 Key issues requiring attention

- 1 Heavy rail transport is critical for some large mining projects and the development of a robust rail network will be instrumental to the prosperity of current and future resource projects.
- 2 Establishment of rail and infrastructure corridors, including detailed alignment planning, land acquisition and assembly.
- 3 Future water supply and associated infrastructure requirements for the hematite and magnetite projects are uncertain.
- 4 Power supply has been identified as inadequate by several local government authorities. This has the potential to act as an impediment to additional growth and development without ongoing attention.
- 5 Parts of the road network throughout the region require upgrades based on current condition and with ongoing and increased numbers of heavy vehicles, this will be exacerbated.

- 6 Uncertainty regarding the full scale of resource operations, and actual population growth rates, means that the demonstrated need for government investment will remain a contentious issue.
- 7 Strategic planning support has not kept pace with the increased volume of statutory planning applications.
- 8 A number of inland towns have declining populations and are hoping to gain economic growth as a spin-off from resource development in the region. It is not clear how growth in this sector will influence these towns.

In setting out to analyse future options three scenarios were originally developed. These involve:

- Only upgrading services as and when major project commitments are made.
- Maximising existing networks and bringing Oakajee into play as an iron ore port for foundation users.
- Growth of foundation customers' throughput and additional business for the Oakajee iron ore facilities together with new projects on the Oakajee industrial estate.

Consultation with relevant stakeholders in the Mid-West region identified that the three scenarios did not necessarily summarise the range of possible development options.

A more realistic medium-term development projection would be to ensure that the existing core transport infrastructure, particularly rail, roads, port, and social infrastructure, are upgraded and maintained, and further strategic planning for the urban and industrial growth is undertaken. It is also recommended that processes to acquire land for necessary infrastructure corridors proceed as a priority.

Table 1
Summary of recommendations

Issues	Recommendation	Responsible Agency or Group	Required Timeframe
Power			
<ul style="list-style-type: none"> Forecast electricity load is expected to exceed supply by 2009-10 without new transmission capacity. Uncertainty regarding new mining proposals in the Mid-West is an impediment to more detailed planning for supply and distribution of electricity. Some mining proposals require new power generation to be developed. There is potential for the private sector to provide significant base load power supplies for the region should Aviva's Coolimba coal-fired power station at Eneabba proceed. Gas supply from the Perth Basin has fallen and as a result new gas supplies will need to come from gas pipelines that traverse through the region. Oakajee Industrial Estate may ultimately need gas for major new projects. There is currently no supply but a corridor has been acquired. 	1 A power demand assessment for the proposed Oakajee Port and Industrial Estate is undertaken as a matter of priority so that planning and budgeting for power requirements and a distribution line can be undertaken.	LandCorp	2008-10
	2 Take steps to ensure a 33 kV distribution line from the Chapman Valley substation to Northampton is established, and subsequently reinforce the distribution system to Kalbarri.	Western Power (WP)	2008-11
	3 Investigations of future gas requirements should occur to determine an effective approach to provide an adequate gas supply to meet the demands of the growing resource industry in the region.	DBP/Alinta	2009-10
	4 The construction of the 330 kV transmission line from Perth to Geraldton (recently announced by Government) should occur in a timely manner to ensure that the region is provided with an adequate power supply prior to major resource projects coming online.	WP	End 2009-2011
	5 Investigate an appropriate site (existing or proposed) for a substation to service the future magnetite projects operating at Geraldton Port as a matter of priority.	WP	2008-09
	6 Complete the construction of a 132 kV transmission line between the chosen substation site and the Geraldton Port as a matter of priority. Ensure that commercial arrangements are put in place for supply of power for new magnetite operations that are due to come online in the near future.	WP	2008-09
	7 Ensure that development proposals for new private sector power generation and distribution projects are processed in a timely manner.	Department for Planning and Infrastructure (DPI)/Local government (LG)	Ongoing

Issues	Recommendation	Responsible Agency or Group	Required Timeframe
Water			
<ul style="list-style-type: none"> Water availability will be a significant issue for parts of the iron ore industry. Growth of settlements will increase pressure on water supply and requires ongoing attention. There are 24 public drinking water source areas in the Mid-West. Some infrastructure, such as power stations or major roads, may not be compatible land uses in these areas. Allocation of potable water for some industrial purposes, ie slurry pipelines, is a contentious issue in the region. 	8 Develop a Mid-West water plan to guide sustainable water allocation for future potable and non-potable water uses.	Department of Water (DoW)	2010
	9 Ensure that land use planning recognises the importance of protecting public drinking water source areas.	DPI/DoW/LG	Ongoing
	10 Ensure that land use planning recognises the importance of protecting corridors and buffers required to support conveyance of water to its required destination, land areas for waste water treatment and return of water to the environment.	DoW	2010
	11 Investigate alternative water supplies (eg recycled, water desalination) for potable and non-potable water supplies and water use efficiency measures for the region, as a matter of priority	DoW	Ongoing
	12 Investigate the potential quality and quantity of water that can be extracted from the Casuarina aquifer to supply the Mid-West with drinking water and water for commercial purposes.	DoW	2009-10
Rail			
<ul style="list-style-type: none"> There is uncertainty over who will ultimately construct and operate major new rail infrastructure in the Mid-West. Proposed new rail routes to Oakajee and connections to Nangulu need to be identified and steps put in place to secure the corridors. Upgrading of the existing rail network is required to accommodate Stage 1 iron ore transport requirements. 	13 Prompt selection of a rail infrastructure provider(s) is paramount in order to allow for the commencement of the development of Oakajee and the realisation of key mining projects.	DPI/private rail infrastructure providers	2008-09
	14 Support the development of a robust and high performing rail network that maximises its use.	DPI/private rail infrastructure providers	2008-12
	15 Ensure that land use planning will enable corridors to be identified and secured ahead of need.	DPI/LG	Ongoing

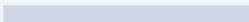
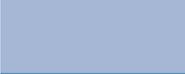
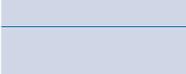
Issues	Recommendation	Responsible Agency or Group	Required Timeframe
Roads			
<ul style="list-style-type: none"> The geographically dispersed nature of the mineral deposits in the region represent a great challenge, particularly in the context of current and potential transport requirements of industry. Extensive road haulage of iron ore is viewed as a serious issue to local groups in the Mid-West, and it is widely accepted that the implementation of an effective rail network is pivotal to the region's development. Severe pressure on the road network in the region will be at peak level during the construction phase of major projects. Ongoing demands on this key infrastructure will warrant the need for significant investment in maintenance and upgrade. The development and implementation of a rail network will assist in the alleviation of pressure on the road network. 	16 Ensure that priority projects identified in the regional road network plan are implemented in a timely manner to ensure that conflict between residential, tourist and the growing freight traffic is minimised.	Main Roads Western Australia (MRWA)	2008-15
	17 Prioritise the realignment of the North West Coastal Highway at Northampton to allow for through freight traffic to bypass the town centre.	MRWA	2010-12
	18 Prioritise the upgrade of sections of the Geraldton-Mount Magnet road east of Mount Magnet to accommodate the increasing heavy haulage traffic.	MRWA	2010-12
	19 Prioritise the initiative to increase the pavement width of Mullewa Road between Mullewa and Perenjori townships.	MRWA	2009-10
	20 Ensure that the primary road network (ie roads such as the Brand Highway) are maintained to a standard that will support mining and agriculture requirements, as well as meeting the needs of general traffic in the region. Upgrading of these roads should be in preference to other roads where freight can be directed to rail.	MRWA	Ongoing

Issues	Recommendation	Responsible Agency or Group	Required Timeframe	
Land				
<ul style="list-style-type: none"> Narngulu Industrial Estate is reaching capacity in terms of noise and air quality, and it is highly likely that land in this estate will only be available to benign industries. Land will be required for infrastructure (services) corridors, rail reserves and road reserves. Priority forward planning is required to identify and secure corridors ahead of the time when they will be required. Strategic land use planning needs to keep pace with developments, including the identification of industrial and residential land requirements in regional towns. 	21	Prioritise the establishment of a Stage 1 Industrial Estate at Oakajee for general and light industrial uses.	LandCorp/ DPI/LG	Ongoing
	22	Planning for land requirements for the Oakajee/Narngulu infrastructure corridor requires immediate action. The Oakajee project is expected to be completed by approximately 2011-12. The time required to implement the establishment of the corridor (ie consultation, rezoning, land purchase) needs to be factored into delivery of port and rail timeframes. It is recommended that detailed planning for the optimum corridor alignment is carried out immediately and that investigations into the process to create the corridor (ie State Agreement, Rail Enabling Act) is undertaken as a priority.	DPI	2008-12
	23	Land and facilities to support large new infrastructure projects, such as the Aviva Coolimba power station proposal, need to be recognised in town planning schemes.	Government service agencies	2008-12
	24	Plan for sites that may accommodate appropriate housing suitable for fly-in-fly-out and drive-in-drive-out workers.	DPI/LG	2008-09
Social and Community Services				
<ul style="list-style-type: none"> Medical services in some inland regional areas are reported to be under pressure. Western Australia Police have indicated that their strategic planning for the region should ensure that their forecast resources would be adequate to cater for expected growth. 	25	Continue to work with community service providers to ensure the supply of services continues to meet future demands. For example, ensure the upgrades to the Geraldton Hospital and regional medical facilities occur as planned and in accordance with needs.	Government service providers	Ongoing
	26	Continue the investigation of potential education improvements for the Greater Geraldton Region, with particular emphasis on providing training facilities relating to the resource industry.	Department of Education and Training (DET)	Ongoing

Issues	Recommendation	Responsible Agency or Group	Required Timeframe
Environment and Policy			
<ul style="list-style-type: none"> • The environmental impacts of cumulative mining activity in the Banded Ironstone Formation ranges of parts of the Mid-West is recognised as an important factor in the future viability of some mining operations. • Emerging issues associated with climate change adaption and mitigation are rapidly becoming a reality. • At present there is no formal legislative mechanism for creating an infrastructure corridor. Most existing services corridors are not created by an Act of Parliament, but rather by individual actions, ie proclamation of a main road, creation of easements on subdivision plans. One exception is the creation of a railway, which ordinarily requires a special Act of Parliament to be passed. 	27 Investigate additional resourcing opportunities to assist State and local governments to undertake strategic and statutory planning to facilitate future growth.	DPI/LG	2008-10
	28 The environmental approval processes represents a significant barrier to entry for prospective mining proposals. There is a need to increase resources and fast track major projects.	Department of Environment and Conservation (DEC)	Ongoing
	29 In future, consideration may need to be given to how infrastructure investment is responding to climate change adaption and mitigation.	Government agencies/LG	Ongoing
	30 The mechanism for creation of an infrastructure corridor, the power to allocate space in the corridor and the processes under which land is acquired may require further attention by government.	DPI/ Department of Industry and Resources (DOIR)	2008-10
	31 Formulate a sustainability framework and/or policy to ensure social economic and environmental benefits are delivered.	DPI/DEC/ DOIR	Ongoing

Issues	Recommendation	Responsible Agency or Group	Required Timeframe
General			
<ul style="list-style-type: none"> • There is considerable uncertainty regarding the future development of major new mining projects, the scale of development and population impacts. Several scenarios are possible, which could ultimately lead to structural change in the composition of the resident population. • Mid-West infrastructure solutions should be managed and implemented using methodologies which integrate both private and public contribution. This will ultimately work to avoid delays in the implementation of the works. • Major proponent funded infrastructure is dependent on the timing of major project development. Many of the current iron ore operations are currently running on marginal revenue. 	<p>32 Accurately present and market regional settlements that are actively seeking to attract economic opportunities via mining developments.</p>	<p>Mid West Development Commission (MWDC)</p>	<p>Ongoing</p>
	<p>33 Servicing/planning authorities need to be aware that temporary accommodation to provide for up to a 2000 strong construction workforce associated with the Oakajee development will need to be factored into any service planning for this development. Other settlements may also be required to house substantial temporary construction workforces.</p>	<p>Government service agencies/LG</p>	<p>2009-12</p>
	<p>34 Industry has a role to contribute to infrastructure requirements of the region. State and local government need to consider ways to encourage private sector investment in a range of infrastructure projects.</p>	<p>Private sector</p>	<p>Ongoing</p>
	<p>35 Should the forecasted (labour intensive) major mining developments eventuate, then consideration should be given to more detailed re-evaluation of the region's population projections and any emerging structural changes in the residential population.</p>	<p>DPI/LG</p>	<p>Ongoing</p>
Tourism and Recreation			
<ul style="list-style-type: none"> • Need to plan for potential tourist needs to cater for growth and interest in the region. 	<p>36 A growing number of resource sector workers are provided with week-long relief breaks on average, every 3 to 4 working weeks. The collaborative investigation of additional tourism and recreational sites/facilities should be carried out to ensure that the already stretched tourist accommodation facilities are not overwhelmed by this new foreseeable demand.</p>	<p>DPI/LG</p>	<p>Ongoing</p>

Table 2
Future infrastructure projects identified for the Mid-West

Project		Delivery Timeframe		
		2008-09 to 2012-13	2013-14 to 2017-18	2018-19 +
Funded by the private sector				
Funded by government				
Rail				
1	Rolling stock upgrades to meet projected tonnages of the Stage 1 iron ore projects			
2	Rail infrastructure upgrades to meet projected tonnages of the Stage 1 iron ore projects			
3	Geraldton Port capital costs to meet projected tonnages of the Stage 1 iron ore projects			
4	Development of new rail lines to transport ore from N-E mine sites to the proposed Oakajee Port (25.0 mtpa +)			
Road				
5	Realignment of the North West Coastal Highway at Northampton			
6	Upgrade of sections of the Geraldton-Mount Magnet Road west of Mount Magnet			
7	Increase the pavement width of Mullewa Road between Mullewa and Perenjori			
8	Stage 2 of the Geraldton southern transport corridor			
9	Geraldton Outer Freight Bypass			
10	Fencing – parts of Great Northern Highway between Mount Magnet and Newman			
11	Construct dual carriageway along North West Coastal Highway			
12	Widen seal – Wubin Mullewa Road			
13	Widen seal – Chapman Valley Road			
14	Realign Greenough S-Bend on Brand Highway			
15	Realignment of Brand Highway at Pell Bridge			
16	Oakajee Port Access realignment at North West Coastal Highway			
17	Realign Geraldton-Mount Magnet Road through Mullewa townsite			
18	Construct passing lanes along Brand Highway and various other upgrades			
19	Development of Oakajee industrial estate – Capital Works – Roads (Highway intersections)			
20	Development of Oakajee industrial estate – General Industry – Roads (Highway intersections)			

NOTE:

The projects in this table have been assembled based on consultation with infrastructure providers, and assessed by the WAPC, as actions required to support resource activity in the Mid-West region. Delivery timeframes are indicative only and should not be interpreted as committed and or funded projects. Project delivery is subject to government prioritisation processes.

Project		Delivery Timeframe		
		2008-09 to 2012-13	2013-14 to 2017-18	2018-19 +
Funded by the private sector				
Funded by government				
Port				
21	Complete upgrade of the existing train unloader at the Geraldton Port			
22	Development of new berths and loading facilities at the Geraldton Port			
23	Development of new Oakajee deepwater port to handle foundation customers			
Public Transport				
24	New bus/coach public transport depot to support growth in the Greater Geraldton Region			
Water and Wastewater				
25	Potential to construct a desalination plant in the Oakajee estate			
26	Investigation and subsequent development of borefields (ie the Casuarina sub-area) should this resource be required for industry or other uses			
27	Development of water supplies to support growth of inland towns and construction camps as demand requires			
28	Prepare a regional water plan for the Mid-West			
29	Infrastructure to support slurry transport of iron ore from mine sites, to Geraldton Port			
30	Development of Oakajee industrial estate – General Industry – water			
31	Development of Oakajee industrial estate – Capital Works – wastewater treatment plant			
32	New sewerage treatment plants north and south of Geraldton town centre to cater for growth of new residential areas			
33	Development of Oakajee industrial estate – General Industry – sewerage			
34	Site investigation for future wastewater treatment plant at Kalbarri			
Electricity and Gas				
35	New 132 kV transmission line from Geraldton to Northampton, with upgrade of section to service first stage Oakajee Port users			
36	Link new Nargulu west extension to Geraldton substation – Install ~12 km 33 kV line			
37	Construction of a 330 kV transmission line from Perth (Pinjar) to Geraldton			
38	New 132 kV substation and double circuit 132 kV line to service the future magnetite projects operating at Geraldton Port			

NOTE:

The projects in this table have been assembled based on consultation with infrastructure providers, and assessed by the WAPC, as actions required to support resource activity in the Mid-West region. Delivery timeframes are indicative only and should not be interpreted as committed and or funded projects. Project delivery is subject to government prioritisation processes.

Project	Delivery Timeframe		
	2008-09 to 2012-13	2013-14 to 2017-18	2018-19 +
Funded by the private sector			
Funded by government			
39 132 kV or 330 kV transmission line from Moonyoonooka to Oakajee			
40 New transmission lines, ie to Gindalbie, to support magnetite mining operations			
41 Private (Aviva/Coolimba power plant) in the Eneabba area (400 mW)			
42 Establish new substation in Southern Geraldton (at Rudds Gully) supplied by new 132 kV double circuit line			
43 132 kV single circuit line from Rudds Gully to Moonyoonooka			
44 Resupply Regans substation			
45 Establish new substation at Dongara with 132 kV line			
46 Establish new substation at Drummond			
47 Establish new substation at Northampton			
48 Establish new substation (450 mW) at Oakajee			
49 New 330 kV terminal station at Eneabba - (also required for Gindalbie project)			
50 Conversion of the second Neerabup to Moonyoonooka line circuit to operation at 330 kV			
51 Establishment of new 330/132 kV terminal station at Badgingarra			
52 Establish substation at Three Springs to supply Extension Hill Pty Ltd			
53 New substation at Jurien Bay with 132 kV line			
54 Construction of a new double-circuit Eastern Terminal - Three Springs (ET-TST) 330 kV line			
55 New 132 kV double circuit line from Moonyoonooka to Wizard Peak, with new 132/33 kV substation at Wizard Peak			
56 Establish a new 132/11 kV substation at Glenfield			
57 Establish a new 132/11 kV substation at Buller			
58 Development of Oakajee industrial estate - power			
59 Gas capacity increase for Dampier to Bunbury pipeline, other potential pipelines and feeder line upgrades to support mining and industry developments in the region			
60 Extend the Dampier to Bunbury natural gas pipeline to Oakajee			
Communications			
61 Installing a telephone exchange and mobile base station at the Oakajee industrial estate			
62 Mobile phone coverage and ADSL broadband for towns such as Yalgoo to support mining related activity			

NOTE:

The projects in this table have been assembled based on consultation with infrastructure providers, and assessed by the WAPC, as actions required to support resource activity in the Mid-West region. Delivery timeframes are indicative only and should not be interpreted as committed and or funded projects. Project delivery is subject to government prioritisation processes.

Project		Delivery Timeframe		
		2008-09 to 2012-13	2013-14 to 2017-18	2018-19 +
Funded by the private sector				
Funded by government				
Social Infrastructure				
63	Ensure Fire and Emergency Services Authority (FESA) have enough resources and infrastructure to cater for expected growth			
64	Other community services to meet future demands			
65	Ensure health infrastructure and services have enough resources to cater for expected growth			
66	Planned health replacement facility – Kalbarri			
67	Planned health replacement facility – Dongara			
68	Small hospital/health service essential upgrades			
69	Replacement of nursing post – Yalgoo			
70	Replacement of nursing post – Mount Magnet			
71	Geraldton Stage 2 Hospital/Health Service			
72	New Works – Ambulatory Care – Expansion of services			
73	New Works – Child care – Geraldton			
74	New Works – Aged care upgrades			
75	New Works – Teaching and Training			
76	New Works – Medi Hotels			
77	New Works – Renal dialysis			
78	New Works – Drug and alcohol			
79	New Works – Mental health inpatient unit Geraldton			
80	New Works – Co-location of GP practices on hospital/health service site – Geraldton			
81	New Works – Nursing home partnerships – Kalbarri/Dongara			
82	New Works – Specialty centres, health education facility – Geraldton Hospital/Health Service			
83	Capital investment – Mount Magnet Police Station			
84	Capital investment – Cue Police Station			
85	Capital investment – Three Springs Police Station			
86	Capital investment – Mullewa Police Station			
87	Capital investment – Yalgoo Police Station			
88	Capital investment – Northampton Police Station			
89	Capital investment – Kalbarri Police Station			
90	Capital investment – Mingenew Police Station			
91	Capital investment – Morawa Police Station			
92	Capital investment – Dongara Police Station			

NOTE:

The projects in this table have been assembled based on consultation with infrastructure providers, and assessed by the WAPC, as actions required to support resource activity in the Mid-West region. Delivery timeframes are indicative only and should not be interpreted as committed and or funded projects. Project delivery is subject to government prioritisation processes.

Project	Delivery Timeframe		
	2008-09 to 2012-13	2013-14 to 2017-18	2018-19 +
Funded by the private sector			
Funded by government			
93 Capital investment – Geraldton/Mid-West Gascoyne District Police Complex major refurbishment and expansion			
94 Capital investment – Meekatharra Police Station			
95 Capital investment – Perenjori Police Station			
96 Capital investment – Carnamah Police Station major refurbishment			
97 Capital investment – Leeman Police Station major refurbishment			
98 Ensure appropriate education and training facilities relating to the resource industry are provided.			
99 Geraldton Secondary College – upgrade Stage 2			
100 Dongara District High School – additions			
101 Central West TAFE Engineering facilities			
Corridors and Land			
102 Cost of land for Oakajee/Narngulu infrastructure corridor and new rail corridors to mine sites	Cost sharing arrangement		
103 Cost of land for slurry pipeline corridors from mines to the Geraldton Port	Cost sharing arrangement		
104 Development of Oakajee industrial estate – structure planning			
105 Development of Oakajee industrial estate – environmental costs			
106 Development of Oakajee industrial estate – subdivision professional fees			
107 Development of Oakajee industrial estate – Capital Works – landscaping			
108 Development of Oakajee industrial estate – General Industry – drainage			
109 Land for government utilities to service residential growth driven by resource developments			
110 Cost of acquiring land for industrial purposes in close proximity to urban centres			
111 Cost of acquiring land for gas corridors			
Policy			
112 Cost of statutory clearances required such as Mining clearance under section 16(3) of the Mining Act 1978, environmental clearances and rezoning appeals			
113 Temporary accommodation for construction workforce associated with the Oakajee development and other projects			
114 Cost to government to cover salaries and consultancy fees in establishing Oakajee			
115 Support for local government, ie Shire of Chapman Valley, for next two years to cover increased workload that Oakajee will generate			

NOTE:

The projects in this table have been assembled based on consultation with infrastructure providers, and assessed by the WAPC, as actions required to support resource activity in the Mid-West region. Delivery timeframes are indicative only and should not be interpreted as committed and or funded projects. Project delivery is subject to government prioritisation processes.

2 Introduction

2.1 Introduction to the Mid-West

The Mid-West region is comprised of 18 local government authorities and covers an area of approximately 472 336 kilometres (including offshore islands), which is almost one fifth of the area of Western Australia. The region extends along the coast starting from Green Head, south of Dongara to the border of the Gascoyne region, north of Kalbarri. The Mid-West also extends over 800 kilometres inland where it borders the north-east Pilbara region. The great expanses of the region encompass a diverse range of landscape, and incorporate a variety of land uses. Map 1 shows the study area and its major characteristics.

The demographic make-up of the Mid-West is directly related to the respective land use of the areas making up the region. The coastal areas of the region, which exhibit higher rainfall patterns, provide more support to the agriculture sector. This results in higher populations, which are serviced by larger service centres (Geraldton, Dongara, Greenough and Northampton). The population of the Mid-West is approximately 52 000 people, of which approximately 35 000 live in the City of Geraldton-Greenough.

2.2 The need for this study

The Mid-West region has a number of iron ore deposits. Up to this point it has not been economic to develop these deposits due to their relatively small size and low quality of ore compared to deposits in the Pilbara region. China's ongoing steady demand for raw materials now means that development of the Mid-West iron ore industry is economically viable. This increase in demand, coupled with the ongoing stability of the state's already existing export markets, has led to an unprecedented call for the region to play a more significant role in servicing Australia's

trade partners. The area of the Mid-West most affected by this growth is likely to be Greater Geraldton (City of Geraldton-Greenough and Shire of Chapman Valley), adjacent coastal shires (Northampton and Irwin), and to a lesser extent, inland towns.

The growth of the resources sector in the Mid-West is somewhat limited by the current state of the infrastructure in the region. Based on a number of pre-feasibility study predictions, there is significant growth potential for iron ore based developments in this region, but for these plans to come to fruition, a number of significant infrastructure constraints must be addressed.

The present lack of accessibility to critical infrastructure in the region can present a significant barrier to entry for industry. The current world market clearly highlights the increased demand for iron ore, and the potential inability of operations in the Mid-West region to produce and transport material at projected capacity, could present consequences to the economy of Geraldton and the Mid-West.

The purpose of this study is to provide the State Government with recommendations to address the critical infrastructure issues currently facing the Mid-West, and issues that are anticipated by industry and local communities. It will also examine and provide broad estimates for factors such as employment, population and social infrastructure, which may arise as a result of indirect impacts of industry growth in the region.

2.3 Scope of work

A number of the indicators used in this study are based on predictable elements such as future mining operations, commissioned infrastructure enhancements and other quantitative and qualitative measures. There are numerous factors that will potentially impact on the future of the region which are outside of the scope of this report. Factors such as the world economy, environmental issues and ongoing advancements in technology, all represent elements which have an influence on future planning and provide challenges in predicting impending growth in particular regions.

A snapshot of the current status of the region forms the basic foundation in which future growth and development can be based upon. This snapshot works on the premise that the basic structural dynamic of the Mid-West involves a number of shires circling Geraldton, while being serviced by this urban, regional and well-serviced hub.

Population growth in the Mid-West will be examined based on a combination of factors. Impacts such as committed future resource projects, planned and projected residential development, continuing agricultural decline and other relevant projects in the region all have a significant bearing on the demography. The demographic information currently available from WAPC and the Australian Bureau of Statistics has been used as base information.

The population projections of the region that will be examined are not necessarily forecasts that will predict the future, but are more "what if" scenarios based on assumptions on activity in the region. It can be assumed that future trends in fertility, mortality and migration (cohort component method) have been factored into the current projected population figures, which are readily available from the above named agencies and will not be considered as part of this study.

When projecting population, or in making assessments on economic contributors to growth in a specified region, the shorter the projection period, the more reliable the projection. A key objective of this report is to identify potential growth centres based on three potential growth options. The scenarios are as follows:

- only upgrading services as and when major project commitments are made;
- maximising existing networks and bringing Oakajee into play as an iron ore port for foundation users; and
- growth of foundation customers' throughput and additional business for the Oakajee iron ore facilities, together with new projects on the Oakajee industrial estate.

The three scenarios named above are based on developments occurring by 2012, or commencing shortly thereafter. The findings of this report can assist service delivery agencies to make decisions based on the forecast growth scenarios and to determine new infrastructure investment to meet service provision requirements.

2.4 Project methodology

Much of the information contained in this report is the direct result of stakeholder consultation and literature review and analysis. Several industry contacts viewed the scenarios as incremental development in the region and although being presented with the specific growth options, stakeholders, particularly service providers, regional development groups and industry associations, outlined their current planning focus and their perceptions of gaps in infrastructure in the region as it relates to their operations and interests.

This study involves three critical tasks undertaken throughout the development of this final report and have been identified as follows.

2.4.1 Collection, research and review of existing relevant information

This report is primarily involved with the preliminary research work, including, but not limited to, the collection and analysis of key demographic and other data based on the scenarios provided by DPI.

From this analysis, estimates of key indicators in the region have been provided, and infrastructure requirements determined based on these estimates. This stage included consultation with service delivery agencies combined with the examination of various existing data sources. The information gathered included areas such as transport, water and energy.

2.4.2 Strategic infrastructure analysis

This section involves the examination of the direct and indirect impact on local communities based on expansion of the resource sector in the Mid-West region and the investigation of the real infrastructure requirements based on the dynamics of the projects in the region, for example fly-in-fly-out ramifications.

2.5 Governance and decision-making

There are a number of committees and reference groups that advise or make decisions on matters affecting the Mid-West. These are as follows.

- Townsite Development Senior Officer's group (advises Ministerial Council on priorities for LandCorp projects).
- Infrastructure Co-ordinating Committee (advisory committee of the WAPC).
- Mid-West Strategic Infrastructure Group (information sharing committee coordinated by Mid West Development Commission).
- Oakajee Port and Rail Reference Group (DPI group, reports to Oakajee Project Director and ministerial level).
- Statutory Planning Committee (WAPC committee, determines subdivisions and recommends to the Minister on schemes and scheme amendments).

There is no one group with oversight of all the initiatives and activities taking place in the Mid-West.

2.6 Local government perspectives

To achieve a greater understanding of the issues facing local communities and any perceived gaps in infrastructure that currently exist or have the potential to develop, local government representatives were contacted. The received responses are summarised below.

2.6.1 Common Issues between the local governments

A number of common issues have been identified that affect most local governments in the Mid-West, including:

- aging road network and impact of heavy vehicles through townsites;
- capacity of existing essential service infrastructure to cater for growth;
- ability of inland towns to attract new residents and businesses; and
- local government planning resources to support future growth arising as a result of the construction of a deepwater port at Oakajee.

2.6.2 City of Geraldton-Greenough

The City covers an area of 1798 square kilometres and its seat of government is the town of Geraldton. In 2007 the amalgamation of the former City of Geraldton and Shire of Greenough formed the City of Geraldton-Greenough.

Geraldton is approximately 420 kilometres north of Perth and is the regional centre for the Mid-West. It is well placed to accommodate additional growth, both in terms of land supply, human services and essential infrastructure.

2.6.3 Northampton

The Shire of Northampton is located about 50 kilometres north of Geraldton and the major settlements are Northampton, Kalbarri, Horrocks and Gregory. The shire covers an area of 13 738 square kilometres.

Additional resource activity in the region will increase pressure on the shire's major settlements and place a burden on the aging road network. In particular, Kalbarri is a settlement that is already under pressure and has been flagged as a town with the ability to cater for further growth.

2.6.4 Chapman Valley

The Shire of Chapman Valley is located immediately north-east of the City of Geraldton-Greenough, 440 kilometres north of Perth. The shire covers an area of 3965 square kilometres and its seat of government is the small town of Nabawa.

The proposed Oakajee industrial estate and deepwater port is located in the shire. Development of Oakajee will directly affect the operational aspects of the shire, as Chapman Valley will be one of the approval authorities responsible for Oakajee. This will have an impact on staffing requirements.

2.6.5 Irwin

The Shire of Irwin is located about 50 kilometres south of Geraldton and covers an area of 2374 square kilometres. The major settlement is Dongara/Denison.

Increased resource activity may see Dongara becoming a residential base for fly-in-fly-out operations in the greater region.

2.6.6 Coorow

The Shire of Coorow is located approximately 200 kilometres south-east of Geraldton and consists of the three major townsites; Coorow, Leeman and Green Head. Potential expansion in the resource industry in the region is likely to affect Leeman and Green Head as they are both attractive coastal settlements. The towns consist of a high proportion of vacant dwellings, which are owned by investors or holiday homes.

2.6.7 Carnamah

The Shire of Carnamah is located approximately 160 kilometres south of Geraldton and in its bounds are the towns of Carnamah and Eneabba. Increased resource activity could have the greatest effect on Eneabba, which is the location of the proposed Coolimba power project.

2.6.8 Mullewa

The Shire of Mullewa is approximately 100 kilometres east of Geraldton on the Geraldton-Mount Magnet Road. It is strategically located in terms of rail infrastructure, which presents both opportunities and constraints for the town. Mullewa is keen to attract new economic development but this will need to be balanced with the amenity and rural lifestyle of the town.

2.6.9 Morawa

The Shire of Morawa is located approximately 170 kilometres east-south-east of the city of Geraldton and about 390 kilometres north of Perth. The shire covers an area of 3516 square kilometres and is predominantly an agricultural based district.

2.6.10 Mingenew

The Shire of Mingenew is located approximately 110 kilometres south-east of the City of Geraldton-Greenough and about 370 kilometres north of Perth. The shire covers an area of 1939 square kilometres and is a wheatbelt town with an economy dominated by sheep, wheat and lupins. The town of Mingenew services the needs of the surrounding area.

2.6.11 Yalgoo

The Shire of Yalgoo is located approximately 200 kilometres east of Geraldton and 500 kilometres north of Perth. The shire covers an area of 28 215 square kilometres. If the proposed Ferrowest Yalgoo Iron project proceeds as projected, the population impacts on the shire could be significant.

2.6.12 Shire of Meekatharra

The Shire of Meekatharra is located about halfway between the town of Port Hedland and Perth, 538 kilometres north-east of Geraldton. The shire covers an area of 100 789 square kilometres and is a major supply centre for the pastoral and mining area in the Murchison region.

The shire has indicated that they are unaware of any future plans to develop further mines in the local government area, and that many of the existing mines are reaching a phase of deceleration. A concern for the shire is the expense associated with the ongoing maintenance of their local road system caused by mining activity.

2.6.13 Shire of Perenjori

The Shire of Perenjori is located approximately 180 kilometres south-east of Geraldton and is predominantly an agricultural district aligned to wheat and sheep. Perenjori is in reasonable proximity to Mungarra and Mount Karara (which is a 60 year iron ore mine). If both mine sites proceed, this could present growth opportunities for Perenjori. The shire has commissioned studies indicating the potential impact of growth on the shire and these are discussed in greater detail in section 7.

2.6.14 Shire of Three Springs

The Shire of Three Springs is located approximately 140 kilometres south-east of Geraldton. Three Springs is a small country town in the mid-west of Western Australia, with a unique mix of grain and grazing, mining and government services in the shire.

2.6.15 Shires of Murchison, Cue, Wiluna, Mount Magnet and Sandstone

In looking at the likely impacts of growth in the iron ore sector, it is unlikely that the settlements east of Yalgoo will be impacted to any great degree. These shires all face growth and development pressures and will continue to be vital inland communities.

The Shire of Murchison is the only shire in Australia without a town and is located about 260 kilometres north-east of the city of Geraldton and about 550 kilometres north of Perth. The shire covers 41 173 square kilometres and pastoral leases occupy much of this area.

The Shire of Sandstone is located about 430 kilometres east of Geraldton and about 740 kilometres north-east of Perth. The shire covers an area of 32 882 square kilometres. The major issue confronting the Shire of Sandstone is the severe shortage of land available for residential and industrial development. The land which would otherwise be used for residential purposes is either currently Crown land or subject to native title claims.

Cue is located on the Great Northern Highway, 650 kilometres north-east of Perth. Its main industries are mining and pastoral.

The Shire of Wiluna covers an enormous area of some 184 000 square kilometres, which is predominantly a mining and pastoral area. The town of Wiluna is the principal centre in the shire, and there are also a number of mining villages and Aboriginal communities. The township of Wiluna is 966 kilometres north-east of Perth and is situated on the edge of the desert at the gateway to the Canning Stock Route and Gunbarrel Highway.

Mount Magnet is one of the Murchison region's original gold mining towns with the first find recorded in 1891. It supports both mining and pastoral industries which form the economic base of the Shire of Mount Magnet. The beautiful wildflower blooms that can be seen between July and September each year also draw many tourists to the town.

3 Regional resource overview

Map 2 provides an overview of the projects described in this section.

3.1 Major resource projects

The resources sector is fast becoming the most significant contributor to the economy of the Mid-West region and plays an important role in contributing to the overall development of the region. Some of the main commodities produced in the Mid-West are iron ore, mineral sands, nickel, base metals, gold and talc. The region counts for 24 per cent of Western Australia's land mass and only three per cent of the state's population, yet is an extremely significant contributor to the value of the state's resource sector.

A key instigator and major driving force behind the relatively recent growth in mining activity is China's demand for raw resources. This increase in demand, coupled with the stability of the state's already existing export markets has led to an unprecedented call for the Mid-West to play a more significant role in the ongoing servicing of our resource hungry trade partners.

Consultation with the DOIR and liaison with key stakeholders in the region has assisted in identifying the major projects which are commissioned, committed, under consideration or proposed in the region. This information is detailed below.

3.1.1 Jack Hills

Jack Hills Hematite Mine (Stage 1) Commissioned

Murchison Metals Limited

The project is based 70 kilometres west of Meekatharra. Operations commenced in December 2006 and the mine has a current production capacity of 1.5 million tonnes per annum (mtpa). The ore is trucked to Geraldton Port for export, and the first shipment occurred in February 2007. Production capacity of this mine is anticipated to reach 2 mtpa by 2008, before proceeding to Stage 2 in 2010.

Jack Hills Hematite Mine (Stage 2) Under Consideration

Murchison Metals Limited

Stage 2 of the Jack Hills project is projected to commence in 2010, increasing production to 10-25 mtpa. This phase of the project will use new rail infrastructure to transport the ore from the mine in Jack Hills to the proposed deepwater port at Oakajee, and the development of phase 2 will be highly dependent on the availability of the strategic infrastructure in the locations specified. Based on current time constraints, should this project proceed as per schedule, it is highly unlikely that the critical infrastructure required to service the mine would be available by 2010.

A definitive feasibility study and exploration drilling program for the project is progressing.

3.1.2 Weld Range

Weld Range Iron Ore Mine Under Consideration

Midwest Corporation Limited

Midwest Corporation Limited proposes the development of an iron ore mine at Weld Range, 65 kilometres south-west of Meekatharra. The company has indicated that they envisage the use of a new 360 kilometre rail link, which will provide access to the proposed deepwater port at Oakajee. An extensive drilling program commenced in June 2006 and currently a pre-feasibility study is underway. It is anticipated that the first shipment from the mine will occur in late 2010.

3.1.3 Talling Peak

Talling Peak Hematite Mine Commissioned

Mt Gibson Iron Limited

The Talling Peak mine is located 175 kilometres north-east of Geraldton and is expected to be in operation until 2013. Operations commenced production in February 2004 and the mine is currently achieving its target of producing 3 mtpa. Mount Gibson is continuing exploration in and surrounding the Talling Peak site in order to locate more reserves and extend the life of the mine.

3.1.4 Koolanooka/Blue Hills

Koolanooka/Blue Hills Shipping Project Commissioned

Midwest Corporation Limited
Stage 1

The Koolanooka project is located at the original Koolanooka mine site, which is located 160 kilometres south-east of Geraldton with Blue Hills a further 70 kilometres east of Koolanooka. The project is currently in its initial stage, which involves the loading, haulage and shipment of

the iron ore fines stockpile at the Koolanooka mine site. Exports were first shipped in February 2006. The expected output of this operation is estimated at two million tonnes (shipping at 1 mtpa).

Stage 2/3 Committed

This stage involves the processing and shipment of ore mined at the Koolanooka and Blue Hills site. Re-opening of the mines is being environmentally assessed at a public environmental review level.

3.1.5 Mungarra

Mungarra Hematite Project Under Consideration

Gindalbie Metals Limited/Ansteel

Located approximately 85 kilometres east of Morawa, the Mungarra Hematite project will involve the production of 3 mtpa of direct shipping ore. The ore will be trucked to Morawa and then railed to Geraldton Port. The project is being developed under a joint venture agreement between Gindalbie Metals Limited and Ansteel (Angang Steel Company Limited).

The project is currently undergoing environmental assessment at a public environmental review level.

3.1.6 Mt Karara

Karara Magnetite Project Under Consideration

Gindalbie Metals Limited/Ansteel

Located 225 kilometres east of Geraldton, the Karara magnetite project will involve the production of high-grade magnetite concentrate for export. It is proposed that the magnetite concentrate will be transported by slurry pipeline to Geraldton Port for export and pelletising overseas. This project is being developed under a joint venture agreement between Gindalbie Metals Limited and Ansteel (Angang Steel Company Limited). Projected production capacity of this operation is expected to be 8 mtpa.

The project is currently undergoing environmental assessment at a public environmental review level. Subject to government approvals, the company anticipates that the first shipment will occur in the first quarter of 2010.

3.1.7 Mount Gibson

Extension Hill Hematite Project Under Consideration

Mount Gibson Iron

The Extension Hill project is located 330 kilometres south-east of Geraldton. It is intended that ore will be railed to the Geraldton Port for export. Projected production capacity of the operation is expected to be 2 mtpa. The project has environmental approval and the first ore shipments are expected in January 2009.

Extension Hill Magnetite Project Under Consideration

Asia Iron

The project at Extension Hill will produce up to 5 mtpa of magnetite concentrate which will be transported to Geraldton Port by slurry pipeline. The project has environmental approval, and the first exports are expected by the end of 2010.

3.1.8 Yalgoo

Yalgoo Iron Project Proposed

Ferrowest

Located 14 kilometres east of Yalgoo, this project proposes the mining of magnetite ore from the Yogi deposit, which will then be processed on-site to produce high-grade iron nuggets. Ferrowest has identified that existing infrastructure would cater for the project, including an existing gas pipeline (passing through the tenement), use of the Geraldton-Mount Magnet Road and the Ferrowest constructed and implemented gas powered station. The mining township of Yalgoo is expected to house the mining operations staff and provide the administrative centre for operations.

3.1.9 Wiluna West

Wiluna West Iron Project Proposed

Golden West Resources

Located 40 kilometres west of the township of Wiluna, a site of 440 square kilometres is considered to contain a range of resources, including iron ore, gold and uranium. This project is in the early exploration stages although early indications suggest resource amounts potentially reaching 150 million tonnes in total.

3.1.10 Eneabba

Central West Coal and Coolimba Power Projects Proposed

Aviva Corporation Limited

Aviva Corporation is progressing the development of the Coolimba power project, comprising two 200 mW base load coal-fired power station and an associated coal deposit located 20 kilometres south of Eneabba. Upon commissioning, the power station will constitute 8 per cent of the installed capacity in the South West Interconnected System and have an operating life of 30 years. Construction is planned to commence in late 2008, with completion anticipated in 2011-12.

The major projects that have been identified can generally be segregated into two general groups based on their spatial distribution and size. Large projects based north-east of Geraldton will need to access a new port facility at Oakajee, while the smaller projects located south-east of Geraldton, will continue to be serviced by the existing Geraldton Port.

In addition to the projects listed above, there are a number of other projects that are listed as prospective such as the Iluka Resources heavy mineral sands project at Cataby and the Gunson Resources project 250 kilometres north of Geraldton.

Table 3
Summary of Mid-West resource projects (committed/under consideration)

Proponent/ project	Location	Stage	Output (mtpa) Mine life (yrs)	Capital (million)	Employment ¹	
					Construction	Operation
Projects under consideration						
Asia Iron Extension Hill magnetite mine	Extension Hill (330 km south-east of Geraldton)	Environmental approval	5 mtpa 20 yrs	\$715	1000	280
Aviva Corporation Limited Central West Coal and Coolimba power projects	20 km south of Eneabba		Power 2x200 mW base load coal fired power station	\$1000	600	100
Gindalbie Metals Limited/Ansteel Mt Karara magnetite mine	Mt Karara (70 km east of Morawa)	Undergoing environmental assessment at PER level	8 mtpa 60+ yrs	\$1000	400	240
Gindalbie Metals Limited/Ansteel Mungarra hematite mine	Mungarra (85 km east of Morawa)	Undergoing environmental assessment at PER level	3 mtpa 6yrs	\$75	200	170
Mid-West Corporation Limited Weld Range iron ore mine	Weld Range (65 km south-west of Meekatharra)	Pre-feasibility study	15-20 mtpa 15+ yrs	\$800	900	220
Mt Gibson Iron Limited Extension Hill hematite mine	Extension Hill (330 km south-east of Geraldton)	Environmental approval and construction approved by Mt Gibson board	2 mtpa 7+ yrs	\$73	150	100
Murchison Metals Limited Jack Hills hematite mine Stage 2	Jack Hills (70 km west of Meekatharra)	Feasibility study and exploration drilling program	10-25 mtpa	\$750	450	350
Total Workforce					3700	1460
Committed projects						
Mid-West Corporation Limited Koolanooka/Blue Hills hematite iron ore mine	Koolanooka (160 km south-east of Geraldton)	Undergoing environmental assessment at PER level	1-2 mtpa 5 yrs	\$26.4	40	60

Source: Prospect magazine (March 2008 – May 2008), Department of Industry and Resources (2008)

¹ Employment is the anticipated number of people who will be employed by a project during construction or operational (permanent) phases. These figures may differ to the number at commencement of the project and should be read as indicative.

In order to better understand new mining project needs, DPI has taken three projects as the basis of a case study using readily available information. These three projects are the Weld Range Direct Shipping iron ore project (table 4), the Karara magnetite project (table 5) and the Coolimba power station (table 6).

Table 4
Weld Range Direct Shipping Iron Ore Project

Project	Direct shipping of (haematite) iron ore, 15 mtpa over 15 to 20 years. Mining, crushing, screening and exporting.
Location	350 km north-east of Geraldton, 60 kilometres north-west of Cue
On-site infrastructure requirements	<ul style="list-style-type: none"> • Mining on-site, 22 km conveyer, crushing/screening plant • Rail link to Oakajee port, 480 km of new track • Port rail terminal and stockpiles • New Oakajee port, breakwater, loading wharf, channel and basin, suitable for Cape size vessels (< 200 000 tonnes) • Power supply at mine site – 12 mW – supplied by LNG fuelled engines • Water supply for mining – 73 000 kL per annum, ground water • Potable water – 17 500 kL per annum – produced by a reverse osmosis treatment of groundwater, located near the accommodation village • Wastewater disposal via septic tanks • Upgrade of an existing airstrip • Accommodation village
Off-site infrastructure requirements	<ul style="list-style-type: none"> • All accommodation will occur on-site • The only significant local impact is emergency medical treatment of employees • During construction and during full plant operation there will be a need for transport of material to and from the site, ie construction materials, LNG, fuel, oil, explosives
Workforce	<ul style="list-style-type: none"> • Permanent workforce of 220 fully fly-in-fly-out, housed in an accommodation village constructed on-site • Temporary workforce during construction of rail lines

Table 5
Karara Magnetite Project

Project	Magnetite iron ore mining, concentration, ore slurry transfer, filtration and export, 7.5 mtpa. Production to increase to 10.0 mtpa after two years.
Location of project	220 km south-east of Geraldton, 70 km east of Morawa
On-site and direct infrastructure requirements	<ul style="list-style-type: none"> • Open pit mining, crusher at mine site, grinding, magnetic separation, reverse flotation and concentrate thickener • 250 km 750 mm slurry pipeline from mine site to Geraldton Port • Filtration and stockpile at Geraldton Port • Ship loader Berth 7 Geraldton Port • Reclaimed water facility at Narngulu • New gas fired power station and power lines to mine site • 10 gL per annum of process water, sourced from Dandaragan borefield • Water pipe from borefield to mine site • Potable water for the mine camp will be drawn from ground water and subject to reverse osmosis treatment • Dedicated transmission line to enable electricity to be drawn from a high voltage transmission line between Eneabba and Three Springs • New power station at Three Springs or Mungarra • Gas feed from Dampier main to operate power station • Accommodation camp at mine site • Sewerage treatment plant at mine site • New airstrip at the mine site
Off-site indirect infrastructure requirements	<ul style="list-style-type: none"> • Use of medical facilities at Morawa • Relocation of some part of the workforce for the operation • During construction and during full plant operation there will be a need for transport of material to and from the site, ie pipes, machinery and so on
Workforce	<ul style="list-style-type: none"> • A permanent work force of 240 fully fly-in-fly-out, housed in an accommodation village constructed on-site • Approximately 400 workers during construction, housed at the mine site • Temporary workforce for construction of slurry pipeline and associated infrastructure

Table 6
Coolimba Power Project

Project	Development of a 400 mW coal and gas fired base load power station.
Location	20 km south of Eneabba
On-site infrastructure requirements	<ul style="list-style-type: none"> • Open cut coal mine to a depth of 100 m • Conveyor from mine site to power station to transport coal • Water extraction from mine site and piping for power station needs • Transmission line connection to South West Interconnected System • Gas connection to Dampier-Bunbury pipeline • 400 mW power station
Off-site infrastructure requirements	<ul style="list-style-type: none"> • 600 person construction camp located nearby (Leeman). This camp will need to be serviced • 100 permanent workers to operate mine and run power station housed throughout local communities • Upgrade of access road to power station and mine site • During construction and during full plant operation there will be a need for transport of material to and from the site, ie construction materials, fuel
Workforce	<ul style="list-style-type: none"> • Permanent workforce of 100 sourced from local communities • Temporary workforce of up to 600 during construction phase

4 Infrastructure evaluation

4.1 Oakajee estate

The proposed site for the Oakajee port is located approximately 25 kilometres north of Geraldton between the Buller and Oakajee river mouths. Map 3 shows the location of Oakajee and other major services. The Oakajee estate comprises approximately 6645 ha of land, of which 1135 ha forms the core industrial/port area and 5310 ha being required to provide an appropriate buffer to the industry. The Oakajee port itself will have a 170 ha footprint over the ocean seabed. Plans for land based facilities include a strategic industrial core supported by general industry and surrounded by a buffer that varies in width from 1.5-4.5 kilometres.

The port will initially be designed to cater for 60 million tonnes of iron ore to be transported per annum with flexibility in the design to allow more than 90 million tonnes per annum, in addition to other commodities to be transported as they come online. The Oakajee port will accommodate vessels of up to 180 000 tonnes, which is significantly larger than the 55 000 tonne vessels that can be accommodated at Geraldton Port.

A fundamental contributor to attracting multiple users to the Oakajee facility is the development of the associated industrial estate. This estate is envisaged to initially cater for iron ore stockpiles in its early phases, followed by the incorporation of other industry, which are expected to be iron ore related such as pellet plants.

LandCorp is currently in the process of preparing a structure plan for the Oakajee industrial estate and is awaiting the selection of the rail infrastructure provider, in order to seek the service provider's input into the structure plan.

The following list describes the type of industries and services that could potentially be established in the Oakajee industrial estate by 2012.

- Downstream iron ore processing industries (ie pelletising plant, small steel mill, iron plants, iron ore stockpiling).
- Industries generating substantial power requirements (ie iron carbide production).
- Chemical plant.
- Oil processing facility.
- Major power, water and gas processing facilities.
- Heavy industry (eg Iluka processing facility).
- Special marine based industries (ie marine engineering, ship building, and manufacture, fabrication and assembly of components used by offshore petroleum industry).

Major support services will need to be established at Oakajee by 2012. These services may include power (substation, gas, gas fired power station), communications, water supply (reticulated and/or desalination plant), waste management, engineering fabrication, equipment hire, scaffolding and maintenance equipment.

The following sections provide an evaluation of the potential servicing requirements for the Oakajee estate.

4.1.1 Power

There is the potential to obtain initial power supply for the Oakajee industrial estate via a 132 kV line running from the substation located in Chapman Valley to Northampton. Power from this source will only accommodate the first stage of development of the proposed port. Ultimately, an alternative power supply source will be required for the Oakajee port and industrial estate. LandCorp has previously indicated that power generation to the Oakajee estate would need to be provided by a third party. One option might be the development of a 450 mW power station in the Oakajee estate (Land Corp 1997).

Without a power station on-site, Western Power has advised that the future operation of Oakajee is dependent on the construction of a 330 kV line from the terminal station at Moonyoonooka, located south-west of Geraldton.

4.1.2 Gas

There is also the opportunity to extend the Dampier to Bunbury natural gas pipeline to Oakajee. A pipeline spur could be designed to deliver in excess of 150 Tj/day of natural gas to Oakajee and may be designed so that the capacity of the pipeline may be upgraded to meet the needs of other industries as and when required (SMEC 2004).

4.1.3 Water

The Oakajee site does not contain sufficient water supply to service the future port and industrial estate. Water would need to be imported from a major groundwater resource, such as the Casuarina aquifer to the site. Currently there is water available in the Casuarina sub-area and this is being investigated to more accurately understand the resource from the point of view of quality and quantity.

Future planning for water use at Oakajee would benefit from additional information on likely water demand and quality. Liaison with DoW is necessary to discuss possible water sources. There is also the potential to construct a desalination plant in the Oakajee estate and this is considered to be a feasible option that needs further exploration. Construction of such a plant is unlikely to occur before 2012.

4.1.4 Wastewater

A wastewater treatment system will need to be established in the Oakajee estate by 2012, depending on the type and rate of industrial development. It is acknowledged that industries that establish early in the estate will dispose of effluent individually (ie septic tanks, aerobic treatment units, leach drains). With the development of the Oakajee port, LandCorp will develop a structure plan for the estate and this will address its servicing requirements.

There is likely to be the need for a central wastewater treatment plant by 2012, once a substantial number of industries have become established in the estate.

4.2 Transport

The Mid-West Infrastructure Forum held in Geraldton in April 2005 highlighted two major infrastructure bottlenecks in getting product from the mine to market. These are:

- the lack of an efficient, high-capacity rail network; and
- the region's only port is constrained by the size of ship it can handle.

The establishment of a strategic (heavy) industrial area is a potential third obstacle.

The following section provides an analysis of the transport status in the Mid-West region.

4.2.1 Slurry pipelines

Slurry pipelines are an option that a number of mining operations are considering for transport of iron ore. Asia Iron is one of the iron ore operations that are considering this option seriously. One of the main impediments to the slurry pipeline option is that there may not be a sufficient long-term supply of water for this type of transport. As an example, the Shire of Perenjori is in negotiations with Asia Iron for an additional non-potable water supply for parks and gardens which will free up a substantial amount of scheme water capacity for additional household usage. Water Corporation has indicated to Mid-West stakeholders that they are only making infrastructure commitments 3-5 years ahead, which is not a sufficient guarantee for long-term mining interests. Based on this current barrier to long-term implementation of this option, the use of slurry pipelines may only be a feasible option for operations with a relatively short mine life.

Further investigation is required in collaboration with DoW and Water Corporation into possible water sources and longer-term water commitments for the Mid-West. The information on hand at the time of release of this study gave no indication as to Water Corporation's policy stance regarding the use of slurry pipelines. The use of potable water for slurry purposes is a contentious issue and will be subject to further investigations.

In addition, significant impediments to their development in some areas has emerged such as access to land and established reserves. For example, early indications are that the southern transport corridor leading into Geraldton Port is constrained in its capacity to accommodate slurry pipelines.

4.2.2 Rail

The majority of the Mid-West's freight movements consist of transport of bulk products, such as grain, coal, fertiliser, talc, mineral sands, sodium and cyanide. The main transport depot at the Narngulu industrial estate forms the junction of the two southern railway lines.

Approximately 19 proposed mineral projects are currently under consideration in the region. The majority of these projects will require significant infrastructure upgrades to transfer their products to Geraldton Port for export. The State Government has adopted a policy that supports transport of bulk freight by rail in preference to road. Several areas of the present rail network need upgrading. An exercise is presently being conducted to determine whether a parallel track may be more feasible. If this is so, then the existing tracks will not need upgrading.

The importance of securing rail corridors early in the strategic planning process is widely recognised in the region.

There are two long-term iron ore (hematite) projects that will require the construction of a new northern railway line. These are:

- Murchison Metals (Jack Hills) – Stage 2
- Midwest Corporation Limited (Weld Range)

The following provides a summary of the three key rail infrastructure proposals for the Mid-West:

4.2.2.1 Murchison Metals Limited

Murchison Metals Limited owns the Jack Hills project, which is located in the northern corridor of the Mid-West region, 380 kilometres north-east of the port of Geraldton. The deposit at Jack Hills contains numerous deposits of high-grade hematite ore, which can be mined and shipped directly to customers without any further processing of the product, and will represent lower operating costs.

In June 2007 Murchison Metals Limited entered into an agreement by which Japanese company Mitsubishi Development Pty Ltd will acquire 50 per cent interest in the Mid-West iron ore assets of Murchison Metals Limited. The agreement includes the joint development of port and rail infrastructure to service the mine at Jack Hills and the greater region.

Murchison Metals Limited and WestNet Rail are jointly in the process of investigating the integration of the existing narrow gauge rail network from Mullewa to Geraldton, with the new standard gauge rail line proposed to be constructed between the operations in the north of the Mid-West, namely Jack Hills, Weld Range and Oakajee.

In October 2007 Murchison Metals Limited proposed a \$987 million takeover offer for Midwest Corporation Limited which, to date, has not been accepted.

4.2.2.2 WestNet Rail

WestNet Rail operates the 5100 kilometres of standard, narrow and dual gauge rail network in the south-west of Western Australia and is currently under a 49-year lease with the State Government. They provide track access to various rail operators, including the Australian Railroad Group and is responsible for maintaining the track infrastructure, signalling, level crossings and train control functions.

WestNet Rail proposes to link all projects in the Mid-West region to the existing WestNet Rail infrastructure and to the proposed port at Oakajee. They have indicated that the consolidation of iron ore transport through a single rail corridor will be beneficial to the Mid-West region as land acquisition will become less of a barrier to infrastructure development. The existing rail corridor controlled by WestNet Rail between Mullewa and Narngulu would then be upgraded to a high axle load, double track and dual gauge configuration.

Under the proposal by WestNet Rail, Mullewa would become the merging point for the proposed link from the northern corridor operations, namely Jack Hills and Weld Range, Wiluna and deposits in the south (Koolanooka, Karara, and Extension Hill).

4.2.2.3 Yilgarn Infrastructure Limited

Yilgarn Infrastructure Limited is an unlisted public company, which has been established to supply the mining and resources industry in the Mid-West with efficient rail and port services on an open access multi-user basis.

The company has a wide range of investors and currently has a conditional debt-finance agreement in place with an overseas bank to fund the port and rail project for the region.

Yilgarn Infrastructure Limited is set to partner with major port builder China Communications Construction Corporation to progress the firm feasibility studies for the Oakajee port and accelerate the pre-construction phase.

The approach of Yilgarn Infrastructure Limited is to implement a greenfield model for infrastructure development based on the relative infancy of the region in terms of iron ore mining. It is strongly committed to the development of new, independent infrastructure for the region maximising access for the mines in the Mid-West.

Midwest Corporation Limited has formally signed an agreement with Yilgarn Infrastructure Limited to become a foundation customer of the company's multi-user port and rail infrastructure, once complete.

The key infrastructure stakeholders for the region (Yilgarn Infrastructure Limited, Murchison Metals Limited, WestNet Rail, and Midwest Corporation Limited) share a common interest in the timely implementation of a multi-user access rail network and are committed to the development of the Oakajee facility. With this common goal in mind, it is critical that there is a collaborative approach to implementing an effective solution for the Mid-West. Any further delays in the commencement of this strategic infrastructure project could possibly lead to key iron ore clientele seeking the product from other international providers.

In May 2008 the directors of Murchison Metals Limited announced a recommended merger of Murchison Metals and Midwest Corporation Limited. The potential merger would create a major new Australian iron ore group with a dominant position in the burgeoning Mid-West region. This situation could present the opportunity to facilitate a better coordinated and efficient development of the iron ore assets and create a new foundation for the construction of the port and rail infrastructure.

For a plan showing current rail infrastructure in the region, refer to map 3 .

4.2.3 Geraldton Port

Geraldton Port has a total of six land-backed berths. Iron ore has previously been shipped through Berth 4, and this berth is currently in use 80 per cent of the time.

This situation has changed with new capacity to increase exports, following the successful completion of the \$49 million upgrade of Berth 5 as a dedicated iron ore berth, which was officially opened in April 2008. Berth 5's 10 mtpa capacity is almost double the whole port's 6.44 million tonnes of exports, including 3.5 mtpa of iron ore in 2006-07. Moving iron ore from Berth 4 has freed significant capacity to serve other exporters. Also, iron ore can now be loaded over Berth 5 simultaneously with mineral sands over Berth 4, a major improvement to the port's efficiency.

Two junior iron ore companies have raised the proposal for the creation of a seventh berth. The exact nature of this expansion is yet to be determined. Additionally, any upgrades and expansion to the port will require environmental and planning approvals.

The Geraldton Port Authority (GPA) has advised that there is currently berth capacity for 8-10 mtpa. There are iron ore companies that currently require the transport of a combined total of approximately 30 mtpa through the port. The port can currently accommodate 55 000 tonne vessels.

According to GPA, the critical issues preventing the efficient operation of the port are transport into the port (ie rail network) and the limited storage capacity of the Geraldton facility.

The current iron ore rail unloading facility was constructed in the mid 1960s for the purpose of unloading iron ore transported from Koolanooka. GPA is currently upgrading the existing train unloader and an additional train unloader is also planned, which combined, will provide for a throughput of 28 mtpa. These tonnages are valid if the capacity of the rail line to deliver the loads is achieved and are based on fully loading 550 ships per annum every day of the year, 24 hours

a day, filling in part of the fishing boat harbour and reclaiming the boat storage area. These proposals would need to be approved by GPA.

The Mid West Development Commission has indicated in their report: *Riding the Tiger: A Unique Opportunity for the Mid-West* that it is highly likely that Geraldton Port will reach capacity by 2011-12.

GPA considers the use of slurry pipelines for transport as a practical option, as the pipelines do not have road/rail transport issues and also result in a reduction of storage requirements.

Power supply has been identified as a significant future constraint. Following consultation with GPA, they have advised that the port is currently provided with adequate power to service the new Berth 5, grain train unloader and storage for new hematite iron ore operations. In addition, two new 4 mW feeder lines are currently being constructed to service the storage and new grain unloader at the port.

If the key magnetite iron ore operations come online through the port, power supply will need to be substantially upgraded. Through consultation with GPA, it is understood that additional power to service the new magnetite operations can be obtained from a substation located in the locality of Rangeway in Geraldton. Alternative sites are also being investigated by Western Power, including a new 132 kV substation that could potentially be constructed on a site owned by GPA on Augusta Street in Geraldton. In addition to this, a 132 kV transmission line will need to be constructed between the chosen substation site and the port. It should be noted that site selection will be subject to environmental and planning approvals, including community consultation.

Stage 2 of the southern transport corridor has also been identified as integral to the future efficient operation of the port. This project is discussed separately in section 4.2.4 below.

4.2.4 Roads

Roads in the Mid-West region carry a large number of heavy vehicles, with heavy vehicles outnumbering cars in some instances. Table 7 provides a breakdown of the percentage of heavy vehicles on a selection of Mid-West roads.

Table 7
Mid-West road user table

Road	AADT*	Heavy vehicles (%)	Daily number of heavy vehicles
Geraldton-Mount Magnet Rd	963	17	161
Great Northern Highway	512	51	261
Brand Highway	1797	17	309
North West Coastal Highway	1750	24	420
Goldfields Highway	71	45	32

* Annual Average Daily Traffic (Reference: Main Roads Western Australia, 2007)

As can be seen in table 7, heavy haulage vehicles contribute to a substantial portion of the traffic on the key north-south and east-west roads in the Mid-West, particularly to the Great Northern Highway. Heavy haulage traffic will continue to grow as an issue for the region, as the larger mining projects come online. While the Transport Co-ordination Act 1966 is currently being used in the Mid-West to limit the impact on the road network by encouraging use of rail, the current rail infrastructure in the region has its own limitations and as such, partial use of the road network for freight is inevitable. Traffic modelling is currently being undertaken by DPI to allow implications of various development scenarios on the regional road network to be tested.

In the short term, the volume of heavy haulage vehicles on the roads is unlikely to be significantly reduced as there will be a need to carry out extensive construction work for the mine sites and rail infrastructure implementation. MRWA should place particular emphasis on the ongoing maintenance of regional roads during this time to ensure the optimal use of this crucial element of core infrastructure (road network).

MRWA has developed a regional road network plan, which identifies and addresses future funding requirements for the enhancement of regional roads over the next 10 years (2007-08 to 2016-17). The report provides an outline of the analysis used to allocate state-wide funding and assists in the prioritisation of projects in the regions.

The road network plan identifies any existing and potential shortfalls in the road network in the Mid-West region and highlights a number of major road infrastructure projects aimed at addressing deficiencies in the region. Table 8 provides a summary of the highest priority road projects identified by MRWA in the plan. These are also shown on map 4.

Table 8
Mid-West high priority road projects

Project name	Road No	Road name
Various fencing Mount Magnet to Newman	H006	Great Northern Highway
Construct dual carriageway	H007	North West Coastal Highway
Widen seal	M039	Wubin Mullewa Road
Widen seal	M064	Chapman Valley Road
Realign Greenough S-Bend	H004	Brand Highway
Realignment at Pell Bridge	H004	Brand Highway
Realign at Northampton	H007	North West Coastal Highway
Oakajee Port Access realignment	H007	North West Coastal Highway
Geraldton southern transport corridor stage 2	H050	Geraldton Mount Magnet Road
Realign through Mullewa townsite	H050	Geraldton Mount Magnet Road
Construct passing lanes	H004	Brand Highway

(Reference: MRWA, 2007)

One of the key projects identified in table 8 that is relevant to the resource industry is the southern transport corridor.

Design and construction of the southern transport corridor commenced with Stage 1 in September 2003. Stage 1 of this corridor comprised approximately 13 kilometres of new railway from Narngulu industrial area to the Port of Geraldton and approximately five kilometres of highway from the North West Coastal Highway into the port. As funding will allow construction of Stage 2 to commence in late 2008, completion is expected in 2010. MRWA has previously purchased 100 per cent of the land required for the construction of Stage 2 of the southern transport corridor.

Stage 2 of the project will involve the construction of the new highway from the North West Coastal Highway connection eastward through to the Geraldton-Mount Magnet Road near the Geraldton Airport, a distance of approximately 8.7 kilometres. This stage which will be predominantly constructed as a single carriageway with provision for dualling in the future will also incorporate provision for connection of "Road B" and the future north-south route, together with connections to Goulds Road and the Geraldton-Walkaway Road.

It is recommended that the priority project identified by MRWA in the regional network plan be implemented as a matter of priority, due to the growing number of freight vehicles using the Mid-West road network.

Through consultation with MRWA, the following projects have been identified as not funded in the State Government budget in the next five years, but may need to be brought forward in order to adequately cater for the increasing freight traffic in the region:

Geraldton-Mount Magnet Road is an important intra-regional link between Geraldton and Mount Magnet, passing through Mullewa and Yalgoo. The road is a major freight route for grain, mining product and agricultural and mining supplies. Geraldton-Mount Magnet Road carries heavy tourist traffic during the spring wildflower season. Upgrading the substandard sections east of Mount Magnet is critical, due to the road accommodating 53.5 metres long vehicles along the whole section of the road.

Wubin-Mullewa Road is a narrow seal road and provides a link between key mining towns, Mullewa and Perenjori. The width of the seal requires increasing between these two towns.

North West Coastal Highway forms part of the strategic coastal link between Perth and the major regional population centres of Geraldton, Carnarvon, Karratha, Northampton and Port Hedland. This highway is a major freight route as well as the principal access route to coastal tourist destinations north of Geraldton. Currently, heavy vehicles up to 53.5 metres long are not permitted on the section of the highway south of Carnarvon. Industry pressure is increasing for an extension of the heavy vehicle network to just north of Northampton and ultimately, south of Geraldton. A bypass route north of Northampton will be required to divert freight traffic from the town in the near future if this is to occur. Currently, work is being undertaken by MRWA on options for the north-south Geraldton bypass route. These projects should be considered a priority in future State Government budgeting.

In addition, there is general agreement of the need to progress with an alignment definition study for the north-south road through Geraldton to support future development of the Greater Geraldton Region and Geraldton City. MRWA has very recently commenced further planning work for the southern section of the north-south route. There is also a requirement for a freight network review to be undertaken, to consider the management of heavy vehicles through Geraldton, including a critical review of the rail and services corridor between Oakajee and Narngulu as a potential eastern bypass. MRWA and DPI both of these projects.

Apart from the projects identified above and in the regional road network plan for the Mid-West, there is no necessity to acquire additional land for future road links in the region, as key links such as the southern transport corridor (Stage 2) have previously been acquired by State Government.

As separate exercise DPI obtained information on major new Stage 1 mining proposals for the Mid-West. These projects are scheduled to occur over the period 2007 to 2027 and are of a scale that can theoretically be exported through the existing Geraldton Port if the new port at Oakajee is not available. Freight movements were determined for two-way truck trips, based on the appropriate licensed vehicle combination and maximum allowable tare weight for each route.

DPI then assigned the transport tasks to the road and rail network based on mining company developer intentions. In terms of size, the potential freight task could see 9.0 mtpa on rail and just over 4.0 mtpa on road moving to Geraldton Port.

MRWA road design standards, (lane and shoulder widths for sealed rural and outer urban roads) were used to determine desirable standard required to accommodate existing traffic volumes (PCEs). Sections of road currently below standard were identified.

The general findings of this work were that some roads will only be used by the mining sector to transport ore for a limited period of time. Other roads will have a significant increase in truck numbers for a sustained period of time, ie truck numbers alone using the John Willcock Link could increase in the range of 357 to 410 per day even with a rail task in this corridor of up to 9.0 mtpa.

Therefore, it was the recommendation by DPI that every effort should be made to facilitate the use of rail for those mines that have viable access to the rail system. Without the use of rail a significant road-based task will be thrown onto roads that in most cases would not be up to standard without upgrading. Roads such as Brand Highway which will continue to be a major ongoing freight route, are under standard in parts and should be upgraded in preference to other roads where freight can be diverted to rail.

4.3 Aviation

The Geraldton, Meekatharra and Mount Magnet airports are regional airports located in the Mid-West that accommodate regular flights to and from Perth. Of the total regular passenger transport trips to and from Perth involving the region for the 2006-07 year, the proportional regular passenger transport break up between the three regional airports are as follows:

Geraldton:	89.5%
Meekatharra:	6.5%
Mount Magnet:	4%

At the time of release of this study, the official figures for regular passenger transport were confidential. In order to maintain the confidentiality of these figures, the data provided was converted to percentage figures as above.

Other airports, which service the Mid-West region, are provided at the following locations:

- Dongara
- Kalbarri
- Morawa
- Perenjori
- Murchison
- Yalgoo
- Cue
- Wiluna

The region's principal airport is located in the City of Geraldton-Greenough, in close proximity to the Geraldton townsite. Geraldton is provided with air services direct to and from Perth via Skywest Airlines. Skippers Airline provides direct flights to Meekatharra, Mount Magnet and Wiluna. Geraldton airport can currently accommodate up to 90 000 passengers a year. Fly-in-fly-out air services operate from Perth and Geraldton airports to mine sites throughout the Mid-West region.

The (then) Shire of Greenough adopted an airport masterplan to guide the future expansion of the Geraldton airport. Since 1999, the main runway has been upgraded, new aviation hangars have been constructed and a new \$3.6 million passenger terminal has been built. In addition, the shire had been proactive in defining an appropriate buffer for the airport, acquiring land in the buffer area and establishing a special control area.

DPI is currently in the process of tendering for a licence for a second airline to operate between Perth and Geraldton. It is expected that either the new airline service provider, the existing service provider, or both providers will request permission to fly regular passenger transport jet services in and out of Geraldton.

Upon advice from DPI, this could result in approximately \$1-\$1.5 million in expansion costs, including terminal, security and procedural changes.

Kalbarri's new airport was constructed in 2001, which is jointly owned by the Shire of Northampton and the City of Geraldton-Greenough. Four flights a week service Kalbarri as part of the Perth/Geraldton to Carnarvon route. Because of through bookings in both directions, seats for travel to and from Kalbarri are limited. The introduction of a second air service to Geraldton is likely to ease seat availability.

For many of the mines that are operating, and are projected to commence operation, there is a need for significant upgrades to the mine sites' airports due to the anticipated growth. The majority of the necessary upgrades are expected to be on a user-funded basis. Map 1 provides a map of the airfield locations in the Mid-West.

4.4 Water

4.4.1 Water source planning and allocation

DoW is responsible for planning, management and protection of water sources. It can declare water reserves and catchment areas. Water Corporation is the water service provider and is regulated by the department. In 2007 the state water plan was released and a regional water plan for the Mid-West will be developed by DoW in the period 2008-2010.

Due to the current economic activity in the Mid-West, the DoW Geraldton Office has received a large number of groundwater applications from various industries, including mining, agricultural, horticultural and land development. Map 6 shows the extent of the Water Corporation's supply network.

Licensing information indicates that 319.45 gL per annum is presently abstracted from groundwater sources for use in agricultural industries in the northern agricultural region. Most of this water is used for horticulture.

The DoW Geraldton Office covers licensing in the Arrowsmith, Jurien and part of the East Murchison and Gascoyne groundwater areas. The two major aquifers under high demand are the Parmelia in the Tathra groundwater sub-area and the Yarragadee in the Twin Hills groundwater sub-area, which are both part of the Arrowsmith groundwater area.

Water plans and more detailed water allocation and management plans are prepared by DoW. These plans consider water demands and determine the sustainable allocation

limits of water for potable and non-potable uses (eg mining, agriculture, industry) and for the maintenance of environmental systems. Licensing of groundwater use in the Mid-West is a statutory requirement under the provisions of the Rights in Water and Irrigation Act 1914.

DoW advises that water is available in current licensing mechanisms to support current and future growth in public water supply in the Mid-West region. The public water reserves are outlined in table 9.

Table 9
Public water reserves in the Mid-West

Sub-area	Aquifer	Public water reserve (kL/pa)
Public water reserves in the Arrowsmith groundwater area		
Dongara	Superficial	1 000 000
Eneabba Plains	Superficial	2 000 000
	Yarragadee	1 000 000
Allanooka	Yarragadee	8 000 000
Twin Hills	Yarragadee	5 000 000
	Lesueur	200 000
Mingenew	Parmelia	2 000 000
Tathra	Parmelia	2 000 000
Morrison	Parmelia	500 000
Total		21 700 000
Public water reserves in the Jurien groundwater area		
Cervantes	Superficial	10 000 000
	Lesueur	2 500 000
Nambung	Yarragadee	2 500 000
	Lesueur	2 000 000
Badgingarra	Yarragadee	2 000 000
Dinner Hill	Leederville-Parmelia	1 500 000
Watheroo	Fractured Rock	300 000
Total		20 300 000

DoW has received a total request of 32.8 gL from the Parmelia aquifer. Of this, 17 per cent (5.57 gL) is mining related, 41 per cent (13.45 gL) related to irrigation of pasture and 42 per cent (13.78 gL) for horticultural purposes.

Total request from the Yarragadee aquifer in the Twin Hills is 45.5 gL. Of this, 69 per cent (31.4 gL) is horticultural, 0.05 per cent (2.27 gL) for pasture irrigation and 26.5 per cent (12 gL) is related to mining activity. These applications are currently under assessment by DoW.

Presently there is water available in the Casuarina sub-area of the Gascoyne groundwater area. This sub-area is being investigated to more accurately understand the resource.

Table 10 illustrates the potential water requirements relating to future mining activities in the Mid-West.

It is noted that iron ore processing projects generally have high water input requirements. The water requirements may increase with slurry pipeline transport which can be designed to recycle water or use sea water. There is concern in the region that water may be used for this form of transport, particularly when it may be otherwise used for agricultural or potable purposes.

It may be possible for slurry pipeline projects to use hyper saline, rather than potable water resources. Due to the preliminary stage of many of the iron ore projects in the Mid-West, it remains unclear as to the location, amount and quality of the water resource required to service the potential iron ore projects.

Table 10
Water requirement per project per annum

Company	Project	Product	Mine life	Water requirement per annum
Midwest Corporation	Koolanooka	Iron ore	2006-2013	150 000 kL
Cockburn Cement	Dongara	Quicklime		Less than 5 000 kL
Iluka	Eneabba	Mineral sands	Around 2017-2022	15 gL
Luzenac	Three Springs	Talc	2030	150 000 kL
Tiwest	Dongara	Mineral sands	Start 2010 (6+ yrs)	To be determined
Aviva	Eneabba	Coal	No proposed start date (potential mine life of 20-30 yrs)	To be determined
Asia Iron	Extension Hill	Iron ore (magnetite)	20+ yrs	Approximately 5 gL
Gindalbie Metals	Mt Karara	Iron ore (magnetite)	20+ yrs	To be determined
Midwest Corporation	Koolanooka	Iron ore (magnetite)	20+ yrs	To be determined

kL: Kilotres gL: Gigalitres (Source: Mid West Development Commission, 2007)

4.4.2 Public drinking water protection

There are 24 public drinking water source areas in the Mid-West. It is critical for drinking water source protection that land uses are compatible with the protection needs of these areas. Some infrastructure, such as power stations or major roads, may not be compatible land uses. There is an ongoing requirement to ensure that appropriate protection mechanisms are in place for planning and evaluation of developments. DOW has a water source protection classification system which outlines the priority 1, 2 and 3 source protection system and land use compatibility in public drinking water areas.

4.4.3 Residential water planning

Water Corporation has recently commissioned a study to provide residential water demand projections for the Greater Geraldton Region. In order to provide this information, land release data provided by council planning staff has been analysed in order to estimate future development densities of the study area.

Current conditions in the Mid-West indicate that there is an increasing disparity between the indicative land releases and the level of effective service connection. It is suggested that water planning for the region should be based on a steady, high growth rate scenario over a period of 30 years. Based on the projected land supply and in view of rapid development across the region a growth rate of 2.9 per cent per annum in number of connections required would be a reasonable basis for planning purposes.

- Number of lots (connections): 28 555
- Daily peak demand: 100 mL/day
- Annual demand: 24 gL/year

These are an indicator of projected residential demand based on a 30 year period. The figures provide an insight for relevant service providers as to the maximum water requirements for the Greater Geraldton Region. It is envisaged that Water Corporation will use this data to contribute to infrastructure requirement decisions for unallocated land.

The inclusion of the Oakajee industrial estate (excluding the port facility) could add approximately 14 per cent to these projections. Further information on water supply for the Oakajee facility is contained in section 4.1.

4.5 Energy

4.5.1 Gas

Four natural gas pipelines currently service the region:

- Parmelia pipeline (Dongara-Pinjarra)
- Dampier to Bunbury natural gas pipeline
- Goldfields gas pipeline (North West Shelf-Kalgoorlie)
- Mid-West gas pipeline (Geraldton to Mount Magnet)

New lateral gas lines may be constructed as demand arises from new resource projects. The primary users of gas in the Mid-West are the Narngulu industrial estate, Iluka Resources and the Geraldton townsite. In the past, iron ore industries have not been large users of gas in the Mid-West region.

Iron ore requires processing in order to transform the ore into a higher value product. A key issue for the iron ore industry is access to an affordable and reliable energy supply to fuel power stations involved in the processing of iron ore. As such, the identification of a cheap gas source and the infrastructure required for transporting gas to project sites is an important issue for the Mid-West.

The future Oakajee estate will need access to a reliable and sufficient gas supply. A 50 metre wide multi-user corridor has been acquired and connects to the widened Dampier to Bunbury natural gas pipeline corridor, just north of the Greenough River, and extends westwards to the Oakajee industrial estate, a distance of some 50 kilometres. The corridor provides an alignment for any future gas transmission pipelines developed by the private sector that may be required to service the industrial estate.

Gas reserves in the Perth basin have fallen from an estimate of 1.6 trillion cubic feet (tcf) in 2004 to 0.5 tcf in 2005. This is significantly low when comparing to the gas reserves in the Pilbara (Carnarvon basin), which contains 83.9 tcf of natural gas reserves (DoIR, 2004).

It is unlikely that a large-scale gas source will be found in the Perth basin that is sufficient to provide the long-term supply needed by the iron ore processing projects currently under consideration in the Mid-West. Due to the lack of available gas resources in the region, there is a need to consider the opportunity to use gas supplied via pipelines that traverse through the Mid-West.

The Diversified Utility and Energy Trust has estimated the cost of increasing the Dampier to Bunbury pipeline's capacity to 1000 terajoules per day at \$1000 million. This part of the project offers the best opportunities for the further processing of the State's resources, including any potential iron ore processing projects.

It has been identified through discussions with Alinta Gas that it does not proactively plan for gas infrastructure (pipelines) in the Mid-West but will plan for new infrastructure as and when major projects arise. This is largely due to the fact that gas is not considered an essential service in the Mid-West. As such, individual developers will need to apply to the relevant gas service provider on a case-by-case basis if and when the need arises.

The key natural gas pipelines in the State traverse through the Mid-West region in relatively close proximity to the Oakajee estate and major iron ore projects. Given the proposal of the Diversified Utility and Energy Trust to upgrade the capacity of the Dampier to Bunbury natural gas pipeline, it is considered that the gas supply to the region has the capacity to accommodate future growth associated with Oakajee and the iron ore industries.

4.5.2 Electricity

The new regulatory environment that Western Power operates in requires the organisation to justify its major augmentations in terms of maximising net benefits. A number of projects are under way, some of which will require review by the Government's economic regulator. The private sector can also provide power supply options for the region.

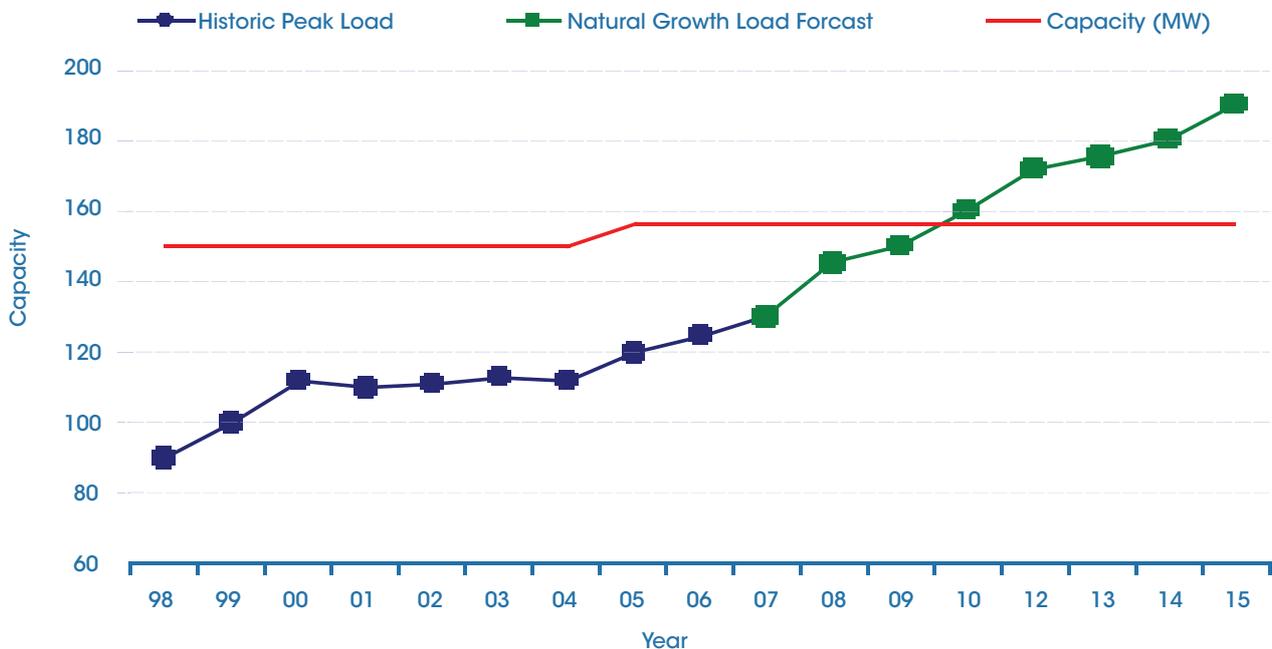
Western Power currently provides electricity to the Mid-West region by dual 132 kV lines. Geraldton, Chapman Valley, Golden Grove, Three Springs and Eneabba each have 132 kV zone substations. The 33 kV lines to Dongara, Kalbarri, Northampton, Mullewa, Narngulu and Nabawa and throughout the Geraldton-Greenough area then distribute electricity. Map 3 shows the extent of Western Power's network. Horizon Power services other towns in the region via stand-alone generation units.

Electricity supplies are supplemented, as necessary, by 21 mW and 112 mW gas power stations located at Utkarra (Geraldton) and Mungarra (60 kilometres south-east of Geraldton) respectively. The Mid-West electrical grid is connected to the South West Integrated System.

The Mid-West region network is significantly constrained by existing 132 kV line thermal ratings and synchronous stability. Construction of the 132 kV line between Pinjar and Eneabba in 2004 has temporarily eased some of these constraints. The recent connection of the Emu Downs wind farms has exhausted transmission capacity available to connect new generation between Pinjar and Eneabba. New generation in the Geraldton area cannot be accommodated due to existing thermal limits on the 132 kV network. If the existing lines are run above their thermal limits following a single line trip, conductor sagging could reduce clearances creating a public safety risk.

Constraints in the northern part of the Mid-West region are the principal reason that the system requires reinforcement. Figure 1 shows the expected natural load growth in the region.

Figure 1
Power Supply and Demand Based on Natural Growth Load (MW) from 1997-98 to 2015-16



(Source: Western Power - Proposed improvements to the Mid-West region's transmission network March 2007)

Western Power has reviewed the load forecast and adequacy of the existing 132 kV transmission network that supplies the area north of Eneabba and Muchea. Spare firm supply capacity to the area north of Eneabba and Muchea is just above 20 mW. Forecast load is expected to exceed supply capacity by summer 2009/10.

The increase of 5 mW in the firm capacity shown in the graph is due to the contribution from the Walkway wind farm near Geraldton commissioned in 2005. Although, this wind farm has an installed capacity of 90 mW, its contribution to the summer peak capacity is significantly lower than its installed nominal capacity. The wind farm power output is a function of prevailing winds and is not reliable during times of the system peak demand.

To meet the load forecast and alleviate system constraints, Western Power is to construct a new 330 kV double-circuit transmission line between Pinjar and Geraldton (with one side initially energised at 132 kV) and a new 330/132 kV Moonyoonooka terminal east of Geraldton. Approval has been given by the Minister for Energy to build the 330 kV line to Geraldton. Construction

is to take place in two stages. The first stage will involve replacing the existing 132 kV transmission lines from Pinjar to Eneabba with a 330 kV line. The second stage is to be built where there is no existing power between Eneabba and a new substation at Moonyoonooka. Construction is expected to commence in late 2009 and be completed by 2011.

Expected benefits of the proposed improvements to the transmission network are as follows:

- ability to accommodate natural load growth in the region;
- increase in transmission capacity to support forecast load growth in the region;
- increase in transmission capacity to enable connection of customers (new loads and generation);
- improvements in reliability of power supply to all customers in the region;
- ability to connect new wind farms;

- ability to connect new base generation located north of Perth;
- facilitation of entry of lower cost generation in the region;
- opportunity to retire old and inefficient gas turbines at Geraldton and Mungarra; and
- reduction in transmission losses.

The transmission line will provide power to existing and proposed energy users in the Mid-West region, including new mining and industrial projects.

The Geraldton Iron Ore Alliance (GIOA) has stated the following with respect to the Perth-Geraldton 330 kV line. The timing of the 330 kV transmission line is a critical issue for the GIOA Mid-West iron ore companies. The most eastern alignment for the 330 kV transmission line is the preferred route for supplying power to the GIOA iron ore projects.

It is understood the current power supply to Kalbarri and Dongara is insufficient to allow for further significant expansion of the townsites. As these townsites are in a coastal location, they are likely to experience significant pressure for growth in the near future.

In response to the power supply issues identified above, Western Power has advised that a second feeder has been put into service to Dongara. This reinforcement has significantly increased the supply capacity to the Dongara area. A review of load growth for Dongara has been completed and a number of minor enhancements to the supply for Dongara are planned to meet projected load.

Western Power is currently pursuing a program of works to reinforce supplies to the Kalbarri area. The first stage of this project consists of working with the community to establish a corridor from Chapman substation to Northampton. The following stages will include a submission to the Economic Regulatory Authority on Western Power's intention to construct the line and then, if successful, construction of the line.

Western Power is in the process of constructing an underground feeder line to Geraldton.

Commercial negotiations have commenced with GPA with regard to their future power needs and are in the process of constructing an underground feeder line to the port to improve the capacity for power supply to the area.

Magnetite iron ore operations, including the Karara magnetite project, the Extension Hill project and Ferrowest's Yalgoo operation have significant power requirements. Development of the magnetite iron ore projects will necessitate upgrading of localised power generation or transmission lines. It is expected that mining projects will meet the full cost of upgrading electricity supplies through non-refundable capital contributions, and both Extension Hill and Karara have committed to funding an additional high voltage transmission line between Eneabba and Three Springs, as well as dedicated transmission lines to their projects, which will have also have the dual benefit of improving the quality and reliability of the Three Springs substation. The construction of user-funded gas fired power stations is also a possibility.

A private power provider, Aviva Corporation, is actively considering a 400 mW integrated energy development near Eneabba. This power station will be fuelled by the Central West coal deposit 20 kilometres south of Eneabba. It is a \$1 billion project and with the potential to become the only baseload power station north of Perth. The project is progressing through the requisite environmental approvals with State Government. Aviva hopes to commence construction work on the project in 2009, which will extend over three years for completion in 2012.

4.6 Communications

Telstra is the major telecommunications provider in the Mid-West. The mining operations, which are currently located in the region, are major users of telecommunication services as their operations rely heavily on the use of email, remote inventory databases, local intranet networks and numerous other telco-provided facilities. Responsibility for the provision of broadband services lies with the Commonwealth Government.

Telstra is obliged to install basic telephone services anywhere in Australia under the Universal Service Obligation. A large proportion of towns in the Mid-West currently have ADSL broadband access and the remainder of the study area has a good chance of access to Next Generation Broadband (3G). In the areas where there is an absence of existing infrastructure (greenfield) and a high capacity of infrastructure development is required, Telstra is willing to engage in commercial arrangements with the relevant stakeholders.

The cost of installing a telephone exchange and mobile base station at the Oakajee industrial estate is estimated to be in the order of \$1.8 to \$2 million. An optic fibre cable was installed past Oakajee following the highway in 2007 and Telstra will encourage the installation of optical cable to the area to promote the development of the industrial estate.

Inadequate mobile telephone communications has been identified as a concern for some inland communities, for example Yalgoo. Telstra has not identified any constraints that would pose an issue for the development of telecommunications infrastructure in and around the Oakajee industrial area.

Telstra has been upgrading its network to cater for the expansion in the resource industry in the Mid-West and is installing high-speed next generation equipment in order to promote the ongoing development of the region.

4.6.1 Square Kilometre Array (Radio Astronomy Park)

There is currently a major proposal under consideration to establish a radio astronomy facility at Mileura Station near Meekatharra and Cue. Australia is one of two countries shortlisted for the square kilometre array project with the successful bidder to be decided in 2012. A key determining factor in the selection of an appropriate site for the establishment of this type of facility and its ongoing effectiveness, is the ability to provide an area (of 27 kilometre radius) of radio-quietness. The joint bid with the Commonwealth Government to secure the \$2 billion square kilometre array project has been boosted with a \$20 million investment to develop an international radio astronomy research centre in the State. The project could see the world's greatest capacity telescope built north-east of Geraldton at the Murchison Radio-Astronomy Observatory site. A 1500 square kilometre site has been set aside for the project.

There will be the obvious need to ensure that any proposed rail corridor will take into consideration the need to avoid this designated area. To date there has been no identified issues with the mining operations of Jack Hill and Weld Range co-existing in the region (which is located in the vicinity of the park).

It is anticipated that the potential operational workforce (up to 100 persons) of this facility will not generate a need for the provision of substantial hard or social infrastructure to the area.

4.7 Social and community infrastructure

4.7.1 Health

Almost 74 per cent of the Mid-West population is based in the combined coastal shires of Geraldton-Greenough and Irwin. The major hospitals which service the region are located in the regional centre of Geraldton. The two key facilities in the town are Geraldton Regional Hospital and St John of God Hospital, the former being a public facility. With an increasing population, there is emerging pressure on beds at Geraldton Regional Hospital. Table 11 shows the future planned profile for the hospital as the regional resource centre for the wider region.

The establishment of a dedicated mental health inpatient unit is seen as essential as the next phase of the development of the Geraldton Health Campus. It is projected that an eight bed unit will be required to sufficiently reduce the number of patient transfers to the metropolitan area.

Other health requirements that have been identified for the hospital include:

- redesign existing infant delivery suites;
- redesign and relocation of the high dependency unit;
- establishment of three motel room style medi-hotel units for ante-natal care; and

Table 11
Future profile of Geraldton Hospital – Regional Resource Centre

Inpatient services	Current functional planning units (FPU)	2011 FPU	2016 FPU
Adult medicine and rehabilitation	36	23	24
Palliative care	3	3	3
Adult surgery	12	18	18
Adult mental health	6	9	9
Obstetrics/maternity	20	10	10
High dependency unit	5	6	7
Paediatrics (overnight and day beds)	12	12	12
Total overnight beds	94	81	83
Adult day surgery Stage 2	7	9	9
Renal chairs	7	10	15
Chemotherapy chairs	4	4	4
Total same day chairs/beds	18	23	28
23 hour beds	Nil	4	4
Emergency department treatment spaces	11	14	16
Theatres	2	2	3
Endoscopy suite	1	1	1
Birthing suite	3	3	3
Imaging modalities:			
General X-ray/screening	2	3	3
Ultrasound	2	2	2
CT	1	1	1

Source: WA Country Health Service

- provision of a home base for increased staff required for ambulatory programs.

The introduction of the Multi-Purpose Service has provided a vehicle for the amalgamation of various types of health services to be combined under the one roof, which has allowed for a flexible approach to health services in the region. These facilities provide basic medical services to surrounding communities, which encompass a broad range of disciplines. There are six Multi-Purpose Service facilities in the Mid-West district, which provide health services to people living in the shires of Carnamah, Chapman Valley, Coorow, Irwin, Meekatharra, Mingenew, Morawa, Mullewa, Murchison, Northampton (based at Kalbarri), Perenjori, Three Springs and Yalgoo.

Health industry stakeholders stated that the services in the region were adequate and fulfilled the requirements of the current resident population. They also maintain that the current facilities have the capacity to manage any potential future increase in demand for their services. Examples were cited where inland centres, such as Mount Magnet and Meekatharra, were considered to be under constant pressure. Although there are a number of Multi-Purpose Service facilities in the wider Mid-West region, particular emphasis is placed on access from the inland regions to the centre of Geraldton, where there is the availability of more robust health facilities as opposed to the individual health units in the smaller shires.

Some criticism is apparent in the region with regard to current arrangements for patient transport. For example, the Shire of Yalgoo is concerned that the Patient Assisted Travel Scheme does not adequately address the real cost of moving patients in remote areas, for example travelling to Geraldton to receive specialist treatment.

Other health requirements that have been identified include:

- establishment of a new nursing post in Mount Magnet;
- establishment of a new health centre at Wiluna;

- creation of aged health care accommodation in Kalbarri linked to the health centre;
- additional office space and support mechanisms required for allied health services in Geraldton to enable delivery of government programs for the aged;
- need for strengthening of Population Health Service to enable an increased emphasis to be placed on disease prevention, chronic disease management and self care; and
- continuation of the Bidi Bidi project for at-risk mothers and children.

4.7.2 Education and training

The Mid-West region accommodates the Central West College of TAFE, two public senior high schools, eight district high schools, three remote community schools, an agricultural school, an education support centre and 22 primary schools, as well as the Geraldton Regional Community Education Centre (WAPC, 2005).

The Department of Education and Training (DET) considers the status of infrastructure in respect to education and training in the region to be adequate and does not believe that there is any particular urgency in the development of new facilities in the Mid-West.

DET generally acquires land for development of schools as the need arises, for example, when population pressures in the region justify the expansion of resources in this area. When examining the current and future resource projects in the Mid-West, DET estimates that the workforce population being attracted to the region would not generate the demand for any significant educational infrastructure enhancements in the region.

The department advised that recent major capital works in the region include the following:

- Batavia Coast Marine Centre at Geraldton – this project is part of the Separation Point Marine Precinct, a world class research, education, training and ecotourism facility;
- additions to the Kalbarri District High School (completed in 2007);
- redevelopment of Geraldton Secondary College;
- upgrade to Central West TAFE;
- Geraldton Secondary College refurbishments;
- Separation Point Marine Precinct Interpretive Centre; and
- Wiluna Community School.

The upgrade of the Central West TAFE in Geraldton and the Separation Point Marine Precinct affirms the City of Geraldton as a centre of learning. It is recommended that WAPC and DET continue to discuss potential education improvements for Geraldton, with particular emphasis on providing training facilities relating to the resource industry.

4.7.3 Police

Western Australia Police were consulted to determine future police infrastructure requirements for the Mid-West. WA Police has advised that there are a number of projects in the Mid-West region that have been identified in the proposed 10 and 20 year capital investment plan. These projects include a number of upgrades to existing facilities located throughout the Mid-West, including (but not limited to) facilities located in Geraldton, Mount Magnet, Northampton, Yalgoo, Perenjori, Cue and Kalbarri. New facilities are also proposed at Geraldton.

WA Police has indicated that their strategic planning for the region should ensure that their forecast resources would be adequate to cater for any expected growth.

4.7.4 Public transport

In December 2004 the Mid West Development Commission, released a sustainability action plan, which is aimed at encouraging and promoting the balanced, responsible and enduring economic, environmental and social development of the Mid-West region. The action item below relates to commuting transport.

“Identify actions to reduce unnecessary solo car journeys and promote travel alternatives such as cycling, walking, public transport, car-pooling, telework and develop a green transport plan for workplaces with 100 or more staff.”

The development of the Oakajee deepwater port and industrial estate may prompt the establishment of commuter public transport between the Greater Geraldton Region (combined with other populous coastal towns) and the new Oakajee development. It is envisaged that a major bus depot may be necessary to provide commuter transport for workers operating from the Oakajee estate, between Geraldton and Oakajee.

Further, it is recommended that the Government takes an active role in the encouragement of the relevant resource companies in the region to participate in the provision of dedicated transport (shuttle) services from major residential centres to the mine site/work locations in drive-in-drive-out range.

TransWA operates a coach service, which connects Perth to Geraldton and Meekatharra based on a specified timetable. They have indicated that there has been a steady increase in demand for services to and from Geraldton and that the location of the existing terminal (Chapman Road, Geraldton) is of a good size to accommodate this increase. There has recently been a proposal to relocate the terminal to a site located on the corner of Chapman Road and Forrest Street in Geraldton, which is currently a mostly vacant block. Planning has already commenced and approval granted to develop this site for this purpose.

From the perspective of TransWA, client feedback and satisfaction is a key driver for improvement and development, and any future trends in demand growth will be addressed accordingly.

The Public Transport Authority advises that it is constantly monitoring the growth in the regions and is responsive to any changes in demand in a particular town. It has identified that a public transport system must remain dynamic and be tailored to suit the dynamic of the population it services.

This is an area where the services in Geraldton have been enhanced on a regular basis to ensure maximum accessibility to the areas most in need of public transport facilities.

An example of this responsiveness is the identification of fly-in-fly-out communities in the region and the acknowledgement that the majority of this population would most likely be without a regular means of day-to-day transport. Strategies are then implemented to work to secure a transport service for these areas. It is recommended that State Government should place (resourcing) emphasis on the areas, where a deficiency in public transport access has been identified.

5 Land supply and development activity

This section details information on residential and industrial land supply at the regional level. Land supply and availability for individual centres has been assessed as part of the settlement capacity statements in section 7.

5.1 Residential

A brief study was undertaken to determine the areas of developed and undeveloped zoned land in the Mid-West region. This study used data sourced from the Valuer General's Office to determine the presence of residential and industrial uses on individual parcels of land. The results of this analysis were then aggregated to a local government level (table 12 and 13).

The Mid-West region contains more than 6200 ha of residential zoned land. More than half of this land is located in the City of Geraldton-Greenough. Other local governments with large areas of zoned land include the shires of Cue, Morawa, Northampton and Irwin. At a regional level, land identified as developed, accounted for 33 per cent of the total zoned area, indicating a significant supply of undeveloped zoned land across the region. These areas may be subject to land assembly processes or resolution of development issues such as lack of servicing, or the requirement for further planning.

Table 12
Area of undeveloped/developed residential land by local government

Local government	Developed area (ha)	Undeveloped area (ha)	Total area of residential zoned land (ha)
Carnamah	24.9	42.5	67.4
Chapman Valley	2.6	16.4	19.0
Coorow	87.7	80.0	167.7
Cue	51.1	912.3	963.4
Geraldton-Greenough	1359.0	2021.9	3380.9
Irwin	133.8	165.9	299.7
Meekatharra	33.8	17.4	51.2
Mingenew	12.3	18.5	30.8
Morawa	23.6	539.7	563.3
Mount Magnet	28.9	14.6	43.5
Mullewa	19.9	29.4	49.3
Northampton	233.6	230.5	464.1
Perenjori	23.3	17.0	40.3
Sandstone	3.3	11.3	14.6
Three Springs	23.2	16.7	39.9
Wiluna	4.4	44.6	49.0
Yalgoo	3.5	6.6	10.1
Total	2068.9	4185.3	6254.2

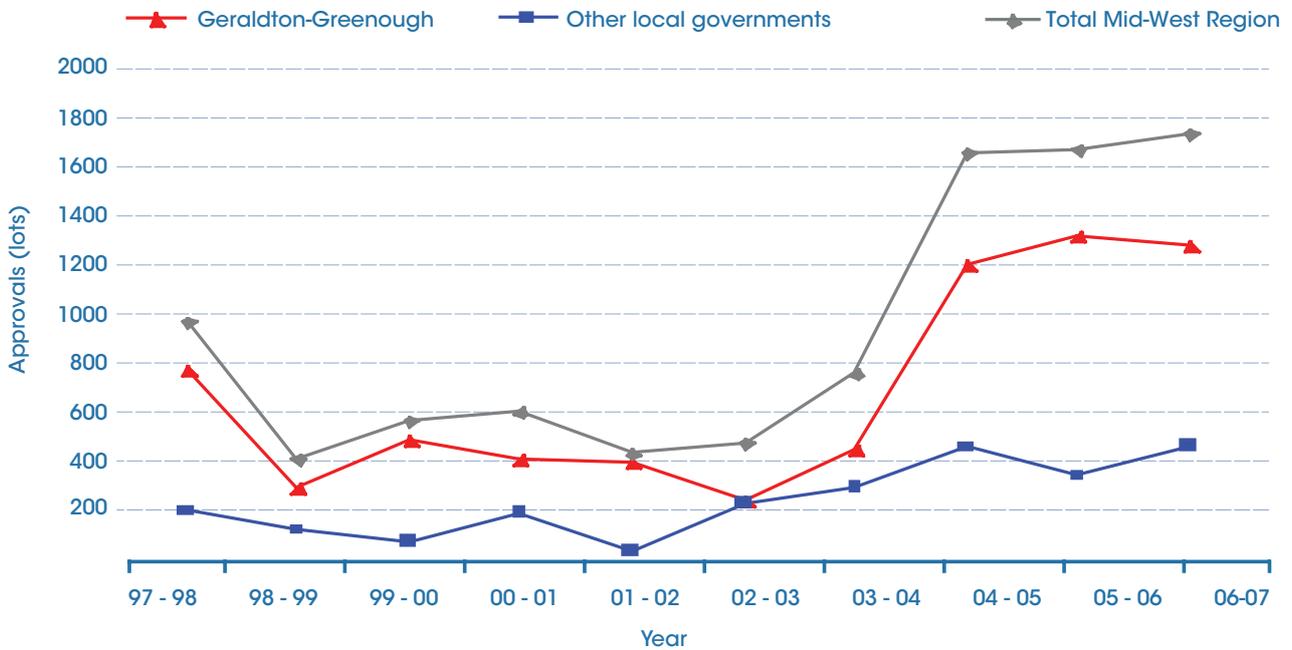
The City of Geraldton-Greenough and the shires of Coorow, Irwin and Northampton are expected to experience additional growth as a result of development of the resource industry in the region. Of these local governments, all have more than 45 per cent of their residential zoned land area identified as undeveloped. This indicates sufficient capacity to accommodate some growth. Further information regarding land supply in individual centres is contained in section 7.

In recent times, the majority of residential development activity has occurred in coastal local government areas, such as the City of Geraldton-Greenough, and the shires of Irwin and Northampton.

Figures 2 and 3 detail the number of conditional and final approvals for residential lots for the combined City of Geraldton and Shire of Greenough (now amalgamated into the City of Geraldton-Greenough) in comparison to other local government authorities in the Mid-West region (over the last 10 years). Residential conditional and final approvals were relatively steady over the period 1997-98 to 2002-03, but have increased sharply since 2003-04.

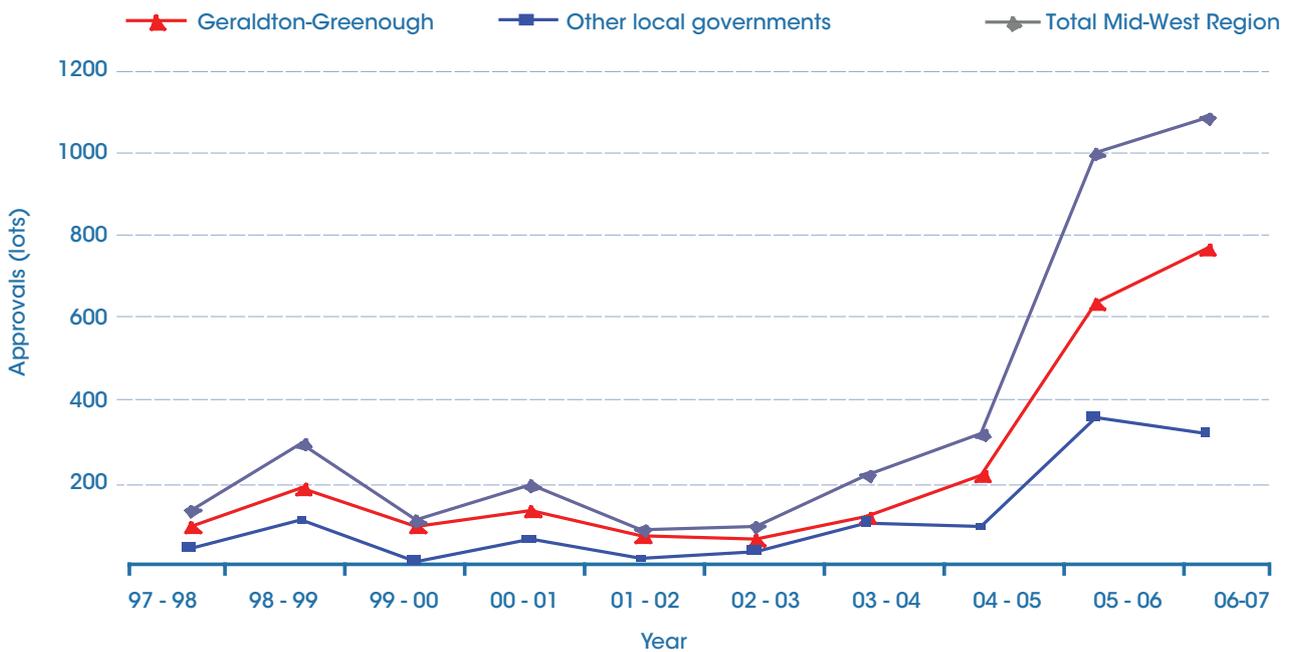
On average, 355 residential lots have received final approval per annum over the last 10 years in the Mid-West. In comparison, the average for the last five years is significantly higher at 545 lots per annum. Over the last 5 and 10 years, the combined City of Geraldton and Shire of Greenough accounted for approximately two-thirds of the total residential final approvals for the region.

Figure 2
Residential conditional approvals - Mid-West region 1997-98 to 2006-07



(Source: DPI internal databases 2008)

Figure 3
Residential final approvals - Mid-West region 1997-98 to 2006-07



(Source: DPI internal databases 2008)

Data extracted from WAPC databases identifies that as at 31 March 2008, there were conditional subdivision approvals for more than 4150 residential lots across the Mid-West region. The majority of these lots are located in the City of Geraldton-Greenough (more than 3500 lots), and the shires of Irwin and Northampton (more than 280 lots in each shire). Based on an average of 355 residential final approvals per annum (last 10 years), this equates to approximately 12 years supply. Based on recent consumption rates at an average of 545 residential lots per annum (last 5 years), this equates to just under eight years supply.

Localities with large numbers of conditional approvals for residential lots include:

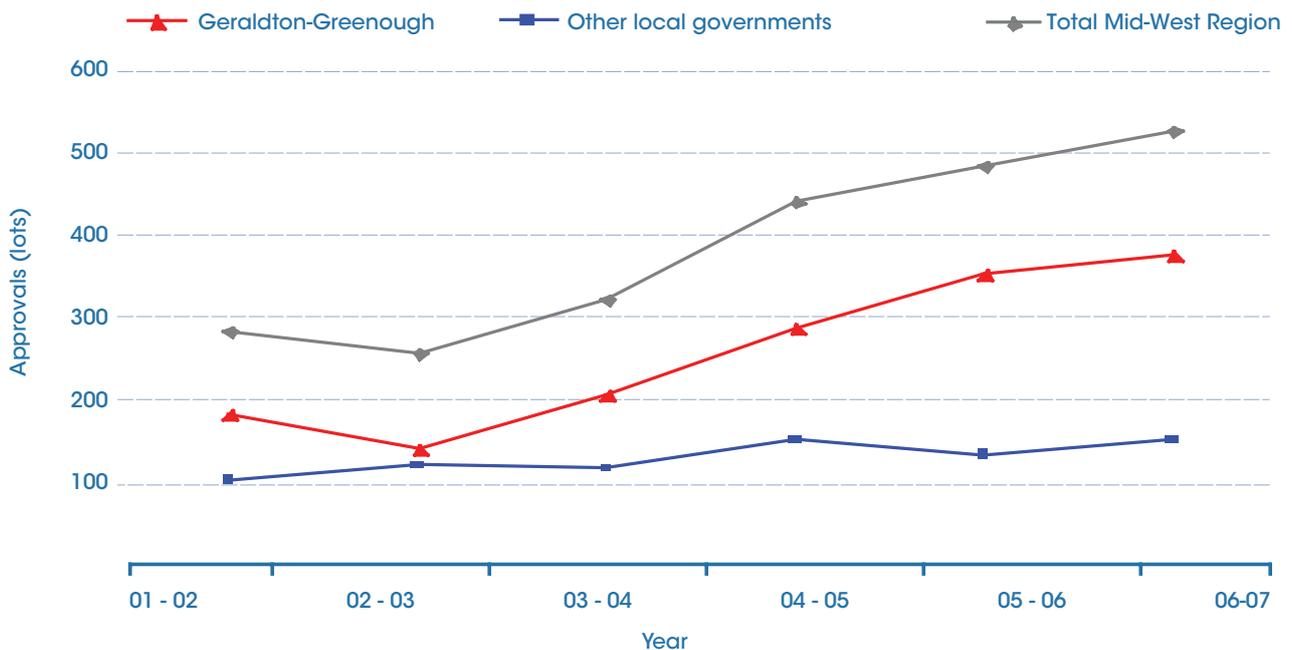
- Cape Burney (1000 lots)
- Wandina (350 lots)
- Sunset Beach (350 lots)
- Glenfield (300 lots)

- Waggrakine (300 lots)
- Dongara/Denison (280 lots)
- Kalbarri (230 lots)

Special rural and special residential development also accounts for a significant component of residential development in some Mid-West shires. Data for these uses has not been included in the data detailed above. The City of Geraldton-Greenough, and the shires of Chapman Valley, Irwin and Northampton have significant areas zoned for low-density residential (special residential) and/or special rural uses.

Figure 4 displays building approvals (houses and other dwellings) for the Mid-West region over the period 2001-02 to 2006-07. The average number of building approvals per annum over this period was 388 approvals. The combined City of Geraldton and Shire of Greenough accounted for approximately two-thirds of the building approvals over this period. The shires of Irwin and Northampton also recorded significant numbers of dwelling approvals.

Figure 4
Building approvals - Mid-West region 2001-2002 to 2006-07



(Source: Australian Bureau of Statistics Catalogue 8731.0)

5.2 Industrial

The Mid-West region contains almost 4700 ha of industrial zoned land. Almost half of this land is located in the Shire of Chapman Valley, which contains the proposed Oakajee port and industrial estate. The City of Geraldton-Greenough contains just under 1100 ha of industrial zoned land and the Shire of Three Springs more than 820 ha (extractive industry). At a regional level, land identified as developed accounted for only 13 per cent of the total zoned area, indicating a significant supply of undeveloped industrial zoned land across the region. These areas may contain industrial uses, but due to limitations with the source data, these areas have been identified as undeveloped. For example, uses such as storage where no permanent structures exist on the land, in effect, are classified as undeveloped.

These undeveloped areas may require resolution of a number of issues for development to proceed. For example, these constraints might include land assembly processes, servicing issues or the requirement for further planning. Further information regarding industrial land supply in individual centres is contained in section 7.

Table 13

Area of industrial zoned land by local government

Local government	Developed area (ha)	Undeveloped area (ha)	Total area of industrial zoned land (ha)
Carnamah	5.5	84.8	90.3
Chapman Valley	0.0	2333.6	2333.6
Coorow	11.6	33.4	45.0
Cue	3.2	21.6	24.8
Geraldton-Greenough	329.9	765.6	1095.5
Irwin	22.9	25.8	48.7
Meekatharra	4.3	9.5	13.8
Mingenew	9.6	18.6	28.2
Morawa	7.5	6.6	14.1
Mount Magnet	10.6	9.4	20.0
Mullewa	6.9	29.6	36.5
Northampton	12.6	56.5	69.1
Perenjori	4.8	15.0	19.8
Sandstone	0.4	3.2	3.6
Three Springs	205.4	623.5	828.9
Wiluna	1.1	16.9	18.0
Yalgoo	0.6	4.2	4.8
Total	636.9	4057.8	4694.7

The proposed Oakajee industrial estate will likely accommodate heavy, general, noxious, hazardous support industries for the region. Potential industries may include iron ore processing, petrochemical, mineral sands, chemical, manufacturing, as well as industries requiring direct port access. In order for the Oakajee estate to attract industry, a coordinated approach to planning and implementing services will be required. LandCorp owns more than 90 per cent of the land zoned for the industrial estate and is currently undertaking detailed structure planning for the area.

Other major industrial estates in the region include the Narngulu and Webberton industrial estates. Narngulu is located approximately 10 kilometres south-east of the Geraldton town centre and was intended to provide for heavy and general industrial uses requiring large land areas. It currently contains a range of general industrial uses such as the Iluka mineral sands processing plant. A significant portion of the estate consists of vacant and under-used land, with LandCorp in ownership of large areas of vacant land in the estate. With the development of the resource industry in the region, it is anticipated that demand for general and light industrial land will increase, especially for industries supporting resource development.

DPI is currently undertaking a review of the Narngulu industrial estate, which aims to retain a core area of general industrial land while providing additional land for light industrial and other areas for large format commercial uses along major transport routes. Further development of the estate will require the resolution of a number of issues such as the interface between general and light industrial areas with the surrounding urban and rural residential expansion areas. Major transport routes and other key infrastructure will also need to be considered.

Webberton industrial estate is centrally located, approximately five kilometres north of the Geraldton town centre. The estate caters for a range of light and service industries. Much of the land in the industrial estate has been taken up, with only a small portion of lots currently vacant. An additional 40 ha of land to the south of the Webberton estate has been identified for future light and service industrial development. This area is zoned development and is in private ownership.

The Geraldton Region Plan (1999) also identified more than 1600 ha of land to the east of Narngulu as a future strategic industry site. Development of this area, known as Wizard Peak, would require further detailed investigation.

With the development of the resource industry in the region, opportunities may also arise for outlying centres to provide services and accommodate industries in support of development in the region.

Few industrial lots have received conditional and/or final approval over the last 10 years in the Mid-West region. This data is detailed in figures 5 and 6 shown below. Of the low levels of industrial subdivision activity, the majority has occurred in the City of Geraldton-Greenough and the shires of Northampton, Mullewa and Mount Magnet. Conditional and final approvals for industrial lots peaked in the 2006-07 financial year.

On average, 12 industrial lots have received final approval per annum over the last 10 years in the Mid-West region. The City of Geraldton-Greenough accounted for almost all of these final approvals.

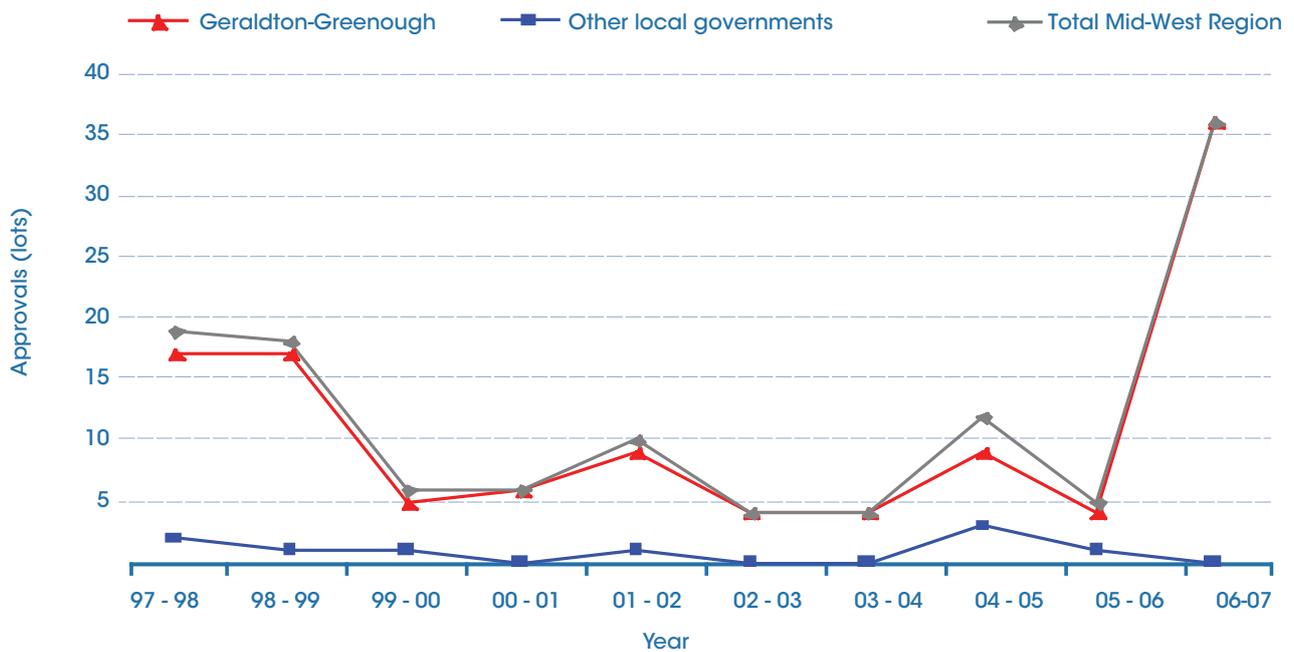
This data provides an indication of industrial development trends by way of subdivision only, and therefore may not provide a precise measure of industrial development trends across the region.

Figure 5
Industrial conditional approvals - Mid-West region 1997-98 to 2006-07



(Source: DPI internal databases 2008)

Figure 6
Industrial final approvals - Mid-West region 1997-98 to 2006-07



(Source: DPI internal databases 2008)

5.3 Infrastructure corridors

Infrastructure corridors are created when there is a case for co-location of a number of services in a single reservation. Co-location can reduce environmental and social impacts and provide greater flexibility. Infrastructure corridors can also facilitate efficient and effective servicing of major industrial estates. Failure to adequately plan for future servicing of ports and industrial estates can have negative economic consequences. Typical users of an infrastructure corridor are gas, electricity, water, rail, road, slurry pipelines and telecommunications.

At present there is no formal legislative mechanism for creating an infrastructure corridor. Strategic regional land use plans can identify the need for infrastructure corridors, although the mechanism to create the corridor and acquire the land needs further consideration. Some corridors are created as individual actions by government agencies, for example, the creation of easements for power and water infrastructure. One exception is the creation of a railway, which ordinarily requires a special Act of Parliament to be passed. Matters relating to the mechanism to create an infrastructure corridor, the allocation of easements/space in the corridor and the processes under which land is acquired and then managed, requires further attention by the State Government.

In 2000 the State Government set about identifying a 600 kilometre infrastructure corridor commencing near the intersection with the north-south Dampier-Bunbury gas pipeline, running just north of Mullewa and then onwards to the north-eastern Goldfields near Leonora. The Government has obtained all statutory approvals for the reserve, with some native title negotiations still to be concluded. Compulsory acquisition of the corridor land has not been finalised. The intention of the 450 metre wide corridor is to provide for a range of services and although it was not specifically designed for rail, this may need to be accommodated in the future.

5.4 Oakajee-Narngulu corridor

In the Mid-West region, the establishment of the Oakajee-Narngulu corridor is a major priority.

The initial planning for this corridor was based on establishing a railway link between Narngulu and Oakajee, but also included some consideration of a services corridor that could include roads, powerlines and pipelines. A 40 metre corridor was identified for the railway and received approval from the Environmental Protection Authority in 1998. A wider area (250 metres wide) was also considered for services but was not formally recognised in the environmental approval process. It is now considered that the inclusion of a services corridor requires an increase in corridor width from 250 metres to potentially 450 metres.

More recent work commissioned by the DPI provides a summary of the status of corridor planning and a better understanding of services that are likely to have a requirement to share or access the corridor in full or in part. The study also indicated the individual utility service requirements. The corridor would provide the opportunity for development of a regional road, which could serve as an outer bypass of Geraldton and as a heavy road haulage connection between the industrial areas.

An optimistic time frame for establishing a corridor would be approximately 2-3 years. Statutory clearances under the Mining Act 1978 and EP Act, as well as recognition in town planning schemes, will also add to time frames and costs.

When approval is granted for the Oakajee port to be developed, the construction of a rail line will be essential to handle the short- to medium-term mineral export needs. Rail cannot reach the port without a corridor being established. Detailed identification and purchase of the land is essential to achieve this outcome. The port will have the capacity for future expansion to service the anticipated longer-term needs of miners in the Mid-West region, and also provide the opportunity for the establishment of a processing industry in the adjoining Oakajee industrial estate that requires ready port access. It is important that, where possible, planning for the railway should be effectively integrated with the broader planning for the Oakajee-Narngulu infrastructure corridor.

5.5 Tourism and recreation

The Mid-West encompasses the tourism area known as the Coral Coast of Western Australia and has long been a well sought after destination for travellers, both domestic and abroad. Considering the popularity of towns further north of the region such as Monkey Mia and Exmouth, there is serious potential for the expansion of the capacity of this southern stretch (Mid-West) of the region to cater for the influx of leisure seeking visitors, particularly in the areas surrounding Geraldton and the twin towns of Dongara/Denison.

It is generally accepted that resource industry employees work on a shift arrangement, which provide them with substantial periods of personal leisure time, in which a bulk of this time is spent on tourism and recreation based activities.

A significant proportion of the population in the Mid-West is transitory, based around the resource sector, which provides merit to the fact that serious consideration should be given to the upgrade of the tourism capability and recreational capacity of the area.

The strategic location of the coastal local governments in the region provides an exceptional opportunity for the towns to capitalise on any significant growth in the region. Additionally, consultants and associated city-based mine staff that may be required to stay overnight on occasions, may require accommodation nearby of a suitable standard.

Tourism Western Australia published a fact sheet on tourism in the Coral Coast in May 2007, based on 2006 survey data. The information compiled shows 585 000 domestic visitors and over 61 000 international visitors stayed in the region during 2006. Of these, 76 per cent of the total visitors to the region were intrastate visitors.

With scenarios of projected population growth in coastal areas of the region and enhancements to access availability for metropolitan Perth (ie Indian Ocean Drive) to the Mid-West, it is imperative that there is particular emphasis placed on the investigation of potential tourism and recreation sites to cater for an increase in the expected demand for these facilities.

6 Demographic considerations

6.1 Population numbers and trends

The Mid-West region covers an area of over 472 000 square kilometres with a coastline that stretches approximately 330 kilometres. With a total population of around 52 000 the area has a very low population density overall. Table 14 shows Australian Bureau of Statistics estimated resident population by local government area for the Mid-West.

Table 14
Estimated resident population by local government

Local government	Estimated resident population (ERP)		Count of persons (Census 2006)
	30 June 2006 ¹	30 June 2007 ²	(place of usual residence)
Carnamah (S)	787	789	749
Chapman Valley (S)	957	982	914
Coorow (S)	1 256	1 196	1 199
Cue (S)	359	362	327
Geraldton (C)	20 233	20 333	18 916
Greenough (S)	14 789	15 394	14 035
Irwin (S)	3 240	3 347	3 052
Meekatharra (S)	1 296	1 296	1 137
Mingenew (S)	501	494	471
Morawa (S)	888	894	824
Mount Magnet (S) ³	496	580	458
Mullewa (S)	1 011	950	911
Northampton (S)	3 360	3 412	3 204
Perenjori (S)	564	540	528
Sandstone (S)	130	136	119
Three Springs (S)	713	698	664
Wiluna (S)	770	770	681
Yalgoo (S)	271	272	242
Western Australia	2 059 045	2 105 783	1 959 088

Source: Catalogue 3218.0, Regional Population Growth Australia 2006-2007, Australian Bureau of Statistics (2008)

1 Preliminary rebased estimate based on the results of the 2006 Census of Population and Housing

2 Preliminary estimate

3 Estimates for 2006 for Mount Magnet (S) should be used with caution because they are likely to be revised upwards in the final version of ERP

With the steady decline of the agricultural industry in much of the Mid-West, predominantly due to ongoing drought conditions, there has been a marked shift in the demographic structure of the region. There has been a move away from the inland local governments towards the coastal shires such as Geraldton-Greenough and Irwin. The recent population figures substantiate this movement, as there has been a steady population decline in many of the inland local governments over the preceding decades and a proportionate incline in the population density of the coastal shires.

A significant portion of each local government's population is located in a few centres. If this trend continues, much of the growth predicted

by 2010 will occur in these centres. Centres such as Kalbarri, Port Denison and Dongara are experiencing strong subdivision activity and from developers' intentions data, this trend looks likely to continue.

Table 15 shows regional population growth data sourced from the Australian Bureau of Statistics, which encompasses a 10 year period for the local governments in the study area. In the table green signifies a steady rate of population growth or stability in the estimated count of usual residents. The red highlights local government areas, which have experienced a significant decline in population over the preceding decade (1996-2006).

Table 15
Population numbers 1996 to 2006 by local government

Local government	1996	2001	2006
Carnamah	998	804	787
Chapman Valley	836	876	957
Coorow	1 444	1 375	1 256
Cue	491	394	359
Geraldton	20 200	20 130	20 233
Greenough	10 701	12 634	14 789
Irwin	2 526	3 059	3 240
Meekatharra	2 098	1 453	1 296
Mingenew	611	584	501
Morawa	1 059	985	888
Mount Magnet	869	851	496
Mullewa	1 146	1 118	1 011
Murchison	159	160	127
Northampton	3 020	3 333	3 360
Perenjori	695	612	564
Sandstone	169	133	130
Three Springs	839	751	713
Wiluna	1 162	898	770
Yalgoo	392	325	271
Total	49 415	50 475	51 748

It is important to note that over the period specified in table 15 the total population for the Mid-West region has not significantly altered. Over a 15 year period (1991-2006) the population in the area increased nine per cent; by comparison, the corresponding figure for Western Australia is 26 per cent.

Historically, it is evident that the population of this region generally relocate in the Mid-West itself, and the low growth rate can be attributed to the fact that there has been a low level of migration to the region from intrastate or interstate. Based on the 2001 census, 60 per cent of persons who stated that they had a different address five years prior to the collection had indicated that their previous residence was based in a local government area in the Mid-West region.

6.2 Factors involved in estimating population numbers

6.2.1 Estimated resident population

This figure is available for local government areas only and represents the number of people counted in an area on 30 June 2001. It is calculated by:

- adding the people who were temporarily absent from the area on census night;
- subtracting the overseas visitors counted in the area on census night;
- augmenting the figure for estimated net undercount in the census;
- adjusting for difference between census night and 30 June; and
- updating each year using administrative data from a variety of sources.

Estimated resident populations are the official population figures for Australia. They are widely used as a basis for government decision-making, including the allocation of seats in federal Parliament and distribution of Commonwealth grants.

6.2.2 Net undercount

Immediately following the census, the Australian Bureau of Statistics conducts a post-enumeration survey in randomly selected households to get a picture of the net undercount. This survey factors in the human error associated with collection of census data. Factors contributing to undercount include geographic location, ethnicity, people travelling, errors with the census form, and confidentiality. People may also be counted more than once if they were away from home on census night, but were included on the census form at their usual residence. In the 2006 census, the estimated net undercount in Western Australia was 3.2 per cent. This figure was 4.4 per cent for the balance of Western Australia, and 2.7 per cent for Perth.

6.2.3 Place of enumeration

This count includes every person who spent census night in Australia based on where they were on census night. The figure includes residents, tourists, visitors and service populations. This data is available for towns, localities and postcode areas.

6.2.4 Place of usual residence

A number of people state an area on the basis of where they usually live, rather than where they were on census night. This can be a subjective measure as it depends where people consider their home to be. This data is available for towns, localities and postcode areas.

6.2.5 Service populations

These are people who demand goods or services from providers of such commodities. Such persons may be permanent or temporary residents of the area from which the service is sought, or they may be daytime visitors (including commuters), overnight or short-term visitors to the area, or fly-in fly-out workers. Service populations are not counted separately at the census but may represent up to 25 per cent of the number of people enumerated in a town or locality on census night. It is important to recognise that service populations are generally localised and in most instances are less than 25 per cent.

6.3 Population and dwellings

When examining the housing requirements for the future of the Mid-West, an important indicator to examine is the current number of dwellings in each individual local government. Table 16 outlines the household sizes of individual shires in the region.

Over 50 per cent of the shires in the Mid-West have higher average household sizes (occupants) than Western Australia as a whole. The shires which exhibit the greatest average household size are primarily those with the smallest population counts.

Local governments such as Murchison and Cue, which are primarily based around the mining and/or agricultural sectors, exhibit a pattern (larger household size) in housing occupancy. This indicates that general dwelling locations and structure will be centred on the geographic location of industries, which, in turn, support the population. Smaller communities such as these, which exist exclusively to service a dedicated industry, will lean more towards families residing in the one dwelling as a variety of housing options are not available in these towns.

Table 16
Population and dwelling counts by local government

Local government	Population 2006	Dwellings	Average household size (persons)
Carnamah	787	371	2.4
Chapman Valley	957	414	2.6
Coorow	1 256	872	2.4
Cue	359	160	2.8
Geraldton	20 233	8 556	2.4
Greenough	14 789	5 059	2.9
Irwin	3 240	1 620	2.4
Meekatharra	1 296	525	2.8
Mingenew	501	241	2.5
Morawa	888	418	2.5
Mount Magnet	496	286	2.6
Mullewa	1 011	402	2.7
Murchison	127	72	2.6
Northampton	3 360	2 265	2.4
Perenjori	564	289	2.6
Sandstone	130	57	2.3
Three Springs	713	349	2.4
Wiluna	770	162	3.3
Yalgoo	271	92	2.6
Western Australia	2 059 045	851 164	2.5

Geraldton is the largest regional centre north of Perth. While considering its strategic coastal and central geographic location in the scheme of the Mid-West region, the ongoing elongated growth along its north and south coast highlight the future capacity of Geraldton to be a major urban centre servicing the greater Mid-West region and, to a lesser extent, the north-west of the state.

Approximately 85 per cent of the total Mid-West population is located in the shires located along the coastline. When examining the historic census figures and the Australian Bureau of Statistics estimates of regional population, the steady decline in population of inland Mid-West areas becomes more evident.

6.4 Population projections

Estimated growth rates for the Mid-West region have been developed by the WAPC. Table 17 contains 5, 10 and 20 year population projections by local government area. These figures are the WAPC projections, as published in Western Australia Tomorrow (2005).

Table 17
Population projections by local government

Local government	Projected population				Average annual growth rate (%)		
	2008	2013	2018	2028	2008-2013	2008-2018	2008-2028
Carnamah (S)	680	620	600	520	-1.8	-1.2	-1.3
Chapman Valley (S)	940	940	940	940	0.0	0.0	0.0
Coorow (S)	1400	1400	1400	1300	0.0	0.0	-0.4
Cue (S)	360	340	340	340	-1.1	-0.6	-0.3
Geraldton (C)	19 500	19 200	19 000	17 400	-0.3	-0.3	-0.6
Greenough (S)	14 700	16 400	18 100	21 100	2.2	2.1	1.8
Irwin (S)	3 300	3 500	3 800	4 300	1.2	1.4	1.3
Meekatharra (S)	1 600	1 700	1 800	1 900	1.2	1.2	0.9
Mingenew (S)	580	590	620	600	0.3	0.7	0.2
Morawa (S)	960	960	960	930	0.0	0.0	-0.2
Mount Magnet (S) ³	830	850	880	910	0.5	0.6	0.5
Mullewa (S)	1 100	1 200	1 200	1 400	1.8	0.9	1.2
Northampton (S)	3 400	3 400	3 400	3 400	0.0	0.0	0.0
Perenjori (S)	570	560	560	540	-0.4	-0.2	-0.3
Sandstone (S)	140	160	150	160	2.7	0.7	0.7
Three Springs (S)	740	740	720	680	0.0	-0.3	-0.4
Wiluna (S)	1 000	1 100	1 100	1 100	1.9	1.0	0.5
Yalgoo (S)	300	300	300	260	0.0	0.0	-0.7
Mid-West Region	52 400	54 200	56 100	58 000	0.7	0.7	0.5
Western Australia	2 112 700	2 276 900	2 441 000	2 730 400	1.5	1.5	1.3

Source: Western Australia Tomorrow, WAPC (2005)

6.4.1 Discussion of Population Projections

In January 2005, the Chamber of Minerals and Energy (CME) released the publication Fly In/ Fly Out: A Sustainability Perspective. This document examined the ramifications of fly-in-fly-out operations on their respective communities and economies and established, subsequent to completing a survey of over 18 000 mining employees, that 47 per cent of all mining employees in Western Australia are employed on a fly-in-fly-out basis. This means that workforces associated with the various mining projects proposed in the Mid-West may not necessarily live in the region. Due to the Mid-West's relative proximity to major southern population centres, there is a possibility of attracting more drive-in-drive-out workers.

It will be important to monitor the situation if major mining or industry projects eventuate. Follow-up investigations of short-term population growth and any structural changes to the resident population may need more detailed evaluation over time.

6.4.2 Population projections: direct

Using the CME proportion as a basis for determining the local workforce, the total population impact on the Mid-West region would amount to an estimated total of 1590 residential employees (53 per cent of 3000 persons).

While considering an average proportion of persons in a marriage/de facto relationship as being 47 per cent and 18 per cent of these having one dependent child, the subsequent direct increase in the population of the Mid-West could reach up to approximately 2472 persons.

In these instances, after applying the fly-in-fly-out percentage, the appropriate multiplier (direct impact only), which can be applied to the resultant working population (1590), would be a figure of 1.6 (not taking into consideration consequential employment). That is, if a presumed resident workforce of 100 persons were anticipated, the immediate growth as a result of this would be 160 persons.

6.4.3 Population projections: direct and indirect

A number of assumptions can be made when considering the population growth attributed to an increasing workforce population in a particular region. Variables such as the possible indirect and consequential workforces, household sizes (family composition) and dependent counts can all contribute to the overall growth of a region or town. All of these factors should be considered when formulating a multiplier which can apply to a specific scenario.

Table 18
Direct and indirect population assumptions

Estimated workforce (WP)	Locally based (LB)	Indirect workers (IW)	Consequential workers (CW)	Total (TOT)	Workers with families (WF)	Single workers (SW)	Workers with dependents (WD)	Total local population SW + WD	Multiplier
	WP x 0.53a	LB x 0.3b	LB x 0.3b	LB + IW + CW	TOT x 0.6c	TOT x 0.4e	WF x 2.5e	SW + WD	
3000	1590	477	477	2544	1526	1018	3816	4834	3

a assumes a fly-in-fly-out proportion of 47 per cent (CME)

b assumes a multiplier of 0.3 for indirect and consequential employment (based on DPI observations)

c assumes 60 per cent of the workforce have families (based on the Australian Bureau of Statistics observations: 2006 Census)

d assumes the remainder being single at 40 per cent

e assumes an average household size for the region of 2.5 persons (Australian Bureau of Statistics: 2006 Census of Population and Housing)

Based on the scenario in table 18, a multiplier of approximately three has been applied which is founded on a local workforce of 1590 persons. Considering the specified growth variables in the table, the total local population growth in the Mid-West would be 4834 persons. If this growth occurred over a five year period, by itself it would produce an overall increase in the region's population of just under two per cent. This does not take into account any transfers that might occur in the region or other growth areas and sectors in decline.

Should a variable in this scenario change, the adjustment in the projection outcome would be proportionate to this change, for example, increased use of fly-in-fly-out as opposed to residential workforce.

Case Study – Potential population implications associated with a (haematite) iron ore project with a permanent workforce of 270, based at a remote mine site.

The CME suggests that around 50 per cent of mine workers throughout Western Australia operate on a fly-in-fly-out basis. If it is assumed that 50 percent of the permanent fly-in-fly-out or drive-in-drive-out workforce resides in the Mid-West for this project, then it is realistic to assume a population multiplier affect for this project of around three. In other words, a permanent, locally based, workforce of 135 could generate a population increase of around 422 persons (all other things being equal). This figure includes permanent workers, comprising single workers (30 per cent), workers in a family arrangement (70 per cent), workers' dependents (family size of three), indirect and consequential workers (0.3 for each permanent worker) and their families. Approximately half of the population projection would occur if only 25 per cent of fly-in-fly-out workers resided in the region, ie 212 workers and their dependents.

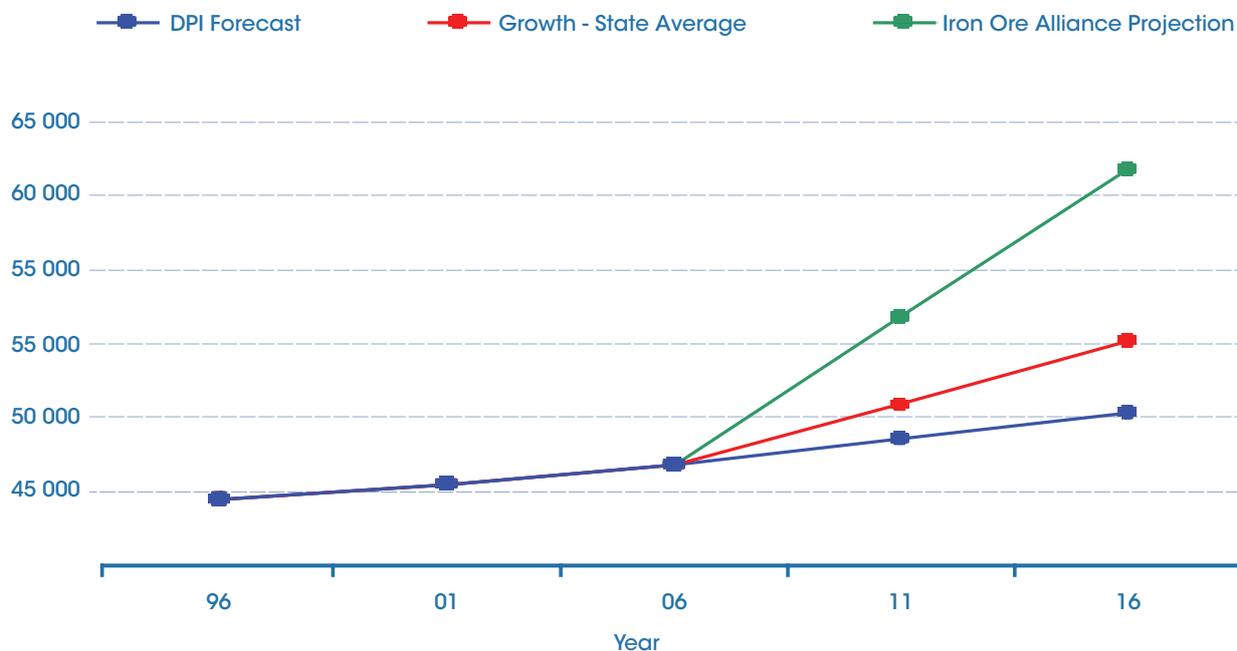
Regardless of the forecasts, it can be assumed that the coastal shires of Geraldton-Greenough, Irwin, Northampton and Chapman Valley would absorb a significant proportion of this population growth. The service availability and lifestyle advantages of local government areas such as these would present an encouraging prospect for potential workers to operate from towns in these regions and travel inland to their places of employment.

This assumed increase in the residential population would mean that the Mid-West (particularly the higher growth local government areas) would need to accommodate approximately an additional 1000-1500 dwellings to service the resource industry's accommodation needs.

Figure 7 illustrates several other population projects – the region growing at a rate based on WAPC estimates, at the state average and to an estimate developed by the GIOA.

DPI, as the State's demographer, predicts estimated resident populations throughout the State, based on factors such as fertility, migration, population decline and economic developments. This is published in *Western Australia Tomorrow (2005)* and may not always account for population spikes occurring as a result of construction workforces, tourism or fly-in-fly-out workforces. By the same token, project impacts such as those estimated by GIOA may not factor in population declines from inland

Figure 7
Mid-West Population Projections - Various Options



(Source - DPI, Geraldton Iron Ore Alliance - Mining Expansion in the Mid West: Social and Economic Benefits, 2007)

areas, the capacity of the existing population to meet employment targets and/or the likely extent of fly-in-fly-out or drive-in-drive-out workers. It is considered extremely unlikely that the regional population projections estimated by GIOA would be realised in the next 10 years.

6.4.4 Scenario evaluation

In setting out to examine growth of the region and the likely need for new infrastructure, three initial scenarios were identified. The scenarios essentially present low, medium and high growth options for the Mid-West and are intended to provide a possible means of identifying potential infrastructure gaps in the region.

6.4.4.1 Scenario A

This scenario proposes a situation where services are only upgraded as and when major project commitments are made. Geraldton Port is rapidly nearing capacity and the current bottleneck situation at the port, which has been expressed by numerous stakeholders, is only forecast to deteriorate.

The Mid West Development Commission has anticipated that Geraldton Port will reach capacity by 2010-2011 based on the potential iron ore industry development. As this scenario does not include the development of the Oakajee facility as a priority, it is critical, at a minimum, to ensure that the existing rail network to the port is upgraded to accommodate 8-10 mtpa of iron ore.

6.4.4.2 Scenario B

This scenario includes maximising existing networks and bringing Oakajee into play as an iron ore port for foundation users.

Major iron ore stakeholders in the region have indicated that the potential reserves (unconfirmed) would exploit the Geraldton Port's lack of future capacity to manage the projected

tonnage of the major projects combined. Should the estimated reserves of 60-80 mtpa be realised in the preceding 6-7 years, the key objective should be to service these operations by cost-effective means.

As many of the current and proposed iron ore projects in the Mid-West are in the very early stages of operation or exploration, the level of capital investment required to establish a complete strategic infrastructure solution may not be feasible in the short term. This conclusion assumes that the infrastructure would be completely user funded with minimal or no government contribution.

The development of the Oakajee port and rail infrastructure is critical to the establishment of the larger Stage 2 projects.

6.4.4.3 Scenario C

Scenario C includes growth of foundation customers' throughput and additional business for the Oakajee iron ore facilities, together with new projects on the Oakajee industrial estate.

At this somewhat early stage of development in the Mid-West region, this scenario is difficult to justify. The future use of the Narngulu industrial estate will be paramount in determining whether the Oakajee industrial estate will be used in the next 3-5 years. LandCorp has indicated that heavy industry will be discouraged from commencing operations at Narngulu, which makes an industrial area at Oakajee an important requirement for sustainable industrial growth in the region.

Overall there are a multitude of factors to be taken into consideration such as planning process timeframes, types of industry, land release and availability, infrastructure provider(s) and iron ore project(s) realisation. As a result, the task of estimating the right level of investment is very difficult at this stage. A more realistic option is for the State Government to continue to support current mining operations and to facilitate, where economically feasible, the commencement of foundation users of a new deepwater port at Oakajee, and to actively plan for a higher level of industrial development in the medium to long term.

6.5 Sustainability

Future growth of the Mid-West region needs to take into account sustainable development principles with an overall aim to maximise the positive benefits that the resource boom can deliver while minimising the negative impacts. To achieve sustainability, it is essential to define and incorporate equally, all the governance, social, environmental and economic issues that are involved. This can be achieved through setting achievable sustainability objectives and targets, while maximising opportunities by incorporating new and innovative practices and sustainability principles into the wide range of decision-making processes, project planning, design and management systems that will occur.

Future infrastructure investment decisions and strategies will need to address the current issues, as identified by this analysis report, plus long-term sustainability issues and how to minimise and mitigate environmental impacts. There is also a need to determine how to maximise social and indigenous cultural benefits along with economic benefits that will flow to the state and the Mid-West region from the resource boom. Examples include policy on greenhouse gas emissions, water resources, economic growth and local indigenous communities.

These strategies can help to shape the final design, location, construction and operation of the major (and supporting) infrastructure projects, while incorporating demand management plans for resources such as materials, power and water.

7 Settlement capacity

This section focuses on individual settlements and provides information on the following topics:

- population trends
- residential lot creation activity
- land availability and supply
- future significant land releases
- essential service infrastructure and capacity information
- community facilities

Basic land information maps are provided at the rear of this document for most of the towns discussed in this section.

It is anticipated that most of the residential growth associated with the development of the resource industry will occur in the settlements of:

- 1 Geraldton (City of Geraldton-Greenough)
- 2 Kalbarri (Shire of Northampton)
- 3 Dongara/Denison (Shire of Irwin)
- 4 Northampton (Shire of Northampton)
- 5 Green Head (Shire of Coorow)
- 6 Leeman (Shire of Coorow)

It is likely that the following settlements will come under pressure for development, but are currently unprepared for growth:

- 7 Horrocks (Shire of Northampton)
- 8 Port Gregory (Shire of Northampton)

Growth in the iron ore sector may present development opportunities for the following settlements:

- 9 Mullewa (Shire of Mullewa)
- 10 Mingenew (Shire of Mingenew)
- 11 Three Springs (Shire of Three Springs)
- 12 Eneabba (Shire of Carnamah)
- 13 Morawa (Shire of Morawa)
- 14 Perenjori (Shire of Perenjori)
- 15 Yalgoo (Shire of Yalgoo)
- 16 Carnamah (Shire of Carnamah)

Expansion of the iron ore industry is unlikely to affect the following settlements to any great degree.

- Mount Magnet
- Cue
- Sandstone
- Meekatharra
- Wiluna

The historical population data in this section has been derived from census publications. As such there have been changes to the geography over time. This data must therefore be considered to have a certain amount of volatility to it.

For example, the area referred to as Geraldton includes the previous localities of Geraldton and Greenough. To produce this data, the localities that have appeared previously and are now part of an expanded locality, have been summed together to produce this time series. This means that areas outside of the old localities which are now included in the new expanded locality are not included in the time series data. This may have the effect of increasing apparent growth rates.

Land availability data in this section (for settlements 1-8) is an estimate only and has not been verified. The data is based on a broad level analysis undertaken by DPI, which focused on undeveloped greenfield areas and used information sources such as aerial photography and Valuer General's Office data.

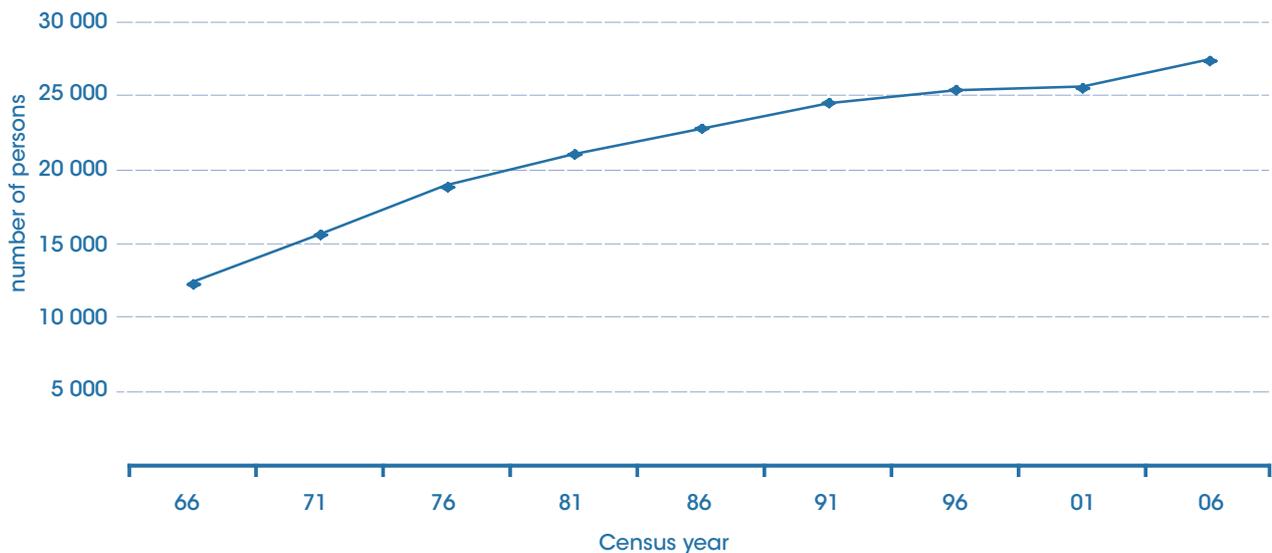
Note that vacant lots in existing developed areas and under-used areas (with significant additional capacity) were identified as developed for the purposes of this exercise.

7.1 Geraldton (City of Geraldton-Greenough)

Geraldton is the regional centre for the Mid-West and has experienced sustained and steady growth for some time, and will continue to do so. The town is very well placed to meet potential demand for residential land, including high growth scenarios.

Population snapshot

1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
12 196	15 457	18 773	20 895	22 628	24 361	25 243	25 436	27 259	Steady and sustained growth



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
970	760	472	3 503	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie – does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.1.1 Future land release

- There are significant areas of undeveloped residential zoned land.
- There are a large number of conditional approvals for subdivision in the City of Geraldton-Greenough. The majority of these are in the localities of Cape Burney (1000 lots), Wandina (350 lots), Sunset Beach (350 lots), Glenfield (300 lots) and Waggrakine (300 lots).
- The majority of residential development in the city is by the private sector, including residential estates such as Double Beach, Ocean Heights and Sunset Beach.
- Structure plans/outline development plans have also been prepared for areas in Utakarra, Glenfield, Waggrakine and Rudds Gully, some of which are at draft stage.
- The draft Northern Geraldton district structure plan identifies additional areas for future residential development in the localities of Moresby (Rowan's Farm – Woorree New Town) and Buller (Shire of Chapman Valley).
- Special residential and special rural land uses also make up a significant component of development in Geraldton. There are current conditional approvals for development of special rural lots at Deepdale, and special residential (low-density residential) lots at Strathalbyn.
- Major industrial estates in the city include the Webberton and Narngulu estates. Further planning is under way for development of light industrial land south of the Webberton estate (Wonthealla development zone) and for additional development at Narngulu.
- The proposed Oakajee industrial estate in the Shire of Chapman Valley will likely accommodate a range of heavy, general, noxious and hazardous industries. LandCorp is in ownership of more than 90 per cent of the zoned area and is currently undertaking structure planning for the area.

Land availability						
	Total area (ha)	Undeveloped area ¹				
		Total undeveloped area (ha)	Freehold		Crown	
			Private ownership (ha)	Other govt ownership ² (ha)	Crown reserve (ha)	Unallocated Crown land (ha)
Residential zoned land	2950.4	1638.3	1385.0	23.4 (LG) 154.3 (Oth)	46.9	28.7
Commercial zoned land	178.5	22.7	19.4	0.4	0.6	2.3
Industrial zoned land	1024.2	380.5	198.3	2.1 (LG) 149.8 (Oth)	18.8	11.5
Industrial zoned land (Oakajee)	2331.0	2331.0	0.0	2151.3 (Oth)	0.0	179.7

Source: DPI internal databases (2008).

1 Data is an estimate only and has not been verified. A broad level analysis was undertaken, focusing on greenfield areas, and as such vacant lots in existing developed areas and underdeveloped areas (with significant additional capacity) were identified as developed for the purposes of this exercise.

2 Other government ownership includes both local (LG) and State Government (Oth).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	12 210 000 kL	12 337 687 kL	Geraldton water supply catchment area and Allanooka scheme. Combined abstraction from both supply sources.
Power	unknown	Close to capacity but planning underway to meet anticipated demand	Three substations provide power to Geraldton (Chapman, Durlacher and Rangeway). Supply is meeting current demand, although some areas have limited expansion capacity.
Wastewater capacity	3500 m ³	Inflow 2772 m ³ Discharge 1946 m ³	No 1. Glenfield (Being upgraded) No 2. Wonthella New plant at Narngulu being constructed

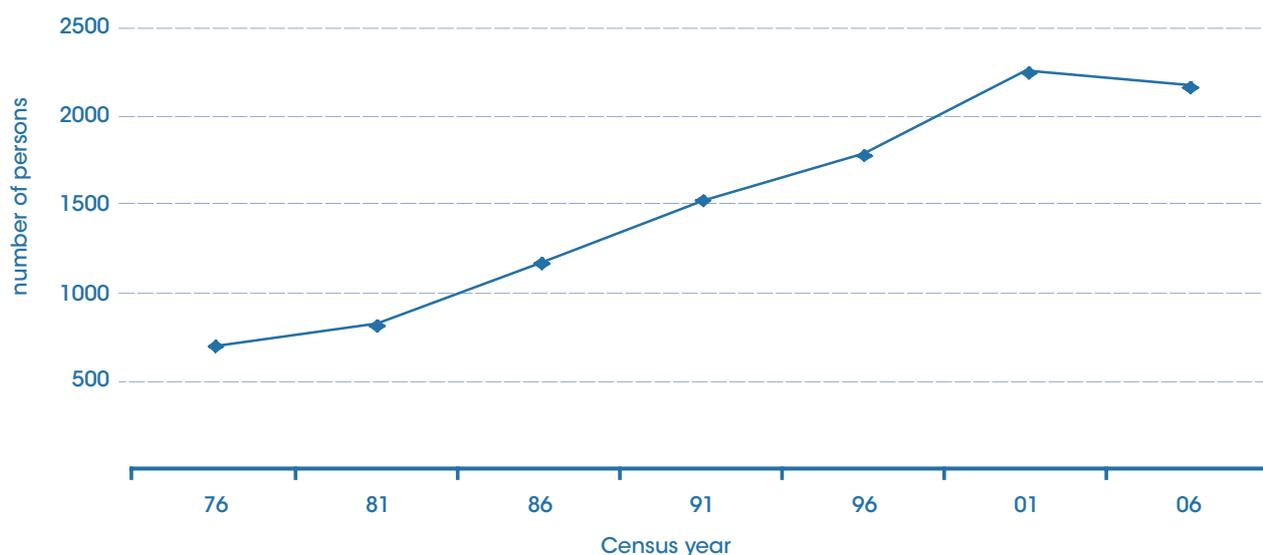
Community facilities		
Service	Description of service	Use of service
Pre-primary school/s		
Primary school/s	7 x public primary schools 3 x Catholic primary schools	
High school/s	John Wilcock College Geraldton Senior College Strathabryn Christian College Geraldton Grammar School Nagle Catholic College	
Tertiary education (eg TAFE)	Central West TAFE, Geraldton Universities Centre	
Childcare centres	Yes	
Hospital/s	Geraldton Regional Hospital, St John of God Hospital	
Other health facilities	Rangeway Child Health Centre, Aboriginal Medical Services, Community Health Centre, Hillcrest Lodge Nursing Home, John Frewer Hostel, Girls Hostel, Geraldton Nursing Home, Aged Home, Family Day Care Scheme	
Police station	Geraldton Police Station (district hub)	
Other facilities (please list) (eg - telecentre, fire brigade, playgroup)	Volunteer fire brigade, playgroups	
Oval/s	Numerous ovals and recreational parks throughout the city, supporting football, baseball, softball, cricket, hockey, soccer, rugby, lacrosse, touch football, and gridiron	Active clubs in all sports
Courts (tennis, netball, basketball)	Numerous courts and sports clubs support a variety of sports - tennis, badminton, basketball, netball, racquetball, croquet and squash	Active clubs in all sports
Tracks (eg bmx, racing)	Polocrosse, turf, equestrian, horse and pony clubs, speedway, go- Kart and BMX clubs	

Community facilities		
Service	Description of service	Use of service
Other recreation facilities (please list)	Entertainment centre, rollerdome, Country Women's Association (CWA), Police and Citizens Youth Club (PCYC), swimming pool, speedway, rifle range, archery range, gymnasium, bowling, golf. A wide range of facilities are available in Geraldton.	Active swimming, archery, golf, gymnastics, bowling, rowing, ski clubs
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Connected to Brand Highway to south, North West Coastal Highway to north and Geraldton-Mount Magnet Road to east.	
Airport/airstrip	Geraldton Airport	A number of general aviation companies operate from the airport. SkyWest operates multiple daily flights between Geraldton and Perth.
TransWA services	Coach service	Perth to Geraldton and return daily. Connections to Kalbarri and Meekatharra.

7.2 Kalbarri (Shire of Northampton)

Located approximately 110 kilometres north of Northampton, Kalbarri is a regional tourist centre, with a range of holiday and leisure attractions. The town also supports the crayfish industry. The town has capacity to accommodate additional growth with areas of undeveloped residential and industrial zoned land, some of which is unallocated Crown land. Kalbarri has limited capacity based on its current water and power supplies and upgrades are currently being planned. It has experienced significant and steady growth over a number of years.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	n/a	695	820	1170	1521	1788	2256	2174	High growth settlement – experiences close to 5000 people at peak tourist season



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
214	88	2	230	41

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie – does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.2.1 Future significant land releases

- There are currently conditional approvals to subdivide 230 residential lots in the townsite.
- The majority of the current residential approvals are for the Captial Hill estate which is part of the Kalbarri Vision project, located south of the town centre. This area is covered by the Port Kalbarri structure plan.
- LandCorp has conditional approval for the subdivision of 41 lots (Walker Street – stage 2). Completion is anticipated for late 2008.
- There is a significant area of residential zoned land located south of the townsite (approximately 70 ha). This area is unallocated Crown land.
- There are currently no industrial lots available in Kalbarri. LandCorp has conditional approvals for the subdivision of 16 industrial lots located adjacent to the existing industrial area. It is anticipated that these lots will be made available for sale in late 2008.
- There is a small amount of undeveloped industrial zoned land additional to the area with conditional approval. This area is also unallocated Crown land.
- A draft townsite strategy has been prepared for Kalbarri, which identifies areas for future residential, commercial and industrial expansion.

Land availability

	Total area (ha)	Undeveloped area ¹				
		Total undeveloped area (ha)	Freehold		Crown	
			Private ownership (ha)	Other govt ownership (ha)	Crown reserve (ha)	Unallocated Crown land (ha)
Residential zoned land	212.6	100.8	17.7	0	6.2	76.9
Commercial zoned land	7.5	2.9	1.1	0	1.8	0
Industrial zoned land	45.8	36.4	0	0	2.9	33.5

Source: DPI internal databases (2008).

¹ Data is an estimate only and has not been verified. A broad level analysis was undertaken, focusing on greenfield areas, and as such vacant lots in existing developed areas and underdeveloped areas (with significant additional capacity) were identified as developed for the purposes of this exercise.

² Other government ownership includes both local (LG) and state government (Oth).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	500 000 kL	446 660 kL	From Kalbarri water reserve, pumping station being upgraded.
Power			Less than 5% capacity in the system, design and costing of upgrade underway
Wastewater	1000 m ³ per day	n/a	Capacity being reviewed, funding allocated in budget for expansion works

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Kalbarri District High School	High Total student numbers increasing (218 students in 2004, 235 students in 2008)
Primary school/s		
High school/s		
Tertiary education (eg TAFE)	None	
Child care centres	Yes	Medium
Hospital	Medical centre Kalbarri Health Service	
Other health facilities	Doctor	
Police station	Kalbarri Police Station – patrolling station business hours	
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Telecentre, Volunteer SES & Fire, ambulance, visitors' centre	
Oval/s	Football, cricket, touch football	High
Courts (tennis, netball, basketball)	Tennis, basketball, netball and squash	High
Tracks (eg bmx, racing)	Walking tracks, skate park	High
Other recreation facilities (please list)	Golf course, lawn bowls, PCYC, recreational centre, entertainment centre, arts and crafts	High
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located approximately 65 kilometres from North West Coastal Highway	
Airport/airstrip	Airstrip	Used by Royal Flying Doctor Service (RFDS) and commercial flights
TransWA services	Coach service	Perth to Geraldton and Kalbarri and return three times weekly

7.3 Dongara and Denison (Shire of Irwin)

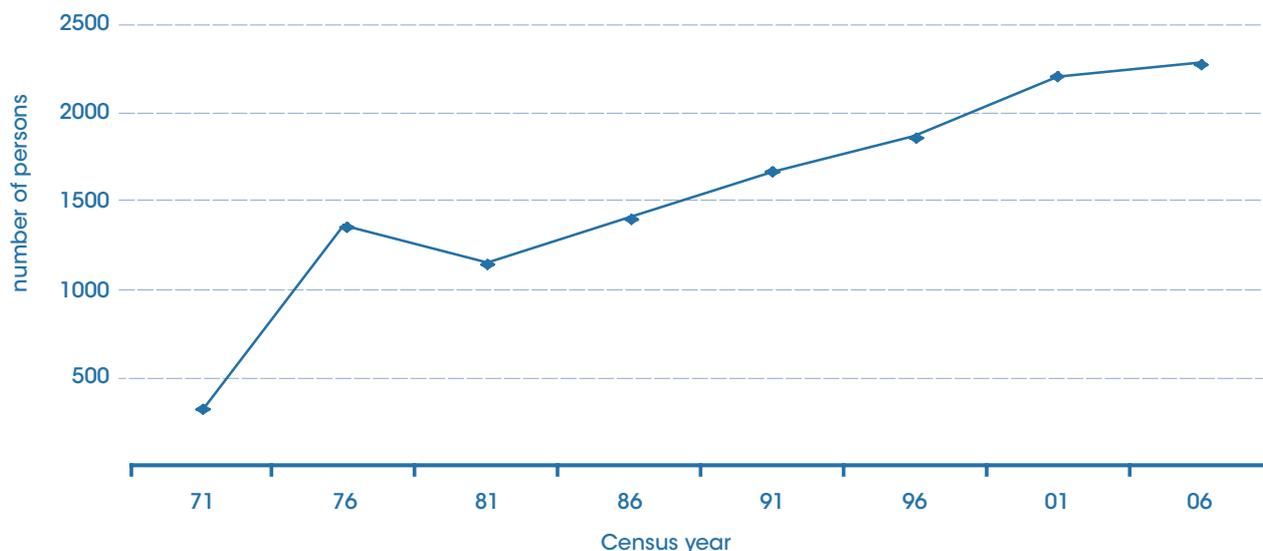
Located approximately 360 kilometres north of Perth and 60 kilometres south of Geraldton, Dongara and Port Denison historically supported the surrounding rural industry. The towns now support a thriving fishing industry and a growing tourism industry.

In 2005 the Shire of Irwin commissioned a report (Assessment of the Implications for the Shire of Irwin of Significant Population Growth: Syme Marmion & Co) aimed at investigating the possible implications of population growth on the shire based on scenarios involving the growth in the resource sector and the sea change phenomenon. The findings of this study have left the shire well placed to make decisions and recommendations based on the dynamics of its current and future demographic.

The shire has also identified shortfalls in recreation, tourism accommodation and aged care/housing facilities and feels that the State and Commonwealth governments will need to make more contributions in order to prevent these service gaps having a significant impact on future growth.

Consultation with the shire revealed that the major area of concern with regards to critical infrastructure supporting a projected growth in the region, is the capacity of power supply. This issue is currently being addressed by the addition of a new three-phase power line being constructed from Rudds Gully to Dongara. Any significant increase in population would mean that further infrastructure upgrades in this area would be required. Similarly, the town is almost nearing the capacity of current scheme water supply, and with the anticipation of strong growth in residential development, the issue of future water supply will need to be addressed.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	331	1368	1155	1416	1677	1874	2221	2292	Steady and sustained growth over a number of years



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
229	171	8	285	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie – does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.3.1 Future land release

- There are current conditional subdivision approvals to create more than 280 residential lots in Dongara/Denison. The majority of these are located in the North Shore and The Retreat residential estates (staged release).
- There are also significant areas zoned for special residential and special rural land uses, some of which are undeveloped.
- The Springfield special rural area to the east of the townsite (covered by the Springfield structure plan) has capacity for more than 200 additional lots.
- Development of Arcadia Waters Retirement Village in Denison (yielding approximately 50 dwelling units) is also under way.
- There are existing areas zoned for both general and light industrial uses. The general industrial area located on Brand Highway is partly developed, with undeveloped areas in private ownership. The light industrial area accommodates uses supporting the fishing industry. The area is almost fully used, with limited land available.
- A local planning strategy has been prepared and was endorsed by the WAPC in June 2007.

Land availability						
	Total area (ha)	Undeveloped area ¹				
		Total undeveloped area (ha)	Freehold		Crown	
			Private ownership (ha)	Other govt ownership (ha)	Crown reserve (ha)	Unallocated Crown land (ha)
Residential zoned land	239.6	43.0	26.0	3.1 (LG)	2.2	11.7
Commercial zoned land	10.6	0	0	0	0	0
Industrial zoned land	48.7	18.0	16.3	0	0.8	0.9

Source: DPI internal databases (2008).

1 Data is an estimate only and has not been verified. A broad level analysis was undertaken, focusing on greenfield areas, and as such vacant lots in existing developed areas and underdeveloped areas (with significant additional capacity) were identified as developed for the purposes of this exercise.

2 Other government ownership includes both local (LG) and state government (Oth).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	600 000 kL (from Wye Spring wellfield)	535196 kL	Combined allocation/abstraction for Dongara and Denison. May be supplemented from Allanooka scheme if needed.
Power		95%	Upgrades underway to resolve supply issues
Wastewater			Currently being upgraded and expanded

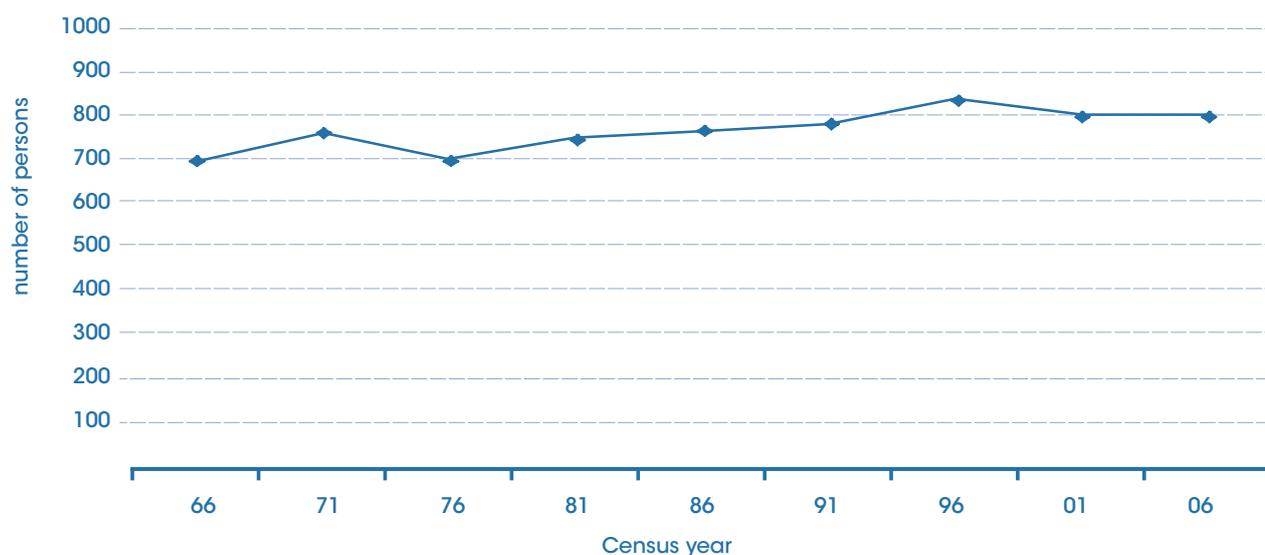
Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Dongara District High School	Total student numbers increasing (382 students in 2004, 425 students in 2008)
Primary school/s		
High school/s		
Tertiary education (eg TAFE)	None	
Child care centres	Child care centre, Playgroup Association	Playgroup Association open three times weekly
Hospital	Dongara Health Service (Country Health Service)	
Other health facilities		
Police station	Dongara Police Station – patrolling station business hours	
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Playgroup Association, Toddler Time at the recreation centre	Toddler Time once weekly
Oval/s	Football, cricket, hockey	Active clubs in these sports
Courts (tennis, netball, basketball)	Tennis, netball, badminton, basketball, squash	Active clubs in these sports
Tracks (eg bmx, racing)	Racecourse	Race club, polocrosse club
Other recreation facilities (please list)	Golf course, pavilion, recreation centre with gymnasium, bowling, pistol club, yacht club, surf lifesaving	Active golf, bowling, gymnastics, yacht, swimming, karate clubs
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located adjacent to Brand Highway (sealed) and eight kilometres to the Midlands Road (sealed) Located adjacent to freight railway	Operational
Airport/airstrip	Airfield located south of Port Denison	Used by RFDS
TransWA services	Coach service	Perth to Geraldton and return daily

7.4 Northampton (Shire of Northampton)

Located approximately 50 kilometres north of Geraldton, Northampton is a service centre for the surrounding agricultural region and also acts as an administrative centre for the shire. Northampton has a number of heritage sites and is a popular stopover for tourists travelling through the region.

The town has recorded a steady population for some time and has the capacity to accommodate additional growth, with large areas of under-used zoned land. The townsite does not currently have a reticulated sewerage scheme.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
701	763	703	750	768	786	842	805	805	Population numbers have remained steady for an extended time



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
13	10	0	34	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.4.1 Future land release

- There are currently conditional approvals to subdivide 34 residential lots in the townsite.
- There is a large amount of residential zoned land that is under-used and consists of single dwellings on large lots. There is currently no reticulated sewerage scheme.
- Much of the undeveloped residential land is in private ownership.
- The only land zoned for industrial use is currently occupied for grain silos. Additional land for industrial uses is urgently required.
- A draft local planning strategy has been prepared for the Shire of Northampton and identifies areas for future residential and industrial uses in Northampton.

Land availability						
	Total area (ha)	Undeveloped area ¹				
		Total undeveloped area (ha)	Freehold		Crown	
			Private ownership (ha)	Other govt ownership (ha)	Crown reserve (ha)	Unallocated Crown land (ha)
Residential zoned land	178.2	10.3	8.7	0	0.4	1.2
Commercial zoned land	14.3	1.7	1.0	0.7 (LG)	0	0
Industrial zoned land	3.9	0	0	0	0	0

Source: DPI internal databases (2008).

1 Data is an estimate only and has not been verified. A broad level analysis was undertaken, focusing on greenfield areas, and as such vacant lots in existing developed areas and underdeveloped areas (with significant additional capacity) were identified as developed for the purposes of this exercise.

2 Other government ownership includes both local (LG) and state government (Oth).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	350 000 kL	108 664 kL	Supplied by Allanooka since February 2008
Power		90%	Upgrade at concept design stage
Wastewater			No reticulated sewerage

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Northampton District High School St Mary's Catholic Primary School	High Total student numbers decreasing (162 students in 2004, 132 students in 2008) for public school.
Primary school/s	Northampton District High School St Mary's Catholic Primary School	High
High school/s	Northampton District High School (to Year 10)	High
Tertiary education (eg TAFE)	None	
Child care centres	Yes	High
Hospital	Northampton District Hospital	
Other health facilities	Doctors/Aboriginal health service	
Police station	Northampton Police Station - patrolling station business hours	
Other facilities (please list) (eg - telecentre, fire brigade, playgroup)	RSL, arts and crafts	There is an RSL hall, arts and crafts are at the library
Oval/s	Football, cricket, indoor cricket	High
Courts (tennis, netball, basketball)	Tennis, basketball, netball, badminton, squash	High
Tracks (eg bmx, racing)	None	
Other recreation facilities (please list)	Golf course, lawn bowls, show pavilion, sports pavilion, skate park	High
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located on the North West Coastal Highway (sealed) Freight railway	High Closed
Airport/airstrip	None - nearest airport at Geraldton	
TransWA services	Coach service	Perth to Geraldton and Kalbarri and return three times weekly

7.5 Green Head (Shire of Coorow)

Green Head is a small coastal settlement supported by the fishing and tourism industries. There is residential and industrial zoned land in the town, but it will require land assembly. Community facilities in the town are very limited, so this matter would require attention if significant growth was to occur.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	249	Not available due to small population numbers

Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
55	45	3	2	40

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.5.1 Future land release

- LandCorp has developed two stages (88 lots) of the South Bay Estate at Green Head. An application has been lodged to develop a further stage of 40 lots.
- LandCorp has current conditional approval to subdivide eight industrial lots.
- There are existing areas of zoned and undeveloped residential and industrial land which are unallocated Crown land. These areas will require land assembly before further development can occur. Structure planning is under way for residential and industrial expansion in the townsite.

Land availability						
	Total area (ha)	Undeveloped area ¹				
		Total undeveloped area (ha)	Freehold		Crown	
			Private ownership (ha)	Other govt ownership (ha)	Crown reserve (ha)	Unallocated Crown land (ha)
Residential zoned land	62.6	16.5	0	5.0 (Oth)	0	11.5
Commercial zoned land	1.8	0	0	0	0	0
Industrial zoned land	20.9	13.4	0	0	0	13.4

Source: DPI internal databases (2008).

1 Data is an estimate only and has not been verified. A broad level analysis was undertaken, focusing on greenfield areas, and as such vacant lots in existing developed areas and underdeveloped areas (with significant additional capacity) were identified as developed for the purposes of this exercise.

2 Other government ownership includes both local (LG) and state government (Oth).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	470 000 kL (Mt Peron wellfield)	282 663 kL	Refer to Leeman – both towns supplied from same source
Power		40 per cent	Capacity for additional users
Wastewater		n/a	Temporary wastewater treatment plant close to capacity, new treatment plant concept plan prepared for advertising

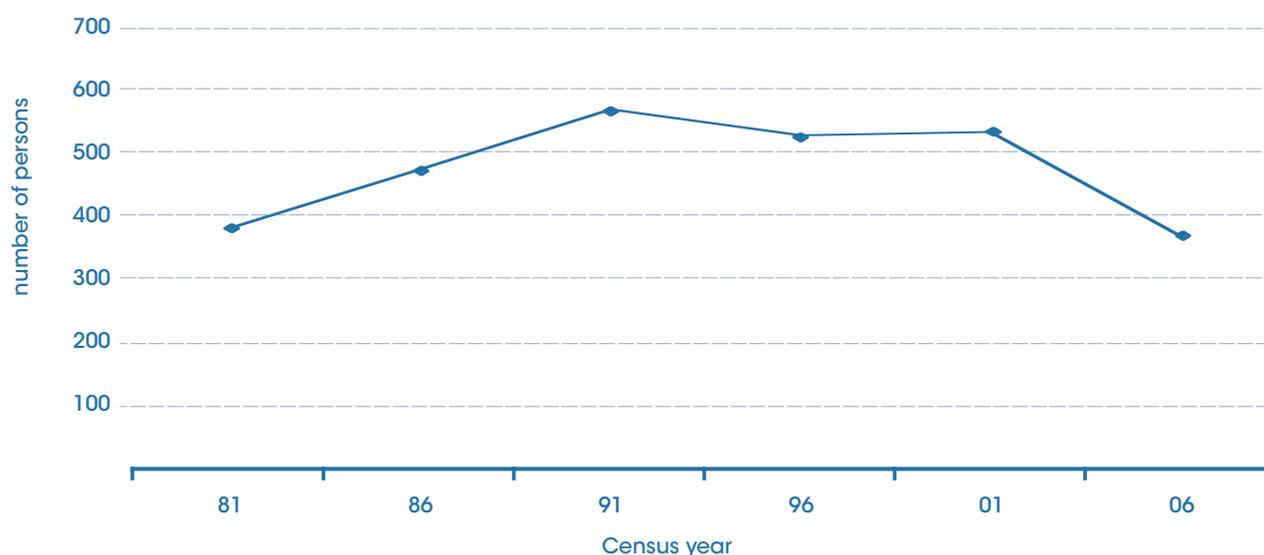
Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	None	
Primary school/s	None	
High school/s	None	
Tertiary education (eg TAFE)	None	
Child care centres		
Hospital	None	
Other health facilities		
Police station	None	

Community facilities		
Service	Description of service	Use of service
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Bushfire brigade	
Oval/s	None	
Courts (tennis, netball, basketball)	Tennis	Active tennis club
Tracks (eg bmx, racing)	None	
Other recreation facilities (please list)	Community centre, golf, bowling	Active clubs in golf and bowling
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located approximately 40 kilometres from Brand Highway on Coorow – Green Head Road (sealed) and Indian Ocean Drive (sealed)	
Airport/airstrip	None – nearest service at Leeman	
TransWA services	None – nearest service at Eneabba and Warradarge (roadhouse)	

7.6 Leeman (Shire of Coorow)

Leeman is a small coastal settlement supported by the fishing and tourism industry. With capacity for additional growth, Aviva Corporation intends to house their construction and operation workforce in Leeman.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	n/a	n/a	385	479	573	531	539	374	Population figures may be unreliable



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
3	0	0	20	20

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.6.1 Future land release

- LandCorp has current conditional approval to subdivide 20 residential lots.
- There is an existing area of zoned and undeveloped residential land to the south of the townsite which is unallocated Crown land. This area will require land assembly before further development can occur.
- There are a number of sites identified for possible infill development in the townsite, some of which require local scheme amendments and land assembly processes to be undertaken.
- There are some vacant lots in the existing industrial area. Expansion of the existing area requires land assembly and a local scheme amendment.
- Structure planning is under way for residential and industrial expansion in the townsite.

Land availability						
	Total area (ha)	Undeveloped area ¹				
		Total undeveloped area (ha)	Freehold		Crown	
			Private ownership (ha)	Other govt ownership (ha)	Crown reserve (ha)	Unallocated Crown land (ha)
Residential zoned land	64.8	34.4	0	0	0.9	33.5
Commercial zoned land	2.4	1.6	0	0	0	1.6
Industrial zoned land	12.8	0	0	0	0	0

Source: DPI internal databases (2008).

1 Data is an estimate only and has not been verified. A broad level analysis was undertaken, focusing on greenfield areas, and as such vacant lots in existing developed areas and underdeveloped areas (with significant additional capacity) were identified as developed for the purposes of this exercise.

2 Other government ownership includes both local (LG) and state government (Oth).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	470 000 kL from Mt Peron wellfield	282 663 kL	Combined abstraction for Leeman and Greenhead
Power		40 per cent	Plenty of spare capacity to accommodate growth
Wastewater capacity	350 m ³	218 m ³	

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Leeman Primary School	Total student numbers decreasing (116 students in 2004, 52 students in 2008)
Primary school/s		
High school/s	None	
Tertiary education (eg TAFE)	None	
Child care centres		
Hospital	None	
Other health facilities		
Police station	Leeman Police Station – patrolling station business hours	
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Telecentre, bushfire brigade, Koast Kids Klub, volunteer sea search and rescue	
Oval/s	Football, hockey	Football club
Courts (tennis, netball, basketball)	Tennis, basketball	Basketball association
Tracks (eg bmx, racing)	None	
Other recreation facilities (please list)	Community and recreation centre, bowling	Bowling club
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located approximately 40 kilometres from Brand Highway on Indian Ocean Drive (sealed)	
Airport/airstrip	Yes – airstrip located south of townsite	
TransWA services	None – nearest service at Eneabba and Warradarge (roadhouse)	

7.7 Horrocks (Shire of Northampton)

Located approximately 20 kilometres west of Northampton, Horrocks was established as a coastal holiday settlement. The town is supported by the tourism and fishing industry. The Shire of Northampton is in ownership of undeveloped residential and town centre zoned land in the townsite.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	138	Not available due to small population numbers

Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
26	0	17	16	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.7.1 Future land release

- The Shire of Northampton has current conditional approval to subdivide 16 residential lots (Stage 2 of Horrocks Beach subdivision). These lots will be released in 2008 and will require dwellings to be constructed in five years.
- There is a proposal to develop more than 800 lots (residential, rural residential, rural smallholdings) to the east of the townsite (Seaview Farm). A draft structure plan has been prepared and submitted to council and is awaiting comment by the WAPC.
- A draft local planning strategy has been prepared for the Shire of Northampton which details strategies and actions required for the Horrocks townsite.
- All of the undeveloped residential and town centre zoned land is in the ownership of local government.

Land availability						
	Total area (ha)	Undeveloped area ¹				
		Total undeveloped area (ha)	Freehold		Crown	
			Private ownership (ha)	Other govt ownership (ha)	Crown reserve (ha)	Unallocated Crown land (ha)
Residential zoned land	16.2	8.6	0	8.6 (LG)	0	0
Commercial zoned land	9.9	3.1	0	3.1 (LG)	0	0
Industrial zoned land	0	0	0	0	0	0

Source: DPI internal databases (2008).

1 Data is an estimate only and has not been verified. A broad level analysis was undertaken, focusing on greenfield areas, and as such vacant lots in existing developed areas and underdeveloped areas (with significant additional capacity) were identified as developed for the purposes of this exercise.

2 Other government ownership includes both local (LG) and state government (Oth).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	100 000 kL	54 632 kL	Additional capacity for residential growth (Horrocks borefield)
Power		90 per cent	Limited capacity for expansion
Wastewater		n/a	Wastewater treatment plant

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	None - relies on Northampton	
Primary school/s	None - relies on Northampton	
High school/s	None - relies on Northampton	
Tertiary education (eg TAFE)	None	
Child care centres	None	
Hospital	None	
Other health facilities	None	
Police station	None	
Other facilities (please list)	None	
(eg - telecentre, fire brigade, playgroup)		
Oval/s		Low
Courts (tennis, netball, basketball)	Tennis	Low
Tracks (eg bmx, racing)	None	
Other recreation facilities (please list)	Golf course (9 hole), playground	High
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	20 kilometres from North West Coastal Highway	
Airport/airstrip	None - relies on Geraldton	
TransWA services	None - nearest service at Northampton	

7.8 Gregory (Shire of Northampton)

Located approximately 40 kilometres north-west of Northampton, Gregory is a coastal hamlet. Historically a port for mining and agricultural activities, the town now supports the tourism and fishing industries. There is very limited capacity for additional growth due to a number of existing constraints.

The suburb of Gregory recorded a count of 46 persons in the 2006 census (place of usual residence).

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Not available due to very small population numbers

Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
0	0	0	0	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie – does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.8.1 Future land release

- There are currently no applications to subdivide residential or industrial lots in the town.
- There is no undeveloped residential zoned land in the townsite.
- The townsite is surrounded by unallocated Crown land which is subject to native title.
- The townsite has considerable servicing constraints, including no reticulated sewerage system and issues with water and power supply.
- A draft local planning strategy has been prepared for the Shire of Northampton which details strategies and actions required for the Gregory townsite.

Land availability						
	Total area (ha)	Undeveloped area ¹				
		Total undeveloped area (ha)	Freehold		Crown	
			Private ownership (ha)	Other govt ownership (ha)	Crown reserve (ha)	Unallocated Crown land (ha)
Residential zoned land	5.2	0	0	0	0	0
Commercial zoned land	0.3	0	0	0	0	0
Industrial zoned land	0	0	0	0	0	0

Source: DPI internal databases (2008).

1 Data is an estimate only and has not been verified. A broad level analysis was undertaken, focusing on greenfield areas, and as such vacant lots in existing developed areas and underdeveloped areas (with significant additional capacity) were identified as developed for the purposes of this exercise.

2 Other government ownership includes both local (LG) and state government (Oth).

Essential service infrastructure			
	Allocation	Usage	Comments
Water		n/a	Not serviced by Water Corporation (serviced by shire). Water supply is not to a potable standard considered acceptable by the Water Corporation. Private water tanks.
Power		90 per cent	Upgrade at concept design stage
Wastewater			No reticulated sewerage – septic tanks

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	None	
Primary school/s	None	
High school/s	None	
Tertiary education (eg TAFE)	None	
Child care centres	None	
Hospital	None	
Other health facilities	None	
Police station	None	
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Volunteer fire brigade	
Oval/s	Small oval	Minimal

Community facilities		
Service	Description of service	Use of service
Courts (tennis, netball, basketball)	None	
Tracks (eg bmx, racing)	None	
Other recreation facilities (please list)	Playground	
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located on Port Gregory Road (sealed) – 45 kilometres to North West Coastal Highway	
Airport/airstrip	None – nearest airport at Kalbarri	
TransWA services	None – nearest service at Kalbarri and Northampton	

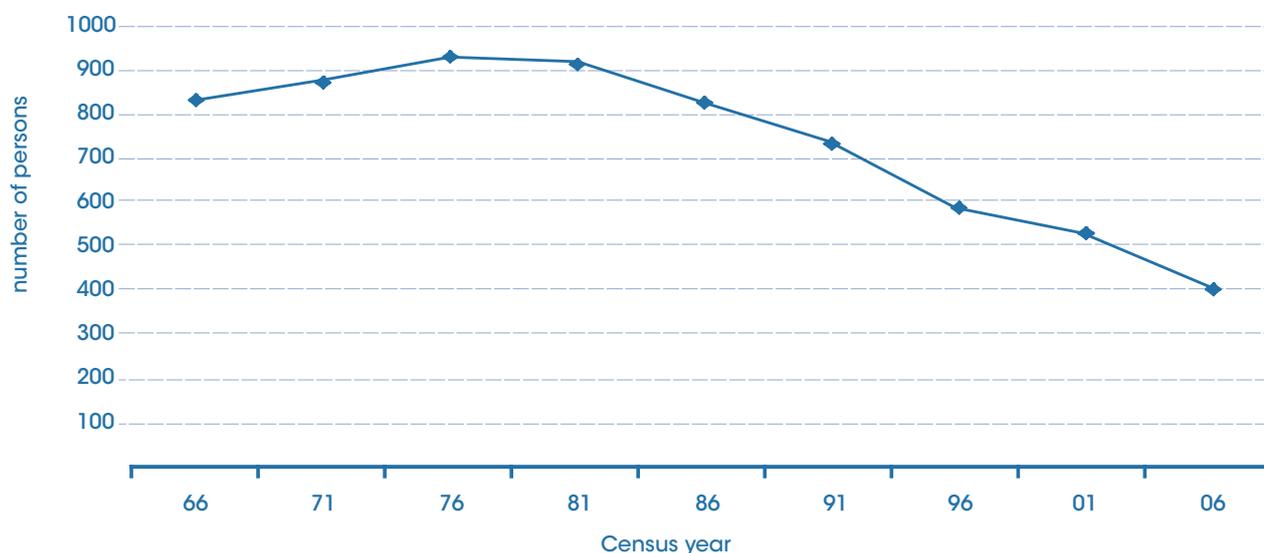
7.9 Mullewa (Shire of Mullewa)

Located approximately 95 kilometres east of Geraldton and 460 kilometres north of Perth, Mullewa services the surrounding wheat and sheep agricultural area. The Mount Gibson iron ore mine at Tallering Peak has brought new opportunities, and tourism is also an important part of the fabric of the town. Further resource prospects to the east of Mullewa may offer additional employment opportunities in the future.

Mullewa's major industry is agriculture with 44 per cent of the workforce employed in agricultural activities. Rainfall averages 425 mm per annum and the district has become one of Western Australia's primary agricultural areas, with broad-acre grain farms producing in excess of 250 000 tonnes annually, in a good year.

The town has experienced a decline in population since the late 1970s, meaning that the town has ample capacity to accommodate growth. Significant growth would require upgrades to services.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
833	878	933	918	828	739	591	532	407	Steady decline so capacity to accommodate growth



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
3	1	0	0	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lotstratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.9.1 Future land release

There are currently no applications to subdivide residential lots in the town.

There are a number of vacant residential and industrial zoned lots in the townsite, some of which are in local government ownership.

Land availability	
	Total area (ha)
Residential zoned land	49.3
Commercial zoned land	8.3
Industrial zoned land	36.5
Source: DPI internal databases (2008)	

Essential service infrastructure			
	Allocation	Usage	Comments
Water		133 146 kL	Refer to Geraldton 278 services supplied by Allanooka borefield, potential to support 620 services in Mullewa (282 presently connected)
Power		75 per cent	Some spare capacity in the system 300 customers currently serviced
Wastewater			Limited wastewater scheme – septic tanks

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Our Lady of Mount Carmel Catholic Primary School, Mullewa District High School	Total student numbers increasing for public school (88 students in 2004, 115 students in 2008)
Primary school/s	Our Lady of Mount Carmel Catholic Primary School, Mullewa District High School	
High school/s	Mullewa District High School	
Tertiary education (eg TAFE)	TAFE courses available through telecentre	
Child care centres	Playgroup	Active playgroup once per week
Hospital	Mullewa Health Service, community health nurse, health education officer	Fortnightly occupational therapist, visiting podiatrist, physiotherapist and speech therapist, HACC service.
Other health facilities	Mullewa medical centre, St John Ambulance substation	Twice weekly GP service

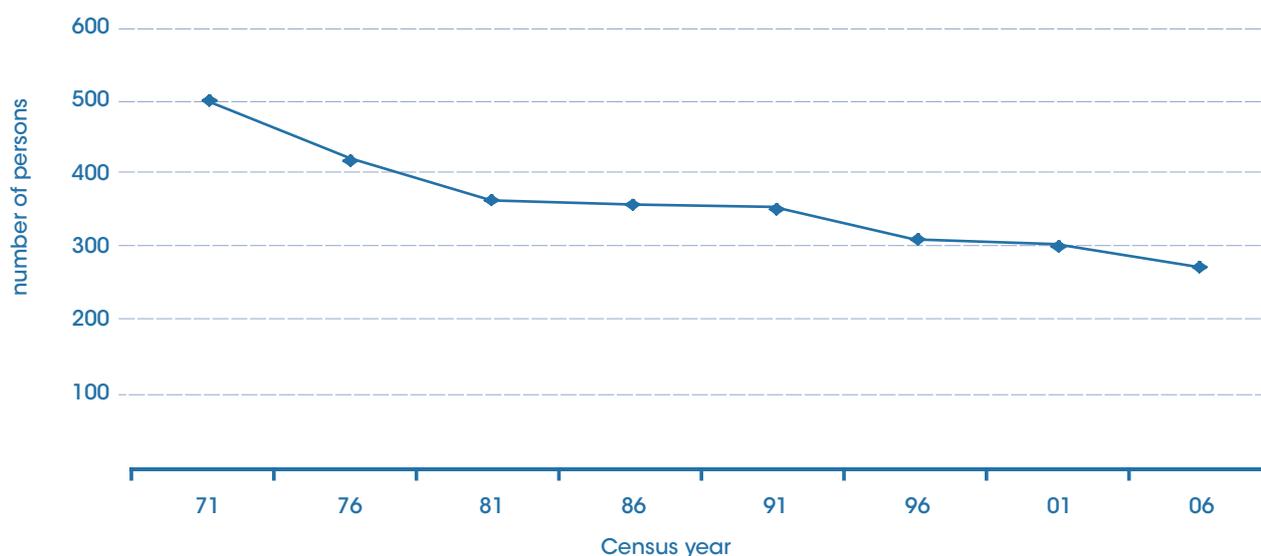
Community facilities		
Service	Description of service	Use of service
Police station	Mullewa Police Station (patrolling station – business hours)	Operates 7 days per week
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Library, volunteer fire and rescue, Bushfire brigade, telecentre, arts and crafts, indigenous womens' art centre	Each of these services has a dedicated building
Oval/s	Sporting oval	Active football club
Courts (tennis, netball, basketball)	Recreation centre – basketball, netball, badminton, volleyball, squash, tennis courts	Active badminton and tennis clubs
Tracks (eg bmx, racing)	None	
Other recreation facilities (please list)	Swimming pool, golf course, bowling club, rifle range, polocrosse club, licensed sports club, gymnasium	Active swimming, golf, bowling and polocrosse clubs
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located on Geraldton-Mount Magnet Road (sealed), and Carnarvon-Mullewa Road (sealed), Wubin-Mullewa Road and Mullewa-Mingenew Road Freight railway	Operational
Airport/airstrip	Airport located 7 kilometres north of townsite	
TransWA services	Coach service	Perth to Geraldton (via Northam and Mullewa) and return twice per week Geraldton to Meekatharra and return twice per week
Communications	3G mobile telephone network, 2 x broadband internet service (satellite, wireless and ADSL)	

7.10 Mingenew (Shire of Mingenew)

Located on the Midlands Road approximately 120 kilometres south-east of Geraldton and 370 kilometres north of Perth, Mingenew services the surrounding agricultural industry.

Mingenew has experienced a steady decline in population since the late 1970s, meaning that the town has ample capacity to accommodate growth. Significant growth would require upgrades to services.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	504	423	368	362	357	313	306	276	Steady decline so capacity to accommodate growth



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
3	0	0	10	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.10.1 Future land release

- There are current conditional approvals to develop 10 residential lots and eight industrial lots (Shire of Mingenew).
- There are some existing vacant residential and industrial zoned lots in the townsite.
- The Shire of Mingenew is in ownership of an area of undeveloped industrial zoned land to the north of the townsite.
- There is little undeveloped residential zoned land available for townsite expansion.

Land availability	
	Total area (ha)
Residential zoned land	30.7
Commercial zoned land	5.3
Industrial zoned land	28.2
Source: DPI internal databases (2008).	

Essential service infrastructure			
	Allocation	Usage	Comments
Water	120 000 kL	72 224 kL	Capacity to accommodate additional users (Mingenew wellfield)
Power		65 per cent	Capacity for additional users
Wastewater			Septic tanks

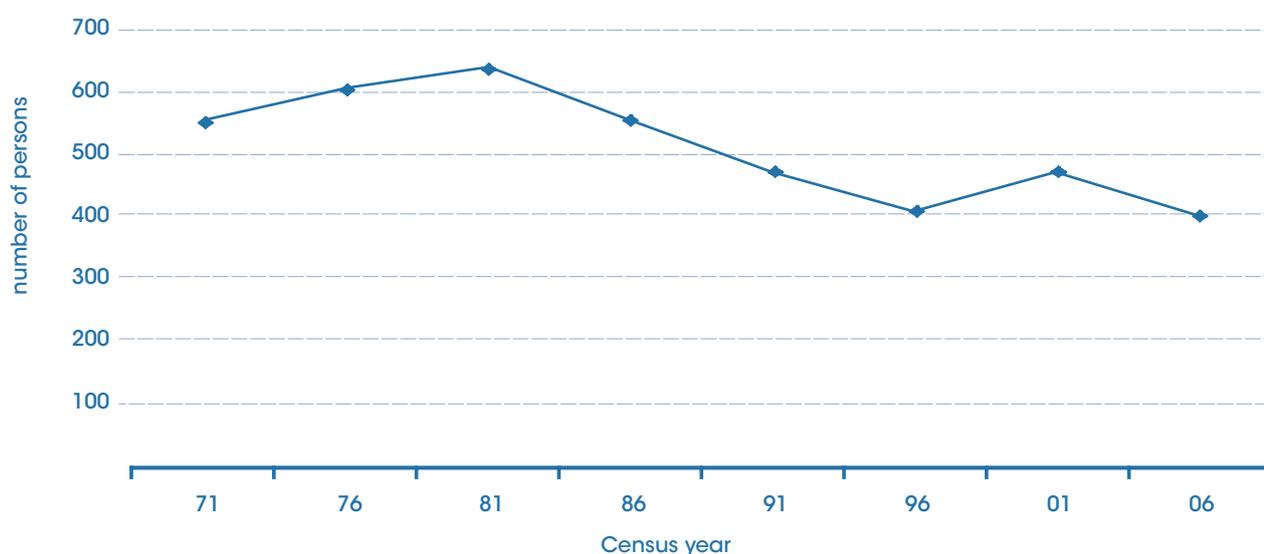
Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Mingenew Pre-primary and Primary School	Total student numbers steady (94 students in 2004, 95 students in 2008)
Primary school/s		
High school/s	None	
Tertiary education (eg TAFE)	None	
Child care centres	Occasional – no specific site	
Hospital	None	
Other health facilities	Silver Chain medical centre, visiting specialists	
Police station	Mingenew Police Station (patrolling station – business hours)	
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Playgroup, telecentre, arts and crafts, painting group, seniors bingo, scrapbooking, toy library, karate	Active community organisations involved in playgroup and arts and crafts, dedicated facilities to telecentre, museum, Lions Club hall and Masonic Lodge

Community facilities		
Service	Description of service	Use of service
Oval/s	Football, cricket, hockey oval	Active football, hockey and cricket clubs
Courts (tennis, netball, basketball)	Netball, tennis, basketball	Active netball, tennis and basketball clubs
Tracks (eg bmx, racing)	Racetrack	Active turf club
Other recreation facilities (please list)	Sports club, lawn bowls, 18 hole golf course, showground, saleyards	Active golf and lawn bowls clubs
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located on Midlands Road (sealed), Mingenew-Morawa Road (sealed) and Mingenew-Mullewa Road (sealed) Freight railway	Operational
Airport/airstrip	None	
TransWA services	Coach service	Perth to Geraldton and Kalbarri and return four times weekly

7.11 Three Springs (Shire of Three Springs)

Located on the Midlands Road approximately 170 kilometres south-east of Geraldton and 310 kilometres north of Perth, Three Springs services the surrounding sheep and wheat industry. The town has experienced a steady decline in population since the early 1980s. This means that Three Springs has ample capacity to accommodate growth, including a range of community facilities. Significant growth would require upgrades to services.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	554	605	638	556	473	411	473	402	Reasonably steady decline so capacity to accommodate growth



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
2	0	1	0	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.11.1 Future land release

There are currently no applications to subdivide residential or industrial lots in Three Springs.

While there are few vacant residential and industrial zoned lots in the townsite, there are some under-used residential lots and an area of undeveloped residential zoned land in local government ownership.

Land availability	
	Total area (ha)
Residential zoned land	34.8
Commercial zoned land	3.8
Industrial zoned land	5.1
Source: DPI internal databases (2008).	

Essential service infrastructure			
	Allocation	Usage	Comments
Water	240 000 kL	158 926 kL	Capacity to accommodate additional users (from Dookanooka wellfield, Three Springs water reserve)
Power		40 per cent	Capacity for additional users
Wastewater			

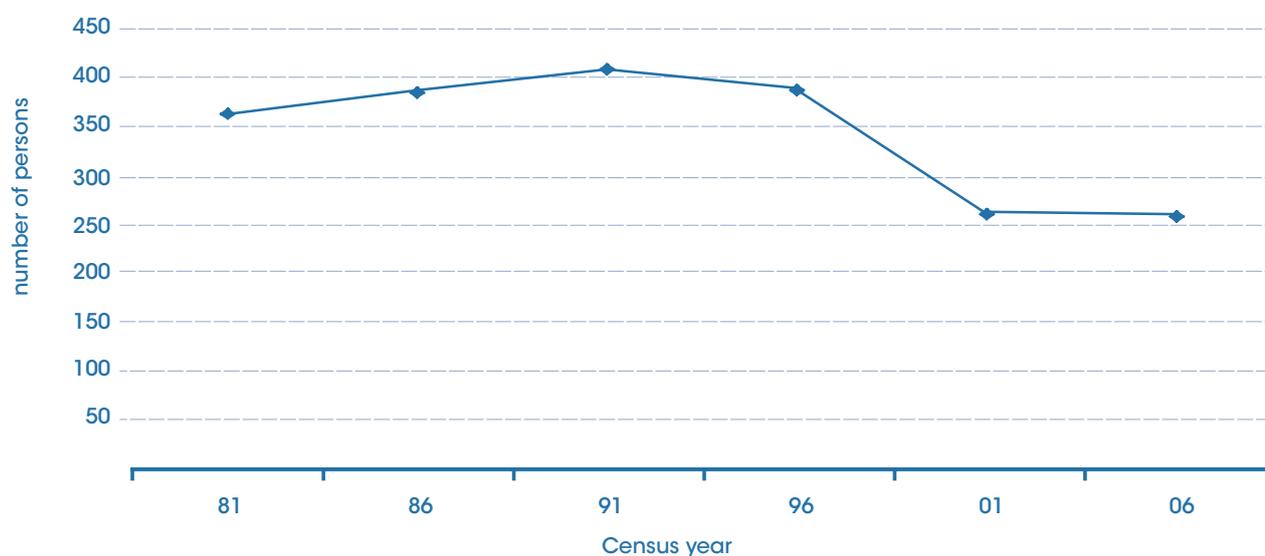
Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Three Springs Pre-Primary and Primary School	Total student numbers steady (58 students in 2004, 59 students in 2008)
Primary school/s		
High school/s	None	
Tertiary education (eg TAFE)	None	
Child care centres	Yes	Licensed for 7 children
Hospital	North Midlands District Hospital	
Other health facilities	Medical centre, GP	
Police station	Three Springs Police Station (patrolling station – business hours)	Three officers, one admin
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Playgroup, yoga, Lions, RSL, crafts, fire brigade	Historical Society, RSL, Lions Club, RSL Women's Auxillary, Craft Club
Oval/s	Football oval, cricket, hockey	Active cricket, football, hockey clubs

Community facilities		
Service	Description of service	Use of service
Courts (tennis, netball, basketball)	Sporting club – tennis, netball, squash, basketball, badminton	Active netball and tennis clubs
Tracks (eg bmx, racing)	None	
Other recreation facilities (please list)	Recreation centre – badminton, golf club, swimming pool, rifle range, pavilion, playground	Active rifle and sport clay target shooting clubs
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located on Midlands Road (sealed), Eneabba-Three Springs Road (sealed) and Morawa-Three Springs Road (sealed) Freight railway	Operational
Airport/airstrip	Airstrip (located 10 kilometres east of townsite)	Used by RFDS
TransWA services	Coach service	Perth to Geraldton and Kalbarri and return four times weekly

7.12 Eneabba (Shire of Carnamah)

Located on the Brand Highway approximately 145 kilometres south of Geraldton and 280 kilometres north of Perth, Eneabba services the surrounding agricultural and mining industries. Eneabba has experienced a decline in population over the last ten years. This means that the town has ample capacity to accommodate growth, including a range of community facilities. Significant growth would require upgrades to services.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	n/a	n/a	364	387	410	389	263	260	Recent decline so capacity to accommodate some growth



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
0	0	0	0	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.12.1 Future land release

- There are currently no applications to subdivide residential or industrial lots in the town.
- There are some vacant residential and industrial zoned lots in the townsite, some of which are unallocated Crown land.
- Council has approached DPI to reallocate land for residential, industrial and commercial use.
- Subdivision of rural land into 5-10 acre special rural lots is planned for the next 1-5 years.

Land availability	
	Total area (ha)
Residential zoned land	24.8
Commercial zoned land	7.7
Industrial zoned land	7.7

Source: DPI internal databases (2008).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	200 000 kL 19.5 gL	100 402 kL n/a	123 services, capacity for future expansion (Eneabba wellfield) Mineral sands industry requirements
Power		40 per cent	Supplied via Three Springs substation
Wastewater			Not known

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Eneabba Primary School	Total student numbers steady (37 students in 2004, 36 students in 2008)
Primary school/s		
High school/s	None	
Tertiary education (eg TAFE)	None	
Child care centres	Only playgroup	
Hospital	None	
Other health facilities		
Police station	None	
Other facilities (please list) (eg - telecentre, fire brigade, playgroup)	Playgroup, bushfire brigade	A community centre is available
Oval/s	Football	Two ovals available

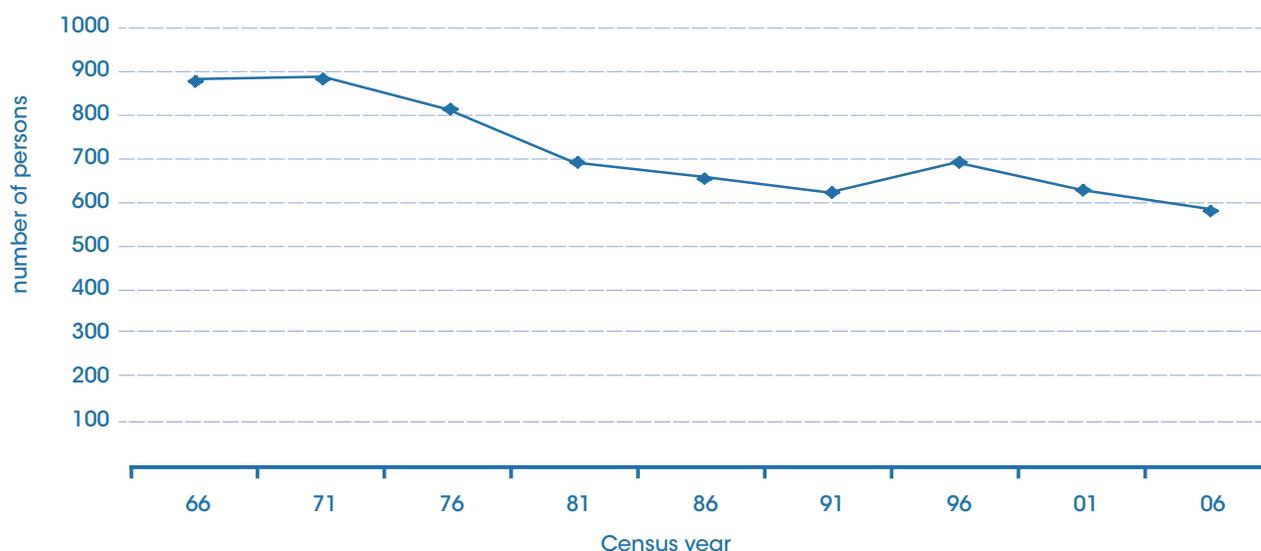
Community facilities		
Service	Description of service	Use of service
Courts (tennis, netball, basketball)	Tennis, squash, climbing ropes	Recreation centre available
Tracks (eg bmx, racing)	None	
Other recreation facilities (please list)	Swimming pool, lawn bowls, golf course	A recreation and sporting club is active and provides for bowling –there is a clubhouse at the golf course available
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Freight railway Located on Brand Highway (sealed) and Eneabba-Three Springs Road (sealed)	Operational
Airport/airstrip	Airport located to west of townsite	Unknown
TransWA services	Coach service	Perth to Geraldton and Kalbarri and return daily

7.13 Morawa (Shire of Morawa)

Located approximately 370 kilometres north-east of Perth and 180 kilometres south-east of Geraldton, Morawa services the surrounding wheat and sheep agricultural area.

Morawa has experienced a decline in population since the early 1970s, meaning that the town has ample capacity to accommodate growth. Significant growth would require upgrades to services. A key concern for Morawa is power capacity, as it is located on the edge of the power grid.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
881	887	814	694	659	624	692	629	585	Steady population decline so capacity to accommodate growth



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
0	0	0	0	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.13.1 Future land release

- There is little undeveloped residential and industrial zoned land in the townsite.
- The Shire of Morawa is in ownership of a number of residential lots in the townsite.
- There are currently no applications to subdivide residential or industrial lots in the town.

Land availability	
	Total area (ha)
Residential zoned land	14.1
Commercial zoned land	5.9
Industrial zoned land	44.3
Source: DPI internal databases (2008).	

Essential service infrastructure			
	Allocation	Usage	Comments
Water	600 000 kL (Arrowsmith borefield)	217 035 kL	Also supplies Arrino, Perenjori, Caron, Bunjil and Latham as well as farmlands (estimated 180 306 kL)
Power		90 per cent	Limited capacity for additional users
Wastewater		Not available	Scheme operated by the shire

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Serviced by Morawa District High School (Pre-primary – Year 12)	Total student numbers decreasing (251 students in 2004, 181 students in 2008)
Primary school/s		
High school/s		
	WA College of Agriculture (Year 10-12)	62 students
Tertiary education (eg TAFE)	None	
Child care centres	One	Operates 5 days per week
Hospital	Morawa Perenjori Multi-Purpose Centre servicing Morawa and Perenjori communities	Services include patient care, ante-natal classes, physiotherapy, dietician, diabetic education, podiatry and other visiting specialists
Other health facilities	Child health centre GP and medical centre	Open 3 ½ days per week
Police station	Morawa Police Station – patrolling station business hours	Operates 7 days per week

Community facilities		
Service	Description of service	Use of service
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Playgroup, ambulance, SES, fire brigade, library, telecentre, various community groups	Playgroup – Friday 9-11 at neighbourhood learning centre, historical society, Lions Club, SES, CWA, Tree Committee
Oval/s	Oval and greater sportsground, football, cricket, hockey	Active football, cricket, hockey clubs
Courts (tennis, netball, basketball)	Basketball, tennis, netball, squash, badminton	Active badminton, bowling, netball and tennis clubs
Tracks (eg bmx, racing)	BMX track, speedway	Active speedway club
Other recreation facilities (please list)	Morawa Gliding Club (operates on most Sundays from Prater Airport), Morawa golf and lawn bowling club, swimming pool, rifle range	Gliding club (7 days per week for part of year), rifle club and swimming club
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Freight railway Located on Wubin-Mullewa Road (sealed)	Operational
Airport/airstrip	Local airstrip (Prater Airport)	
TransWA services	Coach service	Perth to Geraldton (via Northam and Mullewa) and return twice per week
Communications	Next G mobile telephone network, Broadband internet service providers (Broadband Net and Telstra)	

7.14 Perenjori (Shire of Perenjori)

Located approximately 350 kilometres north-east of Perth and 40 kilometres south of Morawa, Perenjori is located in the centre of the Mid-West region's wheat and sheep-producing area.

In July 2006 the Shire of Perenjori, in partnership with the Mid West Development Commission, funded an economic and social impact study. This report included an interactive economic model that allows us to consider different scenarios. This model produced the following results:

- If Perenjori can attract 10 per cent of the mining workforce, and 50 per cent of this workforce is married it will result in an additional direct population impact of 200. This would almost double the size of the Perenjori townsite population.
- This does not take account of any indirect or multiplier effects from the increased local population or businesses contracting to the mines.
- Water Supply – The Extension Hill magnetite project involves transporting iron ore via a slurry pipeline to Geraldton, with a return pipeline for recycled water, and additional water from the Tathra borefield. The shire is in negotiations with the project proponent for an additional non-potable water supply for parks and gardens which will free up substantial scheme water capacity for additional household usage.
- Power Supplies – Both the Extension Hill and Karara magnetite projects will be drawing power from the grid. The companies involved will be funding an additional high voltage transmission line between Eneabba and Three Springs, as well as dedicated transmission lines to their projects. This should improve the quality and reliability of the Three Springs substation which services Perenjori.

Population snapshot

1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	209	Not available due to small population numbers

Recent residential lot creation activity

Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
3	0	2	21	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie – does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.14.1 Future land release

- There is vacant and zoned residential land available in the townsite, much of which is in the ownership of the Shire of Perenjori.
- The shire is undertaking a new residential subdivision that will produce 19 lots and up to 22 new dwellings.
- The shire has negotiated to purchase eight industrial lots which are already fully serviced with water and power, and a new sealed roadway will be completed by the end of the current financial year.
- Council is contracting a review of the town planning scheme which will identify land for future residential, rural residential, education, commercial and general industrial use, which should accommodate any expansion of the townsite for the next 20 years. The changes are expected to be enacted in two years.

Land availability	
	Total area (ha)
Residential zoned land	40.3
Commercial zoned land	3.0
Industrial zoned land	19.8

Source: DPI internal databases (2008).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	600 000 kL (Arrowsmith borefield)	86 374 kL	Combined allocation with Morawa. The shire is negotiating supply of water from the return water line for the Extension Hill magnetite project, this should substitute for scheme water for parks and gardens freeing supply for additional residences
Power	Western Power	90 per cent	The power infrastructure is due for upgrade or replacement and there is limited capacity to accommodate additional users
Wastewater	n/a	n/a	No reticulated sewerage – septic tanks

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Kindergarten and pre-primary at Perenjori Primary School	Presently 8 students, capacity 25 students
Primary school/s	Perenjori Primary School	Presently 34 students Capacity 75 students Total student numbers decreasing (54 students in 2004, 38 students in 2008)

Community facilities		
Service	Description of service	Use of service
High school/s	High schools in Morawa and Carnamah	Daily bus service
Tertiary education (eg TAFE)	TAFE courses available through telecentre	Presently only periodic short courses
Child care centres	Nil – potential for family day care	Active playgroup with dedicated premises
Hospital	Serviced by Morawa Perenjori Health Centre in Morawa	Recent \$12 million upgrade, includes residential independent and high dependency aged care, palliative care and acute care
Other health facilities	Perenjori Health Centre St John Ambulance substation	Twice weekly GP service, visiting physio, podiatry and psychologist, HACC Service, visiting alternative therapists at telecentre
Police station	Permanent two-man station (Perenjori Police Station – patrolling station business hours)	New officer-in-charge in place, second long-term officer to be recruited
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Telecentre, playgroup, health club, arts and crafts, community bus, volunteer fire brigade, CWA, arts and crafts	Each of these services has a dedicated building
Oval/s	Football, cricket, hockey oval	Active football and cricket teams
Courts (tennis, netball, basketball)	Netball, tennis, basketball, squash	Active netball and tennis clubs
Tracks (eg bmx, racing)	None	
Other recreation facilities (please list)	Licensed sports club, grass bowling green, 18 hole golf course, swimming pool, sport pavilion, fitness club, showground, stock yards and pavilions	Active golf and bowling clubs and pistol club
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Railway Located on the junction of the Wubin-Mullewa Road and Carnamah-Perenjori Road (both sealed)	Present use for grain, future use for iron ore
Airport/airstrip	Perenjori Aerodrome – unsealed, pilot activated lighting	Two fly-in-fly-out flights per week
TransWA services	Coach service	Perth to Geraldton and return twice per week

Community facilities		
Service	Description of service	Use of service
Communications	Next G mobile telephone network, Broadband internet – ADSL through any reseller, wireless canopy (up to 20 mbps) through Broadband Net and Next G wireless internet through Telstra	

7.15 Yalgoo (Shire of Yalgoo)

Located approximately 220 kilometres east of Geraldton and 500 kilometres north-east of Perth, Yalgoo is a historic mining town. The town services the surrounding agricultural and mining industries.

The areas which would be of major concern should key projects materialise in the vicinity, are as follows:

- power generation
- road services
- possible airport upgrades (should fly-in-fly-out operations be predominant)
- schools and medical facilities
- recreational facilities (currently under consideration for 2-3 years time)
- rezoning requirements and timeliness (to the east of the town). Town Planning Scheme No 2 recently advertised with submissions now open.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	164	Not available due to small population numbers

Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
0	0	0	0	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie – does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.15.1 Future land release

- There are currently no applications to subdivide residential or industrial lots in the town.
- LandCorp has some residential lots available for purchase.
- While areas of vacant and zoned residential and industrial land exist in the townsite, much of this area is unallocated Crown land and would require land assembly processes to be undertaken.

Land availability	
	Total area (ha)
Residential zoned land	9.9
Commercial zoned land	2.9
Industrial zoned land	4.8

Source: DPI internal databases (2008).

Essential service infrastructure			
	Allocation	Usage	Comments
Water	50 000 kL	51 866 kL	Usage exceeds allocation – limited capacity to accommodate additional users
Power			Unknown (Horizon Power)
Wastewater	n/a	n/a	No reticulated sewerage – septic tanks

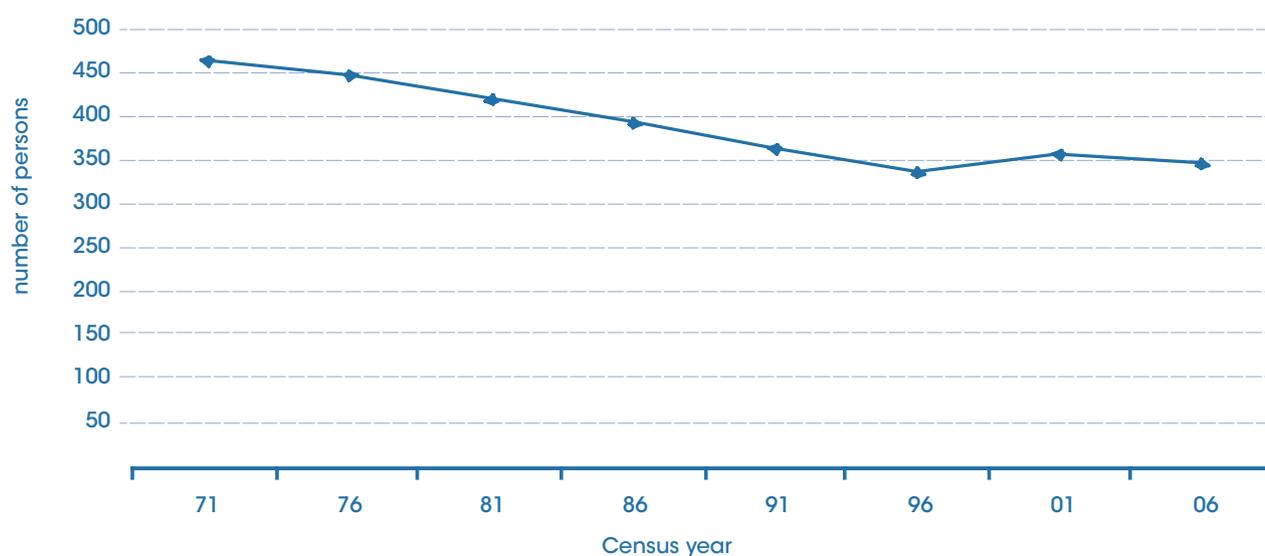
Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Yalgoo Primary School	Total student numbers steady (42 students in 2004, 34 students in 2008)
Primary school/s		
High school/s	None	
Tertiary education (eg TAFE)	None	
Child care centres	Unknown	Unknown
Hospital	None	
Other health facilities	Yalgoo nursing post	Frequent
Police station	Yalgoo Police Station (patrolling station – business hours)	
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Video conferencing rooms, St John Ambulance, town fire brigade	
Oval/s	Sporting oval	Unknown
Courts (tennis, netball, basketball etc)	Tennis court, basketball courts	Unknown
Tracks (eg bmx, racing)	Racecourse	Unknown
Other recreation facilities (please list)	Rifle range	Unknown
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Railway Located on Geraldton – Mount Magnet Road (sealed)	Railway closed, railway station made into sports complex
Airport/airstrip	Airstrip (gravel surface)	Infrequent
TransWA services	Coach service	Geraldton to Meekatharra and return twice per week

7.16 Carnamah (Shire of Carnamah)

Located on the Midlands Road approximately 190 kilometres south-east of Geraldton and 300 kilometres north of Perth, Carnamah services the surrounding agricultural industry.

Carnamah has experienced a period of population decline, but this has stabilised over the last 10 years. The town has capacity to accommodate some additional growth and significant growth would require upgrades to services.

Population snapshot									
1966	1971	1976	1981	1986	1991	1996	2001	2006	Comments
n/a	466	449	422	394	367	338	359	348	A period of population decline, but has now stabilised



Recent residential lot creation activity				
Residential lots created ¹ (2001-02 to 2005-06)	Residential lots created ¹ (2006-07)	Residential lots created ¹ (1 July 2007 - 31 March 2008)	Residential lots with current conditional approval ²	Proposed LandCorp releases (next 2 years) ³
3	0	0	0	nil

Source: WAPC internal databases (2008).

1 Number of residential lots (final approvals) created as a result of subdivision (ie - does not include survey or vacant lot stratas). Includes final approvals for the purposes of subdivision, amalgamation and boundary realignment.

2 These are approvals for which construction or servicing has not yet commenced, or is currently under way. Calculated as at 31 March 2008.

3 Subject to demand and resolution of development issues.

7.16.1 Future land release

- There are currently no applications to subdivide residential or industrial lots in the town.
- There are some areas of undeveloped residential and industrial zoned land, some of which is in local government ownership and some unallocated Crown land.
- Subdivision of rural land into 5-10 acre special rural lots is planned for the next 1-5 years.

Land availability	
	Total area (ha)
Residential zoned land	42.6
Commercial zoned land	8.5
Industrial zoned land	82.6

Source: DPI internal databases (2008).

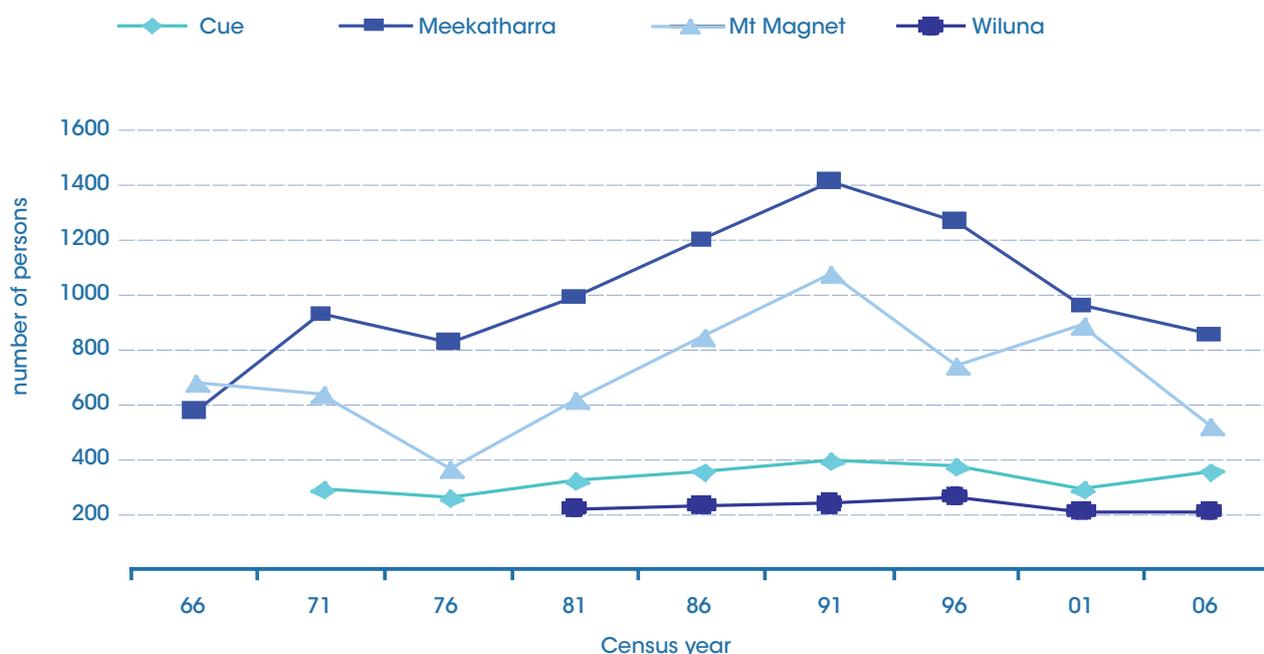
Essential service infrastructure			
	Allocation	Usage	Comments
Water	400 000 kL	309 565 kL	
Power		40 per cent	Capacity for additional users
Wastewater			Septic tanks

Community facilities		
Service	Description of service	Use of service
Pre-primary school/s	Carnamah District High School	Total student numbers steady (166 students in 2004, 146 students in 2008)
Primary school/s		
High school/s		
Tertiary education (eg TAFE)	None	
Child care centres	Child care centre (playgroup)	
Hospital	None	
Other health facilities	Doctors surgery	Limited hours
Police station	Carnamah Police Station (patrolling station – business hours)	
Other facilities (please list) (eg – telecentre, fire brigade, playgroup)	Fire brigade, playgroup	
Oval/s	Niven Park Recreation Complex and Grounds, includes swimming pool, tennis, netball, basketball courts, sporting oval	Active football club, cricket club, swimming club
Courts (tennis, netball, basketball)		
Tracks (eg bmx, racing)		
	None	

Community facilities		
Service	Description of service	Use of service
Other recreation facilities (please list)	Lawn bowls, badminton, golf course, recreation centre, museum, Masonic Lodge, CWA	Active badminton club, bowls club, golf club, historical society, toy library, community care
Location relative to transport network, (eg adjacent to operating freight railway, on main highway)	Located on the Midlands Road (sealed), Carnamah-Eneabba Road (sealed) and Carnamah-Perenjori Road (sealed) Freight railway	Operational
Airport/airstrip	Aerodrome adjacent to townsite	Unknown
TransWA services	Coach service	Perth to Geraldton and Kalbarri and return four times weekly

7.17 Population data - other Mid-West centres

	1966	1971	1976	1981	1986	1991	1996	2001	2006
Cue		287	258	320	357	394	374	290	355
Meekatharra	577	927	829	989	1201	1414	1270	962	856
Mount Magnet	683	636	362	618	847	1076	747	893	520
Wiluna				221	229	236	262	210	209



8 References

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9 Acronyms

List of acronyms used in this report

ADSL	Asymmetric digital subscriber line	TAFE	Technical and Further Education
CME	Chamber of Minerals and Energy	WAPC	Western Australian Planning Commission
CWA	Country Women's Association	gL	gigalitre
DEC	Department of Environment and Conservation	ha	hectare
DET	Department of Education and Training	km	kilometre
DoIR	Department of Industry and Resources	kL	kilolitre
DoW	Department of Water	kV	kilovolt
DPI	Department for Planning and Infrastructure	LNG	liquified natural gas
FESA	Fire and Emergency Services Authority	mbps	megabytes per second
GIOA	Geraldton Iron Ore Alliance	mL	megalitre
GP	General Practitioner	mm	millimetre
GPA	Geraldton Port Authority	mtpa	million tonnes per annum
MRWA	Main Roads Western Australia	mW	megawatt
PCYC	Police and Citizens Youth Club	pa	per annum
RFDS	Royal Flying Doctor Service	tcf	trillion cubic feet
RSL	Returned Services League	tj	terajoule
SES	State Emergency Services		

10 List of submissions received

1 Mid-West Gascoyne Area Consultative Committee

2 Department of Water (1)

3 Mid West Development Commission

4 Shire of Yalgoo

5 Department of Water (2)

6 Three Springs Shire Council

7 Shire of Coorow

8 DPI (1) Planning Matters

9 Shire of Chapman Valley

10 Office of Energy

11 LandCorp

12 Shire of Morawa

13 Mingenew Shire Council

14 Mid-West Regional Council

15 Western Power

16 Main Roads Western Australia

17 Shire of Carnamah

18 Department of Treasury and Finance

19 Department of Housing and Works

20 Shire of Northampton

21 Department of Education and Training

22 DPI (2) State Land Services

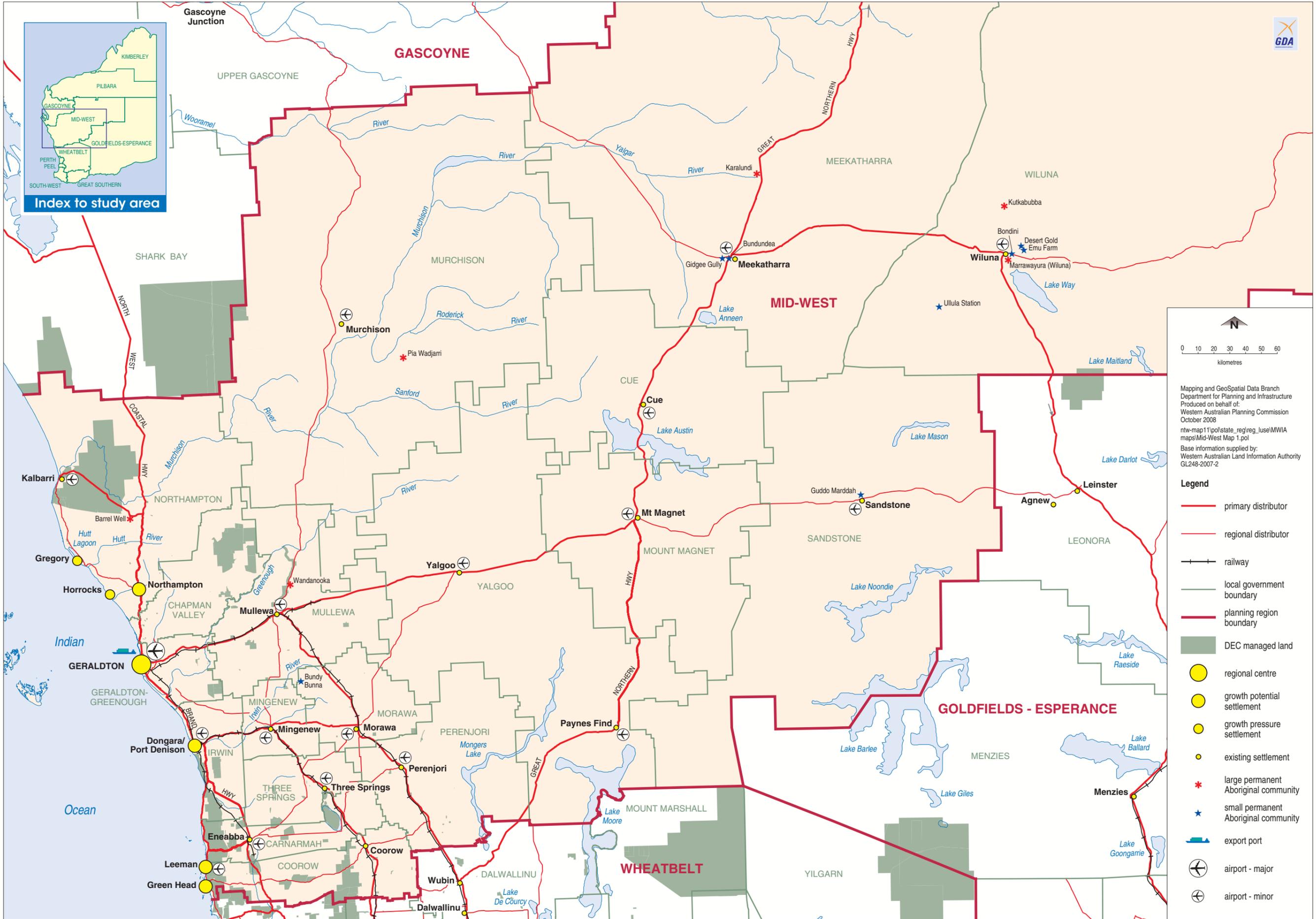
23 City of Geraldton-Greenough

24 DPI (3) Sustainability Directorate

25 Shire of Sandstone

26 Western Australia Country Health Service Mid-West

27 Shire of Perenjori



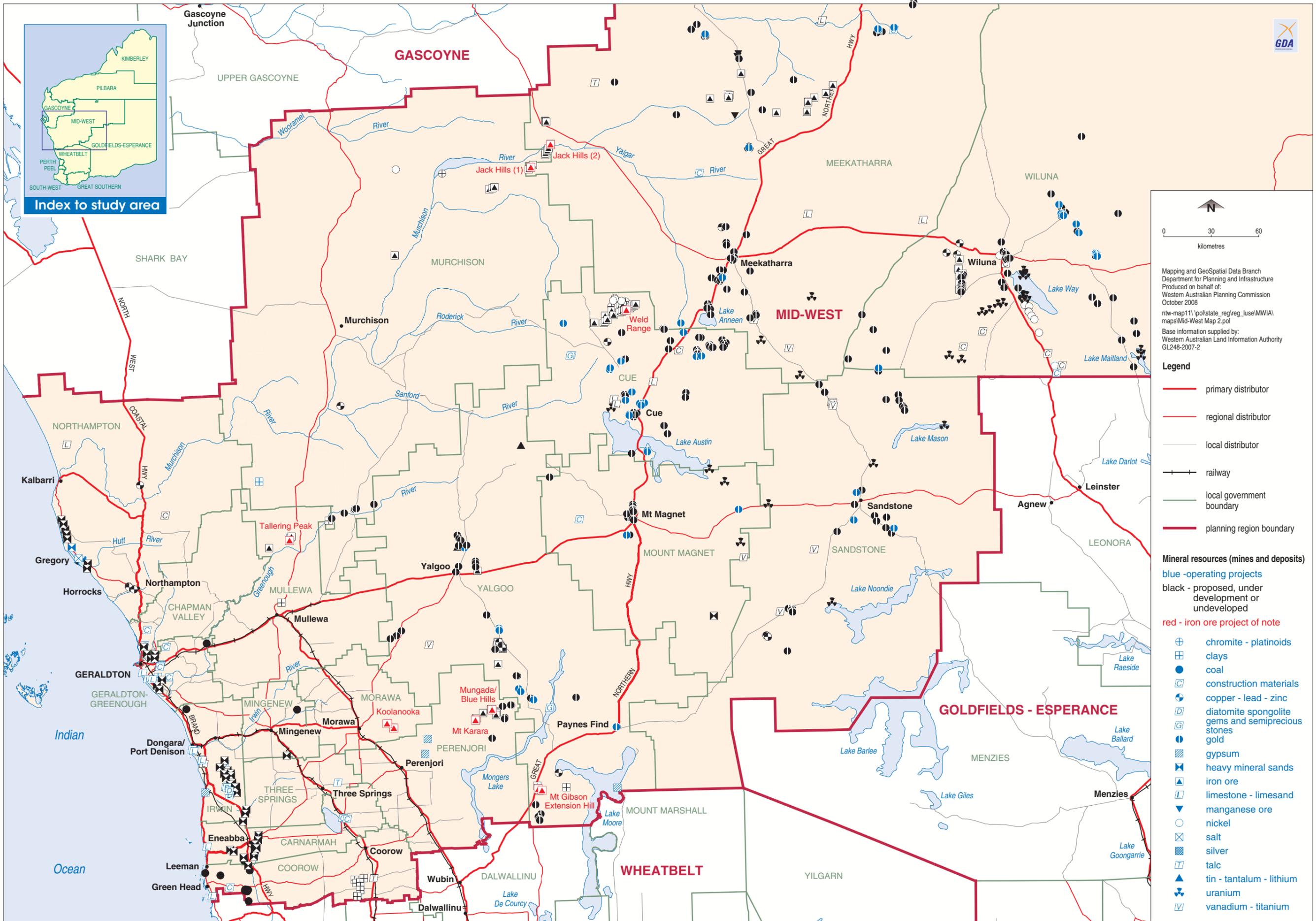
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Legend

- primary distributor
- regional distributor
- railway
- local government boundary
- planning region boundary
- DEC managed land
- regional centre
- growth potential settlement
- growth pressure settlement
- existing settlement
- large permanent Aboriginal community
- small permanent Aboriginal community
- export port
- airport - major
- airport - minor

Mid-West Infrastructure Analysis
Mid-West settlement hierarchy



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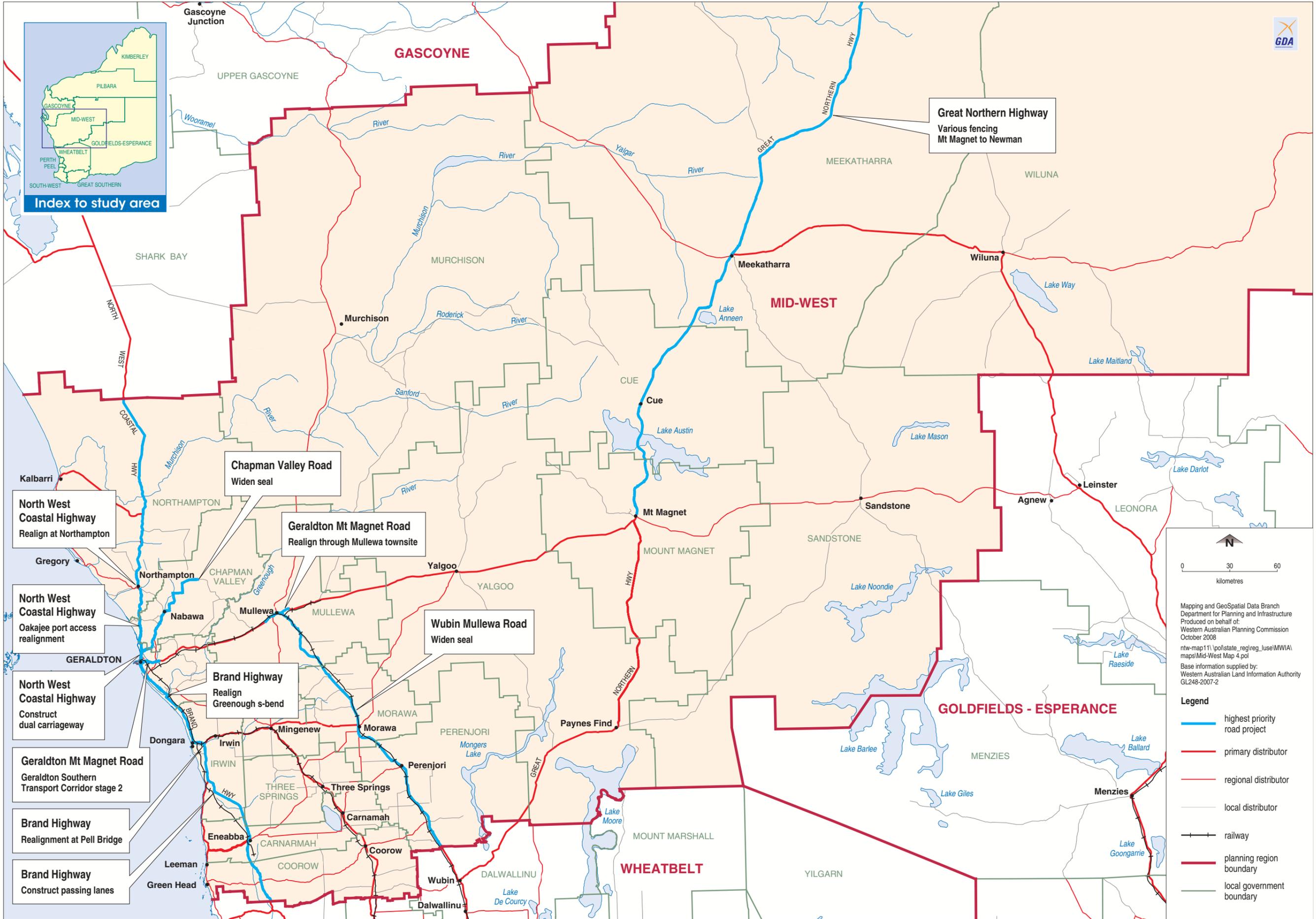
- primary distributor
- regional distributor
- local distributor
- railway
- local government boundary
- planning region boundary

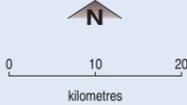
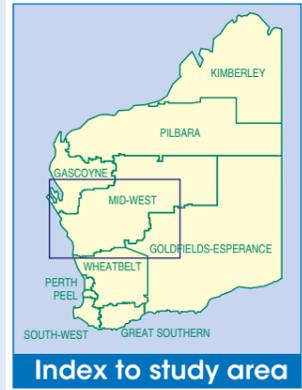
Mineral resources (mines and deposits)

- blue - operating projects
- black - proposed, under development or undeveloped
- red - iron ore project of note

- ⊕ chromite - platinumoids
- ⊞ clays
- coal
- ⊞ construction materials
- ⊞ copper - lead - zinc
- ⊞ diatomite spongolite
- ⊞ gems and semiprecious stones
- gold
- ⊞ gypsum
- ⊞ heavy mineral sands
- ▲ iron ore
- ⊞ limestone - limesand
- ▼ manganese ore
- nickel
- ⊞ salt
- ⊞ silver
- ⊞ talc
- ▲ tin - tantalum - lithium
- ⊞ uranium
- ⊞ vanadium - titanium

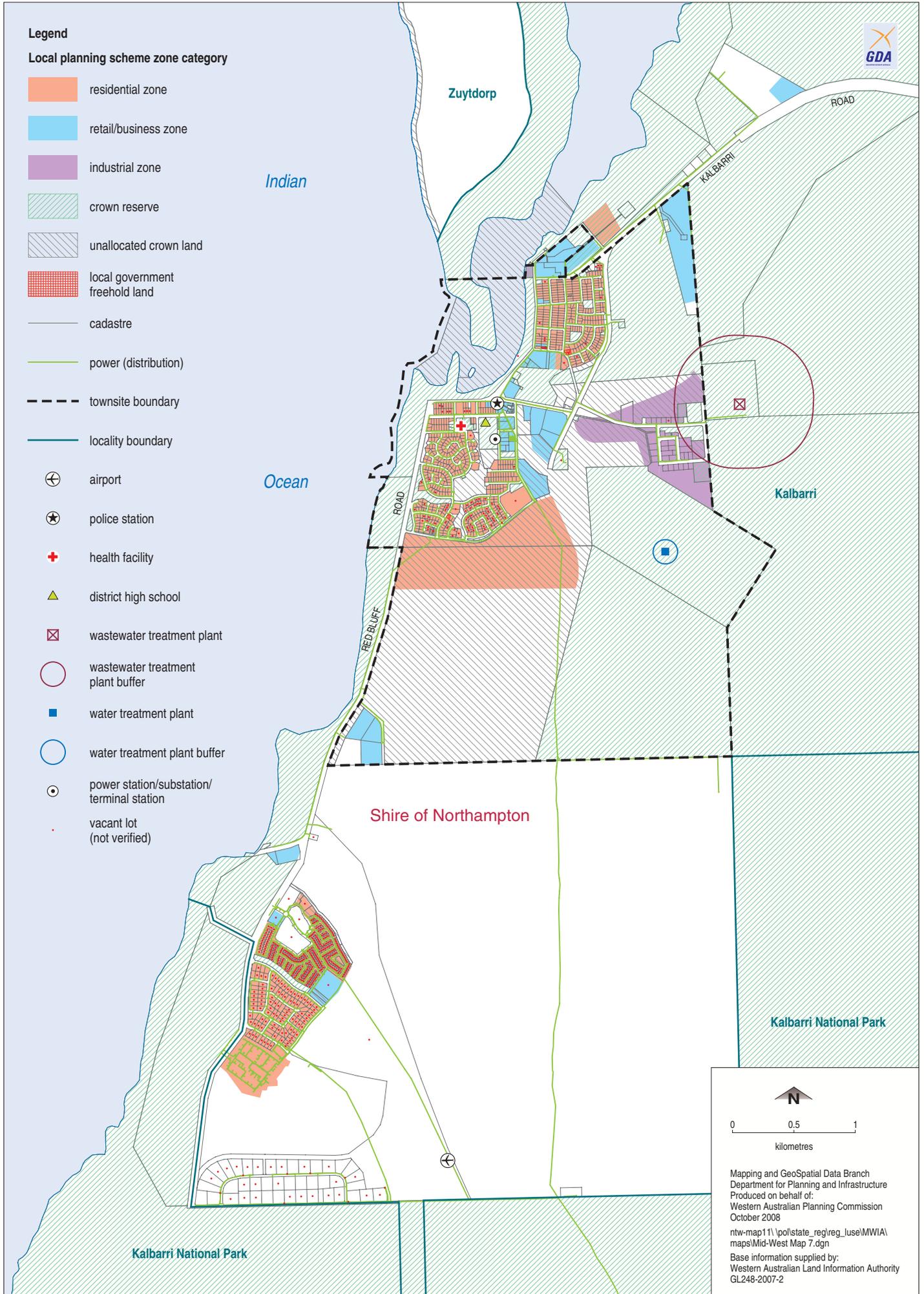
Mid-West Infrastructure Analysis
Major resource locations

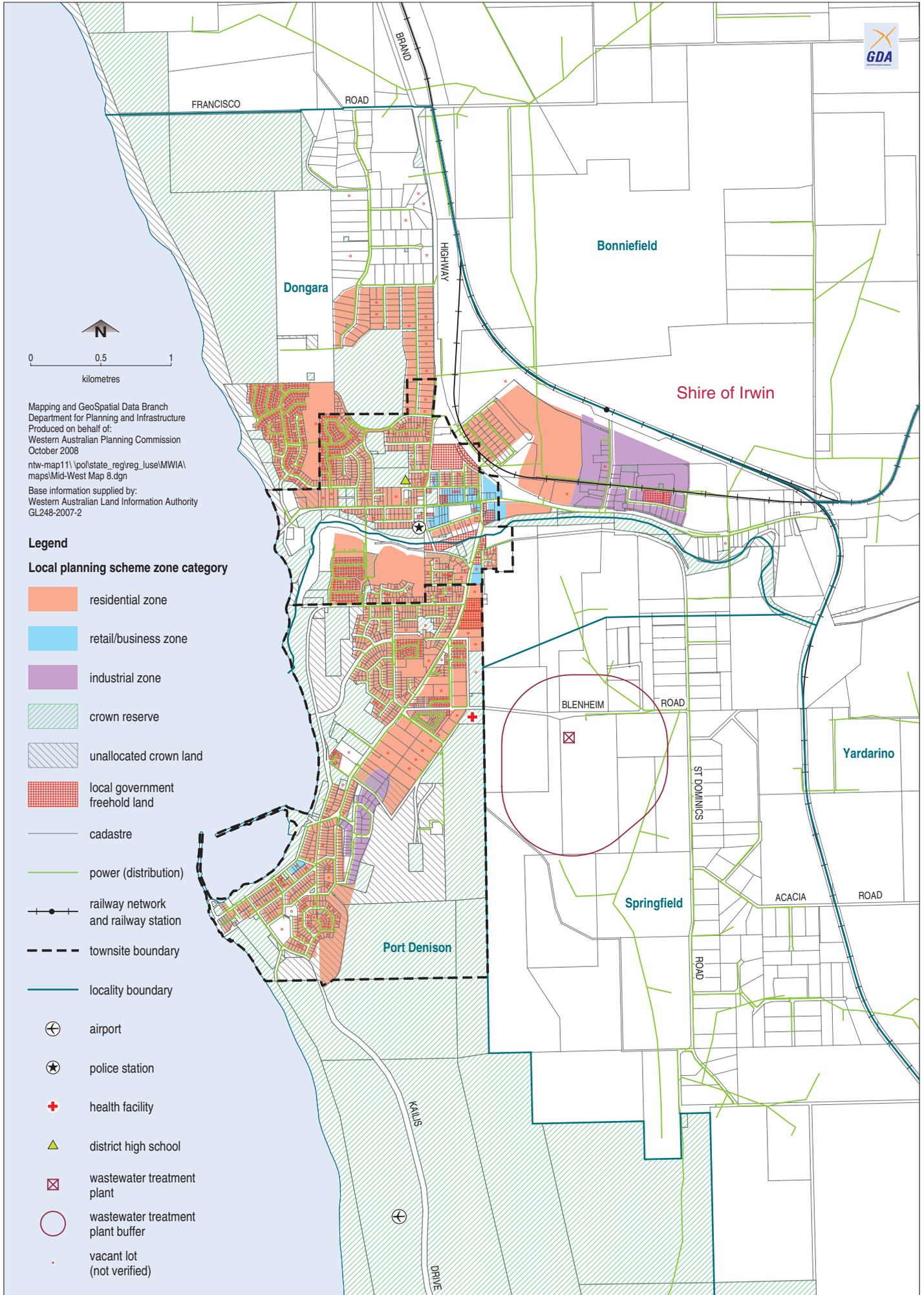


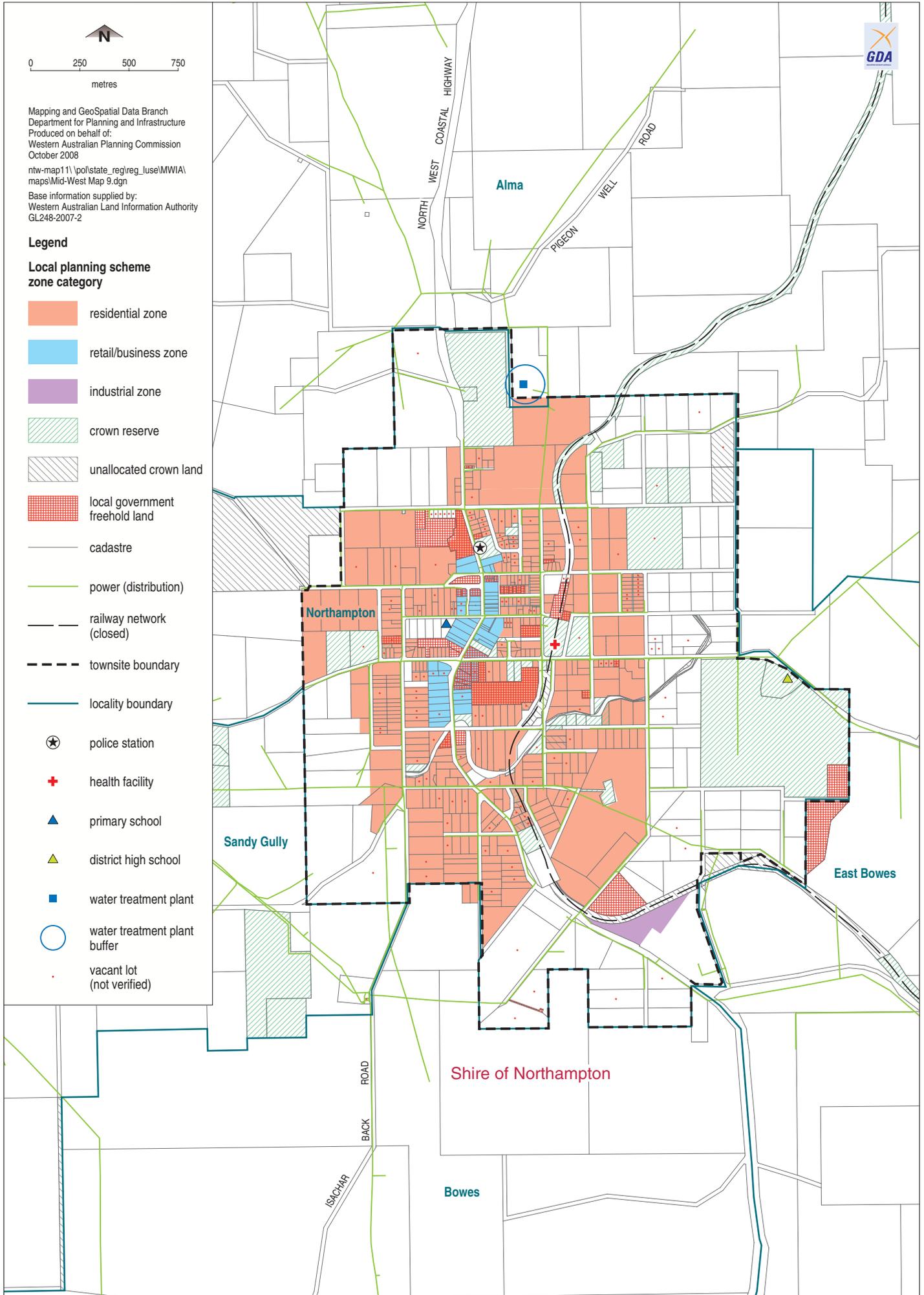


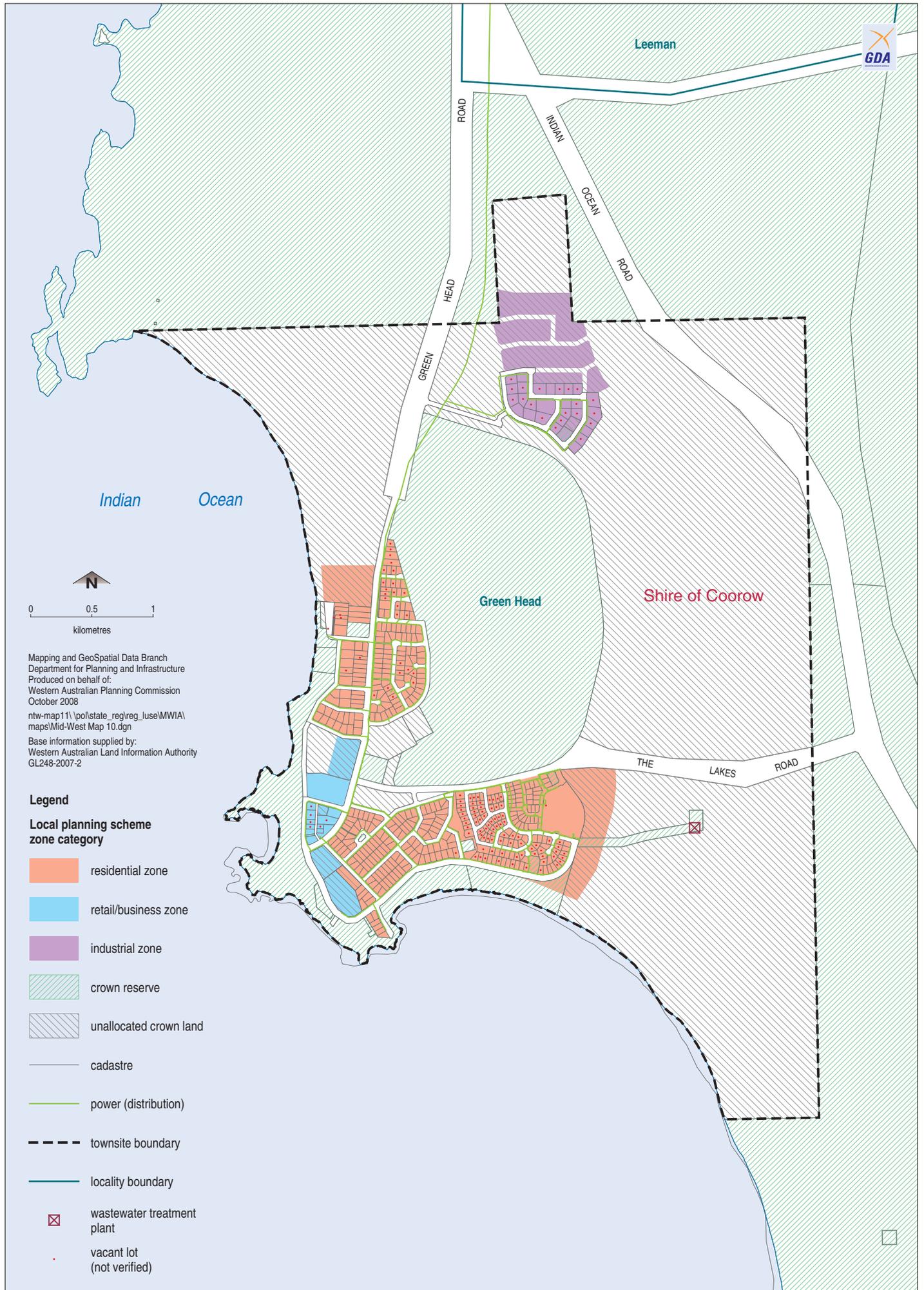
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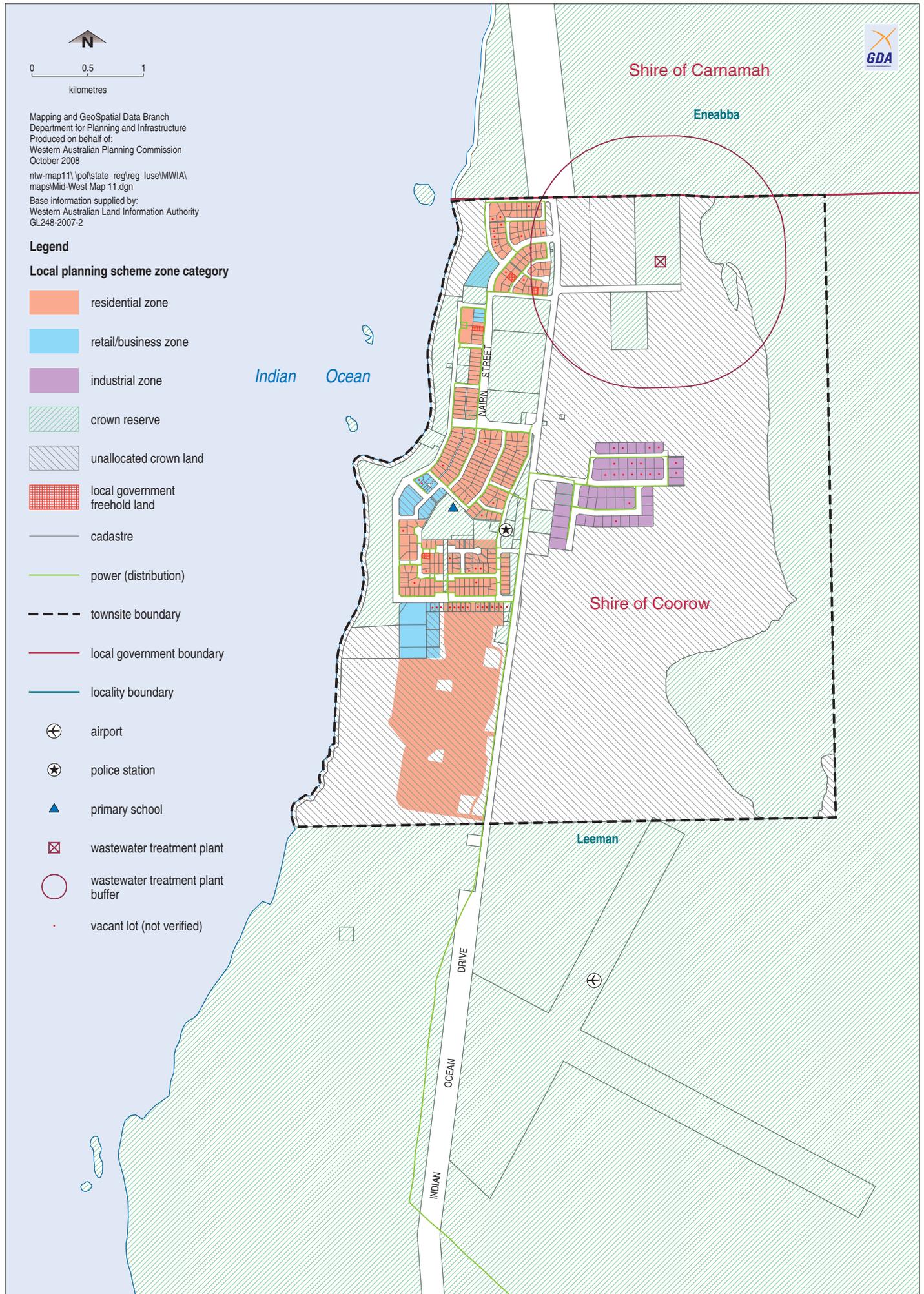
- Legend**
- Water Corporation network
 - primary distributor
 - regional distributor
 - local distributor and local road
 - local government boundary

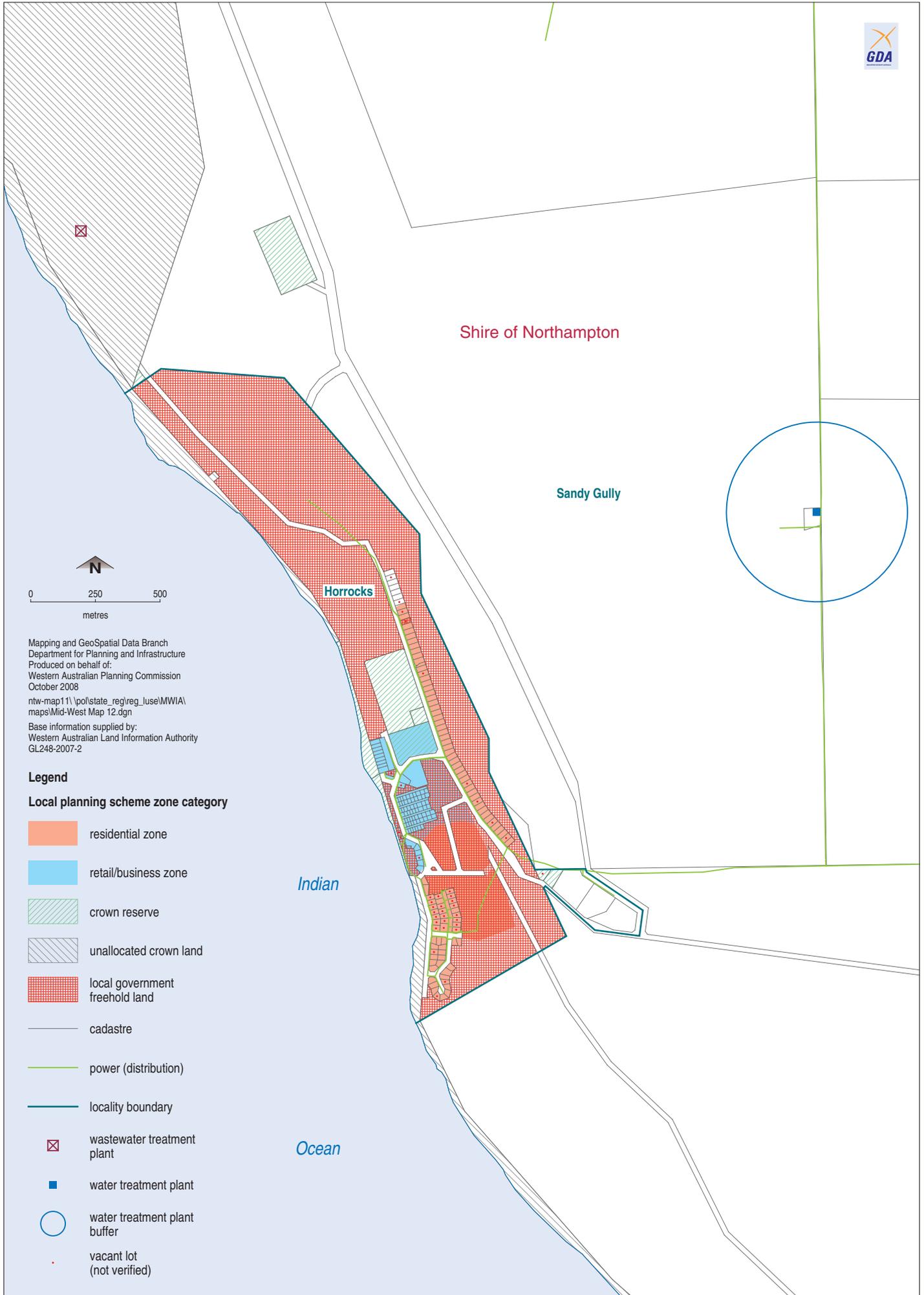


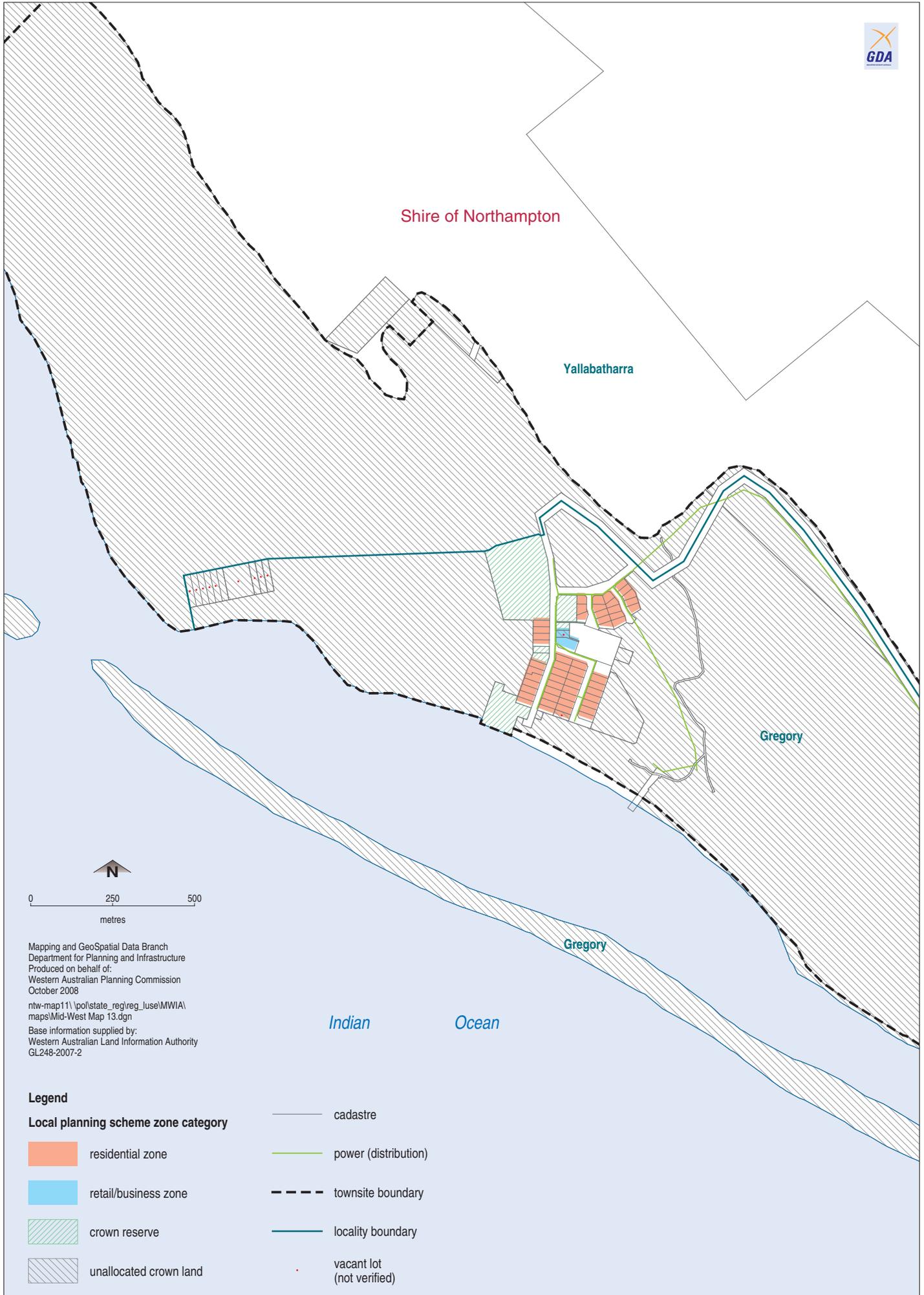












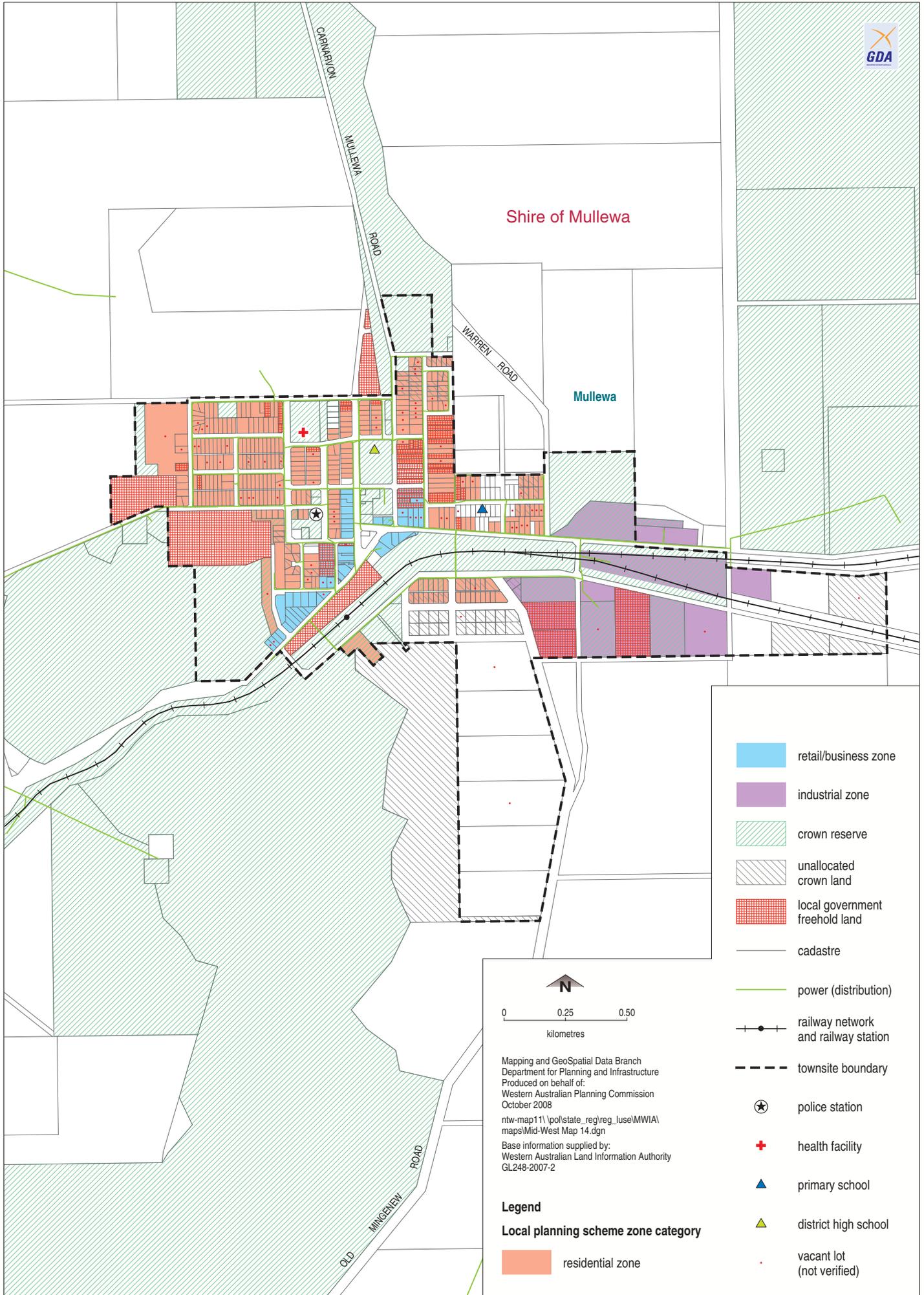
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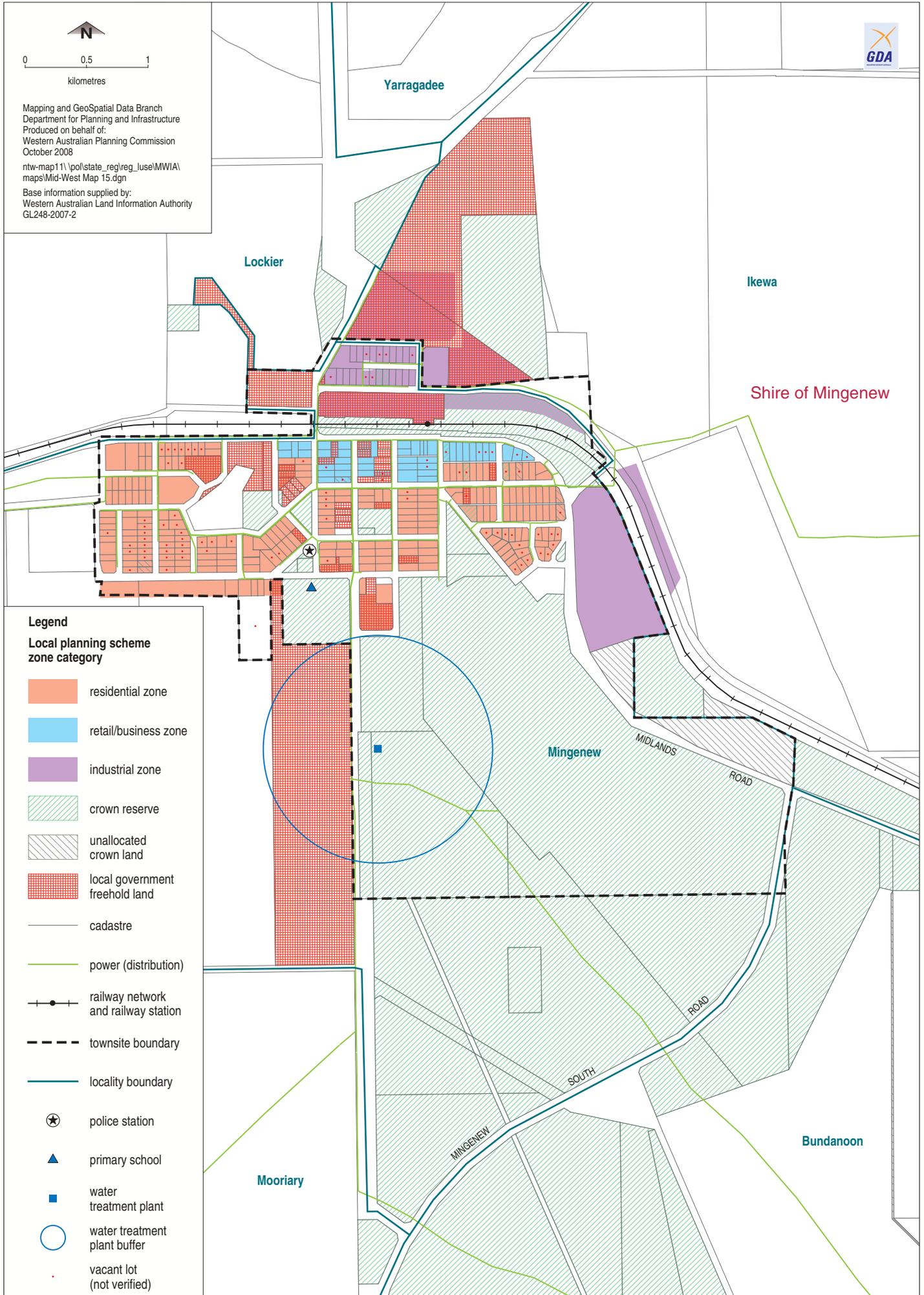
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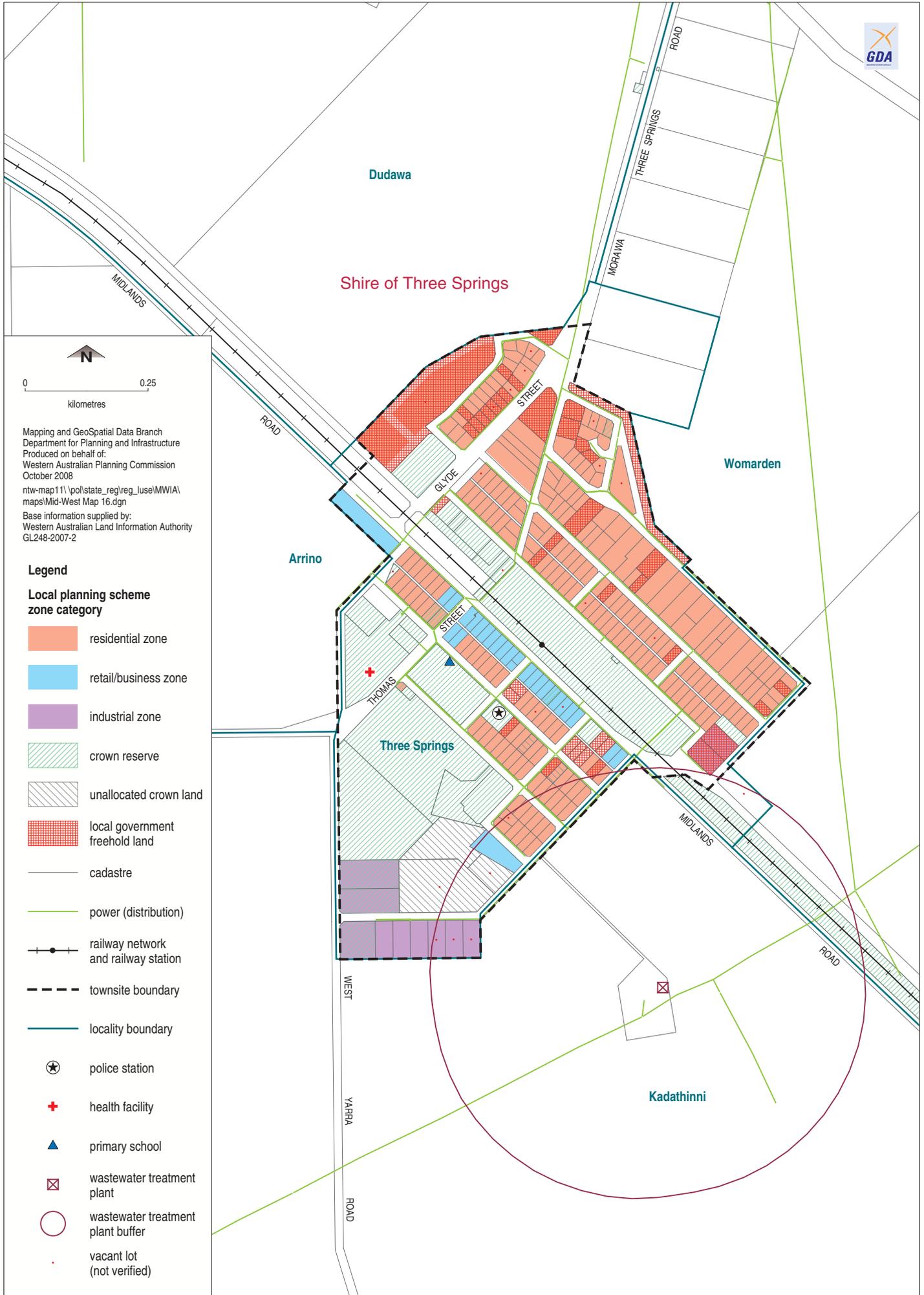
Local planning scheme zone category

- residential zone
- retail/business zone
- crown reserve
- unallocated crown land

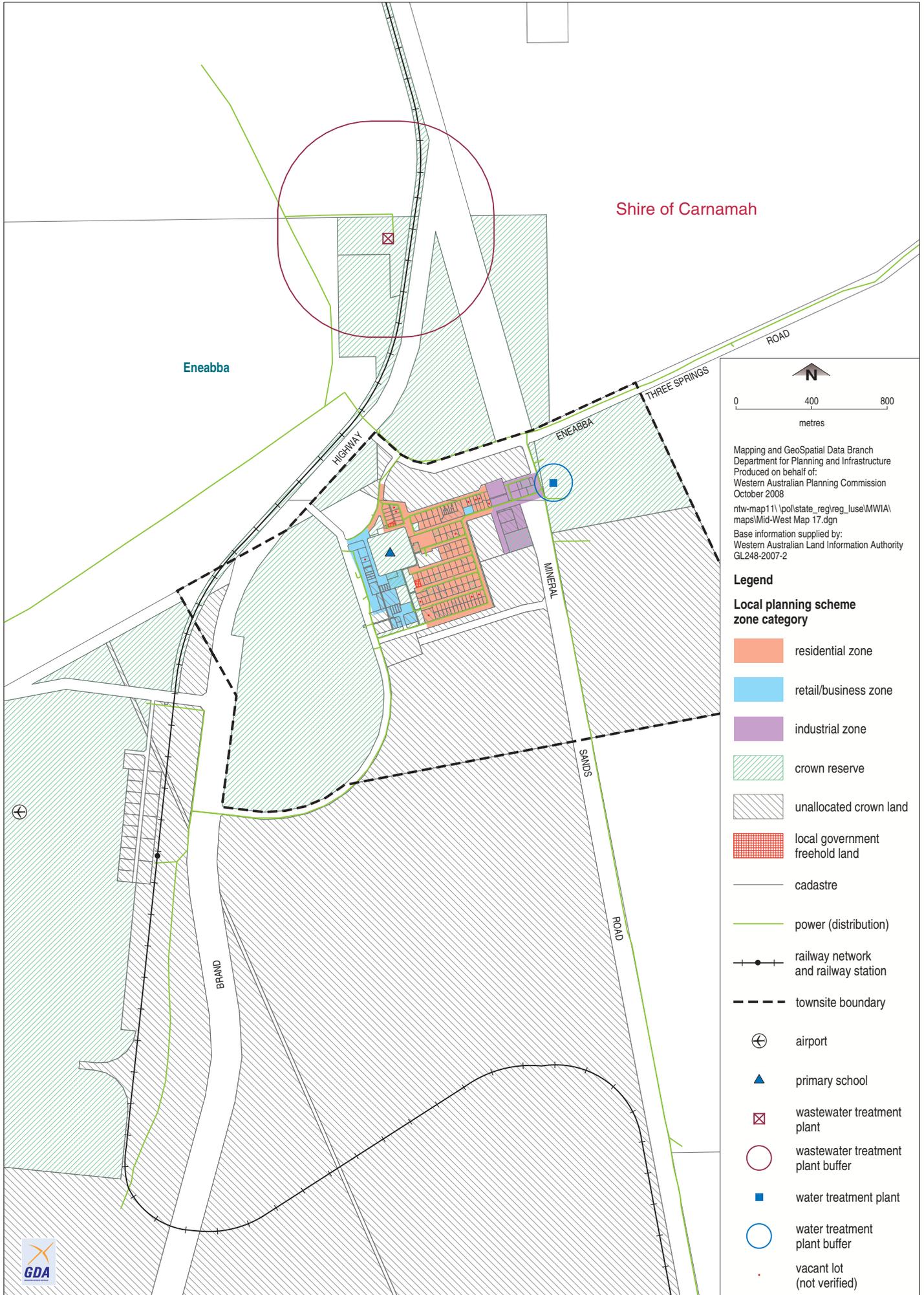
- cadastre
- power (distribution)
- townsite boundary
- locality boundary
- vacant lot (not verified)

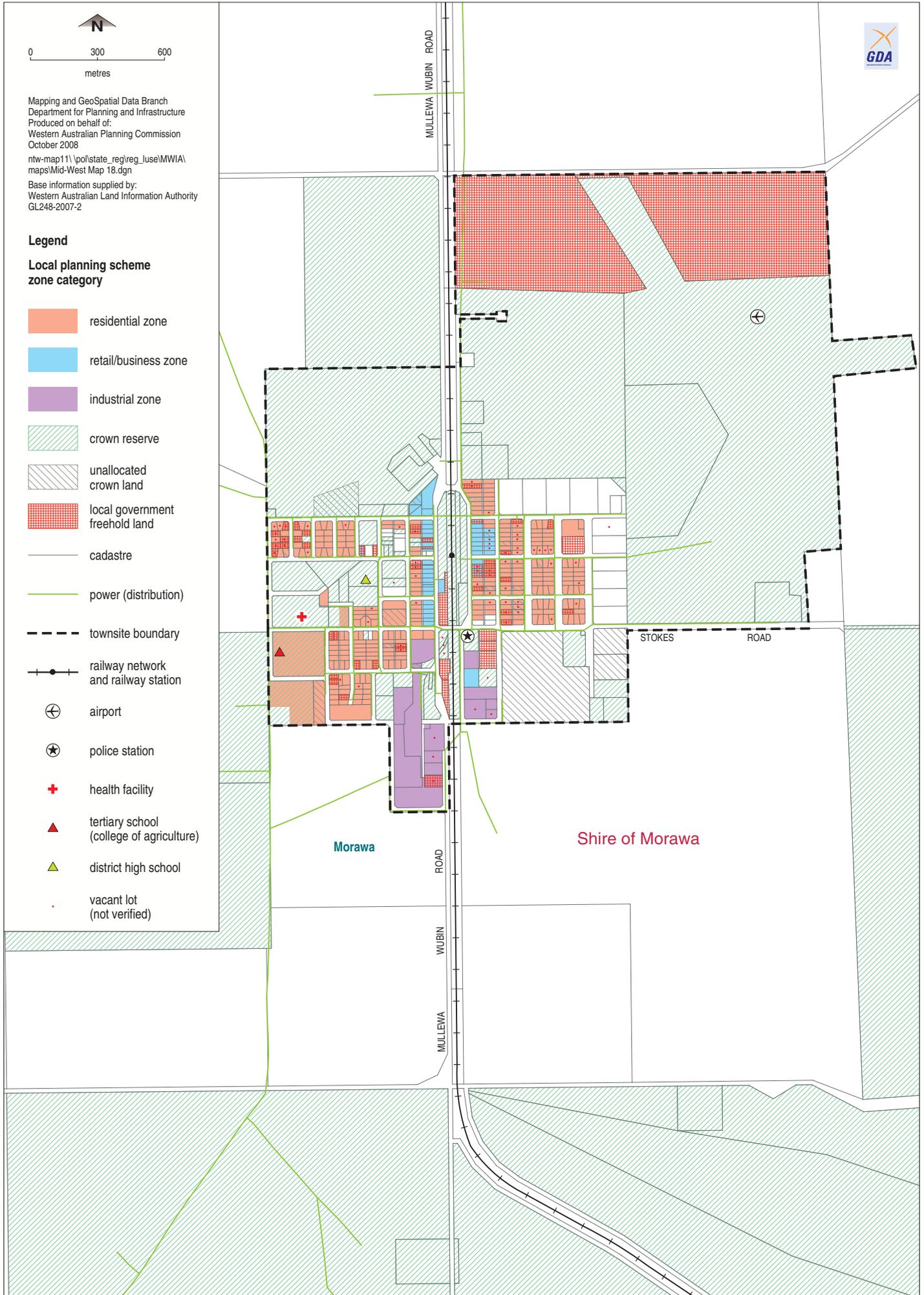


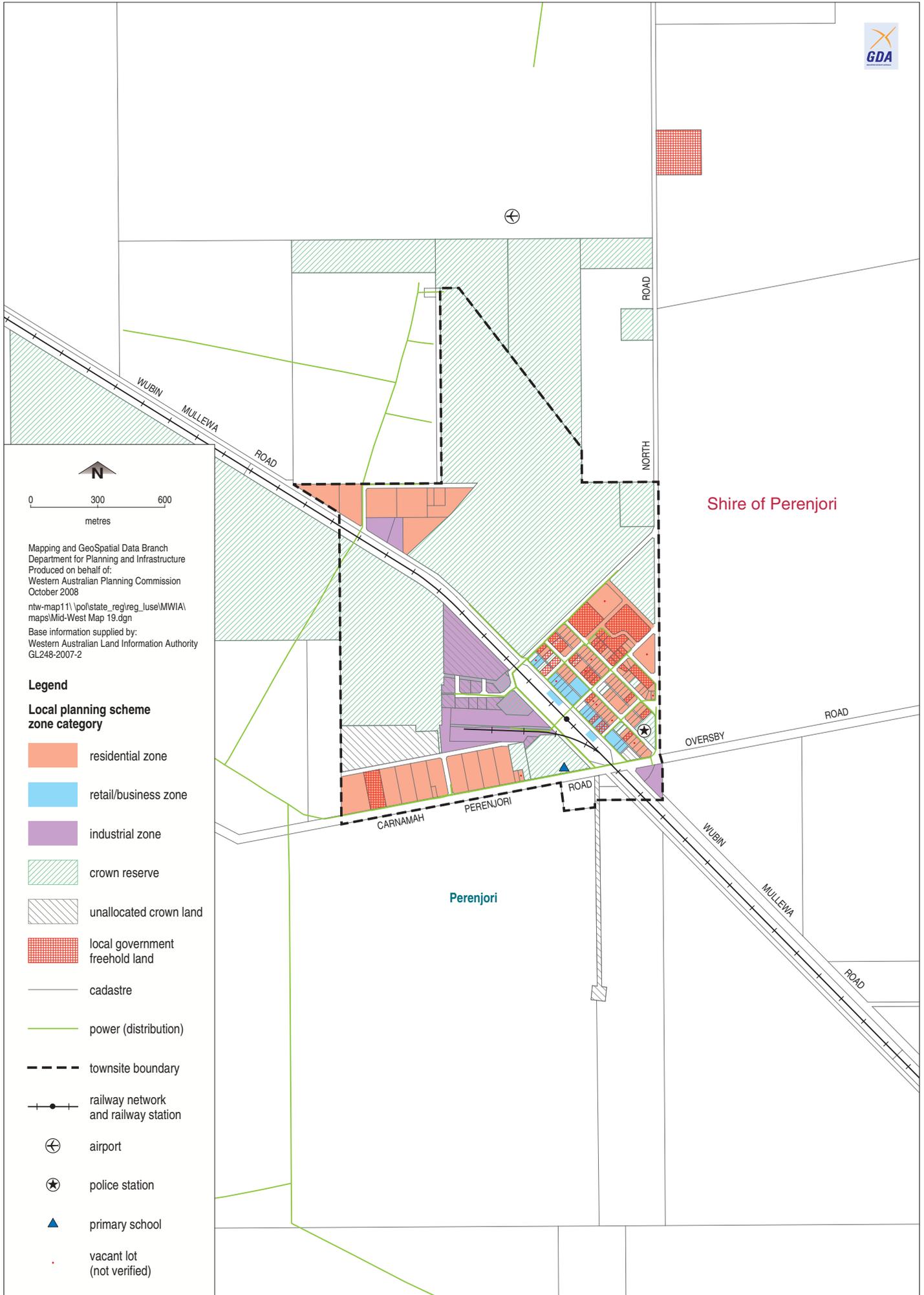




Three Springs land information

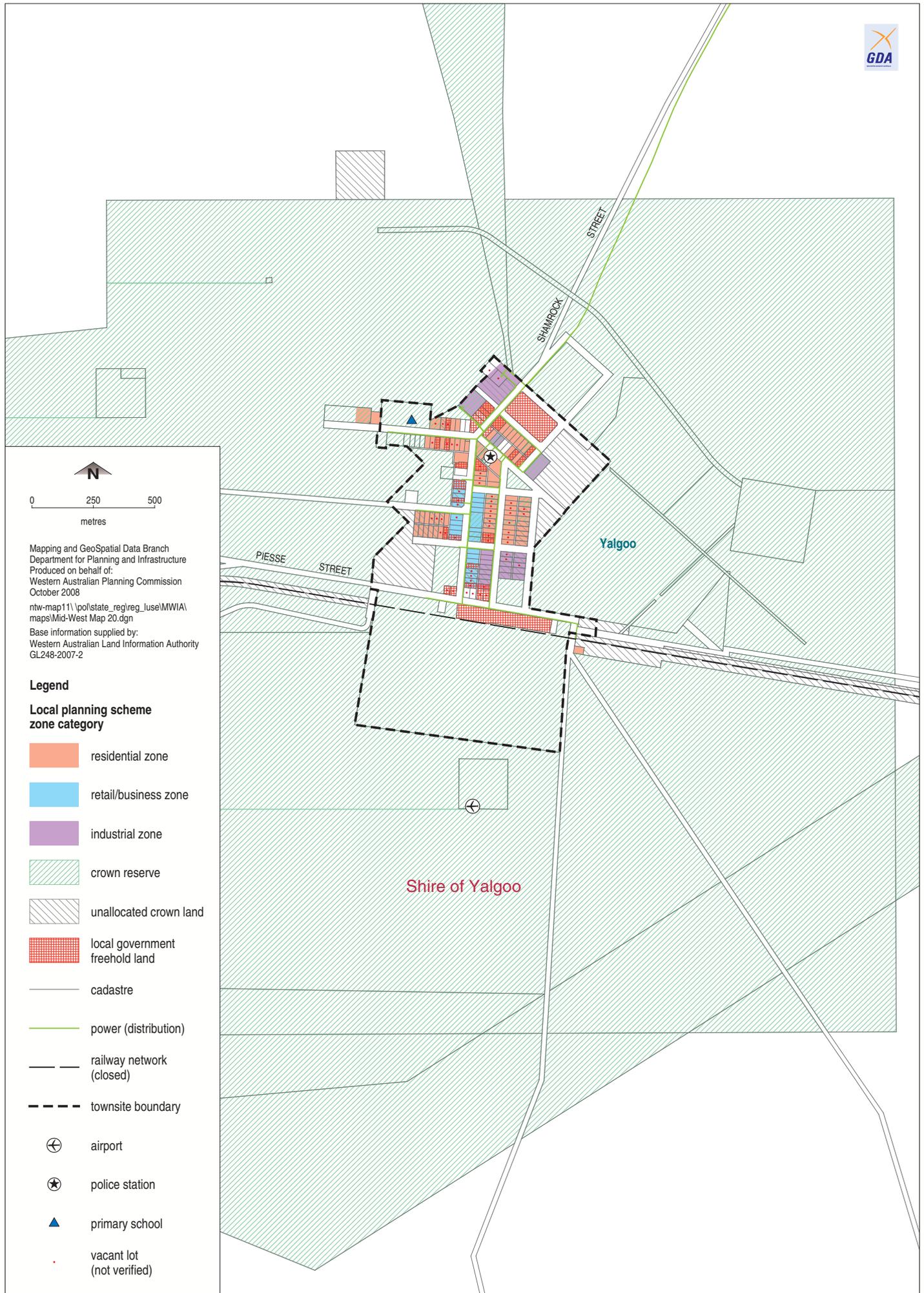






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- Legend**
- Local planning scheme zone category**
- residential zone
 - retail/business zone
 - industrial zone
 - crown reserve
 - unallocated crown land
 - local government freehold land
 - cadastre
 - power (distribution)
 - townsite boundary
 - ++ railway network and railway station
 - + airport
 - ★ police station
 - primary school
 - vacant lot (not verified)




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- Legend**
- Local planning scheme zone category**
-  residential zone
 -  retail/business zone
 -  industrial zone
 -  crown reserve
 -  unallocated crown land
 -  local government freehold land
 -  cadastre
 -  power (distribution)
 -  railway network (closed)
 -  townsite boundary
 -  airport
 -  police station
 -  primary school
 -  vacant lot (not verified)

