



**Request to Amend City  
of Karratha Local  
Planning Scheme No. 8**

Lot 500 Madigan Road, Gap Ridge

## Document Control

### Request to Amend City of Karratha Local Planning Scheme No. 8

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*Version Control*

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# 1 Introduction

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RFF Pty Ltd acts on behalf of the landowner of Lot 500 Madigan Road, Gap Ridge ('the subject land'). This report has been prepared in support of a formal request to Council, pursuant to Section 75 of the *Planning and Development Act 2005*, to initiate an amendment to the City of Karratha Local Planning Scheme No. 8 ('LPS 8') to:

- Rezone a portion of Lot 500 Madigan Road, Gap Ridge from 'Rural Residential' to 'Tourism';
- Update the Scheme Maps accordingly.

The request for a Scheme Amendment is proposed to facilitate the development of the land to accommodate an extension to the existing workforce accommodation facility that currently exists on the western portion of the site, known as the Kingfisher Stayover.

Historic negotiations with the Department of Lands resulted in a portion of Unallocated Crown Land being incorporated to the rear of the subject land. The purpose and intent of the amalgamation was to facilitate an expansion to the Kingfisher Stayover. However, the amalgamation of the subject land created a dual zoning over the property under the City of Karratha Local Planning Scheme, with the developed portion of the land being zoned "Tourism", and the amalgamated, undeveloped portion of the land being zoned "Rural Residential".

Proposals to commence a scheme amendment process to resolve the split zoning have been discussed with the City of Karratha over the years; though the Proponent was advised that this could be resolved through an imminent Scheme Review process. The City's Scheme review process has since stalled, pending resolution to bushfire and coastal management strategies, which the Proponent understands will take some years to complete.

This report provides the background information on the subject land, and addresses the town planning, servicing and environmental considerations relevant to the Scheme Amendment Request area.

## 1.1 Pre-Lodgement Consultation

This request to amend the City of Karratha Local Planning Scheme No. 8 ('LPS 8') has been prepared as a necessary step to facilitate an expansion to the existing Kingfisher Stayover workers accommodation facility. Pre-lodgement engagement has been undertaken throughout the preparation of this request with representatives of City of Karratha.

## 1.2 Background

Ausco Modular Pty Ltd is the lessee and operator of the Kingfisher Stayover Village, located at Lot 500 Madigan Road, Gap Ridge (the subject site), on behalf of the landowner (ERADU Pty Ltd). Kingfisher Stayover is an existing workforce



accommodation facility, comprising 245 rooms, a mess hall and associated recreational facilities.

Historic negotiations with the Department of Lands resulted in an additional portion of Unallocated Crown Land being incorporated into the rear of the subject land. The purpose and intent of this amalgamation was to facilitate the further expansion of the workforce accommodation facility.

The amalgamation of the land created a split zoning over the property, with the existing and developed portion of the site being zoned “Tourism” under the City of Karratha Local Planning Scheme No. 8 (‘LPS 8’) and the amalgamated, undeveloped portion of the land being zoned “Rural Residential” under LPS 8.

On 27 March 2013, the Pilbara Joint Development Assessment Panel granted planning approval for the expansion of the Kingfisher Stayover, which included 440 additional rooms, a new mess hall and the other associated facilities and amenities. The substantial commencement date for the development was extended several times and benefited further from extensions granted as a result of special COVID measures. However, the approval has since lapsed.

**Refer Attachment 1 – Previous JDAP Determinations.**

The gazettal of Amendment No. 39 to the City of Karratha LPS 8 amended ‘Workforce Accommodation’ to a use that is not permitted in the Rural Residential zone.

This proposal seeks to rezone the land to facilitate the development that has long been contemplated, considered and approved.



## 2 Scheme Amendment Proposal

The formal request to Council, pursuant to Section 75 of the *Planning and Development Act 2005*, is to initiate an amendment to the City of Karratha Local Planning Scheme No. 8, to:

- Rezone a portion of Lot 500 Madigan Road, Gap Ridge from 'Rural Residential' to 'Tourism';
- Update the Scheme Maps accordingly.

### Refer Figure 1 – Scheme Amendment Map.

Pursuant to Part 5, Division 1 of the *Planning and Development (Local Planning Schemes) Regulations 2015* ('Regulations'), there are three amendment types: basic, standard and complex. These are defined under Clause 34 of the Regulations. Clause 34(2) of the Regulations requires the local government to specify in its resolutions to prepare or adopt an amendment, what type of amendment it is, as well as the explanation for forming that opinion.

The proposed amendment is considered a standard amendment, which under clause 34 of the Regulations, is described as follows:

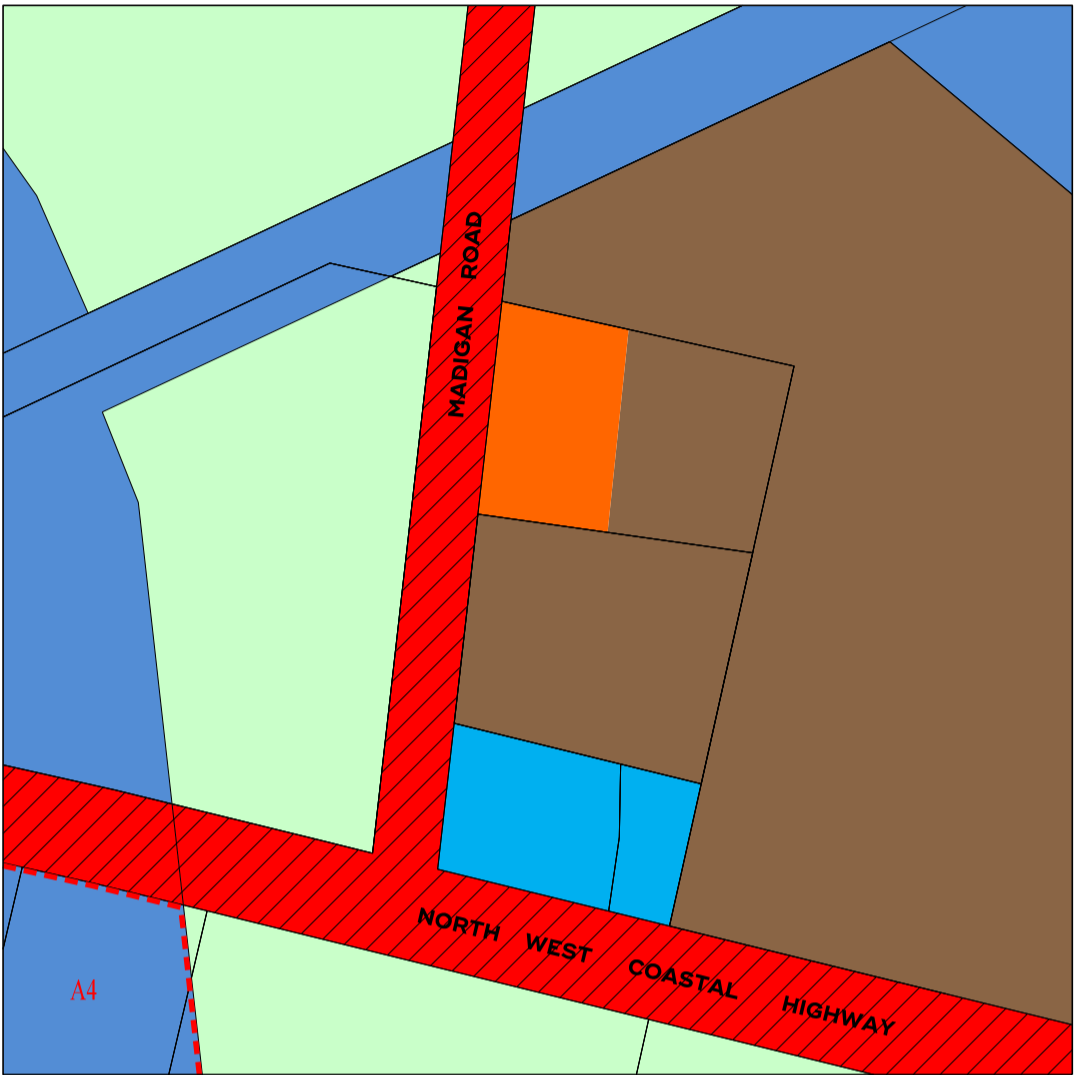
- |   |     |
|---|-----|
| a) An amendment relating to a zone or reserve that is consistent with the objectives identified in the scheme for that zone or reserve;   | Y   |
| b) An amendment that is consistent with a local planning strategy for the scheme that has been endorsed by the Commission;  | Y   |
| c) An amendment to the scheme so that it is consistent with a region planning scheme that applies to the scheme area, other than an amendment that is basic amendment;  | N/A |
| d) An amendment to the scheme map that is consistent with a structure plan or local development plan that has been approved under the scheme for land to which the amendment relates if the scheme does not currently include zones of all types that are outlined in the plan; | N/A |
| e) An amendment that would have minimal impact on land in the scheme area that is not the subject of the amendment;   | Y   |
| f) An amendment that does not result in any significant environmental, social, economic or governance impacts on land in the scheme area;   | Y   |
| g) An amendment that is not a complex or basic amendment.   | Y   |



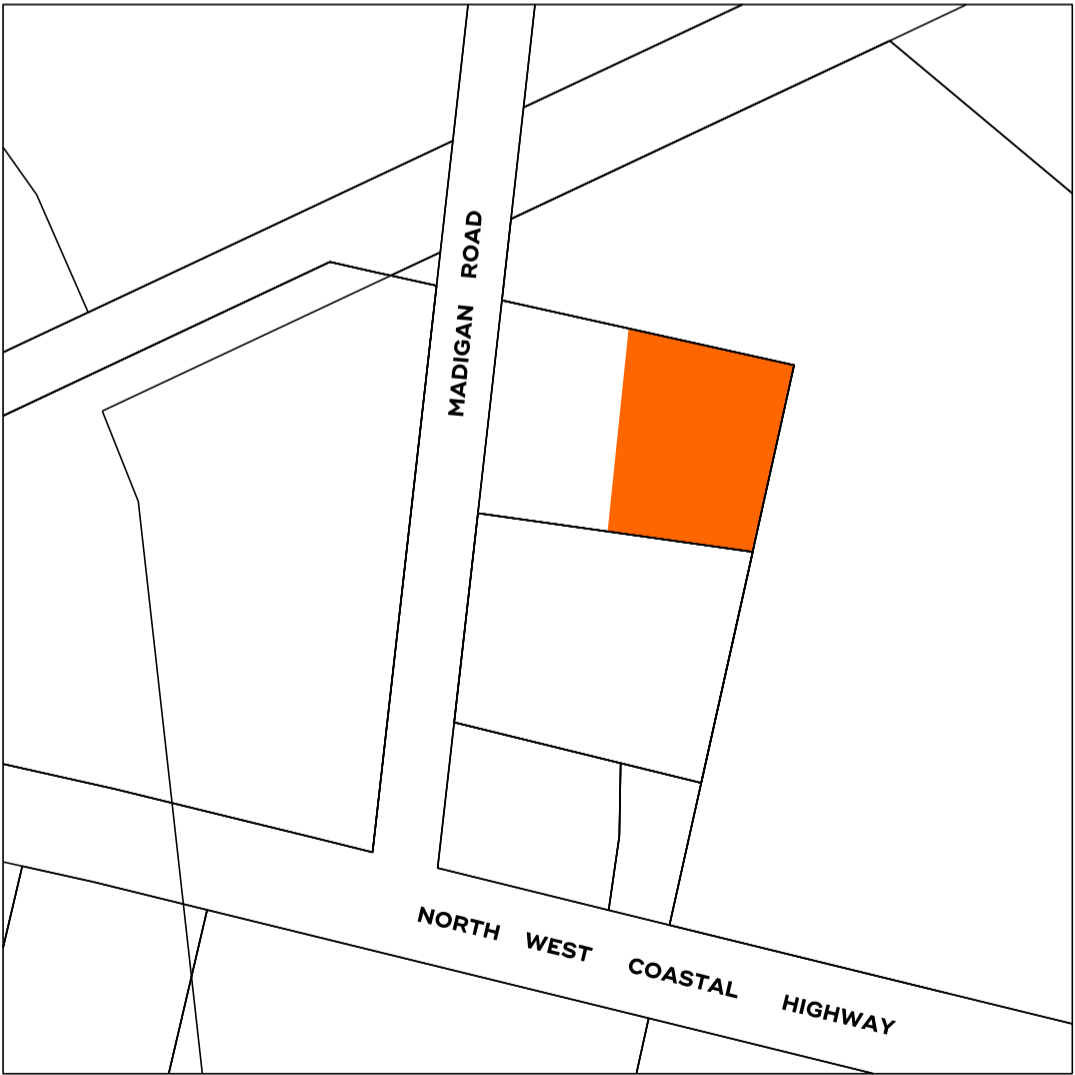
# SCHEME AMENDMENT MAP

## CITY OF KARRATHA

### TOWN PLANNING SCHEME No.8



EXISTING ZONING



PROPOSED ZONING

#### LEGEND

##### LOCAL SCHEME RESERVES

- INFRASTRUCTURE
- STATE REGIONAL ROADS

##### LOCAL SCHEME ZONES

- COMMERCIAL
- RURAL
- RURAL RESIDENTIAL
- TOURISM

##### OTHER CATEGORIES

- A4 ADDITIONAL USE

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0 450m north

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SCHEME AMENDMENT

LOT 500 MADIGAN ROAD,  
GAP RIDGE

FIGURE 1

## 2.1 Proposed Development

This Scheme Amendment is proposed to ultimately facilitate an extension to the existing Workforce Accommodation facility that exists and operates on the western portion of the site. In this regard, we confirm the expansion of the site would be in the order of what has already been considered by the City of Karratha and approved by the Development Assessment Panel.

The 2013, 2015 and 2017 determinations are included at **Attachment 1**.

While the scale of development will remain generally consistent (i.e., an expansion in the order of approximately 440 rooms), the site planning, architectural detail, engineering and detailed bushfire mitigation will be reviewed in support of a future Development Application. However, in summary, the impact of the development is consistent with that already approved on multiple occasions.

## 2.2 Justification

The proposed Amendment to the City of Karratha LPS 8 is appropriate and logical for the following reasons:

- The land is subject to a split zoning under LPS 8, which has resulted from the amalgamation of the Unallocated Crown Land into the historical freehold land parcel. The split zoning of the land is not consistent with the principles of orderly and proper planning.
- The rezoning of the subject land as proposed will provide for the expansion of the existing workforce accommodation facility on the land; a land use that has long been contemplated, considered and approved over the subject land.
- Expansion of the existing workforce accommodation facility is an efficient use of land already functioning for that land use.
- Workforce accommodation is a critical piece of infrastructure to enable a range of major projects to occur. The attached Demand Assessment demonstrates a clear and urgent need for additional (independent) workforce accommodation within the City of Karratha.
- Future supply of workforce accommodation is required to meet the demand from sustained growth in the West Pilbara region. The findings of the attached Demand Assessment are consistent with that prepared in 2017, which clearly demonstrates a shortfall of supply (now at a critical point) for an extended period of time. This is further discussed in **Section 3.4** of this report.
- It has been demonstrated, through previous approvals granted by the Development Assessment Panel, that the subject land is suitable and appropriate for development of workforce accommodation at this location.
- Development of the subject land for workforce accommodation will not prejudice the development outcomes of any surrounding lands.



## 3 Description of Site

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### 3.1 Location

The subject land is located on the outer fringe of the Karratha Townsite area, approximately 9 kilometres (15-minute drive) southwest the Karratha Town Centre, Hospital and 7 kilometres south of the Karratha International Airport.

**Refer Figure 2 – Regional Location.**

The area surrounding the subject land is generally undeveloped and comprises undisturbed natural bushland. A service station / fast food outlet is located approximately 250 metres south of the site on the corner of Madigan Road and North-West Coastal Highway.

Gap Ridge Industrial estate is located 3 kilometres north of the subject land.

**Refer Figure 3 – Local Location.**

### 3.2 Subject Land

The subject land is known as Lot 500 Madigan Road, Gap Ridge, more formerly described as:

- Lot 500 on DP 76571, contained within Certificate of Title Volume 2812, Folio 375.

**Refer Attachment 2 – Certificate of Title.**

The subject land is 6.34 hectares in area, with the undeveloped portion of the site (eastern portion) generally comprising natural remnant vegetation. The site has frontage of approximately 225 metres to Madigan Road.

The Kingfisher Stayover worker's accommodation village comprises:

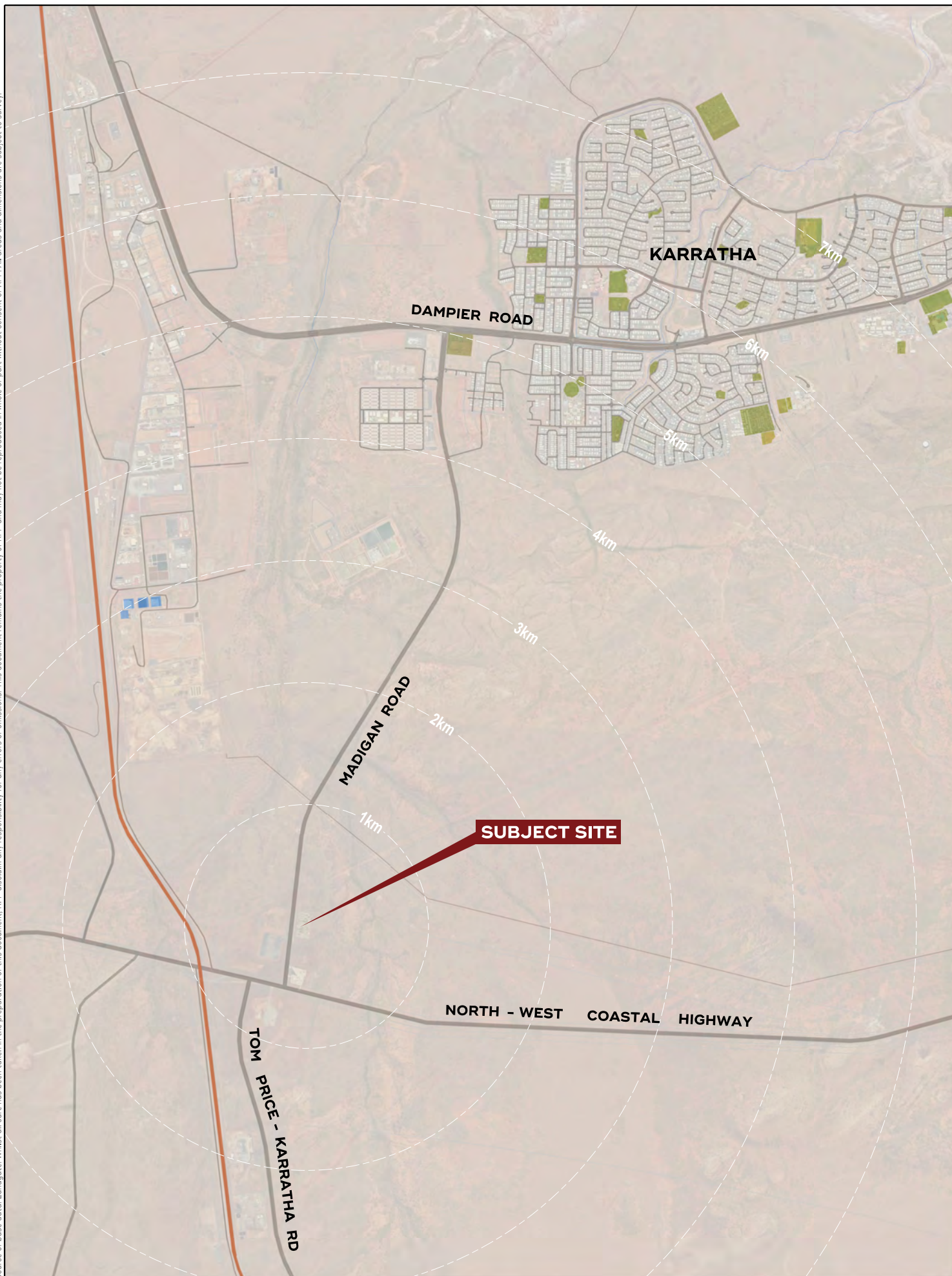
- 245 accommodation rooms within 65 single storey buildings;
- Central facilities including a mess hall, laundry and lockers;
- 137 sealed car parking bays; and
- Outdoor recreational areas (including a swimming pool, outdoor space and barbeques).

The existing Kingfisher Stayover Village has reticulated water and power connection; with wastewater being treated on site. Access to the site is provided via an existing crossover to Madigan Road.

**Refer Figure 4 – Site Plan and Attachment 3 – Feature Survey.**









### 3.3 Surrounding Land Uses

While the land is well-located, it is generally isolated from other development. A large Service Station and Truck Stop is located on the corner of Madigan Road and North West Coastal Highway, 250 metres south of the site. Land directly adjacent the subject land, on the western side of Madigan Road, comprises a Main Roads WA laydown facility. The Karratha Waste Depot is located approximately 1.6 kilometres south of the subject land. Various high voltage transmission lines traverse the broader landscape but do not intersect with the site.

It is not considered that any of the surrounding uses will have any impact on the proposed Scheme Amendment or contemplated development.

### 3.4 Economic Context

Lucid Economics is appointed by the Proponent to prepare the supporting Demand Assessment for this proposal. The report provides an update to the Economic Assessment prepared by RFF in 2017. Both assessments are included at Attachment 4 to this report.

**Refer Attachment 4a – Demand Assessment (Lucid Economics, 2024)**

**Refer Attachment 4b – Economic Assessment (RFF, 2017).**

Economic growth within the City of Karratha has overtaken that of Western Australia over the last three (3) years, averaging 4.4% per annum, compared with the State average of 4.3%. The Karratha economy is very reliant on the mining and resource sector, which represents 84% of the total economic output.

The unemployment rate within the City of Karratha has been below 2% over the last two years, well below the state average of around 4%. This demonstrates the strength of the local economy, the availability of employment opportunities and a shortage of local workers. The Lucid report concludes that the lack of available housing in the City of Karratha means that many of the forecast projects will need to rely on fly-in-fly-out workers to service the projects.

Historic economic cycles in the Pilbara region, and the City of Karratha more specifically, have seen tremendous demand for labour not able to be catered for by existing workforce accommodation facilities, and which have spilled over into the residential and tourism short-stay markets. This has had the impact of significant price increases for properties, and a complete reduction in the availability for residents and visitors alike.

In terms of major project activity, the Lucid report confirms that in 2023, investment into the mining sector in WA was over \$30 billion. The Australian Bureau of Statistics (ABS) estimates that the expected expenditure in mining for the short-term is \$14.6 billion, while the long-term expectation is \$25.9 billion.

Specifically, the City of Karratha has a number of major projects in the pipeline, either under construction or in the advanced stages of planning, totalling over \$50 billion, with an estimated workforce of over 12,000 workers. Refer **Table 1**.



**Table 1: Major Projects – City of Karratha.**

Project	Capital Expenditure (\$m)	Construction Workforce	Anticipated Timeframe	Date of Completion
Woodside – Scarborough LNG / Pluto Train 2	\$16,000	3,200	5 years	2026
Woodside – Browse LNG	\$20,500	1,800	5 Years	2030
Yara Pilbara & Engie Phase 1	\$87	92	2 years	2024
Yara Pilbara & Engie Phase 2	\$1,740	1,832	3 years	2028
Perdaman – Urea Plant	\$6,000	2,500	3 years	2026
BCI Mardie Salt	\$1,421	500	4 years	2026
Dampier Cargo Wharf Projects (Pilbara Ports)	\$160	216	18 months	2026
Andover Lithium – Azure Minerals	\$345	300	2 years	2028
Woodside – Solar	\$300	100	9 months	2024
WA Oil / Chevron Barrow Island Decommissioning	\$1,370	185	10 years	2035
Maitland Burrup Transmission Line	\$75	38	18 months	2026
Rio Tinto Desalination Plant	\$600	300	3 years	2026
Eramurra Solar Salt	\$280	200	4 years	2028
Hexagon WAH2 Project	\$1,620	675	3 years	2028
Perdaman – Solar	\$300	100	9 months	2028
<b>Total</b>	<b>\$50,798</b>	<b>12,037</b>		

Source: Various corporate announcements, news articles and engagement with local stakeholders.

### 3.4.1 Existing Workforce Accommodation

As part of the Demand Assessment, Lucid Economics reviewed the current workforce accommodation market in the City of Karratha. This is summarised in Table 2 (overleaf) and concludes that of the total 6,700 available worker accommodation rooms within the City, there are approximately 4,079 rooms (61%) dedicated to ongoing resource related activity and business.



**Table 2: Current Workforce Accommodation Supply, City of Karratha.**

Facility	Number of Rooms	Owner/Operator
<b>Worker Accommodation Facilities Dedicated to Resource Activity</b>		
Wickham Village	302	Rio Tinto
Wickham Lodge	198	Rio Tinto
Cajuput	155	Rio Tinto
Bapa Maya	48	Rio Tinto
Bamba Maya	22	Rio Tinto
Sea Ripple Village	250	Contracted to Rio Tinto
Bay Village	604	Woodside
The Construction Accommodation Village	2,500	Woodside/Bechtel
<b>Total Resource</b>	<b>4,079</b>	
<b>Independent Worker Accommodation Facilities</b>		
Sea Ripple Village	1,076	Independent
Aspen Village	180	Independent
Stayover Kingfisher Village	245	Independent
Civeo	298	Independent
Karratha Village	125	Independent
Cherratta Lodge	162	Independent
Velocity Village	184	Independent
Velocity Motel	135	Independent
King Village	56	Independent
Karratha Lodge	30	Independent
Latitude 20 Roebourne Village	28	Independent
Hall Street	42	Independent
Pilbara Village	56	Independent
<b>Total Independent</b>	<b>2,617</b>	
<b>Total</b>	<b>6,696</b>	

Note: some villages, such as Citic Pacific Mining's Eramurra Village, that are located well outside of Karratha have been excluded from the local supply. Searipple Village has a total of 1,326 rooms, of which 250 are currently contracted by Rio Tinto.

Source: Various corporate information, news articles and engagement with local stakeholders.

In addition to the demand for major projects (Table 1), there is an ongoing demand for workforce accommodation from operational workforces, as well as general, non-mining projects. The Lucid Economics report provides a full description and profile of total Workforce Accommodation for all (named) projects within the Report included at Appendix 4a and included below at Table 3.

In summary, there is a sustained demand for workforce accommodation rooms far beyond what is currently available within the City of Karratha for at least a 2 – 3-year period. This does not include smaller projects including renewable energy projects.

Provision of adequate workforce accommodation supports the local residential and tourism markets, by ensuring there is no overflow into these property types



that have historically caused significant disruption to these markets and the local economy (i.e., driving up prices to price out tourists and non-resource workers).

**Table 3: Workforce Accommodation Demand – City of Karratha (No. Rooms).**

	2024	2025	2026	2027	2028	2029	2030
<b>Demand</b>							
<b>Dedicated (Regular) Activities</b>							
Resource Companies	1700	1700	1700	1700	1700	1700	1700
Local Contractors	213	213	213	213	213	213	213
Other Industries	840	840	840	840	840	840	840
Shutdown	700	700	700	700	700	700	700
<b>Total Baseline</b>	<b>2753</b>	<b>2753</b>	<b>2753</b>	<b>2753</b>	<b>2753</b>	<b>2753</b>	<b>2753</b>
<i>Total Baseline (including Shutdown)</i>	<i>3453</i>	<i>3453</i>	<i>3453</i>	<i>3453</i>	<i>3453</i>	<i>3453</i>	<i>3453</i>
<b>Major Projects</b>							
Woodside – Scarborough / Pluto Train 2	3200	2240	960	0	0	0	0
Woodside – Browse	0	0	0	540	1260	1800	1260
Yara Pilbara & Engie Phase 1	92	92	0	0	0	0	0
Yara Pilbara & Engie Phase 2	0	0	0	1832	1832	1832	0
Perdaman – Urea Plant	1000	2000	2500	1500	0	0	0
BCI Mardie Salt	500	500	500	0	0	0	0
Dampier Cargo Wharf Projects	0	108	216	0	0	0	0
Andover Lithium – Azure Minerals	0	0	0	300	300	0	0
Woodside – Solar	0	100	0	0	0	0	0
Chevron Barrow Island Decommissioning	0	0	185	185	185	185	185
Maitland Burrup Transmission Line	0	38	38	0	0	0	0
Rio Tinto Desalination Plant	300	300	300	0	0	0	0
Eramurra Solar Salt	200	200	200	200	0	0	0
Hexagon WAH2 Project	0	270	540	675	405	0	0
Perdaman – Solar	0	0	0	100	100	0	0
<b>Total Major Projects</b>	<b>5292</b>	<b>5848</b>	<b>5439</b>	<b>5331</b>	<b>4081</b>	<b>3816</b>	<b>1445</b>
<b>Total Demand</b>	<b>8045</b>	<b>8601</b>	<b>8192</b>	<b>8084</b>	<b>6834</b>	<b>6569</b>	<b>4198</b>
<b>Total Demand (incl. Shutdown)</b>	<b>8745</b>	<b>9301</b>	<b>8892</b>	<b>8784</b>	<b>7534</b>	<b>7269</b>	<b>4898</b>
<b>Total Supply</b>	<b>6696</b>	<b>6696</b>	<b>6696</b>	<b>4196</b>	<b>4196</b>	<b>4196</b>	<b>4196</b>
<b>Total Shortage/Surplus</b>	<b>-1349</b>	<b>-1905</b>	<b>-1496</b>	<b>-3888</b>	<b>-2638</b>	<b>-2373</b>	<b>-2</b>
<i>Total Shortage/Surplus (incl. Shutdown)</i>	<i>-2049</i>	<i>-2605</i>	<i>-2196</i>	<i>-4588</i>	<i>-3338</i>	<i>-3073</i>	<i>-702</i>

Source: Lucid Economics



## 4 Town Planning Considerations

### 4.1 City of Karratha Local Planning Scheme No. 8

The subject land is currently zoned 'Tourism' (western portion) and 'Rural Residential' (eastern portion) under the provisions of the City of Karratha Local Planning Scheme No. 8. Land surrounding the subject land (north, east and south) is also zoned Rural Residential. Land west of Madigan Road is zoned Rural. Various reservations for Infrastructure traverse the landscape, including for major freight routes, railways and high voltage transmission lines.

#### Refer Figure 5 – Zoning Plan.

The land is located within the Karratha precinct. The objectives for the Karratha precinct are set out at Clause 4.8 of LPS 8. Table 1 below provides a justification of the proposal against each of the objectives.

Karratha Objective	Proposal Justification
a) Facilitate the continued growth of Karratha as the regional centre of the West Pilbara.	The proposed Amendment is sought to facilitate a critical asset required to support a number of major projects in Karratha.
b) Develop Karratha as the tourist entry for the West Pilbara built upon and taking into account the levels of commercial travellers associated with resource developments.	The proposed Amendment seeks a Tourism zoning over the site, which will allow for the longer-term redevelopment of the site for a Tourist use.
c) Preserve the key recreational, landscape and heritage values of the Karratha Hills.	The proposal does not impact the Karratha hills.
d) Develop the City Centre as a vibrant, safe and diverse city centre servicing Karratha, the City and the West Pilbara with a mix of commercial, retail, entertainment, residential, civic and retail uses.	N/A. Proposal is not located within the City Centre, though will house a population that will access the City Centre.
e) Create an identity for the City Centre through enhancing the built form and creating an identifiable central focus and improving legibility.	N/A. The proposal is not located within the City Centre.
f) Develop a district mixed business area in Nickol that does not compromise the viability of the City Centre.	N/A. The proposal is not located within the City Centre.



g)	Develop local commercial centres so as to provide convenience goods and services, private recreation, and community uses to the local community.	N/A. The proposal is does not seek to rezone the land to facilitate local commercial activity.
h)	Enhance the high level of residential amenity within Karratha in both existing suburbs and the residential expansion areas.	N/A. The proposal does not seek to facilitate permanent residential accommodation.
i)	Encourage residential development that will accommodate a greater range of lifestyles and needs to reflect the broadening population base.	N/A. The proposal does not seek to facilitate permanent residential accommodation.
j)	Prevent the proliferation of extractive industries in this precinct.	N/A. The proposal does not seek approval for extractive industry.
k)	Retain the Karratha Industrial Estate as the regional service industry centre whilst improving its presentation as part of the entry statement to Karratha.	N/A. The proposal is not located in the proximity of the Karratha Industrial Estate.
l)	Develop an education, leisure and training precinct at the Karratha High School and TAFE site on Dampier Road Stove Hill.	N/A. The proposal is not located within proximity to the High School or TAFE sites.
m)	Encourage and facilitate the establishment of a higher learning campus offering social, cultural, industrial and/or natural resources research opportunities.	The proposal does not prejudice any plans for higher learning campuses within the Karratha Townsite.
n)	Enhance the visual appeal of major city approaches through the establishment of entry statements, provision of landscaping, commissioning of public art and minimising advertising signage.	The proposal seeks to facilitate an extension to the existing Kingfisher Stayover Village. Visual amenity and landscaping will form part of a detailed Development Application for this use.
o)	Encourage the development of tourist resorts, short stay accommodation and caravan parks that provide for tourists and business travellers.	The proposed Amendment seeks a Tourism zoning over the site, which will allow for the longer-term redevelopment of the site for a Tourist use. Immediate demand for accommodation facilities is focussed within the Town Centre.



p)	Encourage indigenous business opportunities and developments that promote indigenous culture.	The proposed development seeks to facilitate an expansion to existing workforce accommodation, which will provide a greater population to access existing indigenous business opportunities.
q)	Discourage the use of shipping containers for storage purposes in residential areas unless located behind the primary street setback area.	N/A. No shipping containers proposed as part of this development. Nevertheless, future development would occur to the rear of the existing development (including primary street setback).
r)	Encourage boundary fencing immediately abutting parks, recreation and drainage reserves to be visually permeable so as to improve surveillance.	The proposal seeks to facilitate an extension to the existing Kingfisher Stayover Village. Permeable fencing will form part of a detailed Development Application for this use.

**Table 4: Proposal Assessment against Karratha Scheme Objectives.**

Clause 5.5 of LPS 8 sets out the specific development requirements for Workforce Accommodation proposals, as follows:

- 5.5.1 *In exercising discretion in relation to a development application for workforce accommodation, the local government shall consider the following:*
- a) *regard for the Workforce Accommodation Local Planning Policy; and*
  - b) *appropriateness of the scale design and standard of the accommodation in the context of the location and its integration with the surrounding development.*
- 5.5.2 *Development applications for all time-limited workforce accommodation shall, to the local government'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 subsequent use which is consistent with the intent of the zone.*
- 5.5.3 *The local government may require, by signed agreement, a commitment to the date and details of rehabilitation and development of a subsequent use the subject of subclause 5.5.2.*

While it is noted that the above requirements will be justified and considered in greater depth in a supporting Development Application, the following justification for the Scheme Amendment is provided:

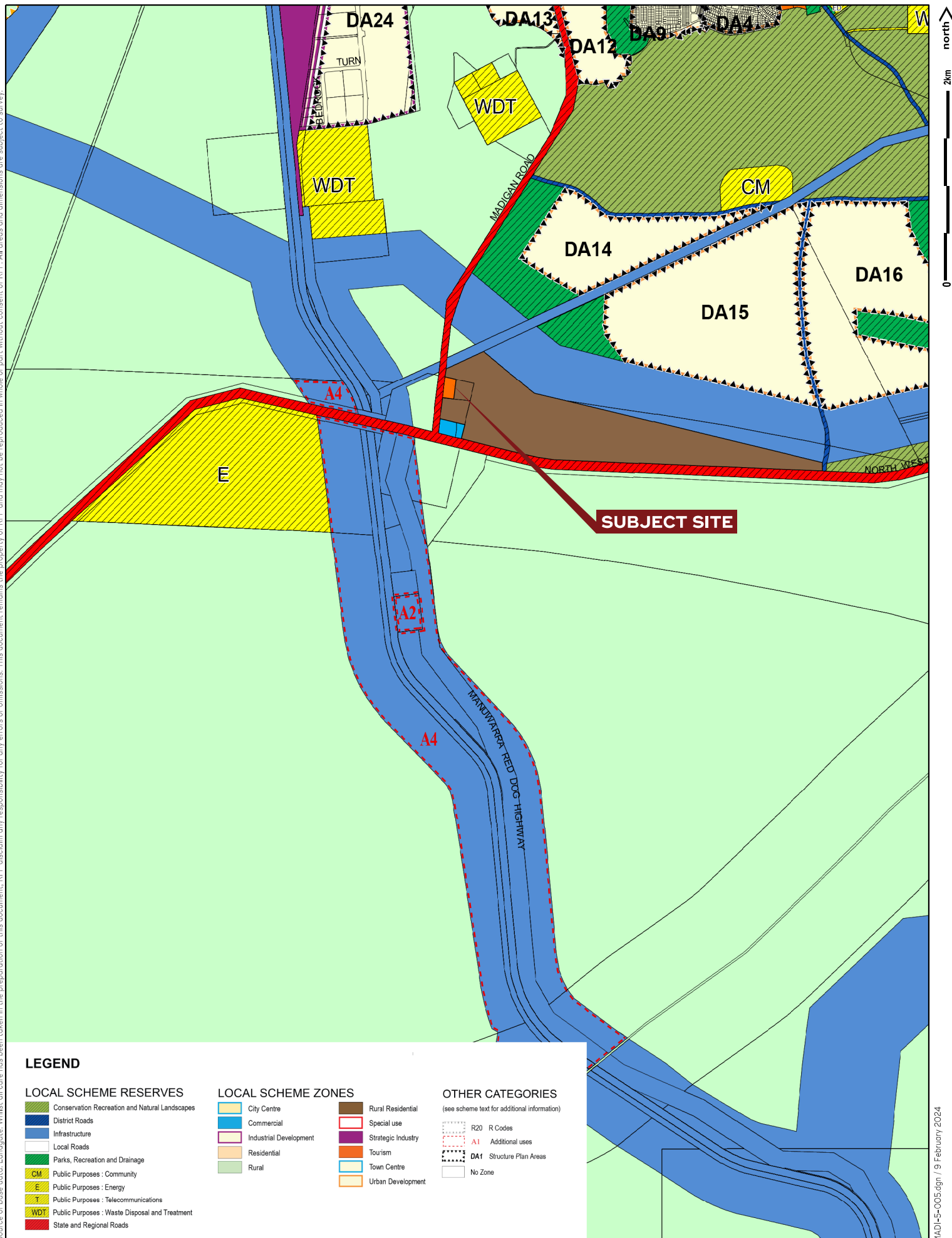
- The City's Workforce Accommodation Local Planning Policy is discussed further at **Section 4.4.1**.



- The development seeks an expansion of an existing and well-maintained worker's accommodation facility. Expansion of its capacity is an efficient use of existing facilities on land that is readily able to be serviced.
- The scale of the proposed development on the subject land has been considered and supported by the City of Karratha and the Development Assessment Panel on multiple occasions.
- The subject land is well-located and within close proximity to the Karratha City Centre, promoting community integration of its residents with the existing recreation, facilities and services.
- The model of development contemplated minimises the required site disturbance, meaning that the eventual rehabilitation of the site will be streamlined.



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MADI-5-005.dgn / 9 February 2024

## 4.2 Strategic Planning Framework

### 4.2.1 City of Karratha Local Planning Strategy

The City of Karratha prepared its Local Planning Strategy in 2020, which was endorsed by the Western Australian Planning Commission (WAPC) on 2 February 2021. The strategy is prepared to set out the vision, objectives and goals for the City of Karratha, and set out the long-term planning directions for the City.

Figure 4 of the Strategy sets out the Opportunities and Constraints affecting development of the Karratha Precinct. In this regard, the land is not impacted by any identified constraints. Figure 5 is the Karratha Strategy Map and identifies the subject land as Tourism zoned.

#### **Refer Figure 6 – Local Planning Strategy Map.**

The proposed Amendment is entirely consistent with the endorsed Local Planning Strategy.

Section 5.3 of the Strategy provides the strategic direction for Karratha and includes the subject land. Specific to this application, the Strategy states that (in relation to Workforce Accommodation):

*“Local Planning Policy DP10 outlines the City’s position as it relates to Workforce Accommodation (WA). The City acknowledge the critical role of WA, the need for a base level supply of WA beds, and potential future need of short-term TWA camps for specific construction projects. However, the overarching objective of this policy is to manage the development of workforce accommodation with a longer term aim to maximise the resident workforce and ensure that where workforce accommodation is provided, this it is designed appropriately and contributes to the City’s vision of Australia’s most liveable City.”*

As discussed throughout this submission, the City of Karratha is facing a critical shortage workforce accommodation in the context of the forecast economic demand. The Proponent submits that the proposed extension to the existing facility is an efficient and more-sustainable solution to alleviate the shortfall. The underlying “Tourism” zoning proposed will facilitate the transition of land use in the future.

The Strategy further states that:

*“Considerable potential exists to increase the City’s role as the tourist hub of the Pilbara and gateway to North Western Australia. However, a shortage of tourist accommodation regularly occurs due to ongoing competition for short stay accommodation.*

*Tourism associated land uses are encouraged within the City Centre. The construction of a hotel at the Quarter is supported by the City.”*

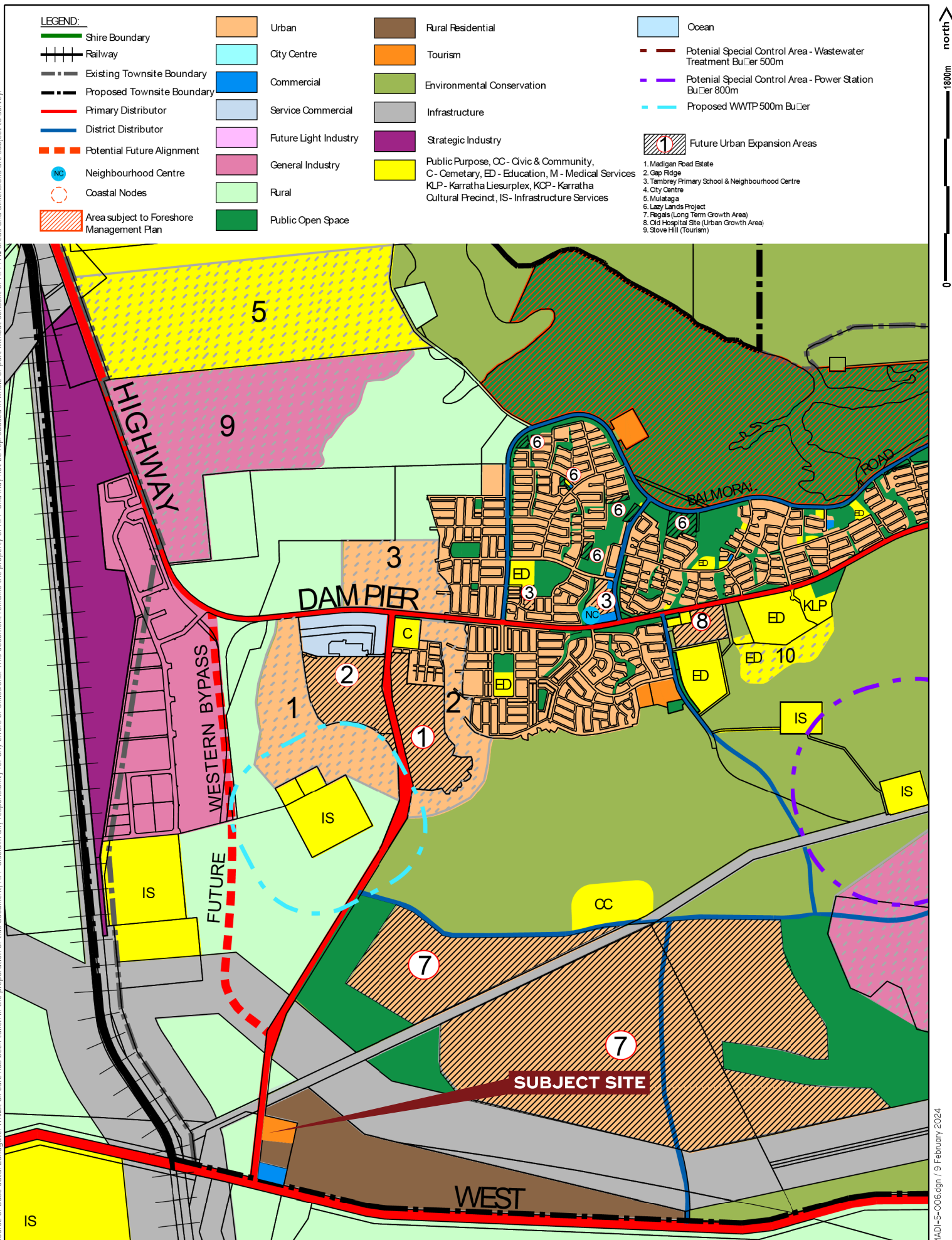
While the land is identified for Tourism by the Strategy, and seeks a Tourism zoning under LPS 8, the Proponent submits that:



- a) Developing the land for workforce accommodation will relieve the demand for tourist accommodation and help to stabilise the broader supply of tourism accommodation in Karratha;
- b) Given the relatively isolated location of the subject land, the site would not likely be successful if developed for tourist accommodation; and
- c) The proposed development and contemplated development is temporary in nature, meaning the site can be readily available for an alternative tourism-related land use to be developed should it become economically viable.

The proposed amendment to LPS 8 is entirely consistent with the City of Karratha Local Planning Strategy.





## 4.3 State Planning Framework

### 4.3.1 State Planning Policy 3 – Urban Growth and Settlement

State Planning Policy 3 – Urban Growth and Settlement (SPP 3) sets out the principles and considerations which apply to urban growth and settlement planning in Western Australia. Policy Measure 5.1 highlights the importance of the provision of adequate accommodation to meet the needs of industry, and the resource sector:

*“There is a need to promote investment in regional communities by recognising that fly-in fly-out arrangements will often be necessary due to remoteness and to attract skilled workers”.*

Having adequate land available and appropriately serviced to meet the demand for workforce accommodation is therefore consistent with the overall objectives and intent of the Policy. The proposed Amendment will provide certainty within the planning framework by:

- Ensuring there is land available to meet existing baseload demand for workforce accommodation near the city centre; and
- Providing adequate land which is serviced and suitably located to provide additional workforce accommodation to support continued growth in the resources sector.

Moreover, the proposal represents an expansion of an existing and operating workforce accommodation facility and represents an efficiency in the use of land already serving this process. The proposal is consistent with SPP 3.

### 4.3.2 State Planning Policy 3.7 – Planning in Bushfire Prone Areas

State Planning Policy 3.7 – Planning in Bushfire Prone Areas (SPP3.7) outlines the measures for strategic planning, subdivision and development applications, for the purpose of protecting people, property and infrastructure from the risk of bushfire.

The subject land is identified as a Bushfire Prone Area on the Department of Fire and Emergency Services (DFES) mapping. Accordingly, a Bushfire Management Plan (BMP) is required to support any future planning and development applications for the land, prepared in accordance with the requirements of SPP3.7 and the associated Guidelines for Planning in Bushfire Prone Areas. A BMP has therefore been prepared by Linfire Consultancy in support of this Scheme Amendment Request, based on the Concept Plan for the site.

Refer Attachment 4 – Bushfire Management Plan.

The outcomes of the BMP demonstrate that, as the residential development progresses, each stage is capable of achieving compliance with the four Bushfire Protection Criteria, outlined in the Appendices to the Guidelines for Planning in Bushfire Prone Areas. This is further discussed in Section 5.5 of this report.



### 4.3.3 State Planning Policy 5.4 – Road and Rail Noise

The subject land adjoins Madigan Road, which is identified as a ‘Strategic Freight and Major Traffic Route’ under the provisions of State Planning Policy 5.4 – Road and Rail Noise (SPP 5.4).

SPP 5.4 applies to proposals that seek to introduce noise sensitive (residential) land uses within proximity to major transport and freight corridors. The intent of SPP 5.4 is to minimise the adverse impact of road noise on noise-sensitive development within the specific trigger distance of the route, to ensure the community is protected from unreasonable levels of noise. SPP 5.4 establishes indoor and outdoor noise targets that are required to be achieved in areas subject to transport noise.

A future development application will require the support of a Noise Assessment to confirm these noise targets are achieved for the future development of the site.

## 4.4 Local Planning Framework

### 4.4.1 Local Planning Policy 10 – Transient Workforce Accommodation

The City of Karratha resolved to amend its Development Policy 10 (DP10) at the Ordinary Council Meeting of 15 December 2014. The revised policy was prepared to include a range of new, tightened development requirements for workforce accommodation.

**Table 5** provides a high-level overview of the proposed scheme amendment against the policy objectives.

Policy Objective	Proposal Response
a) Manage the provision of workforce accommodation by requiring proponents of prospective workforce accommodation proposals or renewal requests to demonstrate an identified need for the beds and that such proposals are not speculative in nature.	Refer <b>Attachment 3 – Demand Assessment</b> , which demonstrates a clear and critical demand for workforce accommodation.
b) Ensure that the flexibility afforded in the location of workforce accommodation is balanced with controls that facilitate development appropriate to the location, and where development occurs within an urban setting, recognises principles of reciprocal benefits that can be realised for the local community and local business from an integrated workforce accommodation facility.	The proposed Amendment seeks to expand the existing and operating workforce accommodation facility. The subject land has already been considered appropriate for this land use (on multiple occasions), with an expansion representing a more efficient and sustainable use of existing facilities. The site is close enough to the Karratha Town Centre to ensure that future residents utilise the existing services.



c)	Provide guidance and performance criteria to enable the preparation and assessment of proposals which are appropriately designed commensurate to their location.	Site planning considerations to be considered further at Development Application stage.
d)	Facilitate development which enables occupants to integrate with the community and town services, recognising that an appropriately integrated workforce accommodation facility has the potential to form the foundation for the development of an urban centre.	The proposed Amendment seeks to expand the existing and operating workforce accommodation facility. Operational management of the camp could further promote integration with the Town Centre (to be detailed further in Development Application).
e)	Enable decision makers to apply discretion in a responsible manner regarding the duration (term) of approval for a proposed development, acknowledging that workforce accommodation should be a temporary and transitional use.	This will be reviewed at Development Application stage.

**Table 5: Assessment Against Workforce Accommodation Objectives.**

This assessment, including against each of the specific policy measures, will be expanded and detailed further in a future Development Application.



## 5 Environmental Attributes, Impacts & Management

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The following section provides a summary of the environmental site conditions and constraints based on the findings of the RPS, prepared in 2012 in support of the initial Development Application.

**Refer Attachment 6 – Environmental Assessment Report.**

### 5.1 Topography & Soils

#### 5.1.1 Topography

The land is generally flat at approximately 20.6 meters Australian Height Datum ('AHD'), with a gentle slow down to approximately 19.2 metres AHD in the north-east corner of the site.

#### 5.1.2 Soils

The surface geology of the subject land as mapped as being within the Archean Metamorphosed basic and ultrabasic igneous rocks, with Alluvium in drainage channels.

The (then) Department of Agriculture identifies the land within the Archean granite-greenstone terrane of the northern Pilbara block. This is characterised as:

- Granite rocks that are poorly exposed and comprise of various deformed and metamorphosed granitic phases that are locally intruded by younger dykes and veins; and
- Greenstone sequences are comprised of metasedimentary and volcanic rocks that have been intruded by significant granitoid bodies.

#### 5.1.3 Acid Sulphate Soils

The Department of Water and Environmental Regulation (DWER) Acid Sulphate Soil Risk Mapping was reviewed in preparation of this Request (2024). The mapping does not identify the subject land of having any risk of Acid Sulphate Soils occurring within three metres of natural soil surface.

Land further east (unallocated crown land) is identified as having a "Moderate to Low" risk of Acid Sulphate Soils occurring within 3 metres of the surface; but this is associated with an ephemeral watercourse which is itself 220-metres east of the subject land.

### 5.2 Biodiversity & Natural Area Assets

#### 5.2.1 Flora & Vegetation

The subject land is mapped and identified within the Interim Biogeographical Regionalisation of Australia (IBRA) region of Pilbara 4. It is within the coastal subregion Roebourne, which is described as:



- “Quaternary alluvial plains with a grass savannah of mixed bunch and hammock grasses, and dwarf Shrub Steppe of *Acacia translucens* or *A. pyrifolia* and *A. inaeuilertera*. Resistant linear ranges of basalts occur across the coastal plains. These uplands are dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus* woodlands. Samphire, *Sporobolus* grasslands and mangal occur on the marine alluvial flats and river deltas”.

Beard (1975) mapped the vegetation of the Pilbara region at a scale of 1:1,000,000 and identified the following vegetation type on the site:

- Mosaic: Short bunched grassland – savannah / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex”.

At the time the EAR was published (2012), the Department of Conservation and Land Management had recorded a substantial proportion of this vegetation complex (approx. 13,750 hectares) as being secured within reservation estates in the Pilbara 4 region.

#### 5.2.1.1 Threatened Ecological Communities

RPS undertook an assessment of threatened and priority flora species and ecological communities, and concluded:

- No Threatened or Priority flora species, or Threatened Ecological Communities were identified as occurring on the subject land, however, a buffer of the Priority 1 Ecological Community (Roebourne Plains Gilgai Grasslands) intersects with the subject land. The extent of this buffer is approximately 18,257 hectares – the proposed development represents an insignificant impact to the long-term protection of the PEC.
- It is considered a low likelihood that the Priority 1 Ecological Community – Roebourne Plains Gilgai Grasslands occurs within the subject land.

#### 5.2.2 Fauna

RPS undertook a desktop assessment of the likelihood of conservation significant fauna species occurring on the site and concluded that although the subject land has the potential to contain habitat that could be utilised by species, it is considered unlikely that the species would be dependent on the subject land for survival.

### 5.3 Hydrology

#### 5.3.1 Surface Water

There are no streams, creeks or any other natural water courses within the subject land.

Stormwater runoff from the existing camp drains into a central drainage line which extends through the site in an eastern direction.

As aforementioned, an ephemeral watercourse (creek) is located approximately 220-metres east of the subject land. The creek performs a hydrological function



of a local flood plain which conveys and disperses the overland flows from the broader catchment area in high rainfall events.

RPS reviewed the Karratha Coastal Vulnerability Study and consulted the (then) Department of Water with respect to the 100-year Average Recurrence Interval (ARI) floor plain for this watercourse. It was determined that the 100-year ARI is 18.9 metres AHD, and accordingly, the subject land is not expected to be impacted by a flood event.

### 5.3.2 Groundwater

DWER's groundwater mapping identifies the following groundwater conditions for the site:

- Groundwater originates from direct infiltration by rainfall and from surface water flows.
- Groundwater in the Pilbara region more generally is most easily accessed near surface water drainage lines.
- Groundwater is generally within 5 and 10 metres below the natural ground surface.
- Groundwater quality is fresh within areas of close proximity to main rivers.
- Groundwater salinity increases in the direction of groundwater flow, in areas of low permeability and with increasing depth.

The closest existing groundwater bore (7O910O39 Regal Well) is located approximately 1.4 kilometres east of the site, though no data was available in 2012 for this bore.

## 5.4 Bushfire Risk

The subject land is identified as a Bushfire Prone Areas as designated on the Department of Fire and Emergency Services (DFES) Map of Bushfire Prone Areas. Accordingly, a Bushfire Management Plan (BMP) has been prepared by Linfire Consultancy in support of this Request to Amend the Local Planning Scheme No. 8. The BMP has been prepared to address the requirements of SPP 3.7 and the associated Guidelines for Planning in Bushfire Prone Areas.

### Refer Attachment 5 – Bushfire Management Plan.

The BMP confirms the risk of bushfire is capable of being appropriately mitigated to achieve compliance with the Guidelines. The main considerations relating to bushfire management of the subject land (to be further defined and detailed in a Development Application) are set out in **Table 6**.



Bushfire Protection Criteria	Proposed Bushfire Management Strategies
<b>Element 1: Location</b>	The post-development Bushfire Hazard Level assessment assumes the subject land would be completely cleared of vegetation, demonstrates that the subject land would comprise 'Moderate' and 'Low' bushfire hazard level. Future development siting will further assist in mitigation.
<b>Element 2: Siting and Design</b>	Future siting and design of development (habitable buildings) will need to be sited appropriately to achieve BAL-29 or less. This includes maintenance of Asset Protection Zones (APZs) and separation from vegetation not able to be maintained.
<b>Element 3: Vehicular Access</b>	The subject land is serviced by the existing Madigan Road (public road), which is a two-way road providing travel routes in north and south directions. The existing development is serviced by an internal ring driveway network that connects to a crossover to Madigan Road. Future development is compliant with Element 3.
<b>Element 4: Water</b>	Future development will be supplied with reticulated water supply (if available capacity within the Water Corporation infrastructure), and if not, will be serviced by static water tanks. Dedicated water supply would be required for firefighting purposes. This will be defined in the Development Application documentation.

**Table 6: Bushfire Protection Criteria Compliance Table.**

## 5.5 Heritage

An Aboriginal Heritage Survey for the subject land was undertaken for the Ngarluma Aboriginal Corporation by Anthropos and Context in 2012. The results of the survey indicated:

- No Aboriginal ethnographic sites are located within the subject land.
- No Aboriginal archaeological sites are located within the subject land.
- Although the mapped polygon for Registered Aboriginal Site 7509: Karratha West 1 intersects with the northern portion of the subject land, no cultural material was located in this area.

**Refer Attachment 7 – Aboriginal Heritage Survey.**



## 6 Servicing & Infrastructure

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JDSI Consulting Engineers were appointed by the Proponent to assist with historic Development Applications and prepared a supporting Construction Hydrologic Design letter in 2012. It is acknowledged that the proposal will need to be supported by more detailed and contemporary engineering design, the letter confirms that:

- Stormwater drainage for the expanded development can be integrated into the existing drainage systems at the subject land.
- Integration of this would actually improve the condition of existing drainage channels which were observed as heavily vegetated and holding stagnant water.
- Overall stormwater management of the entire site would be reviewed and improved by the proposed development, with a stormwater management plan being required as a condition of subdivision approval for a future Development Application for the site.

The initial development Application was also supported by a Services Review letter prepared by CHD in 2012. CHD confirmed that:

- The existing capacity of the reticulated water supply would not have the capacity to service the proposed development. The proposed development could be serviced by new standalone water tanks and associated pumps.
- The existing development is serviced by a private pump station / treatment plant. This would be increased to accommodate the proposed development.

This advice will need to be reviewed and updated in support of a future Development Application and a contemporary servicing requirements, however servicing is not a constraint for the proposed rezoning or the contemplated development.

**Refer Attachment 8 – Engineering Reports.**

### 6.1 Traffic and Access

Shawmac were engaged to prepare a detailed Transport Statement in support of the 2012 development application to expand the workforce accommodation. The Traffic Statement concluded the following:

- The estimated increase to traffic flows on the local road network was initially 455 vehicles per day, which would then reduce to 245 vehicles per day (as a result of the fly in-fly out tenure of residents).
- The major traffic movement is anticipated to flow northwards, to Dampier Road, where traffic would access the Town Centre and Port facilities.
- No changes to the existing road network is required to facilitate the traffic generated by this development.



- The sightlines at the Madigan Road crossover are appropriate and compliant with the Australian Standard and Ausroads road design guidelines.

**Refer Attachment 9 – Traffic Statement.**

An updated Traffic Impact Assessment, prepared to the Western Australian Planning Commission's Traffic Impact Assessment Guidelines, will be required at Development Application stage when final development is determined.



## 7 Conclusion

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This request to Amend the City of Karratha Local Planning Scheme No. 8 seeks to rezone a portion of Lot 500 Madigan Road, Stove Hill from 'Rural Residential' to 'Tourism'.

This proposal to amend LPS 8 seeks to facilitate an expansion to an existing and well-maintained Workforce Accommodation facility and remove an unusual 'split zoning' anomaly that currently impacts the subject land. The gazettal of the Scheme Amendment will be followed by a thorough and detailed Development Application for the expansion, supported by the required technical studies including detailed engineering, landscape design, stormwater management and bushfire planning.

As evidenced in the supporting Demand Assessment, there is a looming and critical shortfall of workers accommodation in the context of the committed pipeline of major projects within the City of Karratha. Workforce accommodation is a critical component to the success of these major projects and the flow-on economic benefits to the City of Karratha. This proposal seeks to alleviate some of that demand within an existing workforce accommodation facility that is operational and strategically located to serve the proposed purpose.

On this basis, it is considered that the proposed Scheme Amendment is consistent with the relevant state and local planning framework, and it is requested that the City of Karratha initiate the requested amendment to the City of Karratha Local Planning Scheme No. 8.



## Attachment 1 – Previous JDAP Approvals (2013, 2015, 2017)





Government of **Western Australia**  
Development Assessment Panels

LG Ref: P3165  
DoP Ref: DP/13/00062  
Enquiries: Development Assessment Panels  
Telephone: (08) 6551 9919

Mr Angus Spencer  
Ausco Modular Pty Ltd  
8 Keegan Street  
O'Connor WA 6163

Dear Mr Spencer

**Pilbara JDAP – Shire of Roebourne – DAP Application P3165  
Lot 326 and Part Lot 211 Madigan Road Gap Ridge  
Transient Workforce Accommodation**

Thank you for your application and plans submitted to the Shire of Roebourne on 4 January 2013 for the above development at the above mentioned site.

This application was considered by the Pilbara Joint Development Assessment Panel at its meeting held on 27 March 2013, where in accordance with the provisions of the Shire of Roebourne Town Planning Scheme No.8, it was resolved to approve the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, a DAP Form 2 application may be made to amend or cancel this planning approval in accordance with Regulation 17 of the Development Assessment Panel Regulations 2011.

Also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. An application must be made within 28 days of the determination in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any enquiries in respect to the conditions of approval please contact Mr Peter York at the Shire of Roebourne on 9186 8509.

Yours sincerely



**DAP Secretariat**

8 1/4 /2013

Encl. DAP Determination Notice  
Approved plans

Cc: Mr Peter York  
Shire of Roebourne  
PO Box 219  
Karratha WA 6714





## ***Planning and Development Act 2005***

### **Shire of Roebourne Town Planning Scheme No.8**

#### **Pilbara Joint Development Assessment Panel**

## **Determination on Development Assessment Panel Application for Planning Approval**

**Location:** Lot 326 and Part Lot 211 Madigan Road Gap Ridge

**Description of proposed Development:** Transient Workforce Accommodation

In accordance with Regulation 8 of the *Development Assessment Panels Regulations 2011*, the above application for planning approval was **granted** on 27 March 2013, subject to the following resolution and conditions:

**Approve** DAP Application DP/13/00062 (P3165) and accompanying plans

Kingfisher Village Site Plan

a. Kingfisher profile

Kingfisher Village Existing and New Buildings

Development Plan Set (date stamped 4 January 2013)

b. Laundry & Store

i 15266\_002 Elevations D290

ii 15266\_002 Floor Plans D290

iii Laundry & Store 3D

c. Retail Office

i 15266\_003 Elevations D290

ii 15266\_003 Floor Plans D290

iii Retail Office 3D

d. Central Facilities

i 15266\_005 Elevations

ii 5266\_005 Floor Plan Schematic Only

iii Central Facilities 3D

e. 4 Room 1 Level Accommodation Unit

i 3D

ii 15266\_001 Floor Plan

iii 15266\_002 Elevations

f. Maintenance Shed

i 15266\_004 Elevations

ii 15266\_004 Floor Plan Schematic Only

g. 8 Room 2 Level Accommodation Units

h. Landscape Concept Plan SP124301\_001 Issue B\_009

Social Impact Assessment

in accordance with Shire of Roebourne Town Planning Scheme No. 8, subject to the following conditions:

#### Land Assembly

1. The proponent shall provide to the Shire of Roebourne evidence of a lease/licence or other legal arrangement for the long term use by the proponent of part Lot 211 Madigan Road Karratha on Lodged Plan DP 29166



[Crown Land 3062 Folio 20] and completion of an amalgamation with Lot 326 Madigan Road, pursuant to Section 87 *Land Administration Act 1997* prior to any works associated with this approval beginning on site.

2. The proponent shall provide to the Shire of Roebourne evidence that the Transient workforce accommodation facility across Lot 211 and 326 will be singly managed to ensure the amenity of the community and residents will be protected.

#### Limitations on Approval

3. This approval to the development and use of the site for a Transient Workforce Accommodation Facility is limited to a period of ten years from the date of this JDAP approval.
4. An application may be made to the Shire of Roebourne for one further period of five years subject to the following:
  - a) The proponent demonstrates a continued need for the facility through a Demand and Social Impact Assessment and accompanying Impact Management Plan to the satisfaction of the Shire of Roebourne; and
  - b) A written report of the implementation and assessment of the effectiveness of the originally endorsed Social Impact Management Plan to the satisfaction of the Shire of Roebourne.
  - c) An application to extend the period of approval shall be lodged no later than three (3) months prior to the expiry of the current approval.
5. No later than three (3) months prior to the Original date of Expiry or the Extended Date of Expiry, the proponent shall submit a Transition Plan setting out the removal all structures and infrastructure approved by this JDAP approval and reinstatement of the lands appropriate to the Rural Residential Zone in which the land is located, to the satisfaction of Shire of Roebourne.

Once endorsed the proponent will implement the Transition Plan prior within one (1) month of the date of expiry to the satisfaction of the Shire of Roebourne.

6. The approved land use and development shall be undertaken in accordance with the endorsed plans and documents with the following modifications:
  - (i) The provision for bicycle parking in accordance with DP10 or otherwise as specified in a Social Impact Management Plan endorsed by the Shire of Roebourne for the facility; and
  - (ii) For any portion of the development to be used for vehicle or equipment servicing, the proponent shall obtain approval for a bunded wash down area with a petrol and oil trap to be provided in compliance with the requirements of the Shire of Roebourne's Environmental Health and the Department of Water's 'Water Quality Protection Note 68: Mechanical Equipment Washdown March 2006'; and
  - (iii) All necessary approvals for the On Site Waste Treatment Plant.

#### Prior to Construction:

7. Prior to the issue of a Building Permit, an application to install an onsite effluent disposal system must be lodged with the Shire of Roebourne (Shire) Environmental Health Service and/or the Department of Health.



8. Prior to the issue of a Building Permit, an Ongoing Noise Management Plan (ONMP) shall be prepared and approved by the Shire of Roebourne. The ONMP is to cover both construction and operational phases with appropriate details incorporated into the Construction and Operational Environment Management Plans respectively to the satisfaction of the Shire.
9. A modified Landscape Concept Plan to be provided to the satisfaction of the Shire of Roebourne including, but not limited to the following:
  - (i) areas for landscaping and reticulation;
  - (ii) the location of and material for pathways, with attention given to safe pedestrian access to and from car parking, accommodation and central amenity areas;
  - (i) incorporation of shade trees wherever possible in the car parking layout; and
  - (ii) The location of bicycle parking facilities.

Once endorsed the proponent shall remove and replace dead or diseased plants and otherwise maintain landscaping, paths and lighting, reticulation system and related infrastructure in accordance with the endorsed plan.
10. Prior to works commencing on the site a detailed Stormwater and Drainage Management Plan is to be submitted to and endorsed by the Shire of Roebourne. The SWMP shall include but not be limited to:
  - (i) Modelling of and design for a 100 year ARI storm event for overland flood management; showing flow rates and volumes; drainage channels and other means to manage stormwater and drainage throughout the site with on and off-site scour prevention.
  - (ii) The proposed development shall not adversely impact upon the existing drainage on and for Madigan Road.
11. Prior to the Occupation, a Waste Management Plan shall be submitted to the satisfaction of the Shire of Roebourne to ensure the management of solid waste and refuse.
12. Prior to the commencement of site works, a Construction and Environmental Management Plan (CEMP) shall be prepared and approved by the Shire of Roebourne. The CEMP shall include but not be limited to:
  - a) Fire management;
  - b) Dust management;
  - c) Traffic management during construction;
  - d) Noise Management;
  - e) Hazard and emergency management, including cyclone and fire preparedness and response procedures
  - f) Management and location of work lay down areas on site and/or near to the site;
  - g) Acid Sulphate Soil management and dewatering if required;
  - h) The Vector Management Plan as lodged shall be incorporated into the Construction Environment Management Plan as appropriate;
  - i) Arrangements for construction workforce accommodation;
  - j) Code of conduct for construction workforce;
  - k) Complaints procedures and contact details for site and project managers.



13. A revised Social Impact Management Plan (SIMP) shall be submitted to, and endorsed by the Shire of Roebourne prior to construction to accurately address the impact of the proposed expansion on local community services and facilities.
14. All car, motorcycle and service vehicle parking including designated bus parking and pick up areas and all vehicular access and manoeuvring areas shall be constructed and line marked in accordance with the Shire of Roebourne Type "A" (two coat seal) or "Type C" (asphalt surfaced commercial/industrial pavements) pavement construction specifications and shade trees shall be provided within car parking areas to the satisfaction of the Shire of Roebourne.
15. The bin compound shall be located and constructed in accordance with the Shire of Roebourne specifications.
16. Arrangements for the provision of sufficient power to service the development or alternatively a reticulated power supply arrangement to be provided for.
17. The proponent shall be responsible for the design and construction of the required access improvements to allow for safe movements of different types of vehicle required to access and egress Madigan Road, to the specifications and satisfaction of Main Roads Western Australia.
18. The car parking areas, access driveways, building entry areas and all pathways are to be lit in accordance with Australian Standard AS1158 Lighting for Roads and Public Spaces and lighting to Australian Standards and incorporating crime prevention through environmental design principles; and thereafter, maintained to the satisfaction of the Shire of Roebourne.
19. Prior to occupation, an Operational Environment Management Plan shall be prepared and approved by the Shire of Roebourne. The OEMP shall include but not be limited to:
  - (i) The ongoing operation of the water supply system and onsite effluent disposal system and management of associated treated waste water.
  - (ii) House rules and code of conduct for staff and occupants;
  - (iii) Litter control practices;
  - (iv) Fire prevention practices;
  - (v) The Vector Management as lodged shall be incorporated into the OEMP as appropriate;
  - (vi) Complaints procedures and management contact details for all key officials;
  - (vii) Emergency procedures, including cyclone preparedness and details of emergency evacuation for each building and the public domain areas, including assembly points and safe places for occupants, staff and visitors to all components of the development in case of an emergency; and
  - (viii) Procedures to ensure all staff and occupants be given and/or all rooms have details of camp rules summarising key information in above.



Once endorsed, the development shall comply with the OEMP at all times.

General Conditions

20. Oversized vehicles or buses associated with on-site occupants or transport of occupants to and from the site shall not be parked within surrounding road reserves.
21. The provision and maintenance of water supply for the development shall at all times be in accordance with Water Corporation requirements.
22. This decision to approve shall expire if the development has not substantially commenced within two [2] years of the date of this decision.

**Advice Notes**

- a. The Pilbara Joint Development Assessment Panel (Pilbara JDAP) has determined this application. Rights of appeal are available to the applicant under the *Planning and Development Act 2005* against the decision of the Pilbara JDAP, including any conditions associated with this decision. Any such appeal must be lodged within 28 days of the date of this decision to the State Administrative Tribunal [Tel 9219 3111 or 1300 306].
- b. This approval does not exempt requirements under any other legislation additional approvals may be required in accordance with those requirements. It is noted that there are other approvals required as prerequisites in relation to use of this Reserve land under the *Land Administration Act 1997*. Planning approval can only be acted upon once approvals under those other statutory processes are completed.
- c. The proponent should confirm with the Department of Environment and Conservation that all necessary approvals have been obtained in relation to clearing of native vegetation, Indigenous cultural heritage, the upgrade to the waste water treatment plant or endangered flora or fauna.
- d. Separate applications must be made for any health approvals required under the *Health Act 1911*.

Detailed plans and specifications of the kitchen, dry storerooms, cool rooms, bar and liquor facilities, staff change rooms, patron and staff sanitary conveniences and garbage room, are to be submitted to and approved by the Shire's Environmental Health Services prior to the occupation of the premises. The plans should include details of:

- (i) The structural finishes of all floors, walls and ceilings;
- (ii) The position, type and construction of all fixtures, fittings and equipment (including cross-sectional drawings of benches, shelving, cupboards, stoves, tables, cabinets, counters, display refrigeration, freezers etc); and
- (iii) All kitchen exhaust hoods and mechanical ventilating systems over cooking ranges, sanitary conveniences, exhaust ventilation systems, mechanical services, hydraulic services, drains, grease traps and provisions for waste disposal.

These plans are to be submitted separately to those submitted to obtain a Building Permit. The application must be in accordance with Chapter 3 of the Australian New Zealand Food Standards Code (Australia Only) and also include any information about the existing facilities to be retained and used.



- e. The applicant is advised it is necessary to apply for lodging house registration issued by the Shire of Roebourne in accordance with the Health Local Laws 1996. The applicant needs to apply for a public building certificate of approval issued by the Shire in accordance with the *Health (Public Buildings) Regulations 1992*.
- f. For Condition 7: The applicant is advised that signage apart from directional signage may require planning approval from Main Roads and/or the Shire. Requirements are contained within the Shire of Roebourne By Law Relating to Signs, Hoardings and Bill Posting. Queries in relation to signage should be directed to Building Services on 9186 8569.

For Condition 7(iii): Setbacks for petrol and oil traps are the same as for effluent disposal systems. Should the wash down area exceed 20m<sup>2</sup> a roof may be required.

For Condition 7 (iv): An Application to Construct or Install an Apparatus for the Treatment of Sewage must be lodged to the Shire's Environmental Health for the treatment and disposal of effluent waste in un-sewered areas that complies with the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*. An application must also be lodged to the Department of Health to seek approval for systems producing greater than 540 litres per day. Applications must demonstrate:

- (i) Total estimated maximum volumes of wastewater generated;
  - (ii) Details of the type of wastewater disposal system;
  - (iii) Details of irrigation areas if these are to be used or where the wastewater will be ultimately disposed;
  - (iv) Details of other fixtures adjacent to irrigation or disposal areas such as structures, subsoil drainage and sumps;
  - (v) The reuse of wastewater is encouraged. Where there is a component of reuse of wastewater a management statement to demonstrate compliance with the *National Water Quality Management Strategy- Australian Guidelines for Water Recycling- Managing Health and Environmental Risks 2006*.
- g. For Condition 10: The Shire of Roebourne encourages the use of treated grey water for maintenance of landscaped and open space areas with consideration of Water Sensitive Urban Design/conservation principles. Planting species should incorporate heat and low water tolerant native plant species.

Wherever possible damage to or removal of mature trees is to be avoided. The landscaping plan should show mature trees to be retained. All landscape planting shall be sufficiently reticulated so that plants are established and maintained in healthy condition on an ongoing basis in accord with the Shire of Roebourne's planting species list.

- h. For Condition 11: Erosion control may be required at stormwater outlets to prevent scouring. The Stormwater and drainage system for the development is to cater for a 100 year ARI storm event and shall be designed in accordance with the *Australian Rainfall and Runoff Manual: A Guide to Flood Estimation*, to ensure that no stormwater run-off discharges onto any adjacent private property by directing all run-off into adjacent road and/or drainage



reserves or to any point of discharge approved by the Shire. The applicant is requested to liaise with the Shire's Infrastructure Services Coordinator regarding requisite details [Tel: (08) 9186 8555].

- i. For Condition 12: The following development standards apply to the management of solid waste and should be considered in the Waste Management Plan:
  - (i) Each site requires a rubbish compound/bin storage area, with the actual requirement (size, construction material and location) being defined by the use.
  - (ii) Rubbish compound/bin storage area is to be screened from public view and provided with a tap and adequate mains supply.
  - (iii) If not fenced or otherwise enclosed, tie down points or alternative means of securing bins during cyclones must be provided.
  - (iv) Rubbish compound/bin storage area is to be constructed with bunded concrete flooring graded to an industrial floor waste gully connected to an approved wastewater disposal system for commercial waste.
  - (v) Drains are to incorporate a 200 mm bucket trap or an alternate solid particulate capture system.
  - (vi) Location of rubbish pickup compound should take into account the ability for a front loading single unit truck (12.5m long with a 12.5m turning radius) to access the compound – particularly when using bulk bin service
  - (vii) Should the rubbish compound/bin storage area exceed 20m<sup>2</sup> a roof may be required.
- j. For Condition 13: The CEMP must have regard to the Department of Environmental Protection publication *a guideline for the prevention of dust and smoke pollution from land development sites in Western Australia* November 1996. This publication requires a Classification Assessment Chart to be completed. The chart and chart notes recognise that the major factors influencing the dust risk potential of a specific site are the time of the year when the works are to be conducted, the nature of the site, and the extent of the proposed works and the proximity of the site to any other land use.

The CEMP should stipulate the hours of construction, likely times that construction vehicles will need to access and egress the site, and outline what management measures are in place to control noise emissions. Noise management provisions and mitigation measures must have regard to the *Environmental Protection (Noise) Regulations 1997*.
- k. For conditions 13 and 20: Management of dust, noise and vectors are required to be to the satisfaction of the Shire's Environmental Health Coordinator [Tel 08 91868638].

Emergency procedures are to be prepared in consultation with FESA Karratha and the Shire of Roebourne Municipal Emergency Response Officer. The proponent is recommended to contact the Shire of Roebourne Municipal Emergency Response Officer [Tel 08 9186 8572].
- l. For Condition 14: Ausco is advised that the Shire of Roebourne looks forward to Ausco's commitment to the active implementation of the Social Impact Analysis and Social Impact Management Plan prepared to support the expansion of the Kingfisher Village. The Shire of Roebourne invites the ongoing gathering and provision of information obtained by Ausco during the



implementation and monitoring process to properly inform local government and regional planning matters regarding the operation of Transient Workforce Accommodation in the Pilbara.

The expected impact on local community services and facilities can only be accurately predicted by undertaking occupant surveys. Once actual/likely use of local community services and facilities has been determined, appropriate response actions to address any impacts can be set. It is envisaged that the SIA will include a proponent commitment to enter into an agreement with the Shire regarding identified impacts. The survey form and methodology should be consistent with community surveys already undertaken by the Shire so there is consistency in data collected. The Shire's Public Affairs Manager should be contacted regarding the Shire's fee for service to undertake survey work for this project. The Shire will then use this same methodology to monitor other TWA developments in the Shire of Roebourne.

A list of Shire requested adjustments to the SIMP are included in the body of this JDAP Responsible Authority Report.

- m. For Condition 18: MRWA advise that no additional access points to Madigan Road will be contemplated. An application form to: "Undertake Works within the Road Reserve-Complex Works" shall be completed and submitted to MRWA Pilbara Region. This is required as part of contractual obligations under Integrated Services Arrangements (ISA's) implemented by Main Roads. This form can be found on the Main Roads website ([www.mainroads.wa.gov.au](http://www.mainroads.wa.gov.au)) under "Using Roads" >Road Traffic Information> Conducting Works on Roads.

- n. Planning approval is required for satellite dishes with a diameter exceeding 1200mm, which are to be installed on an elevation facing a street; or are within the street setback area (forward of the building line); or are within one metre of any property boundary, in accordance with DP3 Satellite Dishes, Wind Turbines and External Fixtures.

A satellite dish must be colour-matched to its background or otherwise a colour agreed to in writing by the carrier and the Shire of Roebourne. Building approval is required except where satellite dishes have a diameter not greater than 1.2 metres.

All satellite dishes must be installed in accordance with the manufacturer's specifications and instructions for Region D Terrain, Category 2 cyclonic winds.

- o. The provision of units and associated parking bays in accordance with Australian Standard AS1428;

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Development Assessment Panel Regulations 2011*.



LG Ref: P3165  
DoP Ref: DP/13/00062  
Enquiries: Development Assessment Panels  
Telephone: (08) 6551 9919

Mr Owen Hightower  
RFF Australia  
owen@rffaustalia.com

Dear Mr Owen Hightower

**Pilbara JDAP – City of Karratha – DAP Application P3165  
Lot 500 Madigan Road, Stove Hill  
Transient Workforce Accommodation**

Thank you for your application and plans submitted to the City of Karratha on 17 March 2015 for the above development at the above mentioned site.

This application was considered by the Pilbara Joint Development Assessment Panel at its meeting held on 13 May 2015, where in accordance with the provisions of the City of Karratha Town Planning Scheme No 8, it was resolved to approve the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, a DAP Form 2 application may be made to amend or cancel this planning approval in accordance with Regulation 17 of the Development Assessment Panel Regulations 2011.

Also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. An application must be made within 28 days of the determination in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any enquiries in respect to the conditions of approval please contact Mr Chris Sayer at the City of Karratha on (08) 9186 8674.

Yours sincerely,

**DAP Secretariat**

**29/05/2015**

Encl. DAP Determination Notice  
Approved plans

Cc: Mr Chris Sayer  
City of Karratha





***Planning and Development Act 2005***

**City of Karratha Town Planning Scheme No 8**

**Pilbara Joint Development Assessment Panel**

**Determination on Development Assessment Panel  
Application for Planning Approval**

**Location:** Lot 500 Madigan Road, Stove Hill

**Description of proposed Development:** Transient Workforce Accommodation

In accordance with Regulation 8 of the *Development Assessment Panels Regulations 2011*, the above application for planning approval was **granted** on 13 May 2015, subject to the following:

1. Accept that the DAP Application reference DP/13/00062 as detailed on the DAP Form 2 dated 17 March 2015 is appropriate for consideration in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;
2. Approve the DAP Application reference DP/13/00062 as detailed on the DAP Form 2 dated 17 March 2015 in accordance with the provisions of Town Planning Scheme No 8, for an extension period of two years only to the planning approval at Lot 500 Madigan Road, Stove Hill, granted by the Pilbara Joint Development Assessment Panel on 27 March 2013.
3. Delete Conditions 1 - 2.
4. Amend Condition 23 as follows:

This decision to approve shall expire if the development has not substantially commenced within four [4] years from the date of the original decision.

**Advice Notes**

1. In relation to Amended Condition 23 of the original approval, the City of Karratha may not support further extensions to the approval period of four [4] years.
2. All other conditions and requirements detailed on the previous approval dated 27 March 2013 shall remain unless altered by this application.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Development Assessment Panel Regulations 2011*.



## Attachment 2 – Certificate of Title



WESTERN



AUSTRALIA

TITLE NUMBER

Volume

Folio

**2812**

**375**

## RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

*BGRoberts*  
REGISTRAR OF TITLES



### LAND DESCRIPTION:

LOT 500 ON DEPOSITED PLAN 76571

### REGISTERED PROPRIETOR: (FIRST SCHEDULE)

ERADU PTY LTD OF PO BOX 428, FLOREAT

(AF M315504 ) REGISTERED 21/6/2013

### LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS: (SECOND SCHEDULE)

1. K211712 MORTGAGE TO WESTPAC BANKING CORPORATION REGISTERED 31/5/2007.
2. M762635 LEASE TO AUSCO MODULAR PTY LTD OF 4-44 FORMATION STREET, WACOL, QUEENSLAND  
EXPIRES: SEE LEASE. REGISTERED 9/9/2014.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.  
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF TITLE-----

### STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP76571  
PREVIOUS TITLE: 2206-985  
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.  
LOCAL GOVERNMENT AUTHORITY: CITY OF KARRATHA



## Attachment 3 – Feature Survey





**LEGEND**

- FENCE
- BANK TOP
- DRAIN EDGE
- PROPOSED BOUNDARY LINE
- BOUNDARY LINE
- MAJOR CONTOUR
- MINOR CONTOUR (Contour Interval 0.2m)
- NATURAL SURFACE LEVEL
- HARD SURFACE / DECK LEVEL
- INVERT LEVEL
- PEG

**NOTES**

This plan has been prepared for the client and should not be used for any other purpose unless authorised by Whelans (WA) Pty Ltd.

The location of cadastral boundaries shown has been extracted from Landgate's database on 05/08/2012 and are subject to survey.

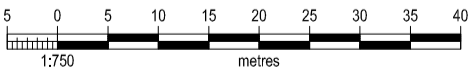
Boundary dimensions have been sourced from the Plan Diagram for this lot and are subject to survey.

Prior to the commencement of any work, relevant authorities should be contacted for the location of underground services.

Levels are based on AHD and derived from SSM DAMPIER 495.

Due to overwriting some levels may be switched off for this plot only.

This note is an integral part of this plan.



SCALE:	1:750	(A1)	DATE DRAWN:	20/04/2012
V.DATUM:	AHD		DRAWN BY:	PHT
H.DATUM:	KAR94		CHECKED BY:	MH
SURVEY DATE:	05/04/2012			
SURVEYOR:	KA		DATA FILE:	120405_ka_combined.acs
JOB NO:	15551		CAD FILE:	120405_Kingfisher_Camp.dwg
PATH:	S:\Projects\15\15551\survey\detail			



**whelans**

133 Scarborough Beach Road, Mount Hawthorn WA 6016  
PO Box 99, MOUNT HAWTHORN WA 6915  
T: 08 9443 1511 F: 08 9444 3901  
E: whelans@whelans.com.au W: www.whelans.com.au

**FEATURE SURVEY**  
LOT 326 on D92294 & PART LOT 211 on DP29166  
KINGFISHER CAMP  
MADIGAN ROAD, KARRATHA

© This plan must not be reproduced without the permission of WHELAN'S

CLIENT: AUSCO MODULAR PTY LTD

REV 0  
PLAN  
15551-002

SHEET 1 OF 1

## Attachment 4a – Demand Analysis (Lucid Economics, 2024)





# Karratha Worker Accommodation Demand Assessment

*Report prepared for*

**AUSCO**

**March 2024**



**LUCID**  
ECONOMICS



# lucid

/ˈluːsɪd/

*adjective*

1. expressed clearly; easy to understand

2. bright or luminous



## Document Control

Job Name: AUSCO Kingfisher Expansion

Client: RFF Australia

Client Contact: Madison Mackenzie

### Version Control

Version	Date	Authorisation
Draft v1	11/3/24	MC

### Disclaimer:

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## Acknowledgement of Country

Lucid Economics acknowledges the Traditional Custodians and Elders of Country throughout Australia, and their connection to land, sea and community. We pay our respects to Aboriginal and Torres Strait Islander Elders past, present and emerging.

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# 1. Introduction

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Lucid Economics Pty Ltd (Lucid Economics) has been engaged by RFF Australia (RFF) to conduct a demand assessment for worker accommodation in Karratha.

RFF is working with AUSCO in terms of a potential expansion of its Stayover Kingfisher Village, which currently provides 249 worker accommodation rooms (Figure 1.1).

The demand assessment is required as part of the planning process and evaluates the current (and likely future) balance between supply and demand of worker accommodation in Karratha. Worker accommodation has always been a feature in Karratha and is required to support fly-in/fly-out (FIFO) workers for both construction and operational projects.

**Figure 1.1. Stayover Kingfisher Accommodation Village**



Source: Ausco (2024)

## 2. Project Description

The existing Stayover Kingfisher Village is located at Lot 500 Madigan Road, Gap Ridge, just north of the North West Coast Highway (Figure 2.1). The site is 6.34 hectares in size and the existing Stayover Kingfisher Village occupies approximately 40% of the site.

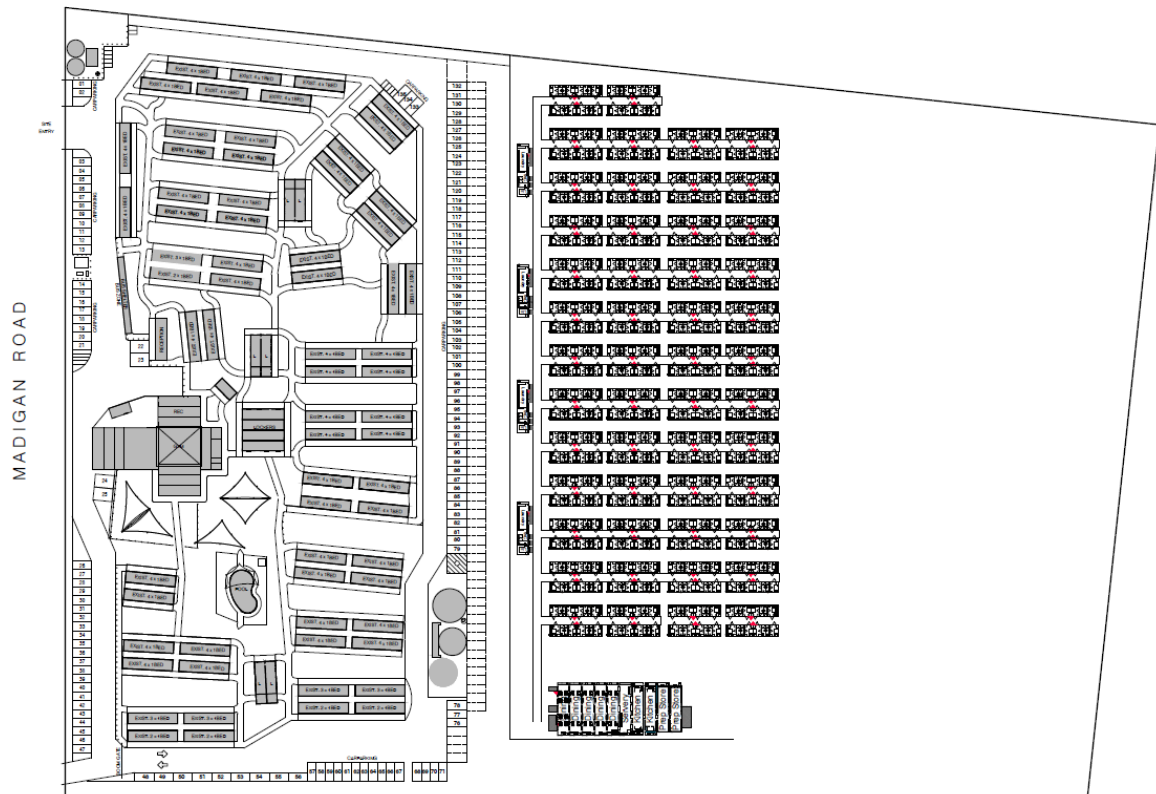
The proposed expansion project would include a 400 room mobile worker accommodation village behind the existing workforce village (Figure 2.2). It would be expected that these additional rooms could be available in the market in 2025.

Figure 2.1. Subject Site



Source: PricewaterhouseCoopers (2024)

Figure 2.2. Proposed Expansion



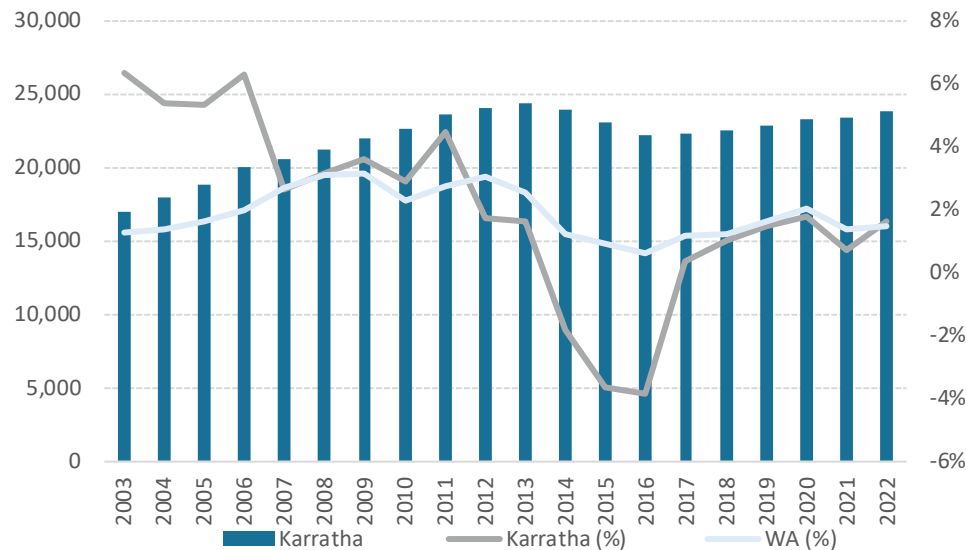
Source: RFF (2024)

### 3. Economic Context

#### 3.1 Population

Karratha had an estimated resident population of 23,787 at June 2022. Population growth in Karratha has been similar to that of Western Australia over the last five years, averaging 1.3% per year (Figure 3.1). Migration made up only a small portion of population growth (12%) in 2022.

Figure 3.1. Population, City of Karratha



Source: ABS (2023)

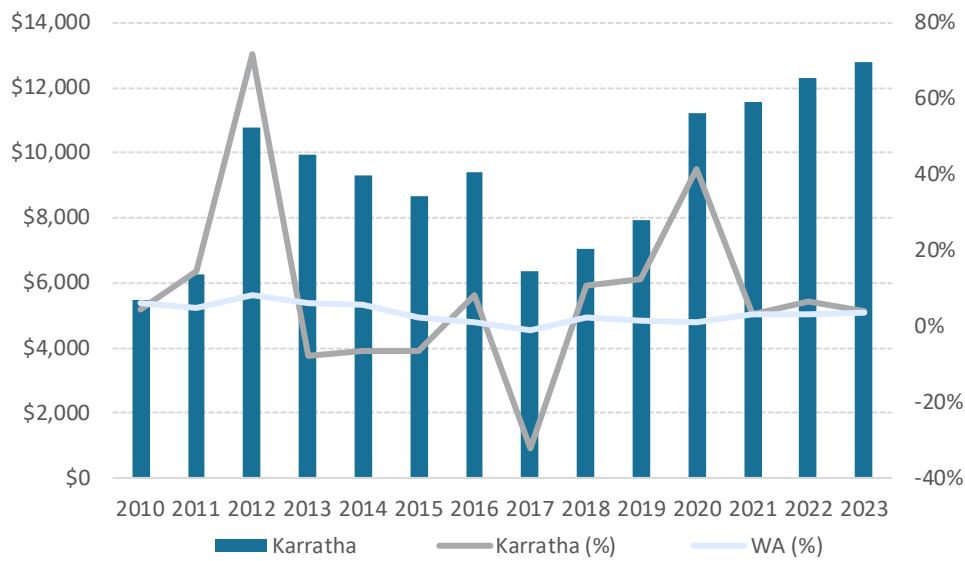
#### **Population Growth and Jobs**

Population growth is often the function of job growth as new residents move to an area to take on a new job. In many regional areas, the ability of a local area to grow its population over the recent past has been the availability of housing to support new residents entering the local area. The residential vacancy rate in Karratha has averaged just 1.1% over the last three years (SQM Research, 2024), demonstrating that the local housing supply would be a deterrent for population growth in Karratha.

#### 3.2 Local Economy

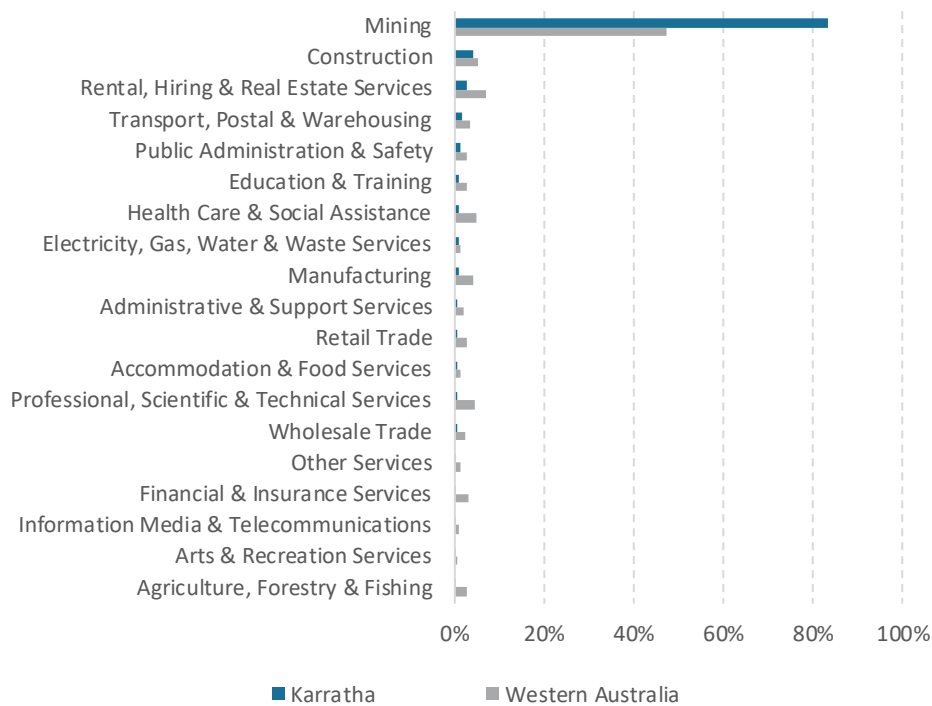
Over the last three years, economic growth in Karratha has outpaced growth across Western Australia, averaging 4.4% per year compared to 4.3% at the State level (Figure 3.2). The Karratha economy is very reliant upon the mining sector, which represents 83% of the total economy. Given the significance of mining, resource and major project activity, it is not surprising that construction is the second largest sector in the local economy (Figure 3.3).

**Figure 3.2. Gross Regional Product, City of Karratha**



Source: REMPLAN (2024); ABS (2023a)

**Figure 3.3. Contribution to GRP, City of Karratha**



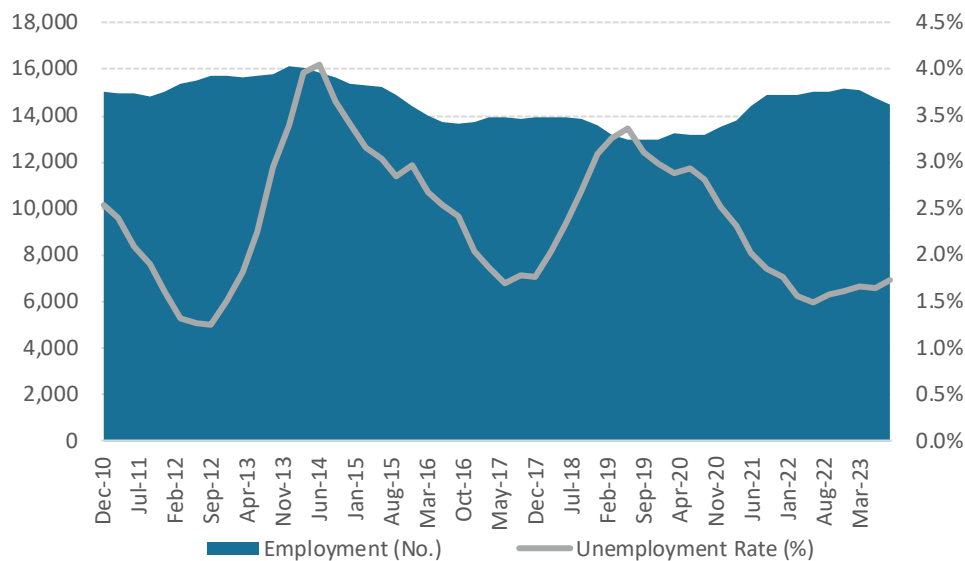
Source: REMPLAN (2024); ABS (2023a)

### **Mining, Resources and Jobs**

The local economy in Karratha is driven by the mining sector and associated resource activities, including the construction of new major projects. The unemployment rate in Karratha has been below 2% across the last two years, while unemployment across Western Australia has generally been double that of Karratha (ABS, 2024), which demonstrates the strength of the local economy and availability of jobs and a shortage of local workers.

Due to the lack of housing availability, it may be that Karratha will need to rely more heavily on FIFO workers over the short-term to meet the demand for labour in the local economy.

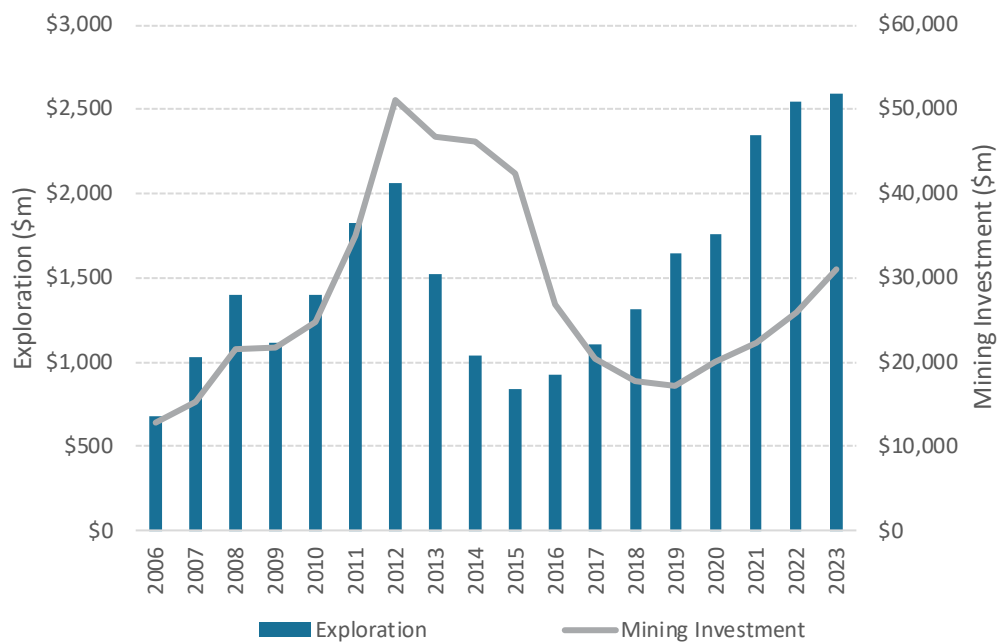
**Figure 3.4. Employment and Unemployment, City of Karratha**



Source: Jobs and Skills (2024)

## **3.3 Mining and Major Project Activity**

As highlighted in Figure 3.3, mining is very important to the State economy. Figure 3.5 shows that as expenditure into mining exploration grows over time in Western Australia, so too does investment into new mining activity. Expenditure on mining exploration is now well above the level experienced during the mining investment boom in 2011-12. While investment into mining has not yet reached a similar level as in 2011-12, it has been growing strongly over the last five years. In 2023, investment into mining in Western Australia was over \$30 billion. The ABS estimates that expected expenditure into mining in Western Australia over the short-term is \$14.6 billion while the long-term expectation is \$25.9 billion (ABS, 2023c).

**Figure 3.5. Investment into Exploration and Mining, Western Australia**

Note: Exploration expenditure excludes petroleum.

Source: ABS (2023b); ABS (2023c)

Karratha has a significant pipeline of major projects that are either under construction or in the advanced stages of planning (Table 3.1). In total there are over \$50 billion in major projects that will have an estimated requirement for over 12,000 construction workers.

Almost 50% of the capital investment into major projects is currently under construction making up 53% of the total construction workforce.

#### **Major Projects Drive Demand for Workforce Accommodation**

For decades, major project activity in Karratha has driven demand for workforce accommodation and accommodating workers is a major facet for the construction of major projects. As highlighted in Table 3.1, some projects have a very significant construction workforce (i.e. 3,200 workers for Woodside's Scarborough LNG and Pluto Train 2 projects, 2,500 workers for Perdaman's urea project). At the same time, Karratha cannot accommodate a permanent residential workforce of this size and scale, and given the specialist skills involved, a FIFO workforce is required. While many of the major projects have lengthy construction schedules, various workers are required for differing lengths of time on projects, which means that all major projects will have varying workforce requirements over the course of their construction. Some projects are shorter in duration. Given the diversity of projects and construction timeframes, the demand for workers in Karratha will vary over the course of any given month or year, so a supply of workforce accommodation that can accommodate peak periods of activity is required.

Table 3.1. Karratha Major Projects

Project	Capital Expenditure (\$m)	Construction Workforce	Anticipated Timeframe	Date of Completion
Woodside – Scarborough LNG / Pluto Train 2	\$16,000	3,200	5 years	2026
Woodside - Browse LNG	\$20,500	1,800	5 Years	2030
Yara Pilbara & Engie Phase 1	\$87	92	2 years	2024
Yara Pilbara & Engie Phase 2	\$1,740	1,832	3 years	2028
Perdaman - Urea Plant	\$6,000	2,500	3 years	2026
BCI Mardie Salt	\$1,421	500	4 years	2026
Dampier Cargo Wharf Projects (Pilbara Ports)	\$160	216	18 months	2026
Andover Lithium - Azure Minerals	\$345	300	2 years	2028
Woodside - Solar	\$300	100	9 months	2024
WA Oil / Chevron Barrow Island Decommissioning	\$1,370	185	10 years	2035
Maitland Burrup Transmission Line	\$75	38	18 months	2026
Rio Tinto Desalination Plant	\$600	300	3 years	2026
Eramurra Solar Salt	\$280	200	4 years	2028
Hexagon WAH2 Project	\$1,620	675	3 years	2028
Perdaman - Solar	\$300	100	9 months	2028
<b>Total</b>	<b>\$50,798</b>	<b>12,037</b>		

Source: Various corporate announcements, news articles and engagement with local stakeholders.

## 4. Workforce Accommodation Market

### 4.1 Current Supply

Karratha currently has a total of 6,700 rooms for worker accommodation, of which 4,079 rooms (61% of total) are dedicated to resource related activity and specific businesses. These rooms would not be accessible for some major project activity.

The Construction Accommodation Village (CAV) provides 2,500 rooms and was established specifically for Woodside's Scarborough LNG and Pluto Train 2 projects. These rooms cannot be used to support other projects and the village must be decommissioned after construction is completed (2026).

Table 4.1. Current Workforce Accommodation Supply, Karratha

Facility	Number of Rooms	Owner/Operator
<b>Worker Accommodation Facilities Dedicated to Resource Activity</b>		
Wickham Village	302	Rio Tinto
Wickham Lodge	198	Rio Tinto
Cajuput	155	Rio Tinto
Bapa Maya	48	Rio Tinto
Bamba Maya	22	Rio Tinto
Searipple Village	250	Contracted to Rio Tinto
Bay Village	604	Woodside
The Construction Accommodation Village (CAV)	2,500	Woodside/Bechtel
<i>Total Dedicated Resource Worker Accommodation</i>	<i>4,079</i>	
<b>Independent Worker Accommodation Facilities</b>		
Searipple Village	1,076	Independent
Aspen Village	180	Independent
Kingfisher Ausco Stayover	249	Independent
Civeo	298	Independent
Karratha Village	125	Independent
Cherratta Lodge	162	Independent
Velocity Village	184	Independent
Velocity Motel	135	Independent
King Village	56	Independent
Karratha Lodge	30	Independent
Latitude 20 Roebourne Village	28	Independent
Hall Street	42	Independent
Pilbara Village	56	Independent
<i>Total Independent Worker Accommodation</i>	<i>2,621</i>	
<b>Total</b>	<b>6,700</b>	

Note: some villages, such as Citic Pacific Mining's Eramurra Village, that are located well outside of Karratha have been excluded from the local supply. Searipple Village has a total of 1,326 rooms, of which 250 are currently contracted by Rio Tinto.

Source: Various corporate information, news articles and engagement with local stakeholders.

## 4.2 Current and Future Demand

Current and future demand for worker accommodation has been based on information related to various major projects that are either under construction or in the advanced stages of planning and are anticipated to start construction in the near future (refer Table 3.1).

In addition to demand from major projects, there is on-going demand for worker accommodation from the operational workforce for Woodside and Rio Tinto as well as general, non-mining construction projects. Additionally, Woodside's North West Shelf project undergoes regular shutdown and maintenance projects that causes a short-term spike in worker demand (i.e. an estimated 800 workers). A shutdown is planned for 2024 and these take place roughly every two years.

Non-resource related construction projects would include road works, non-residential and residential construction projects in the area. In order to estimate non-resource related construction projects, the value of building approvals was evaluated and the average construction activity over the last five years was identified. Input-output modelling was used to estimate the required construction workforce for these projects. It was estimated that half of the required construction workforce would require local short-term worker accommodation resulting in demand for 100 rooms for non-resource related projects. It should be noted that this approach may not identify all non-resource related projects, including major road construction projects or others, as some projects would not require a building approval from Council. As such, this estimate may not include all current or future demand.

Table 4.2 shows the current and future expected demand for worker accommodation in Karratha. The following major projects contribute a significant amount to the current and future demand:

- Woodside – Scarborough LNG / Pluto Train 2
- Woodside – Browse LNG
- Perdaman Urea Project
- Yara Pilbara and Energie Phase 2

As a result of these projects, demand for worker accommodation rooms is expected to peak in 2026 at 8,513 rooms. Current demand for worker accommodation is 8,366 rooms. With a total supply of 6,700 rooms, there is a current shortage of 1,666 rooms (Figure 4.1). As many rooms are dedicated to resource activities, the shortage could be more severe for major projects. The shortage of worker accommodation rooms becomes most severe in 2027 with a shortage of over 3,400 rooms (i.e. the year after the CAV is decommissioned). A shortage of worker accommodation rooms is expected to remain through 2030, although the shortage in 2030 is expected to be 319 rooms.

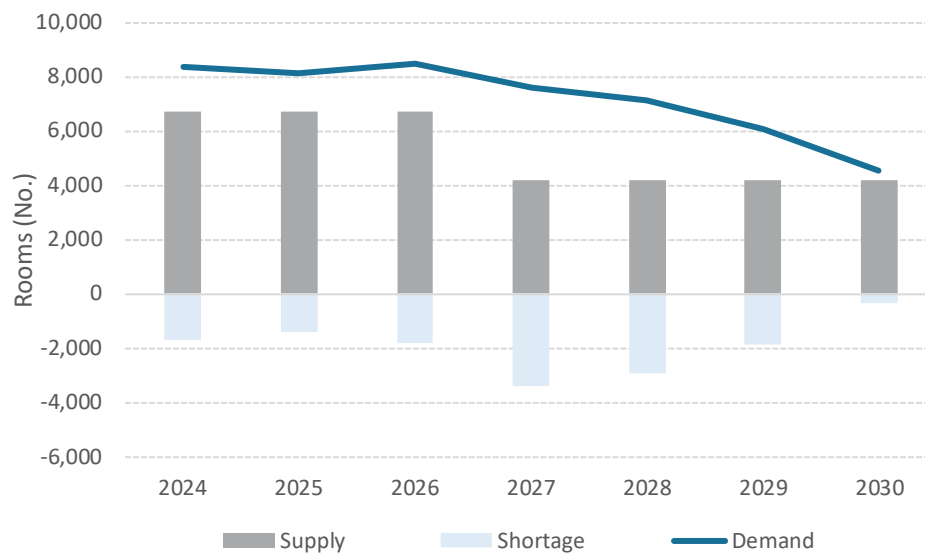
During this forecast period, it is likely that additional major projects may emerge, increasing demand for worker accommodation in the later years of the forecast period, which would add demand and increase the anticipated shortage.

Table 4.2. Worker Accommodation Demand, Karratha (Rooms)

	2024	2025	2026	2027	2028	2029	2030
<b>Demand</b>							
<b>Dedicated (Regular) Resource Activities</b>							
Woodside (NWS) Baseline	700	700	700	700	700	700	700
Woodside (NWS) Shutdown	800		800		800		800
Rio Tinto Baseline	1,475	1,475	1,475	1,475	1,475	1,475	1,475
Total Resource Baseline	2,975	2,175	2,975	2,175	2,975	2,175	2,975
<b>Non-Resource Related Projects</b>							
Non-Resource Related Projects	100	100	100	100	100	100	100
<b>Major Projects</b>							
Woodside - Scarborough/Pluto Train 2	3,200	2,240	960	0	0	0	0
Woodside - Browse	0	0	0	540	1,260	1,800	1,260
Yara Pilbara & Engie Phase 1	92	92	0	0	0	0	0
Yara Pilbara & Engie Phase 2	0	0	0	1,832	1,832	1,832	0
Perdaman - Urea Plant	1,000	2,000	2,500	1,500	0	0	0
BCI Mardie Salt	500	500	500	0	0	0	0
Dampier Cargo Wharf Projects	0	108	216	0	0	0	0
Andover Lithium - Azure Minerals	0	0	0	300	300	0	0
Woodside - Solar	0	100	0	0	0	0	0
Chevron Barrow Island Decommissioning	0	0	185	185	185	185	185
Maitland Burrup Transmission Line	0	38	38	0	0	0	0
Rio Tinto Desalination Plant	300	300	300	0	0	0	0
Eramurra Solar Salt	200	200	200	200	0	0	0
Hexagon WAH2 Project	0	270	540	675	405	0	0
Perdaman - Solar	0	0	0	100	100	0	0
Total Major Projects	5,292	5,848	5,439	5,331	4,081	3,816	1,445
<b>Total Demand</b>	<b>8,366</b>	<b>8,122</b>	<b>8,513</b>	<b>7,606</b>	<b>7,156</b>	<b>6,091</b>	<b>4,519</b>

Source: Lucid Economics

Figure 4.1. Worker Accommodation Supply and Demand, Karratha



Source: Lucid Economics

## 5. Summary

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The demand assessment has showed a significant shortage of worker accommodation rooms in Karratha that will become more severe over time. A shortage of worker accommodation can cause delays to major projects (generating negative economic impacts), decrease the availability and affordability of housing and short-stay accommodation markets and cause significant disruption to the local economy. As was the case during the mining investment boom in 2011-12, a shortage of worker accommodation saw numerous resource related businesses and construction firms purchase or lease residential housing for their workers, which significantly drove up the costs and greatly impeded the normal functioning of the property market. Equally, some businesses engaged in long-term bookings at local short-stay accommodation providers (i.e. traditional hotels/motel accommodation), which essentially shut off the market to many visitors.

Ensuring a sufficient supply of worker accommodation in Karratha is essential to maintain and grow the local economy and to avoid many of the negative outcomes that the market has experienced previously.

The proposed expansion to the Stayover Kingfisher worker accommodation village would positively impact the expected shortage of worker accommodation rooms. An additional 400 worker accommodation rooms would represent 28% of the anticipated shortage expected in 2025. While not significant, this additional supply will contribute greatly to the economy in terms of unlocking a workforce for major projects and allowing these major projects to progress.

The analysis shows that the proposed expansion of the Stayover Kingfisher Village is required by the market and is not likely to impact any of the existing worker accommodation providers.

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## Attachment 4b – Economic Assessment (RFF, 2017)



# Ausco Transient Worker Accommodation (TWA)

## *Economic Assessment*

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Prepared by:



Prepared for:



# Executive Summary

## Background

Transient Worker Accommodation (TWA) plays a vital role in the overall accommodation mix in Karratha, providing accommodation for required workers to stay in the region for certain required lengths of time. While it will always be important for mining and resource centres like Karratha to grow their residential populations, it is also understood that TWA is required, particularly to cater for short-term, temporary maintenance periods or major project construction.

Ausco owns and operates the Kingfisher Stayover Village in Karratha that has 241 rooms and caters to transient workers travelling to the area for various construction and various resource related work. Ausco was previously granted a development approval to add 440 rooms to its existing village. This approval will expire later on this year, so an economic assessment of the area is required to better understand the current and future need for TWA capacity in Karratha.

## Economic Context

### Local Level

The Karratha economy is very reliant upon the mining and resource sector, which constitutes 51% of the local economy (in GRP terms). The reliance on the mining and resource sector has caused historical periods of tremendous growth as well as economic decline. During the mining investment boom, the population of Karratha grew significantly, as did the local economy. As the boom waned, so too did the population and the economy.

During the mining investment boom, the tremendous demand for labour was not able to be catered for in TWA and spilled over into the residential and short-stay accommodation market, greatly increasing prices and reducing availability for residents and visitors alike.

There are currently \$54.3 billion in major projects in Karratha currently in planning (and many are well advanced):

- Rio Tinto will invest \$1.6 billion to expand the Robe River Valley operations
- Rio Tinto will invest \$2.6 billion into the Koodaideri iron ore mine
- Woodside is currently in the process of developing its \$15.4 billion Scarborough LNG project
- Woodside is in the process of developing its \$28.7 billion Browse LNG project
- Leichhardt Industries is currently planning for its \$230 million Eramurra Industrial Salt project
- BCI is currently planning for its \$335 million Mardi Salt project
- Perdaman Chemicals is building a \$4 billion urea plant in Karratha
- Wesfarmers together with Coogee Chemicals and Mitsubishi are conducting a pre-feasibility for a \$1.4 billion methanol plant to be built on the Burrup Peninsula
- There are a variety of projects including an oyster farm, algae farm, a magnesium extraction plant and a hydrogen processing plant that could see hundreds of millions of dollars invested in Karratha over the next five years
- Anketell Point Project received approval in 2013 and represents \$4.5 billion of investment

## State Level

Mining is an important aspect of the State's economy and through business investment made during the mining investment boom, the State's economy has grown significantly over the last decade. Expenditure on exploration has historically aligned to business investment and recently has increased 17% over the last year. Equally, mining job advertisements in Western Australia are on the rise and have more than doubled since 2016. These indicators, combined with the planned major projects in Karratha, signal that there is the potential for a resurgence in the mining and resource sector in Western Australia based again on business investment.

## TWA Market in Karratha

There are 3,838 TWA beds in Karratha, which includes the new Woodside Bay Village that is expected to be completed at the end of this year or in the first quarter of 2020. At the same time, there is current demand for 3,191 TWA bed, including the peak times during routine maintenance shutdowns, which creates a surplus of 647 TWA beds. During non-shutdown periods the surplus of TWA beds is 1,991.

**Table E.1 TWA Supply in Karratha**

Facility	Number of Beds	Owner/Operator
<b>TWA Facilities owned by resource company</b>		
Wickham Lodge	186	Rio Tinto
Wickham Village	198	Rio Tinto
Cajuput	164	Rio Tinto
Bapa Maya	48	Rio Tinto
Bamba Maya	22	Rio Tinto
Searipple Village	804	Contracted to Rio Tinto
New Woodside Bay Village	604	Woodside
<i>Total Resource Related</i>	<i>2,026</i>	
<b>TWA Facilities independently owned</b>		
Searipple Village	522	Independent
Aspen Village	187	Independent
Kingfisher Ausco Stayover	257	Independent
Civeo (formerly The Mac Karratha)	298	Independent
Karratha Village	123	Independent
Cherratta Lodge	106	Independent
Velocity Village	186	Independent
Velocity Motel	47	Independent
King Village	56	Independent
Karratha Lodge	30	Independent
<i>Total Independent</i>	<i>1,812</i>	
<b>Total</b>	<b>3,838</b>	

Note: Searipple is independently owned however has a long-term contract for 804 rooms to Rio Tinto, therefore these rooms are generally not available in the market. Peninsula Palms is a Rio Tinto owned TWA with 550 rooms that is currently in care and maintenance. New Woodside Bay Village expected to be completed this year.

Source: RFF (2017); The West (2018d)

**Table E.2 TWA Demand in Karratha (Number of Beds)**

	Including Shutdown	Excluding Shutdown
Woodside Baseline	700	700
Woodside Shutdown	800	
Rio Tinto Baseline	1,075	1,075
Rio Tinto Shutdown	400	
Non-resource	216	216
<b>Total</b>	<b>3,191</b>	<b>1,991</b>

Source: RFF (2017)

**Table E.3 TWA Supply and Demand Balance in Karratha (Number of Beds)**

	Including Shutdown	Excluding Shutdown
Supply	3,838	3,838
Demand	3,191	1,991
<b>Shortage/Surplus</b>	<b>647</b>	<b>1,847</b>

Source: RFF

Given the recent announcements and the \$54.3 billion of investment that is currently planned for Karratha, there is potential that demand from FIFO workers for TWA beds will increase significantly in the short to medium term. These combined projects would likely have a construction workforce required of 6,154 workers. This level of demand could quickly fill any and all available TWA rooms in Karratha and create a situation where TWA demand would again be forced into the short-stay and residential accommodation markets. Figure E.1 shows that the Perdaman project alone (which signed a binding EPC contract late last year and plans to start construction at the end of 2019 or in 2020) could easily fill all available TWA beds in the market. If Woodside were to proceed with its second LNG train for its Pluto project, then the market would again be under considerable strain.

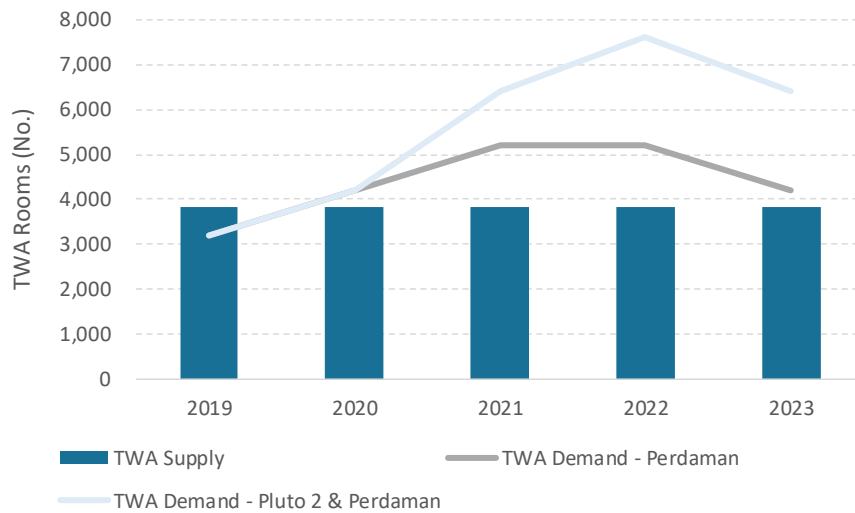
**Table E.4 Major Project Construction Workforce in Karratha**

	Construction Workforce (No.)
Woodside Pluto Train 2	2,417
Leichhardt Eramurra Salt	137
BCI Mardi Salt	200
Perdaman Fertiliser	2,000
Wesfarmers Methanol	500
Anketell	900
<b>Total</b>	<b>6,154</b>

Note: Woodside Pluto Train 2 workforce requirements estimated by using average construction workforce per LNG train on Curtis Island, QLD.

Source: Leichhardt Industries (2019); BCI (2019); Perdaman (2018); EPA (2002); API (2011); CSQ (2019); RFF

**Figure E.1 Potential Future Supply and Demand of TWA Rooms in Karratha**



Source: RFF

## Summary

Allowing an extension to the existing approval to expand the Kingfisher Stayover Village by 400 rooms for 5-10 years would assist the local market in Karratha to be in a better position to manage future spikes in demand for TWA capacity. While the extension itself would not guarantee future supply, it would allow Ausco to more quickly and efficiently develop these rooms (in reaction to market demand). The time savings provided through avoiding another development approval process would assist the TWA market in Karratha to better manage future demand and provide a greater buffer from spill over into the residential and short-stay accommodation markets.

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# 1. Introduction

Ausco has engaged RFF to conduct an economic assessment regarding the current and future operating context in Karratha for transient worker accommodation (TWA).

Ausco currently have a development approval to expand their Kingfisher Stayover Village through an additional 440 rooms, increasing overall capacity to 681 accommodation units. The development approval is set to expire later this year, so it is timely to consider the market need for future TWA rooms.

TWA plays an important role in the overall accommodation mix in Karratha, accommodating fly-in/fly-out (FIFO) workers and allowing industry and major projects to progress in the region. TWA in Karratha provides accommodation to Rio Tinto and Woodside staff (both operational and workers required during routine shutdown periods). TWA is also important for housing any construction workforce that might be associated with any major projects. Ensuring that there is sufficient TWA room capacity in Karratha is important to allow major projects access to workers during the construction phase as well as ensuring that construction related worker demand does not spill over into other forms of accommodation, namely the short-stay and residential accommodation markets. History has demonstrated that when temporary worker demand increases that without sufficient accommodation supply, this demand will fuel considerable price growth across both short-stay and residential accommodation and limit supply.

Ensuring a balance between TWA demand and supply will allow the Karratha economy to grow in a managed and more 'normalised' fashion.

This assessment considers the existing economic context in Karratha and the mining/resource sector more broadly as well as the current and potential future market for TWA in Karratha.

## 2. Project Description

Ausco currently has a development approval to expand its Kingfisher Stayover Village. The approval is for an additional 440 rooms to increase overall capacity to 681 accommodation units.

The Ausco Stayover design is intended to lift the standard of village style development throughout the Pilbara. An emphasis has been placed on the internal amenity that can be offered to residents in addition to a more environmentally sustainable development model.

Extensive landscape and recreational space will be available for use by residents including a large central recreation area which is designed to encourage greater interaction and social engagement amongst residents. On-site waste water recycling for the purpose of irrigation will be implemented. 4

The proposal specifically includes:

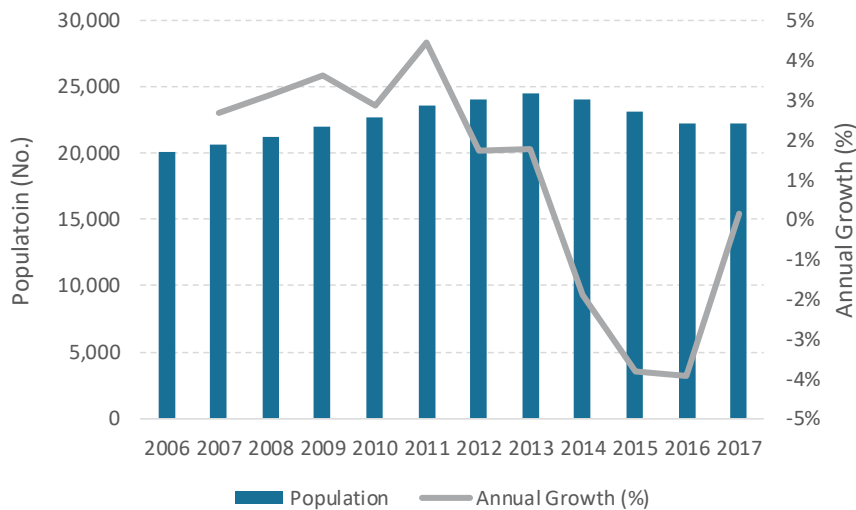
- 400 additional rooms predominantly in a single storey format however 112 units will be in a two-storey layout and are located to the rear of the new site;
- Relocation of 10 accommodation buildings and 2 laundry building in the existing village to improve circulation and layout of the site;
- Two large car parking areas increasing the total number of bays from 137 to 342 including 3 disabled bays and 11 large vehicle bays;
- A new reception building and bus pick-up/drop-off area at the front of the site;
- A new dry and wet mess which will be designed and constructed to Importance Level 4 under the Building Code of Australia allowing use as a Cyclone Shelter for emergency management purposes;
- 3 new laundry buildings; and
- Local infrastructure upgrades including a new on-site waste water treatment plant will also be constructed as part of the expansion.

## 3. Economic Context

### 3.1 Population

The population of Karratha has showed volatile swings over the last decade as major projects in the mining and resource sector created demand for new residents and then as the projects were completed or shelved, the population declined (Figure 3.1). The growth and decline of population in Karratha follows a very similar path to the mining investment boom and the rise and fall of the iron ore price. This correlation shows the impact that the resource and mining sector can have on the population of Karratha. Interestingly, over the last year the population has stabilised and numerous economic indicators would suggest that when 2018 population estimates are released by the ABS in March 2019 that the population of Karratha will have grown.

**Figure 3.1 Historic Population, City of Karratha**



Note: Estimated resident population.

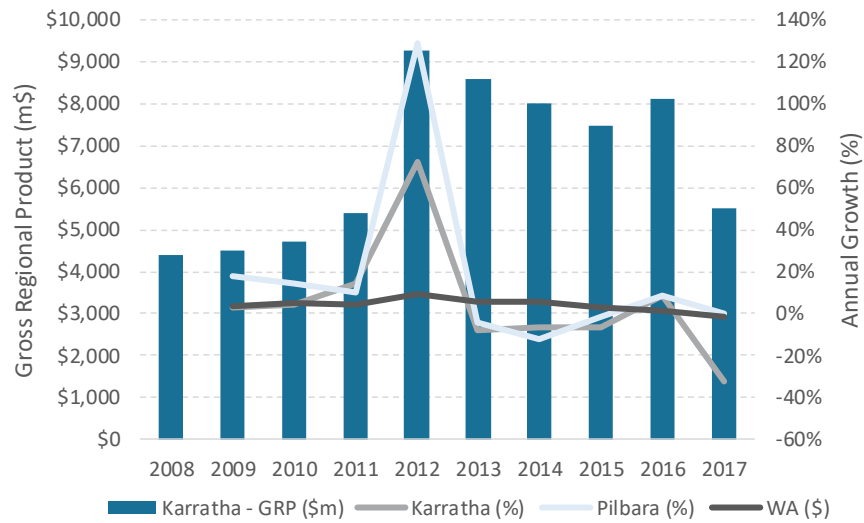
Source: ABS (2018a)

### 3.2 Local Economy

Similar to its population, the local economy has seen volatile swings in growth (Figure 3.2). Local gross regional product is estimated at \$5.5 billion and is dominated by mining and resource sector as mining, construction (mining related) and transport (port related) activity combine to make up over half of the economy (Figure 3.3).

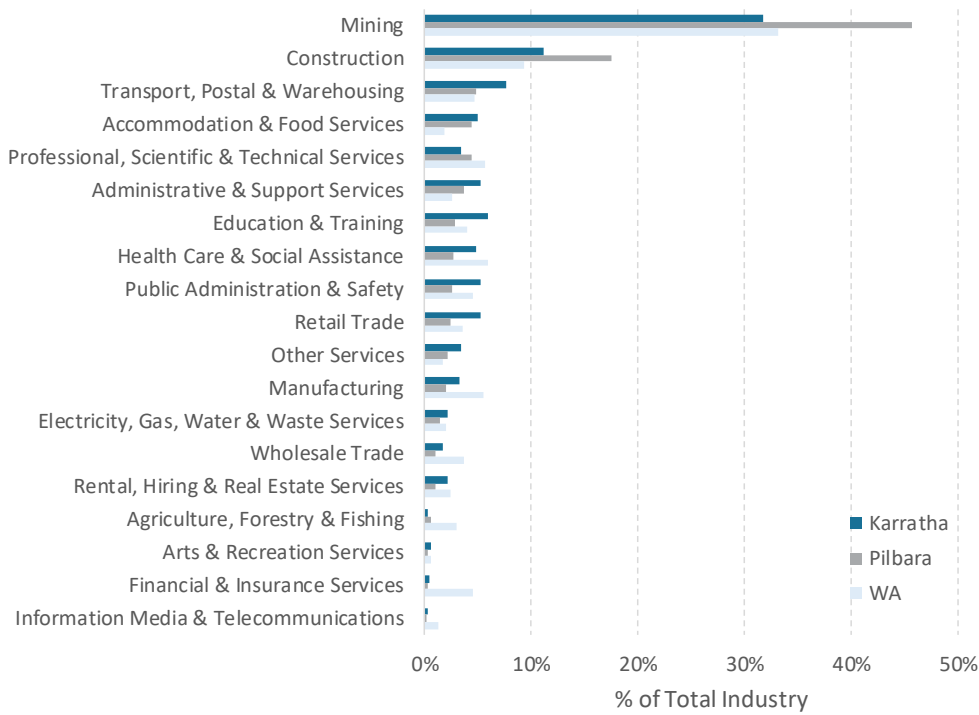
Given the nature of the economy, it is not surprising that there have been swings in employment and unemployment over the last decade (which also relates to the population increasing and decreasing during this time). From a peak in March 2014, Karratha has lost over 3,000 jobs (18% of total) (Figure 3.4). The unemployment rate has remained relatively low, which indicates that the labour force has contracted significantly, resulting in the falling population.

**Figure 3.2 Gross Regional Product, City of Karratha**



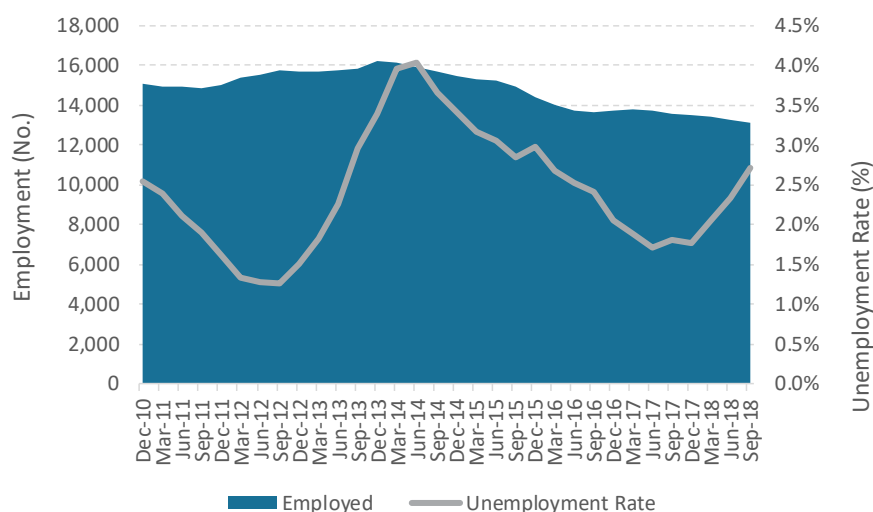
Source: REMPLAN (2019); ABS (2018b)

**Figure 3.3 Industry Value Added, % Contribution to Total (2017)**



Source: REMPLAN (2019); ABS (2018b)

**Figure 3.4 Employment and Unemployment Rate, City of Karratha**



Source: DJSB (2019)

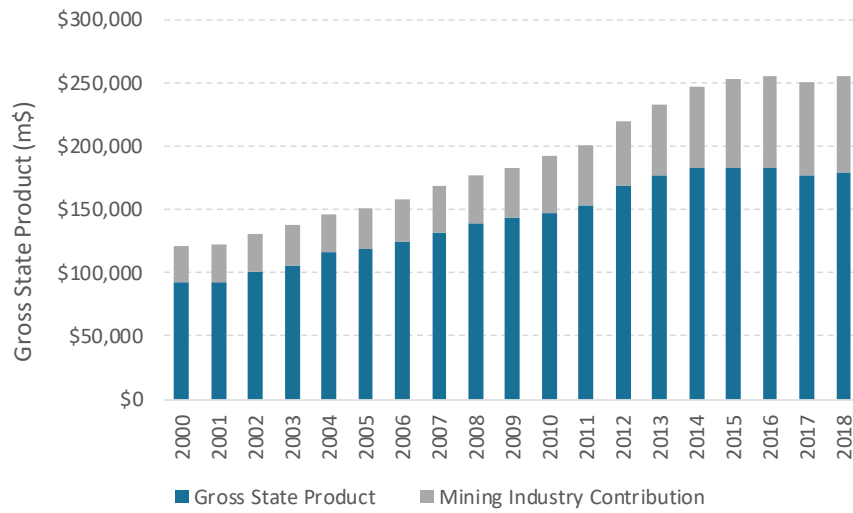
### 3.3 Mining Activity

Mining is critically important to Western Australia's economy. Its proportion of Gross State Product has increased over the last two decades, due in part to the mining investment boom transitioning into production phase, which greatly increased the production capacity of the State in general and the Pilbara particularly. Mining now contributes 30% to Gross State Product, compared with 23% in 2000 (Figure 3.5).

Final State Demand measures the internal consumption within the State (excluded imports and exports). Figure 3.6 shows that business investment (in the mining/resource sector) has been a big driver of final state demand in the past. The growth in business investment (in the mining/resource sector) was also a significant contributor to growth in Gross State Product. Equally, business investment (in the mining/resource sector) has historically followed a similar trend to expenditure on exploration activities in the State (Figure 3.7). As the graph indicates, expenditure on exploration has increased by 17% over the last year. Job advertisements in the mining sector in Western Australia have more than doubled since the low in 2016.

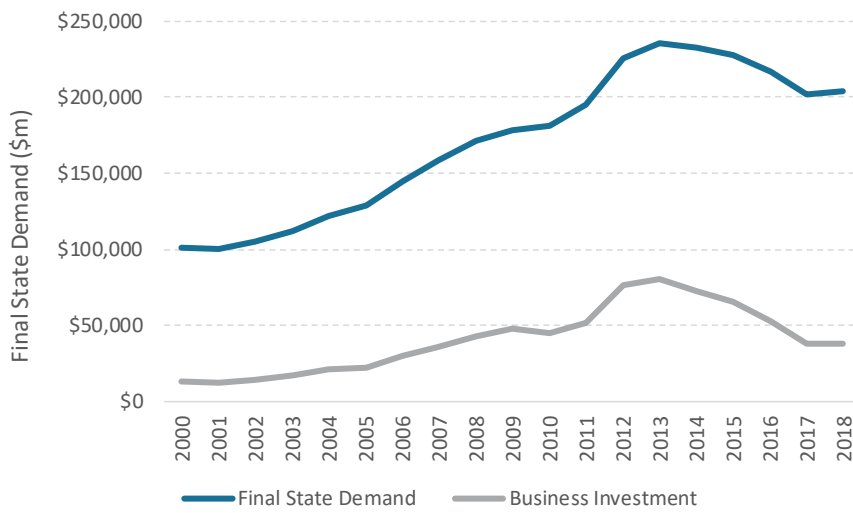
These indicators combined to signal potential future investment in the mining sector in Western Australia (and the Pilbara), which could lead to considerable economic growth, relative to the last few years.

**Figure 3.5 Gross State Product, Western Australia (\$m)**



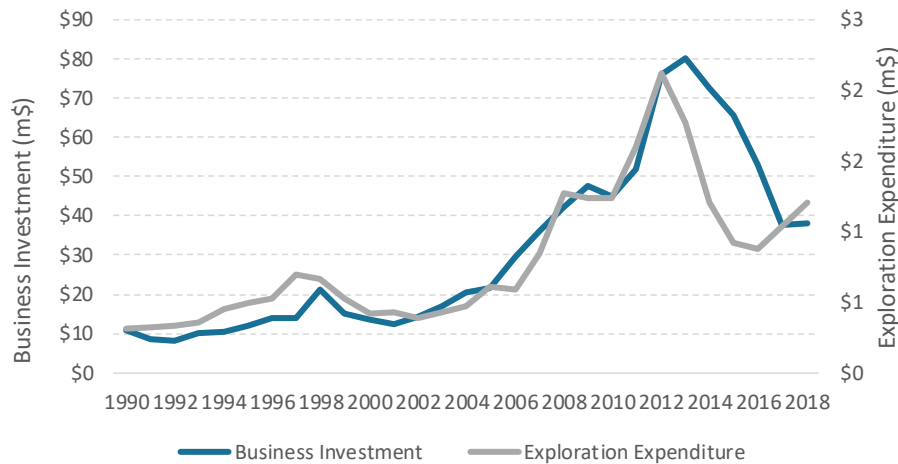
Source: ABS (2018b)

**Figure 3.6 Final State Demand and Business Investment, Western Australia (\$m)**



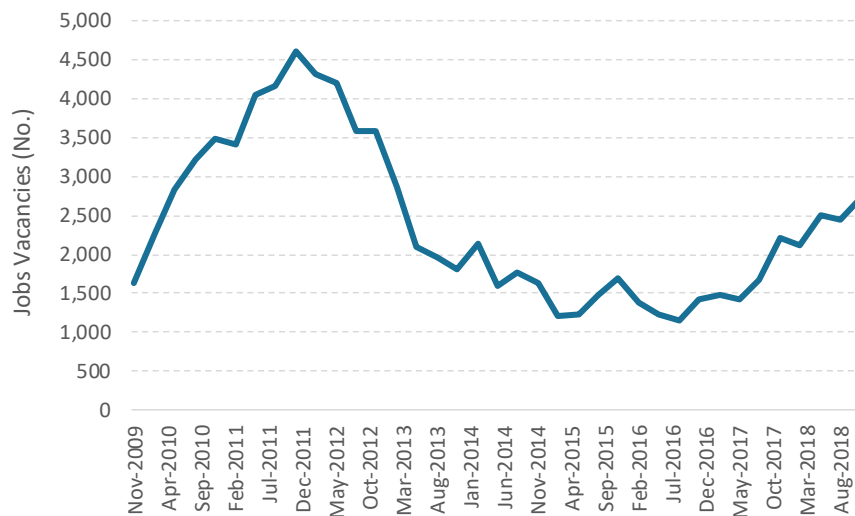
Source: ABS (2018b)

**Figure 3.7 Business Investment and Mining Exploration, Western Australia (\$m)**



Source: ABS (2018b); ABS (2018c)

**Figure 3.8 Mining Job Vacancies, Western Australia (No.)**



Source: ABS (2018d)

Over the last twelve months, there has been numerous significant announcements regarding future major projects that will impact Karratha, including:

- Rio Tinto will invest \$1.6 billion to expand the Robe River Valley operations
- Rio Tinto will invest \$2.6 billion into the Koodaideri iron ore mine
- Woodside is currently in the process of developing its \$15.4 billion Scarborough LNG project
- Woodside is in the process of developing its \$28.7 billion Browse LNG project
- Leichhardt Industries is currently planning for its \$230 million Eramurra Industrial Salt project
- BCI is currently planning for its \$335 million Mardi Salt project
- Perdaman Chemicals is building a \$4 billion urea plant in Karratha
- Wesfarmers together with Coogee Chemicals and Mitsubishi are conducting a pre-feasibility for a \$1.4 billion methanol plant to be built on the Burrup Peninsula
- There are a variety of projects including an oyster farm, algae farm, a magnesium extraction plant and a hydrogen processing plant that could see hundreds of millions of dollars invested in Karratha over the next five years

The Anketell Port Project, which received approval in 2013, is still a potential future reality. The \$4.5 billion port and infrastructure project would provide an initial shipping capacity of 40-50 million tonnes per year, with an ultimate capacity of 350 million tonnes (The West, 2016). The project was suspended in 2016 after the iron ore price fell 66% from its highs in 2011. Recently, iron ore prices have increased 63% from the lows experienced in early 2016 (World Bank, 2019).

Combined, there is the potential future investment of \$54.3 billion earmarked for Karratha over the short to medium term. Many of these projects are well advanced and have a strong likelihood of progressing through to construction phase.

#### **Future Growth in the Mining and Resource Sector in Karratha is Likely**

The Karratha economy is explicitly tied to local activity in the mining and resource sector. Historically, during the investment boom, there was considerable investment into the local region, which created significant demand for local workers (both resident workers and FIFO). This considerable demand for labour quickly outstripped all available TWA accommodation and the demand spilled over into the short-stay and residential accommodation markets, as evidenced by high prices and high occupancy rates.

It would appear that Karratha is poised again for future growth and investment from the mining and resource sector. There are currently \$54.3 billion in major projects that have been announced and many are well advanced. Combined with other indicators from a state level, there could be considerable growth in the future for local workers (both resident workers and FIFO). Any lack of future TWA accommodation could again cause a spill over effect into the short-stay and residential accommodation market, causing the same issues that were experienced during the mining investment boom.

## 4. Current and Future TWA Market

### 4.1 Current TWA Market

Table 4.1 highlights that there are 3,838 TWA beds in Karratha, which includes the new Woodside Bay Village, which is expected to be completed at the end of this year. At the same time, there is current demand for 3,191 TWA bed, including the peak times during routine maintenance shutdowns. Currently, there is a surplus of 647 TWA beds during shutdown periods and 1,991 TWA beds excluding these shutdown periods. It should be noted that shutdown periods typically last around a month and would not necessarily be scheduled at the same time, however, it is still important to consider the potential maximum demand.

**Table 4.1 TWA Supply in Karratha**

Facility	Number of Beds	Owner/Operator
<b>TWA Facilities owned by resource company</b>		
Wickham Lodge	186	Rio Tinto
Wickham Village	198	Rio Tinto
Cajuput	164	Rio Tinto
Bapa Maya	48	Rio Tinto
Bamba Maya	22	Rio Tinto
Searipple Village	804	Contracted to Rio Tinto
New Woodside Bay Village	604	Woodside
<i>Total Resource Related</i>	<i>2,026</i>	
<b>TWA Facilities independently owned</b>		
Searipple Village	522	Independent
Aspen Village	187	Independent
Kingfisher Ausco Stayover	440	Independent
Civeo (formerly The Mac Karratha)	298	Independent
Karratha Village	123	Independent
Cherratta Lodge	106	Independent
Velocity Village	186	Independent
Velocity Motel	47	Independent
King Village	56	Independent
Karratha Lodge	30	Independent
<i>Total Independent</i>	<i>1,812</i>	
<b>Total</b>	<b>3,980</b>	

Note: Searipple is independently owned however has a long-term contract for 804 rooms to Rio Tinto, therefore these rooms are generally not available in the market. Peninsula Palms is a Rio Tinto owned TWA with 550 rooms that is currently in care and maintenance. New Woodside Bay Village expected to be completed this year.

Source: RFF (2017); The West (2018d)

**Table 4.2 TWA Demand in Karratha (Number of Beds)**

	Including Shutdown	Excluding Shutdown
Woodside Baseline	700	700
Woodside Shutdown	800	
Rio Tinto Baseline	1,075	1,075
Rio Tinto Shutdown	400	
Non-resource	216	216
<b>Total</b>	<b>3,191</b>	<b>1,991</b>

Source: RFF (2017)

**Table 4.3 TWA Supply and Demand Balance in Karratha (Number of Beds)**

	Including Shutdown	Excluding Shutdown
Supply	3,838	3,838
Demand	3,191	1,991
<b>Shortage/Surplus</b>	<b>647</b>	<b>1,847</b>

Source: RFF

## 4.2 Future TWA Market

Given the recent announcements and the \$54.3 billion of investment that is currently planned for Karratha, there is potential that the local market may need to again house a significant number of construction workers. Given the nature of these projects, it is likely that the majority of these workers are likely to be FIFO workers (as opposed to resident workers). Table 4.4 shows that these projects combined could have a total requirement of 6,154 workers during their respective construction phases. This level of demand could quickly fill any and all available TWA rooms and create a situation where TWA demand would again be forced into the short-stay and residential accommodation markets. Figure 4.1 shows that the Perdaman project could easily fill all available TWA beds in the market. In November last year, Perdaman signed a binding EPC (Engineering, Procurement and Construction) contract to construction the Urea Plant. Construction could start at the end of 2019 or in 2020, which would mean that planning for their accommodation should now be underway. In October last year, Woodside awarded Bechtel the front-end engineering and design (FEED) contract for its Browse and Scarborough projects and is likely to reach a final investment decision in 2020.

If these two projects (and any of the others) materialise and move into construction phase, Karratha will require additional TWA capacity.

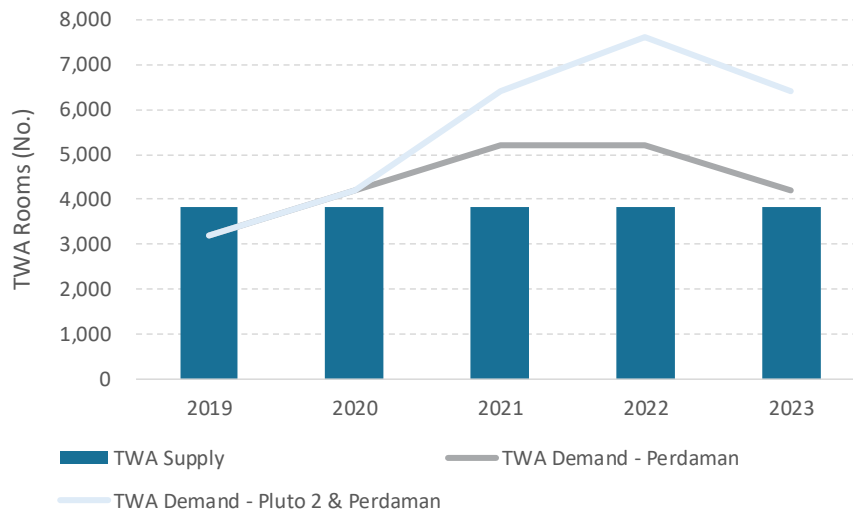
**Table 4.4 Major Project Construction Workforce in Karratha**

	Construction Workforce (No.)
Woodside Pluto Train 2	2,417
Leichhardt Eramurra Salt	137
BCI Mardi Salt	200
Perdaman Fertiliser	2,000
Wesfarmers Methanol	500
Anketell	900
<b>Total</b>	<b>6,154</b>

Note: Woodside Pluto Train 2 workforce requirements estimated by using average construction workforce per LNG train on Curtis Island, QLD.

Source: Leichhardt Industries (2019); BCI (2019); Perdaman (2018); EPA (2002); API (2011); CSQ (2019); RFF

**Figure 4.1 Potential Future Supply and Demand of TWA Rooms in Karratha**



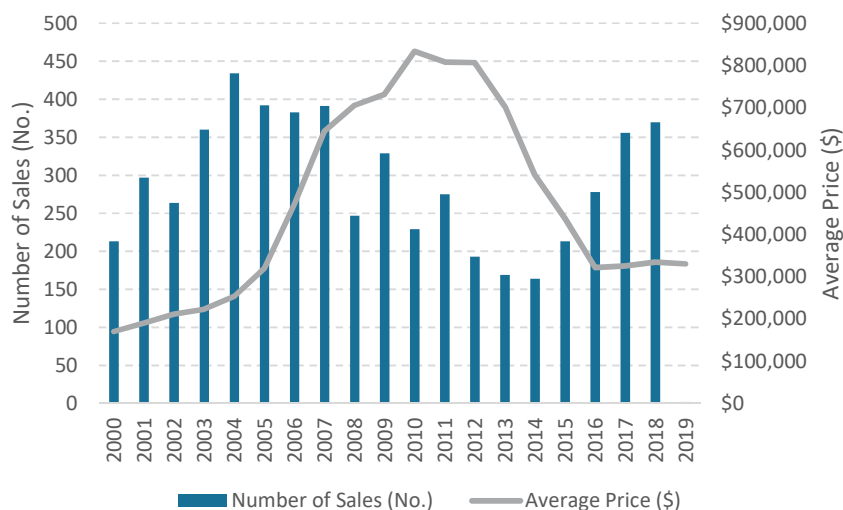
Source: RFF

### 4.3 Future Considerations

At the peak of the mining investment boom, residential houses in Karratha had an average price of \$800,000, which was 2.5 times the current average house price. The current pricing has 'normalised' and aligns well with housing prices in Karratha prior to the mining investment boom. Hotel rooms were selling for an average daily rate (ADR) of \$300 during the mining investment boom, which was on par with the Sydney and Melbourne CBD at the time. Similar to housing prices, accommodation has 'normalised' become more affordable. The dramatic price escalation that the residential and short-stay accommodation markets experienced the mining investment boom were driven directly by the significant demand for workers during this period.

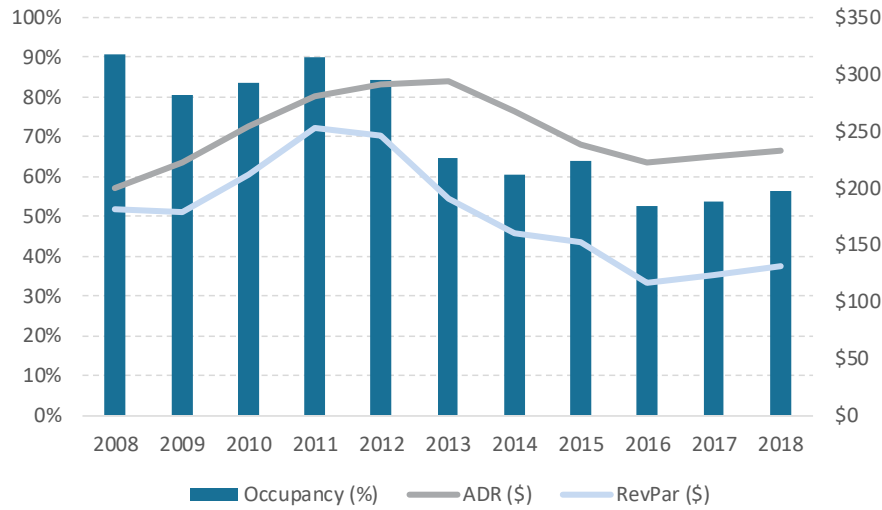
If TWA capacity in Karratha does not keep pace with changes in demand for workers, then Karratha could experience another period of dramatic price escalation. While it is unlikely that the price escalation will reach the same level as during the mining investment boom, the extent of the price increases will relate to the fundamentals of supply and demand for accommodation.

**Figure 4.2 Average House Prices, Karratha**



Source: Pricefinder (2019)

**Figure 4.3 Tourist Accommodation Market Statistics, Karratha**



Note: Growth in occupancy, ADR and RevPAR from TRA's Australian Accommodation Monitor used to identify Karratha data for 2017 and 2018.  
Source: ABS (2016); TRA (2018)

The tourism segment in Karratha has evolved since the end of the mining boom when leisure visitors were largely 'crowded out' of the market through the demand for accommodation from the mining and resource sector. It has been noted in numerous policy and strategy documents since that tourism is an important industry for Karratha and the Pilbara region as it can leverage the natural advantages of the region and provide a level of economic diversification away from mining and resource activity. Ensuring that there is sufficient TWA capacity to cater for future major projects and growth periods over the short to medium term should be considered in order to ensure the tourism sector can continue to grow locally.

## 5. Summary

This assessment has found:

- The Karratha economy is very reliant upon the mining and resource sector and has undergone periods of tremendous growth (and decline) that was directly related to mining and resource sector construction and major project activity.
- During the mining investment boom, the considerable demand for labour was not able to be captured by the TWA market and spilled over into the residential and short-stay accommodation markets, causing prices to escalate greatly (2.5 times the current rates for residential and 60% higher for short-stay accommodation).
- Construction and major project activity in Karratha is likely to increase significantly over the short to medium term as various projects may move into construction phase.
- While current capacity exists in the TWA market locally, this existing capacity could be quickly filled depending when and if various major projects proceed to construction phase.
- Having additional approved TWA rooms ready for construction could shorten the time required to meet future demand, if major projects proceed to construction phase in the future (by avoiding the often long lead times required to purchase land, conduct design and architectural work and submit a development approval).
- Enabling TWA capacity to more rapidly meet the market (through having existing approvals) will assist in managing future spikes in demand based on major project construction timelines and maintaining more 'normalised' pricing for residential and short-stay accommodation.
- Ensuring that the TWA capacity locally can expand quickly will provide some buffer for the local tourism sector, ensuring affordability and availability of short-stay accommodation.

If Ausco's existing approval for an additional 404 rooms were to be extended for 5-10 years, the development could likely then be delivered to the market in a timely manner to meet the demand for future expected major projects.

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## Attachment 5 – Bushfire Management Plan





# Lot 500 Madigan Road, Gap Ridge

## Bushfire Management Plan

Date: 26 February 2024

Prepared for: RFF Pty Ltd

Linfire Ref: 20240119335RFF-BMP-001\_A

**Linfire Consultancy**

ABN: 577 930 47299

Revision	Issue Date	Revision Description	Approved By
A	26 Feb 2024	Issued for Review	Linden Wears (Level 3 BPAD 19809)



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Further, the achievement of the level of implementation of fire precautions will depend on the actions of the landowner or occupiers of the land, over which Linfire has no control. If the proponent becomes concerned about changing factors then either a review of the existing BMP, or a new BMP, should be requested. Linfire accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report and its supporting material by any third party.

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## 1.0 Proposal details

### 1.1 Background

RFF Pty Ltd, on behalf of the Proponent, are seeking to lodge a Local Planning Scheme (LPS) Amendment application for the proposed development across the eastern portion of Lot 500 Madigan Road, Gap Ridge (the project area) in the City of Karratha. The proposed development seeks to provide additional short-stay accommodation, similar to the existing Ausco Stayover Kingfisher Village within western portion of the lot, and requires amendment of the City of Karratha LPS No. 8 to rezone from Rural Residential to Tourism. A zoning plan has been provided in Figure 1, with the project area shown in blue dashed line.

### 1.2 Site description

The project area comprises approximately 3.78 ha of Lot 500, and has not been previously developed so is currently vegetated.

The project area is surrounded by the following (see Figure 2):

- Directly west of the project area is existing short-stay accommodation at the Ausco Stayover Kingfisher Village, with Madigan Road further to the west.
- Lot 501 Madigan Road directly to the south, is undeveloped Crown Land that is largely uncleared, although there are several areas cleared areas within the lot.
- Lot 331 envelopes that project area to the east and the north, and is Unallocated Crown Land that is largely uncleared.

Access to the project area is currently via Madigan Road to the west, with future access to be extended from the existing internal driveways within the Ausco Stayover Kingfisher Village. There is currently reticulated water supply to the site, however there doesn't appear to be existing street hydrants along this part of Madigan Road.

The project area is designated as bushfire prone on the *Map of Bush Fire Prone Areas* (DFES 2023; see Plate 1).

### 1.3 Purpose

This Bushfire Management Plan (BMP) has been prepared to address requirements under *Policy Measure 6.3 of State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015) and *Guidelines for Planning in Bushfire-Prone Areas* (the Guidelines; WAPC 2021).

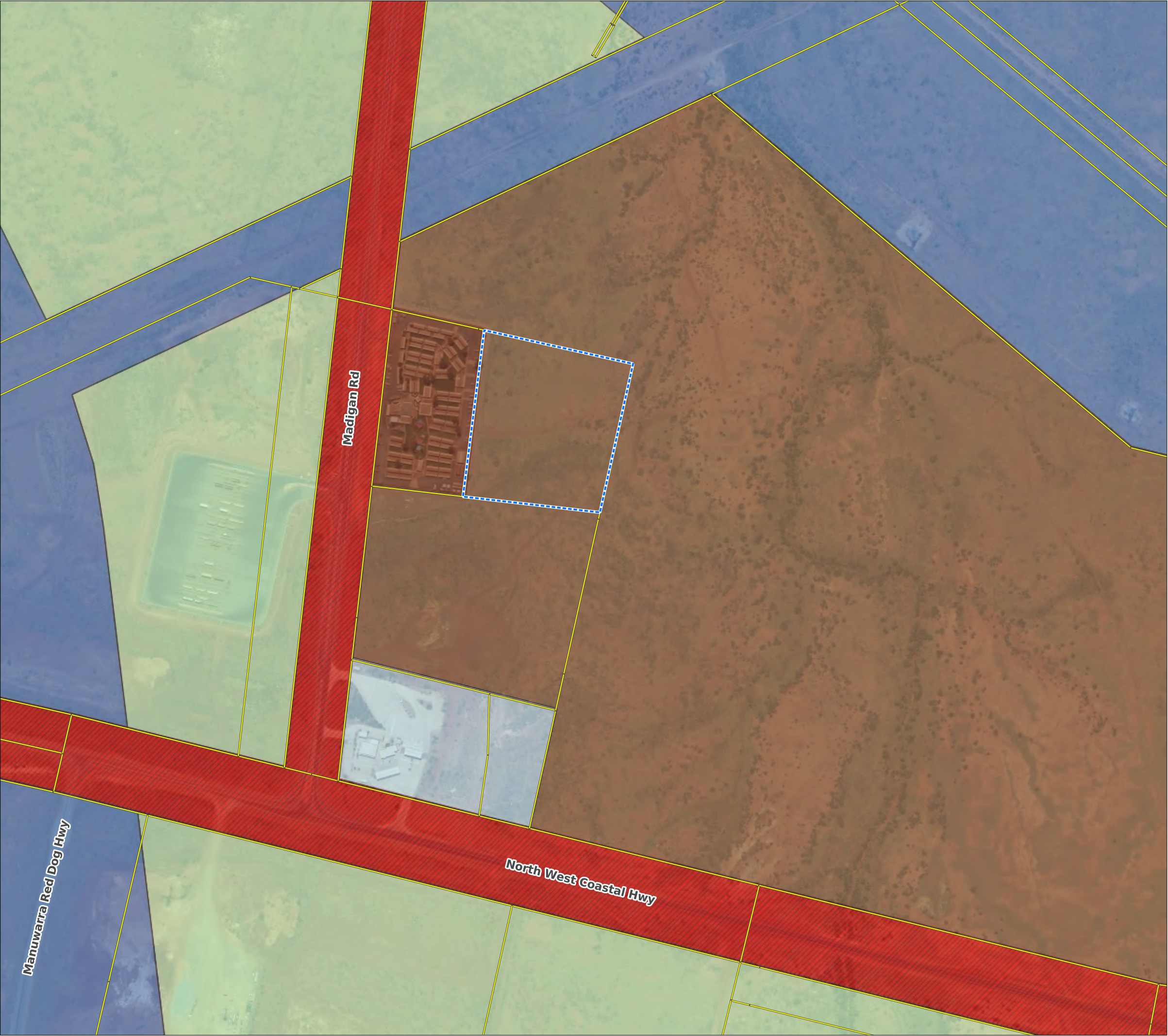
Linfire note that the final use of future development is still to be determined, and while it is likely will be for short-stay accommodation by transient workers, it may also be used by tourists. On this basis, the assessment against the Guidelines, has been conducted for Elements 1 to 4 (if more of workers accommodation) and also against Element 5 (if assessed as vulnerable tourism accommodation).

### 1.4 Other plans/reports

There are no known bushfire reports or assessments that have been prepared previously for the project area.



**Plate 1: Map of Bush Fire Prone Areas (DFES 2023)**



Legend

- Cadastre
- Local Planning Scheme
  - Shopping / commercial
  - Infrastructure
  - Rural
  - Rural residential
  - State and regional roads
  - Tourism

Scale 1: 5,000

0 70 140 210 Metres



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Figure 1: Zoning Plan

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Legend

-  Project Area
-  100m
-  150m
-  Cadastre

Scale 1:2,500



0 40 80 120 Metres



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Figure 2: Site Overview

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## 2.0 Environmental considerations

### 2.1 Native vegetation - modification and clearing

The project area is largely uncleared of vegetation, and it is expected that the site will need to be cleared to accommodate development as part of future planning applications. Table 1 provides a summary of a search of publicly available environmental data.

Linfire assumes that all relevant environmental and aboriginal heritage studies will be undertaken to support the project, and if any State and Federal environmental referrals and approvals are required, they will be sought prior to commencing on-site vegetation modification or clearing required to construct the development.

**Table 1: Summary of environmental values**

Environmental value	Not mapped as occurring within or adjacent to the project area	Mapped as occurring within or adjacent to the project area		Description
		Within	Adjacent	
Environmentally Sensitive Area	✓			No part of the project area is identified as being an Environmentally Sensitive Area, nor is any adjacent land.
Swan Bioplan Regionally Significant Natural Area	✓			No Regionally Significant Natural Areas were identified.
Ecological linkages	✓			No ecological linkages were identified.
Wetlands	✓			No wetlands are mapped as occurring within or adjacent to the project area
Waterways	✓			No waterways are mapped within the project area or in adjacent land however there is evidence of a waterway is located approximately 250 m to the west of the project area. This is not anticipated to be impacted by the proposed development.
Threatened Ecological Communities listed under the EPBC Act		✓	✓	This layer is currently publicly available at a very coarse level but suggests that Threatened Ecological Communities could occur within the project area and in adjacent land.
Threatened and priority flora	✓			No Threatened and Priority Flora are mapped as occurring within or adjacent to the project area
Fauna habitat listed under the EPBC Act	✓			No fauna habitat was mapped as occurring within or adjacent to the project area

Environmental value	Not mapped as occurring within or adjacent to the project area	Mapped as occurring within or adjacent to the project area		Description
		Within	Adjacent	
Threatened and priority fauna	✓			No Threatened and Priority Fauna are mapped as occurring within or adjacent to the project area
Bush Forever Site	✓			No Bush Forever Area is mapped as occurring within or adjacent to the project area.
DBCA managed lands and waters (includes legislated lands and waters and lands of interest)	✓			No DBCA managed lands and waters is mapped as occurring within or adjacent to the project area.
Conservation covenants	✓			No information has been provided by the client regarding Conservation Covenants.
Crown Reserves			✓	The following Crown Reserves have been identified adjacent to the project area: <ul style="list-style-type: none"> <li>R 31113 (west of Msdigan Road – MRWA management order)</li> </ul>
Aboriginal Heritage	✓			No Aboriginal Heritage Places are mapped as occurring within or adjacent to the project area. The nearest heritage place are Registered Sites 7509 and 387, approximately 450 m north and 650 m north-east respectively. With Other Heritage Place 7510 approximately 250 m north.

## 2.2 Revegetation / Landscaping

Pre-development mapping depicting the current vegetation classifications and extent, is provided in Section 3.1.3, with the anticipated post-development vegetation classifications following completion of the development, identified in Section 3.1.4.

While the project area is currently vegetated, all vegetation is expected to be cleared as part of future tourism development. Any required Asset Protection Zones (APZs) are to be either non-vegetated elements or landscaped in accordance with Schedule 1 of the Guidelines (refer to Appendix 2). All other future landscaping onsite, is to comply with the requirements of AS 3959 Clause 2.2.3.2 (e) and (f) (refer to Appendix 3), and align with the principles of Schedule 1 of the Guidelines.

### **3.0 Bushfire assessment results**

#### **3.1 Assessment inputs**

##### **3.1.1 Vegetation classification**

Linfire assessed classified vegetation and exclusions within 150 m of the project area through on-ground verification on 11 February 2024 in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016). Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix 1, depicted in Figure 3 (pre-development) and Figure 4 (post-development) and summarised on Table 2 and Table 3.

The assessed classified vegetation that is expected to remain following development works is as follows:

- Class C Shrubland
- Class D Scrub

A summary of the assessed exclusions are as follows:

- Clause 2.2.3.2 (e) areas of non-vegetated land such as land cleared for existing and proposed roads, infrastructure and buildings
- Clause 2.2.3.2 (f) land managed in a minimal fuel low threat condition, such as road verges, managed gardens and lawns including the managed POS areas.

Other exclusions that may be relevant for future development are as follows:

- Clause 2.2.3.2 (a) plots of unmanaged vegetation further than 100 m from the project area
- Clause 2.2.3.2 (c) isolated plots of unmanaged vegetation, that will be less than 2500 m<sup>2</sup> and will be located so it is further than 20 m from any proposed lots or any other classified vegetation
- Clause 2.2.3.2 (d) isolated plots of unmanaged vegetation, that will be less than 20 m wide and will be located so it is further than 20 m from any proposed lots or any other classified vegetation

Exclusions under Clauses 2.2.3.2 (e) and (f) used for all non-vegetated elements and managed vegetation proposed as part of the development, with Clauses 2.2.3.2 (c) and (d) potentially used to exclude vegetation associated with small plots of unmanaged vegetation such as future drainage areas, if possible.

##### **3.1.2 Effective slope**

Linfire assessed effective slope under classified vegetation through on-ground verification on 11 February 2024 in accordance with AS 3959. Results were cross-referenced with Landgate 10m contour data and are depicted in Table 2, Table 3 and Figures 3 and 4.

Site observations are that there is a gentle slope from west to east across the landscape, toward a local waterway 225 m east of the project area.

##### **3.1.3 Pre-development inputs**

A summary of the assessed pre-development classified vegetation, exclusions and effective slope within the project area, and the adjacent 150 m, are listed in Table 2 and illustrated in Figure 3.

**Table 2: Pre-development vegetation classifications/exclusions and effective slope**

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class C Shrubland	Flat/upslope (0°)	Vegetation less than 2m high, containing areas of grassland and smaller shrubs, with very occasional shrub.
2	Class C Shrubland	Downslope >0–5°	
3	Class D Scrub	Flat/upslope (0°)	Localised areas where plots of vegetation are 2 m to 6 m high (more typically 4m high). Often this classification still includes a significant amount of grass and shrubland vegetation, however the more concentrated presence of taller vegetation has required a more conservative classification.
4	Class D Scrub	Downslope >0–5°	
5	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing non-vegetated elements and low threat vegetation within existing development on Lot 500 and also within Madigan Road verge, largely consisting of internal roads, paths, buildings, cultivated gardens and maintained lawns.
6	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	Existing non-vegetated along Madigan Road and in lots adjacent to the project area and Lot 500.

### 3.1.4 Post-development inputs

A summary of the potential post-development classified vegetation, exclusions and effective slope within the project area, and the adjacent 150 m, are listed in Table 3 and illustrated in Figure 4.

The post-development vegetation classifications for all land external to the project area has remained the same as for the pre-development classifications. If external vegetation is altered prior to future planning stages, the change in vegetation condition is to be captured through a future BHL assessment or BAL contour map assessment.

Within the project area, the BMP assumes that there will be no onsite vegetation retention following construction of future tourism development, internal roads and infrastructure. Should any vegetation retention or revegetation be proposed as part of future development, or should proposed drainage swales or basins be unable to be excluded from classification, it is expected that sufficient separation will need to be provided as part of future planning so that any BAL impact on habitable buildings is limited to BAL-29 or lower and captured through a future BHL assessment or BAL contour map assessment.

**Table 3: Post-development vegetation classifications/exclusions and effective slope**

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class C Shrubland	Flat/upslope (0°)	Vegetation less than 2m high, containing areas of grassland and smaller shrubs, with very occasional shrub.
2	Class C Shrubland	Downslope >0–5°	

Vegetation plot	Vegetation classification	Effective slope	Comments
3	Class D Scrub	Flat/upslope (0°)	Localised areas where plots of vegetation are 2 m to 6 m high (more typically 4m high). Often this classification still includes a significant amount of grass and shrubland vegetation, however the more concentrated presence of taller vegetation has required a more conservative classification.
4	Class D Scrub	Downslope >0–5°	
5	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing non-vegetated elements and low threat vegetation within existing development on Lot 500 and also within Madigan Road verge, largely consisting of internal roads, paths, buildings, cultivated gardens and maintained lawns.
6	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	Existing non-vegetated along Madigan Road and in lots adjacent to the project area and Lot 500.
7	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Project area to be modified to non-vegetated elements and low threat vegetation as part of this development.



Legend

- Photo Location
- Contours
- Project Area
- 100m
- 150m
- Cadastre
- Vegetation Plot
- Classified Vegetation
  - C. Shrubland
  - D. Scrub
  - Excluded Clause 2.2.3.2(e)
  - Excluded Clause 2.2.3.2(e&f)

Scale 1:1,700

0 30 60 90 Metres



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Figure 3: Pre-development vegetation classification and effective slope

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Legend

- Contours
- Project Area
- Assessment Area
  - 100m
  - 150m
- Vegetation Plot
- Classified Vegetation
  - C. Shrubland
  - D. Scrub
  - Excluded Clause 2.2.3.2(e)
  - Excluded Clause 2.2.3.2(e&f)
  - Modified to non vegetated and low threat

Scale 1:1,700



0 30 60 90 Metres

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Lot 500 Madigan Road, Gap Ridge

Figure 4: Post-development vegetation classification and effective slope

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## 3.2 Assessment outputs

In accordance with SPP 3.7 Policy Measure 6.3, a bushfire hazard level (BHL) assessment can be used for strategic proposals, or where lot layout is known, a Bushfire Attack Level (BAL) contour assessment to determine the indicative acceptable BAL ratings across the site. In this instance, given the lot layout is not currently known, a BHL assessment has been provided to demonstrate that compliance can be achieved at future planning stages.

### 3.2.1 Bushfire Hazard Level (BHL) assessment

Pre- and post-development vegetation extents have been assigned a bushfire hazard level in accordance with the methodology detailed in Appendix Two of the Guidelines as outlined in Table 4.

**Table 4: Bushfire hazard levels and characteristics**

Bushfire hazard level	Characteristics*
Extreme	<ul style="list-style-type: none"> <li>Class A Forest</li> <li>Class B Woodland (05)</li> <li>Class D Scrub</li> <li>Any classified vegetation with a greater than 10° slope.</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>Class B Low woodland (07)</li> <li>Class C Shrubland</li> <li>Class E Mallee/Mulga</li> <li>Class G Grassland, including sown pasture and crops</li> <li>Class G Grassland: Open woodland (06), Low open woodland (08), Open shrubland (09)</li> <li>Vegetation that has a low hazard level but is within 100 metres of vegetation classified as a moderate or extreme hazard, is to adopt a moderate hazard level.</li> </ul>
Low	<ul style="list-style-type: none"> <li>Low threat vegetation may include areas of maintained lawns, golf courses, public recreation reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks</li> <li>Managed grassland in a minimal fuel condition (insufficient fuel is available to significantly increase the severity of the bushfire attack). For example, short-cropped grass to a nominal height of 100 millimetre</li> <li>Non-vegetated areas including waterways, roads, footpaths, buildings and rock outcrops.</li> </ul>

\*Vegetation classifications from AS 3959-2018 Table 2.3.

#### 3.2.1.1 Pre-development BHL assessment

Linfire has mapped the pre-development bushfire hazard levels within the project area and adjacent 150 m wide assessment area. The bushfire hazard levels have been assessed on the basis of the vegetation discussed in Section 3.1.3 (i.e. the current pre-development extent of vegetation within, and surrounding, the project area).

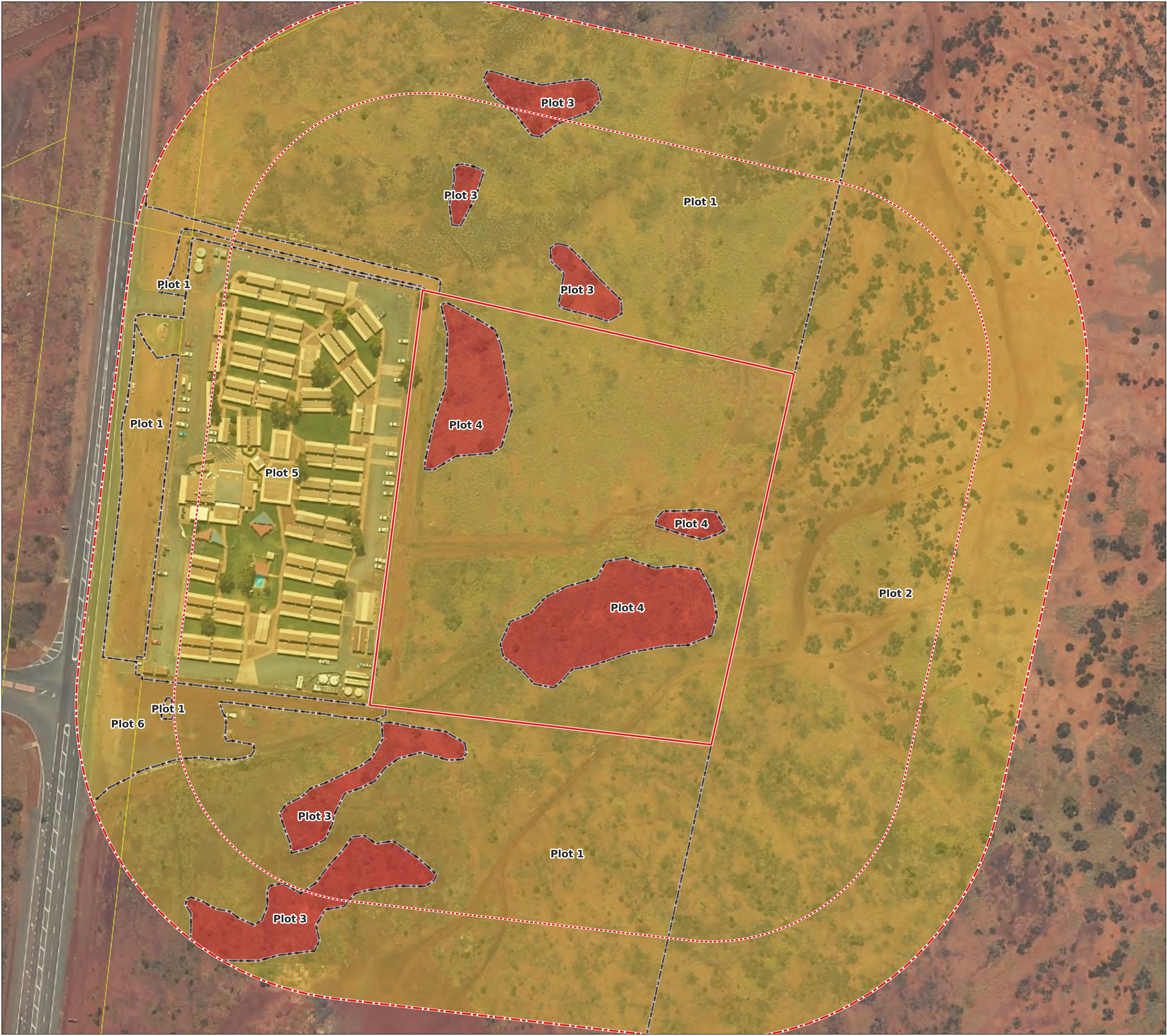
The pre-development BHL assessment (refer to Figure 5) show that based on the existing vegetation, the project area contains land with Moderate and Extreme bushfire hazard levels.

#### 3.2.1.2 Post-development BHL assessment

Linfire has mapped the potential post-development bushfire hazard levels to demonstrate that the future bushfire hazard levels will be acceptable for future development to occur within the project area. The bushfire hazard levels have been assigned on the basis of the vegetation discussed in Section 3.1.4 and the future expected vegetation extent within and surrounding the project area.



The post-development BHL assessment (refer to Figure 6) demonstrate that all future habitable development (i.e. flat land within proposed lots) will be located on land with be Moderate and Low bushfire hazard level.



Legend

- Project Area
- 100m
- 150m
- Cadastre
- Vegetation Plot
- Bushfire Hazard Level
  - Extreme
  - Moderate

Scale 1:1,700



0 30 60 90 Metres



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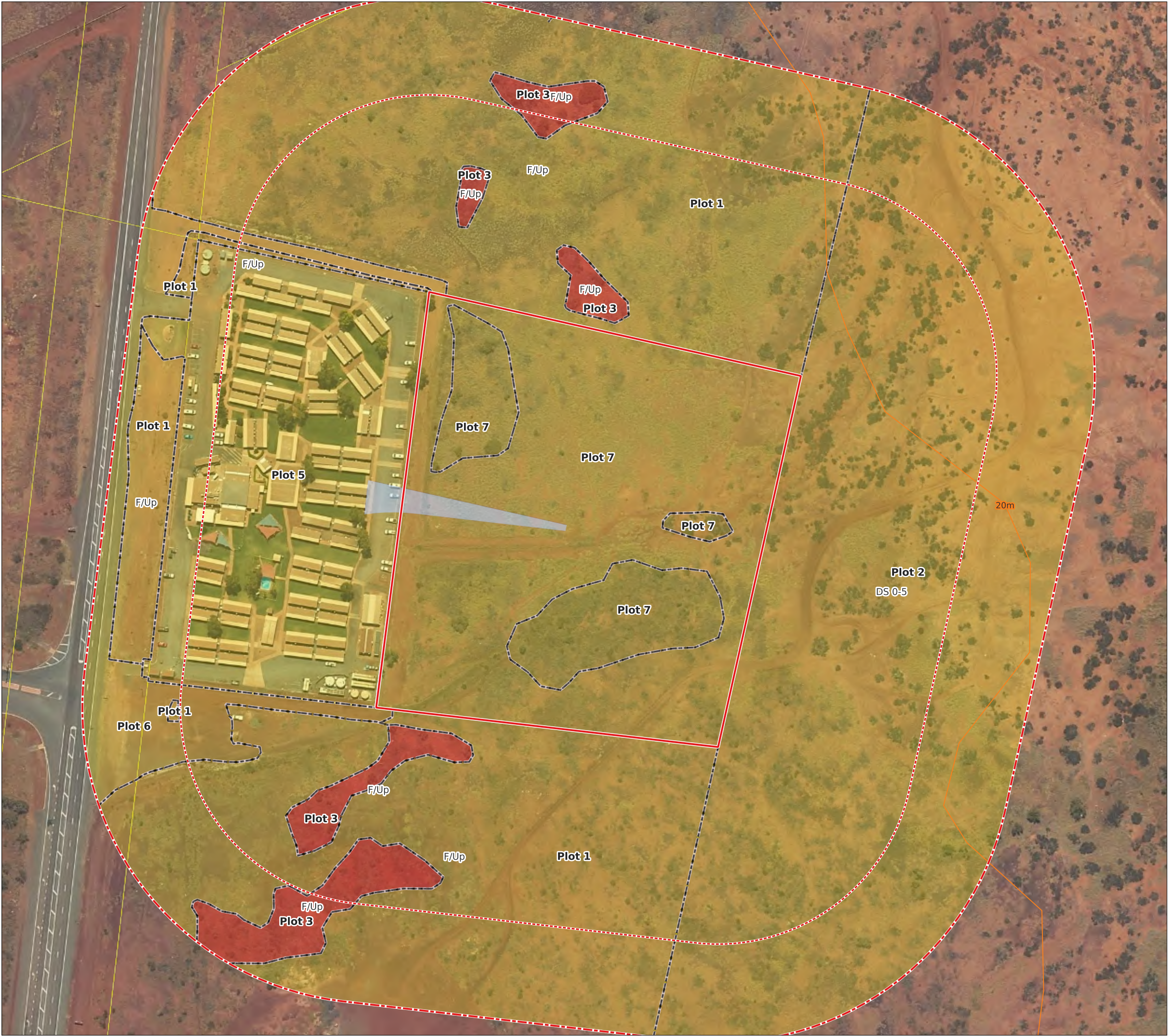
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Figure 5: Pre-development BHL assessment

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Legend

- Contours
- Project Area
- Assessment Area
  - 100m
  - 150m
- Vegetation Plot
- Bushfire Hazard Level
  - Extreme
  - Moderate
  - Low

Scale 1:1,700



0 30 60 90 Metres



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Figure 6: Post-development BHL assessment

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## **4.0 Identification of bushfire hazard issues**

### **4.1 Bushfire context**

Upon completion of the development, the predominant bushfire risk to the project area is from the broad extent of unmanaged grassland and woodland vegetation to the north, east and south of the project area, with continuous fires runs kilometres long in all these directions. Fires from other directions, especially the west, are largely shielded by existing tourism development and other cleared land, resulting in less chance of bushfire directly impacting the project area. Notwithstanding, bushfires do have the potential to impact the site with elevated radiant heat and ember attack if the risk is not managed.

### **4.2 Bushfire hazard issues**

Examination of strategic development design in accordance with the concept plan and pre and post-development bushfire hazards has identified the following bushfire hazard issues to be considered at future planning stages:

1. Based on the existing extent of vegetation outside the project area, parts of the proposed development would subject to an initial BAL of BAL-FZ, if unmanaged. In order for the development to achieve a compliant rating of BAL-29 or less, sufficient separation need to be provided between habitable development and classifiable, unmanaged vegetation. Similarly, sufficient separation will also be required from any classifiable onsite vegetation, if any, to achieve BAL-29 or less.
2. Provision of a coherent internal vehicular access network to ensure occupants are able to egress away from bushfire, and fire brigade has appropriate and flexible access to habitable development and direct interfaces with unmanaged vegetation
3. Provision of a secure water supply for bushfire fighting activities.
4. Ensure the bushfire risk to any future vulnerable land uses is appropriately considered and mitigated.

### **4.3 Bushfire safety strategy**

The following bushfire safety strategy is proposed to demonstrate compliance with the Bushfire Protection Criteria of the Guidelines at future planning stages, in order to address the bushfire hazards identified above:

1. Create sufficient separation between future habitable buildings and post-development classified vegetation outside the project area, to achieve BAL-29 or lower in accordance with AS 3959. All land within the project area is expected to be either non-vegetated or low threat landscaping, otherwise APZ will also be required from any classified vegetation within the project area. Internal APZ setbacks may be required within some lots to prevent development in areas of BAL-40/FZ.
2. Ensure vehicular access to and from the proposed development complies with the technical specifications of Guidelines.
3. Ensure a secure bushfire fighting water supply, most likely through use of static firewater tanks.
4. Ensure a Bushfire Emergency Evacuation Plan accompanies the BMP for any future planning applications for vulnerable land uses.

Based on the above, Linfire considers the bushfire hazards within and adjacent to project area and the associated bushfire risks are manageable through standard management responses outlined in the Guidelines and AS 3959. These responses will be factored into proposed development as early as possible at all stages of the planning process to ensure a suitable, compliant and effective



bushfire management outcome is achieved for protection of future life, property and environmental assets.

## 5.0 Assessment against the bushfire protection criteria

Given the final occupants of the future development is still to be determined,

### 5.1 Compliance assessment against the Bushfire Protection Criteria (Elements 1 to 4)

An acceptable solutions assessment against Elements 1 to 4 of the bushfire protection criteria is provided in Table 5.

**Table 5: Compliance with the bushfire protection criteria of the Guidelines**

Bushfire protection criteria			Development response	
Performance Principle	Acceptable solutions	Planning Stage	Method of compliance	Proposed bushfire management measures
<b>Element 1: Location</b> <i>Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure</i>				
<b>Performance Principle P1</b> The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low, or a BAL-29 or below, and the risk can be managed.  For unavoidable development in areas where BAL-40 or BAL-FZ applies, demonstrating that the risk can be managed to the satisfaction of the decision-maker.	<b>A1.1 Development location</b> The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL-29 or below.	All	<b>Acceptable Solution</b>	The post-development BHL assessment (Figure 6), which assumes future development will modify the project area to non-vegetated or low threat vegetation, demonstrates that on completion of development, all developable land will comprise Moderate and Low bushfire hazard level, which is compliant with A1.1.
<b>Element 2: Siting and design of development</b> <i>Intent: To ensure that the siting and design of development minimises the level of bushfire impact.</i>				
<b>Performance Principle P2</b> The siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire threat that applies to the site. The proposal incorporates a defensible space and significantly reduces the heat intensities at the building surface thereby minimising the bushfire risk to people, property and infrastructure, including compliance with AS 3959 if appropriate.	<b>A2.1 Asset Protection Zone (APZ)</b> Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:  <b>Width:</b> Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m <sup>2</sup> (BAL-29) in all circumstances.  <b>Location:</b> the APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes)  <b>Management:</b> the APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones' (see Guidelines Schedule 1).	All	<b>Acceptable Solution</b>	Where post-development vegetation (including any proposed onsite unmanaged retention, rehabilitation or drainage vegetation) is not able to be excluded in accordance with AS 3959 Clause 2.2.3.2, sufficient separation will be required to achieve BAL-29 at proposed habitable development. Strategies to achieve this separation include the use of: <ul style="list-style-type: none"> <li>• interfacing roads or driveways,</li> <li>• firebreaks,</li> <li>• building setbacks</li> <li>• targeted onsite non-vegetated elements and/or managed low threat landscaping</li> <li>• strategically located and vegetated drainage basins to reduce separation requirements.</li> </ul> The required separation distances (including APZs where required) will be identified for each stage of planning application, where required, based confirmed lot layout and BAL contour assessment. Based on the vegetation classifications identified during the site assessment, or considered potentially likely within the assessment area, the following separation distances may apply to achieve BAL-29: <ul style="list-style-type: none"> <li>• 9 m from Class C shrubland (flat/upslope)</li> <li>• 10 m from Class C shrubland (downslope 0°-5°)</li> <li>• 13 m from Class D scrub (flat/upslope)</li> <li>• 15 m from Class D scrub (downslope 0°-5°)</li> </ul> At future planning stages, it will be possible to define the required APZs widths and locations to respond to unmanaged vegetation more accurately. Any identified APZs are to be implemented and maintained in accordance with Schedule 1 of the Guidelines (see Appendix 2) and the City of Karratha Firebreak Notice (see Appendix 6). Outside of

Bushfire protection criteria			Development response	
Performance Principle	Acceptable solutions	Planning Stage	Method of compliance	Proposed bushfire management measures
				nominated APZs and areas of unmanaged vegetation, any landscaping within the project area, will likely consist of low threat and managed gardens in accordance with AS 3959 Clause 2.2.3.2 (f) (refer Appendix 3) and Schedule 1 of the Guidelines (refer to Appendix 2).  If any staging of development is to occur, it may be necessary to consider staging buffers to remove any temporary BAL-40/FZ impacts from vegetation remaining in undeveloped parts of the project area, or temporarily quarantine until the bushfire hazard can be removed.
<b>Element 3: Vehicular access</b>				
<i>Intent: To ensure that the vehicular access serving a subdivision/ development is available and safe</i>				
<b>Performance Principle P3i</b> The design and capacity of vehicular access and egress is to provide for the community to evacuate to a suitable destination before a bushfire arrives at the site, allowing emergency services personnel to attend the site and/or hazard vegetation.	<b>A3.1 Public Roads</b> <i>The minimum requirements under this acceptable solution are applicable to all proposed and existing public roads.</i> Public roads are to meet the minimum technical requirements in Table 6, Column 1. The trafficable (carriageway/pavement) width is to be in accordance with the relevant class of road in the Local Government Guidelines for Subdivisional Development (IPWEA Subdivision Guidelines), Liveable Neighbourhoods, Austroad standards and/or any applicable standards for the local government area.	SP, Sb, Do	<u>Existing compliance with Acceptable Solution</u>	No public roads are currently proposed as part of future development. Vehicular access to project area is from Madigan Road, which is a sealed two-way road that appear to be compliant with Guidelines, and are sufficient for occupant egress and emergency services access. Should any public roads be proposed as part of future development, they will be required to comply with the relevant technical requirements of the Guidelines (see Appendix 4).
	<b>A3.2a Multiple access routes</b> Public road access is to be provided in two different directions to at least two different suitable destinations with an all-weather surface (two-way access). If the public road access to the subject site is via a no-through road which cannot be avoided due to demonstrated site constraints, the road access is to be a maximum of 200 metres from the subject lot(s) boundary to an intersection where two-way access is provided. The no-through road may exceed 200 metres if it is demonstrated that an alternative access, including an emergency access way, cannot be provided due to site constraints and the following requirements are met: <ul style="list-style-type: none"> <li>the no-through road travels towards a suitable destination; and</li> <li>the balance of the no-through road, that is greater than 200 metres from the subject site, is wholly within BAL-LOW, or is within a residential built-out area – Figure 23.</li> </ul>	SP, Sb, Do	<u>Acceptable Solution</u>	The project area is already well-served by the existing public road network, namely Madigan Road, which is a two-way road providing for travel north (to Dampier Highway) and south (to NW Coastal Highway) to suitable destinations. Internal access from the project area to Madigan Road, is expected to be via the existing accommodation village driveway network, which addressed further below under A3.6. Based on the above, future development is able to be provided with at least, two access routes which meets and exceeds the requirements of Acceptable Solution A3.2a.
	<b>A3.2b Emergency access way</b> <i>Where it is demonstrated that A3.2a cannot be achieved due to site constraints, or where an alternative design option does not exist, an emergency access way can be considered as an acceptable solution.</i> An emergency access way is to meet all the following requirements: <ul style="list-style-type: none"> <li>requirements in Table 6, Column 2;</li> <li>provides a through connection to a public road;</li> <li>be no more than 500 metres in length; and</li> <li>must be signposted and if gated, gates must open the whole trafficable width and remain unlocked.</li> </ul>	SP, Sb, Do	<u>Not Applicable (Acceptable Solution if required in future planning applications)</u>	No emergency access ways (EAWs) are currently proposed as part of future development. If permanent emergency access ways (EAW) are required, or if development and vehicular access construction is to be staged and requires temporary EAWs, these are also to be constructed to the relevant technical requirements of the Guidelines (see Appendix 4).
	<b>A3.3 Through roads</b> All public roads should be through-roads. No-through roads should be avoided and should only be considered as an acceptable solution where:	SP, Sb	<u>Acceptable Solution (if required in future planning applications)</u>	No public roads are currently proposed as part of future development and Madigan Road is an existing through road. If as part of future planning, the development requires any permanent no-through roads, or on a temporary basis as part of development staging, they will need to be less than 200 m in length and

Bushfire protection criteria			Development response	
Performance Principle	Acceptable solutions	Planning Stage	Method of compliance	Proposed bushfire management measures
	<ul style="list-style-type: none"> <li>it is demonstrated that no alternative road layout exists due to site constraints; and</li> <li>the no-through road is a maximum length of 200 metres to an intersection providing two-way access, unless it satisfies the exemption provisions in A3.2a of this table.</li> </ul> <p>A no-through road is to meet all the following requirements:</p> <ul style="list-style-type: none"> <li>requirements of a public road (Table 6, Column 1); and</li> <li>turn-around area as shown in Figure 24</li> </ul>			include either an 18 m turning head or compliant hammerhead, or be excludable under A3.2a, and are to be constructed to the relevant technical requirements of the Guidelines (see Appendix 4).
<p><u>Performance Principle P3ii</u></p> <p>The internal layout, design and construction of public and private vehicular access and egress in the subdivision / development allow emergency and other vehicles to move through it safely and easily.</p> <p>The design of vehicular access and egress provides:</p> <ul style="list-style-type: none"> <li>access and egress for emergency service vehicles while allowing the community to evacuate;</li> <li>a defensible space for emergency services personnel on the interface between classified vegetation and development site; and</li> <li>hazard separation between classified vegetation and the subject site to reduce the potential radiant heat that may impact a lot(s).</li> </ul>	<p><u>A3.4a Perimeter Roads</u></p> <p>A perimeter road is a public road and should be provided for greenfield or infill development where 10 or more lots are being proposed (including as part of a staged subdivision) with the aim of:</p> <ul style="list-style-type: none"> <li>separating areas of classified vegetation under AS3959, which adjoin the subject site, from the proposed lot(s); and</li> <li>removing the need for battle-axe lots that back onto areas of classified vegetation.</li> </ul> <p>A perimeter road is to meet the requirements contained in Table 6, Column 1.</p> <p>A perimeter road may not be required where:</p> <ul style="list-style-type: none"> <li>the adjoining classified vegetation is Class G Grassland;</li> <li>lots are zoned for rural living or equivalent;</li> <li>it is demonstrated that it cannot be provided due to site constraints; or</li> <li>all lots have frontage to an existing public road</li> </ul>	SP, Sb	<u>Not Applicable</u>	No public roads are currently proposed as part of future development.
<p><u>Performance Principle P3iii</u></p> <p>Vehicular access is provided which allows:</p> <ul style="list-style-type: none"> <li>access and egress for emergency service vehicles;</li> <li>defensible space for emergency services personnel on the interface between classified vegetation and development; and</li> <li>hazard separation between classified vegetation and the site to reduce the potential radiant heat that may impact a lot(s).</li> </ul>	<p><u>A3.4b Fire service access route</u></p> <p><i>Where proposed lots adjoin classified vegetation under AS3959, and a perimeter road is not required in accordance with A3.4a, a fire service access route can be considered as an acceptable solution to provide firefighter access, where access is not available, to the classified vegetation.</i></p> <p>A fire service access route is to meet all the following requirements:</p> <ul style="list-style-type: none"> <li>requirements in Table 6, Column 3;</li> <li>be through-routes with no dead-ends;</li> <li>linked to the internal road system at regular intervals, every 500 metres;</li> <li>must be signposted;</li> <li>no further than 500 metres from a public road;</li> <li>if gated, gates must open the required horizontal clearance and can be locked by the local government and/or emergency services, if keys are provided for each gate; and</li> <li>turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres.</li> </ul>	SP, Sb	<u>Not Applicable</u> <b>(Acceptable Solution if required in future planning applications)</b>	<p>The proposed development does not require fire service access routes (FSARs) to achieve fire brigade access to the project area.</p> <p>Should an FSAR be required as part of future planning stages, they will be constructed to the relevant technical requirements of the Guidelines (see Appendix 4) including interconnecting with the public road network at 500 m intervals, be through roads no further than 500 m from a public road, and have turnarounds every 500 m.</p>
<p><u>Performance Principle P3iv</u></p> <p>Vehicular access is provided which</p>	<p><u>A3.5 Battle-axe access legs</u></p> <p><i>Where it is demonstrated that a battle-axe cannot be avoided due to</i></p>	Sb	<u>Not Applicable</u>	No battle-axe legs are proposed as part of the development and the project area is not serviced by an existing battle-axe.

Bushfire protection criteria			Development response	
Performance Principle	Acceptable solutions	Planning Stage	Method of compliance	Proposed bushfire management measures
allows emergency service vehicles to directly access all habitable buildings and water supplies and exit the lot without entrapment	<p><i>site constraints, it can be considered as an acceptable solution.</i></p> <p>There are no battle-axe technical requirements where the point the battle-axe access leg joins the effective area of the lot, is less than 50 metres from a public road in a reticulated area.</p> <p>In circumstances where the above condition is not met, or the battle-axe is in a non-reticulated water area, the battle-axe is to meet all the following requirements:</p> <ul style="list-style-type: none"> <li>requirements in Table 6, Column 4; and</li> <li>passing bays every 200 metres with a minimum length of 20 metres and a minimum additional trafficable width of two metres (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum six metres)</li> </ul>			
	<p><u>A3.6 Private driveways</u></p> <p>There are no private driveway technical requirements where the private driveway is:</p> <ul style="list-style-type: none"> <li>within a lot serviced by reticulated water;</li> <li>no greater than 70 metres in length between the most distant external part of the development site and the public road measured as a hose lay; and</li> <li>accessed by a public road where the road speed limit is not greater than 70 km/h.</li> </ul> <p>In circumstances where all of the above conditions are not met, or the private driveway is in a non-reticulated water area, the private driveway is to meet all the following requirements:</p> <ul style="list-style-type: none"> <li>requirements in Table 6, Column 4;</li> <li>passing bays every 200 metres with a minimum length of 20 metres and a minimum additional trafficable width of two metres (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum six metres); and</li> <li>turn-around area as shown in Figure 28 and within 30 metres of the habitable building.</li> </ul>	Dd, Do	<u>Acceptable Solution</u>	<p>Vehicular access to the project area, and future development, is to be provided through extension of the existing village driveway network, which appears compliant with the private driveway specifications (e.g. roads 6m wide, sealed surface etc).</p> <p>All internal driveways within the project area as part of future development, are to be constructed to the relevant technical requirements of the Guidelines for private driveways (see Appendix 4), including turn-around areas within 30 m of each building, passing bays if driveways are longer than 200 m.</p>
<b>Element 4: Water</b>				
<i>Intent: To ensure that water is available to enable people, property and infrastructure to be defended from bushfire</i>				
<u>No Performance Principle Applies</u>	<p><u>A4.1 Identification of future water supply</u></p> <p>Evidence that a reticulated or sufficient non-reticulated water supply for bushfire fighting can be provided at the subdivision and/or development application stage, in accordance with the specifications of the relevant water supply authority or the requirements of Schedule 2.</p> <p>Where the provision of a strategic water tank(s) is required a suitable area within a road reserve or a dedicated lot the location should be identified, should be identified on the structure plan, to the satisfaction of the local government.</p>	SP	<u>Acceptable Solution</u>	<p>Future development is expected to be provided with a reticulated water supply, likely extended from existing town main supplies from the existing Stayover Kingfisher Village to the west. There are currently not known street hydrants in Madigan Road, so it is expected that strategic bushfire water tanks would be required to achieve compliance with A4.1.</p> <p>Firefighting water supply to larger developments within the project area, may be provided by onsite fire hydrant systems that may be installed at these facilities, if triggered by the National Construction Code).</p>
<p><u>Performance Principle P4</u></p> <p>The subdivision, development or land use is provided with a permanent and secure water supply that is sufficient for firefighting purposes.</p> <p>Provide a permanent water supply that is:</p>	<p><u>A4.2 Provision of water for firefighting purposes</u></p> <p>Where a reticulated water supply is existing or proposed, hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority. Where these specifications cannot be met, then the following applies:</p> <ul style="list-style-type: none"> <li>The provision of a water tank(s), in accordance with the</li> </ul>	Sb, Dd, Do	<u>Acceptable Solution</u>	<p>Assuming that providing a compliant reticulated water supply is not achievable to any part of the proposed development, the required strategic bushfire water tanks would need to be sized in accordance with Schedule 2 (refer to Appendix 5), and designed in accordance with the requirements of the local council and the technical requirements of Schedule 2 of the Guidelines.</p>

Bushfire protection criteria			Development response	
Performance Principle	Acceptable solutions	Planning Stage	Method of compliance	Proposed bushfire management measures
<ul style="list-style-type: none"> <li>sufficient and available for firefighting purposes;</li> <li>constructed from non-combustible materials (e.g. steel), or able to maintain its integrity throughout a bushfire; and</li> <li>accessible, with legal access for maintenance and re-filling by tankers and emergency service vehicles</li> </ul>	<p>requirements of Schedule 2; and</p> <ul style="list-style-type: none"> <li>Where the provision of a strategic water tank(s) is applicable, then the following requirements apply: <ul style="list-style-type: none"> <li>land to be ceded free of cost to the local government for the placement of the tank(s);</li> <li>the lot or road reserve where the tank is to be located is identified on the plan of subdivision;</li> <li>tank capacity, construction, and fittings, provided in accordance with the requirements of Schedule 2; and</li> <li>a strategic water tank is to be located no more than 10 minutes from the subject site (at legal road speeds).</li> </ul> </li> </ul> <p>Where a subdivision includes an existing habitable building(s) that is to be retained, a water supply should be provided to this existing habitable building(s), in accordance with the requirements listed above.</p>			

\* **Applicable Planning Stages** (**SP** - Strategic planning and structure plan where lot layout is unknown; **Sb** - Structure plan where lot layout is known and subdivision application; **Dd** – Development application for a single dwelling, ancillary dwelling or minor development; **Do** – Development application for any other development)

## 5.2 Compliance assessment against the Bushfire Protection Criteria (Element 5)

An assessment against the bushfire protection criteria for Elements 5 is provided in Table 6 for the vulnerable tourism and short-stay land use against the “**Other Short-Term Accommodation**” class

**Table 6: Compliance with the bushfire protection criteria of the Guidelines (Element 5)**

Bushfire protection criteria		Development response	
Performance Principle	Acceptable solutions	Method of compliance	Proposed bushfire management measures
ELEMENT 5 INTENT: To provide bushfire protection for tourism land uses relevant to the characteristics of the occupants and/or the location, to preserve life and reduce the impact of bushfire on property and infrastructure			
Other short-term accommodation – including motel, serviced apartments, tourist development (includes cabins and chalets), holiday accommodation and caravan park (which incorporates camping grounds)			
<p><b><u>Performance Principle P5vii</u></b></p> <p>Habitable buildings are sited and designed to:</p> <ul style="list-style-type: none"><li>• minimise clearing of existing vegetation; and</li><li>• provide hazard separation between classified vegetation and a development site, that is managed in perpetuity, to protect life, prevent the spread of, and manage the impacts of, fire.</li></ul>	<p><b><u>A5.7 Siting and design</u></b></p> <ul style="list-style-type: none"><li>• <b>A5.7a</b> For caravan parks, the provision of an APZ to achieve BAL-29 (29kW/m<sup>2</sup>) around the campground facilities, which may include the office, manager’s residence, camper’s kitchen, and shower/laundry.</li><li>• <b>A5.7b</b> Where the BMP identifies accommodation structures, including, but not limited to, caravan and camping sites, eco tents and cabins, as a tolerable loss in the event of a bushfire, these accommodation structures can be sited in areas above BAL-29 (29kW/m<sup>2</sup>).</li><li>• <b>A5.7c</b> For all other short-term accommodation, an APZ to be provided in accordance with Element 2: Siting and Design of Development A2.1 Asset Protection Zone.</li><li>• <b>A5.7d</b> A landscape management plan is to be prepared to identify on-going onsite vegetation management (where appropriate).</li></ul> <p>Where an on-site shelter is proposed, to comply with A5.8.2e, it is to meet all the following requirements:</p> <ul style="list-style-type: none"><li>• <b>A5.7e</b> Pedestrian paths to any on-site shelter are to be provided on-site and be clearly signposted.</li><li>• <b>A5.7f</b> Where a building is to function as an on-site shelter, there is to be sufficient separation distance from the predominant bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 10kW/m<sup>2</sup> (with an assumed flame temperature of 1200K); or where an open space area is to function as an onsite shelter, there is to be sufficient separation distance from the bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 2kW/m<sup>2</sup> (with an assumed flame temperature of 1200K).</li><li>• <b>A5.7g</b> Buildings identified as suitable for on-site shelter be designed and constructed in accordance with National Construction Code and the ABCB Community Shelter Handbook.</li></ul>	<p><b><u>Acceptable Solutions</u></b></p>	<p><b><u>A5.7a – To Be Compliant</u></b></p> <ul style="list-style-type: none"><li>• If proposed development is a caravan park, all proposed buildings are to be sited in BAL-29 or lower.</li></ul> <p><b><u>A5.7b – To Be Compliant</u></b></p> <ul style="list-style-type: none"><li>• While the future development is not yet known, it is expected:<ul style="list-style-type: none"><li>◦ Any permanent or Class 1-9 buildings would not be considered a tolerable loss.</li><li>◦ Any temporary structures (e.g. caravans, camp sites or tent-like eco-tents) unable to achieve any BAL construction compliance, would be considered a tolerable loss.</li></ul></li></ul> <p><b><u>A5.7c – To Be Compliant</u></b></p> <ul style="list-style-type: none"><li>• All short-term accommodation (other than any temporary structures considered a tolerable loss, will need to be sited in BAL-29 or lower, and where required, have a compliant APZ established along interfaces with unmanaged vegetation</li><li>• The APZ is to comply with the APZ standards from the Guidelines (see Appendix 2)</li><li>• All land within the project area excluded as non-vegetated or low threat vegetation as part of future development, but outside any APZ nominated in future BMPs, is expected to be maintained as non-vegetated elements or low threat vegetation compliant with AS 3959 Clause 2.2.3.2 (e) and (f) (see Appendix 3) and the principles of Schedule 1 of the Guidelines (see Appendix 2).</li></ul> <p><b><u>A5.7d – To Be Compliant</u></b></p> <ul style="list-style-type: none"><li>• The vegetation modification and ongoing management requirements are to be documented in future BMP’s and/or landscape plans, as required by the decision-maker.</li></ul> <p><b><u>A5.7e, A5.7g and A5.7g – Not Applicable (but to be compliant if required)</u></b></p> <ul style="list-style-type: none"><li>• It is not expected that an onsite shelter is required to achieve compliance with A5.8.2e, however if required, any on-site shelter shall comply with A5.7e, A5.7f and A5.7g.</li></ul>
<p><b><u>Performance Principle P5viii</u></b></p> <p>The design and capacity of vehicular access and egress allows the occupants to evacuate to a suitable destination before a bushfire arrives to the site, whilst allowing emergency service personnel to attend the site; or it is demonstrated through a risk assessment that the risk can be managed.</p>	<p><b><u>A5.8.1 Vehicular access for all proposals</u></b></p> <ul style="list-style-type: none"><li>• <b>A5.8.1a</b> Internal vehicular access/private driveway is to provide emergency egress/access for all patrons and staff, in the event of a bushfire. Where possible, this is to include the provision of at least two internal access/egress points to the public road network.</li><li>• <b>A5.8.1b</b> Internal vehicular access/private driveways longer than 70 metres are to meet all the following requirements:<ul style="list-style-type: none"><li>◦ Requirements in Table 6, Column 4;</li><li>◦ Passing bays every 200 metres with a minimum length of 20 metres and a minimum additional trafficable width of two metres (that is, the combined trafficable width of the passing bay and constructed private driveway to be a minimum six metres); and</li><li>◦ Turn-around areas as shown in Figure 28.</li></ul></li><li>• <b>A5.8.1c</b> Signage to be provided within the site, advising of where each access</li></ul>	<p><b><u>Acceptable Solutions</u></b></p>	<p><b><u>A5.8.1a –To Be Compliant</u></b></p> <ul style="list-style-type: none"><li>• Internal driveways within future development are expected to via connection to the existing internal driveway network in the existing accommodation village to the west within Lot 500. This is expected to provide two internal routes back to Madigan Road.</li></ul> <p><b><u>A5.8.1b – To Be Compliant</u></b></p> <ul style="list-style-type: none"><li>• All internal driveways within the project area as part of future development are to be constructed to the relevant technical requirements of the Guidelines for private driveways (see Appendix 4), including turn-around areas within 30 m of each building, passing bays if driveways are longer than 200 m.</li></ul> <p><b><u>A5.8.1c – To Be Compliant</u></b></p> <ul style="list-style-type: none"><li>• General information signs within the site are to contain information what to do in the event</li></ul>

Performance Principle	Bushfire protection criteria Acceptable solutions	Method of compliance	Development response Proposed bushfire management measures
	<p>route travels to and the distance and general information signs on what to do in the event of a bushfire.</p> <p><b><u>A5.8.2 Vehicular access for short-term accommodation outside of a residential built-out area</u></b></p> <ul style="list-style-type: none"> <li><b>A5.8.2a</b> Public road access is to be provided in two different directions to at least two different suitable destinations.</li> <li><b>A5.8.2b</b> All public roads to be through roads. No-through roads are not recommended but if unavoidable, or they are existing, the following requirements apply: <ul style="list-style-type: none"> <li>No more than 200 metres in length, where the adjoining classified vegetation, excluding the road reserve, has an extreme BHL; or</li> <li>No more than 500 metres in length, where the adjoining classified vegetation, excluding the road reserve, has a moderate BHL; or</li> <li>No limitation, where the adjoining classified vegetation, excluding the road reserve, has a low BHL or is not identified as bushfire prone.</li> </ul> </li> <li><b>A5.8.2c</b> Where it is demonstrated that A5.8.2a and A5.8.2b cannot be achieved, an emergency access way can be considered as an acceptable solution. An emergency access way is to meet all of the following requirements: <ul style="list-style-type: none"> <li>Requirements in Table 6, Column 2;</li> <li>Provide a through connection to a public road;</li> <li>Be no more than 500 metres in length; and</li> <li>Must be signposted and if gated, gates must remain unlocked.</li> </ul> </li> <li><b>A5.8.2d</b> A public road is to meet the requirements in Table 6, Column 1.</li> <li><b>A5.8.2e</b> Where A5.8.2a, A5.8.2b and A5.8.2c (if required), cannot be achieved, and the proposed development has a capacity of up to a maximum of 100 guests and staff at any one time, an on-site shelter is to be provided in accordance with A5.7e, A5.7f and A5.7g.</li> </ul>		<p>of a bushfire.</p> <p><b><u>Proposed development is outside of residential built-out area</u></b></p> <ul style="list-style-type: none"> <li>The project area is considered to be outside a residential built-out area</li> </ul> <p><b><u>A5.8.2a – Existing Compliance</u></b></p> <ul style="list-style-type: none"> <li>The project area is already well-served by the existing public road network, namely Madigan Road, which is a two-way road providing for travel north (to Dampier Highway) and south (to NW Coastal Highway) to suitable destinations.</li> </ul> <p><b><u>A5.8.2b – Not applicable</u></b></p> <ul style="list-style-type: none"> <li>No public roads are currently proposed as part of future development and Madigan Road is an existing through road.</li> </ul> <p><b><u>A5.8.2c – Not Applicable</u></b></p> <ul style="list-style-type: none"> <li>No emergency access way (EAW) is required to resolve non-compliances with 5.8.2a and 5.8.2b.</li> <li>Notwithstanding, if permanent EAWs are required, or if development and vehicular access construction is to be staged and requires temporary EAWs, these are also to be constructed to the relevant technical requirements of the Guidelines (see Appendix 4) and A5.8.2c.</li> </ul> <p><b><u>A5.8.2d – Existing Compliance</u></b></p> <ul style="list-style-type: none"> <li>No public roads are currently proposed as part of future development</li> <li>Existing public road (Madigan Road) appears to be compliant with public road specifications (sealed, two-way road).</li> </ul> <p><b><u>A5.8.2e– Not Applicable (but to be compliant if required)</u></b></p> <ul style="list-style-type: none"> <li>As compliance with A5.8.2a, A5.8.2b and A5.8.2c can be achieved, an onsite shelter is not required.</li> <li>If onsite shelter is required, it shall comply with A5.7e, A5.7f and A5.7g.</li> </ul>
<p><b><u>Performance Principle P5ix</u></b></p> <p>Provide a permanent water supply that is:</p> <ul style="list-style-type: none"> <li>sufficient and available for firefighting purposes;</li> <li>constructed from non-combustible materials (e.g. steel), or able to maintain its integrity throughout a bushfire; and</li> <li>accessible, with legal access for maintenance and re-filling by tankers and emergency service vehicles.</li> </ul>	<p><b><u>A5.9 Provisions of water</u></b></p> <ul style="list-style-type: none"> <li><b>A5.9a</b> The development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority; or</li> <li><b>A5.9b</b> Provision of a water tanks(s) in accordance with the requirements of Element 4, Schedule 2, 2.2 technical requirements.</li> </ul>	<p><b>Acceptable Solutions</b></p>	<p><b><u>A5.9a and A5.9b – To Be Compliant</u></b></p> <ul style="list-style-type: none"> <li>Future development is expected to be provided with a reticulated water supply, likely extended from existing town main supplies from the existing Stayover Kingfisher Village to the west.</li> <li>There are currently not known street hydrants in Madigan Road, so it is expected that strategic bushfire water tanks would be required to achieve compliance with A5.9b.</li> <li>Firefighting water supply to larger developments within the project area, may be provided by onsite fire hydrant systems that may be installed at these facilities, if triggered by the National Construction Code).</li> <li>Assuming that providing a compliant reticulated water supply is not achievable to any part of the proposed development, the required strategic bushfire water tanks would need to be sized in accordance with Schedule 2 (refer to Appendix 5), and designed in accordance with the requirements of the local council and the technical requirements of Schedule 2 of the Guidelines.</li> </ul>

## **6.0 Responsibilities for implementation and management of the bushfire measures**

This BMP has been prepared as a strategic guide to demonstrate how development compliance will be delivered at future planning stages in accordance with the Guidelines. Aside from the preparation of future BMPs to accompany future subdivision and development applications where appropriate, there are no further items to implement, enforce or review at this strategic stage of the planning process.

Future BMPs prepared for subsequent subdivision and development applications are to meet the relevant commitments outlined in this strategic level BMP, address the relevant requirements of SPP 3.7 (i.e. Policy Measures 6.4 and 6.5 respectively) and demonstrate in detail how the proposed development will incorporate the relevant acceptable solutions or meet the performance requirements of the Guidelines. Future BMPs are to include the following detailed information:

- proposed development layout, including any lots, high risk land uses, roads, POS/drainage areas, etc
- detailed landscape plans for all POS, drainage and areas of revegetation or retention, to confirm the final extent of classified vegetation (retained or revegetated) and exclusions (non-vegetated areas and low threat vegetation).
- final determination of post development classified vegetation extent, exclusions and effective slope
- BAL contour map demonstrating that proposed development areas will achieve BAL–29 or lower (may require designation of building envelopes)
- width and alignment of compliant APZs/setbacks
- confirmation of how bushfire management will be addressed during development staging including consideration of low threat staging buffers and vehicular access (temporary no-through roads/EAWs)
- proposed approach to fuel management throughout POS, vacant land, staging buffers, adjacent properties and road verges; or application of AS 3959 in response to classified vegetation
- vehicular access provisions, including demonstration that a minimum of two access routes will be achieved for each stage of development in accordance with Acceptable Solution A3.2a
- water supply provisions with regards to reticulated water supply provisions (including network of street hydrants), or static firewater tanks if required
- demonstration of compliance with the bushfire protection criteria of the Guidelines
- requirements for any proposed vulnerable land uses including provision of a BMP and Bushfire Emergency Evacuation Plan to accompany the development application
- requirements for any proposed high-risk land uses (e.g flammable or energised risks), including provision of a BMP and Bushfire Risk Management Plan to accompany the development application
- requirements for BMP compliance reports as a condition of subdivision
- provisions for notification on Title for any future lots with a rating of BAL–12.5 or greater as a condition of subdivision
- compliance requirements with the current local government annual firebreak notice, as amended or varied
- construction of Class 1, 2, 3 or associated 10a buildings in accordance with AS 3959 to

the assessed BAL rating

- proposed implementation and audit program outlining all measures requiring implementation and the appropriate timing and responsibilities for implementation.

On the basis of the information contained in this BMP, Linfire considers the bushfire hazards within and adjacent to the project area and the associated bushfire risks are manageable through standard management responses outlined in the Guidelines and AS 3959. Linfire considers that on implementation of the proposed management measures, the project area will be able to be developed with a manageable level of bushfire risk whilst maintaining full compliance with the Guidelines and AS 3959.

## 7.0 References

Department of Fire and Emergency Services (DFES) 2023, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from:

<https://maps.slip.wa.gov.au/landgate/bushfireprone/>,

Department of Planning (DoP) 2016, *Visual guide for bushfire risk assessment in Western Australia*, Department of Planning, Perth.

Standards Australia (SA) 2018, Australian Standard AS 3959–2018 *Construction of Buildings in Bushfire-prone Areas*, Standards Australia, Sydney.

Western Australian Planning Commission (WAPC) 2015, *State Planning Policy 3.7 Planning in Bushfire Prone Areas*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2021, *Guidelines for Planning in Bushfire Prone Areas*, Version 1.4 December 2021, Western Australian Planning Commission, Perth.

## Appendix 1 Vegetation plot photos and description



Photo ID: 1a



Photo ID: 1c



Photo ID: 1e



Photo ID: 1b



Photo ID: 1d



Photo ID: 1f

Plot number	Plot 1
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity



Photo ID: 1g



Photo ID: 1h



Photo ID: 1i

Plot number	Plot 1
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity



Photo ID: 2a



Photo ID: 2b



Photo ID: 2c



Photo ID: 2d



Photo ID: 2e



Photo ID: 2f

Plot number	Plot 2
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity



Photo ID: 2g



Photo ID: 2i



Photo ID: 2k

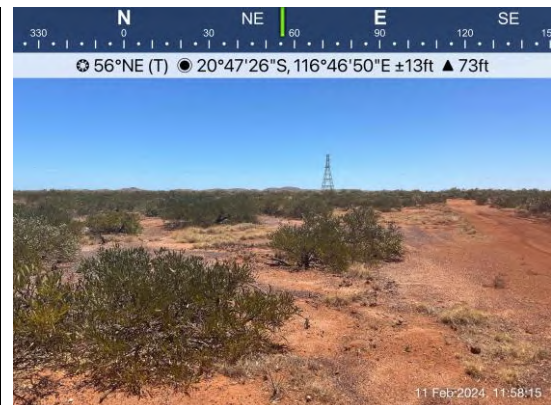


Photo ID: 2h



Photo ID: 2j



Photo ID: 2l

Plot number	Plot 2
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity



Photo ID: 2m



Photo ID: 2o



Photo ID: 2n

Plot number	Plot 2
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity



Photo ID: 3a



Photo ID: 3c



Photo ID: 3b

Plot number	Plot 3
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity



Photo ID: 4a



Photo ID: 4c



Photo ID: 4b

Plot number	Plot 4
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity



Photo ID: 5a



Photo ID: 5b



Photo ID: 5c



Photo ID: 5d



Photo ID: 5e

Photo ID: 5f

Plot number	Plot 5
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Low threat cultivated gardens and maintained lawns within surrounding properties and non-vegetated areas including roads, footpaths, driveways and building footprints



Photo ID: 5g



Photo ID: 5h

Plot number	Plot 5
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Low threat cultivated gardens and maintained lawns within surrounding properties and non-vegetated areas including roads, footpaths, driveways and building footprints



Photo ID: 6a



Photo ID: 6b



Photo ID: 6c



Photo ID: 6d

Plot number	Plot 6
Vegetation classification	Excluded – Non-vegetated (Clause 2.2.3.2 [e])
Description / justification	Non-vegetated tracks and laydown outside the existing village

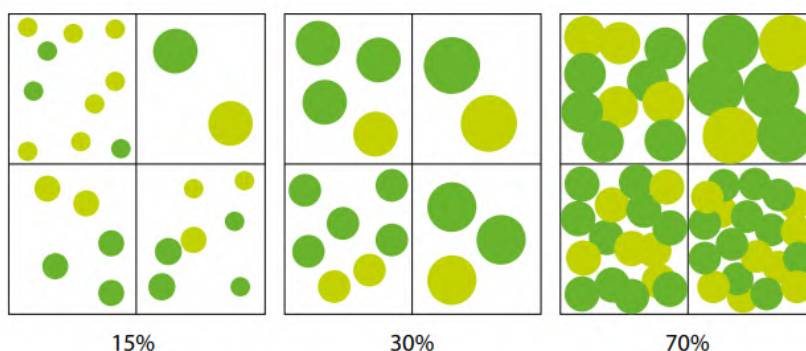
## Appendix 2 APZ standards (Schedule 1 of the Guidelines)

An APZ is a low fuel area maintained around a habitable building to increase the likelihood that it will survive a bushfire, by providing a defensible space and reducing the potential for direct flame contact, radiant heat exposure and ember attack.

Vegetation management within an APZ should provide defensible space and be maintained to a low threat state, in perpetuity, in accordance with the requirements outlined in Schedule 1.

### Schedule 1: Standards for Asset Protection Zones

- **Trees\* (> 6 metres in height)**
  - Trunks at maturity should be a minimum distance of six metres from all elevations of the building.
  - Branches at maturity should not touch or overhang a building or powerline.
  - Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation.
  - Canopy cover within the APZ should be <15 per cent of the total APZ area.
  - Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ.



- **Shrub\* and Scrub\* (0.5 metres to 6 metres in height)**
  - Should not be located under trees or within three metres of buildings.
  - Should not be planted in clumps >5 square metres in area.
  - Clumps should be separated from each other and any exposed window or door by at least 10 metres.
  - Shrub and scrub >6 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height)**
  - Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above.
  - Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
  - Ground covers >0.5 metres in height are to be treated as shrubs
- **Grass**
  - Grass should be maintained at a height of 100 millimetres or less, at all times.
  - Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
- **Fine Fuel load (combustible dead vegetation mater <6 mm in thickness)\*\***
  - Should be managed and removed on a regular basis to maintain a low threat state.
  - Should be maintained at <2 tonnes per hectare (on average).
  - Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch

### Schedule 1: Standards for Asset Protection Zones

>6 millimetres in thickness.

- **Defendable Space**
  - Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
- **Fences within the APZ**
  - Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959)
- **LPG Cylinders**
  - Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building.
  - The pressure relief valve should point away from the house.
  - No flammable material within six metres from the front of the valve.
  - Must sit on a firm, level and non-combustible base and be secured to a solid structure.

*\* Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

*\*\* Fine fuel load should be maintained to less than two tonnes per hectare, however this is often a subjective assessment.*

- *Reducing fuel load levels does not necessarily require the removal of existing vegetation. A combination of methods can be utilised to reduce fuel load such as raking, weed removal, pruning, mulching and/or the removal of plant material.*
- *A simple method to estimate fuel load is to roughly equate one tonne of fuel load per hectare as 100 grams per square metre. For example, two tonnes per hectare of leaf litter is roughly 200 grams of leaf litter per square metre and eight tonnes per hectare is roughly 800 grams.*
- *Eucalyptus leaf litter is approximately 100 grams per handful, so two handfuls of litter per square metre will roughly equate to two tonnes per hectare.*
- *Different types of fine fuel, like mulch or pine needles may be more or less than a handful, however the 100 grams per square metre rule of thumb can still be used.*

### E2 Plant flammability

There are certain plant characteristics that are known to influence flammability, such as moisture or oil content and the presence and type of bark. Plants with lower flammability properties may still burn during a bushfire event, but may be more resistant to burning and some may regenerate faster post-bushfire.

There are many terms for plant flammability that should not be confused, including:

- Fire resistant – plant species that survive being burnt and will regrow after a bushfire and therefore may be highly flammable and inappropriate for a garden in areas of high bushfire risk.
- Fire retardant – plants that may not burn readily or may slow the passage of a bushfire.
- Fire wise – plants that have been identified and selected based on their flammability properties and linked to maintenance advice and planting location within a garden.

Although not a requirement of these Guidelines, local governments may develop their own list of fire wise or fire retardant plant species that suit the environmental characteristics of an area. When developing a recommended plant species list, local governments should consult with ecologists,

land care officers or environmental authorities to ensure the plants do not present a risk to endangered ecological communities, threatened, or endangered species or their habitat.

When selecting plants, private landholders and developers should aim for plants within the APZ that have the following characteristics:

- grow in a predicted structure, shape and height;
- are open and loose branching with leaves that are thinly spread;
- have a coarse texture and low surface-area-to-volume ratio;
- will not drop large amounts of leaves or limbs, that require regular maintenance;
- have wide, flat, and thick or succulent leaves;
- trees that have bark attached tightly to their trunk or have smooth bark;
- have low amounts of oils, waxes, and resins (which will often have a strong scent when crushed);
- do not produce or hold large amounts of fine dead material in their crowns; and/or
- will not become a weed in the area.

Refer to the WAPC Bushfire and Vegetation Fact Sheet for further information on clearing and vegetation management and APZ landscaping, design and plant selection reference material.

## Appendix 3 Low Threat Vegetation (AS 3959 Clause 2.2.3.2)

### 2.2.3.2 Exclusions—Low threat vegetation and non-vegetated areas


The following vegetation shall be excluded from a BAL assessment:

- (a) Vegetation of any type that is more than 100 m from the site.
- (b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.
- (c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.
- (d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.
- (e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.
- (f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

#### NOTES:

- 1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).
- 2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

## Appendix 4      Vehicular access technical standards of the Guidelines

Public roads	
Acceptable Solution A3.1	
Public roads are to meet the minimum technical requirements in Table 6, Column 1.	
Explanatory note E3.1	
<p>These Guidelines do not prescribe values for the trafficable (carriageway/pavement) width of public roads as they should be in accordance with the class of road as specified in the IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Austroad Standards and/or any applicable standard in the local government area.</p> <p>The IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Austroad Standards do not prescribe a horizontal clearance. However, it is recommended that a traversable verge is provided to allow for emergency services vehicles to stop and operate on the side of the public road, specifically where the public road may traverse large areas of classified vegetation.</p> <p>Where local government roads are proposed to be widened by the proponent, they must obtain approval from the local government</p>	
 <p>The diagram illustrates a cross-section of a public road. It shows a central paved area (4m paving) with a dashed white line down the middle. On either side of the paving is a shoulder (1m shoulder either side). The total width of the road is 6m. A red bus is shown on the left side of the road, and a blue car is on the right. A vertical line on the left side indicates a 4.5m height clearance. Trees are shown on both sides of the road.</p>	
Figure 20: Example of a public road	

Multiple Access Routes
<b>Acceptable solution A3.2a</b>
<p>Public road access is to be provided in two different directions to at least two different suitable destinations with an all-weather surface (two-way access).</p> <p>If the public road access to the subject site is via a no-through road which cannot be avoided due to demonstrated site constraints, the road access is to be a maximum of 200 metres from the subject lot(s) boundary to an intersection where two-way access is provided.</p> <p>The no-through road may exceed 200 metres if it is demonstrated that an alternative access, including an emergency access way, cannot be provided due to site constraints and the following requirements are met:</p> <ul style="list-style-type: none"> <li>the no-through road travels towards a suitable destination; and</li> <li>the balance of the no-through road, that is greater than 200 metres from the subject site, is wholly within BAL-LOW, or is within a residential built-out area – Figure 23.</li> </ul>
<b>Explanatory note E3.2a</b>
<p>Two-way public road access is public road access from a lot in at least two different directions to two suitable destinations, and provides residents and the community, as well as emergency services, with access and egress from both the subdivision and individual habitable buildings/development in the event of a bushfire emergency. A single road provides no alternative route if the access becomes congested or is unable to be traversed due to smoke and/or fallen trees during a bushfire.</p> <p>Two-way public road access applies to access/egress routes leading into a subdivision, as well as those within a subdivision. A road that loops back onto itself does not constitute the option of two different directions.</p> <p>Two-way public road access should always be the first option. Where the site is not able to achieve two-way access within 200 metres of the lot boundary, due to demonstrated site or environmental constraints, the proponent should identify options for an emergency access way from the subject site to a suitable destination. Where an emergency access way cannot be provided, the proponent should demonstrate compliance with the performance principle.</p> <p>Subject sites or proposed lots greater than 200 metres from an intersection, which provides two-way access, do not satisfy the requirement for two-way access unless they meet the provisions which allow for nothrough roads greater than 200 metres in A3.2a.</p> <p>To demonstrate compliance with the performance principle for two-way access, the bushfire planning practitioner may have regard to:</p> <ul style="list-style-type: none"> <li>(a) the extent of the bushfire hazard, location and vegetation classification, the likelihood, potential severity and impact of bushfire to the subject site and the road network;</li> <li>(b) time between fire detection and the onset of conditions in comparison to travel time for the community to evacuate to a suitable destination;</li> <li>(c) available access route(s) travelling towards a suitable destination; and</li> <li>(d) turn-around area for a fire appliance for no-through roads</li> </ul>

### Multiple Access Routes



Figure 21: Example of compliant and non-compliant two-way

Emergency access way
<b>Acceptable solution A3.2b</b>
<p><i>Where it is demonstrated that A3.2a cannot be achieved due to site constraints, or where an alternative design option does not exist, an emergency access way can be considered as an acceptable solution.</i></p> <p>An emergency access way is to meet all the following requirements:</p> <ul style="list-style-type: none"> <li>• requirements in Table 6, Column 2;</li> <li>• provides a through connection to a public road;</li> <li>• be no more than 500 metres in length; and</li> <li>• must be signposted and if gated, gates must open the whole trafficable width and remain unlocked.</li> </ul>
<b>Explanatory note E3.2b</b>
<p>An emergency access way is not a preferred alternative to through public road access and should only be considered acceptable where it has been demonstrated that it will provide the safety and performance needs of emergency services and the community, including consideration for future needs, and that public road access to satisfy A3.2a cannot be achieved due to site constraints, such as an established road network with no opportunity to provide a public road for secondary access. Acceptance of an emergency access way should also consider the ability to accommodate reasonable worst-case vehicle volumes.</p> <p>The principle function of the emergency access way is to provide a contingency (second) community evacuation route and simultaneously provide access for emergency services, in the event of a bushfire emergency. Where an emergency access way traverses classified vegetation, which has the potential to create a bushfire hazard, an emergency access way performs the secondary function of providing access by emergency services to this vegetation.</p> <p>Emergency access ways should connect to a public road to allow alternative two-way through access. An emergency access way should not exceed 500 metres in length as they may not be as safe for road-use due to not being designed or constructed to the full requirements of a public road and may present uncertainties to emergency service personnel and the public as they are not part of the daily road network and not identified on Maps.</p> <p><u>Permanent public emergency access way</u></p> <p>An emergency access way can be provided as either a public easement in gross or a right-of-way. In both approaches, the management of the emergency access way is by the local government as the grantee of the easement or management body of the right-of-way. The proponent must obtain written consent from the local government that the local government will accept care, control and management of the easement or right-of-way; this must be provided to the decision-maker prior to granting planning approval. The approach taken is at the discretion of the decision-maker and/ or the local government and is also dependent on whether the land is to remain in private ownership or be ceded to the Crown. Consultation with Land Use Management at the Department of Planning, Lands and Heritage should also be considered if the land is to be ceded to the Crown or if the local government is uncertain of which approach to take.</p> <p>If the emergency access way is provided as an easement, it should be provided as a public easement in gross under sections 195 and 196 of the Land Administration Act 1997 in favour of the local government and/or public authority, to ensure accessibility for emergency services and the public at all times. To be provided as a right-of-way the emergency access way should be vested in the Crown under section 152 of the Planning and Development Act 2005 as a right-of way and such land to be ceded free of cost and without any payment or compensation by the Crown. If gates are used to control traffic flow during non-emergency periods, these will be managed by the local government and must not be locked. Gates should be double gates wide enough to access the full pavement width and accommodate Type 3.4 fire appliances with the design and construction to be approved by the relevant local government.</p> <p><u>Temporary public emergency access way</u></p> <p>A temporary emergency access way may be proposed to facilitate the staging arrangements of a subdivision. The provision of two public roads may not be possible in the first stage of the subdivision and an emergency access way can be provided as an interim access route until the second public road is developed and gazetted in a subsequent stage of the subdivision (see figure 22). The emergency access way should be provided in the same manner as a permanent emergency access way, but it should be removed from the certificate of title once the public road is developed and gazetted. Where an emergency access way is</p>

### Emergency access way

proposed as an alternative to a public road, the Bushfire Management Plan should provide thorough justification for its use.

#### Restricted public emergency access way

There may be some instances where a restricted emergency access way is proposed as a performance principle based solution where access is only available to the public in the event of a bushfire emergency. This option can only be considered where the local government or Main Roads WA have advised that vehicular access on the emergency access way is not allowed during non-emergency periods, as it provides an additional thoroughfare and entry point on a local or State road. In this scenario, the emergency access way can be provided as an easement under section 195 of the Land Administration Act 1997, as public access in the event of a bushfire emergency or vested in the Crown as a reserve under section 152 of the Planning and Development Act 2005. Such land is to be ceded free of cost without any payment or compensation by the Crown. The proponent must obtain written consent from the local government that the local government will accept care, control and management of the proposed reserve and agree to the terms of the Management Order Conditions (if applicable); this must be provided to the decision-maker prior to granting planning approval.

The purpose of the reserve should be for a public purpose specified in the condition related to the subdivision, for example for emergency access only, or for emergency access and recreation. A reserve for emergency access and recreation can optimise the land-use as a dual purpose where it provides vehicular access in the event of a bushfire emergency, but can be accessed by the public (on foot) on a day-to-day basis as a recreation link. Appropriate signage can ensure the general public is aware of the purpose of the reserve. The approach taken is at the discretion of the decision-maker and/or local government.

#### Right-of-carriageway emergency access way

There may be some instances where a right-of-carriageway easement is proposed as a performance principle-based solution. This may be where particular landowner(s) and emergency services, but not the public, require access over a neighbouring lot(s).

A right-of-carriageway easement should be provided under section 195 of the Land Administration Act 1997. The easement is to provide alternative access for the particular landowner(s) in the event of a bushfire emergency and not for use by the public. In this scenario, support will be necessary from the adjoining lot owner(s). The easement is to be granted to the local government and it is to agree with the landowner on the arrangements of the management of the easement area by deed. These management arrangements will be at the discretion of the local government. If gated, the easement area can be locked to restrict day-to-day vehicular access.

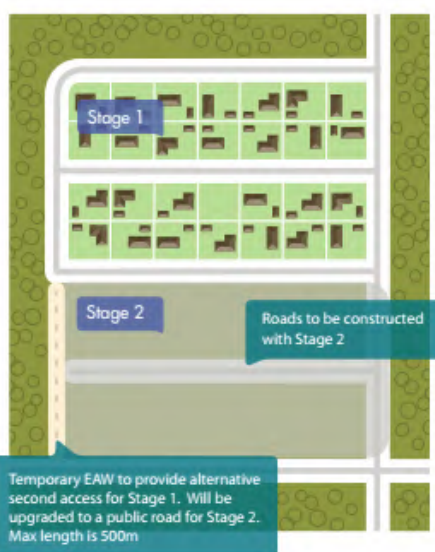
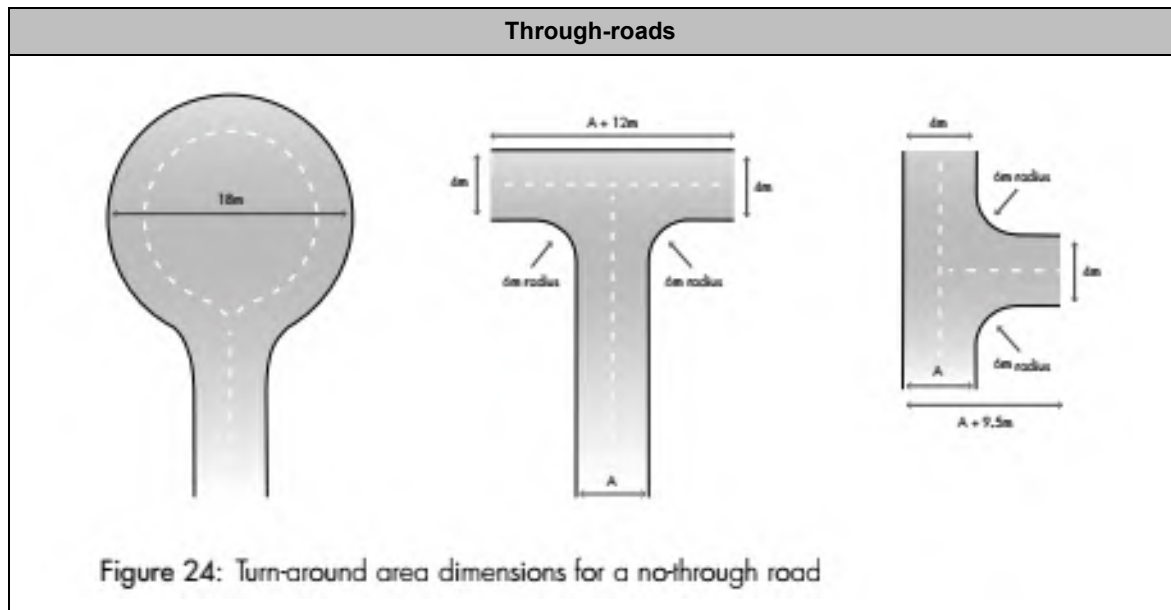


Figure 22: Example of an emergency access way

Through-roads
<p><b>Acceptable solution A3.3</b></p> <p>All public roads should be through-roads. No-through roads should be avoided and should only be considered as an acceptable solution where:</p> <ul style="list-style-type: none"> <li>it is demonstrated that no alternative road layout exists due to site constraints; and</li> <li>the no-through road is a maximum length of 200 metres to an intersection providing two-way access, unless it satisfies the exemption provisions in A3.2a of this table.</li> </ul> <p>A no-through road is to meet all the following requirements:</p> <ul style="list-style-type: none"> <li>requirements of a public road (Table 6, Column 1); and</li> <li>turn-around area as shown in Figure 24</li> </ul>
<p><b>Explanatory note E3.3</b></p> <p>In bushfire prone areas, a proposed structure plan or subdivision that incorporates no-through roads should be avoided because they do not provide a connected and legible design that allows for easy access and egress by the community, residents and emergency services in the event of a bushfire. No-through roads also reduce the options available for access and egress in the event of a bushfire emergency.</p> <p>There will however be situations where a subject site is accessed via an existing or proposed no-through road and alternative access cannot be provided. In these situations, the proponent should demonstrate to the decision-maker, that all efforts have been made with the local government and/or adjoining landowners to secure alternative public road access or an emergency access way and that a redesign has been explored. The bushfire planning practitioner may need to develop a performance principle-based solution or address the non-compliance and demonstrate to the decisionmaker why discretion should be exercised in accordance with section 2.6 of these Guidelines.</p> <p>No-through roads will only be considered an acceptable solution where it is demonstrated by the proponent, to the satisfaction of the decision maker, that a no through-road cannot be avoided due to site constraints. For example, the internal road design of a structure plan or subdivision where site constraints, such as a water body or Bush Forever, prevent the ability to create a through-road and a no through road may be a more appropriate road layout.</p> <p>No-through roads should be a maximum of 200 metres from the lot(s) boundary to an intersection where two-way access is provided and may only exceed 200 metres if it meets the provisions which allow for no-through roads greater than 200 metres in A3.2a.</p>



**Figure 23:** Example of a site on a no-through road greater than 200 metres from the intersection, but within 200 metres of BAL-LOW



Fire service access routes
<b>Acceptable solution A3.4b</b>
<p><i>Where proposed lots adjoin classified vegetation under AS3959, and a perimeter road is not required in accordance with A3.4a, a fire service access route can be considered as an acceptable solution to provide firefighter access, where access is not available, to the classified vegetation.</i></p> <p>A fire service access route is to meet all the following requirements:</p> <ul style="list-style-type: none"> <li>• requirements in Table 6, Column 3;</li> <li>• be through-routes with no dead-ends;</li> <li>• linked to the internal road system at regular intervals, every 500 metres;</li> <li>• must be signposted;</li> <li>• no further than 500 metres from a public road;</li> <li>• if gated, gates must open the required horizontal clearance and can be locked by the local government and/or emergency services, if keys are provided for each gate; and</li> <li>• turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres.</li> </ul>
<b>Explanatory note E3.4b</b>
<p>Where a subdivision adjoins classified vegetation and where A3.2a has been satisfied, hazard separation and defensible space across multiple lots may be required in the form of a fire service access route.</p> <p>A fire service access route is not intended to provide residents and the general public with emergency egress and therefore is not a suitable second access or substitute for a public road. A fire service access route is to provide access for emergency services to classified vegetation for firefighting and fire management purposes.</p> <p>A fire service access route can be provided as either an easement in gross over private or Crown land, or ceded to the Crown as a reserve. In both approaches, the management of the fire service access route is by the local government as the grantee of the easement or management body of the reserve. Determining which approach to take is dependent on what the intended tenure of the fire service access route is, which is explained further below. The proponent must obtain written consent from the local government that the local government will accept care, control and management of the easement or reserve and agree to the terms of the Management Order Conditions (if applicable); this must be provided to the decision-maker prior to granting planning approval. The approach taken is at the discretion of the decision-maker and/or the local government. Consultation with Land Use Management at the Department of Planning, Lands and Heritage should also be considered if the land is to be ceded to the Crown or if the local government is uncertain of which approach to take.</p> <p>Where gates are used, these should be double gates wide enough to access the full required horizontal clearance and accommodate type 3.4 fire appliances with the design and construction to be approved by the relevant local government. Gates on fire service access routes may be locked to restrict access, provided a common key system is used, and such keys are made available for emergency services and designated fire officers within the local government area and/or surrounding district. Gates should be installed where fences cross fire service access routes. If an easement in gross is proposed, such arrangements for gates should be included in the deed of easement and be agreed to by the local government.</p> <p>Fire service access route to remain in private ownership of multiple landowners Where a fire service access route is proposed to traverse multiple private lots and they are intended to remain in the private ownership of the multiple landowners, it should be provided as an easement in gross under section 196 of the Land Administration Act 1997, to ensure accessibility for fire emergency services and not for use by the public. The easement is to be granted to the local government and/or public authority for firefighting and emergency management purposes.</p> <p><u>Fire service access route to be created under State ownership</u></p> <p>Where a fire service access route is proposed to traverse multiple private lots, but the decision-maker and/or local government prefer for the fire service access route to remain in one ownership under the State for management purposes, the fire service access route can be vested in the Crown under section 152 of the Planning and Development Act 2005 as a reserve, such land to be ceded free of cost without any payment or compensation by the Crown. The purpose of the reserve should be for a public purpose specified in the</p>

### Fire service access routes

condition related to the subdivision, for example for vehicular access for emergency services and the local government only, or for vehicular access for emergency services and the local government and recreation. A reserve for emergency services access and recreation can optimise the land-use as a dual purpose, where it provides vehicular access for emergency services, but can be accessed by the public (on foot) on a day-to-day basis as a recreation link. Appropriate signage will ensure the general public is aware of the purpose of the reserve. The approach taken is at the discretion of the decision-maker and/or local government.



Figure 26: Example of a fire service access route

## Private driveways

### Acceptable solution A3.6

There are no private driveway technical requirements where the private driveway is:

- within a lot serviced by reticulated water;
- no greater than 70 metres in length between the most distant external part of the development site and the public road measured as a hose lay; and
- accessed by a public road where the road speed limit is not greater than 70 km/h.

In circumstances where all of the above conditions are not met, or the private driveway is in a non-reticulated water area, the private driveway is to meet all the following requirements:

- requirements in Table 6, Column 4;
- passing bays every 200 metres with a minimum length of 20 metres and a minimum additional trafficable width of two metres (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum six metres); and
- turn-around area as shown in Figure 28 and within 30 metres of the habitable building.

### Explanatory note A3.6

In areas serviced by reticulated water, where the road speed limit is not greater than 70 km/h, and where the distance from the public road to the further part of the habitable building is no greater than 70 metres, emergency service vehicles typically operate from the street frontage.

In the event the habitable building cannot be reached by hose reel from the public road, then emergency service vehicles will need to gain access within the property. Emergency service vehicles will also need to gain access within the property, where access to reticulated water (fire hydrants) is not possible. In these situations, the driveway and battle-axe (if applicable) will need to be wide enough for access for an emergency service vehicle and a vehicle to evacuate.

Turnaround areas should be available for both conventional two-wheel drive vehicles of residents and Type 3.4 fire appliances. Turn-around areas should be located within 30 metres of habitable buildings. Circular and loop driveway design may also be considered. Note that the design requirements for a turn-around area for a private driveway or battle-axe differ to a cul-de-sac.

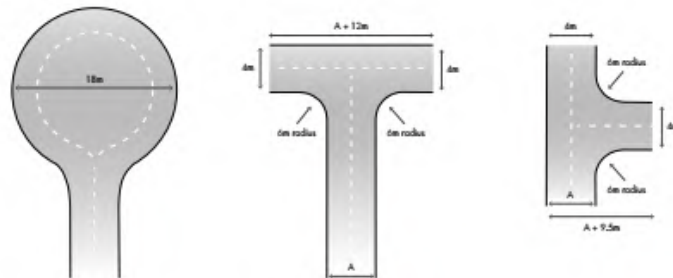
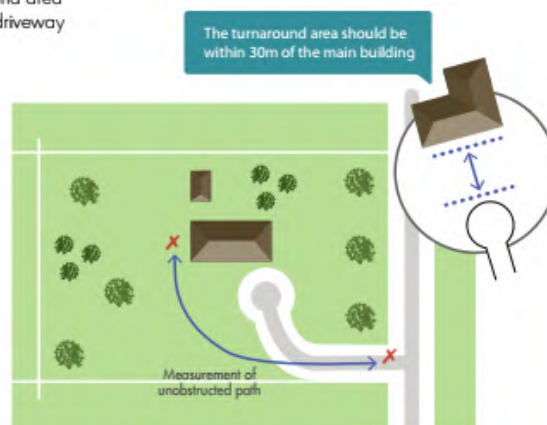


Figure 28: Design requirements for a turn-around area for a private driveway or battle-axe

Figure 29: Design requirements for a private driveway where required under A3.6



Technical requirement	1	2	3	4
	Public road	Emergency access way <sup>1</sup>	Fire service access routes <sup>1</sup>	Battle-axe and private driveways <sup>2</sup>
Minimum trafficable surface (m)	In accordance with A3.1	6	6	4
Minimum horizontal distance (m)	N/A	6	6	6
Minimum vertical clearance (m)	4.5			
Minimum weight capacity (t)	15			
Maximum grade unsealed road <sup>3</sup>	As outlined in the IPWEA Subdivision Guidelines	1 in 10 (10%)		
Maximum grade sealed road <sup>3</sup>		1 in 7 (14.3%)		
Maximum average grade sealed road		1 in 10 (10%)		
Minimum inner radius of road curves (m)		8.5		

**Notes**
<sup>1</sup> To have crossfalls between 3 and 6%

<sup>2</sup> Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

<sup>3</sup> Dips must have no more than a 1 in 8 (12.5% -7.1 degree) entry and exit angle

## Appendix 5 Water technical standards of the Guidelines

Schedule 2 – Water Supply Dedicated for Bushfire Fighting Purposes	
2.1 Water supply requirements	
Water dedicated for firefighting should be provided in accordance with Table 7 below, and be in addition to water required for drinking purposes.	
Table 7: Water supply dedicated for bushfire firefighting purposes	
PLANNING APPLICATION	NON-RETICULATED AREAS
Development application	10,000L per habitable building
Structure Plan / Subdivision: Creation of 1 additional lot	10,000L per lot
Structure Plan / Subdivision: Creation of 3 to 24 lots	10,000L tank per lot <b>or</b> 50,000L strategic water tank
Structure Plan / Subdivision: Creation of 25 lots or more	50,000L per 25 lots or part thereof Provided as a strategic water tank(s) or 10,000L tank per lot
2.2 Technical requirements	
<p><b>2.2.1 Construction and design</b></p> <p>An above-ground tank and associated stand should be constructed of non-combustible material. The tank may need to comply with AS/NZS 3500.1:2018.</p> <p>Below ground tanks should have a 200mm diameter access hole to allow tankers or emergency service vehicles to refill direct from the tank, with the outlet location clearly marked at the surface. The tank may need to comply with AS/NZS 3500.1:2018. An inspection opening may double as the access hole provided that the inspection opening meets the requirements of AS/NZS 3500.1:2018. If the tank is required under the BCA as part of fire hydrant installation, then the tank will also need to comply with AS 2419.</p> <p>Where an outlet for an emergency service vehicle is provided, then an unobstructed, hardened ground surface is to be supplied within four metres of any water supply.</p> <p><b>2.2.2 Pipes and fittings</b></p> <p>All above-ground, exposed water supply pipes and fittings should be metal. Fittings should be located away from the source of bushfire attack and be in accordance with the applicable section below, unless otherwise specified by the local government.</p> <p><b>2.2.2.1 Fittings for above-ground water tanks:</b></p> <ul style="list-style-type: none"> <li>Commercial land uses: 125mm Storz fitting; or</li> <li>Strategic water tanks: 50mm or 100mm (where applicable and adapters are available) male camlock coupling with full flow valve; or</li> <li>Standalone water tanks: 50mm male camlock coupling with full flow valve; or</li> <li>Combined water tanks: 50mm male camlock coupling with full flow valve or a domestic fitting, being a standard household tap that enables an occupant to access the water supply with domestic hoses or buckets for extinguishing minor fires.</li> </ul> <p><b>2.2.2.2 Remote outlets</b></p> <p>In certain circumstances, it may be beneficial to have the outlet located away from the water supply. In such instances in which a remote outlet is to be used, the applicant should consult the local government and DFES on their proposal.</p>	



## **Appendix 6      City of Karratha Firebreak Notice**

# IMPORTANT FIRE MITIGATION NOTICE

## ALL OWNERS AND/OR OCCUPIERS OF LAND SITUATED IN THE CITY OF KARRATHA

This is a requirement under the *Bush Fires Act 1954* Section 33. Failure to comply with this Notice may incur penalties of up to \$5,000 and the works required by this Notice will be carried out at the expense of the owner/occupier.

Pursuant to the powers contained in Section 33 of the *Bush Fires Act 1954*, you are hereby required on or before the 1st day of November, (or within fourteen days of your becoming owner or occupier of land should this be after the 1st day of November), or within fourteen days of you receiving this notice, to clear and maintain mineral earth breaks and reduce the fuel load from the land owned or occupied by you as specified hereunder and to have the specified land and firebreaks clear of all flammable material all year round.

### LAND IN TOWNSITES- INCLUDING MINING AND OR CONSTRUCTION ACCOMMODATION FACILITIES

1.1 Where the area of land is 2000 square metres (approximately 1/2 an acre) or less, all flammable material must be reduced over the whole of the land. Grasses shall be slashed to a height 75mm.

1.2 Where the area of land exceeds 2000 square metres, mineral earth breaks of at least five (5) metres in width must be cleared of all flammable material immediately inside and along the boundaries of the land. Where there are buildings on the land additional mineral earth breaks five (5) metres in width must be cleared immediately surrounding each building.

1.3 Ensure a minimum vertical clearance of 4 metres is maintained along the firebreaks to enable vehicles to drive along the firebreaks without access being obstructed.

### LAND OUTSIDE TOWNSITES INCLUDING MINING AND OR CONSTRUCTION ACCOMMODATION FACILITIES

2.1 For all buildings on land outside of the townsite, two mineral earth breaks with a width not less than five (5) metres and cleared of all flammable material must surround the buildings. The inner mineral earth break must be no less than twenty (20) metres from the perimeter of the building or group of buildings and the outer mineral earth break no less than one hundred (100) metres from the inner mineral earth break.

### POWERLINES AND POWER TRANSMISSION LINES IN TOWNSITES INCLUDING MINING AND OR CONSTRUCTION ACCOMMODATION FACILITIES

3.1 Aerial hazards to power and power transmission lines must be maintained as per the guidelines issued by the Energy Safety - Department of Mines, Industry Regulation and Safety.

For power lines conducting less than or equal to 33,000 volts; ground fuels such as grasses and ground storey species must be cleared to a minimum of five (5) metres either side of a centre line created by the poles, or towers. The total cleared area must not be less than ten (10) metres wide and the entire area must be maintained to the standard of a mineral earth break.

3.2 For power transmission lines greater than 33,000 volts, a mineral earth break of not less than five (5) metres in width must be maintained either side of the widest point of any arms or cross arms on the pole or tower. A mineral earth break of no less than five (5) metres width is to be maintained directly under the power line corridor. All power and transmission lines are to be maintained as per Australian Standard AS7000, to assist in minimizing the risk from sparks or arcing and shall be the responsibility of the owner of the transmission line.

## **WATER SUPPLY PIPELINES AND INFRASTRUCTURE**

4.1 All water supply pipelines and associated infrastructure must have mineral earth breaks not less than five (5) metres wide on both sides of the pipeline and all associated infrastructure and be cleared of all flammable material to prevent the spread of fire and damage to the pipelines or associated infrastructure. Access points must be installed and maintained to allow for Emergency Services access and maintenance use.

## **EXPLOSIVES MAGAZINES AND STORAGE AREAS**

5.1 All Flammable Materials are to be removed to bare earth between any bunkers or storage facilities and all Flammable Materials are to be removed for a distance of not less than fifteen (15) metres from the perimeter of any such storage area.

## **FUEL DEPOT / FUEL STORAGE AREA / HAYSTACKS / STOCKPILED FLAMMABLE MATERIAL**

6.1 For all fuel depots/fuel storage areas, all flammable matter within 10 metres of where fuel drums, fuel ramps or fuel dumps are located, and where fuel drums, whether containing fuel or not are stored, a mineral earth break of not less than five (5) metres in width must be installed immediately adjacent

6.2 For all haystacks/stockpiled flammable materials, a mineral earth break of not less than five (5) metres in width must be installed immediately adjacent to any haystacks or stockpiled flammable material.

## **RAILWAY RESERVES IN TOWNSITES**

7.1 Mineral earth breaks of at least five (5) metres in width must be installed immediately inside all boundaries continuous with any railway reserve on which railway traffic operates and are the responsibility of the owner of the railway.

## **APPLICATION TO VARY FIREBREAK REQUIREMENTS**

If you consider it to be impractical to clear a mineral earth break or remove flammable material as required by this Notice, you may apply to Council or its Authorised Officer no later than the 30th day of August, for permission to provide firebreaks in alternative positions or take alternative action to remove or abate fire hazards. If permission is not granted by Council or Authorised Officer, you must comply with the requirement of this Notice. An application must include a detailed map (google map or similar) of the area you intend to vary, outlining the variation you require, along with the reason for variation.

## **BURNING GARDEN REFUSE DURING LIMITED BURNING TIMES**

9.1 A person must not burn garden refuse at a place (other than a rubbish tip) during the limited burning times for that place unless it is burned:

- (a) in an incinerator in accordance with subsection (2); or
- (b) on the ground in accordance with subsection (3).

9.2 Garden refuse burned in an incinerator is burned in accordance with this subsection where:

- (a) the incinerator is designed and constructed so as to prevent the escape of sparks or burning material; and
- (b) either
  - (i) the incinerator is situated not less than two (2) metres from any building or fence; or
  - (ii) if the incinerator is less than two (2) metres from a building or fence, the Council or its Authorised Officer has given written permission in writing for the incinerator to be used; and there is no flammable material within two (2) metres of the incinerator while it is in use; and

- (c) there is no flammable material within two (2) metres of the incinerator while it is in use; and,
- (d) at least one person is present at the site of the fire at all times until it is completely extinguished; and
- (e) the fire is no longer required, the person ensures that the fire is completely extinguished by the application of water or earth.
- 9.3 The Council or Authorised Officer must not give permission under subsection 9.2
- (b) (ii) unless it is satisfied that the use of the incinerator is not likely to create a fire hazard.

## ADDITIONAL WORKS

10.1 In addition to the requirements of this Notice, you may be required to carry out further works which are considered necessary by an Authorised Officer and specified by way of a separate written notice forwarded to the address of the owner/s as shown on the City rates record for the relevant land.

10.2 If the requirements of this Notice are carried out by burning, such burning must be in accordance with the relevant provisions of the Act.

10.3 Pursuant to Section 33(4) of the Act, where the owner and/or occupier of land fails or neglects to comply with the requisitions of this Notice within the times specified, the City may by its officers and with such servants, workmen and contractors, vehicles and machinery as the officers deem fit, enter upon the land and carry out the requisitions of this Notice which have not been complied with and pursuant to Section 33(5) of the Act, the amount of any costs and expenses incurred may be recovered from the owner and or occupier of the land.

10.4 Failing to comply with this notice may incur a modified penalty or prosecution. A person in default is also liable, whether prosecuted or not, to pay the cost of performing the work directed in this notice, if it is not carried out by the owner or occupier by the date required by this notice.

# Implementing a new, nationally consistent Fire Danger Rating system.

**From 1 September 2022, Australia's Fire Danger Rating System will be improved and simplified to make it easier for you to make decisions to stay safe on days of fire danger risk.**





The move to a simpler system is backed by improvements in science, which will mean we can better predict areas of greater risk on days of fire danger.

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## Attachment 6 – Environmental Assessment Report



## ENVIRONMENTAL ASSESSMENT REPORT

### Kingfisher Stayover Camp Expansion







## **ENVIRONMENTAL ASSESSMENT REPORT**

### **Kingfisher Stayover Camp Expansion**

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## SUMMARY

### Overview

The town of Karratha adjoins the port of Dampier and is located in the Pilbara region of Western Australia. Karratha's initial growth was due to its proximity to the Hamersley Iron Ore operations and the commencement of the nearby Dampier Salt project. The development of the North West Shelf gas fields with associated on-shore Liquefied Natural Gas processing and export facilities have been key drivers in the town's evolution to become the most economically diverse centre in the region.

Karratha is facing significant growth pressures driven, in part, by the ongoing exploration, mining and export activities in the resource rich Pilbara and by the state government's "Pilbara Cities" initiative which aims to transform Karratha into a city capable of sustaining 50,000 people.

Due to the expected increase in the number of fly in, fly out workers required to support ongoing resource activities, and associated construction activities, there is a strong local demand to supply strategically located short-term accommodation to house a transient workforce.

### Background

RPS Environment and Planning Pty Ltd (RPS) has been commissioned by Ausco Modular (Ausco) to provide this Environment Assessment Report (EAR) for part of Lot 211 on Deposited Plan 21966 Madigan Road, Stove Hill in Karratha (the subject land). The subject land is a 3.71 hectare (ha) parcel of land located, approximately eight kilometres to the south-west of the Karratha town centre (Figure 1).

The subject land is currently zoned "Rural Residential" under the Shire of Roebourne's Town Planning Scheme (TPS) No. 8 (Figure 2). A development application is required to be submitted to the Shire of Roebourne and approved by the Pilbara Joint Development Assessment Panel to allow the proposed Development Area Plan (Figure 3) to proceed.

### Environmental Assessment Report

This EAR has been prepared for the dual purposes of supporting the development of the subject land in accordance with the proposed Development Area Plan and to support an application to the Department of Environment and Conservation for a clearing permit.

The objectives of this EAR are to:

- Identify the potential impacts to the environment posed by the development of the subject land.

- Identify management actions aimed at facilitating the proposed development of the subject land in accordance with the Environmental Protection Authority's (EPA) objectives.
- Assess the proposed Development Area Plan against the 10 Clearing Principles to determine whether it is at variance to the principles.

This environmental assessment of the subject land has been undertaken to the level of a desktop assessment.

## **Key Findings**

### Hydrology

In the area of the subject land the 100 year Average Recurrence Interval for the ephemeral watercourse, located to the east of the subject land, is 18.9 metres Australian Height Datum (m AHD).

### Flora and Vegetation

No Threatened or Priority flora species or Threatened Ecological Communities are identified as occurring upon the subject land, however a buffer to a Priority I Ecological Community – *Roebourne Plains Gilgai Grasslands* intersects the subject land. It is considered a low likelihood that the Priority I Ecological Community – *Roebourne Plains Gilgai Grasslands* occurs upon the subject land.

### Fauna

The subject land may potentially contain habitat which could be utilised by some species of conservation significant fauna, however given the size of the subject land, its proximity to the Kingfisher Stayover Camp and the similarity of habitat in the Karratha area it is considered unlikely to be considered significant habitat upon which any species of conservation significant fauna is dependent upon for survival.

### Heritage

- No Aboriginal ethnographic sites are located within the subject land.
- No Aboriginal archaeological sites are located within the subject land.
- Although the polygon of Registered Aboriginal Site: Karratha West I (Site ID: 7509) intersects a northern portion of the subject land, no cultural material was located within this portion of the polygon. Therefore the physical site of Registered Aboriginal Site: Karratha West I (Site ID: 7509) is not within the subject land.
- Sixteen isolated stone artefacts were located within the subject land and were left in situ.

### Ten Clearing Principles

The proposed clearing of subject land against the “10 Clearing Principles” found the removal of vegetation is not likely to be at variance with any of the principles.

### **Management of Impacts**

A summary of recommended management measures which will underpin the proposed Development Area Plan for the subject land is provided in Table I. The implementation of these management measures will ensure any potential impacts to the key environmental factors are managed to ensure the proposed development meets the objectives of the EPA.

### **Conclusion**

Through addressing the identified key environmental factors and the implementation of the environmental management recommendations, this environmental assessment demonstrates the potential environmental impacts arising from the proposed development can be managed in accordance with the objectives of the EPA.

**Table 1: Summary of Recommended Management Measures**

Environmental Factor	EPA Objective	Relevant EPA Policy, Government Guidelines, Strategies and Agreements	Potential Impact	Management Measures	Proposed Timing
<b>Part of Lot 211 on Deposited Plan 21966 Madigan Road, Stove Hill</b>					
Hydrology	<i>To maintain the quantity and quality of water so that existing and potential environmental values, including ecosystem maintenance, are protected.</i>	Better Urban Water Management (WAPC 2008).	<ul style="list-style-type: none"> <li>Groundwater level changes that occur as a result of a change in land use.</li> <li>Removal of vegetation and installation of impervious surfaces that lead to an increase in run-off during rainfall events.</li> <li>Development may result in an increase in the potential for urban generated pollutants, such as nutrients, hydrocarbons, litter and sediment, being transported, through surface water run-off, into the local stormwater drainage system that surrounds the subject land.</li> <li>The subject land may be impacted by flooding from the ephemeral watercourse during high rainfall or less frequent extreme events, such as tropical cyclones.</li> </ul>	<ul style="list-style-type: none"> <li>Stormwater Concept Plan.</li> <li>Earthworks Concept Plan.</li> <li>Landscape Plan.</li> </ul>	Development Application approval stage.
Flora and Vegetation	<i>To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.</i>	<ul style="list-style-type: none"> <li><i>Environmental Protection Act 1986.</i></li> <li>Environmental Protection (Clearing of Native Vegetation) Regulations 2004.</li> </ul>	<ul style="list-style-type: none"> <li>Removal of vegetation within the subject land.</li> <li>Removal of vegetation that is located outside the boundaries of the subject land.</li> </ul>	Construction Management.	Prior to Construction.
Heritage	<i>To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.</i>	<i>Aboriginal Heritage Act 1972.</i>	<ul style="list-style-type: none"> <li>Disturbance of the identified isolated artefacts during construction activities.</li> <li>Disturbance to neighbouring registered Aboriginal Site: Karratha West 1 during construction and development phases.</li> </ul>	Construction Management.	Prior to Construction.

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## **I.0 INTRODUCTION**

### **I.1 Background**

RPS Environment and Planning Pty Ltd (RPS) has been commissioned by Ausco Modular (Ausco) to provide this Environment Assessment Report (EAR) for Part of Lot 211 on Deposited Plan 21966 Madigan Road, Stove Hill in Karratha (the subject land). The subject land is a 3.71 hectare (ha) parcel of land located, approximately eight kilometres (km) to the south-west of the Karratha town centre (Figure 1).

This EAR has been prepared for the dual purposes of supporting the development of the subject land in accordance with the proposed Development Area Plan and to support an application to the Department of Environment and Conservation (DEC) for a clearing permit.

### **I.2 Objective**

The objectives of this EAR are to:

- Identify the potential impacts to the environment posed by the development of the subject land.
- Identify management actions aimed at facilitating the proposed development of the subject land in accordance with the Environmental Protection Authority's (EPA) objectives.
- Assess the proposed Development Area Plan against the "10 Clearing Principles" to determine whether it is at variance to the principles.

### **I.3 Methodology and Scope**

This EAR addresses the following key environmental factors:

- topography
- geology
- hydrology
- flora and vegetation
- fauna
- acid sulfate soils
- contamination
- heritage.

The assessment of these environmental factors has been undertaken to the level of a desktop assessment. The information identified in the desktop assessment has been built upon through liaison with the Department of Water (DoW) and the DEC.

Liaison was undertaken with the DoW to determine the 100 year Average Recurrence Interval (ARI) for the ephemeral watercourse located to the east of the subject land. Liaison was undertaken with the DEC to determine the level of detail of environmental information required to facilitate their assessment of a clearing application for the subject land.

## **2.0 PLANNING CONTEXT**

### **2.1 Strategic Planning**

The proposed development of the subject land will be guided by the following key strategic planning documents.

#### **2.1.1 Karratha City of the North Plan**

In response to the critical issues of population growth and land supply, the state government and the Shire of Roebourne, in partnership with LandCorp, worked collaboratively to produce Karratha City of the North: City Growth Plan (Government of Western Australia 2010). Government of Western Australia (2010) aims to transform Karratha from a town of an estimated 18,000 people to a regional city of 50,000 people.

Government of Western Australia (2010) provides research strategies and actions required to better integrate temporary / fly in, fly out (fi, fo) workers into the Karratha community.

#### **2.1.2 Pilbara Planning and Infrastructure Framework**

The Pilbara Planning and Infrastructure Framework (Western Australian Planning Commission (WAPC) 2012) is a “whole of government” initiative that aims to set the agenda for the physical development of the Pilbara. WAPC (2012) responds to the challenges facing the region and will inform future state and local planning strategies and schemes.

WAPC (2012) identifies the objective for fi, fo settlements is to provide for fi, fo workforces that do not adversely impact on the residential population.

WAPC (2012) identifies the following actions for fi, fo settlements that are of relevance to the subject land:

- Identify appropriately located sites to accommodate fi, fo workforces through the preparation of regional and local government transient workers accommodation policies.
- Encourage urban-based transient worker accommodation to be located close to commercial centres, to serve multi-purpose functions within the regions communities.
- Support the use of on-site transient worker accommodation during the construction stage of major community, commercial and housing development projects.

### 2.1.3 Draft Transient Worker Accommodation in the Pilbara

The Draft Transient Worker Accommodation (TWA) in the Pilbara (Pilbara Development Commission 2012) identifies the current situation of TWA beds in the Pilbara, proposed operational expansion of Pilbara resources projects and considerations for the establishment of TWAs.

Pilbara Development Commission (2012) identifies the:

- Establishment of TWAs is considered in the context of environmental and/or heritage management, alongside the requirements of mining companies.
- Local governments of the Pilbara have jurisdiction in the establishment of camps with the local government area and town area.

## 2.2 Statutory Planning

The proposed development of the subject land is regulated by the following statutory planning instruments.

### 2.2.1 Shire of Roebourne Town Planning Scheme No. 8

Shire of Roebourne's Town Planning Scheme (TPS) No. 8 (Department of Planning 2000) was gazetted in August 2000 and provides the statutory basis for town planning in the Shire of Roebourne. Under TPS No. 8 the subject land is currently zoned "Rural Residential" (Figure 2). This zoning supports the proposed land use of a TWA, therefore an amendment to TPS No. 8, and consequential referral of the project to the EPA under Section 48A of the *Environmental Protection Act 1986* (EP Act), is not required.

To allow development of the subject land to proceed, a development application detailing the proposed Development Area Plan (Figure 3) is required to be submitted to the Shire of Roebourne and approved, under delegated authority, by the Pilbara Joint Development Assessment Panel.

### 2.2.2 Local Planning Policies

Local Planning Policies have been developed to provide guidance on the preparation of development applications and to communicate the objectives of the Shire of Roebourne in relation to development and land use (Shire of Roebourne 2012).

#### 2.2.2.1 DP 10 – Transient Workforce Accommodation

DP 10 – Transient Workforce Accommodation (Shire of Roebourne 2009) local planning policy states the Shire of Roebourne's objectives for the provision of TWAs within the Shire of Roebourne (Appendix I).

DP 10 sets out the Development Standards and Environmental Health Requirements the proposed Development Area Plan is required to meet.

## **2.3 Clearing of Vegetation**

The EP Act contains provisions that protect native vegetation while allowing for approved clearing activities.

### **2.3.1 *Environmental Protection Act 1986***

Any clearing of native vegetation requires a permit under Part V Division 2 of the EP Act except where an exemption applies under Schedule 6 of the EP Act or is prescribed by regulation in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004, provided it is not in an Environmentally Sensitive Area.

The proposed clearing of vegetation upon the subject land is not subject to any exemptions contained in the EP Act or provisions contained in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004, therefore an application for a clearing permit will be submitted to the DEC for assessment. Clearing of vegetation will only be undertaken post-approval from the DEC.

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### 3.0 PROPOSED DEVELOPMENT AREA PLAN

The Kingfisher Stayover Camp is situated in a strategic position in the Shire of Roebourne's landscape. The camp is located close enough to Karratha's town centre to ensure visitors to the camp are able to easily access local amenities provided by Karratha and is far enough out of the town to minimise any potential impacts to the residential population by the accommodation of a local workforce at the site.

The proposed Development Area Plan, which covers the entire extent of the subject land, aims to substantially expand the capacity of the Kingfisher Stayover Camp from a 225 room facility to a 665 room facility.

The new facility will increase the capacity of the Kingfisher Stayover Camp, and the region, to meet the local demand for the provision of accommodation for an ever increasing workforce.

The proposed Development Area Plan is supported by Stormwater and Earthworks Concept Plans, which has been prepared by JDSI Consulting Engineers, and a Landscape Concept Plan, which has been drafted by Cardno (Appendix 2).

The Stormwater and Earthworks Concept Plans provide a carefully designed water sensitive approach to management the total water cycle within the subject land.

The Landscape Concept Plan improves the amenity of the existing site through the incorporation of feature, medium shade trees, and a screen planting eucalypt grove into the Kingfisher Stayover Camp.

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## **4.0 EXISTING ENVIRONMENT**

### **4.1 Location**

The subject land is situated within the locality of Stove Hill, Karratha in the municipality of the Shire of Roebourne. The subject land is located approximately 8 km south-west of the Karratha town centre (Figure 1).

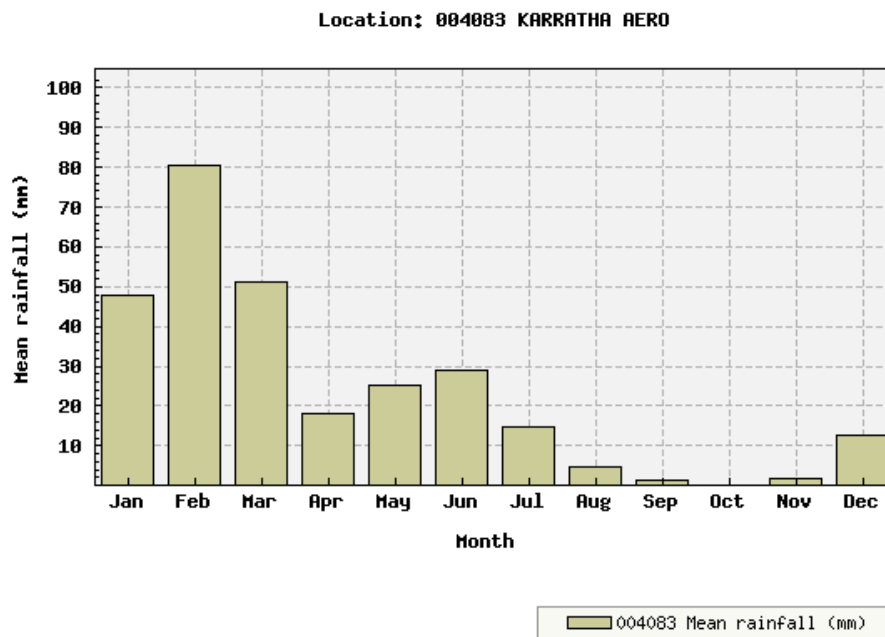
The subject land is approximately 3.71 hectares (ha) in extent and is directly bordered, on its western extent, by the Kingfisher Stayover Camp. To the north, east and south the subject land is bordered by vacant land zoned “Rural Residential” under TPS No. 8 (Figure 2).

Figure 4 identifies the easting and northing coordinates, using Map Grid of Australia 1994, of the four corners of the subject land.

### **4.2 Climate and Weather**

Karratha experiences a hot, semi-arid climate. Summers (October to April) are very hot with average daily maximum temperatures of 36.1 °C in March, which is the hottest month of the year. Winters are generally mild with temperatures ranging from average daily minimum temperatures of 13.8 °C to an average monthly maximum of 26.3 °C in July (Bureau of Meteorology 2012a).

Most of the annual rainfall occurs during the summer period, between January and March, from scattered thunderstorms and occasional tropical cyclones. A secondary rainfall peak occurs in June as a result of rainfall from tropical cloud bands. These events can also produce low maximum temperatures, particularly away from the coast (Figure A).



Australian Government  
Bureau of Meteorology

Created on Thu 29 Mar 2012 17:47 PM EST

(Source: Bureau of Meteorology 2012a)

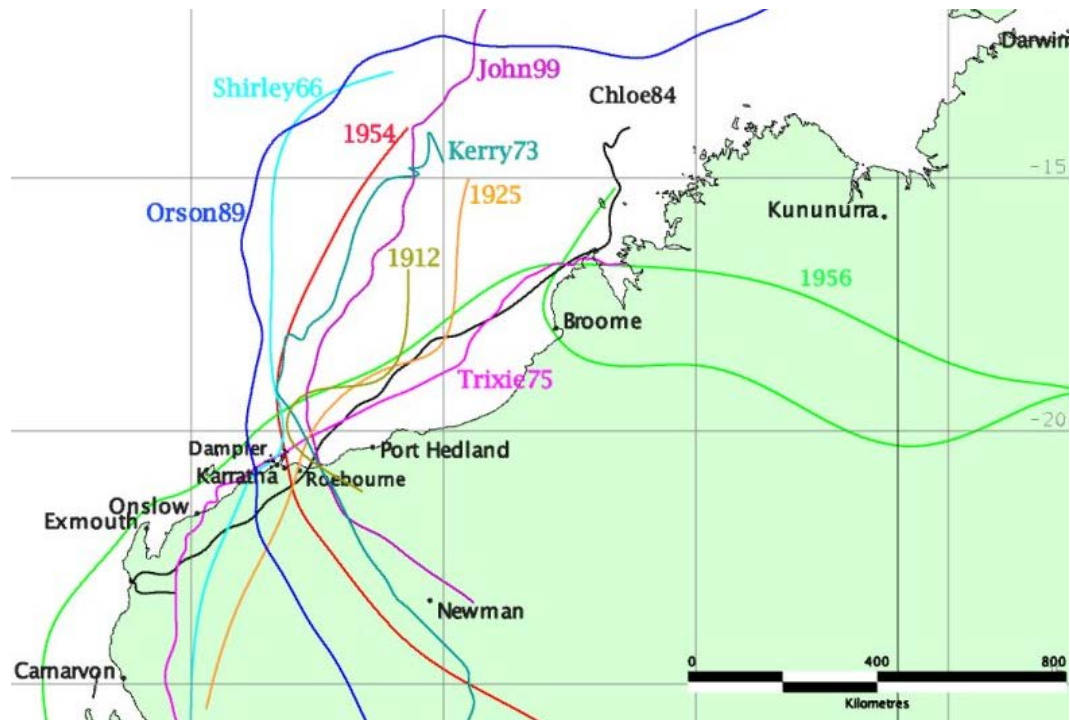
**Figure A: Mean Rainfall for Karratha**

Winds in Karratha are characterised by dominant westerly winds occurring throughout summer and prevailing easterly winds in the winter.

#### 4.2.1 Cyclones

The coastline from Port Hedland to the Exmouth Gulf is the most cyclone prone area in Australia. The area which includes Karratha, Dampier and Roebourne has been severely impacted by 48 cyclones since 1910 that have caused damaging wind gusts in excess of 90 km/h (Bureau of Meteorology 2012b). Figure B shows the tracks of notable cyclones that have impacted Karratha.

Cyclones are most common in the Pilbara region between mid-December and April, peaking in February and March, which can result in extreme rainfall events.



(Source: Bureau of Meteorology 2012b)

**Figure B: Tracks of Notable Cyclones that have Impacted Karratha**

## 4.3 Land Uses

### 4.3.1 Historic Land Uses

The historic land uses for the subject land have been identified from analysis of historical imagery obtained from the Landgate Map viewer, which dates back to the year 2000.

The 2000 image identifies the entire extent of the subject land is comprised of vegetation. To the east of the subject land, there appears to be some development located upon the site of the Kingfisher Stayover Camp, however it is not representative of the present day development. A drainage line, which is in the present day location of the created drainage line, is present and appears to be smaller in size.

The 2004 image differs very little from the 2000 image. There appears to be an unsealed track constructed from Madigan Road, which may have provided access to the subject land from the south.

The 2008 image shows there has been some vegetation removed from a small portion in the south of the subject land and the drainage channel appears to have been created. The Kingfisher Stayover Camp has been constructed directly to the east of the subject land. The remaining extent of the subject land is comprised of vegetation.

#### **4.3.2 Existing Land Uses**

The subject land is currently vacant and comprised almost entirely of native vegetation. The created drainage line extends approximately half way into the subject land, from its western boundary, in an easterly direction and is used to drain stormwater from the Kingfisher Stayover Camp. The subject land does not have a perimeter fence or gates to restrict access and an access track is known to traverse the subject land from the south-west to the north-east.

Anecdotally, the subject land is described as heavily disturbed by rubbish and drainage lines (Anthropos Australis Pty Ltd (Anthropos) and Context Anthropology Pty Ltd (Context) 2012).

#### **4.3.3 Surrounding Land Uses**

The Kingfisher Stayover Camp directly borders the subject land, to the west, and provides comfortable and serviced accommodation for mining and resource workers in Karratha (Ausco 2012).

### **4.4 Topography**

The topography of the subject land is relatively flat and gently slopes from areas of higher elevation in the south-west to areas of lower elevation in the north-east. The elevations ranging between 20.6 metres Australian Height Datum (m AHD) in the south-west to 19.2 m AHD in the north-east (Figure 4).

### **4.5 Geology and Soils**

#### **4.5.1 Regional Geology**

The geology of the Karratha region is characterised and mapped by *Technical Bulletin No. 92: An inventory and condition survey of the Pilbara region, Western Australia* (Department of Agriculture 2004).

Department of Agriculture (2004) identifies the subject land is situated within Archaean granite-greenstone terrane of the northern Pilbara Block. The granite rocks are poorly exposed and comprised of various deformed and metamorphosed granitic phases that are locally intruded by younger dykes and veins. The greenstone sequences are comprised of metasedimentary and volcanic rocks that have been intruded by significant granitoid bodies (Department of Agriculture 2004).

#### 4.5.2 Site Geology

Figure 5 identifies the surface geology of the subject land is comprised of Archean Metamorphosed basic and ultrabasic igneous rocks with Alluvium in drainage channels (Department of Mines and Petroleum 2008).

#### 4.5.3 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils, sediments and peats that contain fine-grained metal sulphides, typically pyrite ( $\text{FeS}_2$ ), which are formed under saturated, anoxic/reducing conditions (MPL Laboratories 2010). In an undisturbed state below the water table, these soils are benign and non-acidic. However, if the soils are exposed to the atmosphere by drainage, excavation or lowering of the water table, the sulfides may react with oxygen to form sulfuric acid. Where these materials have oxidised, they commonly have a mottled appearance (orange/red or buttery yellow discolouration) due to the presence of oxidised iron minerals (MPL Laboratories 2010).

The DEC has compiled broad-scale mapping of the risk of Acid Sulfate Soils (ASS) for regions of Western Australia. Figure 5 shows the ephemeral watercourse to the east of the subject land is mapped as “Moderate–Low” risk of ASS occurring within three metres of the natural soil surface.

The subject land has not been assigned an ASS risk rating and it is assumed there is a “Low–No”<sup>1</sup> known risk of ASS occurring within three metres of the natural soil surface (or deeper).

### 4.6 Hydrology

#### 4.6.1 Surface Water

There are no streams, creeks or any other natural watercourses within the subject land.

Stormwater naturally drains from the Kingfisher Stayover Camp into the created drainage line which extends approximately half way into the subject land, from the western boundary of the subject land, in an easterly direction.

An ephemeral watercourse is located approximately 220 m east of the subject land (Figure 5). The ephemeral watercourse performs the hydrological function of a local flood plain which conveys and disperses the overland flow from the surrounding catchment area during high rainfall or less frequent extreme events, such as tropical cyclones.

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<sup>1</sup> ASS is not known or expected to occur in areas of “Low–No” known risk.

Given the subject land is in close proximity to a known local flood plain, the DoW were consulted to determine the 100 year Average Recurrence Interval (ARI) flood plain for the ephemeral watercourse. Using the preliminary results of the Karratha Coastal Vulnerability Study, the DoW determined in the area of the subject land, the 100 year ARI for the ephemeral watercourse is 18.9 m AHD (Appendix 3).

Figure 4 shows the point of lowest elevation upon the subject land is 19.2 m AHD. Therefore, in a 100 year event, the subject land is not expected to be impacted by flooding from the ephemeral watercourse.

#### **4.6.2 Ground Water**

##### **4.6.2.1 Regional Context**

Groundwater originates from direct infiltration by rainfall and from surface water flows (Department of Water 2010). Groundwater occurs throughout the Pilbara and is most easily accessed near surface water drainage lines (Department of Water 2010).

Groundwater is generally within five to 10 metres below the ground level (Government of Western Australia 2010). Groundwater is generally fresh, except away from the main rivers on the coastal plain. Groundwater salinity increases in the direction of groundwater flow, in areas of low permeability and with increasing depth (Department of Agriculture 2004).

##### **4.6.2.2 Site Context**

The *Geographic Data Atlas* (Department of Water 2012) does not have data for the depth to groundwater or groundwater quality for the subject land. The *Geographic Data Atlas* does identify that groundwater bore 70910038 (709 – Port Hedland Coast – Regal Well) is located approximately 1.4 km to the east of subject land although no data is available for this bore (Figure 5).

#### **4.7 Flora and Vegetation**

##### **4.7.1 Regional Vegetation**

The subject land lies within the Interim Biogeographical Regionalisation of Australia (IBRA) region of Pilbara 4. It is within the coastal subregion of Roebourne (Thackway and Cresswell 1995).

The Roebourne subregion is described as:

Quaternary alluvial plains with a grass savannah of mixed bunch and hummock grasses, and dwarf Shrub Steppe of *Acacia translucens* or *A. pyrifolia* and *A. inaequilatera*. Resistant linear ranges of basalts occur across the coastal plains. These uplands are

dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus* woodlands. Samphire, *Sporobolus* grasslands and mangal occur on the marine alluvial flats and river deltas.

(Department of Conservation and Land Management (CALM) 2002)

#### 4.7.2 Beard Vegetation Mapping

Beard (1975) mapped the vegetation of the Pilbara region at a scale of 1:1,000,000.

Figure 5 identifies that Beard Vegetation Association 589 – “Mosaic: Short bunched grassland – savannah / grass plain (Pilbara)/ Hummock grasslands, grass steppe; soft spinifex” vegetation association naturally occurs over the entire extent of the subject land.

A Biodiversity Audit of WA (CALM 2002) for the Roebourne subregion identifies the Beard Vegetation Association: 589 – “Mosaic: Short bunch grassland – savannah/grass plain (Pilbara)/Hummock grasslands, grass steppe; soft spinifex” has medium priority for reservation.

CALM (2002) identifies that a substantial amount (approximately 13,758.3 ha) of Beard Vegetation Association 589 – “Mosaic: Short bunch grassland – savannah/grass plain (Pilbara)/Hummock grasslands, grass steppe; soft spinifex” is contained in reservation estates within the Pilbara 4 region. This vegetation association is common and widespread throughout the Pilbara with approximately 99.9% of the pre-European vegetation extent remaining (Shepherd et al. 2002).

#### 4.7.3 Desktop Assessment

##### 4.7.3.1 Threatened Flora

A search was undertaken on 16 July 2012 of the DEC's *Threatened (Declared Rare) Flora* database, *Declared Rare and Priority Flora List* and the *Western Australian Herbarium Specimen* database for threatened and priority species collected within a ten kilometre radius of the subject land. There were no threatened or priority species identified as occurring within the subject land.

Table 2 identifies the conservation significant flora species recorded within a 10 kilometre radius of the subject land and their conservation status under the *Wildlife Conservation Act (1950)* (WC Act).

**Table 2: Conservation Significant Flora Species in a Ten Kilometre Radius of the Subject Land**

Species	Conservation Status
<i>Acacia glaucoaesia</i>	Priority 3
<i>Atriplex lindleyi</i> subsp. <i>conduplicata</i>	Priority 3
<i>Eragrostis lanicaulis</i>	Priority 3
<i>Eragrostis surreyana</i>	Priority 3
<i>Eriochloa fatmensis</i>	Priority 3
<i>Gomphrena cucullata</i>	Priority 2
<i>Gomphrena pusilla</i>	Priority 2
<i>Gomphrena leptophylla</i>	Priority 3
<i>Goodenia pallida</i>	Priority 1
<i>Gymnanthera cunninghamii</i>	Priority 3
<i>Nicotiana heterantha</i>	Priority 1
<i>Phragmites karka</i>	Priority 3
<i>Polymeria distigma</i>	Priority 3
<i>Pterocaulon intermedium</i>	Priority 3
<i>Rhynchosia bungarensis</i>	Priority 4
<i>Schoenus punctatus</i>	Priority 3
<i>Stackhousia clementii</i>	Priority 3
<i>Terminalia supranitifolia</i>	Priority 3
<i>Themeda</i> sp. <i>Hamersley Station</i> (M.E. Trudgen 11431)	Priority 3
<i>Trianthema</i> sp. <i>Python Pool</i> (G.R. Guerin & M.E. Trudgen GG 1023)	Priority 2
<i>Vigna</i> sp. <i>rockpiles</i> (R. Butcher et al. RB 1400)	Priority 3

Figure 5 shows the species which are in close proximity to the subject land, where their location is known and has been provided by the DEC.

A search using the Department of Sustainability, Environment, Water, Population and Communities' (SEWPaC) *Protected Matters Search Tool*, undertaken on 2 August 2012, identified there were no known occurrences of Threatened Flora protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) identified within the subject land or within a surrounding five kilometre radius (Appendix 4).

#### 4.7.3.2 Conservation Significant Vegetation

##### ***Threatened Ecological Communities***

A search was undertaken on 16 July 2012 of the DEC's *Threatened and Priority Ecological Communities* database and identified there were no known occurrences of Threatened Ecological Communities (TECs) within a ten kilometre radius of the subject land. SEWPaC's *Protected Matters Search Tool* identified there were no known occurrences of TECs protected under the EPBC Act identified within the subject land or within a surrounding five kilometre radius buffer (Appendix 4).

### **Priority Ecological Communities**

The search of the DEC's *Threatened and Priority Ecological Communities* database identified the buffer<sup>2</sup> of the Priority I Ecological Community – *Roebourne Plains gilgai grasslands* intersects the subject land (Figure 5).

The *Roebourne Plains gilgai grasslands* are restricted to the Karratha area and occur on micorelief of deep cracking clays, surrounded by clay pans/flats and sandy coastal and alluvial plains. The gilgai depressions supports ephemeral and perennial tussock grasslands dominated by *Sorghum* sp. and *Eragrotis xerophila* along with other native species including *Astrebla pectinata*, *Eriachne benthamii*, *Chrysopogon fallax* and *Panicum decompositum* (DEC 2012).

Priority Ecological Communities (PECs) are possible TECs that do not meet the survey criteria or are not adequately defined (DEC 2012). Priority I Ecological Communities are poorly known ecological communities that are known from very few occurrences with a very restricted distribution (DEC 2010).

PECs are not protected under either the WC Act or EPBC Act.

#### **4.7.3.3 Discussion**

##### **Regional Context**

The Priority I Ecological Community – *Roebourne Plains gilgai grasslands* is associated with Beard Vegetation Association 589 – “Mosaic: Short bunched grassland – savannah / grass plain (Pilbara)/ Hummock grasslands, grass steppe; soft spinifex”. Beard Vegetation Association 589 – “Mosaic: Short bunched grassland – savannah / grass plain (Pilbara)/ Hummock grasslands, grass steppe; soft spinifex” is common and widespread throughout the Pilbara with approximately 99.9% of the pre-European vegetation extent remaining (Shepherd et al. 2002). CALM (2002) identifies approximately 13,758.3 ha of this association is contained in reservation estates within the Pilbara 4 region.

CALM (2002) notes:

- Subregional flora is poorly known with few intensive studies being undertaken.
- Only small areas have been examined in detail by botanists.
- Quadrat based floristic data is available from only a few localities.

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<sup>2</sup> The buffer radius around each occurrence of a TEC or PEC is included to help ensure that developments with potential to impact groundwater or surface water are picked up. For upland TEC or PECs that are believed not be groundwater dependent, the buffer area radius encompasses the TEC or PEC site location recorded in the TEC database, and extends at least to the furthest point in the occurrence. This is to ensure that the “buffer” area encompasses at least the entire TEC or PEC.

Potentially, a lack of survey effort in the Roebourne subregion could be the reason why Priority I Ecological Community – *Roebourne Plains gilgai grasslands* is poorly known from very few occurrences with a very restricted distribution.

### **Karratha Context**

In addition to the search conducted on 16 July 2012 of the DEC's *Threatened and Priority Ecological Communities* database, RPS has conducted a prior search on 7 July 2011 of the DEC's *Threatened and Priority Ecological Communities* database for the Karratha area, using a larger buffer.

Figure 6 shows the mapped extent of the buffers of the Priority I Ecological Community – *Roebourne Plains gilgai grasslands* in the Karratha area and in relation to the subject land. Using these two DEC supplied data sets, RPS has calculated the total known extent of the buffers for Priority I Ecological Community – *Roebourne Plains gilgai grasslands* in the Karratha area is 18, 257.53 ha.

The portion of the buffer for Priority I Ecological Community – *Roebourne Plains gilgai grasslands* intersecting the subject land, covers approximately 2.21 ha.

Table 3 quantifies the impact to the buffers of the Priority I Ecological Community – *Roebourne Plains gilgai grasslands*.

**Table 3 Proposed Impact to Priority I Ecological Community – *Roebourne Plains gilgai grasslands* Buffers**

	Regional Distribution (ha)	Subject Land (ha)
<b>Pre-development</b>	18, 257.53	2.21 ha
<b>Post-development</b>	18,255.32	0 ha

In relation to the known potential regional distribution of this PEC's buffers, the extent that covers the subject land comprises 0.012% of its known potential regional distribution.

Given the small area of the extent of the PEC buffer that covers the subject land, it is considered unlikely that the proposed clearing of vegetation present upon the subject land would be considered a significant impact upon which the existence of the Priority I Ecological Community – *Roebourne Plains gilgai grasslands* is dependent upon for maintenance.

#### **4.7.3.4 Supplementary Information**

Anthropos and Context (2012) identifies the vegetation of subject land is dominated by *Cenchrus ciliaris* (Buffel Grass) interspersed with *Acacia ampliceps*, *A.pyrifolia* (Ranji Bush) and *Triodia* spp. (Spinifex).



(Source: Anthropos and Context 2012)

**Plate I: Vegetation of the Subject Land**

Buffel grass is native to Africa and south-western Asia and is a common weed species in northern Australian native ecosystems.

**4.7.3.5 Likelihood of Occurrence**

It is considered a low likelihood that the PEC I *Roebourne Plains gilgai grasslands* occurs on the subject land for the following reasons:

- The composition of the vegetation on the subject land, as described by Anthropos and Context (2012), is dissimilar to the floristic suite characteristic of the PEC *Roebourne Plains gilgai grasslands*. Buffel Grass and *Triodia* spp. are the dominant grasses identified as occurring on the subject land and they are not known to describe the PEC *Roebourne Plains gilgai grasslands*.
- The differential gradient (1.6 m AHD) and topography of the subject land contradicts the landform to which the PEC I *Roebourne Plains gilgai grasslands* are known to occur on.
- A review and comparison of the subject land to known locations of other PEC I *Roebourne Plains gilgai grasslands* located in the Karratha area (including to the east of the subject land) using high resolution aerial photography suggests the visual constitution of the vegetation present on the subject land, when compared to locations containing the PEC *Roebourne Plains gilgai grasslands* differ in appearance.

#### 4.7.3.6 Conclusions

- No Threatened or Priority flora species or TECs are identified as occurring upon the subject land, however a buffer of the Priority I Ecological Community – *Roebourne Plains Gilgai Grasslands* intersects the subject land.
- The Beard Vegetation Association 589 - Mosaic: Short bunched grassland – savannah / grass plain (Pilbara)/ Hummock grasslands, grass steppe; soft spinifex associated with the Priority I Ecological Community – *Roebourne Plains Gilgai Grasslands* is not restricted to the subject land and is well reserved within the region.
- The potential extent of the Priority I Ecological Community – *Roebourne Plains Gilgai Grasslands* in the Karratha area is 18, 257.53 ha.
- The proposed clearing of subject land represents an insignificant impact to the long term maintenance of the PEC.
- The vegetation association upon the subject land is dominated by a weed species.
- It is considered a low likelihood that the Priority I Ecological Community – *Roebourne Plains Gilgai Grasslands* occurs upon the subject land.

## 4.8 Fauna

A desktop assessment was undertaken to identify fauna species of conservation significance that may potentially occur in the subject land.

A search was undertaken on 16 July 2012 of the DEC's *Threatened Fauna* database using a radial buffer of 15 km from the subject land to identify recordings of species conservation significant fauna, under the WC Act, in the local area surrounding the site. The search identified that two Threatened species and five Priority species of fauna have been recorded.

SEWPaC's *Protected Matters Search Tool* identified four Threatened species, 10 Migratory species and one Marine species protected under the EPBC Act may potentially occur within a five kilometre radius buffer surrounding, and including, the subject land (Appendix 4).

Table 4 identifies the species of conservation significant fauna recorded by the searches, their conservation status under the WC Act and the EPBC Act and their likelihood of their occurrence within the subject land.

**Table 4: Conservation Significant Fauna Species and their Likelihood of their Occurrence within the Subject Land**

Species	Conservation Status (State)	Conservation Status (EPBC)	Occurrence on Subject Land
<b>Birds</b>			
<i>Apus pacificus</i> (fork-tailed swift)	-	Migratory	<p>The fork-tailed swift breeds in Siberia and the Himalayas and migrates to Australia in October, before returning to the breeding grounds by May or June. Movements within Australia are in response to weather patterns, with this species often following thunderstorms. When in Australia, the fork-tailed swift is common and prominent in both natural and developed environments.</p> <p>It is unlikely this species occurs within the subject land, except as a mobile species flying over the subject land, and as such is considered unlikely to be significantly impacted by the proposed development.</p>
<i>Ardea alba</i> (great egret)	-	Migratory	<p>The great egret is widespread in southern and eastern Asia and Australasia and is highly mobile, rendering them less susceptible to population fragmentation. In Western Australia breeding colonies nest predominantly in <i>Melaleuca</i> swamps in November and December although breeding is dependent to some extent on rainfall.</p> <p>Given that the preferred habitat of the great egret does not occur upon the subject land it is considered unlikely that this species will be significantly impacted by proposed development.</p>
<i>Ardea ibis</i> (cattle egret)	-	Migratory	<p>The cattle egret is widespread in southern and eastern Asia and Australasia and is highly mobile, rendering them less susceptible to population fragmentation. In Western Australia breeding colonies nest predominantly in <i>Melaleuca</i> swamps in November and December although breeding is dependent to some extent on rainfall.</p> <p>Given that the preferred habitat of the great egret does not occur upon the subject land it is considered unlikely that this species will be significantly impacted by proposed development.</p>
<i>Ardeotis australis</i> (Australian bustard)	Priority 4	-	<p>Australian bustards are tall birds that live on open grassy plains and low shrubby areas in northern Australia. The Australian bustard has been recorded by the DEC's <i>Threatened Fauna</i> database in the locality of Maitland, Karratha in 1978 with no further recordings for this species being made.</p> <p>It is considered that there is habitat available in the subject land which, potentially, could support the Australian bustard. Given the similarity of habitat in the Karratha area it is considered unlikely that the subject land would contain habitat which this species is dependent upon.</p>
<i>Charadrius veredus</i> (oriental plover)	-	Migratory	<p>The oriental plover is a non-breeding visitor to Australia where it occurs in both coastal and inland areas; however it is mostly recorded along the north-western coast. When inland, the oriental plover generally inhabits flat, open, semi-arid or arid grasslands where areas of bare ground are prevalent.</p> <p>There is potential habitat present on the subject land for this species, however given the size of the subject land and the fact that it only occupies a very small area of the extensive distribution of this species, it is considered unlikely that the oriental plover will be significantly impacted by this development proposal.</p>

Species	Conservation Status (State)	Conservation Status (EPBC)	Occurrence on Subject Land
<i>Glareola maldivium</i> (oriental pratincole)	-	Migratory	<p>The oriental pratincole is a medium-sized shorebird that occurs in small to very large flocks of thousands to millions of individuals. It is widespread in the northern extent of Australia, particularly along the coastlines of Western Australia's Pilbara and Kimberley regions. The breeding season is spent in southern, south-eastern and eastern Asia, with the non-breeding season spent largely in Australia. During this time, the oriental pratincole preferably inhabits beaches, mudflats, islands, open plains, floodplains or short grassland, often with extensive areas of bare ground.</p> <p>As this species is known to frequent shorelines in north-west of Western Australia, it is not considered that there is suitable habitat on the subject land for this species and as such, it is considered unlikely to be adversely impacted by the proposed development of the subject land.</p>
<i>Haliaeetus leucogaster</i> (white-bellied sea eagle)	-	Migratory	<p>The white-bellied sea eagle is not globally threatened, but has been subject to population decline within Australia and South East Asia. In Australia, it is distributed along the coastline, and is restricted to a narrow band of coastline in south-western Australia. The population residing within Australia is estimated at 500 mating pairs. The white-bellied sea eagle is found in coastal habitats and tends to occupy dunes, tidal flats, woodlands, forests and grasslands (generally in areas associated with large bodies of water). When not migrating, the home range of the white-bellied sea eagle can be up to 100 square km, although breeding adult birds are generally sedentary (breeding season runs from June to January). The nests of these birds are large and conspicuous, generally constructed in large trees, cliffs, rocky outcrops, mangroves, caves or on artificial structures.</p> <p>This species is considered unlikely to frequent any habitat present on the subject land on a regular basis and therefore, the proposed development of the subject land is not considered likely to impact this species.</p>
<i>Hirundo rustica</i> (barn swallow)	-	Migratory	<p>The barn swallow occurs in open land, such as agricultural pasture and plains, roosting or nesting in dead trees, banks, cliff cavities and rock shelves. It is a regular non-breeding summer migrant to northern Australia, where its range extends from the Kimberley region to north-eastern and south-eastern Queensland.</p> <p>There is potential habitat present on the subject land for this species, however given the size of the subject land and the fact that it only occupies a very small area of the extensive distribution of this species, it is considered unlikely that the barn swallow will be significantly impacted by this development proposal.</p>
<i>Merops ornatus</i> (rainbow bee-eater)	-	Migratory	<p>The population size of this species within Australia is not known, but it is assumed to be quite large. It is known to occur across the majority of the mainland. It migrates between Australia, Eastern Indonesia and Japan, and has formed a colony on Rottnest Island. The rainbow bee-eater tends to occupy open forests and woodlands, including cleared or semi-cleared areas and farmland, and prefers timbered landscapes. Their nests consist of an enlarged chamber at the end of a long burrow that is excavated by both the female and male bird from flat or sloping ground, cliff faces or mounds of gravel.</p> <p>Due to its proximity to the ephemeral watercourse, there is potential habitat present on the subject land for this species, however given the size of the subject land and the fact that it only occupies a very small area of the extensive distribution of this species, it is considered unlikely that the rainbow bee-eater will be significantly impacted by this development proposal.</p>

Species	Conservation Status (State)	Conservation Status (EPBC)	Occurrence on Subject Land
<i>Numenius madagascariensis</i> (eastern curlew)	Priority 4	Migratory	<p>Within Australia, the eastern curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and south-east regions including Tasmania. Eastern curlews are rarely recorded inland. They have a continuous distribution from Barrow Island and Dampier Archipelago, Western Australia, through the Kimberley Division and along Northern Territory, Queensland, and NSW coasts and the islands of Torres Strait. They are patchily distributed elsewhere. The eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbors, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves. The birds are also found in salt works and sewage farms.</p> <p>Given that the preferred and occasional habitat of the eastern curlew does not occur upon the subject land it is considered unlikely that this species will be significantly impacted by proposed development.</p>
<i>Sterna dougallii</i> (roseate tern)	-	Marine	<p>The roseate tern breeds in colonies on the coast and on offshore islands and feeds by plunging into the ocean for fish. Given that the roseate tern is a marine species and that its preferred habitat does not occur upon the subject land it is considered unlikely that this species will be significantly impacted by proposed development.</p>
<b>Mammals</b>			
<i>Dasyurus hallucatus</i> (northern quoll)	Threatened	Endangered	<p>The northern quoll is known to inhabit main land Queensland, the Northern Territory and Western Australia and some offshore islands. Northern quolls occupy a variety of habitats including rocky areas, eucalypt forests and woodlands, rainforests, sandy lowlands and beaches, shrublands, grasslands and deserts. Habitat critical to the survival of the species includes rocky habitats, such as ranges, escarpments, mesas, ranges, gorges, breakaways, boulder fields, major drainage lines or treed creeklines; Structurally diverse woodland or forest areas containing large diameter trees, termite mounds or hollow logs; and Offshore islands where the northern quoll is known to exist.</p> <p>Given that the subject land does not contain any of these features it is not considered habitat which is critical to the survival of the northern quoll and therefore the species is considered unlikely to be significantly impacted by this development proposal.</p>
<i>Leggadina lakedownesis</i> (short-tailed mouse)	Priority 4	-	<p>The short-tailed mouse occurs across northern Australia from Cape York to the Pilbara, with one population on Thevenard and Serrurier Islands. The short-tailed mouse is known to occur on sandy soils and cracking clays in Western Australia. This species has been recorded by the DEC's <i>Threatened Fauna</i> database in the locality of Maitland, Karratha in 2011.</p> <p>Potentially the subject land could be considered to contain habitat for the short-tailed mouse, however given the size of the subject land, its proximity to the Kingfisher Stayover Camp and the similarity of habitat in the Karratha area it is considered unlikely that the subject land would contain habitat which the Short-tailed mouse, is dependent upon.</p>

Species	Conservation Status (State)	Conservation Status (EPBC)	Occurrence on Subject Land
<i>Macrotis lagotis</i> (greater bilby)	-	Vulnerable	The greater bilby is restricted to drier desert areas in the Northern Territory, Western Australia and a small portion of south-western Queensland. Greater bilbys live in sandy desert areas in spinifex grasslands. They dig large burrows up to 2 metres deep in sandplain country. They also seem to prefer freshly-burnt country where there are more plentiful supplies of preferred foods. The greater bilby has not been recorded within the general area of Karratha. Given the restricted distribution of the greater bilby it is unlikely that the subject land would be considered to contain habitat on which the greater bilby is dependent upon.
<i>Pseudomys chapmani</i> (western pebble-mound mouse)	Priority 4	-	The western pebble-mound mouse is restricted in its distribution to the non-coastal, central and eastern parts of the Pilbara. The preferred habitat of the western pebble-mound mouse is in pebbly soils in arid tussock grassland and acacia woodland. The western pebble-mound mouse has been recorded by the DEC's <i>Threatened Fauna</i> database in the locality of Mulataga, Karratha in 1979 with no further recordings for this species being made. It is considered that there is habitat available in the subject land which, potentially, could support the western pebble-mound mouse. Given the size of the subject land, its proximity to the Kingfisher Stayover Camp and the similarity of habitat in the Karratha area it is considered unlikely that the subject land would contain habitat which the western pebble-mound mouse is dependent upon.
<i>Rhinonictis aurantia</i> (Pilbara form) (Pilbara leaf-nosed bat)	-	Vulnerable	The Pilbara leaf-nosed bat is restricted in distribution to the Pilbara. The Pilbara leaf-nosed bat is known to roost in the mines of the eastern Pilbara, in the Hamersley Range and in the sandstone formations south of the Hamersley Range. The Pilbara leaf-nosed bat has not been recorded within the general area of Karratha. Given the restricted distribution of the Pilbara leaf-nosed bat it is unlikely that the subject land would be considered to contain habitat on which the Pilbara leaf-nosed bat is dependent upon.
<b>Reptiles</b>			
<i>Liasis olivaceus</i> subsp. <i>barroni</i> (Pilbara olive python)	Threatened	Vulnerable	The Pilbara olive python is often found around gullies, creeklines, and vegetated water sources and is known from 21 locations within the Pilbara, including Pannawonica, Millstream, Tom Price and Burrup Peninsula. The preferred habitat of the Pilbara olive python is deep gorges and water holes in the Pilbara ranges and part of its habitat is conserved in the Karijini National Park. The Pilbara olive python has been identified as occurring in the localities of Dampier, Dampier Archipelago and Burrup by the DEC's <i>Threatened Fauna</i> database. Given the known distribution of Pilbara olive python in the Karratha area and that its preferred habitat does not occur upon the subject land it is considered unlikely that the proposed development of the subject land significantly impact this species.
<i>Notoscincus butleri</i>	Priority 4	-	<i>Notoscincus butleri</i> inhabits the arid, rocky, near coastal Pilbara area and is associated with Spinifex dominated areas near creek and river margins. The <i>Notoscincus butleri</i> has been recorded by the DEC's <i>Threatened Fauna</i> database in the locality of Stove Hill, Karratha in 2004 with no further recordings for this species being made. Due to its proximity to the ephemeral watercourse, there is potential habitat present on the subject land for this species. Given the size of the subject land, its proximity to the Kingfisher Stayover Camp and the similarity of habitat in the Karratha area it is considered unlikely that the subject land would contain habitat which the <i>Notoscincus butleri</i> is dependent upon.

Table 4 assesses the likelihood of occurrence of the 18 identified conservation significant vertebrate fauna species and identifies that, although the subject land may potentially contain habitat which could be utilised by some of these species, it is considered unlikely to be significant habitat upon which any of the identified species is dependent upon for survival.

Table 4 notes the type of habitat found within the subject land is similar to those found within the Karratha area that surrounds the subject land. This statement is qualified by the extensive nature of the vegetation association that comprises the subject land:

- Section 4.7.1 identifies the Beard Vegetation Association 589 - *Mosaic: Short bunch grassland – savannah/grass plain (Pilbara)/Hummock grasslands, grass steppe; soft Spinifex*, of which the subject land is comprised, has approximately 13, 760 ha presently retained in reservation estates within the Pilbara 4 region. This vegetation association is common and widespread throughout the Pilbara with approximately 99.9% of the pre-European vegetation extent remaining (Shepherd et al. 2002).

## 4.9 Contamination

The contaminated sites legislation in Western Australia has been formulated to protect the health of the local population and safe guard the natural environment from serious harm. Under the *Contaminated Sites Act 2003*, contaminated sites may need to be investigated and remediated, if required, to protect the interests of the owners and occupiers of the specific landholding (DEC 2011).

A search of the DEC's *Contaminated Sites* database was undertaken on 6 August 2012, and no matches were recorded for the subject land or surrounding lands in close proximity to the subject land. Given that the subject land is predominantly comprised of vegetation, significant contamination is unlikely to be present.

## 4.10 Heritage

### 4.10.1 Aboriginal Heritage

The *Aboriginal Heritage Act 1972* defines Aboriginal Heritage Sites and provides for the preservation of places and objects customarily used by or traditionally important to Aboriginals, and prohibits the concealment, destruction or alteration of any Aboriginal Heritage Sites.

An Aboriginal Heritage Site may:

- exist in any area of Western Australia

- not have been recorded in the register of Aboriginal Sites or elsewhere
- not have been identified in previous heritage surveys or reports on that area but remains fully protected under the Act.

A search of the Department of Indigenous Affairs' (DIA) Aboriginal Heritage Inquiry System was undertaken on 2 July 2012 and identified that a portion of Registered Aboriginal Site: Karratha West I (Site ID: 7509) intersects a northern portion of the subject land (Figure 5; Appendix 5).

An Aboriginal Heritage Survey of the subject land was undertaken for the *Ngarluma* Aboriginal Corporation (the registered Native Title Body Corporate) by Anthropos and Context on 24 July 2012.

The results of Aboriginal Heritage Survey indicated that:

- No Aboriginal ethnographic sites are located within the subject land.
- No Aboriginal archaeological sites are located within the subject land.
- Although the polygon of Registered Aboriginal Site: Karratha West I (Site ID: 7509) intersects a northern portion of the subject land, no cultural material was located within this portion of the polygon. Therefore the physical site of Registered Aboriginal Site: Karratha West I (Site ID: 7509) is not within the subject land.
- Sixteen isolated stone artefacts were located within the subject land and were left in situ.

#### **4.10.2 European Heritage**

A desktop search of the Heritage Council of Western Australia's *Heritage Places* database was undertaken on 8 August 2012 and no matches were found for the subject land or surrounding lands in close proximity to the subject land.

## 5.0 CLEARING OF VEGETATION

Any clearing of native vegetation requires a permit under Part V Division 2 of the *Environmental Protection Act 1986* except where an exemption applies under Schedule 6 of the *Environmental Protection Act 1986* or is prescribed by regulation in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, provided it is not in an Environmentally Sensitive Area.

The subject land is not exempt under Schedule 6 of the *Environmental Protection Act 1986* or prescribed by regulation in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* and therefore, an application to the DEC for a permit to clear native vegetation is required.

Liaison was undertaken with the DEC to determine the level of detail required to enable the DEC to assess an application for a clearing permit for the subject land. Personal correspondence received from the DEC advised an Environmental Assessment Report would provide a sufficient level of detail to allow the DEC to assess an application for a clearing permit (Appendix 6).

In order to further assist in the preparation of an application for clearing permit for the subject land, Table 5 provides an assessment of the proposed clearing of the subject land against the “10 Clearing Principles” as outlined in Schedule 5 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* to determine whether it is at variance to the Principles. These Principles aim to ensure all potential impacts resulting from removal of native vegetation can be assessed in an integrated manner.

This desktop assessment of the proposed clearing of subject land against the “10 Clearing Principles” found the removal of vegetation is not likely to be at variance with any of the principles.

**Table 5: Assessment Against the Ten Clearing Principles**

Principle Number	Principle	Assessment	Outcome
(a)	Native vegetation should not be cleared if it comprises a high level of biological diversity	<p>The subject land is not considered to comprise a high level of biodiversity compared to the surrounding areas. The site has been subject to varying degrees of disturbance including changes in surface water regimes (as a result of stormwater run-off from the Kingfisher Stayover Camp) and the incursion of <i>*Cenchrus ciliaris</i>.</p> <p>Anthropos and Context (2012) identifies the vegetation of the subject land is dominated by <i>*Cenchrus ciliaris</i> (buffel grass). This grass is an aggressive invasive species and appears to reduce native species abundance and diversity by aggressively competing with available plant resources (space, sunlight and water). No Threatened Rare or Priority flora species or TECs have been identified as occurring upon the subject land.</p> <p>The proposed clearing and loss of native vegetation at the subject land will not have any detrimental impact upon the ecological integrity and biodiversity of the flora and vegetation of the Karratha area and is unlikely to have any significant impact on the biodiversity of the region.</p> <p>The proposed clearing of the existing vegetation within the subject would facilitate the conservation and biodiversity of the surrounding bushland by reducing the potential incursion of buffel grass into these areas from the site.</p>	The proposal is not at variance with the Principle
(b)	Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous Western Australia.	<p>The remnant vegetation within the subject land is not considered significant habitat and is not considered to comprise habitat suitable for the maintenance of significant fauna.</p> <p>The majority of the subject land has been purported to be in a degraded state by Anthropos and Context (2012). The degree of disturbance and the close proximity of the existing Kingfisher Stayover Camp to the subject land would have impacted on the use of the area by native fauna.</p> <p>A search of the DEC's Threatened Fauna database and SEWPaC's <i>Protected Matters Search Tool</i> indicates the potential for several species of conservation significance to occur on the subject land. These include the EPBC listed northern quoll, greater bilby, Pilbara olive python and the Pilbara leaf-nosed bat.</p> <p>The greater bilby and Pilbara leaf-nosed bat have not been recorded within the general area of Karratha.</p> <p>The remnant vegetation remaining is not considered to comprise habitat suitable for the maintenance of significant fauna. Habitat critical to the survival of the northern quoll includes rocky habitats, such as ranges, escarpments, mesas, ranges, gorges, breakaways, boulder fields, major drainage lines or treed creeklines. These do not occur on the subject land. The preferred habitat of the Pilbara olive python is deep gorges and water holes in the Pilbara ranges. This habitat is not present on the subject land.</p> <p>It is highly unlikely any conservation significant fauna species occur within the area proposed for clearing. Furthermore, the small size of the area proposed for clearing is not considered to contain habitat which these species are likely to depend on.</p> <p>The area proposed for clearing is partially fragmented and does not provide linkages to adjacent bushland to the south and west.</p> <p>Lastly, the habitat type present within the subject land occurs within the surrounding area and is common in the Pilbara 4 subregion.</p>	The proposal is not at variance with the Principle

Principle Number	Principle	Assessment	Outcome
(c)	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	No Threatened Rare flora species were recorded within the Project area. Two Threatened Rare Flora are known from the Pilbara Bioregion; <i>Thryptomene wittweri</i> (TRF) and <i>Lepidium catapycnon</i> (TRF). Both these species have never been recorded in the Pilbara 4 subregion.	The proposal is not at variance with the Principle
(d)	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community	<p>The results of this assessment indicate there are no TECs located within the subject land.</p> <p>Figure 5 indicates that a portion in the eastern extent of the subject land is contained within the buffer of the PEC 1 Roebourne Plains gilgai grasslands.</p> <p>The PEC 1 Roebourne Plains gilgai grasslands is characterised by ephemeral and perennial tussock grasslands dominated by <i>Sorghum</i> sp. and <i>Eragrostis xerophila</i> (Roebourne Plains grass) along with other native species including <i>Astrebla pectinata</i> (barley mitchell grass), <i>Eriachne benthamii</i> (swamp wanderrie grass), <i>Chrysopogon fallax</i> (golden beard grass) and <i>Panicum decompositum</i> (native millet).</p> <p>It is considered a low likelihood that the Priority 1 Ecological Community – Roebourne Plains Gilgai Grasslands occurs upon the subject land.</p> <p>Firstly, the species composition represented on the site is too dissimilar to the floristic suite characteristic of the PEC 1 Roebourne Plains gilgai grasslands.</p> <p>Anthropos and Context (2012) described the vegetation of the subject land as: dominant <i>Cenchrus ciliaris</i> (buffel grass) interspersed with <i>Acacia ampliceps</i>, <i>A.pyrifolia</i> (ranji bush) and <i>Triodia</i> spp</p> <p>The floristic description of this vegetation of the subject land does not share any common association with the floristic composition of the PEC 1 Roebourne Plains gilgai grasslands. <i>Triodia</i> spp. and buffel grass are the dominant grasses occurring on the subject land and not the suite of grasses detailed above.</p> <p>Furthermore, the differential gradient (1.6 m AHD) and topography of the subject land also contradicts the landform to which the PEC 1 Roebourne Plains gilgai grasslands occur on.</p> <p>Lastly, a review and comparison of the subject land to known locations of other PEC 1 Roebourne Plains gilgai grasslands located in the Karratha area (including east of the subject land) using high resolution aerial photography suggests the visual constitution of the vegetation present on the subject land, when compared to locations containing the PEC 1 Roebourne Plains gilgai, are completely different in appearance.</p> <p>Threatened and Priority ecological communities are represented within buffer zones and consequently, may overstate the true extent of a TEC or PEC.</p>	The proposal is not at variance with the Principle
(e)	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	<p>The vegetation of the subject land is representative of Vegetation Association 589 (Beard 1975).</p> <p>According to Shepherd et al. (2002), the vegetation of the Project area is classified as “Least Concern” in terms of extent of vegetation remaining compared to pre-European extents.</p> <p>This vegetation association is common and widespread throughout the Pilbara with approximately 99.9% of the pre-European vegetation extent remaining (Sheppard et al. 2002). CALM (2002) identifies approximately 13,758.3 ha of this association is contained in reservation estates within the Pilbara 4 region.</p> <p>Shepherd et al. (2002) identifies that the remaining extent of this vegetation association is 848,201 ha.</p> <p>Clearing of 3.71 ha of this vegetation association within the subject land will not significantly reduce the known extent from pre-European extents.</p>	The proposal is not at variance with the Principle

Principle Number	Principle	Assessment	Outcome
(f)	Native vegetation should not be cleared if it is growing in or in association with a watercourse or wetland.	There are no streams, creeks or any other natural watercourses within the subject land. An ephemeral watercourse is located 220 metres to the east of the site.	The proposal is not at variance with the Principle
(g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Land degradation can be caused or exacerbated by uncontrolled run-off and wind or water erosion. A carefully designed water sensitive approach to management the total water cycle will be delivered through the integration of a local on-site drainage network with an appropriate landscaping treatment.	The proposal is unlikely to be at variance with the Principle
(h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	There is no conservation areas adjacent to the area proposed for clearing.	The proposal is not at variance with the Principle
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	The subject land has not been assigned an ASS risk rating, therefore it is assumed there is a "Low-No" known risk of Acid Sulfate Soils occurring within three metres of the natural soil surface (or deeper). It is unlikely that shallow clearing of native vegetation on the subject land will expose acid sulphate soils or negatively impact the quality of groundwater on the landholding or to surrounding areas. The clearing of native vegetation is not considered likely to significantly alter the quality of surface or ground waters within the subject land. Erosion may occur following any potential clearing. Erosion can be mitigated by the use of appropriate surface water management and rehabilitation techniques.	The proposal is unlikely to be at variance with the Principle
(j)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the intensity of flooding.	The clearing of native vegetation will not cause, or exacerbate the incidence or intensity of flooding due to increased run-off in localised areas as carefully designed water sensitive approach to management the total water cycle will be delivered through the integration of a local onsite drainage network with an appropriate landscaping treatment.	The proposal is not at variance with the Principle

## **6.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MANAGEMENT MEASURES**

In response to the existing environmental values of the subject land, this section outlines the likely impacts and subsequent management measures to minimise and mitigate any impacts to the key environmental factors resulting from the proposed development of the subject land.

### **6.1 Hydrology**

#### **6.1.1 EPA Objective**

To maintain the quantity and quality of water so that existing and potential environmental values, including ecosystem maintenance, are protected.

#### **6.1.2 Potential Impacts**

Surface water to the east of the subject land and groundwater below the subject land and has the potential to be impacted by a variety of activities including:

- groundwater level changes that occur as a result of a change in land use
- removal of vegetation and installation of impervious surfaces that lead to an increase in run-off during rainfall events
- development may result in an increase in the potential for urban generated pollutants, such as nutrients, hydrocarbons, litter and sediment, being transported, through surface water run-off, into the local stormwater drainage system that surrounds the subject land.

The subject land may be impacted by flooding from the ephemeral watercourse during high rainfall or less frequent extreme events, such as tropical cyclones.

#### **6.1.3 Management Measures**

##### **6.1.3.1 Site Drainage and Landscaping**

To ensure the ephemeral watercourse to the east of the subject land and the amount of recharge to ground water reserves below the subject land is not adversely impacted by the proposed development, a carefully designed water sensitive approach to management the total water cycle will be delivered through the integration of a local onsite drainage network with an appropriate landscaping treatment.

The Stormwater and Earthworks Concept Plans have been prepared by JDSI Consulting Engineers and the Landscape Concept Plan has been drafted by Cardno to support the proposed Development Area Plan for the subject land (Appendix 2).

#### 6.1.3.2 Potential Flooding

To ensure the subject land is not impacted by localised flooding from the ephemeral watercourse the finished floor levels of all built infrastructure will have at least 0.5 m of freeboard to the 100 year ARI flood level.

#### 6.1.3.3 Predicted Outcomes

The predicted outcome from the implementation of the management measures is as follows:

- The subject land will manage storm water inputs to ensure that the site drains to the east through the drainage network and will minimise the potential for urban generated pollutants to be released offsite through the provision of appropriate landscaping.
- The built infrastructure of the Kingfisher Stayover Camp will not be impacted by flooding from the ephemeral watercourse.

## 6.2 **Flora and Vegetation**

### 6.2.1 **EPA Objective**

To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

### 6.2.2 **Potential Impact**

The potential impacts to native vegetation from the proposed development include:

- removal of vegetation within the subject land
- removal of vegetation located outside the boundaries of the subject land.

Section 4.7 identifies that the potential impact to the existing vegetation upon the subject land from the proposed development, when discussed in Regional and Karratha contexts, is not significant.

In order to mitigate against off-site impacts to flora and vegetation and comply with the provisions contained in DP 10 – Transient Workforce Accommodation the following management measures have been recommended.

### **6.2.3 Management Measures**

#### **6.2.3.1 Construction Management**

Pre-construction management activities include:

- flagging of areas not designated for clearing during the construction and development phases to prevent accidental clearing
- development of Construction Environmental Management Plan (CEMP) detailing noise and dust mitigation measures to be implemented during the construction.

Management activities undertaken during construction include:

- soil disturbance during clearing will be minimised and vehicle hygiene measures will be implemented to ensure exotic species do not become established within the subject land whilst construction activities are being undertaken
- implementation of the CEMP.

#### **6.2.3.2 Predicted Outcome**

The predicted outcome from the implementation of the management measures is that no vegetation outside of the subject land will be impacted by the proposal.

## **6.3 Heritage**

### **6.3.1 EPA Objective**

To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.

### **6.3.2 Potential Impacts**

The potential impacts to heritage from the proposed development include:

- disturbance of the identified isolated artifacts during construction activities
- disturbance to neighbouring registered Aboriginal Site: Karratha West I during construction and development phases.

### 6.3.3 Management Measures

#### 6.3.3.1 Construction Management

Pre-construction management activities include:

- The portion of registered Aboriginal Site: Karratha West I that occurs outside the subject land will be flagged during the construction and development phases to ensure the site is not disturbed during construction and / or development.
- Ensure all site workers are advised the subject land does not contain any new Aboriginal Sites pursuant to the *Aboriginal Heritage Act 1972* and that although the subject land contains a portion of the polygon of the registered Aboriginal Site: Karratha West I, no cultural material was found.
- Inform DIA the subject land does not contain registered Aboriginal Site: Karratha West I.
- Liaise with the *Ngarluma* Aboriginal Corporation and the DIA to determine the most culturally appropriate way to relocate the identified isolated artifacts.

#### 6.3.4 Predicted Outcome

The predicted outcome from the implementation of the management measures is that the proposed changes to the natural environment of the subject land do not adversely affect cultural associations and the proposed development will comply with the *Aboriginal Heritage Act 1972*.

## **7.0 CONCLUSION**

Through addressing the identified key environmental factors and the implementation of the environmental management recommendations, this environmental assessment demonstrates the potential environmental impacts arising from the proposed development of Part of Lot 211 on Deposited Plan 21966 Madigan Road, Stove Hill in Karratha can be managed in accordance with the objectives of the EPA.

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## 8.0 REFERENCES

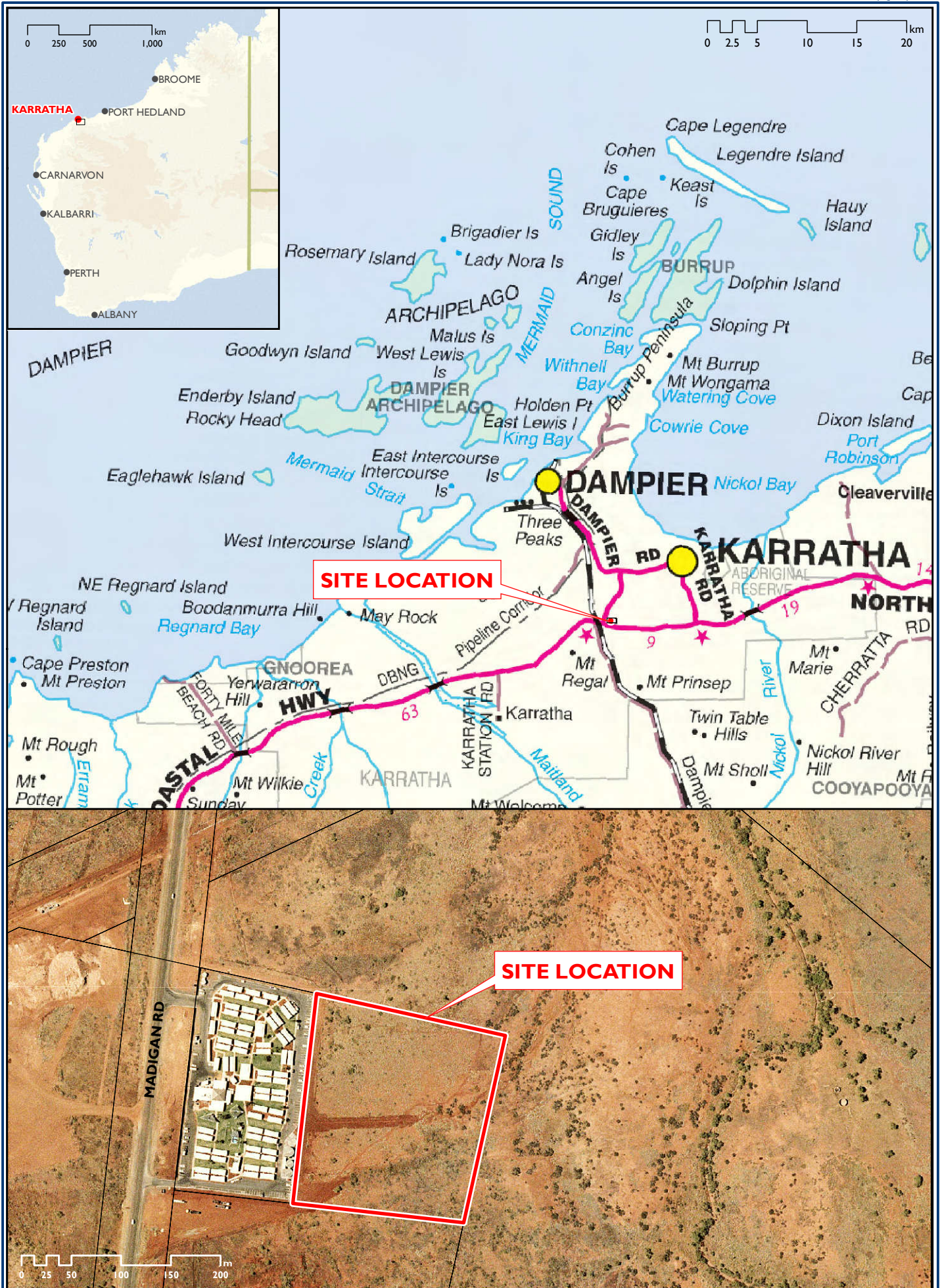
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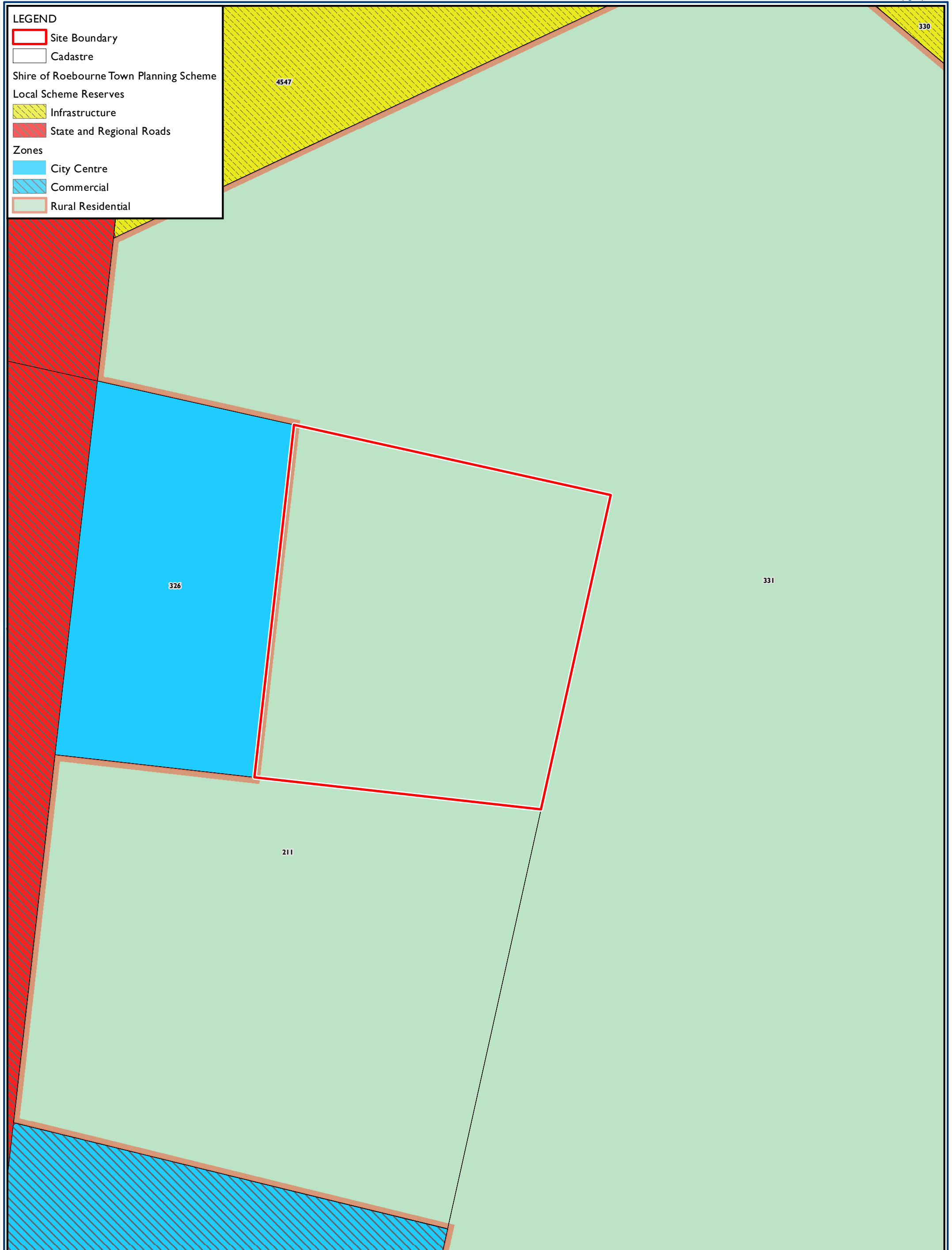
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## FIGURES

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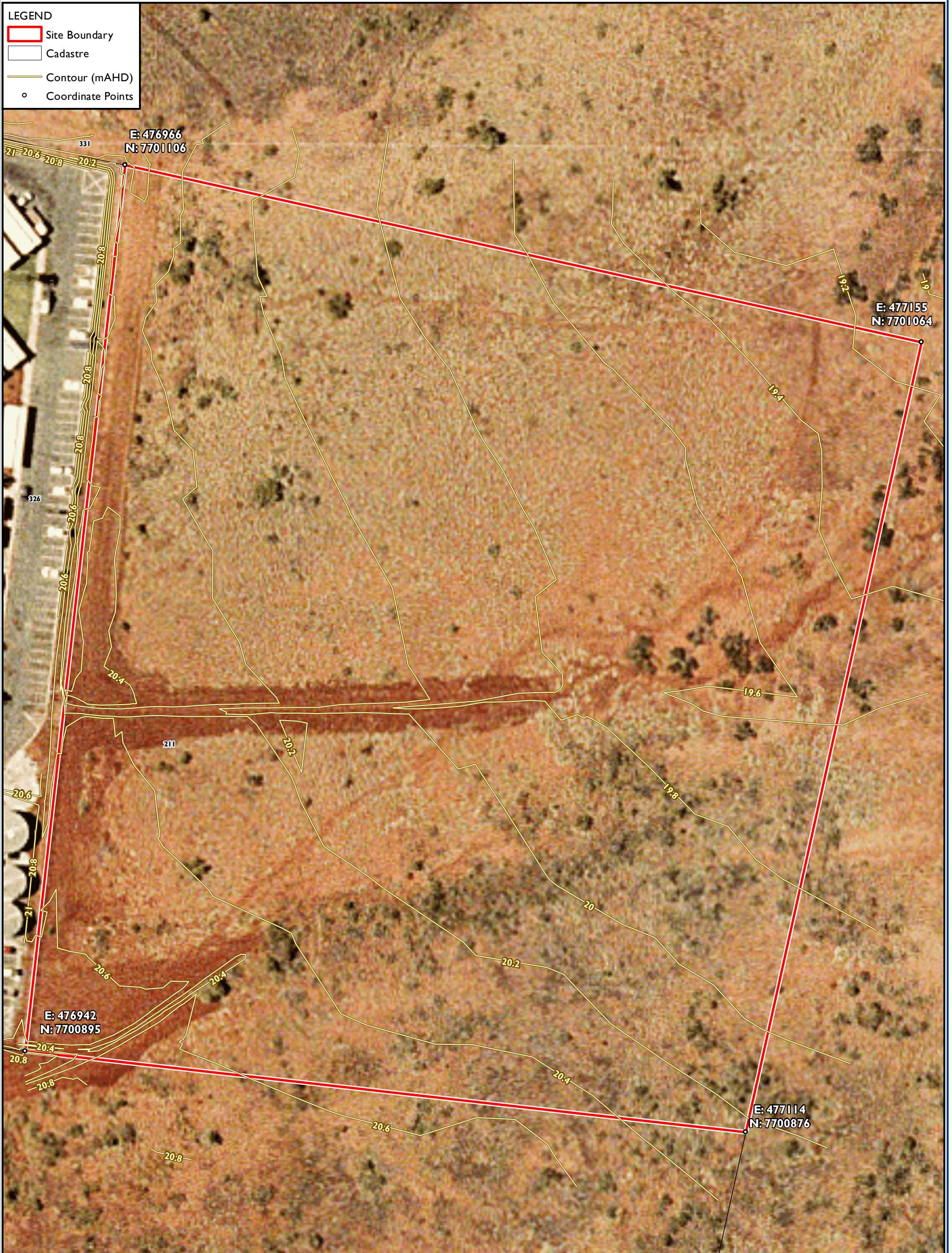


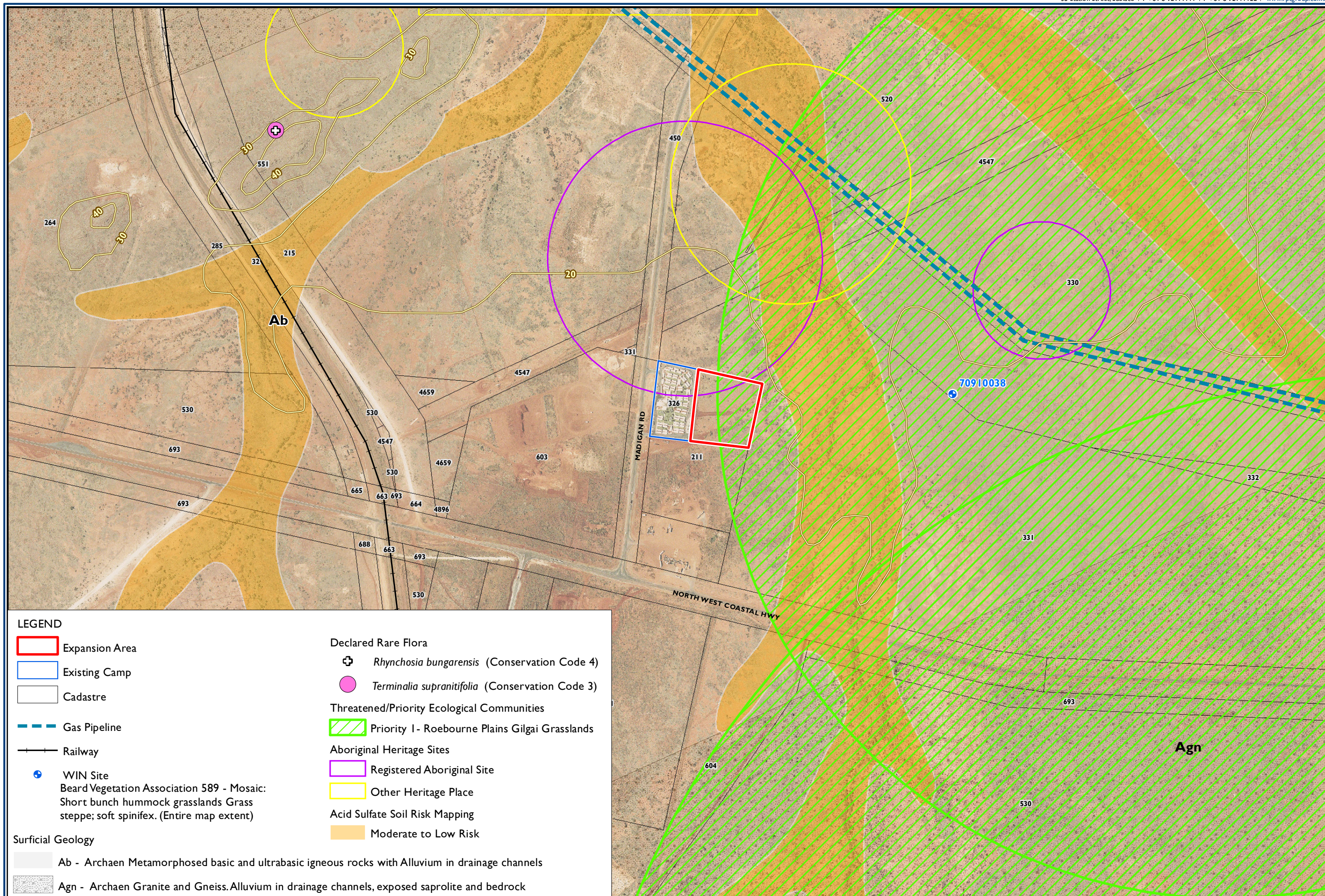


-  EXISTING
-  NEW GROUND FLOOR UNITS
-  NEW UNITS - TWO STOREY BUILDING
-  NEW BUILDINGS
-  RELOCATED INFRASTRUCTURE/BUILDING
-  NEW INFRASTRUCTURE

EXISTING UNITS	241
INCLUDING	- 2 PWD UNITS
NEW GROUND FLOOR UNITS	384
NEW FIRST FLOOR UNITS	56
TOTAL UNITS	681
INCLUDING	- 2 PWD UNITS
CARPARKING	342
INCLUDING	- 3 PWD CAR SPACES - 7 SRV SPACES
MOTORCYCLE	13
TOTAL SITE AREA	6.342ha
INCLUDING BUILDING AREA	1.899ha
INCLUDING PLANT AREA	0.107ha
TOTAL OPEN SPACE	4.336ha
INCLUDING CARPARKING	0.490ha
INCLUDING ACCESS WAYS	0.801ha

PLEASE NOTE F.F.L ARE INDICATIVE AND ARE DEPENDENT ON FINAL MODULE DESIGN DEVELOPMENT AND CIVIL ENGINEERING.





#### LEGEND

- Expansion Area
- Existing Camp
- Cadastre

- Gas Pipeline
- Railway

- WIN Site
- Beard Vegetation Association 589 - Mosaic:  
Short bunch hummock grasslands Grass  
steppe; soft spinifex. (Entire map extent)

#### Surfacial Geology

- Ab - Archaen Metamorphosed basic and ultrabasic igneous rocks with Alluvium in drainage channels
- Agn - Archaen Granite and Gneiss. Alluvium in drainage channels, exposed saprolite and bedrock

#### Declared Rare Flora

- Rhynchosia bungarensis* (Conservation Code 4)
- Terminalia supranitifolia* (Conservation Code 3)

#### Threatened/Priority Ecological Communities

- Priority I - Roebourne Plains Gilgai Grasslands

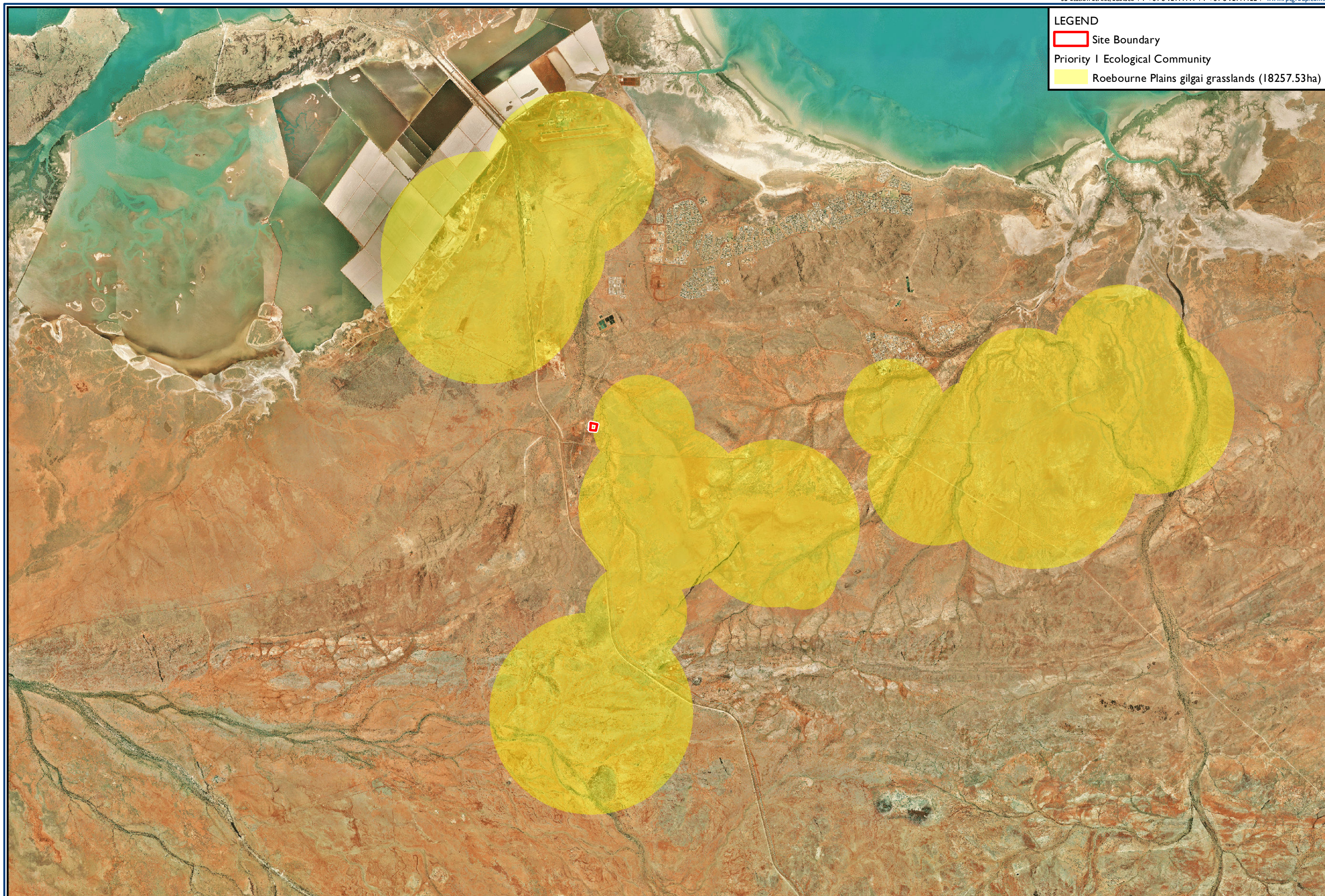
#### Aboriginal Heritage Sites

- Registered Aboriginal Site
- Other Heritage Place

#### Acid Sulfate Soil Risk Mapping

- Moderate to Low Risk

Figure 5



## **APPENDIX I**

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### **DP-10 Transient Workers Accommodation**

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## DP 10

# TRANSIENT WORKFORCE ACCOMMODATION

### OBJECTIVE

1. To provide a safe and functional living environment for the transient workforce associated with industrial development in the Shire of Roebourne (Shire).
2. To ensure a high level of amenity for transient workers and residents both during and after the construction of the transient workforce accommodation facility.
3. To ensure that transient workforce accommodation facilities employ best practice emergency management practices and are able to safely shelter all residents and staff during cyclones.
4. To recognise that transient workforce accommodation facilities will take varying forms depending upon individual occupancy, transportation and catering arrangements.
5. To accommodate a degree variation to development approvals in the form of minor works and incidental structures during the construction of transient workforce accommodation facilities.
6. To ensure that development within land zoned for transient workforce accommodation is designed for transient workforce accommodation.
7. To discourage transient workforce accommodation in the town centre, residential or tourism zones.
8. To minimise the impact of the influx of workers accommodated within transient workforce accommodation facilities.
9. To ensure occupancy of transient workforce accommodation facilities and fly camps are limited to workers or working couples.
10. To recognise the need to provide dedicated parking areas for over-sized vehicles and, dependent upon the permanency of residents, boat, trailer and caravan parking bays.
11. To control the service of alcohol so as not to adversely impact on residents or the community.
12. To recognise that, due to their limited life span, fly camps need not provide the same level of amenity to workers as transient workforce accommodation facilities.

### POLICY PROVISIONS

#### Scope of the Policy:

- This policy applies in the whole of the Shire and forms part of the Shire of Roebourne No. 8 Town Planning Scheme (TPS).
- To the extent where this policy is inconsistent with an approved Development Area Plan (DAP), the DAP shall prevail.
- To the extent where this policy is inconsistent with the Residential Design Codes of Western Australia 2008 (R Codes), this policy shall prevail.

#### Preparation of Planning Applications – The Role of the Development Services Department:

Prior to engaging a consultant, or preparing an application on behalf of a client, it is recommended that you first confirm with Development Services what Shire approvals are required and obtain all relevant information. Whilst Development Services are not in a position to prepare applications including those for planning approval, building licence applications, applications for the registration of a lodging house or applications to construct or install an apparatus for the treatment of sewerage, it is often beneficial to seek feedback when preliminary plans have been prepared to ensure all relevant information is submitted and that fundamental or mandatory requirements have been met. Applications for which further information is required will take longer to process. Development Services can be contacted on 9186 8569.

### **Definitions and Interpretation of this Policy:**

The definitions in the TPS, including the relevant definitions in the R Codes, are the point of reference for the definition of any planning and development term.

- A transient workforce accommodation facility is “a building or group of buildings used for the accommodation of temporary or intermittent workers, comprising bedrooms, dining rooms, kitchens, ablutions, toilets and appropriate amenity area, and associated parking areas constructed in accordance with TPS and the Building Code of Australia, but does not include a hotel, motel or boarding house.”
- A fly camp is “a building or group of buildings used for the accommodation of workers engaged in the construction of a transient workforce accommodation facility, located on or adjacent to the development site.”

### **What Development Requires Planning Approval?**

- Any development works associated with a transient workforce accommodation facility or fly camp, or to be undertaken in the transient workforce accommodation zone requires a planning application, unless exempted by this policy, Commonwealth, or State legislation such as the *Public Works Act 1902*.
- The definition of development also includes the use of land, thus the occupying of land (regardless of the extent of building works occurring) may also require a planning application.

### **Application Procedure:**

When applying for planning approval, the application should include:

- A completed Application for Planning Approval form.
- Payment of an applicable planning fee (refer to Development Services Fees and Charges Information Sheet BS-0005).
- Four [4] copies (to scale) of a site plan showing the following:
  - The legal description, lot dimensions, north point, and street details.
  - The location and use of any existing buildings on-site and existing access/egress point(s), existing parking area and existing landscaping area(s).
  - Location and use of proposed building(s) and setbacks to boundaries and existing buildings.
  - The designated cyclone shelter(s).
  - Buildings, structures and/or vegetation to be removed (if any).
  - Existing site levels and/or contours at regular intervals.
  - Finished floor and design levels.
  - Stormwater drainage details including design levels and erosion control at outlets.
  - Vehicular access/egress to site.
  - Car parking and manoeuvring areas (new or modifications to be designed in accordance with Australian Standard AS2890 and the minimum bay dimensions prescribed by this policy).
  - Landscaping area(s) (including species list, locations and means of reticulation).
  - Fencing details (type, location, colour and height).
- Four [4] copies (to scale) of plans/drawings showing the following:
  - Floor plan of proposed building(s).
  - Elevations of proposed building(s).
  - External colours, finishes and materials.
- A management statement detailing the proposal and specifically addressing:
  - Emergency and environmental management for both the construction and occupancy of the facility including cyclone sheltering, dust suppression, waste management, hygiene, and pest animal and weed control.
  - Catering.
  - Liquor licensing (the extent and nature of any liquor licensed areas e.g. canteen, tavern, packaged liquor sales).
  - Tenants' rights and responsibilities (maximum occupancy of rooms, age restrictions, pet ownership, the parking of and ability to bring onto the site private vehicles, boats, caravans and trailers, alcohol and drug policy, use of onsite facilities; conflict resolution etc.).
  - The transportation of workers.
  - Security and public access.

When applying for planning approval, the application may also be required to include:

- A streetscape perspective view and a shadow diagram.
- A Decommissioning/ Rehabilitation Plan indicating how and when the development will be removed and the site rehabilitated should the site is not zoned specifically for transient workforce accommodation.
- An acoustic engineer's report.
- A construction environmental management plan.
- An operational environmental management plan.
- An insect management plan.
- A traffic management plan.
- Turning templates for the likely maximum size of vehicles accessing the site.
- Parking bays for people with disabilities, motorcycles or bicycles.
- A Community Impact/ Management Plan (for larger facilities).
- An acoustic engineer's report.
- A rubbish compound/bin storage area.
- A wash down area.
- A covering letter/report detailing the proposal.
  - In the case of residential development that relies on a Performance Criteria within the R Codes, a written submission demonstrating how the Performance Criteria has been satisfied, or why the corresponding Acceptable Development Provision cannot be met or is irrelevant.
  - The purpose of the use and the types of processes to be utilised.
  - The type and quantity of goods to be stored, processed or produced.
  - The likely number of staff.
  - The extent and nature of any liquor licensed areas (e.g. small bar, packaged liquor).
  - The likely size/type of service vehicle(s) accessing the site.
  - How land not required for immediate use is to be maintained (e.g. cracker dust, natural vegetation, landscaped).
  - Whether a Works Approval or licence under the *Environmental Protection Act 1986* is required.
  - Whether a licence under the *Dangerous Goods Safety Act 2004* is required.
  - What waste is likely to be generated and the means of storage and disposal (i.e. bulk bin compound, domestic bins).
  - The likely effects, if any, on the neighbourhood including noise levels; air borne emissions, emissions to land or water, traffic including the hours of delivery and despatch, light spill or glare.

#### **Assessment Criteria:**

When considering applications for planning approval in the transient workforce accommodation zone, the Shire shall have regard to:

- Any relevant provisions contained in the TPS including the precinct objective statements in Part V.
- Any relevant local planning policy.
- Relevant legislation, state planning policies, development control policies and planning bulletins published by the Western Australian Planning Commission, and other publications or guidelines produced by state agencies.
- The location and site characteristics of the property and the immediate surrounding area.
- Best practice emergency, environmental, health and well-being management.
- The safe and efficient transportation of residents, goods and materials to, from and within the facility.
- The ability of the residents of transient workforce accommodation facilities to access town sites and their associated services and amenities.
- The scale and overall quality of the development in light of any proposed variations from the requirements of this policy.

In areas not specifically zoned transient workforce accommodation the Shire shall have further regard to:

- Local planning policies for the zone in which the development is to be placed.

- The impact on and from adjoining uses.
- The time frame for the occupancy of the proposed facility.
- The design form and the likely impact on the future use of the land.
- Access to existing services and infrastructure.

#### **Scheme Prescribed Development Standards:**

- Planning applications for transient workforce accommodation, within areas outside the transient workforce accommodation zone, shall be accompanied by information and plans indicating, to the Shire's satisfaction, how and when the development will convert to a subsequent use which is consistent with the Scheme zoning.
- Planning applications for temporary structures to provide transient workforce accommodation shall, to the Shire'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 zone.
- The Shire may require, by signed agreement, a commitment to the date and details of rehabilitation and conversion the site.

### **DEVELOPMENT STANDARDS**

#### **Site Cover:**

Maximum site coverage 50%

#### **Front Building Setbacks:**

7.5 metres, although this will normally be determined by the design of the car parking area as it is strongly recommended that car parking should be located within the front boundary setback. Other issues to take into account are the setbacks of buildings on adjoining developments, the external finishes and material of the front facade, and the quality.

#### **Side and Rear Building Setbacks:**

Three [3] metres, although the need for perimeter landscaping for screening purposes and access for maintenance and pedestrians will also need to be taken into account.

#### **Building Height:**

- An absolute maximum of three [3] levels of habitable floor space.
- A total overall height of 10m for buildings with a concealed roof and 12m for buildings with a pitched roof.

#### **Residential Density:**

Form of Accommodation	Residents per Hectare (max.)
Single-storey single units containing single occupant rooms	100
Single-storey units containing dual occupant rooms	150
multi-storey facilities containing single occupant rooms	200
multi-storey facilities containing dual occupant rooms	300

Variations of up to 10% to the prescribed residential density may be considered provided the applicant can demonstrate that the additional density will not detract from the amenity of the residents or neighbourhood, and how the transient workforce accommodation facility meets or exceeds all other development standards.

#### **Design:**

- A commercial kitchen and communal dining area is required unless external catering arrangements are satisfactorily demonstrated (typically evidence of contractual arrangements), or the individual units contain a kitchen in addition to the provision of outdoor cooking facilities. Catering/ food preparation within commercial kitchens must be undertaken in accordance with the *Health Act 1911*(as amended).

- A minimum of 0.5 of a seat for the effective occupancy plus on-site staff must be provided within a communal dining area. This typically equates to 0.4 of a seat per single occupant room although additional seating and parking bays may be required where dining areas cater to people other than residents.
- Unless an alternative emergency sheltering solution can be demonstrated to the satisfaction of the Shire each facility must provide a building(s) designed for emergency (cyclone) sheltering purposes. Such building(s) must:
  - Be designed to a Building Code of Australia importance level four [4].
  - Be accessible for people with disabilities and have a seating area equal or exceeding one [1] square metre based on maximum effective occupancy plus on-site staff.
  - Be centrally located or be otherwise 'shielded'.
  - Be designed with debris resistant screens and additional restraints for all exit doors (strap bolts).
  - Provide internal toilets and, where appropriate urinal(s), at the rate of one [1] pan per sixty [60] persons effective occupancy plus on-site staff. Urinals may be provided in lieu of up to 50% of the pans in the male toilets calculated at the rate of 700 mm of urinal per pan. Consideration will be given to the use of portable chemical toilets in lieu of up to 50% of this requirement provided adequate ventilation, privacy and a 72 hour holding capacity can be demonstrated.
  - Incorporate elements of design referred to in the Guidelines for Australian Public Cyclone Shelters report to Emergency Management Australia (August 2002) including, but not limited to, waterproofing and weatherproofing, mechanical ventilation, lighting to 400 lux for areas where people may want to read or write, emergency lighting in accordance with the BCA for a class 9b building, communications, emergency power, and contain emergency provisions including drinking water and food.
  - Have a floor level with a minimum height of 6.2m AHD or 500 mm above the highest known storm surge or flood runoff level (whichever is the greater).
- Laundry, sanitary and ablution facilities must be provided to comply with the Shire of Roebourne Health Local Law pertaining to Lodging Houses (one [1] washing machine and one [1] dryer per fifteen [15] residents). Should laundries be provided within self contained accommodation units they must be provided for in a separate room or otherwise segregated from the food preparation area in accordance with Section 7 of the *Health Act (Laundries and Bathrooms) Regulations*.
- Unless exempted by the Australian Human Rights Commission a building providing a unique service or feature including a recreation room or area, dining room, or an internet room must be accessible to people with disabilities via an unobstructed path of travel. For buildings such as laundries that are often duplicated throughout a facility, only that individual building in closest proximity to a dedicated disabled accommodation unit need be accessible.
- Although all accommodation units are encouraged to incorporate elements of universal design as prescribed by Australian Standard AS1428; unless otherwise agreed, all facilities must provide at least one [1] universally accessible room. Furthermore, facilities providing greater than 200 rooms must provide one [1] universally accessible room per 100 rooms.

#### **Landscaping/ Open Space:**

- Each transient workforce accommodation facility shall be provided with landscaped and/ or grassed outdoor recreation area(s), at a minimum rate of four [4] square metres per person accommodated (excluding boundary landscaping). Bonus concessions to reduce the allocation of landscaped and/ or grassed outdoor recreation area(s) by up to one quarter (25%) of the rate may be granted where recreational infrastructure such as swimming pools, gymnasiums and covered barbecue areas are provided, or where the facility adjoins a developed public recreation area.
- As a minimum, outdoor recreation areas shall provide shade and include outdoor cooking facilities.
- A landscaping plan including a species schedule and a reticulation design and specification shall be submitted for approval with any application lodged for planning approval. Landscaping to a minimum width of 1.5 metres shall be provided within the front setback area, to all common boundaries and adjacent to outdoors storage areas that upon maturity will effectively screen the development.

- Car parking and external storage areas, bin compounds and other unsightly structures should also be landscaped to 'soften' their visual impact.
- Each accommodation unit/ suite shall be provided with an area of private space for the exclusive use of the resident. This space may be provided external to the unit, but must be easily accessible. Desirable forms of private space include courtyards, viewing decks and balconies.

#### **Car Parking and Traffic Management:**

Car parking provisions may vary dependent upon each transient workforce accommodation facilities' individual circumstances with particular regard to catering and dining contracts for non-residents, the ability to control the parking of and ability to bring onto the site private vehicles, boats, caravans and trailers as reflected in the management statement, and the opportunity to provide additional on-site parking should the need arise, but as a minimum shall provide the following:

Type of Facility	Standard Bays per Resident
Self contained facilities with a commercial kitchen and communal dining room	0.5
Accommodation units/suites each containing a kitchen	0.75

- All transient workforce accommodation facilities must provide additional oversized vehicle parking bays as deemed necessary to bus workers to and from the site, accommodate service and staff vehicles and park residents' boats, trucks and trailers.
- Standard parking bays to have a minimum width of 2700 mm and length of 5500 mm.
- All parking and manoeuvring areas must be drained, sealed with concrete, asphalt or bitumen, kerbed and line marked. Consideration will be given to gravel or 'cracker dust' surfaces for Fly Camps, overflow parking/ hard standings areas, or where the facility is in an isolated area provided suitable dust suppression can be maintained.
- Parking of residents' vehicles shall be provided on the subject land or other land contiguous with or adjacent to the facility.
- Motorcycle bays shall be provided for larger facilities or those located within town sites.
- Unless exempted by the Australian Human Rights Commission, parking bays for people with disabilities must be provided. One [1] disabled parking bay is generally deemed adequate for a facility with peak occupancy (inclusive of staff) of 200 persons plus one [1] bay per accommodation room dedicated for people with disabilities.
- The provision of motorcycle bays with a minimum width of 1200 mm and length of 2500 mm are generally required at the rate of one per fifty [50] spaces (rounded up).

A traffic management report may be required where development is likely to have a significant impact on the local street network either through the volume or type of vehicle trips generated, where substantive or underground parking areas are proposed, or where heavy vehicles are required to manoeuvre within a site. Traffic management reports are typically required to:

- Demonstrate that the likely impact of traffic including service vehicles accessing and exiting the site will not adversely impact on the locality.
- Identify any engineering design modifications required to local roads.
- Assess on-site manoeuvrability for service and oversize vehicles (turning templates with overhangs).
- Assess parking and access way design against Australian Standard AS2890.
- Assess the location and design of parking for people with disabilities.

#### **Storage:**

All transient workforce accommodation facilities must provide weather-proof storerooms and/or storage facilities with their design and capacity dependent upon likely storage demand and the individual management and residents' needs to secure items in the event of a cyclone.

#### **Washdown Area:**

- Transient workforce accommodation facilities within town sites or where vehicle or equipment servicing is necessary must provide an approved washdown area with a petrol and oil trap in

compliance with the requirements of the Water Corporation, the Shire of Roebourne's Health Department and the Department of Water's Water Quality Protection Note 68: Mechanical Equipment Washdown March 2006.

- Setbacks for petrol and oil traps are same as for effluent disposal systems.
- Should the wash down area exceed 20m<sup>2</sup> a roof may be required in accordance with Water Corporation policy. Please contact the Water Corporation prior to preparing and submitting your plans.

#### **Management:**

- Transient workforce accommodation facilities shall be singly managed to ensure the amenity of the community and residents will be protected.
- Unless otherwise approved all transient workforce accommodation facilities shall provide for managers' residence(s) and/ or administration building(s) to allow effective on-site management.

#### **Aesthetic Considerations:**

Where possible, transient workforce accommodation facilities are encouraged to:

- Use external finishes and materials that are either compatible with the predominant colours of buildings in the neighbourhood or are muted and non-reflective.
- Incorporate 'feature' perimeter fencing in lieu of chain-mesh, particularly where the development has frontage to or is highly visible from major roads, recognised tourist routes, or recreation or conservation reserves.
- Use alternatives to barbed wire perimeter fencing.
- Retain existing trees.
- Ensure landscaping upon maturity will suitably screen or 'soften' the appearance of vehicle parking and external storage areas, bin compounds and other unsightly structures.

#### **Construction Environmental Management Plan (CEMP):**

A CEMP is a plan that demonstrates what provisions and mitigation measures will be in place during construction to control noise emissions, erosion and siltation from stormwater flows, air borne dust and smoke and, if required, advise neighbours when these works are to occur and who to contact should dust become a nuisance. Developers, engineers and contractors are responsible for the development and implementation of CEMP's, and for ensuring that identified contingency measures are implemented as appropriate. CEMP's are particularly important in the Shire due to our arid climate and frequent strong winds that are typically westerly and northerly in summer and easterly in winter.

- A CEMP is required to be submitted on sites greater than 5000m<sup>2</sup> on which any work involving the clearing of vegetation and/or topsoil, recontouring (bulk earthworks), trenching and/or road construction is to be done to develop the land for any use are to occur, or where the proposed development is likely to impact on residential or other sensitive land uses.
- A CEMP may also be required to be submitted for sites less than 5000m<sup>2</sup> undertaking the above works in close proximity of sensitive land uses or located on tourist routes.
- The CEMP must have regard to the Department of Environmental Protection publication a *guideline for the prevention of dust and smoke pollution from land development sites in Western Australia* November 1996. This publication requires a Classification Assessment Chart to be completed. The chart and chart notes recognise that the major factors influencing the dust risk potential of a specific site are the time of the year when the works are to be conducted, the nature of the site, and the extent of the proposed works and the proximity of the site to any other land use. Erosion control may be required at stormwater outlets to prevent scouring.
- The CEMP should stipulate the hours of construction, likely times that construction vehicles will need to access and egress the site, and outline what management measures are in place to control noise emissions. Noise management provisions and mitigation measures must have regard to the *Environmental Protection (Noise) Regulations 1997*.

#### **Operational Noise Management Plan (ONMP):**

An ONMP may be required for facilities and premises that are likely to generate significant noise or are located in close proximity to sensitive noise premises including alfresco dining areas.

- An ONMP must outline what design response and management measures are in place to control noise emissions having regard to the *Environmental Protection (Noise) Regulations 1997*.
- An ONMP may be required to be prepared by a suitable qualified acoustic engineer.

#### **Crossovers:**

As per Shire's specification. It should be noted that different types of vehicles may require different design specifications, therefore when submitting the application it is important to state the use of the site and the type of vehicles that are expected to access the development.

#### **Provision for Cyclists and Pedestrians:**

Developments to include safe and convenient parking facilities for bicycles designed in accordance with *Australian Standard AS2890.3*. Bicycle parking facilities shall generally be provided at a rate of one space per ten [10] accommodation rooms.

#### **Washdown Area:**

- Should any portion of the development be used for vehicle or equipment servicing, then an approved bunded wash down area with a petrol and oil trap is to be provided in compliance with the requirements of the Water Corporation, the Shire of Roebourne's Health Department and the Department of Water's Water Quality Protection Note 68: Mechanical Equipment Washdown March 2006.
- Setbacks for petrol and oil traps are same as for effluent disposal systems.
- Should the wash down area exceed 20m<sup>2</sup> a roof may be required in accordance with Water Corporation policy. Please contact the Water Corporation prior to preparing and submitting your plans.

#### **Signage:**

Requirements contained within the Shire of Roebourne By Law Relating to Signs, Hoardings and Bill Posting. Queries in relation to signage should be directed to Building Services on 9186 8569.

### **ENVIRONMENTAL HEALTH REQUIREMENTS**

#### **Disposal of Effluent in Un-Sewered Areas**

The treatment and disposal of effluent is a significant constraint on development in un-sewered areas, and this may dictate the residential density and type of development the land can support. In view of this, it is critical that wastewater disposal be addressed with initial development applications.

- An Application to Construct or Install an Apparatus for the Treatment of Sewage must be lodged to the Shire's Environmental Health Services Department for the treatment and disposal of effluent waste in un-sewered areas that complies with the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*. In view of this, it is critical that wastewater disposal be addressed with initial development applications.
- An application must also be lodged to the Department of Health to seek approval for systems producing greater than 540 litres per day.

Applicants must demonstrate the following to support an Application to Construct or Install an Apparatus for the Treatment of Sewage.

- Total estimated maximum volumes of wastewater generated.
- Details of the type of wastewater disposal system.
- Details of irrigation areas if these are to be used or where the wastewater will be ultimately disposed.
- Details of other fixtures adjacent to irrigation or disposal areas such as structures, subsoil drainage and sumps.
- The reuse of wastewater is encouraged. Where there is a component of reuse of wastewater a management statement to demonstrate compliance with the *National Water Quality Management Strategy- Australian Guidelines for Water Recycling- Managing Health and Environmental Risks 2006*.

**Solid Waste:**

The management of solid waste for commercial premises usually entails the installation of specific areas to store and to wash refuse disposal receptacles. The following development standards apply:

- Each site requires a rubbish compound/bin storage area, with the actual requirement (size, construction material and location) being defined by the use.
- Rubbish compound/bin storage area is to be screened from public view and provided with a tap and adequate mains supply.
- If not fenced or otherwise enclosed, tie down points or alternative means of securing bins during cyclones must be provided.
- Rubbish compound/bin storage area is to be constructed with bunded concrete flooring graded to an industrial floor waste gully connected to an approved wastewater disposal system for commercial waste.
- Drains are to incorporate a 200 mm bucket trap or an alternate solid particulate capture system.
- Location of rubbish pickup compound should take into account the ability for a front loading single unit truck (12.5m long with a 12.5m turning radius) to access the compound – particularly when using bulk bin service.
- Should the rubbish compound/bin storage area exceed 20m<sup>2</sup> a roof may be required in accordance with Water Corporation policy. Please contact the Water Corporation prior to preparing and submitting your plans.

**Temporary Toilets:**

In accordance with Part 2 Division 1 of the Shire of Roebourne Health Local Laws 1996 one onsite temporary toilet is required for every twenty construction workers. These temporary toilets that must be removed upon the completion of the construction works are exempt from requiring planning approval.

**Insect Management Plan:**

An insect vector management plan is generally required to be submitted with the development application, although this is dependent on the location and scale of the development. Insect vector management plans must detail the following information.

1. Baseline data and assessment of the relative risks (trapping data over time, is there an identified significant risk);
2. Identification of potential hazards from insect vectors, for example, mosquito borne viral diseases such as Ross River and Barmah Forest viruses; and
3. A detailed management strategy using established hierarchy of controls, including:
  - Eliminate; removal of the hazard.
  - Substitute; consideration for alternative locations to accommodate workforce should a significant hazard be identified that cannot be feasibly managed.
  - Containment; through the use of management strategies such as the reduction of breeding sites, the removal of vegetative corridors within the facility to minimise insects travel pathways, and the use of mosquito larvicides and natural predators to reduce numbers of mosquito larvae.
  - Reduce exposure; administrative controls to reduce exposure during times of peak mosquito activity include avoid being outdoors during dawn and dusk and minimising sporting activities during times of high activity or when climatic conditions have resulted in higher than usual activity, such as after significant rainfall events.
  - Training and supervision; information, training and supervision help to make sure people know of the hazards from mosquitoes and other insects such as sandflies. The free distribution of repellents and educational materials, the symptomatic diagnosis of suspect vector borne disease, and the training and supervision of those involved in the process should be documented.
  - Personal protective equipment (PPE); the use of loose fitting clothing and effective insect repellents when you have to work in areas of high incidence of nuisance and potential disease carrying insect vectors should be documented.
  - Welfare management; should other controls fail, the provision of 1<sup>st</sup> aid facilities and access to primary health care should someone become sick as a result of a disease or illness should be documented.

### **Liquor Licensing:**

The Shire of Roebourne supports the responsible service of alcohol and, in accordance with the Roebourne Liquor Accord 2007, the provision of a safe, healthy and exciting environment inside and outside licensed premises. As such, the sale and service of alcohol will generally only be supported by the Shire of Roebourne subject to:

- The sale of packaged takeaway liquor being limited to six [6] cans or stubbies of beer, cider or premixed spirits, or one [1] standard bottle of wine per day for residents or staff of the facility.
- No service of alcohol being permitted to the general public.
- No signage associated with the wet mess or alcoholic products being visible from outside the facility.
- The submission of a Liquor Management Plan having regard, as a minimum to; existing approved management strategies and plans for the facility, staff conduct training, responsible service of alcohol practices, complaints procedures, and customer care.
- For facilities located within town sites, the sale of alcohol to up to two [2] guests per resident being limited to consumption during 'standard' trading hours for licensed venues within that town and within the nominated wet mess.

### **Commencement of Occupation:**

Part 9 of the Shire of Roebourne's Health Local Laws 1996 (the Local Law) requires facilities to be registered prior to occupancy commencing. A requirement for registration is the issuance of a Lodging House Licence by the Shire's Environmental Health Department. The Local Law requirements pertain to matters including the management, duty of care, responsibilities of lodgers and residents, sanitary conveniences and laundries, kitchens and dining facilities, furnishing of sleeping apartments and fire control.

In addition to those matters prescribed under the Local Law further works must be completed prior to occupancy to ensure that the objectives of this policy are met. Such further works include, construction of safe vehicular access and egress, constructed car parking and manoeuvring areas, bin compounds, cyclone shelter(s), recreation amenities, and the provision of lighting and landscaping.

The Shire may consider deferring the completion of minor works, which would typically be limited to the delineation of parking bays, the provision of overflow parking areas, directional signage, landscaping, external lighting, fencing, bicycle parking, vending machines, recreational infrastructure, kerbing, traffic calming and protection devices, pathways and running tracks, water features and the like not prescribed under the Local Law or by the Building Code of Australia provided that:

- The period of deferral is limited and, as determined by the Shire a performance guarantee is in place to ensure the completion of the works.
- The works are minor or incidental to the facility.
- The works do not unreasonably detract from the quality or safety of the living environment.
- If deemed necessary alternative suitable arrangements to provide an acceptable minimum level of service to the facility are in place.
- Any deferral is conditioned as part of any planning approval granted or is agreed to in writing prior to occupancy commencing.

### **Commercial Food Premises:**

The regulatory requirements of the *Health Act 1911*, the *Food Act 2008* and the Food Standards Code are to be complied with for the type of food handling activity proposed. The design of the development must comply with these requirements.

### **Public Swimming Pools:**

The *Health (Aquatic Facilities) Regulations 2007* sets out requirements for public swimming pools. Approvals are administered by the Department of Health.

## RELATED DOCUMENTS

Application for Planning Consent Form  
Application to Construct or Install an Apparatus for the Treatment of Sewage  
Development Services Fees and Charges Information Sheet BS-0005  
Shire of Roebourne Town Planning Scheme No. 8  
Residential Design Codes of Western Australia 2008  
Shire of Roebourne By Law Laws Relating to Signs, Hoardings and Bill Posting  
Shire of Roebourne Health Local Laws  
Local Planning Policy DP2 Performance Guarantee  
Local Planning Policy DP6 Landscaping Requirements for Industrial and Commercial Areas  
*Dangerous Goods Safety Act 2004*  
*Environmental Protection Act 1986*  
*Food Act 2008*  
*Health Act 1911*  
*Environmental Protection (Noise) Regulations 1997*  
*Health (Aquatic Facilities) Regulations 2007*  
*Health (Food Hygiene) Regulations 1993*  
*Health (Public Buildings) Regulations 1992*  
*Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*  
Australian Standard AS1158 Lighting for Roads and Public Spaces  
Australian Standard AS2890 Parking Facilities 2004  
Food Safety Standards Australia  
National Water Quality Management Strategy- Australian Guidelines for Water Recycling- Managing Health and Environmental Risks 2006  
Roebourne Liquor Accord 2007  
Water Quality Protection Note 68: Mechanical Equipment Washdown Department of Water 2006

Previous Policy No:	TS18
Resolution Numbers:	11191 – Jun 1998, 11948 – Apr 2000, 12738 – Sep 2002, 13497 – Oct 2004, 14262 – Oct 2007, 14640 - May 2009
Last Reviewed:	May 2009
Next Review:	May 2010
Responsible Officer:	Manager Planning Services

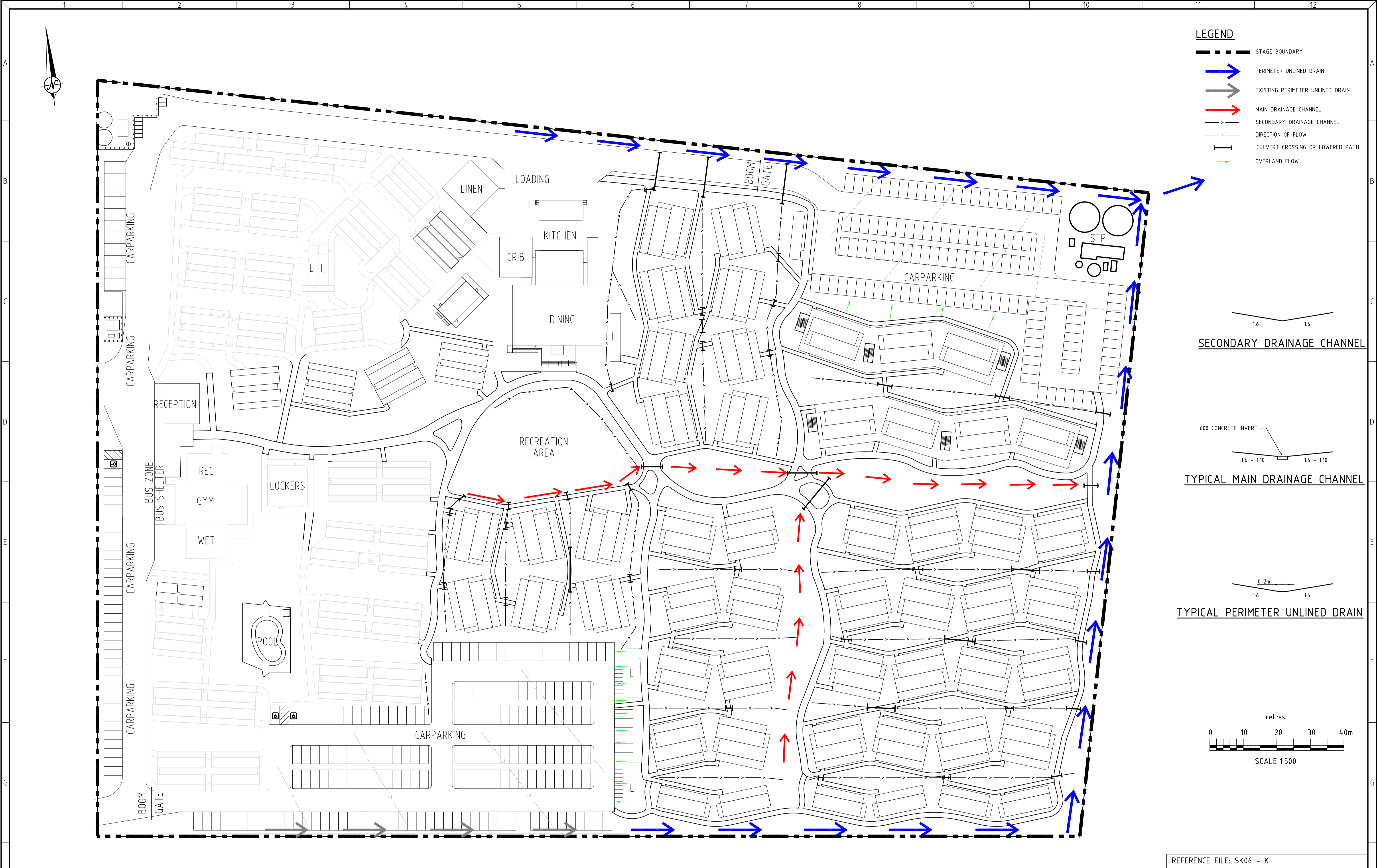


## **APPENDIX 2**

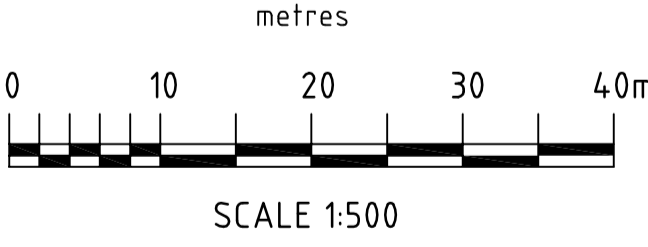
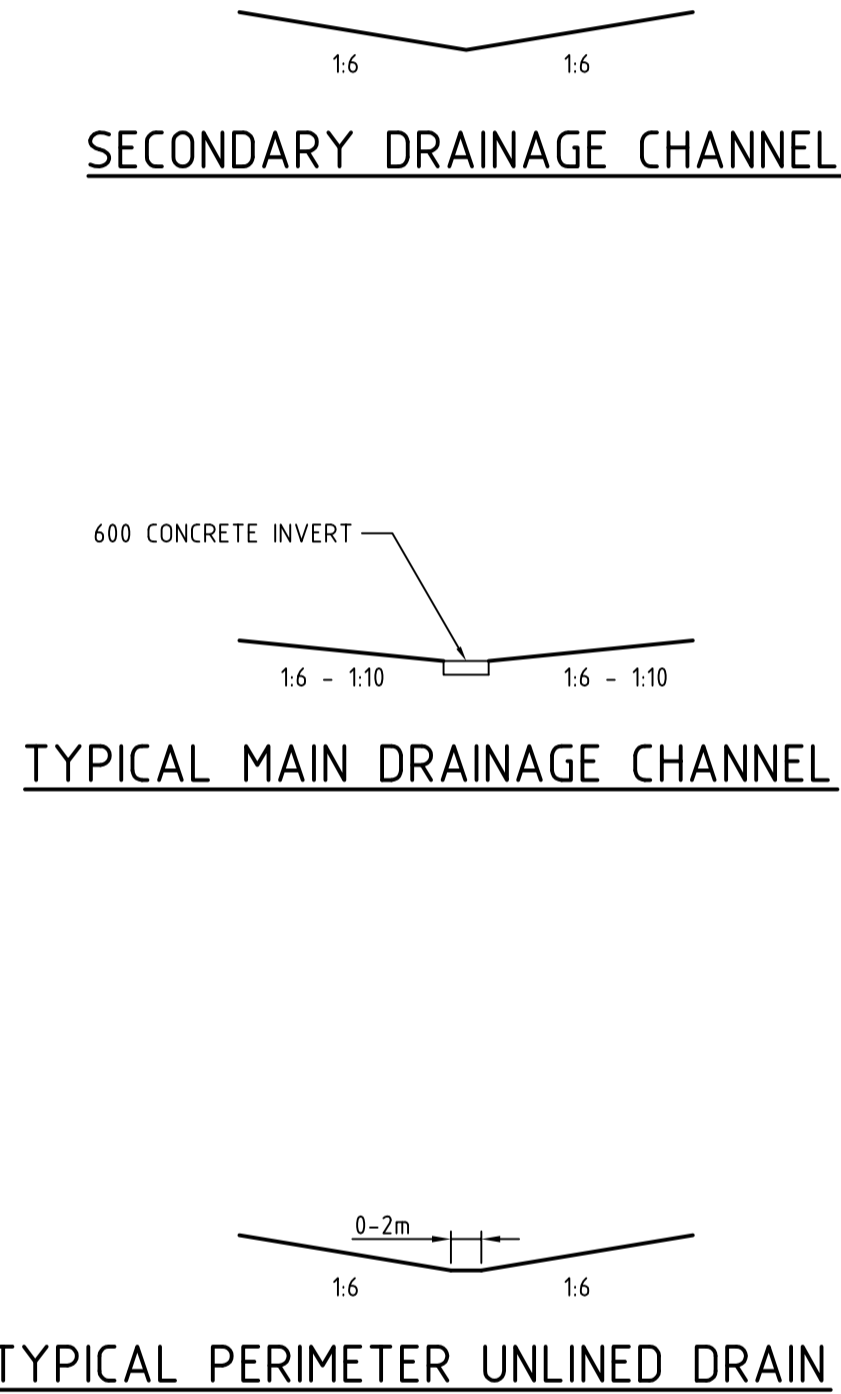
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### **Stormwater, Earthworks and Landscape Concept Plans**

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- LEGEND**
- STAGE BOUNDARY
  - PERIMETER UNLINED DRAIN
  - EXISTING PERIMETER UNLINED DRAIN
  - MAIN DRAINAGE CHANNEL
  - SECONDARY DRAINAGE CHANNEL
  - DIRECTION OF FLOW
  - CULVERT CROSSING OR LOWERED PATH
  - OVERLAND FLOW



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					DRAWN B. SENIOR					WAPC No.	
					DESIGNED G. COFFEY					SCALE $\odot$ A1 NTS	
					PROJECT MANAGER G. COFFEY					DATUM AHD	CO-ORDS KAR-94
					JDSI PROJECT No.: JDS12552					DRAWING No SK01	
										REVISION C	

C	04.09.12	BJS	GPC	LAYOUT AMENDED. RE-ISSUED FOR INFORMATION
B	31.08.12	AJP	GPC	RE-ISSUED FOR INFORMATION
A	20.07.12	BJS	GPC	ISSUED FOR INFORMATION
REV	DATE	DRAWN	CHECKED	APPROVED
1				
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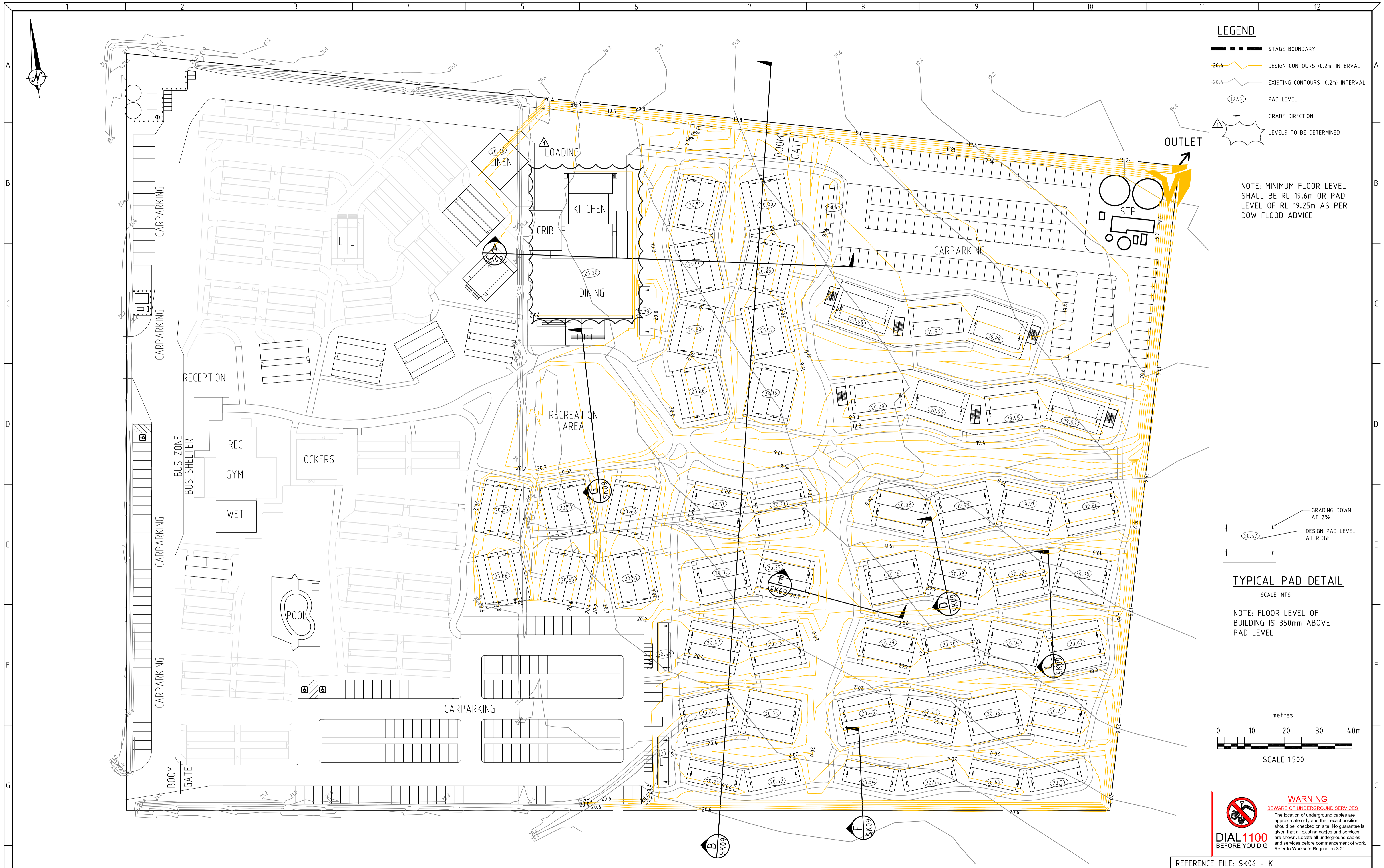
NOTE  
This drawing shall be preliminary only until it is issued for Construction.  
Certified Quality System to ISO 9001

**JDSi**  
CONSULTING ENGINEERS  
Level 1, 59 Parry Street, Perth Western Australia 6000  
P: (08) 9227 0595 F: (08) 9227 8617

CLIENT:  
**AUSCO STAYOVER**

PROJECT:  
**KINGFISHER STAYOVER VILLAGE**

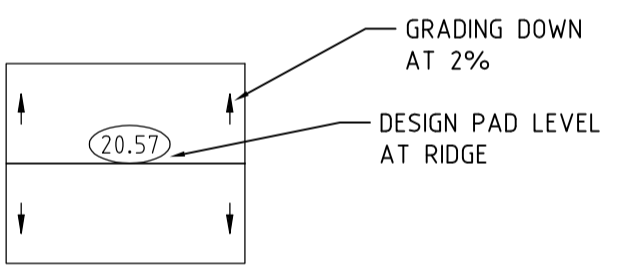
DRAWING TITLE:  
**STORMWATER CONCEPT PLAN**



**LEGEND**

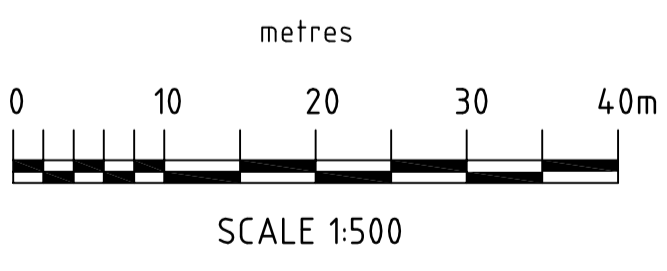
- STAGE BOUNDARY
- DESIGN CONTOURS (0.2m) INTERVAL
- EXISTING CONTOURS (0.2m) INTERVAL
- PAD LEVEL
- GRADE DIRECTION
- LEVELS TO BE DETERMINED

NOTE: MINIMUM FLOOR LEVEL SHALL BE RL 19.6m OR PAD LEVEL OF RL 19.25m AS PER DOW FLOOD ADVICE



**TYPICAL PAD DETAIL**  
SCALE: NTS

NOTE: FLOOR LEVEL OF BUILDING IS 350mm ABOVE PAD LEVEL



**WARNING**  
**BEWARE OF UNDERGROUND SERVICES**  
The location of underground cables are approximate only and their exact position should be checked on site. No guarantee is given that all existing cables and services are shown. Locate all underground cables and services before commencement of work. Refer to Worksafe Regulation 3.21.

**DIAL 1100**  
BEFORE YOU DIG

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LANDSCAPE CONCEPT PLAN





**DESIGN INTENT**  
 The village open space is structured around an E- W central spine which allows for the main paths of pedestrian movement and links the reception , central facilities and accommodation units. N- S cross paths allow for access to the carparks and the laundry facilities. Within these open space areas seating, shelters and BBQ areas are located amongst a treed grassed environment. The Accommodation Unit landscapes provide privacy through screening shrubs and location of paths and provide a more intimate scale of seating and shaded areas.

- 1 **ENTRY**  
 A new vehicular access entry is created for the village near the reception. An irrigated grass verge creates a green entry to the village. Existing and new planting along the existing colourbond fence softens the industrial appearance of the fence. Old vehicle entries are fenced with colourbond fence panels. A new village entry wall is located near the vehicular entry.
  
- 2 **E- W SPINE**  
 The spine is a series of open grass spaces divided by large feature shade trees and groves of palms with low ground cover planting. The wide meandering path provides the main route for residents to access the dining and recreation facilities. Shade structures, seats and groves of eucalypts are sited throughout the landscape setting. The main stw drain is also located along the spine and is a combination of grass and planted swales. Path crossings over swale are via small bridges (e.g. timber or recycled plastic).
  
- 3 **N-S CROSS SPINE**  
 The cross spines are movement and recreation spaces, that provide choice for communal groups to gather away from the central lawn area. Smaller shade structures with BBQs are provided in these spines.
  
- 4 **CARPARK**  
 Carpark trees provide some shade for the cars and the large asphalt areas. Screening is provided between nearby residents to hide headlight glare. Paths are provided from the carpark to the village along the N-S cross spine.
  
- 5 **PERIMETER OF VILLAGE**  
 The landscape at the perimeter of the village consists of a STW drain. It proposed that this drain remain unlined. A chain mesh fence with a low metal panel to reduce snake entry tot he village surrounds the N,E and S sides of the camp.
  
- 6 **LAUNDRY**  
 The landscape adjacent to laundries comprises of an open turfed area with shade trees and seating and acts as an informal communal space to meet fellow residents.
  
- 7 **UNIT LANDSCAPE**  
 The structure of landscape surrounding the units is based on the path network. Spaces created between the access paths become areas for communal gathering, or planted and treed spaces providing privacy between units. It is proposed that generally each set of 4 unit blocks have a grassed area with a seats and shade trees.

DESIGN INTENT





- - - - - TOTAL SITE AREA 6.3ha
- TOTAL OPEN SPACE 2.51 ha

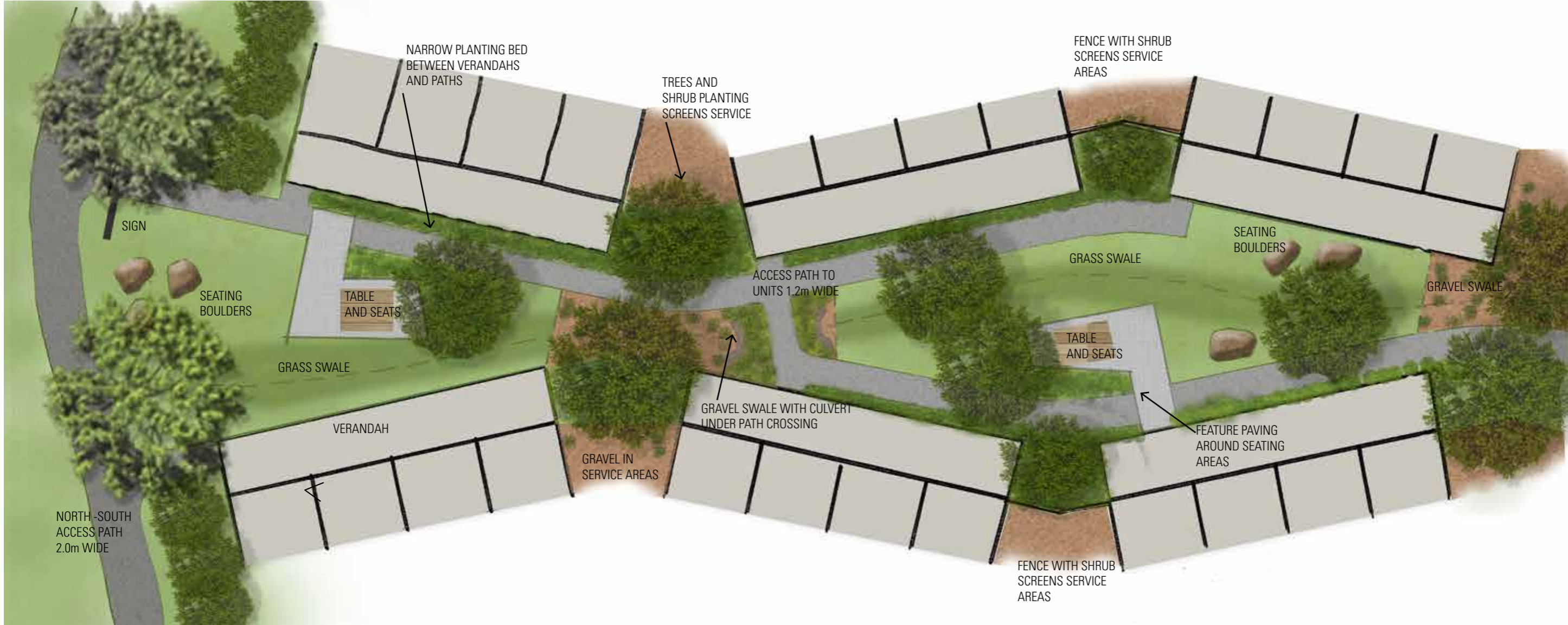
OPEN SPACE

landscape architecture  
urban design  
environmental management

NOT TO SCALE



AUSCO MODULAR	<b>KINGFISHER STAYOVER</b>
DATE <b>SEPT. 2012</b>	DRAWING NO <b>SP124301-003</b>
	ISSUE <b>B</b>



TYPICAL UNIT LANDSCAPE PLAN scale 1:250

TYPICAL PLAN

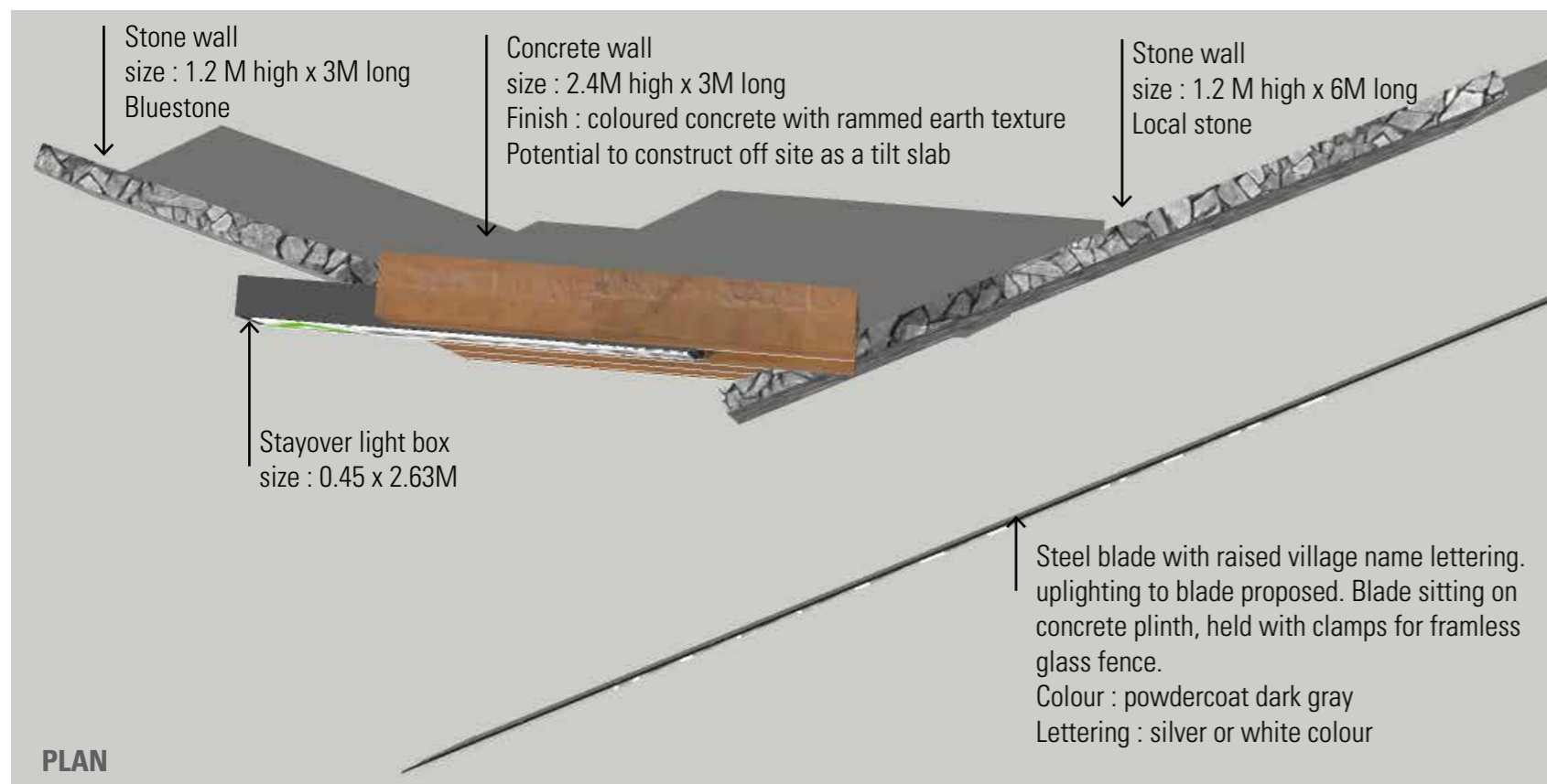




**TYPICAL UNIT LANDSCAPE CROSS SECTION** scale 1:50

TYPICAL SECTION





ENTRY WALL

PATHWAYS

*Sandy and charcoal coloured concrete form the main colours for the concrete paths. Accents of Kimberly sandstone finishes are features through the central spine. Square tool cut joints at smaller shelters emulate the "balinese style"*



TIMBER DECKING, SCREENS AND SWALE CROSSINGS

*Timber bridges, access steps to units and fences are features in the landscape. The timber could be a composite material to reduce maintenance and attack by termites.*



METAL PANELS

*Metal panels used in the entry sign and in feature areas of the landscape such as the large shelters in the main recreation areas*



*Steel and stone or concrete seating supports are low maintenance materials. Timber seating and table tops create a comfortable, residential experience.*



off the shelf landmark bench



*Flexible seating forms and types allow for a combination of seating layouts, and choice for use by single persons or groups*



off the shelf landmark seating



informal local stone for seating areas



off the shelf landmark picnic table

Structures are typified by

- wide eaves
- tin roof
- walls opening to breezes
- shelters orientated for outlook
- a combination of timber and metal materials



Wide eaves, open sides and the shelter orientated for outlook



Larger communal shelters with a balinese theme



Customised landmark structure note the steel posts faced with timber and prominent steel bolts, create a durable structure with a domestic aesthetic



Standard landmark structure for smaller structures with seats only.

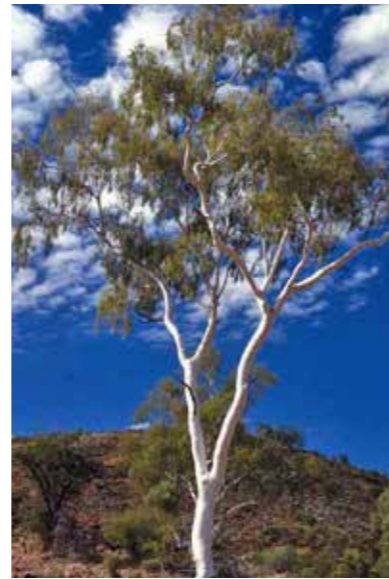
*Small trees provide shade with a colourful native understorey creating interest and privacy from*

trees

ACACIA coriacea  
BRACHYCHITON acuminatus  
EUCALYPTUS victrix

shrubs and groundcovers

EREMOPHILA glabra  
EREMOPHILA maculata  
HARDENBERGIA violacea  
LOMANDRA longifolia  
POA labillardiera 'Eskdale'  
PTILOTUS exaltus  
PTILOTUS nobilis



*The planting to the perimeter of the site provides a wind break from the strong dry westerly winds and is a transition from the lush*

trees and shrubs

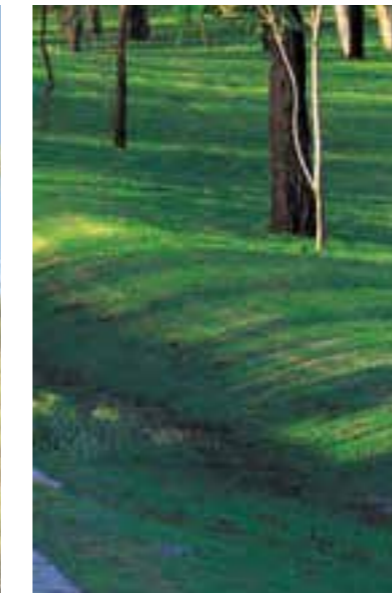
ACACIA coriacea  
BRACHYCHITON acuminatus  
CORYMIBA flavescens  
EREMOPHILA maculata  
EUCALYPTUS victrix  
GREVILLEA Honey Gem  
GREVILLEA Robyn Gordon  
SENNA artemisioides

groundcovers

EREMOPHILA glabra  
TRIODIA scariosa



*The entry landscape is the interface between the natural and designed landscape. It comprises a eucalypt trees in a rolling irrigation lawn with feature planting of spinifex and indigenous planting.*



Within the spine landscape greener nodes at path junctions are proposed. These will be dominated by large spreading shade trees with lush green understoreys, surrounded

tees  
CASSIA javanica  
FICUS hillii

palms, palm-like and cycads  
CYCAD encephalartos  
DION edule  
LIVISTONA australis  
PANDANUS spiralis



*The shaded community areas are dominated by groves of eucalypt planting. The smooth white trunks of the trees provide sculptural forms within the mown green landscape with the occasional low grassy understorey*

trees  
CORYMBIA flavescens  
EUCALYPTUS leucoxylon

shrubs and groundcovers  
DIANELLA longifolia  
MYOPORUM parvifolium



A riparian character is proposed in the planted swales.

trees  
MELALEUCA argentea  
MELALEUCA leucadendron

strappy leaved  
CRINUM asiaticum  
ISOLEPSIS nodosa  
LOMANDRA hastilis



## **APPENDIX 3**

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**Department of Water Advice**

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## Giles Glasson

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**Subject:** Kingfisher Stayover Camp Expansion

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**From:** SMYTHE Toni [<mailto:Toni.Smythe@water.wa.gov.au>]

**Sent:** Thursday, 26 July 2012 12:30 PM

**To:** Jennifer Longstaff

**Subject:** FW: Kingfisher Stayover Camp Expansion

Hi Jenny,

The Department of Water, in carrying out its role in floodplain management, provides advice and recommends guidelines for development on floodplains with the object of minimising flood risk and damage.

The preliminary results of the Karratha Coastal Vulnerability Study shows that in this area the inundation levels for large storm surge events are expected to be:

	<u>100 year ARI</u>	<u>500 year ARI</u>
At 2010	18.9 m AHD	19.3 m AHD
At 2060	18.9 m AHD	19.3 m AHD
At 2110	18.9 m AHD	19.3 m AHD

The estimates include flooding generated from storm surge and catchment flooding, and the estimates for 2060 and 2110 include an allowance of 0.3 metres and 0.9 metres respectively for possible future sea level rise.

The available contour information for the area shows the general natural surface level of the lot to be greater than 19 m AHD (see attached plans).

For proposed development on the lot a minimum habitable floor level of 0.5 m above the 100 year ARI flood level is recommended to ensure adequate flood protection.

Please note that this advice is related to storm surge and major flooding only and does not take into account local stormwater drainage.

For further information please contact Simon Rodgers on (08)6364 6923 or via email at [simon.rodgers@water.wa.gov.au](mailto:simon.rodgers@water.wa.gov.au).

Kind regards,

**Toni Smythe**

Engineer, Floodplain Management

Department of Water

Telephone: (08) 6364 7413

E-mail: [toni.smythe@water.wa.gov.au](mailto:toni.smythe@water.wa.gov.au)

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**From:** RODGERS Simon

**Sent:** Thursday, 26 July 2012 10:12 AM

**To:** SMYTHE Toni

**Subject:** FW: Kingfisher Stayover Camp Expansion

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**From:** Jennifer Longstaff [<mailto:Jennifer.Longstaff@rpsgroup.com.au>]  
**Sent:** Thursday, 19 July 2012 4:45 PM  
**To:** RODGERS Simon  
**Cc:** Giles Glasson  
**Subject:** Kingfisher Stayover Camp Expansion

Hi Simon

I am currently in the process of assessing the potential to expand a short stay accommodation camp, called the Kingfisher Stayover Camp, located in Stove Hill, approximately 4 km from Karratha, as shown on the attached Figure 1. The site address is Part of Lot 211 on deposited Plan 21966, Madigan Road, Stove Hill .

A review of the 'Karratha Coastal Vulnerability Study' (JDA, 2011) indicates that the site **may** be subject to some minor inundation in a flood event, although this is very difficult to accurately determine due to the resolution of the figures provided within the report.

Information that I have to date on the proposal indicates that some minor filling may occur within the expansion site to support the development and that all finished floor levels will be raised to 350mm above ground level. I have also included a topographical figure for your information. (Figure 2)

Are you able to advise if this level of information will be adequate to assess this development proposal or if further information will be required to support such an application? I am aware that floor levels will need to be set with minimum clearances above flood levels if it is determined that the site is subject to flooding, however I am unsure how this will be determined and who is responsible for setting the levels in this regard?

Any advice and assistance much appreciated and please do not hesitate to contact me on the below mentioned number if you would like to discuss things further,

Kind Regards

Jenny



**Jennifer Longstaff**  
**Managing Scientist**  
**(Wednesday and Thursday)**  
**Environment - Land & Infrastructure**  
**RPS Australia Asia Pacific**  
38 Station Street, Subiaco, WA, Australia, 6008  
PO Box 465, Subiaco WA 6904  
**Tel:** +61 8 9288 0821  
**Fax:** +61 8 9211 1122  
**Email:** [Jennifer.Longstaff@rpsgroup.com.au](mailto:Jennifer.Longstaff@rpsgroup.com.au)  
**www:** <http://rpsgroup.com.au>



## **APPENDIX 4**

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### **EPBC Protected Matters Search**

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# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

Report created: 02/08/12 11:34:28

[Summary](#)

[Details](#)

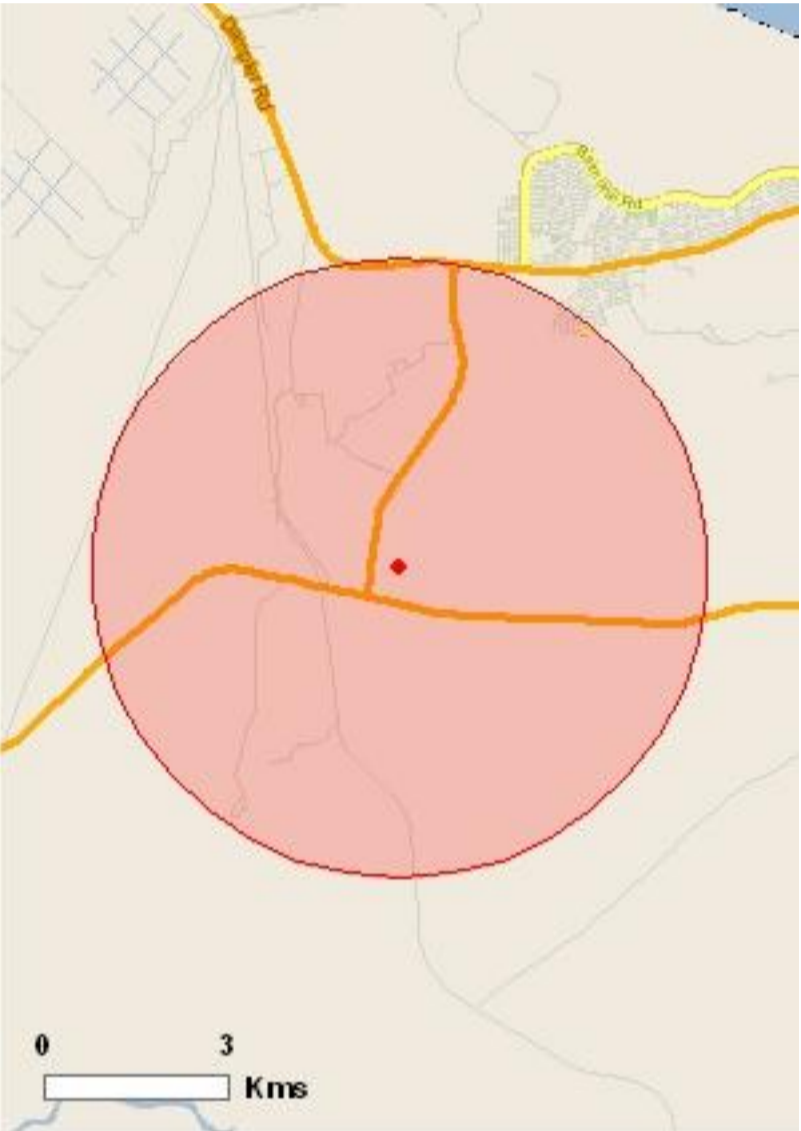
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[Other Matters Protected by the EPBC Act](#)

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[Coordinates](#)

[Buffer: 5.0Km](#)



## Summary

### Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see <http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Areas:</a>	None
<a href="#">Threatened Ecological Communities:</a>	None
<a href="#">Threatened Species:</a>	4
<a href="#">Migratory Species:</a>	10

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov>.

<a href="#">Commonwealth Lands:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	9
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have

<a href="#">Place on the RNE:</a>	None
<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	6
<a href="#">Nationally Important Wetlands:</a>	None

## Details

### Matters of National Environmental Significance

Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
MAMMALS		
<a href="#">Dasyurus hallucatus</a> Northern Quoll [331]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
<a href="#">Macrotis lagotis</a> Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Rhinonictoris aurantia (Pilbara form)</a> Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area

REPTILES		
<a href="#">Liasis olivaceus barroni</a> Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat may occur within area

Migratory Species	[ <a href="#">Resource Information</a> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.	

Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat may occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat may occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area

Migratory Terrestrial Species		
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area

Migratory Wetlands Species		
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat may occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area

### Other Matters Protected by the EPBC Act

Listed Marine Species	[ <a href="#">Resource Information</a> ]	
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		

Name	Threatened	Type of Presence
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat may occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat may occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Sterna dougallii</a> Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area

Extra Information

Invasive Species		[ Resource Information ]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit,		
Name	Status	Type of Presence
Mammals		
<a href="#">Felis catus</a> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<a href="#">Oryctolagus cuniculus</a> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<a href="#">Vulpes vulpes</a> Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		

Name	Status	Type of Presence
<a href="#">Cenchrus ciliaris</a> Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
<a href="#">Parkinsonia aculeata</a> Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
<a href="#">Prosopis spp.</a> Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area

## Coordinates

-20.79104 116.78108

## Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

## Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)

- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

---

[Please feel free to provide feedback via the Contact Us page.](#)

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[Department of Sustainability, Environment, Water, Population and Communities](#)

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## **APPENDIX 5**

---

### **Aboriginal Heritage Inquiry System**

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## Search Criteria

Site 7509

## Disclaimer

Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist. Consultation with Aboriginal communities is on-going to identify additional sites. The AHA protects all Aboriginal sites in Western Australia whether or not they are registered.

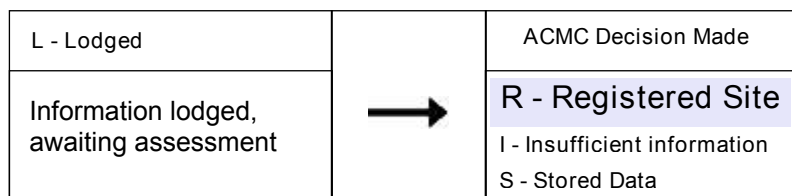
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## Legend

Restriction	Access	Coordinate Accuracy
N No restriction	C Closed	Accuracy is shown as a code in brackets following the site coordinates.
M Male access only	O Open	[Reliable] The spatial information recorded in the site file is deemed to be reliable, due to methods of capture.
F Female access	V Vulnerable	[Unreliable] The spatial information recorded in the site file is deemed to be unreliable due to errors of spatial data capture and/or quality of spatial information reported.

## Status



## Spatial Accuracy

Index coordinates are indicative locations and may not necessarily represent the centre of sites, especially for sites with an access code "closed" or "vulnerable". Map coordinates (Lat/Long) and (Easting/Northing) are based on the GDA 94 datum. The Easting / Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '5000000:Z50' means Easting=5000000, Zone=50.

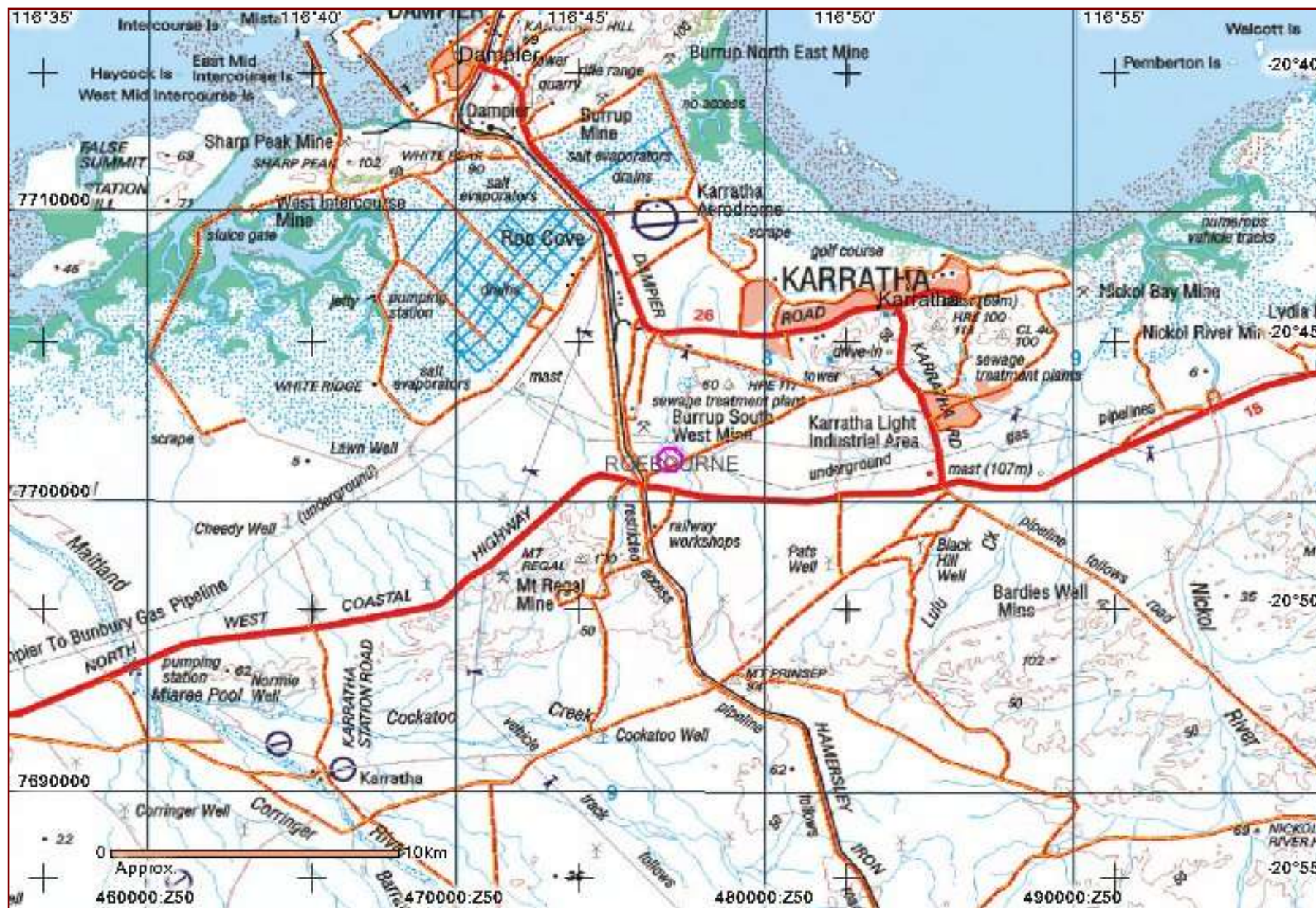
## Sites Shown on Maps

Site boundaries may not appear on maps at low zoom levels



## List of Registered Aboriginal Sites with Map

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
7509	R	O	N	Karratha West 1	Artefacts / Scatter			476927mE 7701435mN Zone 50 [Unreliable]	P05429



## Legend

Selected Heritage Sites

 Registered Sites

 Town

 Map Area

 Search Area

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Geothermal Application, Geothermal Title, Mining Tenement, Petroleum Application, Petroleum Title boundary data copyright © the State of Western Australia (DMP) (2012.7).

For further important information on using this information please see the Department of Indigenous Affairs' Terms of Use statement at <http://www.dia.wa.gov.au/Terms-Of-Use/>



## **APPENDIX 6**

---

**Department of Environment and  
Conservation Advice**

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## Giles Glasson

---

**From:** Carvalho, Raymond <Raymond.Carvalho@dec.wa.gov.au>  
**Sent:** Wednesday, 1 August 2012 3:58 PM  
**To:** Giles Glasson  
**Subject:** RE: Requirements for assessment of a clearing application for Part of Lot 211 on deposited Plan 21966, Madigan Road, Stove Hill.

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Giles,

An Environmental Assessment Report addressing the PEC attached with your application would be great. This would certainly be sufficient to allow for the assessment of the proposed clearing.

From a Planning and other matters perspective, please ensure you have written authority to clear on the Lot from the Department of Regional Development and Lands (DRDL).

Also a Permit will seldom be granted if Planning Approval is not provided, thus preventing potential clearing for no reason.

If you have any further enquiries please don't hesitate to ask,

Kind Regards,

[Raymond Carvalho](#)

[Native Vegetation Conservation Branch](#)

[Department of Environment and Conservation](#)

[Ph: 9219 8751](#)

---

**From:** Giles Glasson [mailto:[Giles.Glasson@rpsgroup.com.au](mailto:Giles.Glasson@rpsgroup.com.au)]  
**Sent:** Tuesday, 31 July 2012 11:28 AM  
**To:** Carvalho, Raymond  
**Subject:** Requirements for assessment of a clearing application for Part of Lot 211 on deposited Plan 21966, Madigan Road, Stove Hill.

Hi Raymond,

Many thanks for your time this morning. As mentioned, I'm keen to seek your assistance with regard to the level of detail that I will need to supply in order to enable the DEC to assess a clearing application which I am currently working upon.

Our project site is a 3.81 ha parcel of land located in Stove Hill, approximately 4km south of the Karratha town site (Site Location figure). The site address is Part of Lot 211 on deposited Plan 21966, Madigan Road, Stove Hill .

A review of the information that we currently have available for the project site identifies that the buffer of a Priority 1 Ecological Community – Roebourne Plains Gilgai Grasslands (PEC) intersects the project site (Environmental Constraints figure). This constraints figure has been compiled from search results received from the DEC's flora and ecological communities searches and other sources. Given the proximity to the site and known habitat of closest identified conservation significant flora species (Priority 4 *Rhynchosia bungleensis* which according

to Florabase grows in Pebbly, shingly coarse sand amongst boulders and the Banks of flow line in the mouth of a gully in a valley wall, which is not present upon site); My primary concern is to address the PEC.

The PEC buffer covers, approximately, 2.21 ha of the site. My understanding is that the PEC buffer information identifies a circular extent surrounding the actual ecological community and within that nominal buffer area the PEC may potentially occur.

For this your general information for this parcel of land, I will be preparing an Environmental Assessment Report, to support a planning application to the Shire of Roebourne. In order to address the issue of the PEC, my approach has been to identify the regional distribution of the PEC (which, inclusive of all the buffers in the ecological communities dataset surrounding the Karratha town site, is approximately 25,4251.16 ha). Therefore the proportion of potential PEC that will be impacted by the proposal to clear the vegetation from within the project site is 0.009% of the PECs known regional distribution.

In my opinion, given the size of area proposed cleared, this is not an impact which would result in diminishing the maintenance of the priority ecological community, as per Principle (d) of the Ten Clearing Principles.

If you could please let me know your thoughts as to whether addressing the PEC, and flora, at the regional level, as described above within the setting of an Environmental Assessment Report, would provide a sufficient level of detail to allow the DEC to assess a clearing application for this parcel of land, that would be fantastic.

I'm more than happy to discuss further with yourself or to come in for a meeting, if you feel that it would be of value.

Many thanks for your assistance,

Giles



**Giles Glasson**  
**Supervising Scientist**  
**Environment - Land & Infrastructure**  
**RPS Australia Asia Pacific**  
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**www:** <http://rpsgroup.com.au>



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## Attachment 7 – Aboriginal Heritage Survey



**THE REPORT OF AN ABORIGINAL HERITAGE SURVEY OF THE PROPOSED  
EXPANSION OF THE KINGFISHER ACCOMMODATION FACILITY, PORTION OF  
LOT 211, MADIGAN ROAD, KARRATHA, WEST PILBARA REGION, WESTERN  
AUSTRALIA**

**September 2012**

**for the  
*Ngarluma* Aboriginal Corporation  
(Registered Native Title Body Corporate) &  
Ausco Modular Pty Ltd**

**By  
Anthropos Australis Pty Ltd  
&  
Context Anthropology Pty Ltd**

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- i. In order to meet their obligations under relevant environmental, heritage, water, public works legislation; and
- ii. For any purpose relating to the Aboriginal Heritage Act 1972 (WA) and or the Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (C'th).

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## DISCLAIMER

Whilst every effort has been made to ensure that all relevant data has been presented, the Author is not accountable for omissions and inconsistencies that may result from information which may come to light in the future but which was not forthcoming at the time of this research.

The results, conclusions and recommendations within this Report are based on information available at the time of its preparation.

## CO-ORDINATE CAPTURE

The Author advises that all co-ordinates quoted in this Report were obtained with a Garmin Hand Held GPS unit using the GDA 94 Datum. All grid references given in this Report are within MGA Zone 50K, unless otherwise stated.



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## ACKNOWLEDGEMENTS

The Author would like to acknowledge and thank the following people in this Report:

- *Ngarluma* Consultants: Jeannie Churnside, Rebecca Parfitt, Jason Highland and Harley Alec who participated in the Survey;
- Jodi Mowarin of *Weymul* Contracting who supported the Survey;
- Angus Spencer and James Rowden of Ausco Modular Pty Ltd who commissioned the Survey;
- Context Anthropology Pty Ltd: Zsuzsanna Gonda, Rae Fallon and Kyoko Metz who conducted and organised the Survey; and
- Anthropos Australis Pty Ltd: Camille Tanner, Emily Ashby and Nicholas Green who conducted and organised the Survey.

**Plate 1: The *Ngarluma* Survey Team**



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## EXECUTIVE SUMMARY

- Ausco Modular Pty Ltd intends to expand the existing Kingfisher Accommodation Facility on a portion of freehold land (Lot 211) adjacent to Madigan Road. The Survey Area is located within the freehold land and is approximately 8 km south west of the Karratha town site, in the West Pilbara region of Western Australia.
- This Report details the results of an Aboriginal heritage survey that used a Site Avoidance methodology to examine the Survey Area, which lies within the *Ngarluma* Determination Area (WC99/14).
- The objectives of the Survey were to:
  - Examine the designated Survey Area to identify and record any Aboriginal archaeological or ethnographic sites, as defined by Section 5 of the *Aboriginal Heritage Act 1972* (the Act), to Site Avoidance standard.
- The Survey was conducted on Tuesday the 24<sup>th</sup> of July 2012, by Camille Tanner of Anthropos Australis Pty Ltd and Zsuzsanna Gonda of Context Anthropology Pty Ltd.
- The *Ngarluma* Consultants that participated in the Survey have had the opportunity to view the Survey Area. Members of the *Ngarluma* Aboriginal Corporation have also approved the Conditions set out below.
- It is a **condition** that Ausco Modular Pty Ltd ensures that their employees and contractors, as appropriate, are advised that:
  1. The Survey Area does **not** contain any new Aboriginal sites pursuant to the *Aboriginal Heritage Act 1972*; and
  2. The Survey Area is overlapped by a portion of registered Aboriginal site polygon ID 7509, but no cultural material was located within this portion of the polygon.
- It is a **condition** that Ausco Modular Pty Ltd inform the Department of Indigenous Affairs that the proposed Kingfisher Accommodation Facility impacts registered Aboriginal site polygon ID 7509, but does not impact the actual Aboriginal site itself, and the Register of Aboriginal Sites should be adjusted to ensure that a Section 18 Notice to use the land containing registered Aboriginal site polygon ID 7509 is not required to ensure compliance with the *Aboriginal Heritage Act 1972*.



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- It is a **condition** that Ausco Modular Pty Ltd avoid all isolated stone artefacts, however, if Ausco Modular Pty Ltd determines it is necessary to move the isolated artefacts, then Ausco Modular Pty Ltd are required to contact the *Ngarluma* Aboriginal Corporation and the Department of Indigenous Affairs to determine the most culturally appropriate way to relocate the isolated artefacts.



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## SECTION ONE – INTRODUCTION AND BACKGROUND DATA

### INTRODUCTION

Ausco Modular Pty Ltd intends to expand the existing Kingfisher Accommodation Facility (the Project) on a portion of freehold land (Lot 211) adjacent to Madigan Road (the Survey Area). The Survey Area is located within the freehold land and is approximately 8 km south west of the Karratha town site, in the West Pilbara region of Western Australia (see Figure 1).

This Report details the results of an Aboriginal heritage survey (the Survey) that used a Site Avoidance methodology to examine the Survey Area, which lies within the *Ngarluma* Determination Area (WC99/14).

The litigated determination of the *Ngarluma/Yindjibarndi* native title claim through the Federal Court has resulted in the establishment of the NAC, which is the registered native title body corporate for the *Ngarluma* portion of the Determination Area. The NAC is the legal entity that holds the native title rights of the *Ngarluma* native title holders including the right to protect and care for sites and objects.

The NAC manages the conduct of Aboriginal Heritage Surveys on behalf of the *Ngarluma* native title holders. The NAC in turn engaged Anthropos Australis Pty Ltd and Context Anthropology Pty Ltd to undertake the Survey. *Weymul* Contracting (*Weymul*) was engaged by the NAC to support the conduct of the Survey.

The Survey Area consists of:

- 3.71 ha of land on a portion of Lot 211, located adjacent to and east of the existing Kingfisher Accommodation Facility.

The objectives of the Survey were to:

- Examine the designated Survey Area to identify and record any Aboriginal archaeological or ethnographic sites, as defined by Section 5 of the *Aboriginal Heritage Act* 1972 (the Act), to Site Avoidance standard.

The Survey was conducted on Tuesday the 24<sup>th</sup> of July 2012, by Camille Tanner of Anthropos Australis Pty Ltd and Zsuzsanna Gonda of Context Anthropology Pty Ltd.

The Survey was conducted with the cooperation and involvement of the *Ngarluma* native title holders nominated by the NAC (the *Ngarluma* Consultants – see Plate 1).

This Report has been prepared in order to provide feedback to the Survey participants, the NAC, and Ausco Modular Pty Ltd.



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**Table 1: Boundary Nodes of the Survey Area (GDA 94, Zone 50)**

<i>Point</i>	<i>Easting*</i> (± 10m)	<i>Northing*</i> (± 10m)
1	476966	7701106
2	477155	7701064
3	477114	7700876
4	476942	7700895

## **REPORT FORMAT**

The format and contents of this Report follow those suggested by the *Draft Guidelines for Aboriginal Heritage Assessment in Western Australia* (DAS 1993; DIA 2002).

This Report is divided into two sections:

**Section One** contains this Introduction, providing details of the Survey Area including a Figure, the Personnel involved in the Survey, the Environmental Data and the Archaeological and Ethnographic Background. This section also includes the Survey Methods, details of the registered Aboriginal sites and notes on Aboriginal Site Recognition; and

**Section Two** details the Results of the Survey. The participation of the *Ngarluma* Consultants is discussed. This section provides details on the Survey Method, the Results of the Survey and the Conditions. This section also includes the References Cited and the Appendices.

## **THE SURVEY AREA**

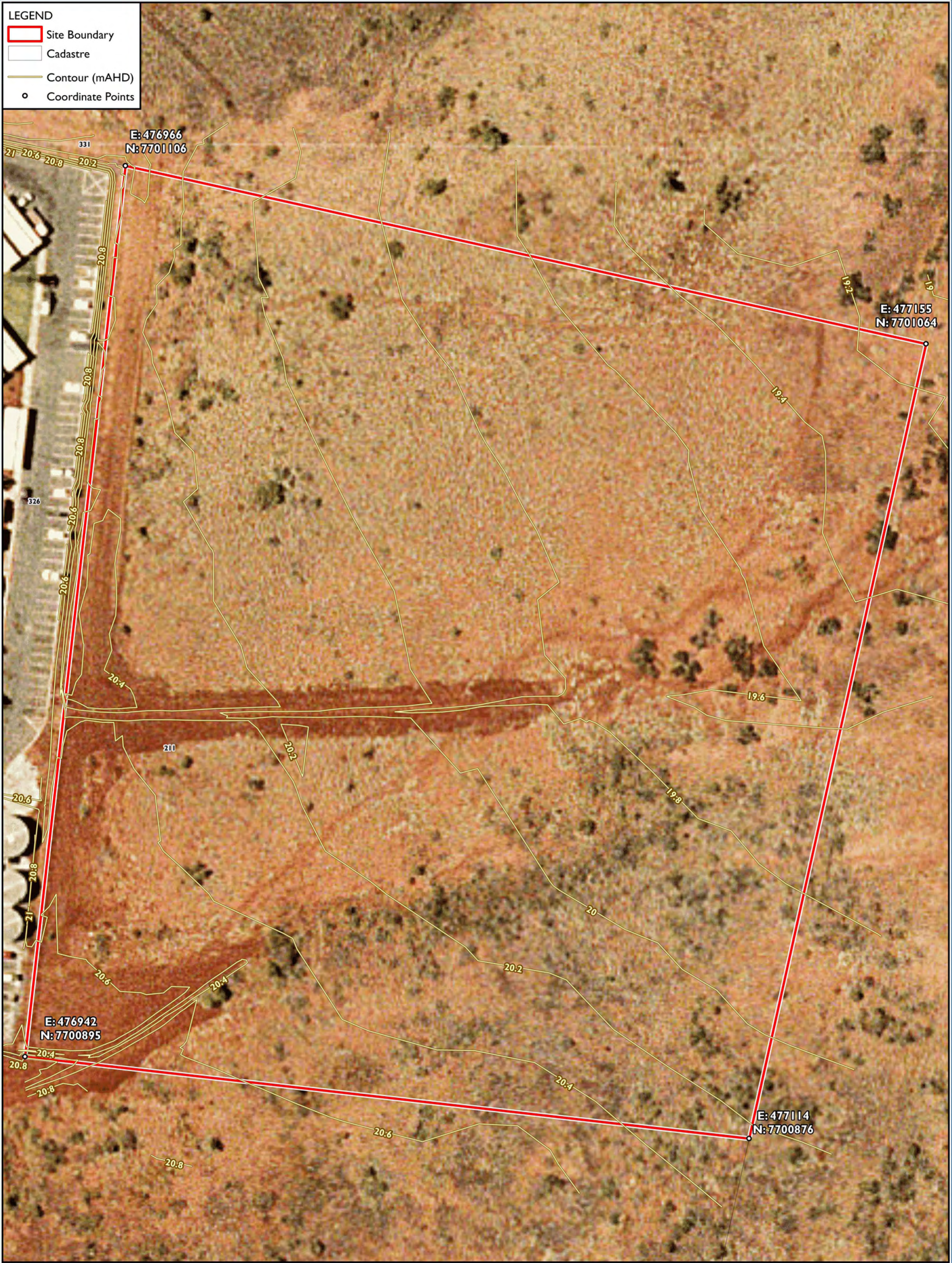
The Survey Area is located approximately 8 km south west of Karratha, in the West Pilbara Region of Western Australia. The Survey Area comprises a 3.71 ha parcel of land within Lot 211, adjacent to Madigan Road and directly east of the existing Kingfisher Accommodation Facility (see Table 1 and Figure 1).



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Figure 1: Location of the Survey Area



## PERSONNEL

The following people and organisations participated in the Survey (the Survey Team):

### ***ANTHROPOS AUSTRALIS PTY LTD***

Camille Tanner

### ***CONTEXT ANTHROPOLOGY PTY LTD***

Zsuzsanna Gonda

### ***NGARLUMA CONSULTANTS***

Jeannie Churnside

Rebecca Parfitt

Jason Highland

Harley Alec

### ***WEYMUL CONTRACTING***

Jodi Mowarin



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## ENVIRONMENTAL DATA

The Survey Area is located on the Abydos Plain, which is part of the Fortescue Botanical District, within the Eremaean Botanical Province (Beard 1975: 8). The Abydos Plain extends east from Cape Preston to Pardoo Creek, east of the de Grey delta (Beard 1975: 50). The characteristic features of the climate, geology, landforms and vegetation of the area are briefly described below.

### CLIMATE

The Survey Area lies within the Australian arid zone with a climate which has been described as arid tropical (Brown 1987: 3; Gentili 1972: 225-231) or semi-desert tropical with summer rain (Beard 1975: 50). The area is characterised by hot summers and cool winters. Precipitation is on average 300 mm per annum. This can be irregular and is mainly attributable to cyclones, which cross the Pilbara coastline from December to April (Beard 1975; Mabbutt 1971; Mulvaney 1984a).

### GEOLOGY AND TOPOGRAPHY

The geology of the Abydos Plain consists of Archaean granite and outcrops of other Archaean rocks in small hills, ranges and dykes (Beard 1975: 50). Faulting and uplifting of the Hamersley Plateau, to the south, has created a pattern of ridges and valleys. The resultant gorges capture the rainfall run-off from the wider plateau, creating a more favourable environment for human occupation than other Areas of the Pilbara (Bradshaw *et al.* 1996: 7).

Most of the Abydos Plain is on granite. The most important geological group in the area is the Hamersley Group. The rock types of this group include iron formations, shale, dolerite, acid lava, and dolomite. Volcanic rocks are also present. Surface expressions of these rock formations are found over an extensive area of the Hamersley Plateau. Chemical deposition has created banded formations of the sedimentary rocks, cherts and opaline silicas, which appear as layers (Trendall 1975). Most of these rocks, including the more silicified banded ironstone formation (BIF), can be suitable for stone tool production (e.g. Brown 1987: 4-5, Table 1; Kee *et al.* 1985: 4).

The topography of the granite plain includes alluvial plains, pediplains, low stony hills and dissected pediments, and low granite outcrops and tors. The main soils are hard alkaline red soils, containing patches of calcrete (Beard 1975: 50).



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## SOILS

Generally soils in the Pilbara are regarded as skeletal (Beard 1975: 29). This is as a result of the low rainfall in the region, and the relatively sparse vegetation cover. Much of the rainfall that occurs comes from storms and cyclones and often washes away soil as soon as it forms (Beard 1975: 29).

## VEGETATION

The bi-seasonal nature of the climate has had a marked effect on the vegetation of the region. A tropical plant element is associated with the cyclonic summer rains and a southern plant element is associated with the erratic winter rains (Beard 1975; Blackwell *et al.* 1978). The combination of tropical and southern plant elements and the resultant seasonal availability of flowering and fruiting provide an extended range of plants potentially useful to humans.

The main vegetation in the region is a general cover of hummock grasses interspersed with a widely spaced shrubs. A shrub steppe of *Acacia pyrifolia*, *Triodia pungens* (Spinifex) dominates. Large shrubs, up to 3 m in height, also include the fire-resistant species *Grevillea wickhamii* and *Hakea suberea*, and trees of *Eucalyptus diachromophloia* and *Eucalyptus papuana* are occasionally found along drainage lines, although they are rare. Along major creeks are trees of *Eucalyptus camaldulensis* and *Melaleuca leucadendron* (Beard 1975: 50-55). Within the Survey Area, the vegetation is dominated by Buffel grass (*Cenchrus ciliaris*), with occasional Wattle (*Acacia ampliceps*), Kanji Bush (*Acacia pyrifolia*), and Spinifex.



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## ARCHAEOLOGICAL BACKGROUND

This summary of archaeological research in the arid zone, the Abydos Plain and the Hamersley Plateau is followed by a brief discussion of previous research in the vicinity of the Survey Area. This includes a review of the registered Aboriginal sites situated within and in close proximity to the Survey Area.

### ANTIQUITY OF ARID ZONE COLONISATION

As noted above, the Abydos Plain lies within the Australian arid zone. A great deal of research has focussed on the Australian arid and semi-arid zones in an attempt to elucidate the nature and timing of human occupation of the area, and the question of the timing of settlement of this area has been the cornerstone of many of the most influential models in Australian prehistory (Birdsell 1953, 1957; Bowdler 1977; Gould 1980; Morse 1994; Smith 1987, 1988; Veth 1989a, 1993, 1995, 1999).

Today, the arid zone covers some 4,600,000 km<sup>2</sup>, or 60% of Australia. Its extent and severity have changed over the past 50,000 years or so, in response to climatic fluctuations, particularly during the height of the Last Glacial Maximum (LGM) at about 18,000 years before present (BP). Until about 15 years ago, archaeological evidence suggested a terminal Pleistocene-early Holocene date for the settlement of the arid zone. Bowdler (1977) for example posited that colonisation of the arid zone did not occur until the climatic amelioration of 10,000 to 12,000 years ago and Gould (1977a; 1977b) argued for long term cultural stability or equilibrium in the Australian arid zone throughout this time. Gould developed the concept of the 'Australian desert culture' based on the coherent chronology and sequence from Puntutjarpa Rock shelter in the Western Desert and from ethnographic and ethno-archaeological observations (Gould 1977a). Gould characterised this desert culture as essentially conservative and unchanging, based on the assumption that the marginal nature of life in the arid zone would have promoted a conservative response as opposed to encouraging adaption.

Subsequent to Gould's excavations of Puntutjarpa, other sites within the arid zone, for example Newman Ore body XXIX (P00187) (Maynard 1980) and Newman Rock Shelter (P2055) (Troilett 1982), produced Pleistocene dates of about 21,000 BP and 26,000 BP respectively (Brown 1987: 24). These sites, however, are located not in the low-lying desert dune-fields but are in the Newman region, on the periphery of the Hamersley Plateau:

At Newman Rock Shelter and Newman Ore body XXIX the few artefacts discarded over the LGM and the extremely slow sediment deposition rates



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indicate that human occupation most likely ceased or was extremely sparse. (Comtesse 2003: 123; Veth 1989b: 86).

Excavations at a further two sites, at Marandoo and site J24 at Mesa J, Pannawonica, have also yielded evidence of occupation which dates to the Pleistocene. These sites have been dated to approximately 18,000 years BP and 23,500 years BP respectively (Hughes and Quartermaine 1992). At Malea rock shelter, in the east Pilbara, McDonald Hales and Associates (1997: 2001) describe a date of 20,950±330 BP associated with stone artefacts and charcoal at 100 cm below the surface and about 10cm above base-rock (McDonald Hales and Associates 1997: 20-21).

These five sites present evidence of the earliest human activity in the inland Pilbara and indicate that occupation of rock shelters at this time was not intensive and consisted of brief and intermittent visits by small groups. The sites discussed above appear to each have been abandoned during the climatically stressful period of the LGM, c. 18,000 years BP. On the other hand, there are three sites in the inland Pilbara that have evidence of occupation during this time. Manganese Gorge 2 at Marandoo is dated to 17,900 BP and Milly's Cave, near Iowa Creek at Yandicoogina, contains cultural material dating to 19,000 BP, and provides evidence that people occupied smaller territorial ranges during this period (Marwick 2002; Smith and Sharp 1993: 44).

This research would indicate, therefore, that the initial (Pleistocene) Aboriginal occupation of the arid zone occurred at around 26,000 to 22,000 years BP. The increased aridity during the LGM caused reductions in the availability of water and food resources, which forced the abandonment of many arid areas until conditions improved in the mid-Holocene. Smith (1988) and Veth (1989a; 1989b; 1993; 1995) argue that a retraction of the population from desert lowlands to refugia (such as the more optimal montane and piedmont areas of the Pilbara Uplands, Central Australian Highlands and Carnarvon Ranges), would have occurred at this time.

## **MODELS OF ARID ZONE COLONISATION**

The concept of cultural stability in arid zone occupation has enjoyed long term influence since Gould's (1969; 1977b) work. Interpretations of archaeological patterns in arid Australia do, however, vary considerably. Smith (1988; 1989) for example, considered that at the time of initial arid zone occupation, special adaptations such as seed-grinding technology, were unnecessary as fully arid conditions had not yet developed. In contrast, Smith saw settlement during the LGM as being restricted largely to areas of springs and permanent waterholes, such as existed in the ranges. Smith argues that the repeated use of Puritjarra between 22,000 and 13,000 BP indicates that the region was not totally abandoned during the glacial maximum. With the climatic amelioration at around 10,000 BP onwards, Smith



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(1987; 1988), like Gould (1977b), argues that the population was able to (re)colonise the entire arid zone.

Other researchers (Lampert and Hughes 1987; 1988; Veth 1987; 1989a; 1989b), however, have pointed to the ephemeral nature of Pleistocene settlement of the arid zone, and suggest that it may not have been continuous throughout this very long period. A great deal of evidence, such as Veth's (1989b: 86) interpretation of the Newman rock shelter sequences, indicate that abandonment of sites and sub-regions had taken place during the height of glacial aridity.

Indeed Veth (1987; 1989a; 1989b) has consistently pointed out just how environmentally diverse the Australian arid zone was, even during the Pleistocene, and he suggests that:

... the occupation of the arid zone from the late Pleistocene on is likely to have been a highly dynamic process. **The notion of a stable human adaptation to the diverse landforms and environments of the arid zone artefacts little support in the archaeological record** [*emphasis in original*](Veth 1989a: 81).

In 1986, Peter Veth commenced fieldwork in the lowland areas of the sandy Western Desert. Unlike the Central Australian Ranges and the Hamersley Plateau, the Western Desert is considered to be the arid zone proper, characterised as it is by uncoordinated drainage, limited water supply and resource stress. Despite the fact that Veth concentrated his efforts around large salt lakes of the Rudall River system that may have held water in the past, his excavations failed to locate any evidence of human occupation of this region prior to 5,000 years BP.

The general 'biogeographic' model of arid zone settlement offered by Veth (1989a; 1989b) as a result of this work is based on the argument that the arid and semi-arid regions of the continent are composed largely of three climatic tracts: (a) refuges or 'islands' of better-watered land; (b) intermediate, relatively arid corridors; and (c) the harsh arid sandy deserts. Veth argues that the refugia, including the Pilbara Uplands, were occupied first while the drier 'corridors' witnessed more transient occupation, being abandoned during the LGM and largely re-settled later during the terminal Pleistocene-early Holocene period. According to Veth, the arid sandy deserts constituted effective barriers to human occupation until as late as 5,000 BP.

Veth (1987; 1989a) incorporated the concept of mid-to-late Holocene intensification (c.f. Lourandos 1983; 1985a; 1985b) into his model of arid zone occupation and argues that it was only when significant changes in the use of resources, equipment, sites and settlement patterns occurred at around 5,000 BP that a true desert adaptation developed which allowed people to move into the arid zone proper (Veth 1987; 1989a):



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It seems reasonable to argue that changes in social structure and economy were necessary before the arid zone could be occupied on a permanent basis and that the timing of permanent occupation of different regions varied (Veth 1987: 109).

Hiscock (1994) also came to broadly similar conclusions, suggesting that the complex, extensive social networks of recent times may not have existed during the Pleistocene and that this may have inhibited the occupation of more arid regions.

### **Mid-to-late Holocene Intensification**

Intensification is a term used to describe new strategies of food production, which increase productivity during the Holocene. Lourandos (1983: 81) argued these changes were due to a:

restructuring of social relations, which placed increasing demands upon the economy and thus production. Such processes resulted in increases in the complexity of social relations and economic growth, sedentism and by inference, population size.

A number of indicators of intensification, in the (mid-to-late Holocene) arid zone archaeological record, have been identified:

1. an increase in site usage i.e. artefact discard rates and sediment accumulation (e.g. Comtesse 2003; Smith 1987; Veth 1989b);
2. an increased rate of site establishment (e.g. Clune 2002);
3. the use of marginal environments (e.g. Hiscock 1994; Veth 1993);
4. the introduction of new tool types such as backed microliths and tula adzes (e.g. Hiscock and Veth 1991: 342);
5. specialised seed grinding and water procurement, storage and conservation techniques (e.g. Smith 1986; Veth 1987; 1989a);
6. increased complexity of exchange programs (Clune 2002; Gibbs and Veth 2002); and
7. increasingly complex social and ceremonial organisation (e.g. Gibbs and Veth 2002) and regional economies (e.g. Clune 2002).

Clune (2002) studied Holocene settlement patterns on the Pilbara coast. She states 'the Abydos Plain experienced increasing aridity during the mid to late Holocene and by implication, experienced increased resource-stress during that time' (Clune 2002: 308). She argues that changes apparent in the archaeological record came about



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through social, economic and logistical restructuring, indirectly due to the effects of resource stress.

Clune (2002) argues items 2, 6 and 7 above are supported by archaeological evidence from coastal sites, but argues no specific evidence to support 4. She states the additional sites in the mid to late Holocene may ‘represent increased group interaction involving economic interdependence and shared ceremonial activity (particularly ceremonies centred on *Thalu*, or increase sites) initiated as a result of the pressures associated with survival in the increasingly arid environment’ (Clune 2002: 327) rather than population increases.

Gibbs and Veth (2002) argue the evidence indicates an intensification of social and ritual networks during the mid to late Holocene, as an arid/semi-arid zone risk minimisation strategy. They argue there is a general increase in the use of art during this period to negotiate broad-scale and local group identity, as a result of increased territoriality.

Clune (2002: 337) concludes that people living on the western Abydos Plain followed a relatively mobile strategy during the mid to late Holocene that may have become more seasonally determined due to environmental pressure. She suggests periods of semi-sedentism may have occurred immediately after the wet season when resources were abundant (Clune 2002: 322).



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## ETHNOGRAPHIC BACKGROUND

This summary of ethnographic research on the *Ngarluma* native title holders is divided into sections that mark historical shifts experienced by the *Ngarluma* people.

### PRE COLONISATION

The *Ngarluma* people have inhabited their traditional land for more than 30,000 years, or *since the world was soft*. Archaeological evidence, as discussed previously, shows continuous occupation of *Ngarluma* traditional country. The archaeological background reveals the long-term occupation of *Ngarluma* country, which in the past moved across their land in small bands, targeting water sources within their own clan estates. Whilst much of *Ngarluma* settlement is now centred in Roebourne, prior to European settlement, the *Ngarluma* people occupied all areas of their traditional country.

Prior to European settlement, *Ngarluma* country was divided into land looked after by clan groups. These clan groups consisted of extended families, defined by kinship structure. Contact between the clans was common, as was contact with neighbouring people. Particular cultural practices, language, social organisation, trade routes and mythological associations distinguished *Ngarluma* country from its neighbours.

The *Ngarluma* people thrived on the natural resources in their country. *Ngarluma* men hunted kangaroos, emu and goanna, as well as fish. *Ngarluma* women collected shellfish and a variety of native plants. These cultural practices and skills were of absolute necessity for survival. Today these practices, and the cultural knowledge inherent in them, are still considered invaluable.

Evidence of *Ngarluma* cultural life, pre-colonisation, is based largely on oral history and the physicality of cultural practice, such as rock art. As noted in the Archaeological Background, *Ngarluma* country has an immense wealth of rock engravings in the region. Engravings depicting animals, human figures, tracks and implements have a basis in ceremony and mythology, and also serve to provide a cultural framework for understanding the world as experienced by the *Ngarluma* people at that time.

There is a predominance of engravings of local animal species as well as other engravings that show various activities. There are also indications that some engravings were renewed as part of hunting-magic rituals (Crawford 1972:308). Some of these rituals form the cultural basis of increase sites, which were tended by ‘*mabun*’ or ‘magic’ men, to ensure bountiful resources for the *Ngarluma* people. Hence, it is clear that engravings are the physical markers of cultural practice.



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Additionally, the rich and vibrant oral history that is passed down through the *Ngarluma* generations, serves to interpret the existing rock art. Often this occurs during law ceremonies and ritual ‘caring’ for sites. The *Ngarluma* people imbed much of their cultural history and knowledge in songs. These songs serve to follow pre-determined paths that criss-cross and exceed the boundaries of *Ngarluma* country, linking and situating *Ngarluma* into the wider framework of the Pilbara region.

Song lines often describe the movements of ancestral beings and Dreamtime spirits. These song lines link many of the major archaeological sites. Thus, archaeological sites, such as engravings, can also be seen to be the physical manifestations of the journeys of ancestral beings and Dreamtime spirits, or the map of cultural belief as experienced by the *Ngarluma* people.

## **POST COLONISATION**

### **Pastoralism**

In 1861, explorer Francis Thomas Gregory, was sent out by the British and colonial governments to investigate the possibilities of expanding rural industry in the north west. In 1863, the British and colonial governments endorsed more settlers establishing themselves in the Pilbara region, and hence on *Ngarluma* country.

As the white settlers started arriving in 1863, the *Ngarluma* people were dispossessed of their lands. By 1865, the reports outlining *Ngarluma* country as suitable for sheep and cattle, had led to up to forty applicants being granted land, and with that, some three million acres were given over to pastoral lease. By 1887, there were forty-four stations within two hundred and twenty-five miles of Roebourne, on country that mostly belonged to the *Ngarluma* people (Olive 2007).

The dispossession of *Ngarluma* land due to pastoral enterprises, such as Andover Station (established 1863) and Karratha Station (established 1866), led to a deprivation of land, which was so severe, that the *Ngarluma* people found no other way to survive, except to seek employment with the pastoralists. This meant interference with some of their cultural practices, although by living on the stations, *Ngarluma* people at least had access to their traditional country and were often given leave by the pastoralists to visit their significant sites during ‘holidays’. Young *Ngarluma* women would mostly be employed at domestic duties, whilst young *Ngarluma* men would be employed on yard hand duties. When the men entered into adulthood they would often work as stockmen. The Elders habitually were camped on the same pastoral stations and hence were still situated on country. Thus, the Elders could pass down their knowledge of country to the next generation as well as engage in transference of culture with the youngest generations, of whom they had care, whilst the middle generations worked to support them (Rijavec 1995). In this



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sense, the pastoral enterprises helped maintain, to some extent, the kinship structures inherent in *Ngarluma* culture.

In 1968, Aboriginal stock workers won the right to award wages and conditions elevating them to equal status to that of white workers. After the *Ngarluma* people had won these rights, many pastoralists would not employ them under the changed conditions, claiming they could not afford to keep the *Ngarluma* workers. This led to a large number of *Ngarluma* people losing their jobs and with that also their right to stay on country (McGrath 1987).

These changes resulted in the movement of *Ngarluma* people, from pastoral stations to the Roebourne Native Reserve and also, outside of traditional *Ngarluma* country, to the reserve in Onslow. By having to leave the stations, the *Ngarluma* people also had to leave their traditional clan estates. With this lack of access to country, the transference of culture was restricted (see Importance of Access to Country).

### **Pearling Industry**

Not long after the sheep industry was established, pearls were found in and around Cossack and the Dampier Archipelago. Hunting parties of white pearlers would capture *Ngarluma* people, to use as slave labour in diving for pearls (Rijavec 1995). *Ngarluma* culture values pearl shell as significant ceremonial items that hold sacred exclusivity to men. Hence, placing *Ngarluma* women and children in constant contact with pearl shells continuously broke cultural and gender taboos (Olive 2007). This further contributed to the *Ngarluma* people experiencing a decimation of their cultural practices.

### **Flying Foam Massacre**

A number of massacres occurred in *Ngarluma* country that contributed to a continued degradation of transference of culture and most especially a lack of access to areas of significance. Lack of access is tantamount to a denial of cultural practice as *Ngarluma* people are then unable to continue maintaining sites of significance or even discussing those sites, as language is inextricably linked to land.

One of the most widely known massacre sites, within *Ngarluma* country, is located on the Burrup Peninsula. The Flying Foam Massacre, which occurred in 1868, was reportedly a result of when a pearler, who had raped a number of *Ngarluma* women, was killed in an act of retribution. A policeman was also killed when trying to arrest the *Ngarluma* men thought to have murdered the pearler. In retaliation, an estimated 60 *Ngarluma* people were shot at the Flying Foam Passage and at King Bay (Lees 2010, Rijavec 1995) by pearlers and pastoralists from the surrounding region, with the approval and support of the Government Resident in Roebourne. This massacre



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effectively wiped out the *Yaburara* people, a northern division or a clan estate of the *Ngarluma* (Edmunds 1994). With no *Yaburara* people to care for the sites on the Burrup Peninsula, or pass down the songs that linked this area to the wider Pilbara region, an estrangement to the Burrup Peninsula occurred for the *Ngarluma* people. However, it is important to note that the *Ngarluma* people still consider that the Burrup Peninsula is part of *Ngarluma* country.

## Reserves

As the *Ngarluma* people lost their employment on the stations and hence, the right to stay on country, the *Ngarluma* people went to live in reserves. The Roebourne Native Reserve was the largest reserve in Western Australia with 300 Aboriginal people living within its confines. *Ngarluma* people were not the only ones to be dispossessed of their land; there was a wider movement of Aboriginal people that had formerly worked on stations that were now drifting into the reserves from all over the Pilbara region. The displaced people that now came together in reserves were not used to intermingling on a daily basis. The government paid no respect to the location of significant sites in relation to where the reserves were situated; neither did they provide sanitization or even work for the people residing there. These factors quickly led to disruption and controversy within the reserve (Olive 2007).

*Yindjibarndi* people were also displaced and had to move into *Ngarluma* country. When the *Yindjibarndi* people came onto *Ngarluma* country, the *Barrimirndi* (mythological Dreamtime snake) that belongs to the *Ngarluma* got angry and arose in to the sky to drive the strange people away. As the *Yindjibarndi* people feared for their lives they called out to their own *Barrimirndi* to save them. The two snakes fought a battle in the sky and as the *Ngarluma Barrimirndi* was pushed back out to the sea, the *Yindjibarndi* people were allowed to stay on *Ngarluma* land (Rijavec 1995).

Further disruption of *Ngarluma* culture came in 1967, when the Australian government granted Aboriginal people citizenship rights. To the *Ngarluma* people these were known as drinking rights, as they now had the right to buy and consume alcohol. After having had their cultural practices degraded over an extended period of time, their family ties broken down through the dispossession of land, having lost their employment on the stations and having been pushed into reserves, alcoholism soon became widespread, the effects of which are ongoing.

In 1975, the Roebourne Native Reserve was closed down. The *Ngarluma* people were instructed to live in a cluster of state houses around the town's cemetery, known as the Village. Living close to where deceased people are buried is strongly against the belief system of the *Ngarluma* people; hence they initially refused to move. Another issue that arose with moving to the Village, was the allocation of houses. When the *Ngarluma* people could not make their own housing arrangements, a son-in-law could end up living next to a mother-in-law. This created problems because,



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according to cultural beliefs, a son-in-law and a mother-in-law are not meant to share the same space (Olive 2007). The government enacted control evident in this example, further undermined cultural practices for the *Ngarluma* people.

The monitoring and control of the *Ngarluma* people, by the government and the Police on the reserves and in the Village, meant that they were made subject to economic, legal and bureaucratic structures that resulted in defining them as subordinate in relation to non Aboriginal people. This meant that the acquisition of *Ngarluma* land could continue, only this time through the expansion of the mining industry.

## Mining

In the early 1960's, several mineral discoveries led to the expansion of the mining industry in this region. Shortly after the large deposits of iron ore were found, a shipping port at Dampier, a railway and two towns were built (Holland-McNair 2006).

The effects of mining and subsequent settlement on *Ngarluma* country have meant that the coastal hinterland in *Ngarluma* country is now criss-crossed by railways and other infrastructure. This has affected the wildlife and hence also hunting which is a traditional way of ensuring a food supply, but inseparable from this is also the cultural knowledge and skills that comes with the practice of hunting. With the mining industry came an increase in the non-Aboriginal population living on *Ngarluma* country, this increase has led to a depletion of resources and in particular water. Sources of water carry with them cultural significance to the *Ngarluma* people, and by building dams and damaging these water sources, ethnographic sites have been destroyed.

The construction of the Harding River Dam in 1984 led to the destruction of several significant sites to the *Ngarluma* people. The *Ngarluma* people today express grave concern about their significant sites that have survived development so far. *Ngarluma* Elders continue to be the keepers of their country, but fear the loss of their significant sites as mining and gas infrastructure development projects continue.

## CURRENT SITUATION

Today, most *Ngarluma* people largely live in Roebourne and the surrounding district including Karratha, Wickham and Port Hedland. People from other language groups, such as *Yindjibarndi*, *Gurrama* and *Banjima*, also live in the same district. The distinct groups have their own traditions, mythologies and Law practices.



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## Roebourne

The population of Roebourne, and surrounding small communities, is about 1,300, of which 95% are Aboriginal. The unemployment rate in Roebourne is 25% with a further 20% of community members participating in Community Development Employment Program activities. Literacy and numeracy levels are low, hindering access to the limited employment opportunities available in the nearby larger towns. Most employment is concerned with local services such as the TAFE College, schools, hospital, prison, shops, etc. (Turk 2008).

In the 1990s, there were a number of important developments including improvements in local educational possibilities at primary, secondary and TAFE (vocational training) levels. Each of these projects were designed to raise the standard of living, improve opportunities for young people, increase the number of commercial enterprises and highlight the strong cultural identity of the community (Turk 2008).

## Importance of Access to Country: Dreamtime, Law, Spirits and Language

The *Ngarluma* people and their country are interconnected spiritually and mythologically.

The spiritual practices and the Law system of the *Ngarluma* people are interconnected with the land and the Dreamtime. *Ngarluma* people call the Dreamtime *Ngurra Nyujunggamu* which means 'when the world was soft.' According to the *Ngarluma* belief system, the creation spirits, or *Marrga*, got up from the ground and lifted the sky and the world out of the sea. The *Marrga* and *Minkala/Mangunyba* (Skygod) then named and shaped the country when the world was soft (Rijavec 1995). Hence, *Ngarluma* country today is the impression of the ancestral beings that once roamed the earth. Connection to country is not just a physical manifestation for the *Ngarluma* people; it is also what connects the individual to the spirit world. This connection is maintained through honour, preservation, celebration and ceremony, which often include singing songs that tell stories about the land. These songs can only be sung when on the specific place on country that the song refers to.

Aboriginal Law is kept strong in Roebourne through the annual *Birdarra* Law ceremonies that take place at Woodbrook. *Yatha* (shade structures) are built on the Law grounds and the families of the initiates, camp for up to five weeks on country during Law time. Aboriginal people from all over the Pilbara, and the Kimberley, often attend the ceremonies. As the Elders in Rijavec's film *Exile and the Kingdom* explain: 'Law ties us to a history that reaches back to the creation of this country; it



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makes us who we are'... 'My heart will always think about this story that belongs to the old people. That's what's keeping me happy'.

The spirits of deceased people live on, and ancestral spirits are highly respected among the *Ngarluma* people. Ancestral spirits can harm people who do wrong on country, which can include things like females visiting male sacred sites or an individual taking things off country that does not belong to them. To be respectful of the spirits and aware of the presence of these spirits at all times is of importance to ensure the wellbeing of the *Ngarluma* people.

It is estimated that there are less than 20 full *Ngarluma* speakers left today. Many others are part speakers, or have a passive knowledge of *Ngarluma*. *Ngarluma* is of the *Ngayarta* language family and is related to other languages such as *Ngarla*, *Nyamal*, *Banyjima*, *Yindjibarndi* and *Martuthunira*. The *Ngayarta* languages are part of the south west branch of the *Pama-Nyungan* languages of Australia.

Language is strongly linked to land. The *Ngarluma* people's system of orientation is based on the knowledge of where a person or a group resides. If a *Ngarluma* person on country is heading to the east, he or she would define this direction by the location of the *Kariyarra* people, and hence saying they are going to *Kariyarra* land. Again, an example of how intricately the *Ngarluma* people are woven into their traditional lands and the relations that are formed through that connection.

## Skin Groups

*Galharra*, or skin names, were part of the Law created during the ancestral *Nyujunggamu* times. In the community, everyone belongs to one of the following skin names: *Banaga*, *Burungu*, *Balyirri* or *Garimarra*. An individual's *Galharra* governs who they can marry, and their relationship to other people in the community. Since the land and rivers have also have *Galharra*, they have a special familial relationship to men and women in Roebourne. These kinship structures give an insight into the ties that connect not only the people to one another, but also how the people are connected to the land (Rijavec 1995). Furthermore, this classificatory kinship system orders behaviour among the *Ngarluma* people. As every individual in the community is classified in relation to one another, this also establishes what sort of behaviour to expect from other community members (Olive 2007).

## Women's Knowledge

The *Ngarluma* people have, despite the difficult circumstances surrounding the transference of culture, continued to practice their culture. The extent of today's knowledge is particularly emphasized through the knowledge of the women. Women's knowledge is gathered throughout a lifetime, and is practiced on a daily



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basis. The knowledge of food collection and preparation is a good example of the cultural competency that the *Ngarluma* women have. Demonstrating an intimate biological and environmental knowledge when preparing food, that otherwise could be toxic, is another good example of cultural knowledge. Harvesting bush fruit, which require detailed knowledge of seasonality and localized geographic availability, knowing how to use bush medicine, knowing where one could obtain potable water by digging soaks, and knowing where to gather honey, grubs and edible insects are all part of the immense pool of knowledge that the *Ngarluma* women have. Perhaps most importantly, this knowledge is actively transferred to the *Ngarluma* children (Olive 2007).

### **Native Title and Prescribed Body Corporate**

In 1993, the *Ngarluma* and *Yindjibarndi* people commenced constructing their Native Title claim and in the following year their claim was lodged with the National Native Title Tribunal. In May 2005, the *Ngarluma* and *Yindjibarndi* Native Title claimant group achieved their determination of Native Title. Following this, the *Ngarluma* people nominated the *Ngarluma* Aboriginal Corporation (NAC – Prescribed Body Corporate) to hold their Native Title rights and interests.

The NAC, in managing Native Title for the *Ngarluma* people, has the responsibility of using native title land to generate social and economic opportunities. The NAC aims to achieve this by creating employment and training opportunities, repatriating and preserving culture and language as well as building a sense of pride in the community.



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## SURVEY METHODS

The Survey involved the use of the following methods:

1. Archival research;
2. Consultation with the *Ngarluma* Consultants as representatives of the NAC; and
3. A formal ethnographic and archaeological Survey of the Survey Area.

## ARCHIVAL RESEARCH

The archival research involved a Register search conducted at the Department of Indigenous Affairs (DIA) in order to access Aboriginal site files pertaining to previously recorded Aboriginal sites within the Survey Area and heritage survey reports detailing previous heritage surveys conducted in the region.

The results of the archival research were used to inform the Survey Team as to the nature and type of Aboriginal sites that could be expected to be encountered during the Survey and also to alert the Survey Team to the presence of those sites that have already been recorded in close proximity to and within the Survey Area itself.

The archival search showed that **one** registered Aboriginal site polygon overlaps a portion of the Survey Area (see Table 2, Figure 2 and Appendix 1).

**Table 2: Registered Aboriginal site polygon overlapping the Survey Area**

Site ID	Status	Access	Site Name	Site Type	Easting (± 10m)	Northing (± 10m)
7509	R	O	Karratha West 1	Artefacts/Scatter	476927mE	7701435mN

Status refers to the status of the site on the DIA Register: R=Registered site. Access refers to whether access is allowed to the public to view the file associated with a registered site: O=Open.

## Registered Aboriginal Site ID 7509

Aboriginal site ID 7509 is registered as an artefact/scatter. The site is registered on the Permanent register and has an Open status. An examination of the Aboriginal site file shows the site, as was originally recorded by Mulvaney in 1984, as consisting of artefactual material covering an area of 200 m x 100 m. The site includes small, low-density concentrations of flakes, blades and multi-platform cores, many of chert lithology.



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## Registered Aboriginal Heritage Survey Reports

The search of the Register of Aboriginal sites revealed that there are **six** Aboriginal Heritage Survey Reports related to the Survey Area (see Table 3).

**Table 3: Registered Aboriginal Heritage reports related to the Survey Area**

<b>Year Published</b>	<b>Report Title</b>	<b>Author(s)</b>	<b>Access</b>	<b>Report ID</b>
1984b	A Survey for Archaeological Sites Relating to Associated Works – Perth – Darwin National Highway: White Springs – Nwc Hwy. Section & North West Coastal Highway: Karratha-Whim Creek Section. Unpublished Report prepared for Main Roads Western Australia	K. Mulvaney	O	104899
1998	Ethnographic report Aboriginal heritage survey. Unpublished Report prepared for Woodside Petroleum.	Barrie Machin	O	101929
2003	Archaeological and ethnographic site avoidance survey under the Aboriginal Heritage Act (1972) of proposed residential subdivision land areas at Karratha, Western Australia. Unpublished Report prepared for LandCorp.	Ronald T Parker	O	20930
2004	Report of an archaeological survey of proposed new Karratha residential land sub-divisions at Karratha, Western Australia. Unpublished Report prepared for LandCorp.	Donald Lantzke	O	20929
2005	Aboriginal Heritage management plan for Main Roads WA Karratha Tom Price stage 2. Unpublished Report prepared for Main Roads Western Australia.	Millstream Link	O	21961
2006	Addendum report on an ethnographic survey of the proposed Karratha – Tom Price Road realignment in the Pilbara Region of Western Australia. Unpublished Report prepared for Millstream Link.	Australian Interaction Consultants	O	22131

**Mulvaney, K. 1984b. A Survey for Archaeological Sites Relating to Associated Works – Perth – Darwin National Highway: White Springs – Nwc Hwy. Section & North West Coastal Highway: Karratha- Whim Creek Section. Unpublished report prepared for Main Roads Western Australia.**

This report details the results of a survey undertaken for the proposed development of the White Springs – North West Coastal Highway section of the Perth-Darwin National Highway, in addition to areas associated with the Karratha – Whim Creek section of the North West Coastal Highway (which was being upgraded). As a result of the survey a total of 31 Aboriginal sites were located and recorded, including grinding patches, grinding stones, mullers, artefact scatters and shell material.



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**Machin, B. 1998. Ethnographic Report Aboriginal Heritage Survey. Unpublished report prepared for Woodside Petroleum.**

The purpose of this survey was to investigate an area on the Burrup Peninsula stated as the second trunkline proposed quarry sites 2, 16 & 28 for Woodside in consultation with the *Yaburarra & Mardudhinera* People. No new ethnographic sites were identified and it was stated that there were no ethnographic impediments to the development of the quarry areas.

**Parker, Ronald T. 2003. Archaeological and ethnographic site avoidance survey under the Aboriginal Heritage Act (1972) of proposed residential subdivision land areas at Karratha, Western Australia. Unpublished report prepared for LandCorp.**

This report details the results of an archaeological and ethnographic survey undertaken for Landcorp's investigation into the supply of residential land within the Karratha town site. The survey involved members of the *Yaburarra* and Coastal *Mardudhinera*, *Ngarluma* and *Yindjibarndi* native title groups, who looked at five survey areas. The archaeology section of the report was informed by report ID 20929 (Lantzke, 2004, see below).

**Lantzke, Donald. 2004. Report of an archaeological survey of proposed new Karratha residential subdivision land areas at Karratha, Western Australia. Unpublished report prepared for LandCorp.**

This report details the results of a survey undertaken between the 13<sup>th</sup> and 15<sup>th</sup> of November 2003 for Landcorp's proposed residential subdivision. The investigation of the suitability of regions of Karratha for subdivision included geotechnical investigations in Project Areas 1 to 8. The survey methodology included pedestrian transects as well as more detailed examination of rock outcrops and watercourses. In addition the archaeologists attempted to relocate any previously recorded sites in the area. As a result of the survey five archaeological sites were located and recorded, including shell middens, artefact scatters, petroglyphs and grinding patches. In addition the ethnographic survey team located three grindstone sets and a manuport.

**Millstream Link. 2005. Aboriginal Heritage management plan for Main Roads WA Karratha Tom Price Road stage 2. Unpublished report prepared for Main Roads Western Australia.**

This report was unavailable at time of writing.

**Australian Interaction Consultants. 2006. Addendum report on an ethnographic survey of the proposed Karratha - Tom Price Road**



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**realignment in the Pilbara Region of Western Australia. Unpublished report prepared for Millstream Link.**

This report details the results of an Aboriginal ethnographic survey undertaken for Millstream Link and the proposed Karratha-Tom Price Road Realignment. The survey was undertaken between the 22<sup>nd</sup> and 23<sup>rd</sup> of February 2006, with *Yaburarra & Mardudhinera*. The Elders noted that previous ground disturbing activity had been undertaken within the survey area, which had not accompanied consultation with *Yaburarra & Mardudhinera* nor *Ngarluma*. The *Ngarluma* Elders were unable to complete their ethnographic consultation due to weather conditions. Two Aboriginal archaeological sites were noted within the project area, which had not been identified during the previous archaeological surveys. The Elders communicated their lack of confidence in the previous archaeological surveys, and requested that Main Roads commission a thorough archaeological survey of the road route by the archaeologists of their choice.



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## **PARTICIPATION OF THE NGARLUMA CONSULTANTS**

The Survey Area is located within the *Ngarluma* Determination Area. The *Ngarluma* Consultants that participated in the Survey were born and live in Karratha, Roebourne and the surrounding district and are very familiar with the Survey Area. The participation of the *Ngarluma* Consultants was organised by Jodi Mowarin of *Weymul*.

## **ETHNOGRAPHIC AND ARCHAEOLOGICAL SURVEY METHOD**

The Survey Area was surveyed using a Site Avoidance methodology.

The Survey Area was surveyed by the Archaeological Survey Team using pedestrian transects spaced at 20 m intervals technically providing a 100% coverage of the Survey Area (see Plate 2). Aboriginal archaeological sites were to be recorded to Site Avoidance standard. Isolated artefacts were recorded and left *in situ*.

The ethnographic component of the Survey was undertaken on foot. The Survey Area was entered through an existing Access Track at the south west side of the Survey Area. Zsuzsanna Gonda and the Senior female *Ngarluma* Consultants (the Ethnographic Survey Team) walked the Survey Area. The male *Ngarluma* Consultants walked the Survey Area with Camille Tanner (the Archaeological Survey Team). The Ethnographic Survey Team walked to all accessible points along the boundary of the Survey Area, where Zsuzsanna Gonda detailed the location and extent of the Survey Area. Additional vantage points within and outside of the Survey Area were also walked to and the location and extent of the Survey Area was detailed further. Zsuzsanna Gonda discussed the ethnographic values of the Survey Area with the Senior female *Ngarluma* Consultants during the Survey. The results of the archaeological component of the Survey were communicated to the Ethnographic Survey Team by Camille Tanner during the lunch break.

Camille Tanner and Zsuzsanna Gonda undertook regular briefings and debriefings with the *Ngarluma* Consultants during the course of the Survey and recorded details of the Survey in field notebooks and on recording sheets.

A pictorial record of the conduct of the Survey was also recorded on digital camera. GPS readings using the GDA 94 Datum, that utilises the MGA Grid Zone 50K, were taken at selected points within the Survey Area in order to verify pre-existing co-ordinates and to record new co-ordinates.



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**Plate 2: View south west of *Ngarluma* Consultants walking transects in the Survey Area**



### **ABORIGINAL SITE RECOGNITION**

On the basis of previous Aboriginal heritage surveys in the region, a number of different types of Aboriginal sites were expected to be encountered within the Survey Area. Definitions of these sites are as follows:

*Artefact scatter* refers to locations where ranges of activities have occurred such as the manufacture and maintenance of tools and the processing of foods. These sites will often contain a wider range of lithic materials than quarries and knapping floors.

*Burial* refers to a place where Aboriginal people were buried pre and post contact. Stones may mark these sites and/or star pickets (for historic burials) or they may have no recognisable features at all. Burial sites may have an associated traditional name or will be referred to by the *Ngarluma* Consultants as the place “where x is buried”.

*Camp site* refers to a location which may have associated stone artefacts or may be a historic camp with evidence of post-contact settlement such as star pickets, wire, cans, glass, Government Wells and old car bodies. Many of these camp sites relate to the ‘strike’ in the 1940s. Camp sites may have an associated traditional name.



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*Ceremonial* refers to a location where Aboriginal people practice or continue to practice traditional ceremonies. Ceremonial sites usually have an associated traditional name.

*Gnamma hole/water source* refers to a natural or artificial rock cavity, which holds water after rain or is linked to the water table. Gnamma holes may have an associated traditional name. A water source may be a pool in a creek and may have an associated traditional name.

*Grinding patches* refers to patches of smoothed rock of varying size. In the Pilbara area these have been interpreted as being seed grinding patches. Grinding patches are frequently associated with engraving sites throughout the Pilbara.

*Modified tree* refers to a tree, which has trunks and/or limbs that have been modified by the removal of bark and/or wood. Aboriginal people removed wood and bark for material items such as shields and baskets or to access native honey inside hollows in the tree.

*Mythological* refers to a location where Aboriginal people have knowledge in story and or song about the activities of their Ancestral Beings. Mythological sites usually have an associated traditional name.

*Named locality* usually refers to a creek, section of river or other natural feature that has no associated mythological or ceremonial significance. Such localities are not necessarily considered to be Aboriginal sites within the meaning of the *Act*.

*Quarry* refers to a location from which stone used to manufacture flaked or ground stone artefacts has been extracted.

*Reduction area (or knapping floor)* refers to a cluster of stone artefacts, which represent the remains of an episode (or episodes) of stone artefact manufacture. Artefacts within a knapping floor can usually be conjoined back together.

*Rock art* refers to art placed on a rock surface that may be created by additive (such as painting or drawing) or subtractive (such as abrading or engraving) processes.

*Stone arrangement* refers to a location where stones/rocks have been placed either as single events (standing stones) or as clusters or arrangements and which may have contemporary ceremonial and/or mythological significance. Stone arrangements may have an associated traditional name.

*Structure* is a term used by the DIA to refer to groupings or piles of rocks or tree branches, relating to economic (e.g. habitation) or ceremonial practices. Cairns may mark water sources; rock shelters may be walled to make small animal habitats and traps; tall stones or lines of stones may indicate ritual grounds.



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## SECTION TWO - RESULTS

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### BACKGROUND

Ausco Modular Pty Ltd intends to expand the existing Kingfisher Accommodation Facility on a portion of freehold land (Lot 211) adjacent to Madigan Road. The Survey Area is located within the freehold land and is approximately 8 km south west of the Karratha town site, in the West Pilbara region of Western Australia.

The objectives of the Survey were to:

- Examine the designated Survey Area to identify and record any Aboriginal archaeological or ethnographic sites, as defined by Section 5 of the *Aboriginal Heritage Act 1972* (the Act), to Site Avoidance Standard.

The results of the Survey are discussed in detail below.

### ETHNOGRAPHIC AND ARCHAEOLOGICAL SURVEY PROCESS

It is a requirement of the professional anthropological and archaeological organisations (Anthropological Society of Western Australia Inc., the Australian Anthropological Society Inc. and the Australian Association of Consulting Archaeologists Inc.) that Aboriginal people (selected by the relevant Aboriginal organisations) participate in heritage surveys. This ensures that the views of relevant Aboriginal organisations and interested individuals concerning Aboriginal ethnographic and archaeological sites are adequately represented and recorded during the conduct of surveys.

The Survey was conducted with the cooperation and involvement of selected representatives of the NAC. This group asserts traditional responsibility for and rights to protect and care for sites and objects within its Determination Area and assert their rights to participate in Aboriginal heritage surveys and to be consulted under the Act.

The participation of the *Ngarluma* Consultants was organised by Jodi Mowarin of *Weymul* Contracting.

### SURVEY METHOD

At 7:25 am, on Tuesday the 24<sup>th</sup> of July 2012, Camille Tanner and Zsuzsanna Gonda arrived at the Karratha Airport and collected their luggage and vehicles. They then



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departed the Karratha Airport in convoy for the truck stop near the Kingfisher Accommodation Facility to meet with the *Ngarluma* Consultants and *Weymul* representative Jodi Mowarin.

At 10:10 am, Camille Tanner and Zsuzsanna Gonda arrived at the truck stop located at 476905mE 7700485mN, where they met *Ngarluma* Consultants Jeannie Churnside, Rebecca Parfitt, Jason Highland, Harley Alec and *Weymul* representative Jodi Mowarin (the Survey Team) who were waiting in two separate private vehicles.

At 10.15 am, the Survey Team departed for the Survey Area in convoy. Camille Tanner and Zsuzsanna Gonda led the group in their own separate vehicles while Jeannie Churnside and Rebecca Parfitt followed in one vehicle and Jason Highland, Harley Alec and Jodi Mowarin followed in another.

At 10:20 am, the Survey Team arrived at 476903mE 7700884mN, where they stopped and set up a camp for the day. This was located near the south western portion of the Survey Area on an existing Access Track west of the Survey Area. Camille Tanner commenced the initial briefing, which included the Survey Methodology, the HS&E considerations, and the Scope of Works, utilising maps of the Survey Area (see Plate 3).

At 10:35 am, Camille Tanner, Jason Highland and Harley Alec (the Archaeological Survey Team) commenced pedestrian transects of the Survey Area in an west/east direction at 476967mE 7701107mN (see Plate 4).

Zsuzsanna Gonda, Jeannie Churnside, Rebecca Parfitt (the Ethnographic Survey Team) and Jodi Mowarin stayed at the camp where further explanation of the Survey Area and discussion of registered Aboriginal site polygon ID 7509 in the north of the Survey Area was undertaken.

At 10:44 am, the Ethnographic Survey Team and Jodi Mowarin left the camp and walked north across the Survey Area. Jeannie Churnside and Rebecca Parfitt discussed the Survey Area at its western boundary.

At 10:59 am, the Ethnographic Survey Team and Jodi Mowarin started moving to the eastern corner of the Survey Area.

At 11:07 am, the Ethnographic Survey Team and Jodi Mowarin met up with the Archaeological Survey Team at 477048mE 7700988mN, near the north eastern corner of the Survey Area.

At 11:36 am, the Ethnographic Survey Team and Jodi Mowarin returned to the camp for a morning tea break.



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**Plate 3: View of the *Ngarluma* Consultants during the briefing**



At 11:56 am, the Ethnographic Survey Team and Jodi Mowarin departed the camp and walked to the eastern boundary of the Survey Area. The Ethnographic Survey Team discussed the proposed development of the Survey Area.

At 12:10 pm, the Ethnographic Survey Team and Jodi Mowarin met with the Archaeological Survey Team located at 477048mE 7700988mN, near the south eastern portion of the Survey Area. Camille Tanner advised Zsuzsanna Gonda that isolated stone artefacts had been located within the Survey Area.

At 12:11 pm, the Survey Team and Jodi Mowarin moved to 477048mE 7700988mN, to examine the isolated stone artefacts. Jeannie Churnside discussed with Camille Tanner and Zsuzsanna Gonda the overlap of registered Aboriginal site polygon ID 7509.

At 12:32 pm, the Survey Team walked the final transect along the southern border of the Survey Area ending at the south western corner of the Survey Area at 476943mE 7700896mN.

At 12:50 pm, the Survey Team arrived back at the camp and then drove in convoy to the Town Oval on Tambrey Drive, located in Karratha, for the final debrief and lunch.



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**Plate 4: View north of *Ngarluma* Consultants walking transects in the Survey Area**



At 1:05 pm, the Survey Team arrived at the Town Oval located at 479521mN 7706359mE, and commenced their lunch break.

At 1.30 pm, Camille Tanner led the debriefing where the results and conditions of the Survey were discussed. The *Ngarluma* Consultants were given the opportunity to present their views regarding the proposed expansion to the existing Kingfisher Accommodation Facility and their recommendations were recorded.

At 1.50 pm, the *Ngarluma* Consultants and Jodi Mowarin left the Town Oval in their own vehicles. Camille Tanner and Zsuzsanna Gonda then drove in convoy to the Karratha Airport.

At 2:25 pm, Camille Tanner and Zsuzsanna Gonda arrived at the Karratha Airport and returned one vehicle. Camille Tanner and Zsuzsanna Gonda then drove back to Karratha where Zsuzsanna Gonda returned Camille Tanner to her accommodation.

At 3.14 pm, Zsuzsanna Gonda drove back to the Karratha Airport, returned the other vehicle, and departed the Karratha Airport for Perth.



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## RESULTS

### LOCATION

The Survey Area is located within Lot 211, on the eastern side of Madigan Road, approximately 8 km south west of the Karratha town centre in the West Pilbara Region of Western Australia (see Figure 1).

### ENVIRONMENT

The Survey Area is relatively flat, with one shallow ephemeral drainage channel running east to west in the southern portion the of the Survey Area. The western boundary of the Survey Area, which abuts the existing Kingfisher Accommodation Facility fence, is heavily disturbed with rubbish and drainage lines. An existing Access Track bisects the Survey Area from the north east boundary to the south west boundary.

The main vegetation in the Survey Area is a general cover of Buffel grass (*Cenchrus ciliaris*) interspersed with occasional Wattle (*Acacia ampliceps*), Kanji Bush (*Acacia pyrifolia*) and Spinifex (*Triodia* spp.) with a denser row of Wattle along the shallow ephemeral drainage channel and towards the eastern boundary. The ground surface consists predominantly of pindan sands with occasional patches covered by ironstone gibber (see Plate 5 and Plate 6).

The variation in vegetation resulted in ground surface visibility falling as low as 10% in some areas, whereas 100% visibility was possible in areas devoid of vegetation.



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**Plate 5: View west of typical vegetation within the Survey Area**



**Plate 6: View north of typical vegetation within the Survey Area**



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## ETHNOGRAPHIC SURVEY RESULTS

The Senior *Ngarluma* Consultants that participated in the Survey have had the opportunity to view the entire Survey Area.

The *Ngarluma* Consultants advised the following during the course of the Survey:

1. The Senior *Ngarluma* Consultants identified **no** new Aboriginal ethnographic sites within the Survey Area.

## ARCHAEOLOGICAL SURVEY RESULTS

The Survey Team located **no** Aboriginal archaeological sites within the Survey Area. Although the polygon of registered Aboriginal site ID 7509 overlaps the north west corner of the Survey Area, no cultural material was located within this portion of the polygon. Therefore, the Survey Area affects the polygon of registered Aboriginal site ID 7509, but not the physical site.

16 isolated stone artefacts were located within the Survey Area (see Table 4 and Appendix 3). These were recorded and left *in situ*.

**Table 4: Isolated artefacts located within Survey Area**

Number	Lithology	Type	Easting ( $\pm 10m$ )	Northing ( $\pm 10m$ )
1	Basalt	Broken Grinding Stone	477103	7701041
2	Basalt	Complete Flake	477112	7701046
3	Basalt	Complete Flake	477112	7701046
4	Chert	Complete Flake	477112	7701046
5	Chalcedony	Complete Flake	477112	7701046
6	Basalt	Complete Flake	477112	7701046
7	Basalt	Complete Flake	477112	7701046
8	Chalcedony	Complete Flake	477130	7701043
9	Chalcedony	Proximal Flake Fragment	477130	7701043
10	Chalcedony	Complete Flake	477099	7700962
11	Chalcedony	Complete Flake	477099	7700962
12	Basalt	Distal Flake Fragment	477099	7700962
13	Chert	Complete Flake	477099	7700962
14	Basalt	Complete Flake	477130	7700937
15	Basalt	Complete Flake	477130	7700937
16	Basalt	Proximal Flake Fragment	477130	7700937



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## CONDITIONS

The *Ngarluma* Consultants that participated in the Survey have had the opportunity to view the Survey Area. Members of the *Ngarluma* Aboriginal Corporation have also approved the Conditions set out below.

It is a **condition** that Ausco Modular Pty Ltd ensures that their employees and contractors, as appropriate, are advised that:

1. The Survey Area does **not** contain any new Aboriginal sites pursuant to the *Aboriginal Heritage Act 1972*; and
2. The Survey Area is overlapped by a portion of registered Aboriginal site polygon ID 7509, but no cultural material was located within this portion of the polygon.

It is a **condition** that Ausco Modular Pty Ltd inform the Department of Indigenous Affairs that the proposed Kingfisher Accommodation Facility impacts registered Aboriginal site polygon ID 7509, but does not impact the actual Aboriginal site itself, and the Register of Aboriginal Sites should be adjusted to ensure that a Section 18 Notice to use the land containing registered Aboriginal site polygon ID 7509 is not required to ensure compliance with the *Aboriginal Heritage Act 1972*.

It is a **condition** that Ausco Modular Pty Ltd avoid all isolated stone artefacts, however, if Ausco Modular Pty Ltd determines it is necessary to move the isolated artefacts, then Ausco Modular Pty Ltd are required to contact the *Ngarluma* Aboriginal Corporation and the Department of Indigenous Affairs to determine the most culturally appropriate way to relocate the isolated artefacts.



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## APPENDIX 1

### *DIA REGISTER SEARCH EXTRACT*



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## Search Criteria

1 sites in a search polygon. The polygon is formed by these points (in order):

MGA Zone 50	
Northing	Easting
7701106	476966
7701064	477155
7700876	477114
7700895	476942



## Disclaimer

Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist. Consultation with Aboriginal communities is on-going to identify additional sites. The AHA protects all Aboriginal sites in Western Australia whether or not they are registered.

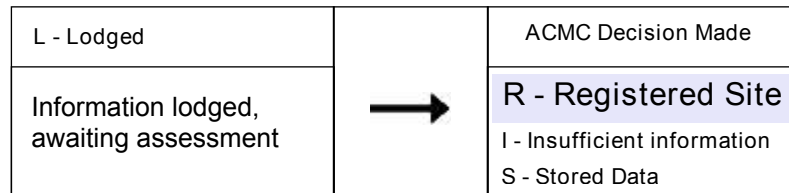
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## Legend

Restriction	Access	Coordinate Accuracy
N No restriction	C Closed	Accuracy is shown as a code in brackets following the site coordinates.
M Male access only	O Open	[Reliable] The spatial information recorded in the site file is deemed to be reliable, due to methods of capture.
F Female access	V Vulnerable	[Unreliable] The spatial information recorded in the site file is deemed to be unreliable due to errors of spatial data capture and/or quality of spatial information reported.

## Status



## Spatial Accuracy

Index coordinates are indicative locations and may not necessarily represent the centre of sites, especially for sites with an access code "closed" or "vulnerable". Map coordinates (Lat/Long) and (Easting/Northing) are based on the GDA 94 datum. The Easting / Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '5000000:Z50' means Easting=5000000, Zone=50.

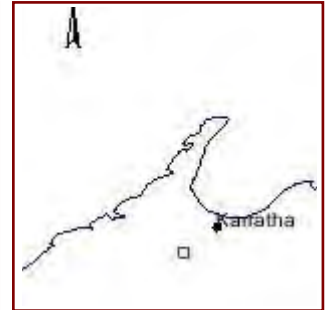
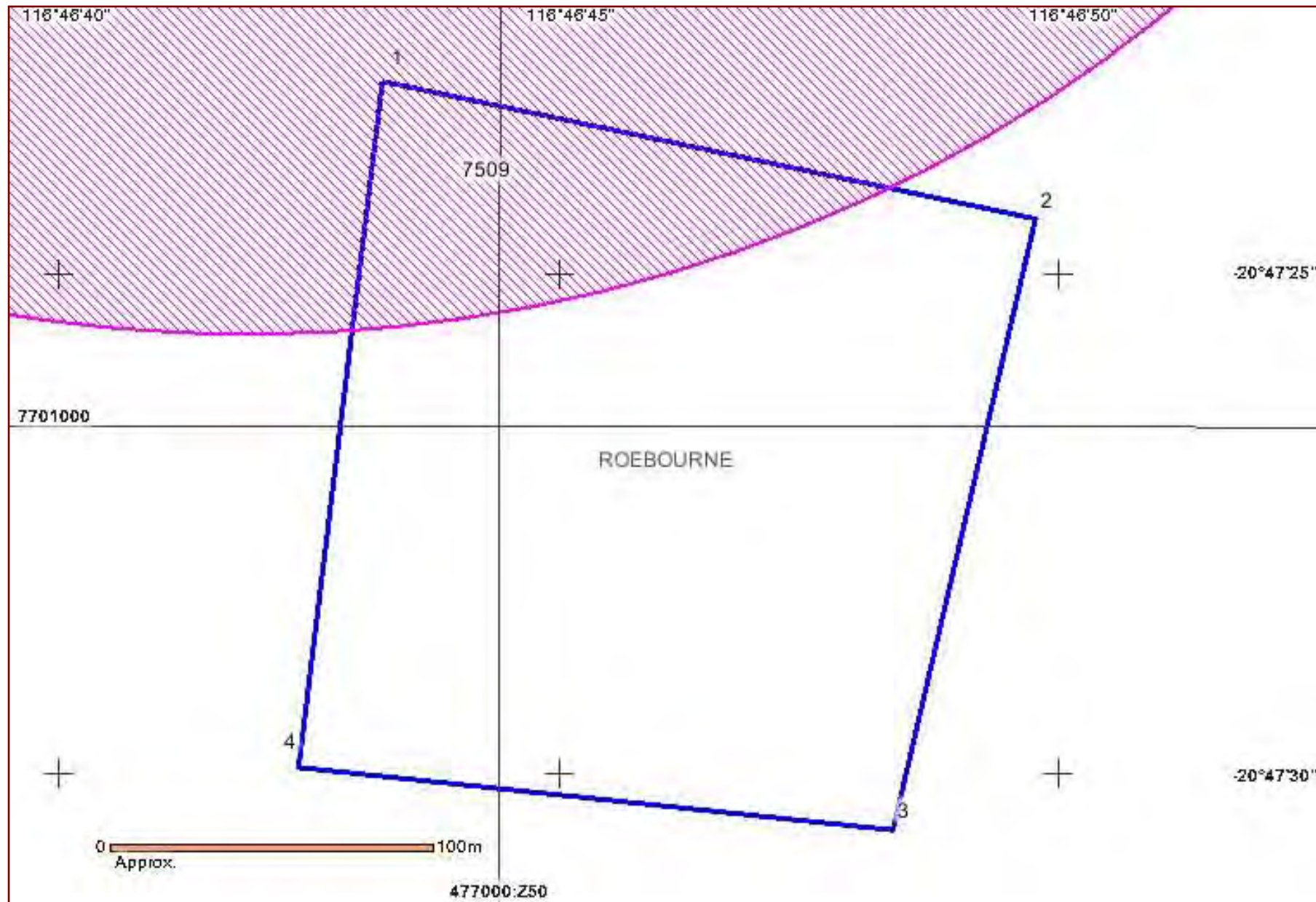
## Sites Shown on Maps

Site boundaries may not appear on maps at low zoom levels



## List of 1 Registered Aboriginal Sites with Map


Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
7509	R	O	N	Karratha West 1	Artefacts / Scatter			476927mE 7701435mN Zone 50 [Unreliable]	P05429



## Legend

Selected Heritage Sites

 Registered Sites

 Town

 Map Area

 Search Area

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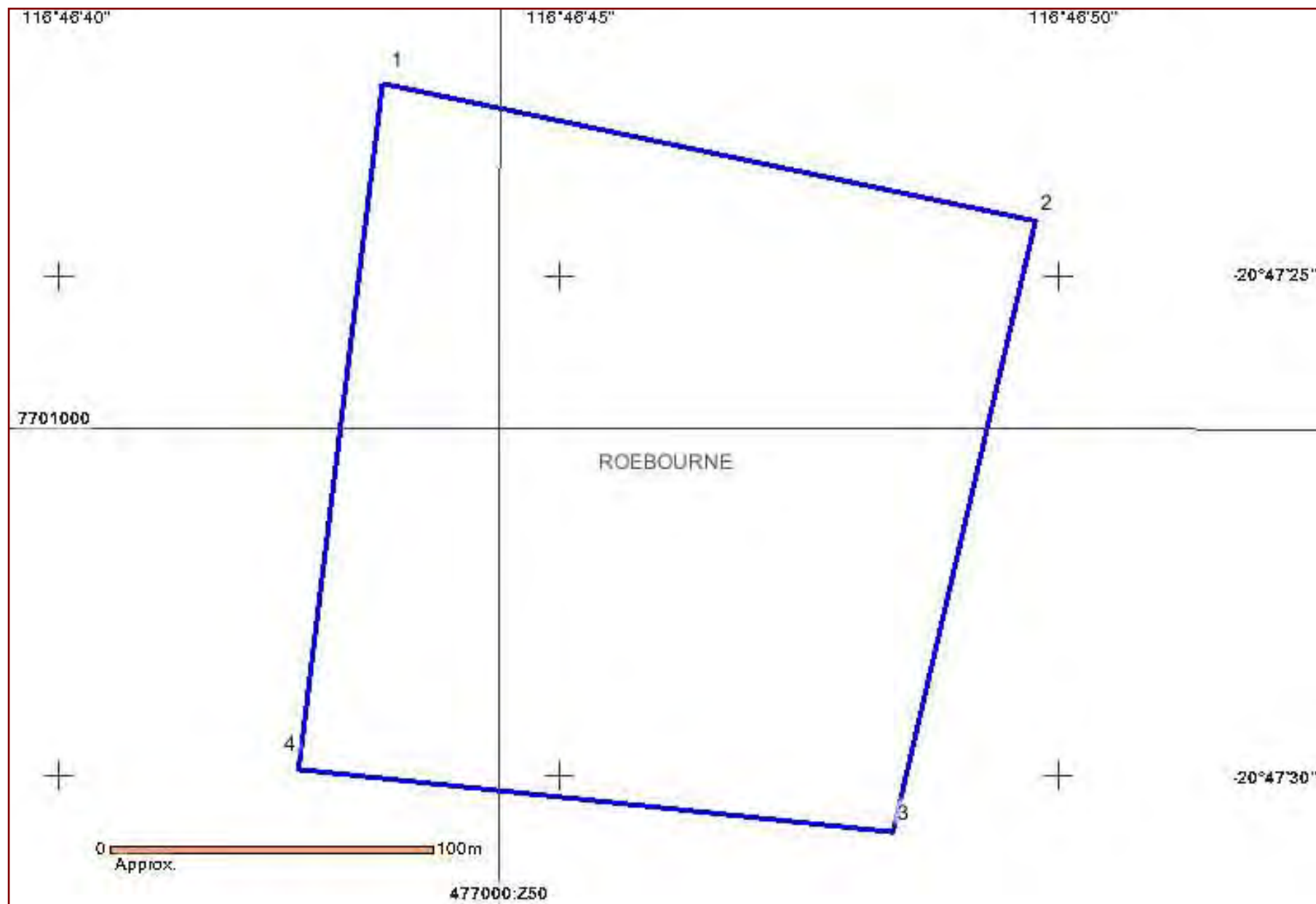
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For further important information on using this information please see the Department of Indigenous Affairs' Terms of Use statement at <http://www.dia.wa.gov.au/Terms-Of-Use/>



## List of Other Heritage Places with Map

No results



## Legend

## Selected Heritage Sites

#### Other Heritage Places

● Town

 Map Area

— Search Area

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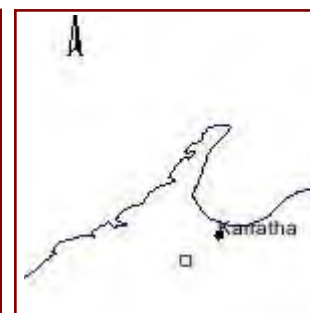
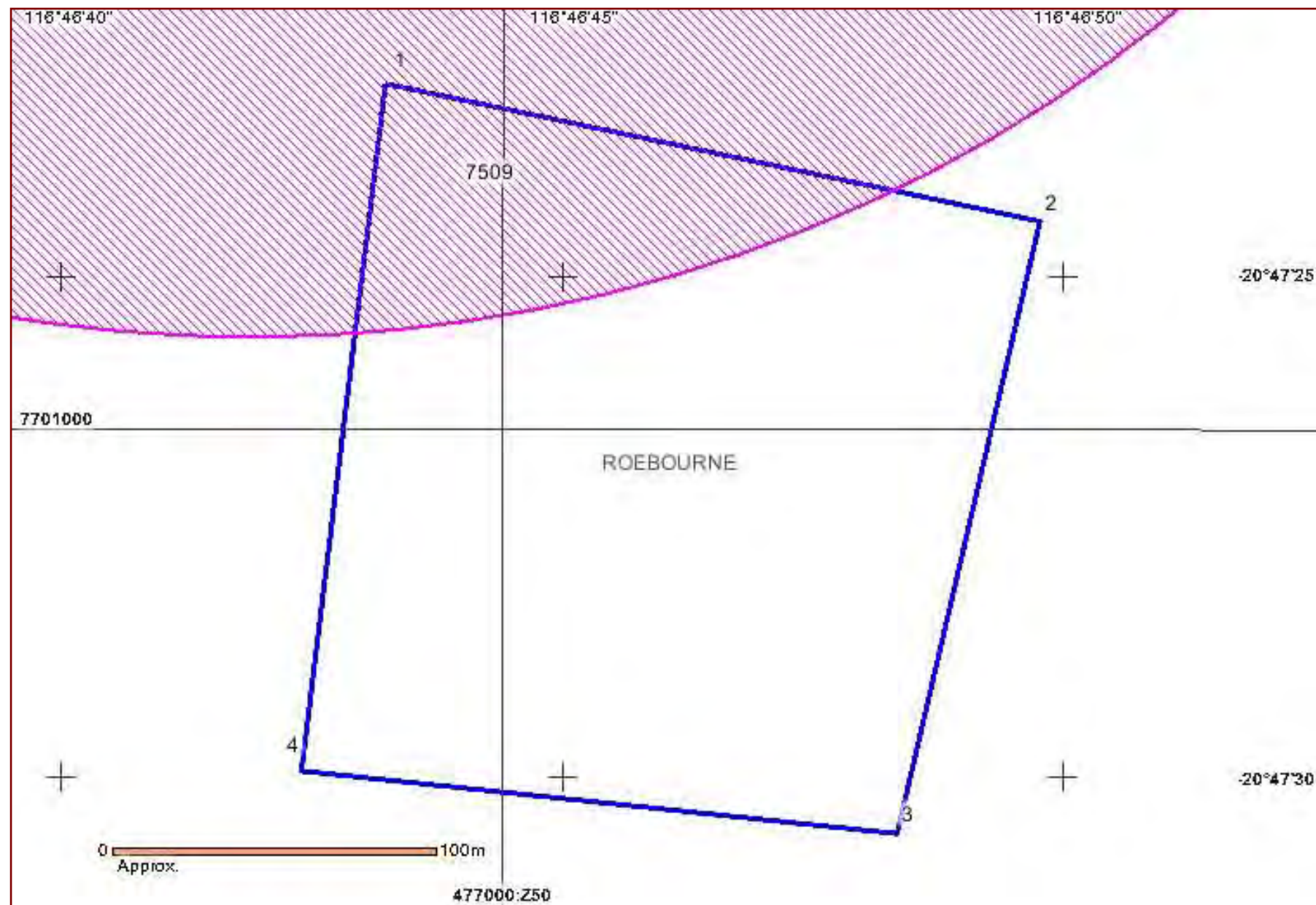
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## Map Showing Registered Aboriginal Sites and Other Heritage Places



## Legend

Selected Heritage Sites

-  Registered Sites
-  Other Heritage Places
-  Town
-  Map Area
-  Search Area

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## APPENDIX 2

### *SURVEY AREA TRANSECT COORDINATES*



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**Table 5: Survey Area Transect Coordinates**

<b>24th July 2012</b>				
<b>Transect</b>		<b>Date and Time</b>	<b>Easting (<math>\pm 10m</math>)</b>	<b>Northing (<math>\pm 10m</math>)</b>
Transect 1	Start	07/24/2012 10:50	476967	7701107
	Finish	07/24/2012 10:55	477159	7701072
Transect 2	Start	07/24/2012 10:58	477133	7701013
	Finish	07/24/2012 11:40	476957	7701013
Transect 3	Start	07/24/2012 11:43	476953	7700949
	Finish	07/24/2012 11:48	477098	7700962
Transect 4	Start	07/24/2012 12:09	477158	7700949
	Finish	07/24/2012 12:40	477134	7700868
Transect 5		07/24/2012 12:47	476943	7700896



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## APPENDIX 3

### ***ARTEFACT RECORDING METHODS & ARTEFACT RECORDING CODES***



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## ARTEFACT RECORDING METHODS

### Stone Artefact Identification

#### Flaked stone artefacts

Flaked stone objects are identified as *artefacts* if one or more of the following characteristics are present:

1. A positive or negative ring crack;
2. A distinct negative or positive bulb of percussion;
3. A definite erailure scar beneath a striking platform; and
4. Definite remnants of flake scars (e.g. dorsal scars and ridges).

Four types of stone artefacts, flakes, cores, retouched pieces and utilised pieces, are identifiable.

A *flake* exhibits one or more of the following characteristics:

1. A ring crack where the precursor struck the core;
2. A positive bulb of percussion; and
3. An erailure scar beneath a striking platform.

A *core* displays one or more complete negative flake scars and no positive flake scars. There are two types of cores:

1. *Single-platform cores*, defined as artefacts from which flakes have been detached from a single platform.
2. A *multi-platform core*, by contrast, is an object from which flakes have been detached from several different striking platforms.

A *retouched piece* exhibits flake scars extending onto the ventral surface and/or deriving from the ventral surface. Since such flake scars may form during use or treadage, as well as during knapping, strict criteria must be applied. The term *retouched/utilised* (R/U) has been used within this Report, reflecting the multiple ways that stone tools that are not knapped can be used, either through the deliberate sharpening/shaping of an edge through retouch, or through the simple utilisation of a naturally shaped working edge.

Artefacts, which cannot be identified as cores, retouched/utilised pieces or flakes owing to the absence of the above diagnostic attributes are usually classed as '*debris*'.

Manuports are unmodified humanly transported stone.



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## Ground stone artefacts

The following types of ground stone artefacts have been identified from the region:

1. Muller: A triangular/oval shaped hand-sized pebble or rock. The grinding area can occur on one or both end surfaces;
2. Pestle: is a fist sized pebble with one abraded flat or convex surface;
3. Millstone: a movable large flat slab with one or two long shallow grooves worn through the process of abrasion. Such artefacts can have flaked margins; and
4. Mortar: A flat surfaced slab/pebble with an oval or round abraded area on one or two faces.

## Stone Artefact Recording Procedures

Stone artefacts within both the background scatter and on Aboriginal archaeological sites were recorded individually in order to characterise spatial variation in the range and types of archaeological materials across the landscape.

## Flakes and Retouched Flakes

The following morphological attributes were measured and recorded for flakes and retouched flakes:

1. Length, or the distance along the percussion axis from the ring crack to the distal margin;
2. Width, or the distance between the lateral margins measured at right angles to the percussion axis half way between the ring crack and distal margin;
3. Thickness, or the maximum distance between the ventral and dorsal surface of the flake half way between the ring crack and the distal margin;
4. Platform width, or the distance along the striking platform from one lateral margin to the other;
5. Platform thickness, or the distance across the striking platform from the centre of the ring crack to the dorsal surface;
6. Type of striking platform. Multiple types of platforms were recognised on flakes:
  - a) cortical (unmodified platform consisting entirely of the outer surface of the parent rock);
  - b) flat (platform where it is not possible to determine whether it has a partial single flake scar, or if it has been heat fractured);



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- c) faceted (striking platform has a number of flake scars resulting from rotation of the core);
  - d) gull wing (where the platform has been shaped through the removal of a flake from the exterior surface)
  - e) crushed (the proximal end of the flake is constituted by a sharp edge lacking a distinct platform);
7. Number of dorsal flake scars;
  8. The proportion of cortex on the dorsal surface of flakes was measured to the nearest 5%;
  9. Termination. Multiple types of termination were recognised on flakes:
    - a) broken (where the termination has been removed, either snapped or stepped);
    - b) axial (where the termination reflects the crack forming the flake moves right through the core, meeting the opposite side at approximately right angles);
    - c) cortical (where the termination reflects the cortex of the core);
    - d) feather (where the termination has minimal thickness and an acute angle between the dorsal and ventral surfaces);
    - e) hinge (where the fracture meets the surface of the core at approximately right angles to the longitudinal axis of the flake);
    - f) plunge (where the fracture plane curves markedly away from the face of the core and continues directly into the core); and
    - g) retouched (where the otherwise complete flake exhibits retouch on the distal end).
  10. Retouch/Utilisation. The presence of edge modification by the removal of small flakes is measured, the type is noted as primarily scalar or stepped in nature, and the location is noted.

## Cores

The following attributes were recorded for cores in the background scatter:

1. Length, or the size of the core along its maximum dimension;
2. Width, or the size of the core measured at a perpendicular angle to the length;
3. Thickness, or the size of the core measured at 90° to the both the width and the length;
4. Number of platforms;
5. Number of flake scars; and



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6. Proportion of cortex measured to the nearest 5%.

Additional information is listed as a note, including evidence of utilisation through pitting or fracturing, or evidence of usage for multiple functions.

## **ARTEFACT RECORDING CODES**

### ***Artefact Type:***

Artefacts were identified in accordance with the methodology outlined above. The following abbreviations have been employed in this Report.

<b>BGS</b>	Broken Grind Stone
<b>CF</b>	Complete Flake
<b>DF</b>	Distal Flake Fragment
<b>PFF</b>	Proximal Flake Fragment

### ***Lithology:***

The material from which the artefact was manufactured. The following abbreviations have been employed in this Report.

<b>BA</b>	Basalt
<b>CH</b>	Chert
<b>CL</b>	Chalcedony

### ***Platform Surface:***

The type (or form) of striking platform of flakes. The following abbreviations have been employed in this Report.

<b>CO</b>	Cortical
<b>FA</b>	Faceted
<b>FL</b>	Flat

### ***Number of Dorsal Flake Scars:***

The number of scars caused by the removal of flakes was recorded. In the case of the flakes the number of scars on the dorsal surface was recorded, while in the case of cores the total number of negative flakes scars was counted.

### ***Cortical Index:***

Cortex is the weathered, chemically altered surface of a rock. The amount of cortex on the cores and on the dorsal surface of flakes was recorded to the nearest 5%.



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***Termination:***

The type (or form) of termination of flakes. The following abbreviations have been employed in this Report.

<b>BR</b>	Broken
<b>CO</b>	Cortical
<b>FE</b>	Feather
<b>PL</b>	Plunge

***Location of Retouch:***

Records the location, type and length of retouch on the margins of an artefact. All measurements are given in mm. The following abbreviations have been employed in this Report.

<b>SC</b>	Scalar
<b>DM</b>	Distal Margin
<b>RM</b>	Right Margin



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## APPENDIX 4

### *ISOLATED ARTEFACT DATA*



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**Table 6: Isolated artefacts located within the Survey Area**

<i><b>Easting (± 10m)</b></i>	<i><b>Northing (± 10m)</b></i>	<i><b>Lithology</b></i>	<i><b>Type</b></i>	<i><b>Length</b></i>	<i><b>Width</b></i>	<i><b>Breadth</b></i>	<i><b>Platform Surface</b></i>	<i><b>Platform Width</b></i>	<i><b>Platform Breadth</b></i>	<i><b>Termination</b></i>	<i><b>Flake Scars</b></i>	<i><b>% Cortex</b></i>	<i><b>Retouch</b></i>
477103	7701041	BA	BGS	175	118	29							
477112	7701046	BA	CF	52	50	10	FL	25	4	FE	1	80	
477112	7701046	BA	CF	40	51	15	FL	21	5	FE	7	0	
477112	7701046	CH	CF	25	18	7	FL	10	2	PL	2	10	
477112	7701046	CL	CF	30	29	6	FL	20	5	FE	5	90	
477112	7701046	BA	CF	20	29	4	FL	10	3	FE	1	90	
477112	7701046	BA	CF	27	13	4	FL	13	3	FE	0	10	
477130	7701043	CL	CF	20	24	11	CO	24	13	CO	3	0	
477130	7701043	CL	PFF	50	42	15	FA	25	13	BR			
477099	7700962	CL	CF	29	24	5	FL	8	2	CO	5	5	
477099	7700962	CL	CF	26	19	13	FL	12	6	FE	3	0	DM 55 SC
477099	7700962	BA	DFF	58	25	5				PL	3	10	
477099	7700962	CH	CF	22	18	5	FL	21	5	FE	1	40	
477130	7700937	BA	CF	58	29	14	FL	66	29	FE	0	90	
477130	7700937	BA	CF	86	79	30	FL	17	8	CO	2	80	
477130	7700937	BA	PFF	60	18	20	FL	5	2	BR	3	10	RM 22 SC



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## Attachment 8 – Engineering Reports



20<sup>th</sup> July 2012

**JDS12552**

Ausco Modular Pty Ltd  
Via Email

ATTN: Angus Spencer

## KINGFISHER STAYOVER VILLAGE, KARRATHA SITE INSPECTION OF EXISTING LAYOUT\_REV A

Dear Sir,

On the 18<sup>th</sup> July 2012, JDSi Consulting Engineers (JDSi) met with Ausco at the Kingfisher Stayover Village, Karratha to inspect the future expansion area and also the existing village in which Ausco mentioned there has been serious flooding and ponding from localised rainfall on the site. This document details our findings and initial recommendations for improvement of the existing village.

### 1) Back of Lot Drainage

Scenario	A majority of units were situated in a back-back configuration with roof pitching being directed to a central servicing corridor.
Problem	<ul style="list-style-type: none"> <li>The central servicing corridor is poorly shaped with blue metal lining the base.</li> <li>Footpath networks are creating stormwater blocks as the paths are raised with no pipe outlet.</li> <li>Hot water systems are significant in size and are located at ground level that impedes stormwater flow.</li> <li>Some guttering has been installed, but is likely not to be capable of catering for regular rainfall and any overflow falls into the centralised channel</li> </ul>
Recommendation	<ul style="list-style-type: none"> <li>Reshape a channel in the form of crushed rock or concrete invert</li> <li>Locally lower footpaths to form a direct drainage outlet or install a pipe outlet under the footpath</li> <li>Raise the hot water system off the ground or move to the sides of the building</li> <li>Guttering to remain, but the above issues need to be addressed also.</li> </ul>

### 2) Streetlights

Scenario	A number of street lights adjacent to the carparks is on a lean
Problem	<ul style="list-style-type: none"> <li>The cause appears to be the street lights are too close to the car bays in which cars are reversing and hitting the poles</li> </ul>
Recommendation	<ul style="list-style-type: none"> <li>Install wheel stops at a distance that will prevent cars from hitting the poles</li> </ul>

### 3) Kerb breaks

Scenario	Ponding of water near kerb line
Problem	<ul style="list-style-type: none"> <li>Kerb breaks have not been situated in low points</li> </ul>
Recommendation	<ul style="list-style-type: none"> <li>Resurvey the carpark and identify the correct locations for kerb breaks</li> <li>Remove kerbing altogether and install flush kerbing. OHS issues can be addressed with wheel stops.</li> </ul>

### 4) Road Crossings

Scenario	A number of concrete channels crossing the carpark are damaged with divots in the seal and concrete
Problem	<ul style="list-style-type: none"> <li>The channel is not constructed to suit vehicle characteristics with the vertical transitions too low meaning cars are "bottoming out" on the raised and lower sections of the drain.</li> </ul>
Recommendation	<ul style="list-style-type: none"> <li>Consider piped crossings to the drain</li> <li>Reshape the concrete channels to dimensions that suit vehicular movement</li> <li>Consider type of kerbing (eg flush) that will allow the direct conveyance of stormwater to channels</li> </ul>

### 5) Surrounding Drain Conditions

Scenario	The drains surrounding the property (especially the rear drain) are heavily vegetated and holding water
Problem	<ul style="list-style-type: none"> <li>The drains are not maintained</li> <li>The drains are poorly graded</li> </ul>
Recommendation	<ul style="list-style-type: none"> <li>Develop a maintenance plan for management implementation</li> <li>Redesign drainage and/or check existing sizing and implement solutions into the expansion contract</li> </ul>

### 6) Internal Drainage Channels

Scenario	Throughout the Village it was difficult to determine the directional flow for drainage and there is growth of grass in culverts.
Problem	<ul style="list-style-type: none"> <li>The drains are poorly defined</li> <li>Grass has been building up causing blockages in culverts</li> <li>Footpaths block drainage channels with no culvert crossings</li> </ul>
Recommendation	<ul style="list-style-type: none"> <li>Redesign stormwater channels</li> <li>Implement a drainage management plan. It is expected that turf will rise in height with general movement of sand; regular maintenance especially near culverts should be completed.</li> <li>With the redesign of the stormwater channels, a design of footpath floodways or culverts shall be implemented</li> </ul>

### 7) OHS Issues

Scenario	Some areas in the village appear to have large height differences with no form of pedestrian barrier
Problem	<ul style="list-style-type: none"> <li>Central service corridor drainage channels are deep beside the footpaths</li> </ul>
Recommendation	<ul style="list-style-type: none"> <li>Organise a safety specialist to complete a review of the Village with respect to safety and OHS compliance.</li> <li>Consider placing a handrail adjacent paths and deep drains</li> </ul>

	or locally fill adjacent the footpath (noting that most situation where this occurred channels were flowing away from the path)
--	---

## 8) Carpark Grading

Scenario	Areas near the south west corner of the site don't appear to have clear stormwater flow
Problem	<ul style="list-style-type: none"> <li>Ponding of water</li> </ul>
Recommendation	<ul style="list-style-type: none"> <li>Survey the village and complete design checks and note any recommendation for improvement</li> </ul>

## 9) Intersection Conditions

Scenario	Intersections with Madigan Road are in poor conditions
Problem	<ul style="list-style-type: none"> <li>Pavement failures and kerbing damage</li> </ul>
Recommendation	<ul style="list-style-type: none"> <li>At completion of the village expansion consider pavement reconstruction and associated kerbing to be completed to suit intersection conditions.</li> </ul>

This document is expected to continue development through workshops with Ausco and their operation and maintenance division in which other issues and suggestions can be raised and the incorporation into future construction contracts considered.

If you have any queries, please do not hesitate to contact me.

Yours faithfully

Glenn Coffey  
**JDSi Consulting Engineers**

## **PROPOSED KINGFISHER CAMP EXPANSION GAP RIDGE, KARRATHA**

### **EXISTING HYDRAULIC SERVICES REVIEW**

**28<sup>th</sup> AUGUST 2012**

#### **1.1 INTRODUCTION**

CHD have been commissioned by JDSi Consulting Engineers to undertake a desk top review of the existing Kingfisher Camp at Gap Ridge, Karratha to identify any potential issues that may affect the proposed 456 person expansion of the Camp. CHD will provide comment on the sewer drainage, domestic cold water service and fire service and identify any possible issues that may affect the proposed expansion. Sewer treatment and the sewer treatment plant do not form part of this scope.

Some information of existing layouts have been provided however assumptions have been made where existing services as built information has not been provided.

#### **1.2 DOMESTIC COLD WATER**

Domestic cold water is currently fed to the site off a Water Corporation transfer main located approximately 150m to the north of the site along Madigan Rd. The size of the reticulated supply from the Water Corporation main to the site is unknown.

The existing site is fed via a 50mm water service and meter rated at 230L/minute. The water service is fed directly to 2No. x 30,000L break tanks for storage and is then reticulated throughout the site via a Grundfos pump set and pressure vessel. From information gained off the existing water plan provided and a site inspection we assume that the existing water service ring main is approx 75dia throughout the site. Tees off the ring main to service accommodation and fire hose reels are assumed minimum 32dia and adequate for the existing accommodation.

2012 water usage figures obtained from the Water Corporation has the site averaging 53,300L/day with 60,000L (24hours) storage. The existing domestic cold water meter has the capacity to provide the site a maximum of 330,000L/day.

##### **Recommendation:**

The existing domestic cold water pipework and storage is adequate for the existing camp but has no capacity to service the proposed extension. We recommend retaining the current storage for the existing camp and providing new standalone tanks and pumps for the proposed extension. In line with the Water Corporation we recommend a minimum of 72 hours redundancy in the tank capacity. A 50dia backflow prevention device will be required to be installed immediately downstream of the meter in line with current Water Corporation policy.

### 1.3 SEWER DRAINAGE

No as-constructed drawings were available to view at the time of producing this report. It is assumed that the existing camp is serviced by 100dia and 150dia PVC sewer drains in accordance with AS3500 plumbing standard. Sewer drainage starts at 100dia at the head of the line and after connecting 5 dongers and is required to be upsized to 150dia. An estimate of the existing fixture loading of the camp (1800 fixture units) suggests that the existing drainage is at its limit and is not suitable to be extended or added on.

**Recommendation:**

We recommend that the existing camp sewer drainage remain discharging to the existing sewer pump at the current Treatment Plant location. The rising main should be extended to discharge at the new sewer treatment plant in the NE corner of the site.

### 1.4 FIRE SERVICE

The existing site does not contain any buildings in excess of 500m<sup>2</sup> and therefore does not require fire hydrant protection under the BCA. Consistent with most mining camps in the Pilbra region fire hose reels have been provided to service all buildings. All fire hose reels are fed off the domestic cold water service by a 32dia water service and are of the sun shield type to minimise determination.

**Recommendation:**

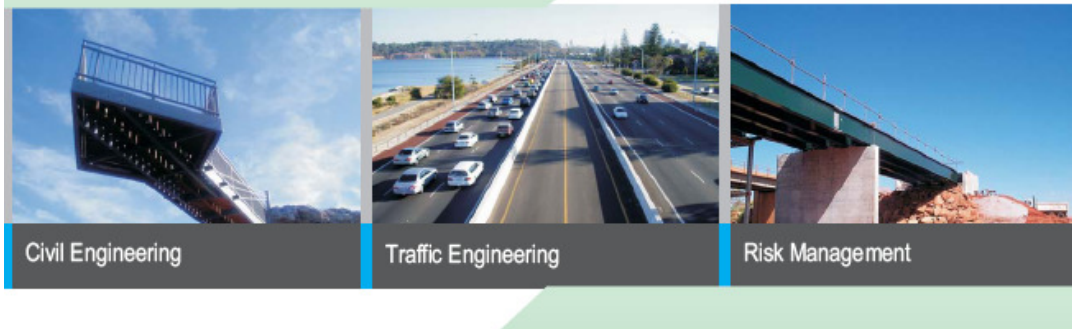
It is recommended that the existing fire hose reel service be retained and remain connected to the domestic cold water service. All new building fire compartments should be kept under 500m<sup>2</sup>.

## Attachment 9 – Traffic Statement





CONSULTING CIVIL & TRAFFIC ENGINEERS, RISK MANAGERS



Project: Transport Statement  
**KINGFISHER CAMP EXPANSION**  
**MADIGAN ROAD, KARRATHA**

Client: **AUSCO MODULAR Pty Ltd**

Author: **Geoff Miles.** BE CPEng ME Dip LG(Clerk) MIEA FIPWEA, SRSA


Signature:

Date: 24 September 2012

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## Document Status

Rev No.	Author	Reviewed by	Date	Issued for	Signature	Date
A	G Miles			Client Review		24/09/12

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## 1. SUMMARY

---

This report provides a transport statement for the proposed expansion of the residential accommodation on Lot 326 Madigan Road, Stove Hill onto the adjacent Lot 221. Stove Hill is south west of the central Karratha town site area. The existing facility has 248 accommodation units and the proposal will expand the site to 681 units. The use would initially be for transient workers with the intent to shift to 50% transient and 50% fly-in / fly-out residents.

The report was commissioned by the project planner Hightower Planning and Development on behalf of Ausco Modular Pty Ltd as the developer of the site and was prepared by Shawmac Pty Ltd.

The proposal includes the construction additional accommodation buildings, additional car parking and the relocation of an existing access to the site.

The key transport focus is the interaction of the traffic generated by this use of the land into the existing transport network.

The transport statement concluded that:

- There would be an increase in vehicular traffic on Madigan Road due to the operation as a TWA facility and that would be reduced as the change to partly FIFO accommodation occurred.
- There would be an estimated 455vpd increase when 100% TWA.
- There would be an estimated reduction to 245vpd when 50% of residents were FIFO.
- Most residents would be vehicular traffic towards Karratha town site / Burrup to the north.
- The peak daily parking demand is at night and would be 300 vehicles at 90% occupancy.
- The site concept provides 353 vehicle parking bays comprising 330 standard passenger vehicle bays, 7 small rigid vehicle bays, 3 universal bays and 13 motorcycle bays.
- Most parking is expected to be vacant during the day.
- The parking area is designed to exceed the minimum requirements of the Australian Standards for Off-Street Parking. The parking has been designed to comply with the Shire of Roebourne's policy DP 10 Transient Workforce Accommodation.
- The transport hours of operation associated with this facility are the two movement peaks around 5 to 6AM and 5 to 6PM.
- There are no identified transport conflicts with other land uses in this area.

## 2. INTRODUCTION AND BACKGROUND

The statement considers the impact that the expansion of the residential accommodation on Lot 326 Madigan Road, Stove Hill onto the adjacent Lot 211 will have on the road network through increased traffic and parking demands.

The report is prepared in response to a request from Hightower Planning and Development on behalf of Ausco Modular Pty Ltd as the developer of the property.

The development site is shown on Figure 1 and is 500m north of the North West Coastal Highway. It is located within the area to the south west of central Karratha formally identified as Stove Hill.

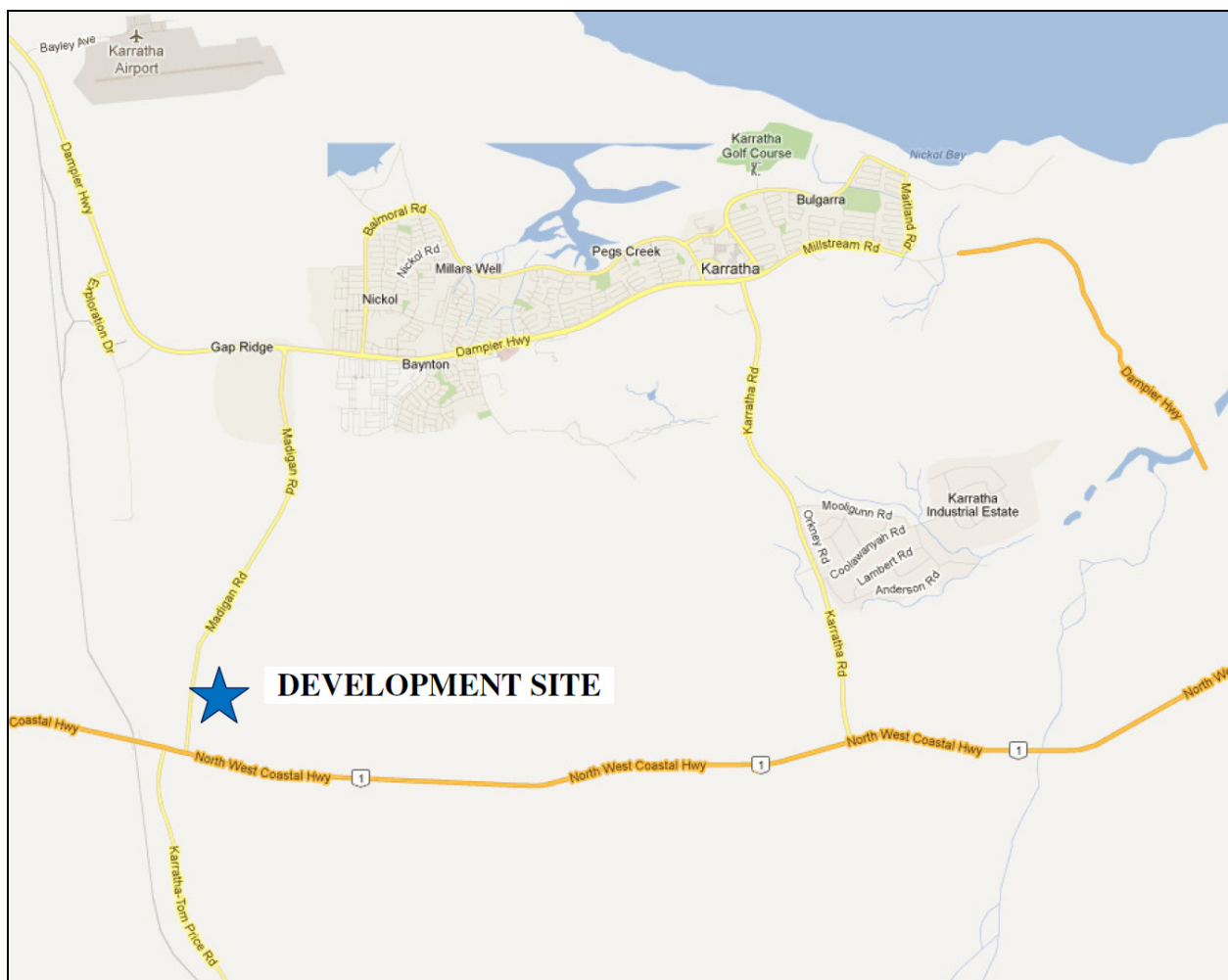


Figure 1 - General Development Location

The site for the expansion is in an area identified by the Shire of Roebourne in the Town Planning Scheme No.8 as being within the Town Site area and zoned for rural residential as shown in Figure 2. The existing accommodation on Lot 326 is zoned for mixed business purposes. The TPS No.8 shows the long term intent to have a new part of the town site close to this area.

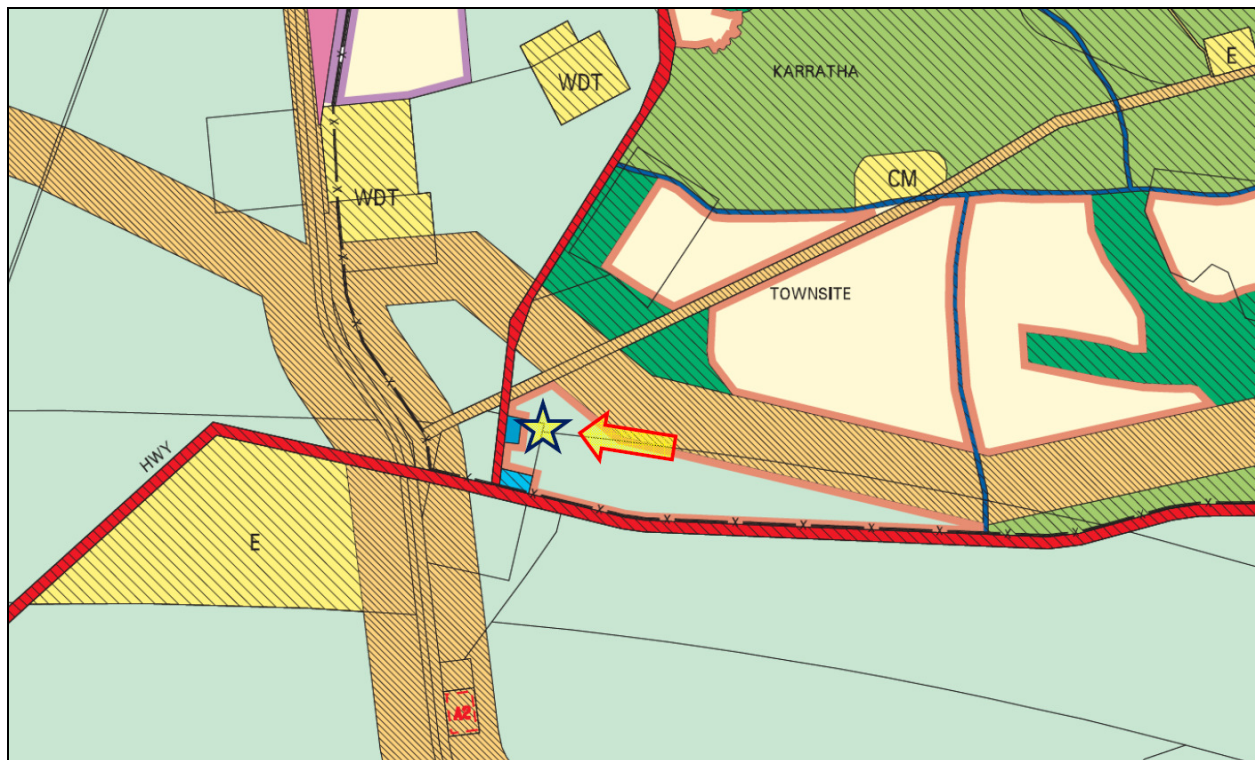


Figure 2 - Town Planning Zoning

The land use as a TWA / FIFO accommodation facility is permitted in the scheme if approval is granted by the Council. The nearest town planning scheme land use could be 'Transient Workforce Accommodation' although at least 50% of the intended accommodation is ultimately for a workforce that is actually permanent - just flown to Perth for longer weekend periods between shifts.

The TPS No.8 definition for transient workforce accommodation is:

**transient workforce accommodation**

dwelling 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 contractors camp and dongas.

This expanded development is intended to be a permanent facility and is primarily for the use by a permanent workforce that operates on shifts and effectively is FIFO. It is not intended that the majority of residents are transient or that the accommodation is temporary and could be relocated.

It is intended that the ultimate use would be for at least 50% of residents would be FIFO and reliant upon employer provided bus services for work commuting trips. There would be more permanent workforce employees and sub-contractors who would bring their own vehicles as well as other employees / contractors / consultants who use company or hire vehicles.

The location is utilised as residential accommodation comprising 257 rooms, associated buildings for catering, recreation, laundry and office. There are 128 car parking bays, 11 motorcycle bays and internal access roads.

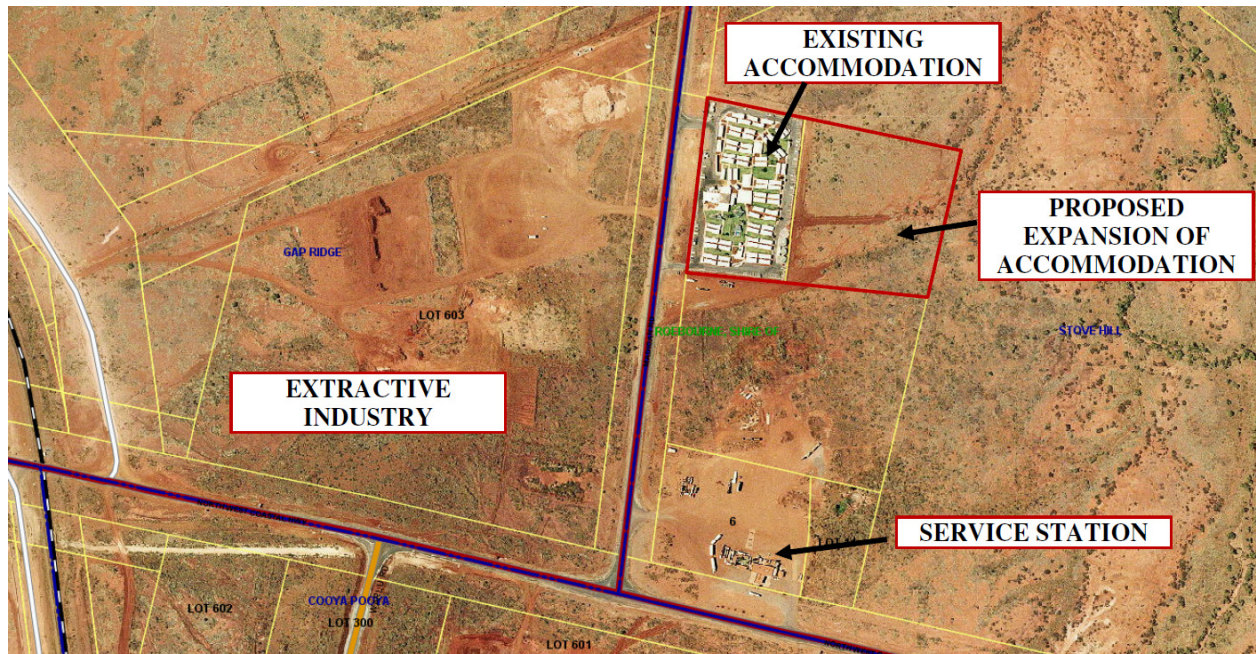


Figure 3 - Aerial photograph of general area

The major traffic route is along Madigan Road to Dampier Road to the north. Vehicular access is unrestricted within the existing road network.

Madigan Road is a state government controlled road through Main Roads WA.

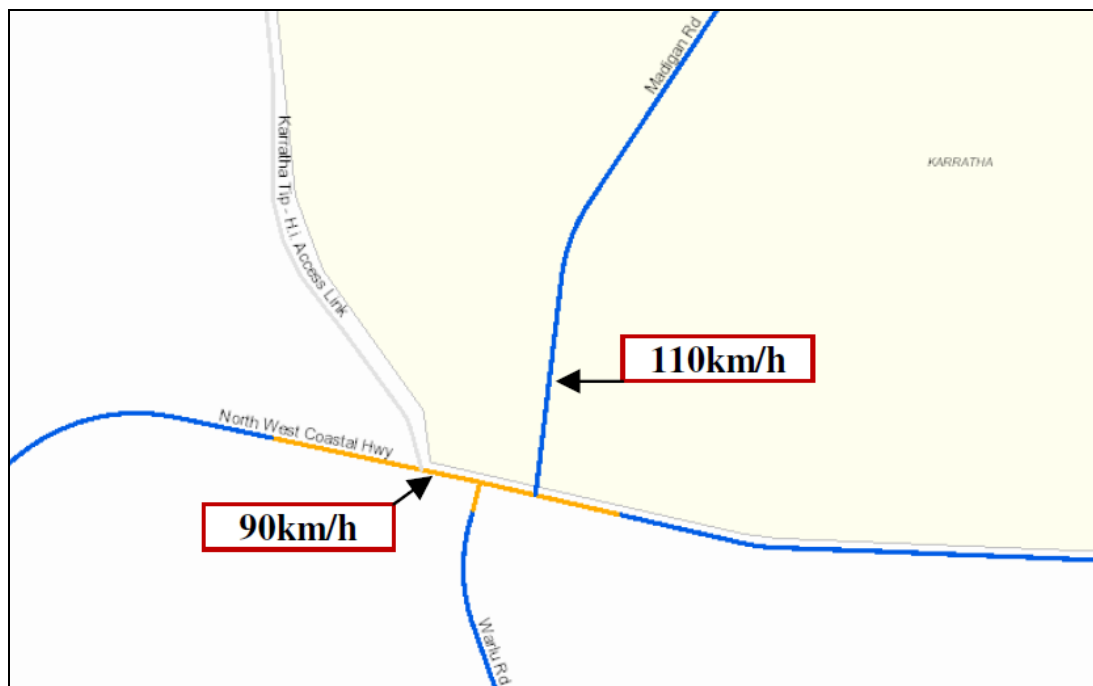


Figure 4 - Speed Zones

Madigan Road is a 110km/h speed zone from the intersection at North West Coastal Highway. There is no reduction in speed before the intersection as there is along the NWCH and Warlu Road in this area.

This statement's purpose is to identify specific transport issues with respect to this site and is not to access the overall transport impacts generated by the other land uses close to this property.

### 3. PROPOSED DEVELOPMENT

The proposed redevelopment incorporates the relocation of some of the existing infrastructure and the expansion with additional single and double storey accommodation buildings to a total of 681 single bedroom units. The site includes some modified and new car parking and facility rooms.

The existing Kingfisher Accommodation infrastructure is shown in Figure 4.

The proposed new expanded layout is shown in Figure 5.

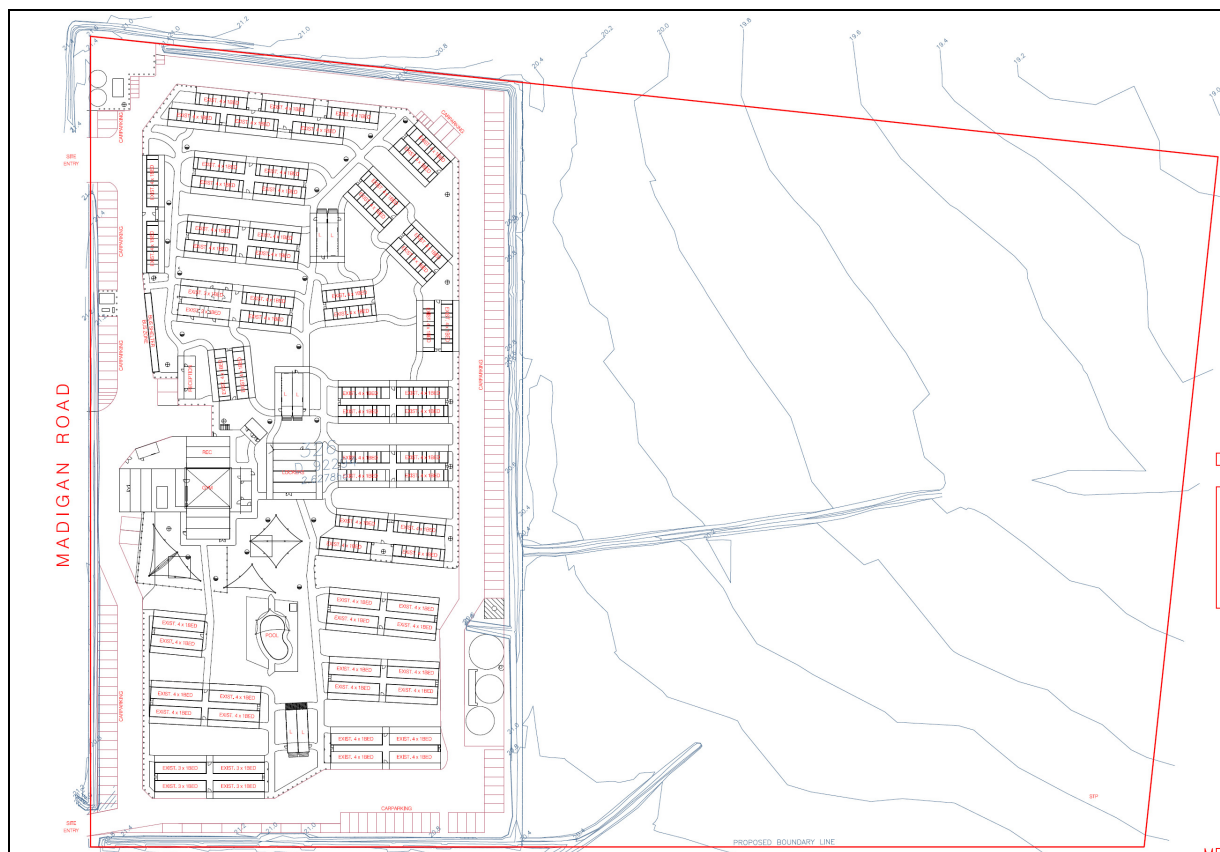


Figure 5 - Existing Layout

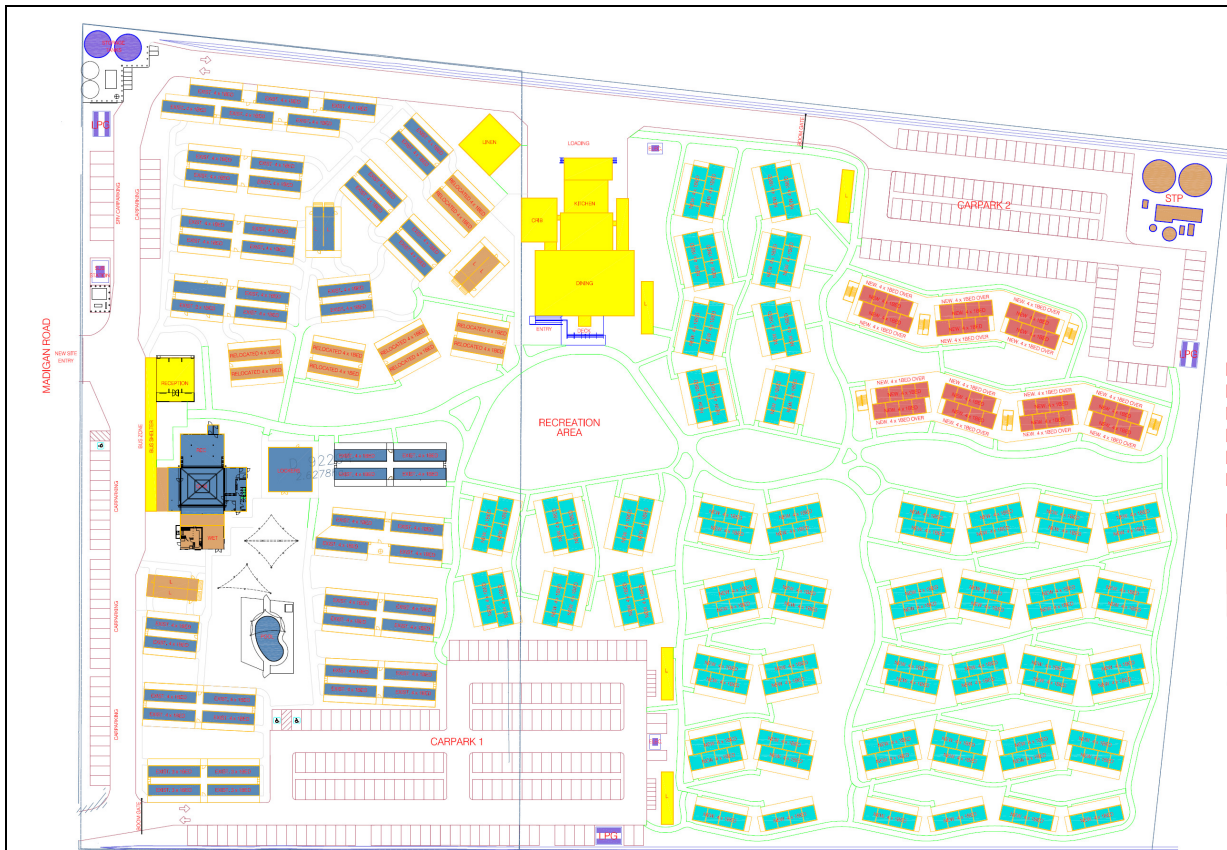


Figure 6 - Proposed Expanded and Redeveloped Site

The site currently operates 257 accommodation units with recreation, catering and laundry facilities on-site. The proposal is for the same types of activity using about 2.5 times the land area providing 2.65 times more accommodation units. The expanded site will use mostly single storey buildings with one part of the site having 14 two storey buildings. The total accommodation units would be 681.

The existing vehicle access is by two accesses from Madigan Road to the common internal roads and car parks. There is proposed to be a relocation of the northern access to be closer to the office / reception building.

## 4. VEHICLE ACCESS AND PARKING

### 4.1. Access and Aisles

The proposed vehicle accesses are from Madigan Road as the only frontage to a public road.

The existing southern crossover is about 6m wide at the boundary, is 32.5m long to the edge of the road shoulder where it is 27.5m wide. The proposed southern crossover would be at the same location and is proposed to be 2m wider to accommodate the exit by large buses / coaches.

The existing northern access is 35m from the northern boundary, is 10.5m wide at the property end, is 33m long and is 38.5m wide measured along the road shoulder. The proposed northern crossover would

be located a further 55m south and be 2m wider at 12.5m at the property boundary.

AS2890.1-2004 Parking Facilities Part 1 Off-Street Parking Facilities identifies that accesses should be clearly recognised as designed to be either be a driveway or an intersection. The primary differentiation is whether the kerbs and footpaths are continuous across the access. In this instance there are no kerbs or pathways along Madigan Road however as the access will be at the same levels as the edge of road with no impediments along the road the access should be designed to the requirements of an intersection. AS 2890.1 classification of the parking facility would appropriately be residential / domestic term parking as User Class 1A. The access widths for a User Class 1A car park of 301 to 600 bays should be an entry width of 6m to 8m and an exit width similar at 6m to 8m. The entry and exit should be separated by 1m to 3m.

Operationally the southern access is proposed to be an exit only and the northern access to be bi-directional. Practically there is expected to be some entry activity at the southern access.

The southern access complies with the exit width requirements of AS2890.1.

The northern access complies with the entry / exit width requirements however the theoretical separation of the two flows is only 0.5m instead of 1m minimum. Practically this is not an issue as the peak vehicle flows will be unidirectional so the potential for opposing vehicle conflict is lesser than in a general open-to-public car park. It is possible that the design be modified to have separate entry / exit at the northern location however this is considered not necessary in this development.

The AS2890.1:2004 specifies the minimum gradient within an off-street car park should be 1% to allow for drainage. The maximum gradients should be 5% parallel to the angle of parking and 6.25% in any other direction. Within a universal bay AS2890.6:2009 Parking Facilities - Off-street Parking for People with Disabilities specifies the maximum gradient to be 3% if the bay is out of doors and has a bituminous sealed surface.

The site has about a 2.5m fall from west to east so internal gradients of about 1% are expected.

The potential gradients within the proposed car park are expected to be between the recommended minimums and maximums.

The car park aisles are 6.2m wide and the internal front spine road is 7.0m to 7.2m wide.

#### 4.2. Parking Bay Dimensions

The design of parking facilities has been reviewed for compliance with the relevant Australian Standards 2890.1:2004 and 2890.6:2009 and Austroads Guides to Traffic Management Part 11 Parking.

The car parking bay size is proposed to be 5.5m long, the bay width is 2.7m and the aisle width is 6.2m. These dimensions are all in excess of the minimums required for residential / domestic parking that are

5.4m by 2.4m and 5.8m aisles. As the Pilbara environment often leads to vehicles being larger 4WD wagons and utilities the larger bay dimensions above the minimum AS2890.1 requirements are an advantage.

The Australian Standard AS 2890.6 2009 Parking Facilities Part 6 Off-street Parking for People with Disabilities refers to the Universal bay to be used by persons with disabilities as a ‘dedicated parking’ bay and specifies the dimensions to be used for such bays. The design for the dedicated bays are in accordance with the Australian Standard AS 2890.6 2009 as the bays and shared areas exceed the minimum dimensions.

AS2890.1 requires the minimum motorcycle parking area to be 2.5m by 1.2m per motorcycle. The motorcycle bays proposed comply with the AS dimension requirements.

The AS2890.1 also raises the aspect that parked motor cycles should not be located so they are vulnerable to being struck by a manoeuvring car. The proposed locations off the east side of Car Park 1 (southern car park) are clear of general vehicle manoeuvring areas. There is a low risk that a large vehicle would drive straight into the motorcycle bay area.

Note – the plans show motorcycle bays in the north-west corner open to the internal access road. These are a remnant from the existing usage and are to be removed due to inappropriate location with semi-trailers needing the full pavement width to turn.

#### 4.3. Access Vehicle Sight Distance

Sight distance from the car park access along the street is defined in AS2890.1 as being a minimum of 190m in a 110km/h speed zone area. The locations of the crossovers are on a horizontal straight 950m long from North West Coastal Highway. The vertical alignment along the straight is a series of low rolling grades of estimated height difference 1m to 2m.

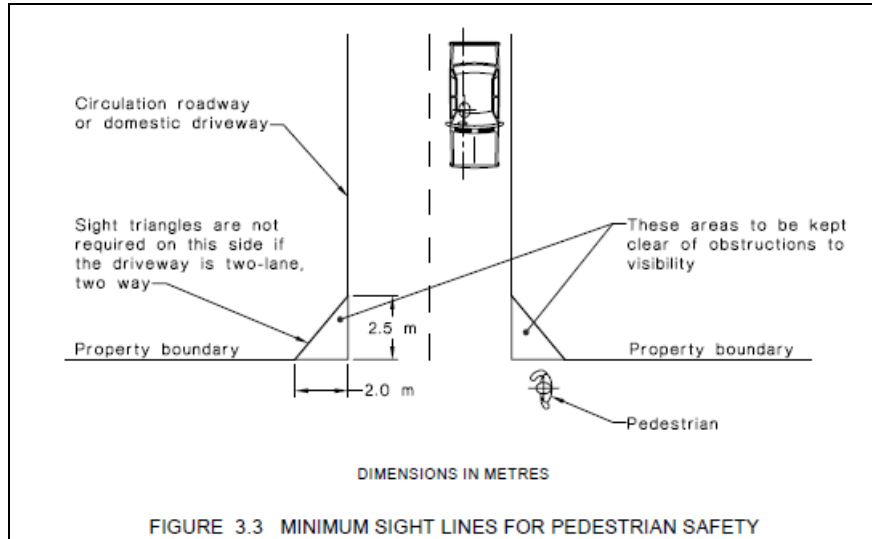
The combination of vertical and horizontal alignments would not impede sight distance from along Madigan Road to any vehicle turning at the accesses. Clear sight distance in excess of 300m exists and that complies with the requirements of AS2890.1.

Austroroads Guides to Road Design - Part 4A Signalised and Unsignalised Intersections provides formulae to calculate the sight distances applicable for trucks:

In a 110km/h zone along Madigan Road the Approach Sight Distance is 290m and the Safe Intersection Sight Distance is 380m. The available sight distances for a truck driver are measured from an eye height of 2.4m compared to a sedan driver at 1.1m. A truck driver would be able to see the entire length of the straight from the higher position. Sight distance for both cars and trucks are available.

#### 4.4. Access Pedestrian Sight Distance

The Australian Standard AS2890.1:2004 also provides details for sight lines and distances for pedestrian movements across an access to a car park. Those details are shown in the AS2890.1 Figure 3.3 extract.



These clear zones exist in the proposed design as the pedestrian walk zone would be close to the edge of the road, 30m from the property boundary.

#### 4.5. Access between Car Parks and Buildings

The concept indicates a network of internal pathways to connect all accommodation buildings with the central facilities, car parks and bus embayment areas.

There are alternate routes along different pathways for nearly every possible route across the site. It is possible for every internal trip to be made on a pathway in a reasonably direct movement. There is only one movement between the south-eastern buildings and the bus / gym / pool area where to travel across a car park would be the obvious shorter route that would be used. That movement is similar to drivers and passengers leaving the vehicles and walking across the car park to the various buildings.

Pathway widths are indicatively 1.2m for serving discrete section of the site and 2.0m as the spines or major walkways. Pathways near the Universal bays in car Park 1 are to be 1.5m wide and have no level change to be able to access the shared area between the two bays. Details will be shown on the construction level of drawings.

#### 4.6. Number of Parking Bays

The number of parking bays required for TWA use is different to FIFO use as very few FIFO residents opt to have an extra vehicle permanently parked at a location remote from their family home.

For this site the use as 100% TWA is used for calculating the initial parking demand however as the use shifts towards 50% FIFO that demand will reduce.

The TPS No8 Appendix 4 Car Parking Requirements for transient workforce accommodation is listed as being at the discretion of the Council. The Shire of Roebourne's requirement is indicated in the Development Policy DP 10 Transient Workforce Accommodation at 1 bay for every 2 units as this development provides a commercial kitchen and communal dining room.

The proposed site layout contains 330 standard car bays and 7 larger 'SRV' bays for a total of 337 bays.

The SRV is a small rigid vehicle defined in AS2890.2 2002 as being 6.4m overall length and 2.3m overall width. That is typically commercial vehicle up to 4 tonne load capacity. The concept parking bays comply with the service bay dimensions in AS2890.2.

The size of the designed standard parking bays is 2.7m by 5.5m and that complies with the DP 10 requirements.

The provision of Universal Bays has been considered and 3 bays are provided. That complies with the DP 10 requirement for 1 bay per every 200 persons. The location of the Universal bays provides one bay that can be used by a visitor or resident without entering the secure car parks plus 2 bays internally near the recreation pool area with path links directly from the edge of these bays.

Motor cycle parking is to be provided for larger facilities or those within town sites so is applicable to this proposal. There are 13 bays to be provided and that exceeds the 7 bays that would be the minimum required at the DP 10 rate of 1 motor cycle bay for every 50 standard parking spaces.

A bus embayment area suitable for at least two large buses is provided towards the front of the development to allow for controlled and comfortable waiting facilities for FIFO residents.

For 681 units proposed the TWA parking requirement would be 341 standard car parking bays.

The parking provision of 337 standard bays is 99% of the calculated rate for 100% TWA use and 100% occupancy. This level of parking will be sufficient for the site usage.

When the site has up to 50% FIFO residents the parking usage will be reduced.

Surveys of parking at other FIFO accommodation facilities within the Shire of Roebourne provided from the operating company showed 4% of residents had private vehicles and a total parking demand was 25% of the unit numbers including the use of company vehicles.

The lowest expected parking demand would be:

TWA - 50% of units - 1 bay per 2 units = 170 standard bays

FIFO - 50% of units - 1 bay per 4 units = 85 standard bays

Total = 255 standard bays.

The parking provision would meet the initial demand and exceed future demands as FIFO is included with TWA use.

#### 4.7. Wash-down Bay

The location of a vehicle wash-down bay is not notated on the plans provided however there are places within Car Park 1 that are not marked as parking bays and are probably the wash-down area.

### 5. PROVISION FOR SERVICE VEHICLES

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The demand for access by service vehicles to accommodation facility includes the delivery of room supplies (linen), catering supplies and the removal of refuse.

The northern access provides ample manoeuvring area for access of semi-trailers onto and off-of the site.

The internal access road around the northern part of the site provides adequate width for a large vehicle to drive to the service area by the catering building. The existing bend at the north-west corner has a 3m radius on the inner side of the road and that is likely to be just enough for a semi-trailer to have a clear path. The small work to increase that radius during construction to a 7m radius would provide an easier truck path.

A dedicated storage area for refuse bins is not notated on the plans however it will be located close to the catering facility. As this area can be accessed by semi-trailers the smaller waste collection trucks can also access that area.

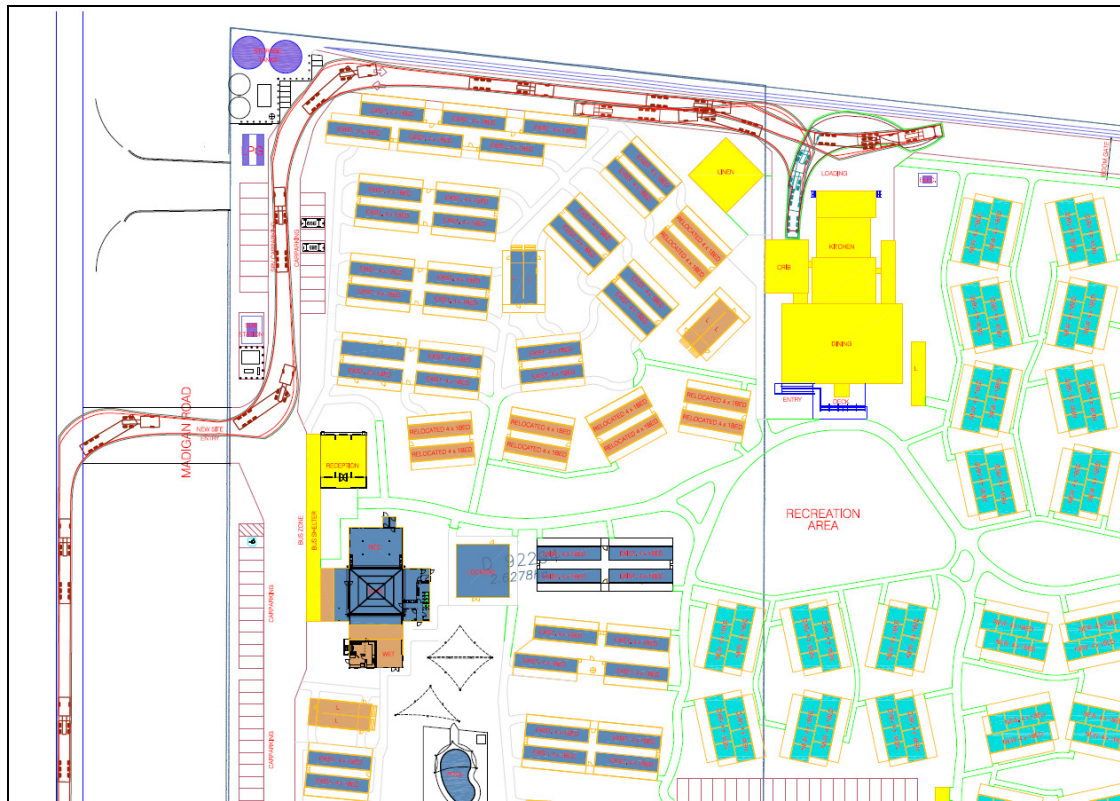


Figure 7 - Semi-Trailer Tracked Path – Entry to Service Area

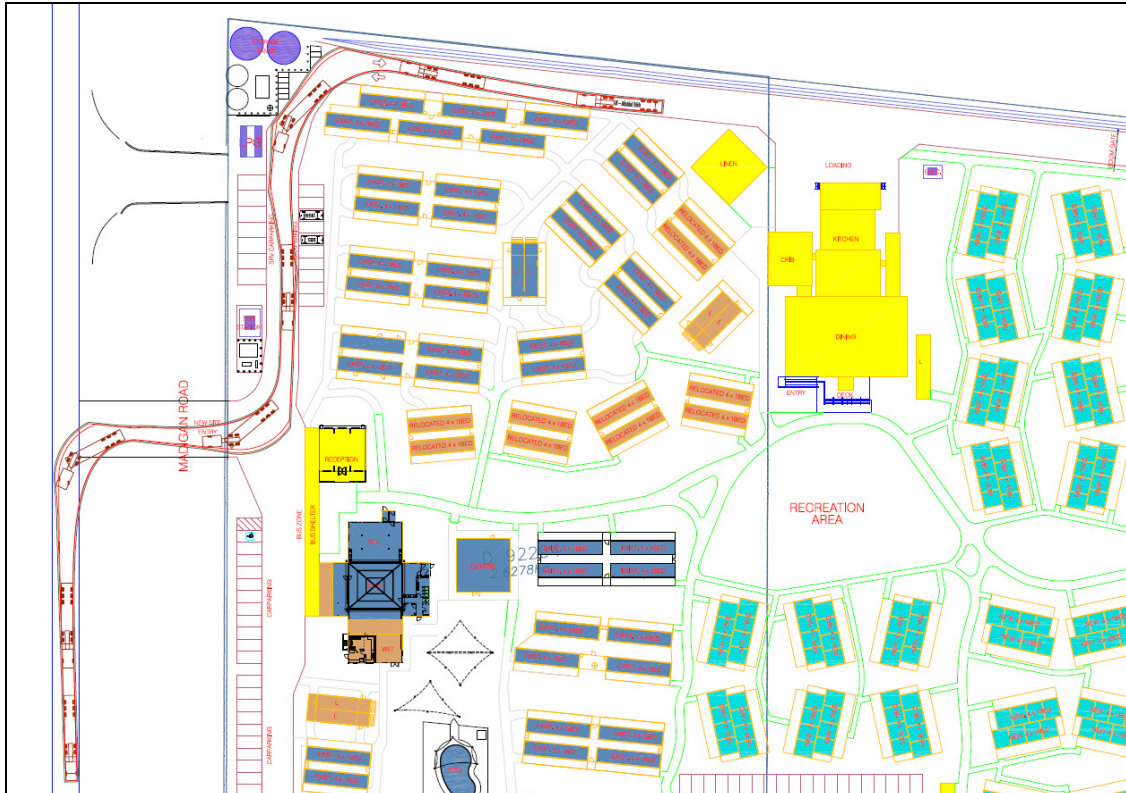


Figure 8 - Semi-Trailer Tracked Path – Exit from Service Area

## 6. HOURS OF OPERATION

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The 'operation' of a TWA / FIFO accommodation facility has two dominant cycles:

1. Transfers to and from the airport at weekly periods for FIFO
2. Transfers / commuting to and from the work site at daily periods.

The daily work shift on sites around Karratha appears to be on a split start time being either 5:30 to 5:30 or 6:30 to 6:30 and the related activity time for pedestrian movement to / from the accommodation is within the 30minutes before and after shift change.

The weekly transfers to the airport are related to flight times and the transfers may be directly to / from the work site rather than the accommodation. The transfers are usually fly-in on a morning flight and fly-out on an evening flight.

## 7. DAILY TRAFFIC VOLUMES AND VEHICLE TYPES

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The existing traffic volume along Madigan Road on record with Main Roads WA is 2009 data of 1,560vpd and 36% heavy vehicles.

The existing and the expanded TWA accommodation facility will generate daily vehicular traffic in relation to resident movements, service staff and supplies.

Staff movements are all expected to be motor vehicle based and some may use car-pooling. An allowance for 30vpd is estimated for all office, catering and cleaning staff for the expanded site.

Resident movement is expected to be 680vpd maximum at 100% occupancy.

An allowance for service vehicle movements is made at 10vpd.

The total site traffic for the new development would be 720vpd.

By the same method the existing facility would generate 265vpd.

The increase in traffic would be 455vpd.

That additional traffic would be reduced as FIFO increases do to bus usage increases and individual resident vehicle decrease resulting in an overall increase of 245vpd.

The traffic volumes along Madigan Road would initially increase to about 2,000vpd and then reduce to 1,750vpd.

The vehicle types generated from this proposed redevelopment will be mostly light commercial vehicle and 4WD vehicle use.

## 8. TRAFFIC MANAGEMENT ON FRONTAGE STREETS

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The site is located along a distributor road in a presently rural and largely undeveloped area.

There are no existing traffic management treatments along the frontage road or at the intersections.

The speed limit along Madigan Road is 110km/h.

As the allowed speed limit is the maximum allowed in the state traffic management for speed control is not necessary.

Pedestrian movement is unusually in this area and no specific pedestrian or cyclist facilities presently exist. There are no facilities identified within 1km that would be an attraction to general pedestrian traffic. Any pedestrian movement to the service station on North West Coastal Highway would be by existing tracks away from the edge of Madigan Road.

Specific additional treatments for the control of vehicle speed along Madigan Road are not identifiable from the existing road conditions and the proposal for an expanded TWA / FIFO accommodation facility.

## 9. PUBLIC TRANSPORT ACCESS

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There is no general public bus service in this area..

## 10. PEDESTRIAN ACCESS

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Pedestrian access to the proposed new development buildings is by an internal network of pedestrian walkways from the car parks and between buildings.

Pedestrian links to Madigan Road has to be by the vehicle accesses.

## 11. CYCLE ACCESS

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Cycle accessibility is through the car park access.

Cycling is on-road as due to the low vehicular traffic volumes there are no dedicated on-street cycle lanes or other facilities.

## 12. SITE SPECIFIC ISSUES

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There are no site specific issues identified with this proposed development.

## 13. SAFETY ISSUES

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A review of the road network in the vicinity of the redevelopment site did not indicate any unacceptable risks that may arise from the traffic flows associated with the development.

Traffic movement of long vehicles to and from Madigan Road will occur as has at the existing crossovers.

Long vehicle turning is common in this section of Madigan Road due to the service station, de-facto road train break-down area near the service station and the extractive industry the opposite site of Madigan Road from this site.

## 14. CONCLUSIONS

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The proposed expansion development of the Kingfisher Accommodation site on Madigan Road, Karratha (Stove Hill) about 500m north of North West Coastal Highway is expected to increase traffic flows on the adjacent road network by initially 455vpd and later by the reduce volume of 245vpd. The traffic flow is expected to decrease as fly-in / fly-out residents replace the initial transient workers expected to use the accommodation.

The major transport movement will be vehicle traffic to and from Dampier Road to the north where the traffic can go to the port or town facilities.

Employment related trips will initially be by independent vehicle and later to be about 50% of residents by bus to the port facilities at Burrup.

The proposed parking off-street provided in the expanded facility is expected to be underutilised as the shift occurs from 100% TWA to 50% TWA / 50% FIFO residents.

The proposed parking level of 330 standard bays, 7 SRV bays, 3 Universal bays and 13 motorcycle bays for a total of 353 vehicle bays will be sufficient for the expected demand.

The car park layout is in excess of the minimum requirements listed in the related Australian Standards and satisfies the Shire of Roebourne policy DP 10 requirements.

Manoeuvring within the car park may require two slight modifications that can be addressed in detail construction drawings.

No changes to the existing surrounding major transport network are proposed due to the redevelopment proceeding.

The accesses onto Madigan Road are located where sight distances are above the minimum recommended in the Australian Standard and Austroads road design guidelines.

## ATTACHMENT 1

### Checklist for a transport statement of a development

Item	Status	Comments / Proposals
<b>Summary</b>	✓	
<b>Introduction/Background</b>		
name of applicant and consultant	✓	
development location and context	✓	
brief description of development	✓	
key issues	✓	
background information	✓	
<b>Development proposal</b>		
proposed land uses	✓	
existing land use	✓	
context with surrounds	✓	
<b>Vehicular access and parking</b>		
access arrangements	✓	
public, private, disabled parking	✓	
set down / pick up	✓	
<b>Service vehicles (non-residential)</b>		
access arrangements	✓	
on/off-site loading facilities	✓	
<b>Service vehicles (residential)</b>	✓	
rubbish collection and emergency vehicle access		
<b>Hours of operation (non-residential only)</b>	✓	Non Applicable
<b>Traffic volumes</b>		
daily or peak traffic volumes	✓	
type of vehicles (eg cars, trucks)	✓	
<b>Traffic management on frontage streets</b>	✓	
<b>Public transport access</b>		
nearest bus/train routes	✓	
nearest bus stops/train stations	✓	
pedestrian/cycle links to bus stops/train station	✓	

<b>Pedestrian access/facilities</b>		
existing pedestrian facilities within the development (if any)	✓	
proposed pedestrian facilities within development	✓	
existing pedestrian facilities on surrounding roads	✓	
proposals to improve pedestrian access	✓	
<b>Cycle access/facilities</b>		
existing cycle facilities within the development (if any)	✓	
proposed cycle facilities within development	✓	
existing cycle facilities on surrounding roads	✓	
proposals to improve cycle access	✓	
<b>Site specific issues</b>	✓	
<b>Safety issues</b>	✓	
identify issues	✓	
remedial measures	✓	

<b>Proponent's name</b>	<b>Company</b>	<b>Signature</b>	<b>Date</b>
<b>Transport assessor's name</b>	<b>Company</b>	<b>Signature</b>	<b>Date</b>
Geoff Miles	Shawmac Pty Ltd		23/09/12

## ATTACHMENT 2

