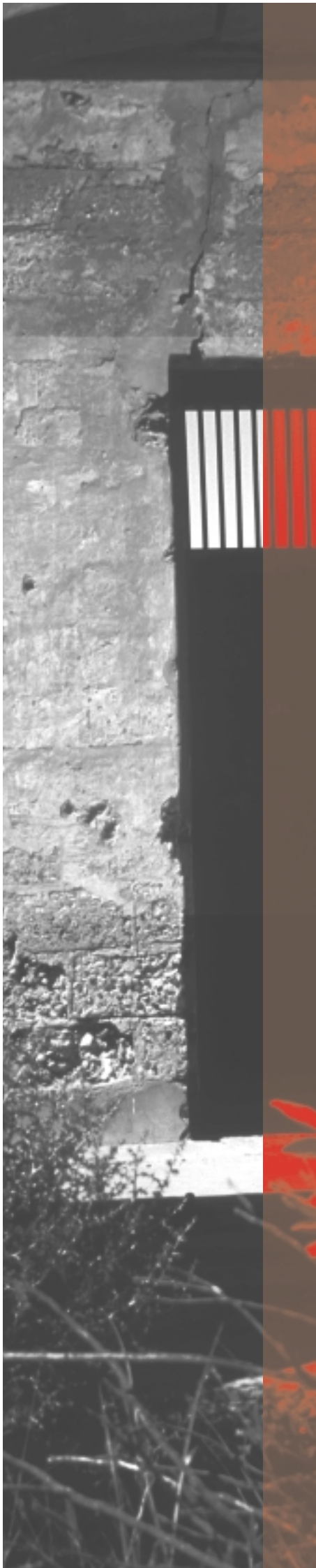
Onslow Structure Plan

Final

September 2003



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FOREWORD

The Onslow area has been home for thousands of years to the Thalanyi, Nhuwala and Burama people, who come from the Cane and Ashburton River area. The area now known as Onslow was first established by European settlers at the mouth of the Ashburton River in 1883 as a service centre for the pastoral and gold mining industries.

Onslow has the unusual distinction of now being located some 20 kilometres east of where it was first established. By 1925, the silting of the Ashburton River was causing problems in the loading and unloading of ships, and the present site adjacent to Beadon Creek was chosen for its access to deep water.

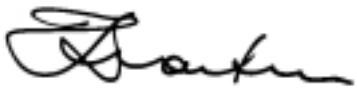
Onslow is now a small coastal community, which supports a population of approximately 700 people. The town has a significant fishing industry and the recently developed Onslow Solar Salt Project, which is expected to produce 2.5 million tones of salt per annum.

The greater Onslow area also hosts onshore gas processing facilities at Tubridgi, using gas from a variety of offshore fields. Gas from the onshore facilities links to the Dampier to Bunbury Gas Pipeline, which supplies reticulated natural gas to communities in the south of the State.

The proximity to the gas and salt projects presents a number of opportunities for the development of strategic industry in the Onslow area, and this plan has made provision for the development of land and associated infrastructure for this purpose.

Onslow is a popular tourist destination for winter visitors to the Pilbara, attracted by the mild northern winters and quiet coastal outlook Onslow offers. Some of the tourist attractions are fishing, the nearby Mackerel Islands, the Ashburton River, Old Onslow and Sunrise and Sunset Beaches. This plan supports further development of the tourism industry.

The Onslow Structure Plan was first released as a draft for public comment in July 2000. It examines all important regional issues in the Onslow area and sets out a framework to guide State decision-making and detailed planning at the local level, with a planning horizon of 20-25 years.



Terry Martin
Chairman
Western Australian Planning Commission

1. INTRODUCTION

The original Onslow was proclaimed a town in 1883 and named after Sir Alexander Onslow, the acting Governor and Chief Magistrate of Western Australia at the time. It supported the nearby pastoral stations that had been established along the Ashburton River and the goldmines that had developed in the hinterland.

One of the first recorded stations was Minderoo, established in 1882. By 1890, all land along the river had been taken up, running mainly sheep, but also a few cattle. Today, it is predominantly cattle with a few sheep. In the early settlement days good pearls were found in the Exmouth Gulf and the town became the home port to a fleet of pearling luggers.

By 1925, the port facilities at the mouth of the Ashburton River were affected by silting causing more and more problems in the loading and unloading of visiting ships. Surveys proved that there was deep water at Beadon Point and so the town was moved about 20k ms to the east to its present location.

By the late 1990s Onslow had developed into a small coastal town supporting the oil and gas industry, various fisheries and the Onslow Solar Salt Project. The development of the salt project and the proximity to oil and gas resources has presented a range of development opportunities in and around Onslow.

1.1 Background and Planning Context

In 1997, the Western Australian Planning Commission (WAPC) released the *State Planning Strategy*, which forms part of the State's planning framework. The *State Planning Strategy* is a broad strategic document that identifies a vision for the State's development until 2029. The vision for the Pilbara Region is:

> "In the next three decades, the Pilbara Region will be a world leading resource development area focusing on mineral extraction, petroleum exploration and production and the primary stages of downstream processing. The region's population will grow in the future, fuelled by specific resource development projects, the sustainable development of Karratha and Port Hedland and a more diverse economy. A growing tourism industry will have developed based on the region's unique natural environment."

Also in 1997, the Pilbara Development Commission released the *Pilbara Land Use Strategy* (PLUS). This study noted that Onslow might experience growth if the proposed solar salt project proceed. This project has now been completed and Onslow is under increased pressure to accommodate additional growth. The Onslow Solar Salt Project provides permanent employment for approximately 65 people.

One of the key recommendations from the PLUS relating to planning for growth in Pilbara towns is to *"Prepare structure plans and rezone land identified for future urban purposes (**Ministry for Planning**, local government authority)"*. The Onslow Structure Plan is a response to this recommendation.

In December 1998, the Shire of Ashburton and the WAPC endorsed a proposal to prepare a structure plan for Onslow and surrounding areas. The plan is to have an outlook of 20-25 years.

The Shire of Ashburton Town Planning Scheme No. 7, covers the entire local government area. A town planning scheme (TPS) has an outlook of five years and zones land for certain purposes, in accordance with the orderly and proper planning of an area. A TPS is a statutory document, which has effect under the *Town Planning and Development Act 1928*. Conversely, a structure plan is a strategic, non-statutory document, with a longer time horizon (usually 15-30 years), and is based on policy objectives and prescriptions. While it is desirable that the Shire of Ashburton endorses a structure plan as a "blueprint" for future development in the townsite, the plan does not have statutory effect. However, the findings and recommendations from the structure plan have been incorporated into the Shire of Ashburton TPS No. 7 where appropriate.

1.2 Objectives

The objectives in preparing a structure plan for Onslow are to:

- enhance the character of Onslow;
- encourage economic growth having regard to current environmental standards;
- protect areas of environmental significance;
- provide utility and community services in a co-ordinated and timely manner; and
- provide a basis for future town planning schemes.

1.3 Scope

The structure plan has two main areas of interest:

1. The Onslow townsite; and
2. The greater Onslow area, which is loosely defined by the Indian Ocean and Onslow's Offshore Islands, BHP and Chevron's onshore gas facilities to the west of Onslow, the area to the east of Beadon Creek, and the North West Coastal Highway.

Map 1 shows the greater Onslow area and Map 2 shows an aerial photograph of the Onslow townsite with an overlay of cadastral boundaries.

1.4 Community Consultation

A discussion paper was prepared, and released in August 1999. This raised a number of issues relating to the Onslow townsite and surrounds. The discussion paper did not contain land use planning proposals or recommendations, but highlighted some land use issues that may confront Onslow in years to come. The release of the discussion paper was followed by a public meeting in Onslow. This meeting was attended by about 20 residents of the town, as well as members of the study team. One letter was received in response to the discussion paper.

A second public meeting was held in January 2000. Members of the Onslow community were given a briefing on the industrial land use planning being undertaken by the then Department of Resources Development (DRD), and information was provided by the Shire of Ashburton on how the structure plan process would relate to the preparation of TPS No. 7.

1.5 Implementation

There are a number of options for implementing the final document. These include:

Option 1
A Cabinet-endorsed plan, which guides local strategic and statutory planning and relies significantly on the provisions of Shire of Ashburton Town Planning Scheme No. 7 for implementation.

Option 2
A plan endorsed by the Shire of Ashburton and the WAPC, which guides local strategic and statutory planning and relies significantly on the provisions and zoning plans of Shire of Ashburton Town Planning Scheme No. 7 for implementation.

Option 3
Using processes, policies, regulations and instruments of planning and management agencies.

Option 2 has been selected as the most appropriate approach for this project.

2. PLANNING CONSIDERATIONS

2.1 Population and Housing

2.1.1 Population

The 2001 Census of Population and Housing conducted by the Australian Bureau of Statistics (ABS), indicates that the population of Onslow is 739 people, up from 588 people in 1996.

This recent increase can be attributed to the construction and permanent workforce associated with Onslow Solar Salt project. It should be noted that the 1996 population was significantly lower than 1991. This was partly due to the movement of Aboriginal people from Onslow to their traditional lands in the inland Pilbara around Tom Price.

It should be noted that there are some difficulties in accurately relating population numbers and movements in the townsite the size of Onslow. This is because the Census applies to one night only in a five year period.

Table 2 provides some demographic details of Onslow in comparison with the State and Pilbara averages.

The number of Aboriginal and / or Torres Strait Islander (TSI) people in Onslow according to the 1996 Census is not considered accurate. The population of Bindi Bindi community was 80 people in 2000, which is a slight decrease since 1996. In addition to the people living in Bindi Bindi, there is a significant Aboriginal population in the Onslow townsite. Local community service providers suggest that only seven or eight families have moved east to Tom Price, which would constitute a population decrease of about 60 people. This indicates that overall population decrease in

Table 1 - Census Counts, Shire of Ashburton and Onslow 1976-2001

	1976	1981	1986	1991	1996	2001
Onslow	220	594	750	881	588	739
Tom Price	3,193	3,540	3,435	3,634	3,872	3,074
Shire of Ashburton (total)			9,297	8,499	8,783	6,888

Source: Australian Bureau of Statistics

Table 2 - Selected Population Characteristics of Onslow, the Pilbara and WA

	Onslow (no.)	Onslow %	Pilbara%	WA %
Aged 15 and over	524	89	74	78
Aboriginal and/or Torres Strait Islanders TSI)	70	12	12	3
Australian born	435	74	73	68
Labour Force Participation rate *		48	68	62
In private dwelling	551	94	90	96
In non-private dwelling	37	6	10	4
Same address 5 years ago (people aged over 15)	294	56	42	55
Different address 5 years ago (people aged over 15)	193	37	69	59

*The labour force participation rate is determined by dividing the number of people in the labour force by the number of people aged over 15.

Source: Australian Bureau of Statistics

Table 3 - Selected Medians for Onslow, the Pilbara and WA

	Onslow	Pilbara	WA	Shire of Ashburton
Median Age	47	33	33	31
Median Weekly Individual Income	$200-299	$500-599	$300-399	-
Median Weekly Household Income	$500-699	$1000-1499	$500-699	-
Average Household Size	2.4	3	2.7	-

Source: Australian Bureau of Statistics (1996)

Onslow (as shown in Table 1) may not be as high as recorded by the ABS. One possible explanation is that collection of household data may not have been pursued as vigorously as necessary.

Table 2 shows that the population of Onslow is considerably older than the populations of the Pilbara and the State overall. This is supported by Table 3, which shows that the median age of Onslow residents is 47, which is about 15 years higher than the median ages for the State and the Pilbara.

The population of Onslow is significantly more "stable" than the average duration of occupancy, with 56 per cent of all residents living in the same place as they did five years ago. This indicates that Onslow has a much lower transient population than most urban centres in the Pilbara.

2.1.2 Housing

The following statistics are derived from the 1996 Census of Population and Housing.
Of the 122 occupied separate homes in Onslow, approximately 40 per cent are owned or being purchased, which is considerably lower than the State average. A similar proportion of homes are rented, and the remainder of tenure options were 'not stated'.

The average household size in Onslow is 2.4 people. This is lower than the State average of 2.7, and the Pilbara average of 3.

Table 4 - Onslow Housing Types

	Occupied	Unoccupied	TOTAL
Separate Homes	122	24	146
Caravans, Cabins	102	0	102
Not Stated	22	3	25
TOTAL	246	27	273

Note: The high number of caravans and cabins in the townsite may be attributed to self-drive tourists. The Census data indicates that of the 100 people living in caravans or cabins, 88 were visitors to the townsite.

2.1.3 Land Supply

Industry
The Department of Land Administration (DOLA) has produced a design for an extension to the industrial area, which provides 10 lots ranging is size from 2,500m^2 to 6,000m^2. Action to progress the subdivision may occur only with the agreement of the native title claimants. The topography of the site restricts design flexibility, however, the road layout may be reassessed prior to development. Development costs for the present site may be prohibitive. Sufficient funds should be available to undertake part of the development once native title issues have been resolved. At present, there are no vacant light industrial lots available.

Residential
In July 2000, there were 35 residential lots available for sale in the Onslow townsite. These lots ranged in size from 790m^2 to 1,533m^2 and were priced from $31,000 to $44,000. Onslow Salt has since taken up the majority of these lots for its permanent workforce.

Commercial
At present, the Onslow town centre is generally located in Second Avenue in a strip-development style. The existing town planning scheme allocates 51 lots for commercial development. However, a significant number of these allotments are currently used for single residential purposes.

Tourism
TPS No. 7 zones several caravan parks and holiday accommodation Tourism zone, which provides greater diversity in the types of land use permitted. Transient workforce accommodation is a discretionary use in this zone.

Map 3 shows existing land uses in the Onslow townsite. The land use survey was conducted in September 1999.

2.1.4 Growth Projections

If current trends were to continue, it is unlikely that Onslow would experience an increase in population. The Onslow Solar Salt Project has recently been completed and provides employment opportunities in the Onslow townsite. The development of the salt project and the proximity to oil and gas resources present a range of development opportunities in and around Onslow.

The critical issue for growth projections is the ability of Onslow to absorb a significant increase in population. TPS No. 7 has allocated approximately 60ha of new land for residential development, which is more than capable of accommodating significant growth. Based on eight dwellings per hectare, which includes provision of roads, parks, public utilities, some 480 dwellings may be accommodated. This would support a population of between 1,150 and 1,440 people, depending on the number of people per dwelling.

In addition to the directly employed workforce, there is indirect and consequential employment. The Department of Industry and Resources (DIR) has developed the following assumptions:

Indirect employment is that generated by the development and operation of a new project. Indirect employment associated with the operational phase of a project for Onslow would be expected to be approximately 25-30% of the total workforce. This allowance is made for employment in areas of associated light industry, maintenance contractors, project materials and equipment suppliers.

Consequential employment is generated by the increase in population to a town or district. Again, an allowance of 25-30% consequential employment is made for permanent direct and indirect workforces. Consequential employment is generated in commercial enterprises serving the community and in government services such as education, health and administration.

The DIR assumes that an industry workforce in Onslow has a 70:30 ratio of married to single people, which is based on similar ratios experienced by other resource companies in the Pilbara Region. Of the married component, an average family size of three people per household (Pilbara average) is assumed. Then, applying the married to single ratio of 70:30 and multiplying the married component by three (persons per household), the figure arrived at is the "married" population. Adding the single component gives the total population increase.

The DIR has also developed a demographic profile model for the estimated three people per household:

Table 5 - Demographic Profile Model

Family Structure	No. of people per/household	Total number of people (based on a hypothetical married workforce of 100 people)
Worker and partner	2	200
Infants (under 5 yrs)	0.3	30
Primary Students	0.5	50
Secondary Students	0.2	20
TOTAL FAMILY UNIT	3	300 people

Source: Department of Industry and Resources

This same model may be used for a variety of industrial workforce projections, working backwards from a total number of workers. The ratio of married to single workers may also be varied to meet the needs of a particular project or community.

2.2 Social and Community Considerations

2.2.1 Lifestyle

The Pilbara Region has a unique lifestyle that supports a strong community spirit, often based around sporting and recreation activities. This is certainly the case in Onslow, where residents and visitors alike enjoy Onslow's coastal outlook through a range of marine-based recreation such as swimming, fishing and diving. So too, Onslow has a range of leisure and sporting facilities which are complemented by the mild winter climate. The venues include Sunrise and Sunset Beaches, Four Mile Creek, the Mackerel Islands and the

Ashburton River. These natural features are an integral part of the Onslow lifestyle and are important to the local community.

While many people may be attracted to the Pilbara through employment opportunities (although this is not especially the case with Onslow), it is undoubtedly the lifestyle that keeps people in the region. Naturally, a significant increase in population, and the development of strategic industrial projects would have an impact on the Onslow lifestyle.

Strategic industrial development is capable of providing many economic opportunities in terms of jobs and business growth. Growth may also result in the provision of additional community services and facilities.

2.2.2 Fly-In Fly-Out Workforces

The State Government has generally indicated a preference against the use of fly-in fly-out workforces where possible. Where industry once created towns to accommodate workers and their families, this is no longer the case, and remote mine sites such as Murrin Murrin and Nifty Copper employ workers exclusively on a fly-in fly-out basis. It is reasonable to suggest that towns such as Pannawonica and Paraburdoo would not have been created in today's environment. This is particularly the case where these towns may not have a long-term future, as was the case with Goldsworthy and Shay Gap.

Onslow's existence and long-term future are not solely dependent on the resources development industry. However, if the town is to grow, it will rely on resource development. Improvements in the level of servicing and facilities in the town will be inexorably linked to the development of those industries.

As such, Onslow will receive the most benefit from industry in terms of servicing and facilities, if the majority of workers on industry projects are housed permanently in the townsite, along with their families. Yet the location of permanent workers in the townsite will have a significant cost implication for industry proponents and government. This may make the use of fly-in fly-out workforces more attractive.

It may be more appropriate to suggest a greater proportion of workers be employed on a fly-in fly-out basis through variation to the demographic profile model. Regardless of how the workers are employed, Onslow will still need to accommodate them, whether it is in permanent homes with their families, or in workforce accommodation camps, which would also become permanent fixtures to the town.

2.2.3 Education, Health, Recreation and Community Services

Onslow has a range of community services and facilities and is quite well serviced considering its population and isolation. Although Onslow is technically located in the Pilbara Region, it has good links to the Gascoyne Region, reflected by the fact that many services are delivered from Exmouth and Carnarvon.

Table 6 illustrates the services available to the Onslow community, and shows where those services originate.

As Table 6 illustrates, Onslow does not enjoy the range of services and facilities that most people take for granted, even in other Pilbara towns. Where services are provided outside Onslow, they can be provided from a variety of centres, including Carnarvon, Exmouth, Port Hedland and Karratha. While Onslow is located in the Pilbara Region, some government departments provide "head office" services from the Gascoyne Region or a mixture of both. This can lead to a lack of communication between agencies, and difficulties for residents if they need to travel to access these services, which may be in different directions from Onslow.

The level of servicing is due partly to the size of the town, and its relative isolation. Regardless, the relative lack of services, and the difficulty in accessing them from other centres are a source of frustration for the Onslow community. This may also have implications for Onslow's ability to attract and retain new residents. While potential new residents from other country areas could appreciate the servicing issues, the majority of city residents would find it difficult to accept the servicing trade-offs that come with living in a remote and isolated town.

Table 6 - Social Services in Onslow

Service	How often, how many, what cost etc.	Service source or comments
Doctor	Monday, Tuesday and Thursday. Patients treated as outpatients from hospital, so generally bulk-billed. The patient must pay for pharmaceutical items. Alternatively, prescriptions can be sent to Exmouth on the doctor's plane and collected and paid for at Postie's General Store.	Exmouth (practitioners fly-in fly-out)
Dentist	Once a month for one week	Exmouth
Pediatrician	Monthly for a couple of days	Perth
Podiatrist	Every second month	Perth
Ophthalmologist	Every third month	Perth
Ear, Nose and Throat	Every third month	Perth
Audiologist	Every third month	Perth
Physician	Every second month	Perth
Dermatologist	Twice yearly	Perth
Optometrist	Every second month, or as advertised	Karratha
Postal Service	Agent only. Post comes to town every day, except Sunday and Monday. No home delivery service - PO Boxes only. (Approx. 220)	Onslow, but collected from North West Coastal Highway.
Bank (or agent)	BankWest and Commonwealth Bank agent. Hours correspond with Postie's General Store i.e. 9am-5pm weekdays, 9am-12 noon Saturday and 11am-12 noon Sunday.	Nearest banks Karratha
Centrelink	8am-12 noon weekdays at Bindi Bindi Aboriginal Village	Closest full service Karratha
Health Services	Community health nurse Monday, Tuesday and Thursday	Exmouth
Youth Services	Youth centre available Wednesday to Saturday, evening only, free service	Onslow
Newspaper	Provided day after issue. Not available Monday	Onslow, but collected from North West Coastal Highway
Television	ABC, GWN	No WIN channel
Radio	ABC, North-West Radio	No FM service
Primary School	100 students, including pre-primary	Onslow
High School	29 students up to Year 11	Onslow, full senior high school at Karratha
Child Care	Onslow Occasional Day Care. Available 9am-1pm Tuesday to Friday. 12 places maximum	Onslow
Hospital (beds)	8 beds	Onslow - Regional Hospital at Port Hedland or Carnarvon
Sports Ovals	One oval used for football and cricket	Onslow
Sport Courts	2 basketball, 2 netball, 2 tennis, 1 bowling green	Onslow
Swimming Pool	None	Karratha
TAFE, further education	None	Karratha
Bus	Greyhound Pioneer, daily service, pick-up from highway - 80km from town	North West Coastal Highway
Taxi	Onslow Taxis, Nifty's Cabs, two taxis each	Onslow, also provides a service to bus stop on North West Coastal Highway
Restaurant	Nikki's Licensed Restaurant First Avenue; and Beadon Bay Hotel	Onslow
Motel	Mackerel Motel, Sun Chalets	Onslow
Caravan Park	Beadon Bay Caravan Park and Ocean View Caravan Park	Onslow
Police	5 Police Officers	Onslow
SES	Volunteer Service	Onslow

Table 6 - Social Services in Onslow - continued

Service	How often how many what cost etc.	Service source or comments
St John Ambulance	Volunteer Service - including Royal Flying Doctor Service	All weather service at Nanutarra and Fortescue Roadhouse
ATSIC	One local representative	Head office in South Hedland
Department of Community Development	Local service	Onslow, but specialty services from Karratha
Department of Housing and Works	No local service	Karratha
Department of Sport and Recreation	No local service, visits as needed/available	Karratha
Main Roads Western Australia	No local service, visits as needed/available	South Hedland – local roads/ Carnarvon – State roads
Water Corporation	Local representative	Head office Karratha
Department of Environmental Protection	No local service, visits as needed/available	Karratha
Water and Rivers Commission	No local service, visits as needed/available	Karratha
Department of Agriculture	No local service, visits as needed/available	Karratha
CALM	No local service, visits as needed/available	Karratha
Department of Fisheries WA	No local service, visits as needed/available	Karratha

Source: Department for Planning and Infrastructure, Karratha 1998-99

2.2.4 Culture and Heritage

Recent Aboriginal History

The introduction of the pastoral award in 1968 led to large numbers of Aboriginal people having to leave their traditional lands which, with the arrival of Europeans in the 19th century, had been taken up as pastoral stations. While most Aboriginal people lived in inland areas, the Government established camps in the coastal areas of Onslow and Roebourne. As such, Onslow accommodates Aboriginal people from the inland Pilbara. The main tribal groups in town are:

- Punjima (Bunjima) and Innawonga - from the Wittenoom and Tom Price area
- Nhuwala, Thalanyji and Burama - from the Cane and Ashburton River area
- Yindjibarndi - people from the Millstream area (one of the larger language groups)
- Ngarluma - from the Roebourne and Whim Creek area
- Martuthinira - traditionally from the coast around the mouth of the Fortescue River and south to the Robe River.

Aboriginal people are now moving back to their traditional homeland areas, which has led to a decrease in the population of Onslow.

Implications of the Aboriginal Heritage Act 1972

The *Aboriginal Heritage Act 1972* requires that management or research on Aboriginal sites be subject to permission under Section 16 from the Aboriginal Cultural Materials Committee. This is an advisory body to the Minister for Indigenous Affairs. Permission is usually conditional on the approval and involvement of the Aboriginal custodians of the site, and on the input of a professional heritage conservator.

Sometimes Aboriginal sites are also popular recreation or tourism areas. For example, coastal sand dunes used for beach access often contain cultural material, and rock art sites are tourist attractions in their own right. This may lead to site damage, for instance by traffic and pedestrian impact, loss of vegetation, pollution, graffiti, or litter. In such cases, management may be required.

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

Development of vacant land generally requires clearance under the Act.

Implications of the Native Title Act 1993

The *Native Title Act 1993* was created to recognise and protect Aboriginal and Torres Strait Islander people's native title rights and interests. The amended Act continues to provide ways to determine native title and protect the existing rights of governments, industry and the general public. The Act also provides ways to negotiate future public works and business activity on land or waters where indigenous people may have native title rights and interests.

Most of the area in and surrounding Onslow is subject to native title claim, although developed areas of the Onslow townsite are exempt from claim. Map 4 shows those areas subject to claim under the Act, which includes the marine environment.

European Built Heritage

Onslow and surrounds have a range of European heritage sites. The Old Onslow townsite is currently being considered for inclusion on the Register of the National Estate. Restoration works to the old police and gaol complex are currently being undertaken to stabilise the ruins and conserve the structure. In 1998, the Shire of Ashburton adopted a conservation plan for Old Onslow townsite, which provides guidance in the preservation and enhancement of an important historical feature in the region. The conservation plan details a series of projects that could be undertaken to secure the history of the region and ensure that tourists visiting the site gain a greater appreciation of the townsite. The primary objectives of the Old Onslow conservation plan have been adopted by the Shire of Ashburton as a policy, which formalises Council's stance on the site and assists in the implementation of the conservation plan. An important focus of the policy is the management of tourists and the development of facilities (e.g. camping, toilets, BBQs) along the Ashburton River approach. However, these are to be kept to a minimum distance of 500m from the townsite.

The Shire of Ashburton has prepared a *Municipal Heritage Inventory* in accordance with the *Heritage of Western Australia Act 1990*, which was adopted by Council in August 1999. Twenty-nine sites have been nominated within the Shire, and Table 7 shows the sites / buildings located within the Onslow area.

The Shire of Ashburton reviews the *Municipal Heritage Inventory* every five years. Council has identified several additional sites in the Onslow area, which may be considered as part of the next review.

In addition to the *Municipal Heritage Inventory*, the Peedamulla Homestead ruin is listed on the Heritage Council of Western Australia's Register of Heritage Places.

Townscape

Townscape is a planning and social response to community needs and a vision of the way a community wants its town to develop. It is expressed by creating, modifying or enhancing the physical environment. One of the main aims of townscape programs is to improve the image and identity of a town and generate feelings of community pride and care.

Townscape is not just about the physical environment, but a response to a range of social and cultural needs. Townscape may apply to a whole town, region, or the community may define the area. Such programs may look at things like roads, footpaths, parking, shop-fronts, parks and public open space, public art, street furniture etc.

Table 7 - Shire of Ashburton Municipal Heritage Inventory - Onslow Area

Place No.	Name of Place	Locality	Address
1	Beadon Hotel	Onslow	Lot 1 Second Ave, Onslow
2	Former Police Residence	Onslow	1-3 Second Ave, Onslow
3	Former Post Office and Residence	Onslow	19 Second Ave, Onslow
4	Old Onslow Townsite	Onslow	Via Onslow
5	Onslow Goods Shed / Museum	Onslow	Second Ave, Onslow
6	Residence: 26 Third Avenue	Onslow	26 Third Ave, Onslow
7	Residence: Sweeting	Onslow	18 Third Ave, Onslow
8	Residence: Turner	Onslow	65 Second Ave, Onslow
9	St Nicholas Church	Onslow	19 Third Ave, Onslow
West of North West Coastal Highway			
1	Ashburton River Road Bridge	Ashburton	Ashburton River, Minderoo Station
2	Minderoo Homestead	Ashburton	c/- Post Office, Onslow
3	Peedamulla Homestead	Ashburton	Peedamulla Pastoral Station
4	Permanent Pools in the Ashburton River (includes Three Mile Pool, Five Mile Pool and Ten Mile Pool)	Ashburton	Ashburton River, Minderoo Station
5	Yanrey Station	Ashburton	Yanrey Pastoral Station, via Carnarvon
6	Yaraloola Homestead	Ashburton	PO Box 145, Pannawonica

Source: Shire of Ashburton Town Planning Scheme

The Shire of Ashburton has recently engaged a consultant to prepare a townscape plan for Onslow. The townscape plan is expected to be completed by August 2003. Implementation of the townscape program may significantly enhance the appearance of Onslow and express the town's unique culture and lifestyle.

Table 8 - Selected Climatic Comparison of Onslow and Perth

Climate	Mean Daily Max. Temp (C)	Mean Days Temp ›30C	Mean Days Temp ›40C	Mean Rainfall (mm)	Highest Monthly Rainfall (mm)
Onslow	31.3	206	17.7	106.7	544.6
Perth	23.3	58.4	2.2	869.4	476.1

Source: Bureau of Meteorology

2.3 The Natural Environment

2.3.1 Climate

Table 8 shows some of Onslow's climatic characteristics, compared with Perth. As shown, Onslow has a semi-arid climate, with high temperatures and irregular rainfall. Notwithstanding the warm summers, Onslow enjoys a mild winter season, which attracts many tourists from colder southern climates.

2.3.2 Cyclonic Activity and Storm Surge

Onslow is in a cyclone area, with cyclones most prevalent between November and April. Cyclones may cause damage in three main ways:

- collapse of buildings and other structures due to fluctuating wind pressure;
- loose objects becoming airborne projectiles from high wind speeds; and
- flooding occurring as a result of ocean storm surge, heavy rainfall in river catchments or a combination of both.

The townsite of Onslow regularly experiences the impact of cyclones and cyclonic activity, including high winds, saltwater inundation and wave action. A large area of the existing townsite is in a storm surge hazard area and the State Government and the Shire of Ashburton have a responsibility for the safety of the community and should not allow development which may cause impacts as a consequence of flooding or storm surge.

Under the Building Code of Australia provisions, Onslow is in Region D, a Category 2 area. Most of northern Australia is in Region D. The Category 2 rating relates to the likely ferocity of winds in the area should a cyclone occur and is the highest rating for winds. This rating applies generally between Onslow and Cape Keraudren.

In 1994, the then Department of Planning and Urban Development released the *Onslow Coastal Plan*. This plan examined a number of planning alternatives for the future development of the town, recognising that most of the present town and desirable locations for tourist developments are in a storm surge hazard area. The key recommendation from the report was to impose strict development conditions in the hazard area. TPS No. 7 has a number of provisions relating to the Onslow Coastal Hazard Area. These are included as Appendix A. Map 5 shows the town planning scheme, including the coastal hazard area.

The plan estimated that storm surge events can raise the sea level to approximately 4m AHD, which proved to be accurate when Tropical Cyclone Vance crossed the coast in March 1999 with an estimated surge of 4m. Although the 1994 plan was produced with the best information available at the time, it is acknowledged that new modelling techniques may provide more up-to-date information on the risk of storm surge to the Onslow townsite.

The Shire of Ashburton has completed a storm surge study to determine “safe” development levels and possible surge mitigation approaches and the development of emergency evacuation plans for areas subject to inundation. Further, the State Government provided funding for construction of seawall/breakwater structures, which has recently been completed.

2.3.3 Conservation Areas and CALM Estate

The Department of Conservation and Land Management (CALM) has two main interests in the Onslow area:

1. The Cane River and Mt Minnie Pastoral Stations, as well as a part of Nanutarra Station, were purchased by CALM in 1998. It is proposed that these properties be given an appropriate conservation vesting within the CALM Estate at some stage; and
2. The coastal strip along the Onslow coast, particularly east of Beadon Creek, which contains mangrove communities, but is not part of the CALM Estate.

The pastoral stations were purchased with Commonwealth funds and certain commitments in respect of the land have been made between CALM and the Commonwealth Government.

The Onslow area is home to several species of mangrove. Mangroves are plant formations, which inhabit sheltered tropical and sub-tropical coastlines. They act as nursery, feeding and breeding grounds, and as buffer zones against wave action, thereby reducing erosion and storm surge damage to coastal areas. They are considered an integral part of coastal and marine processes. The Environmental Protection Authority (EPA) has a guidance statement for the protection of tropical arid zone mangroves along the Pilbara coastline. Map 6 shows major conservation areas and the offshore islands.

2.3.4 Offshore Islands

There are a number of islands off the Onslow coastline. They serve as an important recreation area for Onslow residents and tourists, and in some cases, are utilised by the oil and gas industry facilities.

Thevenard Island

The majority of Thevenard Island is a nature reserve that extends to the low-water mark and is vested with CALM for the conservation of flora and fauna. The south-eastern portion of the island was leased to Mackerel Islands P/L

for a holiday resort in 1965 and the airstrip in 1970. These are DOLA leases and both are still held by Mackerel Islands. Western Australian Petroleum was granted a lease over the north-eastern portion of the island in July 1988 for an onshore oil and gas facility.

Major conservation values on Thevenard Island include beaches used by nesting turtles, particularly green and flatbacks, the presence of Thevenard Island mouse and good examples of sandy habitats. Domestic mice are also present on the island and CALM is planning an eradication program. Breeding records for Caspian Tern, Fairy Tern and Osprey have also been collected by CALM. These records indicate that terns will abandon nests if they are disturbed, and will abandon a colony entirely if it is continually disturbed. The island is also surrounded by coral reefs, which are sub-tidal and not protected, as well as reef flats.

Camping, fires and pets are prohibited on Thevenard Island, as on all nature reserves. Thus, the only recreational use is on the Mackerel Islands lease area, which hosts a number of huts and is serviced by weekly boat trips from Onslow for tourists. Fresh water and power are provided by Chevron. The nature reserve is off limits to visitors except for beaches and a track that runs down the centre of the island to the western end. It is understood that this track was severely degraded by Tropical Cyclone Vance in March 1999.

Serrurier Island

Serrurier Island is a nature reserve, extending to low-water mark and vested with CALM for conservation of flora and fauna. Major conservation values include turtle nesting, a translocated colony of Thevenard Island mouse, shearwater nesting, excellent coral reefs and other marine habitats (most of which are sub-tidal and not protected) and a resting area for dugong, which are specially protected fauna. Breeding records have been collected on this island for Eastern Reef Egret, Fairy Tern, Osprey, Pied Oystercatcher, Silver Gull and Wedge-tailed Shearwater. Shearwaters burrow into sand to nest and burrows will easily collapse underfoot if people walk through a colony. Burrows are in use from approximately August to February.

Camping is permitted on Serrurier Island only by permission from CALM through the district manager in Exmouth. Fires and pets are not permitted on the island. Charter operators from Onslow and Exmouth often moor in sheltered bays to gain access to the island.

Airlie Island

This is a nature reserve vested in CALM for the conservation of flora and fauna. Apache Oil has a small lease on the island for an onshore oil and gas processing facility. Airlie Island is home to the endemic skink found only on Airlie Island and in the vicinity of Roebuck Bay. Breeding records have been kept for Silver Gull, Wedge-tailed Shearwater and White-bellied Sea Eagle. Camping is not permitted and the island is too far from shore to allow easy access from Onslow.

Ashburton Island

This island is unallocated Crown land (UCL) and is close to shore. Onslow residents often visit it for recreation. It is home to the native rat, and turtles use the beaches for nesting. Breeding records have been kept for Bridled Tern and Silver Gull.

Bessieres Island

This island is also known as Anchor Island and is UCL. It is located to the north-east of Serrurier Island but is unlikely to be used for recreation, as it is difficult to access. Breeding records have been kept for Osprey and Wedge-tailed Shearwater.

Direction Island

This is mostly UCL with a small lease to Mackerel Islands, which has one holiday shack. There is an old communications tower on the western end of the island. Breeding records have been kept for Osprey.

Tortoise Island

This island is shaped like a tortoise with a domed middle and is UCL. It is unlikely to be used for recreation, as it is difficult to access. Breeding records have been kept for Caspian Tern and White-bellied Sea Eagle.

2.3.5 Landscape

The greater Onslow area forms part of the Carnarvon Botanical District and is characterised by low-lying scrub and spinifex with some small shrubs and trees. (See Maps 7 and 10). The soil is mostly clay, although there are some significant dune systems towards the coast. Much of the coastal area consists of low-lying salt flat area, with minimal vegetation. Numerous termite mounds dot the landscape around Onslow.

There have been no detailed landform studies undertaken for land north and east of Mt Minnie Station. (See Map 9). However, an inventory and condition survey of rangelands in the Ashburton River catchment was undertaken by the then Department of Agriculture of Western Australia in 1982.

This survey indicated that most of the Onslow Structure Plan area is located within a coastal plains province, which is characterised by extensive sandy plains with longitudinal dunes trending north-east or north and by broad clay plains and circular grassy depressions.

Relief in the western parts of the province is very subdued although occasional dune crests may be up to 30m higher than the surrounding plains.

The Ashburton River meanders through the plains of the northern part of the province in a north-north-west direction for about 110km to the Indian Ocean near Onslow. No tributaries of any consequence flow into the Ashburton River over this distance.

Many of the land systems of the province are old floodplain deposits of the Ashburton River that appears to have altered course across the plains a number of times. Alluvial plain systems flank the river to the width of up to 8-9kms. However, the river does not flood out more than 4-5kms from its course on to these systems, at the present time.

2.3.6 Groundwater

Drinking water for the Onslow townsite is supplied by the Cane River wellfield, located about 30km to the east of Onslow. Water is supplied to the town from Water Corporation bores in alluvial deposits of the river. In 1999, the Water and Rivers Commission (WRC) released the *Cane River Water Reserve Water Source Protection Plan*. This plan recommended that the existing water reserve should be extended to incorporate all existing bores, and allow for the southern extension of the borefield. The proposed reserve is shown on Map 6 and is classified as a Priority 1 water source protection area, which means that no development is permitted in that area.

The water source protection area contains 14 bores, and covers an area of approximately 7,356ha. The licensed allocation from the Cane River is 350ML per annum. The WRC estimated that the Cane River aquifer was capable of a 550ML per annum yields.

The WRC released the *Pilbara Region Water Resources Review and Development Plan* in 1996. This plan suggests a number of ground and surface water options for the Pilbara Region. There are ample water resources in the Pilbara, but the issue is the cost of developing the sources. The review suggested that there was potential for future development of the Cane River aquifer, but that investigations were required to define the capacity of the resource adequately.

2.4 Existing and Proposed Infrastructure

Map 7 shows the location of existing and proposed infrastructure in the greater Onslow area, outside the townsite.

2.4.1 Power Generation

A 3.36MW private gas-fired power station was commissioned in Onslow in October 1999. The impetus for this station was the Onslow Solar Salt Project, but power will also be used for town supply. This will allow the existing diesel station to be decommissioned. The new power station is owned and operated by Onslow Electric Power, an independent power producer that was established for the Azko Nobel Onslow Solar Salt Project. The gas is provided via an underground pipeline from the Tubridgi gas processing facility.
The capacity of the power station will be sufficient to meet anticipated growth in

Onslow up to 2008-09 with provision for further expansion. Any substantial industrial developments will need to make arrangements for power generation.

2.4.2 Water Supply

Three existing bores were re-drilled in 1997-98 and three others are on the Water Corporation's capital program to be re-drilled when needed. In 1997-98 a geophysical investigation was carried out, which was followed by an investigative drilling program to extend the Cane River borefield in a south-easterly direction. This exercise has encouraged Water Corporation to extend the source to meet future town growth. The current bores are licensed for 350ML per annum.

An Onslow water supply scheme review was undertaken in September 1999. This review recommended modifications to the existing system to improve efficiency. This modification work included some duplication of short sections of town mains, subject to capital funding approval. The review also recommended other upgrading, including the construction of a new 2000m^3 storage tank at Tank No. 1, although timing of this work is subject to the recommended improvements and monitoring of town demand and growth.

2.4.3 Wastewater

The infill sewerage program for Onslow is complete and the system has been commissioned. The Onslow wastewater treatment plant (WWTP) has a capacity for 1,000EP (equivalent population), which is considered sufficient to cater for natural growth in the town.

The WWTP provides significant benefits to the community and the environment, such as:

- improved public health and amenity;
- more efficient utilisation of land and certainty for the land development industry;
- improved recycling, re-use and recovery of useful by-products, e.g. biosolids.

To ensure the protection of an essential piece of public infrastructure from encroachment of incompatible land uses, there is a 500m buffer zone around the WWTP. Use of treated effluent from the WWTP will be discussed with the Shire should the need arise.

2.4.4 Beadon Creek Harbour

Beadon Creek Harbour is Onslow's main location for boating activity. The creek is home to a small number of fishing vessels, and supports some tourist activity in the form of fishing charters, and "hire and drive" operations. Beadon Creek is also the main boat-launching area for the large number of recreational craft that utilise the waters off the Onslow coast.

A new floating jetty has been provided for Beadon Creek. This was funded under the then Department of Transport (DOT) recreational boating facilities scheme dollar-for-dollar funding arrangement with local governments.

The Department for Planning and Infrastructure (DPI) also contributed $1.3 million to various projects within Beadon Creek, including the re-dredging of the creek and installing a new pile mooring system for vessels using the facilities.

2.4.5 Airport

Onslow is served by a small airstrip to the south of the townsite. The airport is subject to tidal inundation, and as it has no lights, can only be used during daylight hours. Flares can be used for medical emergencies. The airport is used by small charter craft and the Royal Flying Doctor Service. An obstacle limitation surface has been determined for the existing airport and is shown on Map 5.

To determine the long-term future of the airport, an airport options study was commissioned by the Shire of Ashburton in 1999. The study examined possible realignment of the airport runway. Construction of the realignment of the airport runway has now been completed. It was determined that relocation of the airport to a new site was not a viable option at this stage.

Onslow Airport now has a 1,600m raised strip made from gravel, with lighting so that it can be a 24-hour facility.

In February 2000, the Shire of Ashburton resolved to begin Stage 1 of the Onslow Aerodrome Development, at a cost of $1.8m. Stage 1 involves relocation of the runway to slightly higher ground within the existing airport, which will allow the strip to be used in all weather. This proposal has been assisted by contributions from the DPI under its regional airports development scheme and from the Department of Premier and Cabinet as part of the Cyclone Vance Recovery Fund.

2.4.6 Roads and Transport

Road access to Onslow is via Onslow Road, an 80km branch off the North West Coastal Highway. Main Roads Western Australia is responsible for this road.

Twitchen Road also provides an unsealed link to the highway, although this is not accessible at all times of the year. Another road in the area is the Old Onslow Road, which provides access to the Old Onslow townsite, and to the onshore gas facilities at Tubridgi.

There is no public transport in Onslow per se, but there are two local taxi services that operate four vehicles between them, one of which is a standard to accommodate executive or special event travel. These operators are licensed by the DPI.

Greyhound Pioneer McCafferty's provides a daily bus service to the Onslow turn-off at the North West Coastal Highway which is 80km from the town. To provide a "bus" service to the Greyhound 'terminal', the DPI has issued a contract for a bus service for Greyhound passengers. The local taxi operators currently hold this contract. This service is subsidised by the DPI and passengers are able to travel to the terminal for $26.50 one way for children and pensioners and $30 for adults. However, as the taxi must be pre-booked, the service is not entirely flexible.

2.4.7 Shipping and Port Facilities

Onslow Solar Salt Pty Ltd has constructed a jetty and loading platform to the west of Beadon Point, and a 10km shipping channel dredged to a depth of approximately -6.5m AHD has been created to allow the export of salt from the solar salt project. It is not anticipated that third-party access to these facilities will be permitted. The Beadon Creek Harbour provides access and support to smaller vessels, with an approach area dredged to approximately -3m AHD.

2.4.8 Landfill

Onslow has a landfill site located to the south of the proposed urban extension area. The facility is licensed by the Department of Environmental Protection as a Class 2 site. This means that it can cater only for putrescible waste and low-level hazardous material. This site has nearing the end of its operational life and the Shire of Ashburton is presently undertaking action to relocate the site further south."

2.5 Economic Development

2.5.1 Onslow Community Economic Development Plan

In 1996, the Pilbara Development Commission released the *Onslow Community Economic Development Plan*. All the ideas, priorities and recommendations were gathered from the Onslow community during a series of consultation exercises. The report identified key areas for action, and ranked them.

This summary provides a useful indication of community priorities in 1996 and indicates that the Shire of Ashburton, in conjunction with other agencies, has progressed many of the priority items. The *Onslow Community Economic Development Plan* suggests the formation of an Onslow Development Steering Committee, although this has not occurred to date.

2.5.2 Tourism

Tourism is a small but significant economic activity in Onslow, especially between April and September. As with most of the North-West, the tourism market caters mainly for self-drive tourists. Attractions in and around Onslow include fishing and boating, and tourists may visit Old Onslow and the nearby Mackerel Islands. There are currently two "hire and drive" boats available in town and this industry is considered to have good growth potential.

In terms of tourism infrastructure, Onslow has two caravan parks and two motels, as well as a range of commercial and community services adequate to cater for the annual tourism season. There is also vacant land zoned Tourism that could meet future growth in the tourism industry. These are shown on Map 5.

2.5.3 Pastoral Industry

A number of pastoral stations operate around the Onslow area, including Minderoo, Peedamulla and Urala. These stations use Onslow as a service centre and are the only pastoral stations with post office boxes in Onslow, demonstrating their close relationship with the town. Minderoo Station runs a mixture of sheep and cattle, Urala runs sheep and Peedamulla is a cattle station.

The Land Administration Act 1997 (LAA) covers the tenure and operational arrangements of pastoral stations. Part 7 of the LAA covers the administration of pastoral leases. It established a Pastoral Lands Board, and requires greater emphasis on land use, ecologically sustainable development, prevention of degradation and rehabilitation of degraded and eroded rangelands. Pastoralists are required to manage their lease to its best advantage as a pastoral enterprise. It is essential that improvements are maintained and the Board may require lessees to submit a development plan for the progressive achievement of improvements. Annual stock and improvement declarations must be submitted each financial year.

The LAA also provides opportunities for enterprise diversification through a permit system. A lessee may apply for a permit for clearing, sowing of non-indigenous pastures, other agricultural uses and pastoral-based tourism activities. The permit is available only to the pastoral lessee and is not transferable. If an outside investor is sought for a diversification project, the land must be excluded from the pastoral lease and a general purpose lease negotiated with DOLA.

Urala Station currently operates an accommodation facility, which caters for fly-in fly-out workers involved in the gas industry at Tubridgi. This station also operates a small contracting service, which caters for the onshore gas industry.

The Cane River and Mt Minnie Stations have recently been vested with CALM for conservation purposes.

Table 9 - Summary of Onslow Community Economic Development Plan

Activity	Status
Development of recreational programs and facilities to improve opportunities	Commenced by Shire, funding ongoing
Development of tourism opportunities and facilities	Commenced by Shire, funding ongoing
Establish marina development	Discussions under way, no formal agreement in place
Upgrade Beadon Creek facilities	Completed in conjunction with DPI
Establish more housing	Market driven
Relocate/upgrade airport	Study completed, funding applications submitted, funds committed
More realistic pricing for DOLA residential land	Market driven
Establish townscape plan	To be considered in 2002/03 budget update
Expand employment opportunities	Partially addressed through CDEP and Jobstart
Onslow Solar Salt Project	Completed
Invite politicians to town to discuss "across the board" development opportunities	Ongoing

2.5.4 Fisheries

Onslow Prawn Fishery

This fishery is divided into three restricted zones off the coast near Onslow. It harvests mainly tiger prawns inshore, with a lesser catch of king, banana and endeavour prawns further offshore. Eight licensed vessels have access to designated areas from Locker Island west of Onslow to Dampier to the east. The fishery operates from February to October. In 1996, the catch value (to the fishers) was $1.2 million.

The catch is affected by similar environmental factors operating in Exmouth and the success of tiger prawn breeding stock management. The five-year average annual catch of tiger prawn is 58t, king prawn 46t, endeavour prawn 15t and banana prawn 12t. Environmental factors can also vary catch composition in this fishery - high rainfall years may result in a decline of tiger prawn catch and a corresponding increase in the banana prawn catch. In 1996, 94t of prawns were caught in this fishery.

Onslow was the last prawn fishery to be declared limited-entry in Western Australia, gazetted in 1991. One zone has been reserved since 1976 for the exclusive use of resident fishermen (at specific times) and is actively trawled by four vessels. The other two zones are fished by appropriately endorsed vessels from other fisheries, such as Nickol Bay.

Pilbara Fin Fish Trawling

The Department of Environmental Protection's S*tate of the Environment Report* provided some details on the Pilbara Fin Fish Trawling fishery. This fishery produced 3,201t of fish in 1996, and is considered to be an over exploited fishery. At present, three fishing charter boats, five prawn trawlers and three wetline fishing vessels are based in Onslow.

2.5.5 Onslow Solar Salt Project

Onslow Solar Salt Pty Ltd, part of the international Akzo Nobel group, has recently started operating a 2.5 million tonne per annum solar salt field. The proposal was first raised in the 1960s, although development did not progress until 1989, when Gulf Holdings P/L submitted a proposal to the EPA to produce and ship salt from Onslow. The project cost $80 million. The location of the site is shown on Map 9.

The project involves the pumping of seawater from Beadon Creek into a system of condenser ponds where the seawater migrates, with the aid of gravity, through ponds. As the seawater moves through the system, wind and solar evaporation work to increase the salt levels to a point that allows the liquid to be pumped into one of eight salt crystalisers. Here salt crystals grow over a period of months to a point where the thickness is sufficient to allow harvesting to occur. The residual liquor (known as bitterns) is then discharged into Middle Creek to the west of Onslow. The harvested salt is trucked to a wash plant and then conveyed to an 800t capacity stockpile. The salt is stored on the stockpile for three to four months to allow remaining moisture to drain. When ready for export, the salt is taken from the stockpile with a reclaimer and transported via overland conveyer to the waiting vessel, which is 1.3km offshore.

The Onslow Solar Salt Project was developed under the provisions of the *Onslow Solar Salt Agreement Act 1992*. Construction of the crystalliser and concentrator ponds commenced in July 1997 and construction of the plant, jetty and infrastructure commenced in 1998.

Commissioning of the seawater pumps occurred in November 1997. Two and a half million tonnes per annum (MTPA) is exported as washed salt. Onslow Solar Salt has identified areas further to the west of the project for additional concentrator ponds and has arranged tenure over these areas, as well as a potential corridor to connect to established areas. This may result in an increase in production to 6MTPA. Specific project infrastructure includes a 2.5MTPA wash plant, salt stockpile area, ship-loading jetty and conveyors and a 10km dredged shipping channel to cater for 45,000 deadweight tonnage ships.

The project has provided a significant boost to the Onslow economy, and has seen considerable activity in the town. The project required the construction of approximately 35 homes in the town. A construction "boom", it also provided a significant addition to the town's population, which had been in decline.

The *Onslow Solar Salt Agreement Act 1992* and the EPA environmental conditions that have been applied to the Onslow Solar Salt Project also set out a number of community infrastructure contributions to be made by the proponent. Section 14 of the Act requires the company to:

> "… achieve assimilation of workers employed by the company into Onslow; and pay the State the capital cost of establishing and providing additional services, works and facilities and associated equipment where those additional items are made necessary due to the operations of the company in Onslow".

These conditions and agreements contribute to an improved level of services and facilities in Onslow, and provide additional employment opportunities for local residents.

2.5.6 Oil and Gas Industry

The DRD publication *Western Australian Oil and Gas Industry, 2000* details the oil and gas projects operating in the vicinity of Onslow. These are:

- the Griffin, Chinook, Scinian oil and gas fields, owned by BHP, Mobil and Impex Alpha, approximately 68km north of Onslow; and
- the Chevron-owned Roller/Skate oil and gas fields 20km north-west of Onslow.

The Griffin fields produce primarily oil, but contain an estimated 82PJ of natural gas reserves. These reserves are sold into the domestic gas pipeline system or re-injected into the field or used as fuel in the Griffin venture. The Griffin gas plant is located about 30km south of Onslow and is an onshore gas processing facility. The gas is transported to shore from the Griffin venture via a 68km pipeline and is processed at the plant to meet gas specification standards.

The liquefied petroleum gas (LPG) component of this process is piped 24km to a loading terminal adjoining Onslow Road and is sold by Wesfarmers Kleenheat Gas P/L to the domestic market. Up to 68t of LPG can be provided per day.

In 1997, the Griffin gas plant began processing third-party gas sourced from the Thevenard and Tubridgi permit areas. Gas from the Griffin venture is metered and sold to the Tubridgi joint venture participants, who deliver it into the Dampier Bunbury Natural Gas Pipeline via a 90km feed pipeline.

Gas and oil from the Roller/Skate fields is conditioned and compressed at Thevenard Island. Gas from this and other fields (Saladin, Crest, Yammaderry and Cowle) is transported via a 44km pipeline at Thevenard Island to the mainland, and then overland to the Tubridgi gas processing facilities. Gas from this facility feeds into the Dampier Bunbury Natural Gas Pipeline.

The onshore Tubridgi gas field began production in 1991. The Tubridgi project incorporates gas production and gas-gathering operations. Conditioned gas from the plant is piped 90km to the Dampier Bunbury Natural Gas Pipeline. The Tubridgi joint venture had a 10 year contract to supply AlintaGas with 56PJ of gas. This contract ended in 2001. There is also a Griffin third party project, which enables Tubridgi and Chevron gas to be processed or blended by the Griffin gas plant to meet sales gas specifications. As such, the Tubridgi hub was connected to the Griffin plant in 1997.

The location of the Tubridgi facility and the spare pipeline capacity might assist in the transport of limited quantities of new offshore oil and gas fields in the highly prospective southern area of the Carnarvon Basin.

It is anticipated that storage and shipping facilities on Thevenard and Airlie Islands may be decommissioned in the next 10-15 years. This would present opportunities for tourism and the decommissioning should be undertaken with this in mind. However, there is a possibility that Thevenard Island may continue to be utilised for gas processing facilities in the future.

3. ONSLOW STRUCTURE PLAN

3.1 Future Development

3.1.1 Growth Projections

In July 1998, the then DRD commissioned a consultant to review industrial development potential in the Onslow area. The result was the report *Onslow - Potential Development Sites for Processing Industry and Offshore Support*. It contended that, due to the Onslow Solar Salt Project and the established and potential oil and gas industries in the Onslow area, there was potential for strategic industry such as a petrochemical plant or mineral resource processing. The report also indicated potential for further port development for industry. This, in conjunction with offshore oil / gas activity and the local fishing industry might justify the development of a supply base / secure harbour at Onslow.

The proposals in the report outlined several development options in and around the Onslow townsite, which include:

- a strategic industrial estate in the vicinity of 350ha (five site options);
- a marine facility - supply harbour (three options, including one at Beadon Point);
- a supply base land support area in the vicinity of 80ha; and
- additional port facilities.

This level of industrial activity would have an enormous impact on the town of Onslow. The economic benefits of industrial development must be acknowledged, but there is a need to consider the characteristics that make Onslow unique and attractive to residents and tourists.

Further research occurred in 1999, through the DRD commissioned *Review of Development Factors for Potential Onslow Industrial-Estate*. This report identified a preferred site for strategic industry and support services, and outlines a number of development scenarios for various industries that could locate in the Onslow area in the long term. These are:

Scenario 1 - A petrochemical plant

Scenario 2 - A petrochemical plant, plus a magnesium plant

Scenario 3 - Mixed industry group, including a petrochemical plant, magnesium plant, sodium cyanide plant, ammonia urea plant and a gas to liquids plant

The principal plants identified are generally considered as stand-alone developments. However, a number of synergies may be realised between the projects due to the benefits of proximity. For example, surplus ammonia from the ammonia urea process can be an input to the sodium cyanide process, and the shared use of infrastructure such as gas delivery, power generation, water supply, bulk liquid port storage facility and shipping facilities.

While Onslow is a potential location for this suite of industries, other sites are being considered in alternative locations in the Pilbara Region. A full description of the industry options is included as Appendix B.

DIR has provided information on the projected permanent population figures that would be associated with the industry options. The "multiplier" figures are based on the assumptions outlined in Section 2.1.4.

Therefore, the following permanent population increases could be expected with the following scenarios:

Scenario 1- Petrochemical plant only - 768 people plus existing population; total 1,356 people

Scenario 2 - Petrochemical plant & magnesium - 1,251 people plus existing population; total 1,839 people

Scenario 3 - All projects proceed - 2,211 people plus existing population; total 2,794 people

In addition to these figures, a peak construction workforce of 2,000 people would also need to be accommodated in the town, or in a camp close to town.

Any of the three options would require the town to have a greater level of servicing, facilities and significantly alter the scale of development in Onslow.

3.1.2 Community, Culture and Social Services

The population increases outlined in Table 10 would have a significant impact on the community of Onslow on a number of levels, including the demographic profile, levels of service provision, and availability of housing and accommodation, for permanent and temporary workers and their families. Using the demographic profile model outlined in section 2.1.4, Table 11 shows the estimated number of children that Onslow would need to accommodate (based on married workforce only).

Table 10 - Projected Permanent Population Growth for Various Industry Scenarios

	Petrochemical Plant	Magnesium	Sodium Cyanide	Ammonia Urea	Gas to Liquids
Direct	200	125	50	100	100
Indirect	60	38	15	30	30
Consequential	60	38	15	30	30
Sub-Total	320	201	80	160	160
70% Married	224	141	56	112	112
30% Single	96	60	24	48	48
70% Married x 3	672	423	168	336	336
Total	768	483	192	384	384
Grand Total *					2211

Source: Department of Resources Development, 1999

* *It should be noted that these figures do not include construction workforces. Figures provided by the DIR indicate that none of the projects is likely to be constructed concurrently, and that the peak construction workforce would be 2,000 people. This applies to the petrochemical plant project, with other projects assumed to attract a construction workforce in the vicinity of 1,000 people.*

Another point to recognise is that although a worker may be employed as a single person, and be offered accommodation accordingly, that worker may actually have a partner or family that they wish to relocate to Onslow. This is not reflected in the figures, but may have a significant impact on the local housing market and social services' ability to meet increased demand.

Table 11 - Application of Demographic Profile Model to Industrial Scenarios (Married Workers Only)

Family unit	2 people	0.3	0.5	0.2	3 people
	Married Worker and Partner	Infant (under 5 years)	Primary School (6-12 years)	Secondary School (12-17 years)	Total
Petrochemical Plant	448	67	112	45	672
Magnesium	282	12	71	28	393
Sodium Cyanide	112	17	28	11	168
Ammonia Urea	224	34	56	22	336
Gas to Liquids	224	34	56	22	336
Scenario 1 (petrochemical plant)	448	67	112	45	672
Scenario 2 (petrochemical plant and magnesium)	730	110	183	73	1,096
Scenario 3 (all projects proceed)	1,290	194	323	129	1,936

Based on the assumptions outlined in Table 11, Onslow could expect an increase of up to 194 children aged under five, 323 new primary school students, and 129 new secondary school students. This kind of increase would triple the number of primary school students and quadruple the number of secondary students. Such a significant impact on local health and education facilities would require an upgrade or relocation of existing facilities.

Table 6 indicated the current level of social services available in Onslow. The population increases shown in Tables 10 and 11 are far greater than Onslow could currently cope with. In order to accommodate this population increase there would need to be a significant increase in the services and facilities offered in Onslow.

Should Onslow experience increased population, it would provide an opportunity to identify and enhance the town's culture in terms of Aboriginal and European heritage. This could be achieved through a townscape program and would have the added benefit of improving the aesthetic appearance of the townsite. A townscape project for Onslow is currently being investigated by the Shire of Ashburton and is supported by this Plan.

Aboriginal heritage and culture is formally protected through the provisions of the *Aboriginal Heritage Act 1972* and the *Native Title Act 1993*. The determination of native title claims in the Onslow area may present short-term uncertainty in terms of land supply and access. However, it is hoped that agreements between native title claimants and the State Government over the use of land that is under claim will result in economic opportunities for Aboriginal people, as well as the ability to maintain access to traditional lands and waters.

3.1.3 Natural Environment

The *State of the Environment Report* indicated that priority environmental issues for the Pilbara are dust, loss of fringing vegetation, stratospheric ozone depletion, enhanced greenhouse effect, maintaining biodiversity, erosion and sedimentation. Accordingly, future development needs to take into account the maintenance or sustainability of ecological processes and be mindful of cumulative impacts.

3.2 Proposed Land Uses

All land uses discussed in this section form the basis of the Onslow Structure Plan, (for the townsite area see Map 8; and for the greater Onslow area see Map 9).

3.2.1 Residential and Transient Workforce Accommodation

The Plan provides for an additional 60ha of residential land, which may be utilised for permanent and temporary residential accommodation in the form of chalet homes and transportable homes. However, it is preferable that the residential area be used for permanent accommodation.

Transient workforce accommodation can generally be accommodated in the tourist zones (in TPS No. 7) along the Onslow foreshore, as it is already a discretionary use in this zone.

The following assumptions have been made in accommodating new residents in Onslow:

- Residential land for single homes will be developed to a net density of 10 dwelling units (du) per hectare. This may result in a maximum gross density of 30du per hectare.
- Single workers will generally be employed on a fly-in fly-out basis and will be accommodated either in chalet homes or single persons' quarters (SPQ).
- Approximately 50% of single workers will be accommodated in SPQ and the remainder in self-contained chalets or temporary transportable homes. This will provide flexibility for those people who do not wish to live in a workforce camp.
- Workers living in chalet homes / transportable homes will share those homes at a rate of two people per dwelling. Chalet / transportable homes can achieve a density of 22du per hectare, based on the density assumptions used in the *Shire of Roebourne Accommodation Inventory*.

- Workers living in SPQ camps may be accommodated at a density of 100 people per hectare, based on the following requirements per person:

  25m² private living area, including ensuite;

  25m² parking, including bay, turning area, common road area and visitors' parking;

  25m² for communal open space and clothes drying;

  0.4m² for laundry space;

  12m² for dining areas, including kitchen and storage; and

  10m² for indoor recreation areas such as common room, wet mess and gym.

These figures were used in the accommodation inventory, and reflect local by-laws that govern workforce accommodation camps. However, this density is a guide only, and it may be possible to accommodate between 80-120 people per hectare, depending on local conditions. The Shire of Ashburton has endorsed a *Transient Workforce Accommodation Policy*, which is included as Appendix C.

Table 12 sets out the land requirements for the various industrial scenarios, based on the workforce numbers shown in Tables 10 and 11, and using the assumptions noted above.

For Scenarios 1 and 2, there is adequate residential land to accommodate married workers and their families. Scenario 3, which requires 64.5ha of residential land for permanent housing may be more difficult to accommodate, although with a shortfall of only 4.5ha, it should be possible to accommodate all the homes required.

Single workers can be accommodated in land that is appropriately vested and zoned:

Lot 557 Parsley Street, Onslow, 2.76ha (Beadon Bay Village); and

Lot 674 Second Avenue, Onslow, 2.34ha (vacant).

The sites are zoned for "Tourism" in TPS No. 7. However, if these sites are to be used for transient workforce accommodation, Council will require the proponent to provide a management statement for the development. The statement is required to provide an outline of the quality of life, internal and external to the facility. The statement would also provide advice on the transport of workers to and from the site, access to and egress from the site,

Table 12 - Land Requirements for Industrial Scenarios

	Residential Land (ha) (Married workers)	Residential Units	Chalet Accommodation (ha) (50% of single workers)	No. of Chalets	SPQ Accommodation (ha) (50% of single workers)	SPQ units	Total LAND	Total UNITS
Petrochemical Plant	22.4	224	1.1	24	0.48	48	23.98	296
Magnesium	14.1	141	0.7	15	0.3	30	15.1	186
Sodium Cyanide	5.6	56	0.3	6	0.12	12	6.02	74
Ammonia Urea	11.2	112	0.54	12	0.24	24	11.98	148
Gas to Liquids	11.2	112	0.54	12	0.24	24	11.98	148
Scenario 1 Petrochemical Plant	22.4	224	1.1	24	0.48	48	23.98	296
Scenario 2 Petrochemical Plant and Magnesium	36.5	365	1.8	39	0.78	78	39.08	482
Scenario 3 All projects proceed	64.5	645	3.18	69	1.38	138	69.06	852

catering requirements, emergency management and security issues. The statement also needs to provide an indication of the time frame of the transient workforce accommodation as well as the future rehabilitation and conversion of the site.

While permanent workers may be accommodated in Onslow, there is also a need to accommodate a construction workforce of up to 2,000 people. Based on land use requirements for such a facility, 20ha's of land is required. There is insufficient land in the Tourism zone to accommodate a workforce accommodation camp of this size. A preferred option for this facility is in the Future Urban zone to the south of the existing residential area. A site in this zone would be in proximity to services, and would be distant from the coastal hazard area. This facility is required to cope with a peak workforce of 2,000 and could be rationalised from time to time to meet reduced demand. Development of a workforce accommodation camp in the Future Urban zone would not necessarily preclude full development of this area under Scenario 3, as the peak workforce numbers are predicted to occur during development of Scenario 1 and would be greatly reduced should Scenario 3 eventuate.

3.2.2 Commercial

There are nine vacant lots, 12 commercial lots and three civic lots in the Commercial zone, with the remainder of lots in this zone used for residential purposes. This is shown on the land use survey (Map 3). This Plan is in keeping with TPS No. 7, and shows an increase in commercial lots along Second Avenue. It is unlikely that the commercial zoning of lots in TPS No. 7 will result in commercial expansion in the short term. However, it does provide opportunities for the town centre to expand if necessary. A comparison between Map 3 and Map 5 highlights the number of lots used for commercial purposes and those zoned for commercial purposes.

3.2.3 Industrial

The Plan makes provision for two types of industrial land:

1. **Strategic Industry** - A Future Strategic Industry Development zone is shown on Map 8 with an area of approximately 475ha. This site can accommodate the following generic industries:
   - petrochemical plant - 150ha
   - magnesium plant - 50ha
   - sodium Cyanide plant - 80ha
   - ammonia Urea Plant - 50ha
   - gas to Liquids Plant - 50ha

   This site also makes allowance for a nominal buffer zone of 3km. This buffer allows for noise and risk factors and can be refined as project details are developed, and environmental approvals sought.
2. **General and Light Industry** - The current industrial area adjacent to Beadon Creek is currently developed to capacity, and a new light industrial area is required in the medium to long term. The proposed light industrial area is located to the west of the salt plant access road in the vicinity of the Onslow Power Station, and at 25ha is nearly double the size of the existing industrial area. This is more than adequate to cater for increased demand for light industrial land. Given the area's proximity to the Future Strategic Industrial Development zone and the power station, no caretaker's accommodation will be permitted in the new zone. This land allocation would allow Onslow to cater for a range of industries, while retaining the caretaker function in the existing industrial area.

   The short-term proposal to extend the existing industrial area with an additional 10 lots is supported as a means to meet immediate demand and should proceed regardless of whether industrial projects advance.

3.2.4 Environment, Recreation and Conservation

Significant areas of land in Onslow are already zoned or reserved for recreation and conservation purposes. This includes the recent major addition of the Mt Minnie and Cane River Stations. Map 9 shows existing and proposed recreation and conservation areas outside the Onslow townsite.

The existing coastal hazard area reflects the results of the Shire of Ashburton *Onslow Inundation Study*. These results are incorporated in TPS No. 7.

3.2.5 Tourism

A number of sites are shown as "tourism" in the coastal parts of Onslow. While the preferred use for these sites is tourism, they may be used for transient workforce accommodation in the short to medium term. These lots are not considered suitable for permanent residential development, as they are located in the coastal hazard area.

The lots that may be developed for transient workforce accommodation are located to the east of the existing townsite, and are referred to in greater detail in Section 3.2.1. The Ocean View Caravan Park, Onslow Sun Chalets, Beadon Bay Hotel and Onslow Mackerel Motel should retain their tourist/commercial function, so that Onslow may still meet seasonal tourist demand. These sites may be able to absorb a component of temporary accommodation if an industrial project proceeds, but it is important that tourist demand continues to be met, to ensure the ongoing success of Onslow as a tourist destination.

The continued implementation of the *Old Onslow Conservation Plan* as a policy will provide a greater level of management and services to Old Onslow. Old Onslow has great potential as a tourist attraction, and an improved level of servicing will enhance this potential. The offshore islands also have great potential for increased use as tourist destinations - either for day trips or short-stay (Mackerel Islands) accommodation, as does Airlie Island, when the gas facilities are decommissioned.

The permanent pools in the Ashburton River also provide a significant camping tourist destination for Onslow. These sites require improved management to ensure that their unique values are not eroded.

3.2.6 Community Purposes

An increase in population under Scenario 1, 2 or 3 will have an enormous impact on existing community services and facilities in the Onslow townsite. A dramatic increase in population, either temporary or permanent, will require a considerable influx of capital to upgrade, extend and provide a better range of community services and facilities. These improvements would be largely project driven, but do not have a huge impact in terms of the land required.

The State Government has committed $7 million to replace the existing primary school. It is likely that the new school will be built on the western side of the existing school site. However if relocation is required, a 7ha Crown Reserve exists on the corner of Wooley and McGrath Roads. The new school is expected to be completed in 2005.

Other community purpose sites may be required if Onslow experiences significant population growth. This may include extensions to existing sports or community facilities or provision of new ones. For example, Onslow currently has one child care centre, but this has limited operation times and caters for only 12 children at a time. This centre is currently operating at capacity. An increase in population will require the provision of a new or larger building to cater for more children and increased staffing and expertise. So, while Onslow may require only one childcare centre in total, significant upgrades to the existing facility will be required to meet a slight increase in demand. This applies to a number of community services in the Onslow area.

An increase in population may require the provision of additional services for families and single people. Department of Community Development may need to assess its current level of servicing to meet increased population growth as outlined in Scenarios 1 to 3. A family services plan should be developed based on the various growth scenarios. As with the health expansion plan, this work

should have as its catalyst the release of an EPA Bulletin for a new industrial project. The population and workforce numbers should be updated as new information becomes available.

New recreation land and facilities can be provided through the 10 per cent public open space provision in new subdivision areas. Other facilities may form part of workforce accommodation camps. An indoor recreation centre is proposed adjacent to the Emergency Services building on McGrath Road and there is sufficient capacity in the townsite to accommodate new premises for community purposes. Onslow is relatively well serviced with recreation facilities, and townsite growth will provide a better range of options in this regard. Some consideration should be given to the provision of a public swimming pool. This would be a valuable social facility, given the climate and location of the town.

The Shire of Ashburton has also indicated that land may be required for a new civic centre in the long term. As the inland Pilbara towns of Tom Price, Paraburdoo and Pannawonica wind down in line with the iron ore industry, there may be a need for the Shire of Ashburton's administration to move back to Onslow. The most suitable site is adjacent to the Emergency Services building. It would establish this area as a civic and cultural precinct, with the school, hospital, civic centre and recreation centre in the vicinity. These buildings could also serve as emergency evacuation, should the need arise, as the site is located on high land and would provide protection from storm surge as well as high winds.

At present, Fire and Rescue Services, State Emergency Service, Ambulance, and Sea Search and Rescue are operated on a volunteer basis. It is expected that population growth would see the need for increased volunteer levels for these groups.

3.3 Public Utilities and Reserves

3.3.1 Power

The existing power station has a capacity of 3.3MW. An estimated 1MW is used for townsite supply. Western Power indicates that the power station can increase its power generation to 4.5MW. Power needs in excess of this amount would require the provision of a new power station.

Therefore, the Onslow Power Station could accommodate Scenario 1 in terms of permanent population. However, it would not be able to accommodate the transient workforce accommodation camp associated with Scenario 1. This also means that Scenarios 2 and 3 could not be serviced by the existing power station.

Regardless of domestic supply, any industry locating in or around Onslow would need to construct a power station for its plant. Domestic supply would need to be considered in this equation. This has the potential to result in a fairly convoluted domestic network, with a variety of private suppliers, but there is no reason why this could not occur.

3.3.2 Water

While the existing source is capable of meeting current demand for domestic water supply, population increase associated with industrial development will require extension of the Cane River source to meet increased townsite demand. The Department of Environment estimate that the Cane River aquifer can yield 550ML a year, which would not be adequate to meet growth for Scenarios 1, 2 or 3. In addition to this, the borefield may have capacity for only an additional five years, and may require relocation within the aquifer.

In June 1994, the then Western Australian Water Authority carried out a reconnaissance investigation drilling program, under the groundwater exploration initiative program. The drilling aimed to explore for low-salinity groundwater in the Carnarvon Basin, where the Cane River traverses it. Drilling was done in an area up to 4km laterally from the Cane River, between 1-10km downstream of the North West Coastal Highway.

The report Hydrogeological Report 32 – Upper Cane River Drilling Program held by the WaterCorp concluded that a low-salinity groundwater resource existed in the exploration area. However, more drilling was required to quantify the extent of the resource. Another potential source of potable water was the groundwater discharged from Robe River Iron Ore Associates' mining operation at Mesa J. This was an unused resource that amounted to 7.7GL in 1999. The availability of this resource will depend on the life of the mine.

These new water sources need to be investigated further to establish capacity and to determine the extent that they can meet increased demand resulting from Scenarios 1, 2 and 3.

The development of major industrial projects will require additional water sources. Water source development for industry purposes is the responsibility of industrial proponents and non-potable water could be used for non-domestic supply. Options for industrial supply include the Robe River, Birdrong aquifer and seawater desalination.

3.3.3 Wastewater

The Onslow WWTP has capacity of 1,000EP. If Onslow experiences a significant increase in population, the existing WWTP would need to be upgraded and extended.

WWTP capacity can be extended by installing additional ponds and by developing an effluent re-use scheme. The Water Corporation is able to utilise a range of treatment approaches to meet permanent and temporary demand. For example, the use of aerators and a treated effluent scheme would take pressure off the pond system for a temporary population increase (for workforce accommodation) and allow the WWTP to cope with increased demand.

A permanent population increase would require an extension to the pond system and existing WWTP reserve. This should occur to the south of the existing site, away from the future urban area. The existing pressure main may also need to be upgraded and additional pump stations constructed.

A 2,000 person workforce accommodation camp could operate with a stand-alone treatment facility. However. this kind of camp may be located in the town and could be connected to the town WWTP. The impact of an additional 2,000 users on the WWTP would require the implementation of a treated effluent scheme, to be developed and maintained by the Shire of Ashburton.

Therefore, the wastewater treatment needs of Scenarios 1 to 3 can be met by the Onslow WWTP, with upgrades to infrastructure and technology.

3.3.4 Beadon Creek Harbour

With a substantial increase in industrial activity and population, the Beadon Creek Harbour will come under increased pressure. While no expansion of the fishing industry is proposed, increases in marine service activity and recreational use of the boat-launching area are anticipated.

While there are separate facilities for recreational and commercial craft, potential for transport conflict remains from increasing the amount of traffic in the area. This may be resolved through appropriate management between Beadon Creek users, the DPI and the Shire of Ashburton.

3.3.5 Airport

The Onslow Airport will come under increasing pressure with additional development in Onslow. Current plans to upgrade the airport to a lit, all weather strip will greatly improve its standard and viability.

If large-scale development is to occur in Onslow, some consideration may need to be given to creation of a new airport site that could accommodate large commercial craft, rather than using charter aircraft out of Karratha.

3.3.6 Roads and Transport

Main Roads WA's blueprint for the Pilbara road network is *Roads 2020 - Regional Road Development Strategy Pilbara Region*. This report sets out funding priorities for national highways, State roads, local government roads and review proposals. No new roads or road upgrades were proposed in the Onslow Structure Plan area, and this position is supported.

The existing road network was considered adequate to meet existing and proposed demand. Although, crossing upgrades on the Onslow Road could be undertaken from time to time to improve road access during times of heavy rain. Unsealed roads in the greater Onslow area may become impassable, but this is seasonal and a common occurrence on many unsealed Pilbara roads.

Twitchen Road serves a tourist function and provides alternative access to the Onslow townsite. Upgrading of this road to achieve all-weather status is not viable as a significant portion of the road is located within the Ashburton River floodplain.

A larger population in Onslow may demand a higher level of servicing in terms of the taxi services, although such upgrades will be left to the private market. The provision of a public phone box at the Onslow turn-off, where bus passengers are usually dropped off and picked up, should be investigated. This would provide a greater level of flexibility to users of the bus network.

3.3.7 Shipping and Port Facilities

If additional shipping and port facilities are required for industrial development, it is preferable that they be located as close as possible to the Onslow Solar Salt facility at the easternmost end of the beach. This is to protect the amenity of Sunset Beach, which is well utilised by local residents and is an important recreation area.

It is also preferable that any shipping and/or port facilities be multi-user facilities. This will ensure that expensive infrastructure is not duplicated. This would be beneficial in terms of cost sharing and would minimise the impact of such a facility on a well-used public beach area.

A nominal shipping facility is shown on Map 8.

3.3.8 Landfill

A new landfill site has been identified in the buffer zone of the proposed Future Strategic Industrial Development zone and is shown on Map 8. This will be used for townsite and industrial waste, and will be larger than the existing landfill. A nominal area of 15ha has been allocated to the site. Additional investigation will be required in terms of geological surveys, water testing and EPA approval.

4. CONCLUSIONS AND RECOMMENDATIONS

Onslow is a small town at present, but is capable of accommodating a considerable increase in population, as well as future strategic industrial development. Population increase would result in an improved level of services and facilities in Onslow and would provide economic benefits to the town. However, such growth would also change the form and nature of Onslow.

4.1 Conclusions

4.1.1 Physical Capability

In examining the various industrial scenarios for Onslow, it is apparent that the town is physically capable of the type of growth outlined in Scenarios 1 to 3. Scenario 3 would place Onslow close to capacity, but it would be possible. A significant outlay in capital works would be required to meet increased demands on public utility infrastructure, schools, health services, entertainment and recreation.

4.1.2 Provision of Community Infrastructure

An issue arises in the context of provision of community infrastructure by proponents. The need to provide an extensive range of community infrastructure to accommodate permanent workers and their families may lead proponents to consider the use of fly-in fly-out workforces. This would mean that Onslow would have an increased temporary population in workforce accommodation camps. However, it would not receive the benefit of greatly improved community infrastructure that would come with permanent workers and their families.

4.1.3 Use of Demographic Profile Model

The demographic profile model used to calculate permanent population growth may need to be reviewed. The model used is based on experiences in Karratha and Port Hedland that has a ratio of married to single of 70:30. Onslow is significantly different from these towns in respect of size, location and level of servicing. Therefore, it may be necessary to modify the demographic profile model.

If Onslow does experience industrial growth and if the town does grow significantly, it may be that the demographic profile model will resemble the experience of Karratha and Port Hedland. However, in the short to medium term, it is not considered appropriate to use such a high proportion of married to single workers when calculating potential population growth, as it is unlikely that this would occur in Onslow.

4.1.4 Use of Fly-In Fly-Out Workforces

Growth and improvement of service facilities in Onslow will depend on the development of resources. Onslow would receive the most benefit from resource developments in terms of servicing and facilities if the majority of workers were housed permanently in the townsite, along with their families. However, the location of permanent workers will have significant cost implications for industry proponents and government. This may make the use of fly-in-fly out workforces more attractive.

Regardless of how workers are employed, Onslow will still need to accommodate them, whether it is in permanent homes with their families, or in workforce accommodation camps.

4.1.5 Onslow Community

Onslow is unique in the context of the Pilbara and efforts should be made to recognise its lifestyle and character. There is a need for a social impact assessment of future strategic industrial development on Onslow in light of the type and scale of development outlined in Scenarios 1 to 3. This could provide some indication of the cumulative impact of future strategic industrial development, and general community feedback on proposals.

4.2 Recommendations

A number of recommendations are included for implementation. The principle agencies involved in the recommendations are listed, with the lead agency or agencies indicated in bold lettering.

Extend existing industrial area to meet short-term growth (**DOLA**, LG)

Undertake appropriate conservation vesting of Mt Minnie and Cane River pastoral stations (**CALM**, DOLA)

Support growth of tourism industry and its development and promotion (**LG**, PTA, PDC)

Provide additional tourism infrastructure at and around Old Onslow (**LG**, HCWA)

Determine land requirements for new civic centre in Onslow (**LG**)

Prepare health expansion plan based on Scenarios 1 to 3, with release of EPA Bulletin for new industrial project as a catalyst (**DH**, DPI, DIR)

Prepare family services plan based on Scenarios 1 to 3, with release of EPA Bulletin for new industrial project as a catalyst (**DCD**, DPI, DIR)

Provide public swimming pool (**LG**, DSR)

Undertake townscape program for Onslow (**LG**, DPI)

Investigate ultimate capacity of Cane River groundwater reserve (**WC**)

Investigate additional groundwater resources and their capacity (**WC**)

Establish new landfill site (**LG**, DE)

Continue to upgrade and improve Onslow Aerodrome (**LG**)

Prepare social impact assessments for all strategic industrial proponents (**DIR**, DPI, LG)

Investigate need for Onslow Development Steering Committee to guide future growth and funding related to industrial development (**PDC**, DIR)

Investigate areas suitable for conservation of biophysical systems (**CALM**, DE)

Investigate possible wastewater re-use scheme between Water Corporation, Shire of Ashburton and industry. (**WC**, LG)

APPENDICES, REFERENCES, LIST OF ABBREVIATIONS and MAPS

APPENDIX A

Extract from Shire of Ashburton Town Planning Scheme No. 7

Provisions relating to Onslow Coastal Hazard Area

7.4 Onslow Coastal Hazard Area

7.4.1 The Special Control Area applies to all land up to 4m AHD in the coastal zone and 5m AHD in the frontal dune areas of the townsite, between Four Mile Creek in the south-west and Beadon Creek in the north-east.

7.4.2 Applications for planning approval for land within the Special Control Area shall be assessed in the context of coastal plans, where these have been prepared and endorsed by the WAPC, for each sector of the Special Control Area and development shall conform to the requirements of the endorsed plan.

7.4.3 Applications for planning approval not in conformity with the plan shall be referred to the Ministry for Planning and the Registrar of Aboriginal Sites for advice.

7.4.4 In areas not subject to clause 7.2, and Council considers the form of development the subject of a planning application to be potentially incompatible with and prone to flood and storm surge events, it may have regard for information about these events and may permit, with or without conditions, or refuse proposals at its discretion.

7.4.5 Council shall consult with the relevant agencies regarding the most up-to-date information available about potential flood and storm surge events as relevant to the land subject to particular applications for planning approval.

7.4.6 Council may require applications for planning approval to include an assessment, prepared to its satisfaction, of the impact of potential flood and storm surge events on the proposed development.

Note: Flood and storm surge advice is available for some areas from the Bureau of Meteorology and the Water and Rivers Commission.

7.4.7 After receipt of advice or recommendations from the agencies referred to in subclause 7.4.3, the Council may, notwithstanding any other provision of the Scheme:

(a) approve the development proposal,

(b) refuse the development proposal, or

(c) approve the development proposal subject to conditions, which may include the requirement to prepare and implement a foreshore management plan.

7.4.8 In considering applications for planning approval, Council shall have regard for the following matters:

(a) That development and redevelopment be permitted in the hazard area subject to floor levels being raised above 4m AHD in the general hazard areas and 5m AHD in the frontal hazard area.

(b) That appropriate coastal reserves be established around Onslow and that they be carefully managed.

(c) That any new commercial or tourist development shall be raised to comply with the 4m AHD floor level requirement or 5m AHD requirement in the frontal areas.

(d) That there shall be no increased density of residential development in the hazard areas.

(e) That non-habitable permanent structures such as ablution facilities in caravan parks shall be permitted to have floor levels at the existing ground level.

(f) That any land filling shall be subject to an assessment of impact on the drainage pattern so as to retain the natural drainage to Beadon Creek.

(g) That any building development or building alteration approval in the hazard area be endorsed with the following:

> "The developer undertakes to absolve the State and the Local Government Authority from liability and hence financial relief in the event of damage caused by natural events."

APPENDIX B

Profile of potential industries in Onslow

Extract from Halpern Glick Maunsell report review of *Development Factors for Potential Onslow Industrial Estate, 1999*

(All uses listed in Appendix B are subject to the Native Title Act 1993 in addition to a range of planning and environmental approvals)

Industry 1 - Petrochemical Plant

The petrochemical plant would cover an area of 150ha and is the largest of all facilities being considered for the Onslow area. The proposed plant would use gas from offshore gas fields and salt from the Onslow Solar Salt Project.

The plant would process about 760,000t a year of salt, resulting in the production of 500,000t a year of caustic soda and 440,000t a year of chlorine. The petrochemical plant would also use natural gas to produce methanol (3.5 Mt a year), some of which would be refined and used as a feedstock for the production of ethylene (225,000t a year) and propylene (260,000t a year) in the methanol to olifens process. Approximately 170,000t a year of ethylene would then be reacted with chlorine to produce 590,000t a year of ethylene dichloride.

The plant would produce its own electricity from on-site gas turbines and potable water could be supplied from the Robe River aquifer, some 80km from the site.

Industry 2 - Magnesium Plant

A magnesium plant would require an area up to 50ha. The plant would use gas from offshore gas fields and bitterns from the Onslow Solar Salt project. A typical plant could produce about 50,000t a year of billet magnesium and 105,000t a year of unrefined chlorine gas.

A magnesium plant would require an operating workforce of approximately 125. Construction and operational personnel would be accommodated at Onslow townsite.

A magnesium plant would require 0.3 Mm^3 a year of potable water, 2.5 Mm^3 of brackish water and 1 Mm^3 of soft water. The plant would also require 1,100GWh of power with a peak load of 150MW. The magnesium plant would have both gaseous emissions and liquid emissions. Gaseous emissions would be in the form of bromine, chlorine, dust, hydrochloric acid and sulphur dioxide. Up to 800,000t a year of wastewater would also be produced. This would be disposed of in a wastewater treatment plant.

Industry 3 - Sodium Cyanide Plant

A typical sodium cyanide plant requires 50-80ha of land, would use gas from offshore fields and could make use of ammonia from the proposed ammonia urea Plant. A sodium cyanide plant would produce about 45,000t a year of solid sodium cyanide briquettes. Sodium cyanide manufacture occurs by reacting natural gas, ammonia and air over a catalyst to form a gas stream containing hydrogen cyanide.

It is estimated that a sodium cyanide plant would require a peak construction workforce of 800 personnel and an operating workforce of approximately 50. Construction and operational personnel would be accommodated at Onslow.

There would be gaseous wastes emitted from the flare, the scrubber, the natural gas-fired air heater and the cooling tower air stream. These would be vented to the atmosphere. Gases discharged from the flare would be water vapour, carbon dioxide and nitrogen.

To store discharge wastewater and run-off, 1.5ha of lined evaporation ponds would be

required. Plant maintenance washing and "first flush" stormwater from the process plant and product storage area would also be contained and treated as liquid effluent.

Solid wastes from the plant would be limited to:

- sodium cyanide not meeting specification;
- accumulated solids precipitated from the evaporation ponds;
- packaging material; and
- domestic refuse.

Industry 4 - Ammonia Urea Plant

This example contains information taken from the proposed Burrup Peninsula Ammonia Urea Plant (Plenty River Corporation, 1998). A typical ammonia urea plant would cover an area of 50ha and use gas from offshore gas fields. A typical plant could produce 1,800tpd of ammonia product using natural gas as a feedstock. Of this, 1,100tpd would be used as a feedstock for the integrated urea plant that would produce 2,000tpd of granulated urea product. The remaining 200tpd of ammonia would be available for use by other proposed industries.

Power would be generated by two 12MW gas turbine driver alternator sets. An emergency diesel generator of 1,500kW capacity would be installed to provide backup power supply.

During the construction phase, employment would peak at 1,100 people, averaging 600 people per month. The operating workforce would comprise approximately 50 people.

A flare would be installed to collect the discharges of all process gas vents and pressure relief valves in ammonia service. The likely atmospheric emissions from an ammonia urea plant would come from the primary reformer flue, CO2 removal unit flue, steam boiler of the ammonia plant and from the vent stack, low-pressure absorber outlet and granulated unit stack exhaust air of the urea plant.

Liquid effluent would be produced by the cooling water tower and the demineralisation unit.

Industry 5 - Gas to Liquids Plant

A gas to liquids plant would require about 20-50ha of land and would use gas from offshore gas fields. A gas to liquids plant would process about 1,240tpd of synthetic crude by the conversion of natural gas to synthetic hydrocarbons. The product would be sealed in drums and transported to the jetty for export.

Solid wastes would be collected by licensed contractors and disposed of to landfill. Spent catalyst would be returned to the supplier.

APPENDIX C

Shire of Ashburton Transient Workforce Accommodation Policy

Title: Transient Workforce Accommodation

File No.: OR.CM1

Minute No.: 9.9.230

Date: 15 September 1998

Objectives:

To provide for the establishment of accommodation for groups of transient workers who are temporarily or intermittently based in the vicinity of the workplace (accommodation is normally associated with, but not limited to, construction of plant and infrastructure for major resource companies).

To reasonably limit and encourage the establishment of such accommodation to existing townsites, settlements or other development nodes.

To encourage the use of existing established accommodation within a townsite, settlement, or other development node and to discourage the development of transient workforce accommodation on the outskirts of townsites, if accommodation is readily available in town.

Where transient workforce accommodation is established in townsites or other built-up areas, to provide quality accommodation within a pleasant living environment.

To ensure that the amenity of the community is not adversely affected in terms of noise or other disturbance, aesthetics, environmental impacts or health.

To encourage development of accommodation that can be used for other purposes when no longer required for the transient workforce.

Where Transient Workforce Accommodation is not located in a townsite or built-up area, to ensure that environmental impact is minimal and that the area is rehabilitated after the use has ceased (some applications may also require EPA approval).

To ensure that transient workforce accommodation is not provided to the detriment of availability of tourist accommodation.

Clarify which zones and areas that transient workforce accommodation may be permitted within.

Policy:

Definition

For the purposes of this Policy, transient workforce accommodation shall have the following definition:

"Dwellings intended for the temporary accommodation of transient workers and may be designed to allow transition to another use, or may be designed as a permanent facility for transient workers, and includes a contractor's camp and transportable units."

Location

Transient workforce accommodation is a use that is not listed within the Shire of Ashburton's town planning schemes for Tom Price, Paraburdoo or Onslow and is not specifically referred to in Council's Interim Development Order which covers the rest of the land within the Shire. As such, Council may (by an absolute majority) permit transient workforce accommodation in any zone or area.

Each application shall be considered in the light of its individual merits however, Council will generally apply the following guidelines:

No transient workforce accommodation shall be permitted within any Service Trades or Industrial Zones in the Tom Price, Paraburdoo or Onslow Scheme Areas.

Transient workforce accommodation may be established within any zone in the Tom Price, Paraburdoo or Onslow Scheme Areas where residential development is permitted to be developed (with the exception of the

Service Trades and Industrial Zones). The proposed density must comply with residential planning codes designated for the site, if applicable.

Transient workforce accommodation may be permitted in existing tourist accommodation, caravan parks etc, but not to the detriment of the amenity of other permanent residents or tourists. Where caravan park or other holiday accommodation leases are controlled by Council, lease provisions are likely to include requirements for a minimum number or percentage of sites always being made available for tourists. In the interests of the growing tourism industry within the Shire, all other operators of tourist accommodation facilities are encouraged to adopt a similar approach in their management practices.

Within the Interim Development Order Area, the establishment of transient workforce accommodation will generally only be supported at existing settlements and nodes of development (e.g. Pannawonica, near roadhouses and other camps) however, transient workforce accommodation may be considered in remote areas if the applicant successfully demonstrates that it cannot be feasibly located within a townsite, settlement or development node.

Approval and Delegation

Planning approval is required for all proposals for transient workforce accommodation with the following exceptions:

Where existing approved on site accommodation units are to be used and no other buildings, structures, infrastructure or facilities are proposed.

Where such accommodation has been excluded from the planning process by a State Agreement Act.

Where it involves camps used for defence purposes or wayside camps of drovers or teamsters.

Where less than 25 persons are to be accommodated over a period of less than 6 months, not necessarily in the same location.

Where planning approval is not required for transient workforce accommodation, applicants shall notify Council in writing of the details of the number of persons to be accommodated and a date when the use is to commence. Furthermore, written notification shall be given when the use has ceased.

In all cases, Council's Building and Health approvals will be required.

Under Part IV of the *Environmental Protection Act*, Council may refer an application to the EPA for approval if it appears that it will have a significant impact on the environment.

All applications requiring the planning approval of Council shall be considered by full Council. Applications for facilities ancillary to temporary workers camps and other transient workforce accommodation within the Interim Development Order area, may be dealt with by the Chief Executive Officer under the provisions of Council's Policy TDS008 - Delegated Authority Dealing with Planning Matters.

Applications requiring the planning approval of Council within the town planning scheme areas of the Shire, shall be advertised for public comment by the erection of a sign/s on the site, advertisements in the local newspaper, notices on public noticeboards and contact with adjoining/nearby neighbours if considered necessary.

Planning applications for temporary structures to provide transient workforce accommodation shall, to Council's satisfaction, be accompanied by information and plans indicating how and when the development will be removed and the site rehabilitated or developed for a different use intended for the site.

All applications are required to supply a management statement for the complex for consideration by Council addressing the following matters:

Transport of workers to and from the site;

Site access and egress;

Catering and hygiene;

Emergency management;

Security.

Council may require, by signed agreement, a commitment to the date and details of rehabilitation and conversion as mentioned above.

Assessment

In addition to any town planning scheme requirements and the objectives of this Policy, Council shall consider the following matters when assessing transient workforce accommodation:

Compliance with the Building Code of Australia, the Health Act, the Caravan Parks and Camping Grounds Regulations, Construction Camp Regulations and the Local Law relating to Holiday Accommodation.

Regard shall be given to proposed treatment of vehicular and pedestrian access and landscaping areas (where appropriate).

Any submissions received during a public advertising period.

The impact the development will have on adjoining / surrounding uses.

The length of time the use is to be operational.

The design form.

The ability of the management plan to maintain quality of life both internal and external to the facility.

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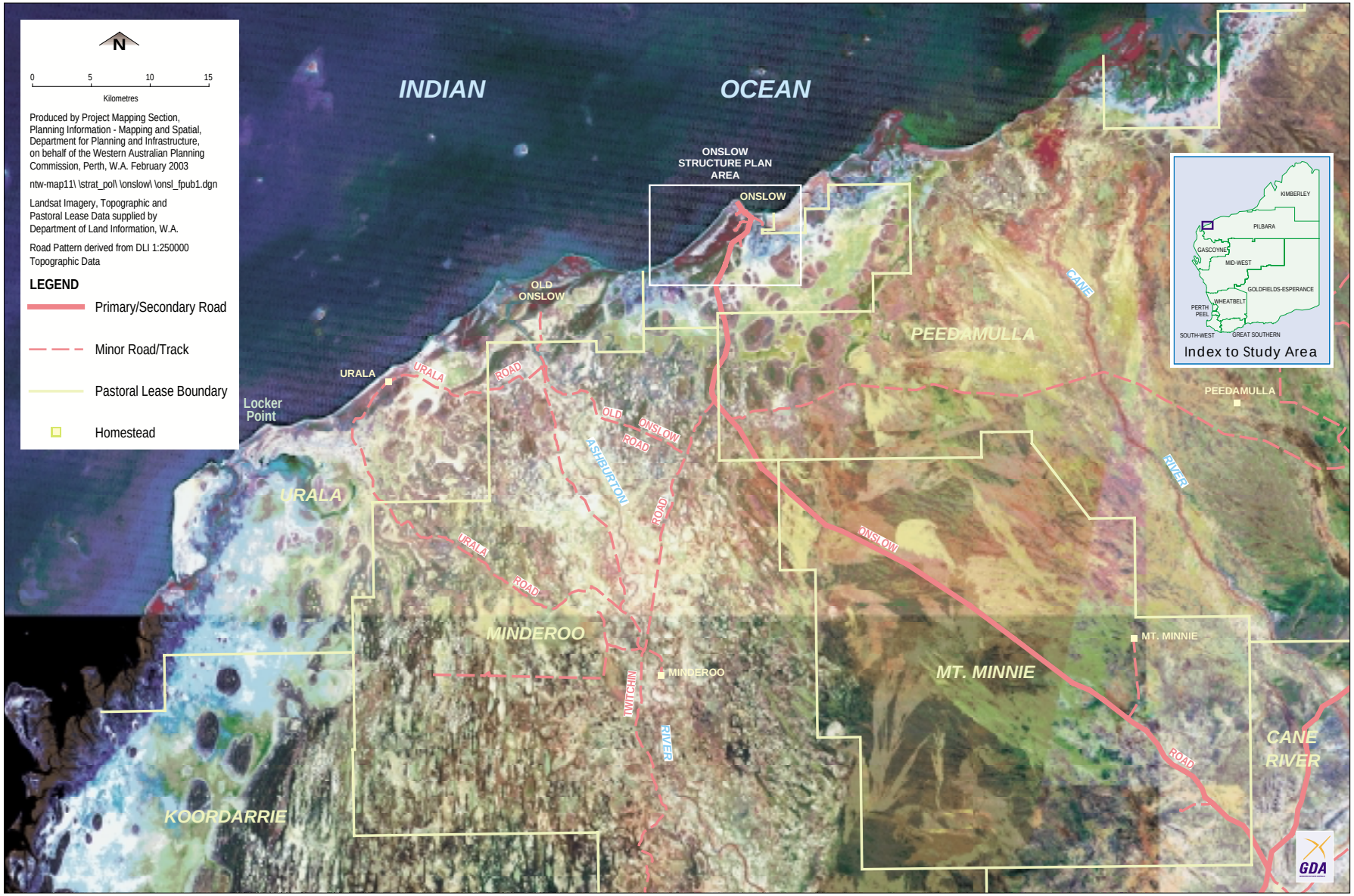
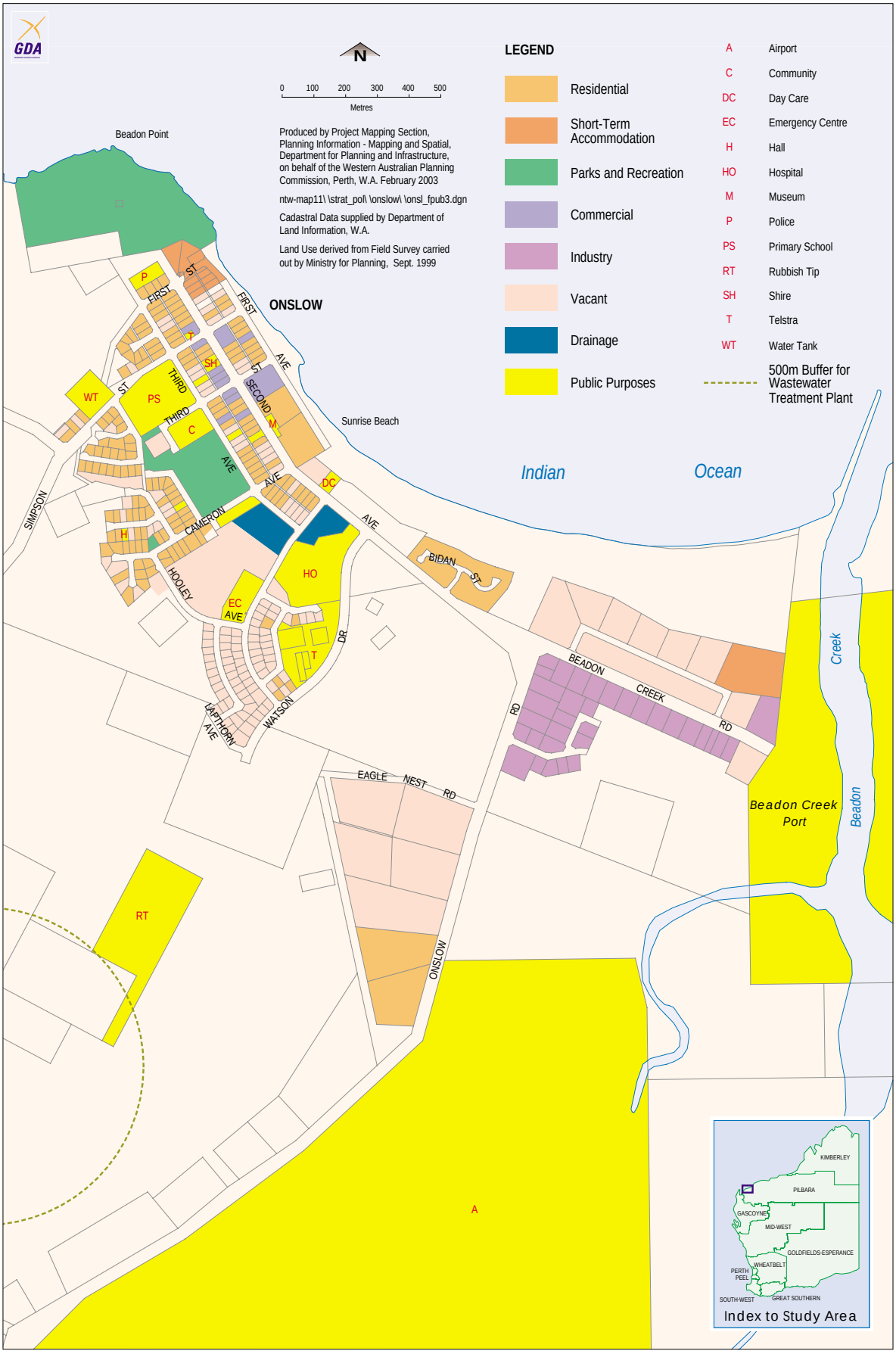
LIST OF ABBREVIATIONS

AAD	Aboriginal Affairs Department (now Department of Indigenous Affairs)
ABS	Australian Bureau of Statistics
AGWA	Agriculture Western Australia (now Department of Agriculture)
AHD	Australian Height Datum
ATSIC	Aboriginal and Torres Strait Islander Commission
BHP	Broken Hill Proprietary
CALM	Department of Conservation and Land Management
CDEP	Community Development Employment Program
DCD	Department for Community Development
DE	Department of Environment
DEP	Department of Environmental Protection (now Department of Environment)
DH	Department of Health
DIA	Department of Indigenous Affairs
DIR	Department of Industry and Resources
DOLA	Department of Land Administration
DOT	Department of Transport (now Department for Planning and Infrastructure)
DPI	Department for Planning and Infrastructure
DPUD	Department of Planning and Urban Development (now Department for Planning and Infrastructure)
DRD	Department of Resources Development (now Department of Industry Resources)
DSR	Department of Sport and Recreation
du	dwelling unit
EP	estimated population
EPA	Environmental Protection Authority
FCS	Family and Children's Services (now Department for Community Development
GL	gigalitre
GWh	Gigawatt hours
ha	hectares
HCWA	Heritage Council of Western Australia
HDWA	Health Department of Western Australia (now Department of Health)
km	kilometre
KW	Kilowatt
LAA	Land Administration Act 1997
LG	local government
LPG	liquified petroleum gas
MfP	Ministry for Planning (now Department for Planning and Infrastructure)
ML	Mega litre
MRWA	Main Roads Western Australia
MTPA	Million tonnes per annum
MW	Megawatt
PDC	Pilbara Development Commission
PJ	Pascal
PLUS	Pilbara Land Use Strategy
PTA	Pilbara Tourism Association
RFDS	Royal Flying Doctor Service
SHS	senior high school
SPQ	single persons' quarters
t	tonnes
tpa	tonnes per annum
tpd	tones per day
TPS	Town Planning Scheme
UCL	unallocated crown land
WAPC	Western Australian Planning Commission
WAPET	Western Australian Petroleum
WC	Water Corporation
WRC	Water and Rivers Commission (now Department of Environment, Water and Catchment Protection)
WWTP	wastewater treatment plant

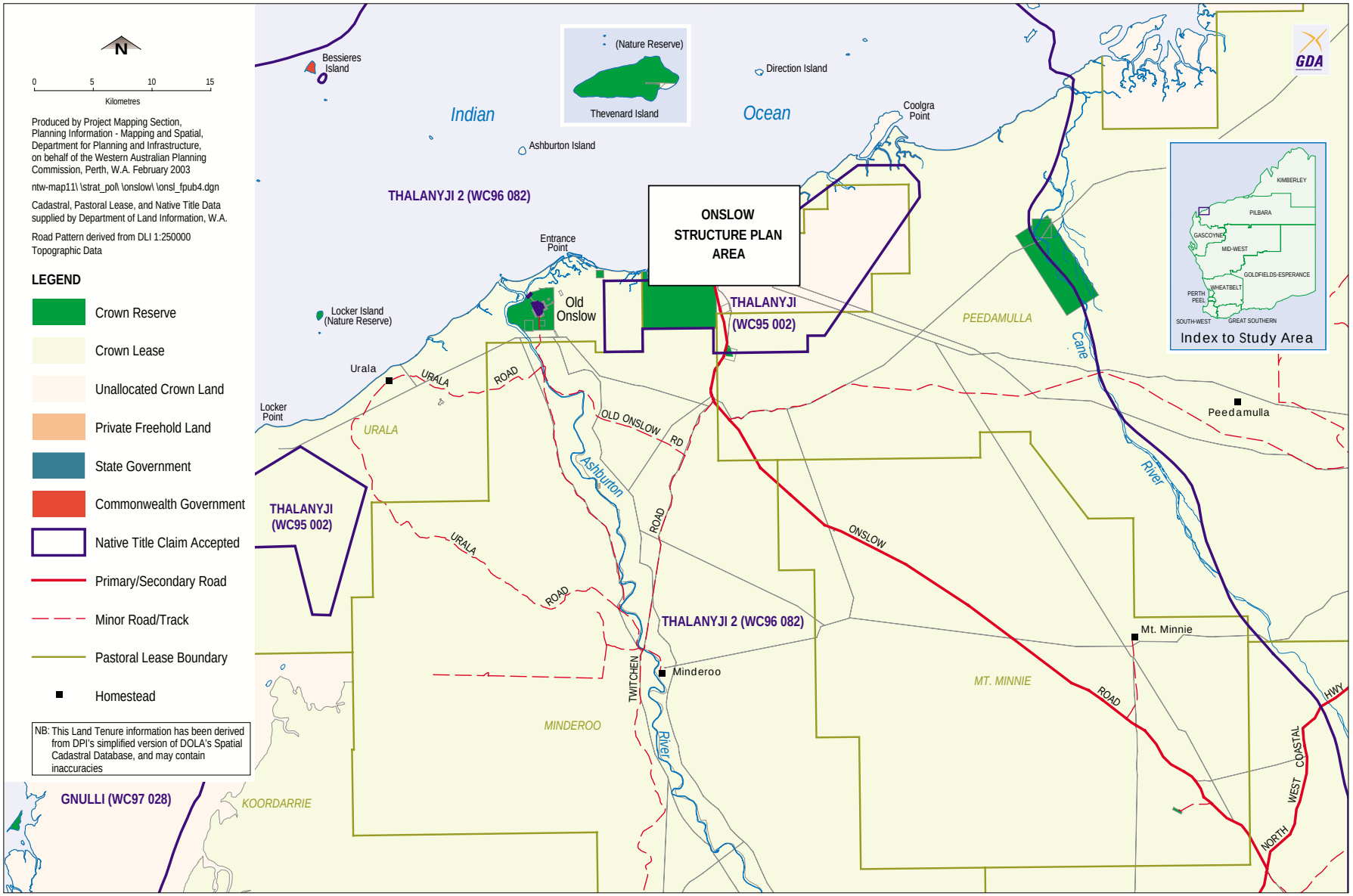
Map 1 : Study Area



Map 2: Aerial Photograph



Map 3: Land Use Plan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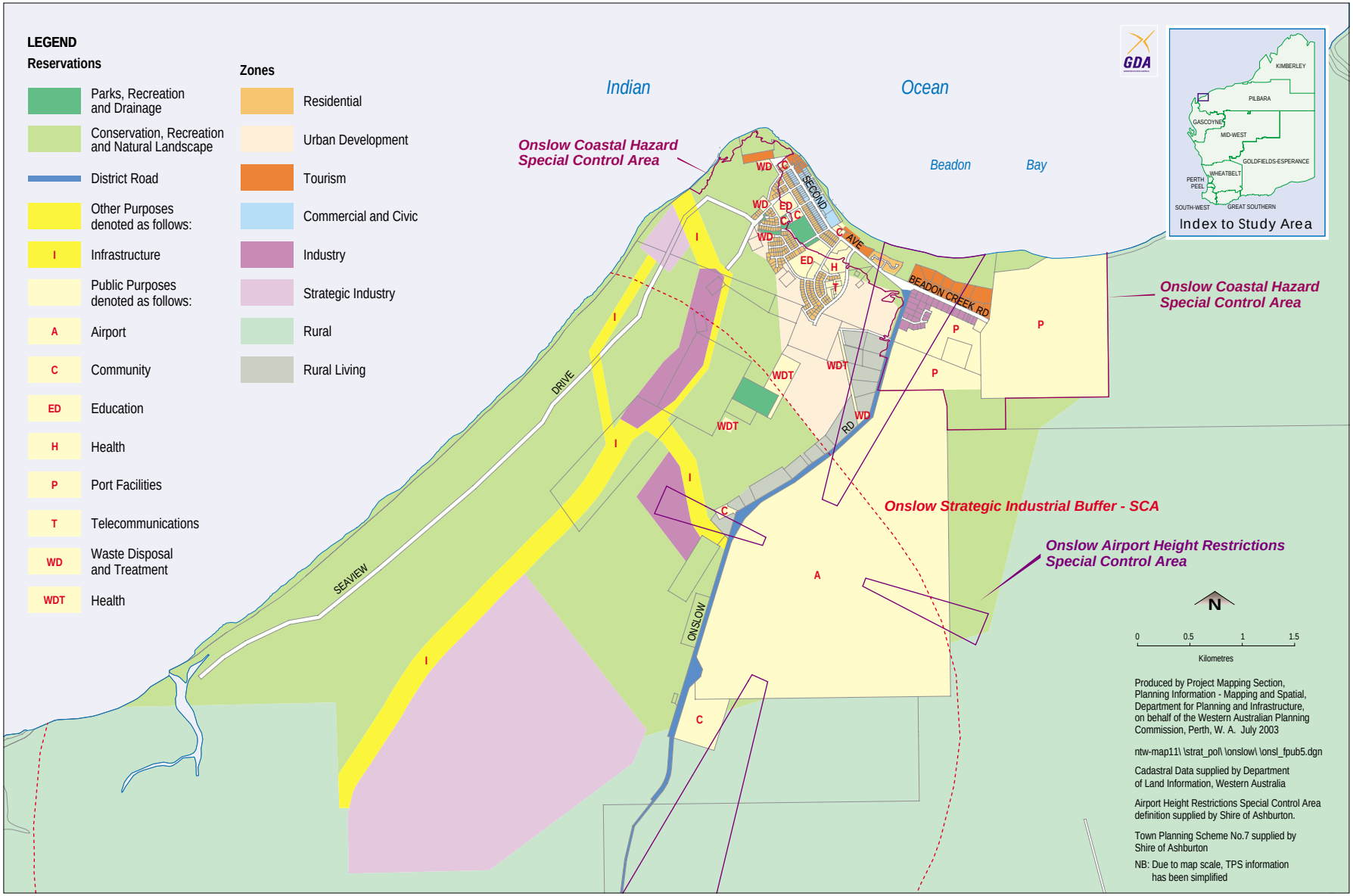
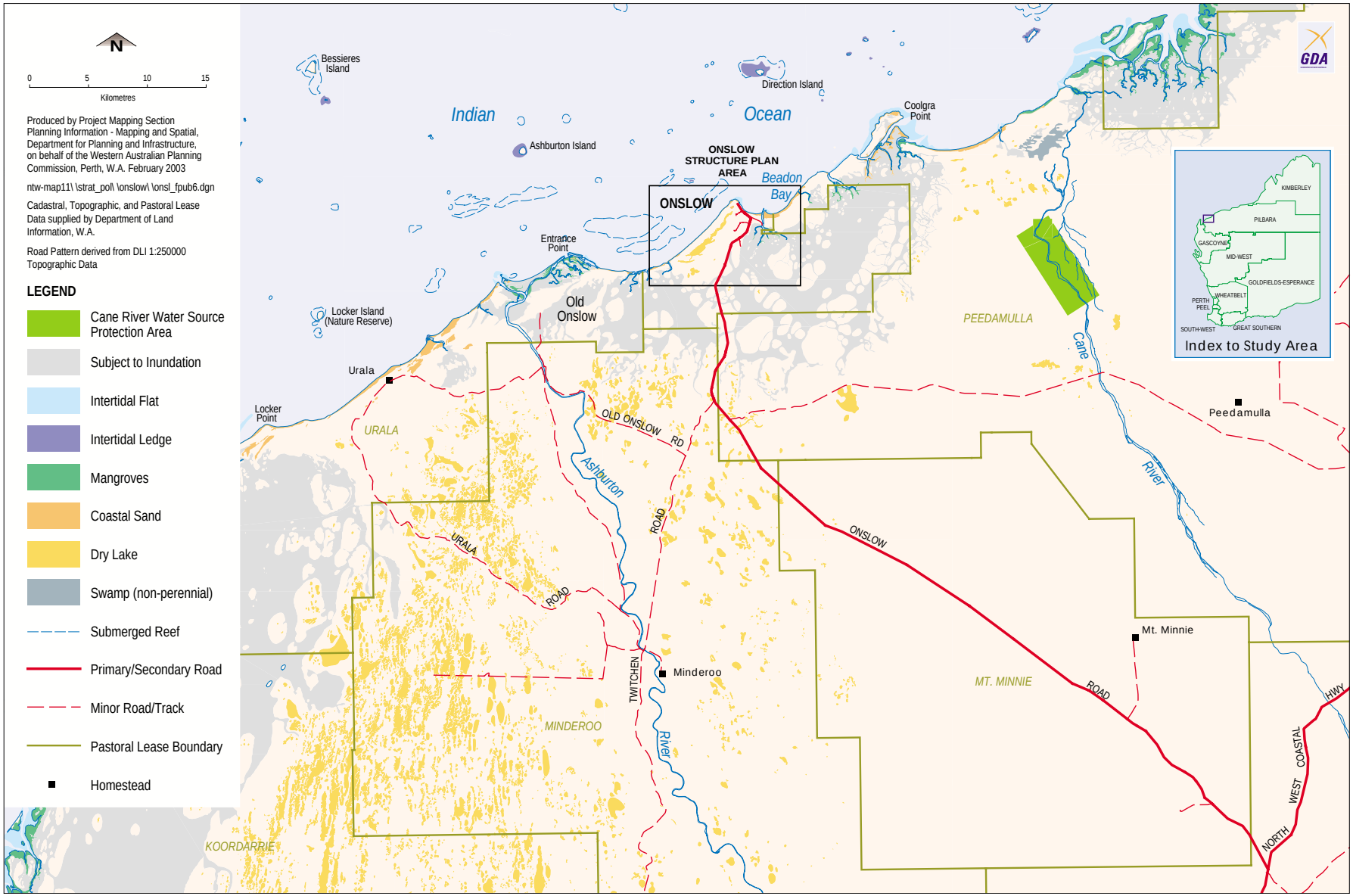
Cadastral, Pastoral Lease, and Native Title Data supplied by Department of Land Information, W.A.
Road Pattern derived from DLI 1:250000 Topographic Data
LEGEND
Crown Reserve
Crown Lease
Unallocated Crown Land
Private Freehold Land
State Government
Commonwealth Government
Native Title Claim Accepted
Primary/Secondary Road
Minor Road/Track
Pastoral Lease Boundary
Homestead
NB: This Land Tenure information has been derived from DPI's simplified version of DOLA's Spatial Cadastral Database, and may contain inaccuracies
Bessieres Island
(Nature Reserve)
Thevenard Island
Direction Island
Indian
Ocean
Coolgra Point
Ashburton Island
THALANYJI 2 (WC96 082)
ONSLOW STRUCTURE PLAN AREA
Entrance Point
Old Onslow
Locker Island (Nature Reserve)
THALANYJI (WC95 002)
PEEDAMULLA
Urala
URALA ROAD
Locker Point
URALA
OLD ONSLOW RD
Ashburton River
Peedamulla
Cane River
THALANYJI (WC95 002)
ONSLOW ROAD
URALA ROAD
THALANYJI 2 (WC96 082)
Mt. Minnie
Minderoo
TWITCHEN
MT. MINNIE
MINDEROO
ROAD
HWY
COASTAL
WEST
NORTH
GNULLI (WC97 028)
KOORDARRIE
GDA
KIMBERLEY
PILBARA
GASCOYNE
MID-WEST
GOLDFIELDS-ESPERANCE
WHEATBELT
PERTH
PEEL
SOUTH-WEST
GREAT SOUTHERN
Index to Study Area

Map 5: Town Planning Scheme No. 7

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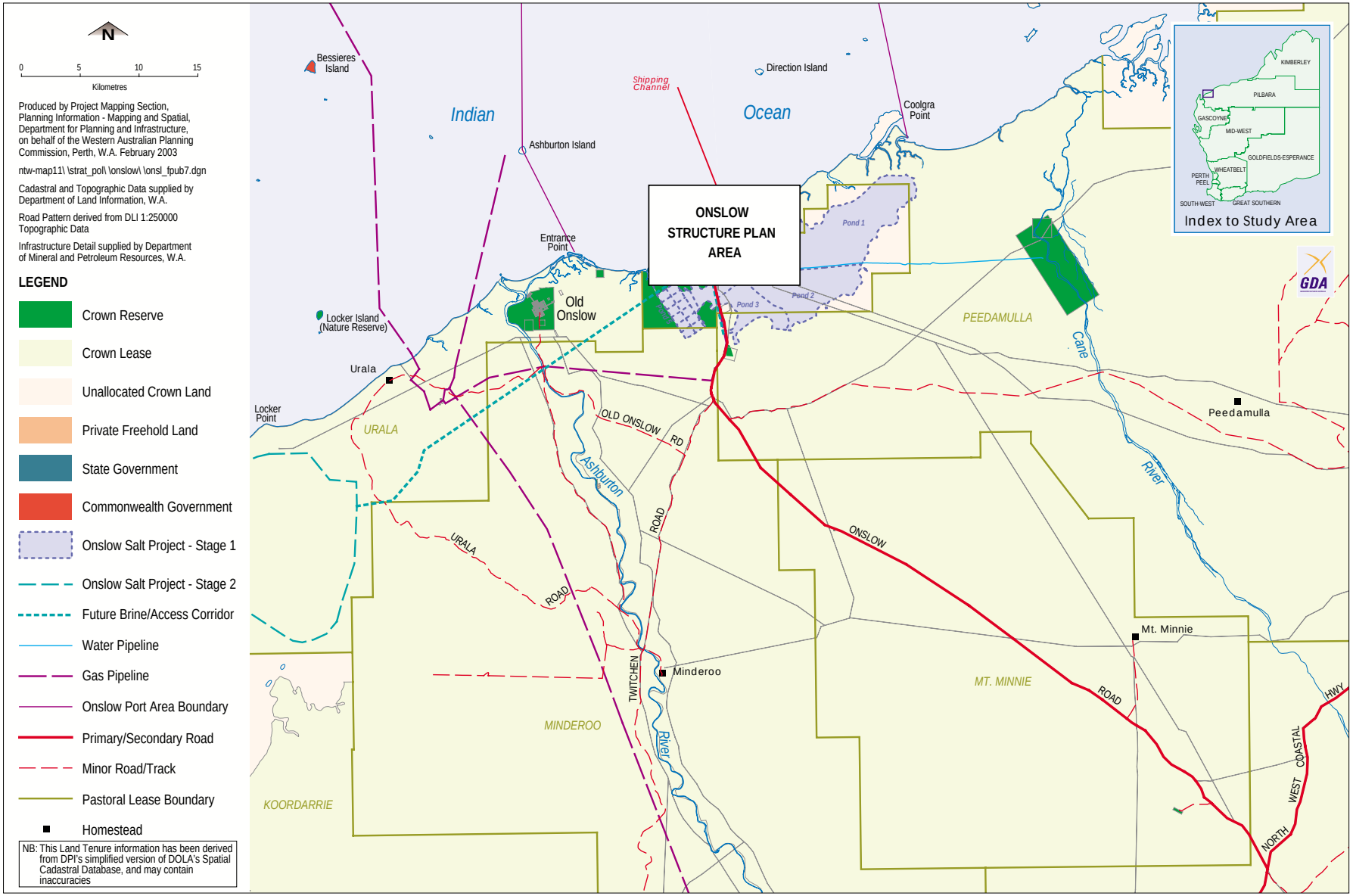
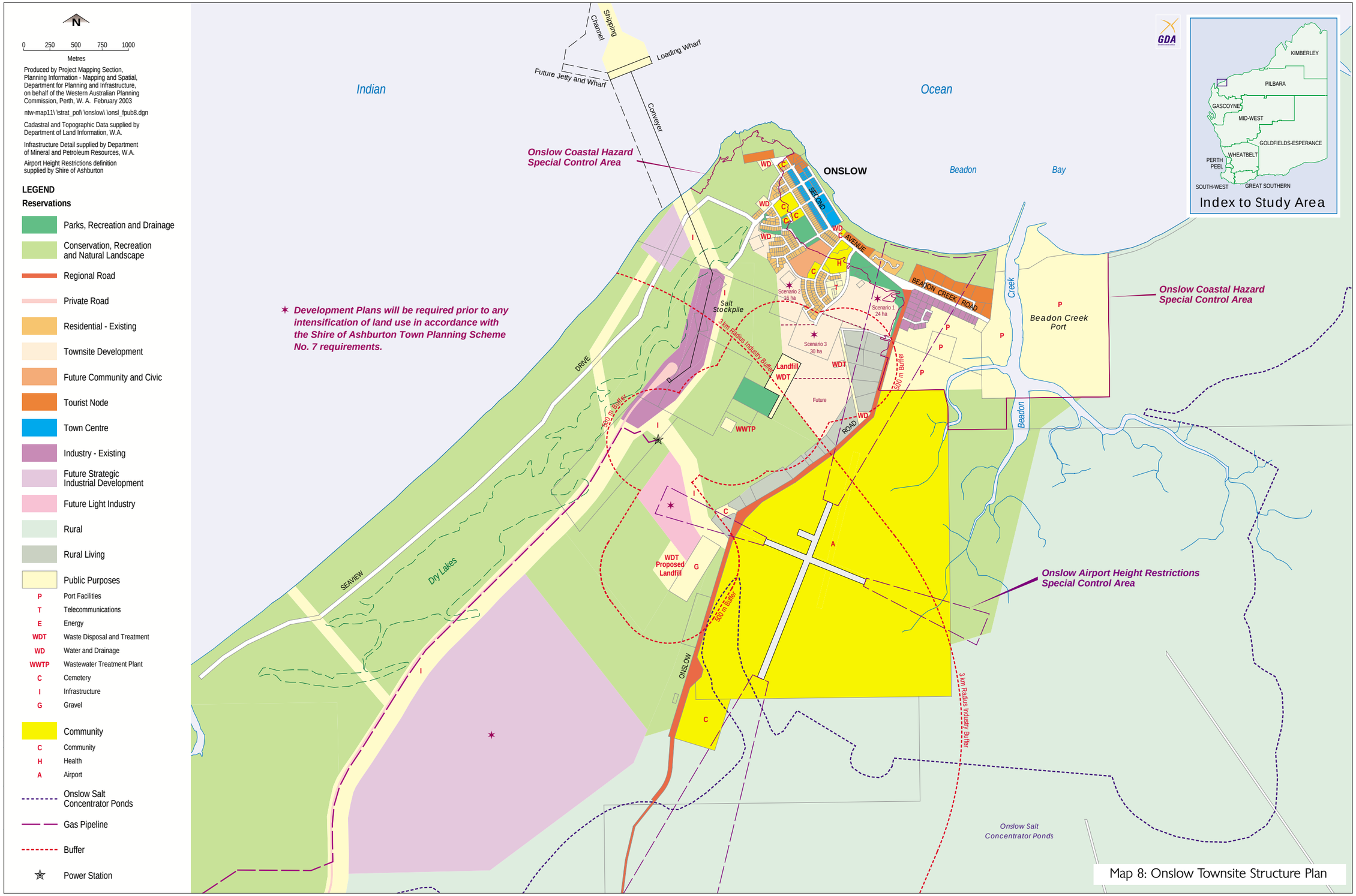
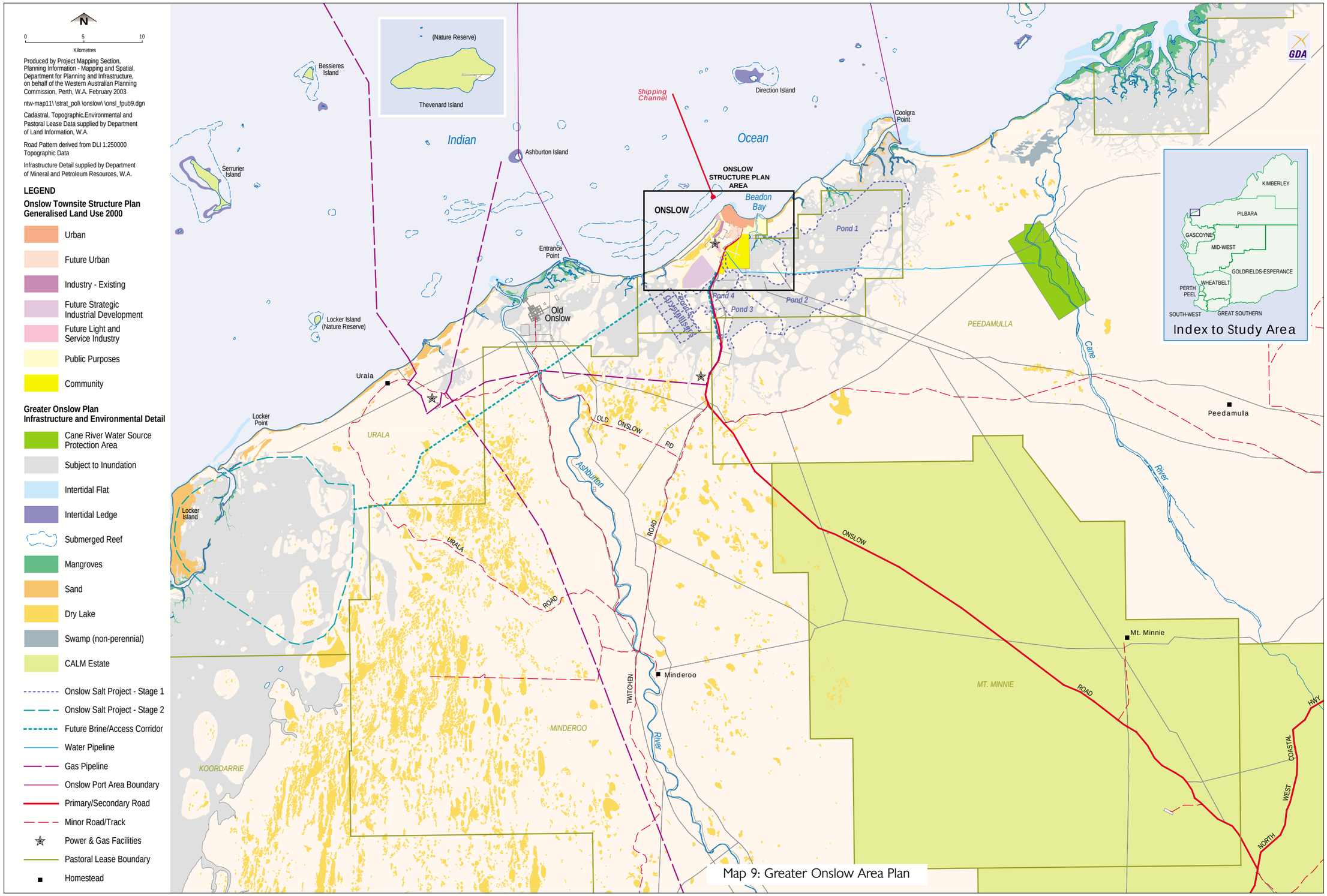
Cadastral, Topographic, and Pastoral Lease Data supplied by Department of Land Information, W.A.
Road Pattern derived from DLI 1:250000 Topographic Data
LEGEND
Cane River Water Source Protection Area
Subject to Inundation
Intertidal Flat
Intertidal Ledge
Mangroves
Coastal Sand
Dry Lake
Swamp (non-perennial)
Submerged Reef
Primary/Secondary Road
Minor Road/Track
Pastoral Lease Boundary
Homestead
Bessieres Island
Direction Island
Indian
Ocean
Coolgra Point
Ashburton Island
ONSLOW STRUCTURE PLAN AREA
Beadon Bay
ONSLOW
Entrance Point
Old Onslow
Locker Island (Nature Reserve)
Urala
Locker Point
URALA
OLD ONSLOW RD
Ashburton
ROAD
URALA ROAD
TWITCHEN
Minderoo
River
MINDEROO
KOORDARRIE
PEEDAMULLA
Cane
River
Peedamulla
ONSLOW
Mt. Minnie
MT. MINNIE
ROAD
HWY
COASTAL
WEST
NORTH
GDA
KIMBERLEY
PILBARA
GASCOYNE
MID-WEST
GOLDFIELDS-ESPERANCE
WHEATBELT
PERTH PEEL
SOUTH-WEST
GREAT SOUTHERN
Index to Study Area

Map 7: Existing and Proposed Infrastructure

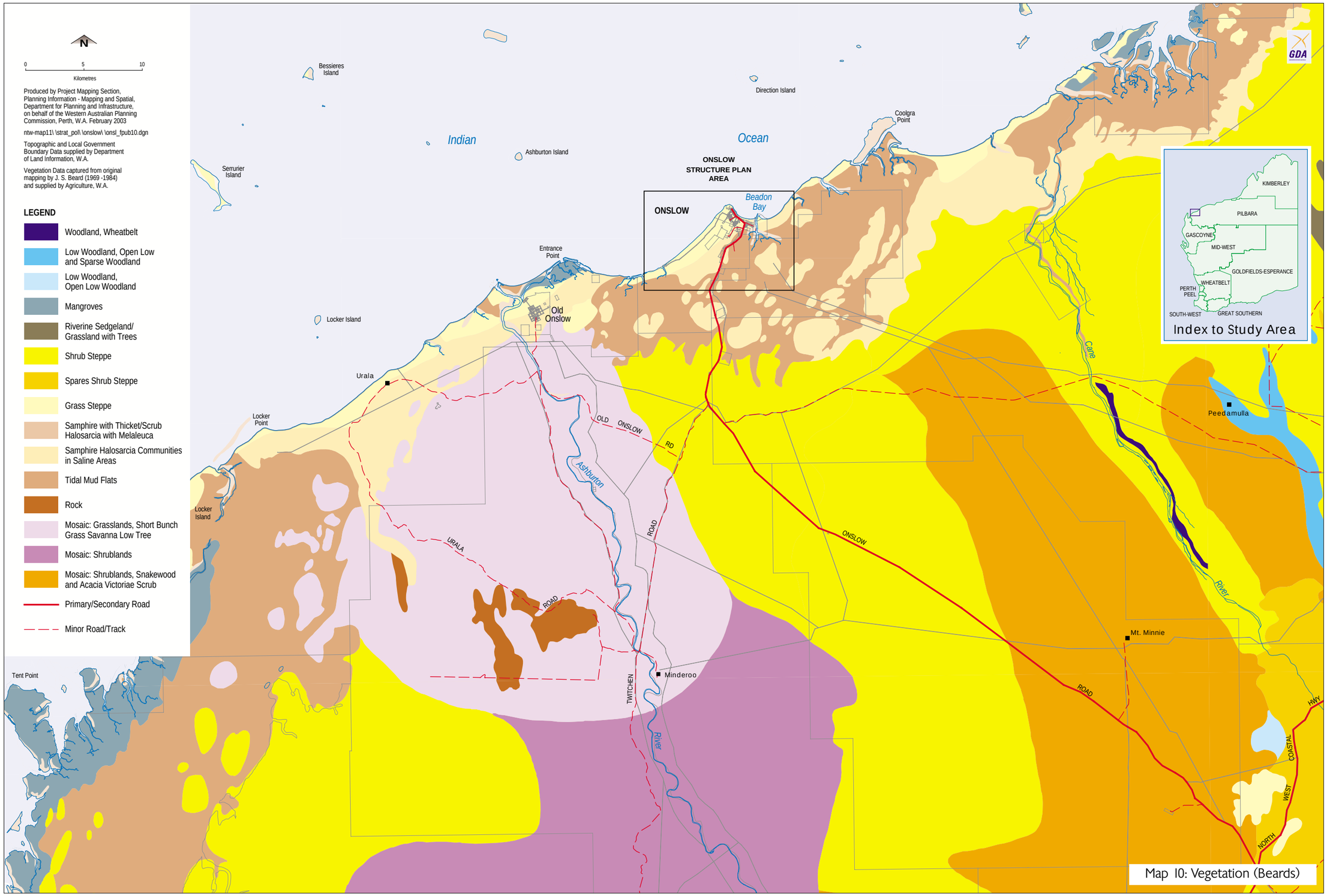




Map 8: Onslow Townsite Structure Plan



Map 9: Greater Onslow Area Plan



Map 10: Vegetation (Beards)