



DEVELOPMENT PLAN REPORT

Lot 1693 Parker Street and Lot 2119 Stanley Street, South Hedland

Part I – Statutory Planning Provisions

Prepared by:

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Version	Purpose of Document	Orig	Review	Review Date	Format Review	RPS Release Approval	Issue Date
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**TABLE OF AMENDMENTS – DEVELOPMENT PLAN FOR LOT 1693 PARKER STREET
AND LOT 2119 STANLEY STREET, SOUTH HEDLAND**

<i>Amendment No.</i>	<i>Description of Amendment</i>	<i>Endorsed by Council</i>	<i>Endorsed by WAPC</i>

CERTIFICATION

CERTIFIED THAT THE DEVELOPMENT PLAN FOR LOT 1693 PARKER STREET AND LOT 2119
STANLEY STREET, SOUTH HEDLAND

WAS ADOPTED BY

RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON

Signed for and on behalf of the Western Australian Planning Commission

An officer of the Commission duly authorised the Commission pursuant to section 16 of the Planning and
Development Act 2005 for that purpose, in the presence of:

_____ Witness

_____ Date

AND BY

RESOLUTION OF THE COUNCIL OF THE TOWN OF PORT HEDLAND OF ENDORSEMENT

ON _____

AND THE SEAL OF THE MUNICIPALITY WAS PURSUANT TO THE COUNCIL'S RESOLUTION
HEREUNTO AFFIXED IN THE PRESENCE OF:

Mayor, Town of Port Hedland

Chief Executive Officer, Town of Port Hedland

_____ Date

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1.0 DEVELOPMENT PLAN AREA

- 1.1 The Development Plan area relates to Lot 1693 Parker Street and Lot 2119 Stanley Street, South Hedland as identified on the Development Plan map.

2.0 DEVELOPMENT PLAN CONTENT

- 2.1 The Development Plan comprises of the following sections:
- Part One – Statutory Section
 - Part Two – Explanatory Information
 - Appendices – Technical Reports
- 2.2 Part Two of the Development Plan provides justification and clarity to the provisions contained in Part One, and is to be used as a reference to guide interpretation and implementation of Part One.

3.0 INTERPRETATIONS

- 3.1 The terms used in the Development Plan have the respective meaning given to them in the Town of Port Hedland Town Planning Scheme No. 5.

4.0 OPERATION DATE

- 4.1 The Development Plan will become operative following the endorsement of the Plan by the Town of Port Hedland and the adoption of the Plan by the Western Australian Planning Commission as provided for by Clause 6.2 of Town Planning Scheme No. 5. The operative date of the Plan is the later of the endorsement or adoption as identified on the Certification page.

5.0 RELATIONSHIP TO THE SCHEME

- 5.1 The provisions of this Development Plan are made pursuant to Clause 5.2, Clause 6.4 and Appendix 6 of the Town of Port Hedland Town Planning Scheme No. 5. The Development Plan is a policy statement and forms part of the Town of Port Hedland Local Planning Policy Manual.
- 5.2 Town Planning Scheme No. 5 provides that land use, development and subdivision of land within the Development Plan area shall be generally be in accordance with the Development Plan.
- 5.3 Land uses permitted within the Development Plan area shall be in accordance with the Town of Port Hedland Town Planning Scheme No. 5 “Residential Zone”.

6.0 PUBLIC OPEN SPACE PROVISION

6.1 The Development Plan includes one area of Public Open Space (POS), totalling 1566m². The POS is located centrally within the Development Plan area and represents 1.36% of the subdividable area.

7.0 RESIDENTIAL DENSITY

7.1 The residential areas of the Development Plan are coded R25, R40 and R60 as illustrated on the Development Plan.

7.2 Subdivision is to be in accordance with the applicable minimum lot sizes listed under Table 1 of State Planning Policy 3.1 Residential Design Codes.

7.3 Part Two of the Development Plan provides justification for the location and distribution of residential densities within the Development Plan area.

8.0 DEVELOPMENT AND REPORTING REQUIREMENTS

8.1 Prior to any subdivision or development being supported, the Town will require:

- (a) a report accompanying any application that outlines the manner in which the findings and recommendations of the plans and strategies listed in Table A below have been incorporated into or addressed by the proposed subdivision or development or will be implemented in subsequent stages of development.

Table A – Reports, Surveys, Strategies and Plans

Documentation	Approval Stage	Approving Authority
Local Water Management Strategy	Concurrent with Development Plan	Town of Port Hedland & Department of Water
Urban Water Management Plan	Prior to clearance of development and/or subdivision conditions	Town of Port Hedland & Department of Water
Geotechnical Report	Prior to clearance of development and/or subdivision conditions	Town of Port Hedland
Landscaping Plan	Prior to clearance of development and/or subdivision conditions.	Town of Port Hedland

DEVELOPMENT PLAN

Lot 1693 Parker Street and Lot 2119 Stanley Street, South Hedland

- LEGEND**
- DEVELOPMENT PLAN AREA
 - RESIDENTIAL R25
 - RESIDENTIAL R40
 - RESIDENTIAL R60
 - PUBLIC OPEN SPACE
 - DRAINAGE SWALE
 - INDICATIVE LAYOUT [R60 GROUP HOUSING SITES]



DEVELOPMENT PLAN
 LOT 1693 PARKER ST AND
 LOT 2119 STANLEY ST



prepared by julie harrold *architect*
 for Cedar Woods Properties

scale:	1:2000 @a3	date:	12 08 2011
ref:	cwp sth dp 01b	initials:	jha

The logo for RPS, consisting of the letters 'RPS' in white, bold, sans-serif font, centered within a dark blue rectangular background.

DEVELOPMENT PLAN REPORT

Lot 1693 Parker Street and Lot 2119 Stanley Street, South Hedland

Part 2 – Explanatory Report

Prepared by:

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Prepared for:

The logo for Cedar Woods Properties Limited. It features the words 'Cedar' and 'Woods' in a bold, sans-serif font, separated by a stylized blue diamond-shaped icon containing a white wave-like pattern. Below this, the words 'PROPERTIES LIMITED' are written in a smaller, all-caps, sans-serif font.

Cedar Woods
PROPERTIES LIMITED

PO Box 788

WEST PERTH WA 6872

Document Status

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Rev 0	Final for Lodgement	LR	SD	11.08.11	11.08.11	SD 11.08.11	11.08.11

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I.0 PLANNING BACKGROUND

I.1 Introduction and Purpose

This Development Plan report has been prepared on behalf of Cedar Wood Properties Limited (Cedar Woods) as the preferred proponent to acquire Lot 1693 Parker Street and Lot 2119 Stanley Street, South Hedland (the subject land), from the Department of Regional Development and Lands (RDL).

Lot 1693 and 2119 were subject to an expression of interest (EOI) process following their release during Stage 1 of the South Hedland Land Release Project. Cedar Woods successfully applied to purchase the subject land in March 2010.

The Cedar Woods' successful bid included key alliances with Foundation Housing, BGC Modular, IBN Corporation and Gumala Aboriginal Corporation to provide a balanced outcome of residential, affordable, key worker, social and indigenous housing options.

The proposed Development Plan has been designed incorporating environmentally sensitive design initiatives around a highly connected road network, and provides a range of medium density housing options which contribute to the required supply of housing in South Hedland.

The preparation of the Development Plan has been supported by the input of a number of technical and design consultants, including:

- **Julie Harrold Architect** – Urban Design
- **RPS** – Urban Water Management and Environmental Investigations
- **Wood & Grieve Engineers** – Drainage and Servicing Investigations
- **Cardno Eppell Olson** – Transport and Traffic
- **UDLA** – Landscape
- **Anthropos Australis** – Aboriginal Heritage

The Development Plan has been prepared in accordance with the design requirements established by Liveable Neighbourhoods and will facilitate the future subdivision and development of the subject land.

I.2 Land Description

I.2.1 Location

The subject land is generally bound by North Circular Road to the north, the Black Rock Tourist Park and Stanley Street to the east, a transient workforce accommodation site to the south and Parker Street to the west (refer **Figure 1 - Location Plan**).

Lots 1693 and 2119 are separated by the existing Water Corporation Water Tower located on Lot 89 (**Figure 2 - Site Plan** and **Figure 3 - Aerial Photograph**).

1.2.2 Area and Land Use

Lot 1693 forms the majority of the Development Plan area with a total land area of 10.528ha. Lot 2119 has a total land area of 9773m². The Development Plan covers a total area of 11.51ha

1.2.3 Legal Description and Ownership

Lot 1693 is formally described as being on Deposited Plan 211244; Certificate of Crown Land Title Volume LR3013, Folio 625. The subject land is currently identified as Unallocated Crown Land, with the primary interest holder being the State of Western Australia.

Lot 2119 is formally described as being on Deposited Plan 211918; Certificate of Crown Land Title Volume LR3002, Folio 595. The subject land is currently identified as Unallocated Crown Land, with the primary interest holder being the State of Western Australia.

1.3 Planning Framework

1.3.1 Zoning and Reservations

The subject land is zoned 'Urban Development' under the Town of Port Hedland Town Planning Scheme No. 5 (TPS 5) and located within the "South Hedland Entry Precinct" as identified by Appendix 5 of the Scheme.

The purpose of the 'Urban Development' zone is to identify land where detailed planning and the provision of infrastructure is required prior to the further subdivision and development of land as established by Clause 6.4.1 of TPS 5.

As established by TPS 5, the objectives of the "South Hedland Entry Precinct" are to:

- a) *"Improve the legibility of the locational and functional relationships between Wedgefield, Boodarie, South Hedland, Port Hedland and the airport;*
- b) *Enhance the visual amenity of entry roads to South Hedland;*
- c) *Given priority to recreation and community uses;*
- d) *Ensure that uses occurring within the Boodarie strategic industrial buffer area place no constraints on industry operations within the Strategic Industry zone;*
- e) *Determine practical functional relationships between land uses as the basis for possible rationalisation of cadastral boundaries within the precinct; and*
- f) *Protect options for future infrastructure within the area reserved for this purpose."*

TPS 5 requires the preparation of a Development Plan for all land zoned 'Urban Development' in accordance with the provisions of Clause 5.2 of the Scheme. Appendix 6 to TPS 5 sets out matters required to be addressed by Development Plans in general.

The proposed Development Plan has been prepared in accordance with provisions outlined in Appendix 6.

1.3.2 Policies

Liveable Neighbourhoods

Liveable Neighbourhoods is an adopted policy intended to guide the subdivision and development of land in Western Australia. The key principles of this policy include:

- *Providing a variety of lots sizes and housing types to cater for the diverse housing needs of the community at a density that can ultimately support the provision of local services;*
- *To ensure cost-effective and resource efficient development to promote affordable housing; and*
- *To maximise land efficiency.*

The proposed Development Plan not only acknowledges the objectives of Liveable Neighbourhoods in providing a greater diversity in housing types, but meets the important objective of maximising land efficiency by rationalising development in an established and well serviced residential area. The proposed development will also allow for the development of housing options that will directly target ongoing affordability constraints and housing demand in South Hedland

Town of Port Hedland Land Use Master Plan

The Town of Port Hedland has undertaken a long term Land Use Master Plan (LUMP). Through a focus on the use of land, the LUMP is intended to guide the growth and development of Port Hedland through the coming 15 – 20 years. It is the first step towards updating TPS 5 which was last reviewed in 2001. The LUMP defines the community's long range vision of how the town should develop.

The land the subject of this Development Plan is identified by the LUMP as being suitable for new housing.

The Pilbara's Port City Growth Plan is currently under development. The plan will be the key document that guides future development of the Town of Port Hedland and upon adoption will effectively replace the LUMP and inform the preparation of Scheme Amendments and / or a new Town Planning Scheme for the Town of Port Hedland. The Growth Plan is expected to maintain the intention of the subject land to be developed for housing.

Hedland Land Availability Plan

The Hedland Land Availability Plan (LAP) is a strategic document adopted by the Town of Port Hedland to guide the Town of Port Hedland and other government authorities on the divestment or development of Crown Land within the Port and South Hedland Town Sites.

Lot 1693 is identified as South Hedland Map Reference No. 59 and Lot 2119 as Map Reference No. 61 within sub-precinct I. The LAP identifies the subject land as "Other – Under Development" meaning the sites are *"already the subject of an established project or land release process aiming to realise development potential"*.

1.3.3 Town Planning Scheme Amendment No. 25

Town Planning Scheme Amendment No. 25 was initiated by the Town of Port Hedland to rezone Lots 1693 and 2119 Parker Street South Hedland, from “Community” to “Urban Development”.

Amendment No. 25 was initiated in light of the land being identified for future development by the LUMP.

Amendment No. 25 was adopted by Council on 14 July 2010 and gazetted on 8 February 2011.

1.4 Context Analysis

1.4.1 Surrounding Land Use and Development Pattern

The area immediately west of Lot 1693 has been developed as a community use site which currently houses the Pundulmurra Aboriginal College (refer **Figure 4: Local Context Plan**). South of Lot 1693 is a student housing site which is currently used as transient workers accommodation.

The area immediately east of Lot 2119 has been developed for low to medium density residential purposes ranging from R20 to R40 under TPS 5.

Built in the 1970s to accommodate the expanding mining industry, South Hedland was intended to be a state-of-the-art development which provided existing residents and new arrivals with all the services and amenities of contemporary urban life.

Considered innovative for its time, the initial plan of South Hedland was based on the idea of community “cells” or neighbourhoods, organised in a circular pattern around a primary school, part or convenience centre with an extensive network of public open space connecting between cells. Unfortunately, the development pattern has, over time, proved to be significantly flawed, with issues associated with an illegible street network, excessive open space, poor connections to the Town Centre and a lack of responsiveness to the natural environment.

The South Hedland Town Centre is now being redeveloped, largely in response to the issues highlighted above, and will include high density residential living, mixed use development including a variety of housing, motel and short stay accommodation and additional retail, office and entertainment functions.

1.4.2 South Hedland Housing Market

Port Hedland is currently experiencing a critical shortage of accommodation for both long-term residents and short-term fly-in / fly-out workers which is recognised as one of the biggest constraints affecting the growth of the town into a city.

The quarterly Housing and Land Snapshot report prepared by the Pilbara Development Commission in June 2011 outlines the average advertised price of the residential properties for sale in South Hedland based on the number of bedrooms, over the previous three quarters (refer below table):

Table 1: Housing and Land Snapshot

South Hedland	Quarter	Number	Min \$	Max \$	Avg \$
One Bedroom	Dec-10	1	\$ 550,000	\$ 550,000	\$ 550,000
	Mar-11	2	\$ 699,000	\$ 699,000	\$ 699,000
	Jun-11	3	\$ 415,000	\$ 525,000	\$ 470,000
Two Bedroom	Dec-10	18	\$ 398,000	\$ 950,000	\$ 643,278
	Mar-11	11	\$ 532,000	\$ 750,000	\$ 656,455
	Jun-11	6	\$ 539,000	\$ 700,000	\$ 636,333
Three Bedroom	Dec-10	113	\$ 480,000	\$ 1,125,000	\$ 740,557
	Mar-11	103	\$ 495,000	\$ 1,125,000	\$ 731,131
	Jun-11	89	\$ 498,000	\$ 1,115,000	\$ 745,921
Four Bedroom & above	Dec-10	75	\$ 690,000	\$ 1,500,000	\$ 933,500
	Mar-11	75	\$ 689,000	\$ 1,500,000	\$ 929,973
	Jun-11	61	\$ 689,000	\$ 1,500,000	\$ 942,311
Total	Dec-10	207	\$ 398,000	\$ 1,500,000	\$ 801,084
	Mar-11	191	\$ 495,000	\$ 1,500,000	\$ 804,573
	Jun-11	159	\$ 415,000	\$ 1,500,000	\$ 811,924

The above table demonstrates a clear lack of availability of one (1) and two (2) bedroom dwellings for sale within South Hedland. The proposed Development Plan will facilitate development of critical housing stock comprised of low and medium density housing which will assist relieving the severe shortage currently being experienced throughout the Town and broader Pilbara region.

2.0 SITE CONDITIONS AND ENVIRONMENT

2.1 Environmental Overview

An Environmental Assessment Report (EAR) was prepared by RPS Environment in preparation of this Development Plan report (refer **Appendix I**). A summary of the key findings of the EAR is provided below.

2.1.1 Climate

South Hedland is located within a hot, semi-arid climatic zone. Summers (October to April) are very hot with an average maximum temperature of 33.2 °C and daily maximum of up to 36.8 °C in March, the hottest month. Winter temperatures range from an average monthly minimum of 19.4 °C with a daily minimum as low as 12.3 °C in July (Bureau of Meteorology 2010).

Most of the annual rainfall occurs during the summer period from scattered thunderstorms and the occasional tropical cyclone. A secondary peak in rainfall occurs in May as a result of rainfall events caused by tropical cloud bands which intermittently affect the area.

Cyclones are most common in the South Hedland region between February and March and sometimes result in extreme rainfall events, on average the highest daily rainfall is typically recorded mid cyclone season in January.

2.1.2 Aboriginal Heritage

A search of the Department of Indigenous Affairs (DIA) Database on 26 May 2011 showed no registered Aboriginal heritage sites within the subject area.

An Aboriginal Heritage Survey, including consultation with Traditional Owners, will be undertaken by Anthropos Australis prior to any ground disturbing activities being undertaken.

2.1.3 Potential Constraints and Management Issues

A summary of the likely impacts resulting from development of the site and the subsequent management commitments are summarised in Table 2 below:

Table 2: Summary of Potential Constraints and Management Issues

	Objective	Potential Impact	Management Recommendations
Wetlands	To maintain the integrity, ecological functions and environmental values of wetlands	There have been no wetlands identified within vicinity of the site. Therefore the proposed development will have no impact on wetlands.	No further work is considered necessary.

	Objective	Potential Impact	Management Recommendations
Acid Sulfate Soils	To ensure that ASS are not disturbed during earthworks and construction activities.	According to regional DEC mapping, it is unlikely that ASS will be encountered during ground disturbing activities.	No ASS investigations are considered necessary due to the DEC mapping over the site. However, geotechnical investigations to be undertaken on the site will confirm this.
Surface water	To maintain the quantity and quality of water so that existing and potential environmental values, including ecosystem function, are protected.	There are no ecologically sensitive ecosystems or wetlands within vicinity of the site that may be impacted by changes in the hydrological regime as a result of from development. Stormwater within the development will require management.	LWMS and UWMP will be prepared at appropriate planning and development stages in accordance with <i>Better Urban Water Management Guidelines</i> (WAPC 2008). These plans will provide further detail in respect to surface and ground water management relevant to detailed planning and engineering of the development design.
Vegetation	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.	Potential impacts to vegetation on site are minimal as vegetation on site is degraded and well represented with the region.	Vegetation is not considered likely to pose a constraint on the proposed development and no further assessments are considered necessary.
Surrounding Land Uses	To ensure surrounding land uses do not impact future development of the site.	Surrounding land uses are not considered likely to impact the proposed development. Dust management will have to be undertaken to protect neighbouring residential land, caravan park and TAFE.	Dust and noise management should be addressed in a Construction Management Plan for the site
Site Contamination	To ensure previous land uses within and surrounding the site do not impact on proposed development of the site.	The DEC contaminated sites database shows no contaminated sites within vicinity of the site. Previous land uses are not considered likely to have contaminated soil or groundwater on site.	A Preliminary Site Investigation (PSI) is not considered necessary.
Fauna	To maintain the abundance, diversity, geographic distribution and productivity of native fauna at the species and ecosystem levels.	The site is not considered likely to contain important habitat for any significant fauna	No fauna species are considered likely to constrain the proposed development and no further work is considered necessary.

3.0 PROPOSED DEVELOPMENT PLAN

3.1 Community Design

3.1.1 Design Philosophy

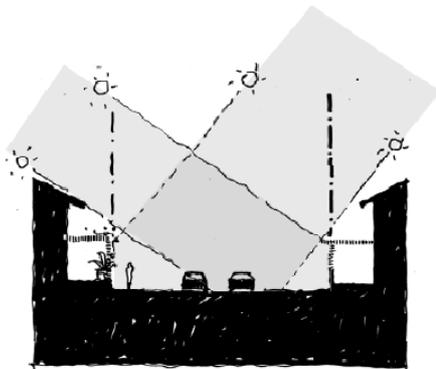
The Development Plan has been prepared by Julie Harrold Architect, with a strong focus on climate responsiveness and a legible street network, as well as the implementation of principles associated with Crime Prevention Through Environmental Design (CPTED). The following provides an overview of the design rationale used by Julie Harrold Architect in preparing the Development Plan:

BREEZEWAYS



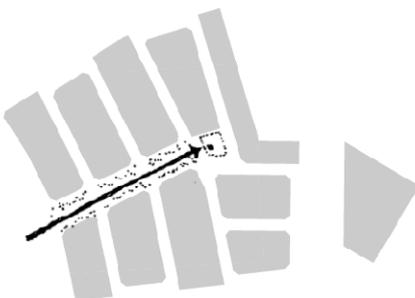
All roads are orientated to create breeze corridors, or breezeways, through the site. Roads are generally oriented north-south with lots facing east and west. This will allow for best opportunity for cross ventilation to dwellings. East-west orientation will also reduce opportunity for solar gain within the dwelling.

SHADE

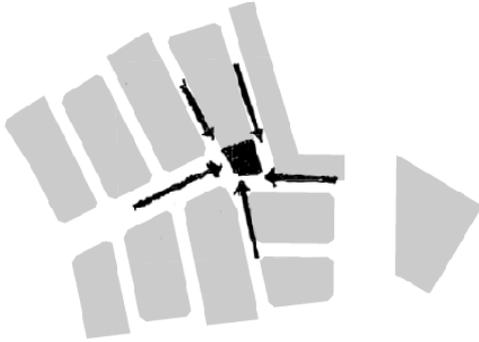


Street widths and dwelling position are located to provide best opportunity for shadowing the public realm. North-south orientated roads and built form with minimal setbacks will provide some shade to footpaths in the morning and afternoon.

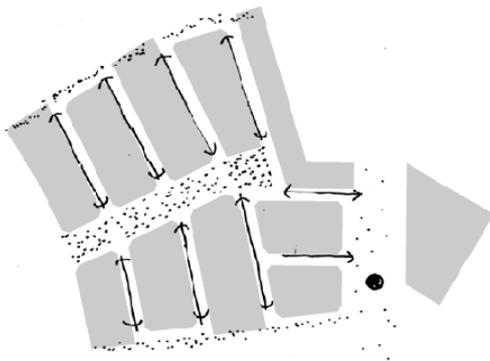
ENTRY ROAD



The entry road verges will be heavily landscaped within swales. Small dwellings will address the road, with rear entry via private access roads, allowing for a continuous built form response and address to the entry into the development. The small dwellings will have high amenity from proximity to the landscaped swale within the road reserve.

CENTRAL PARK

The entry road and a number of access roads terminate with views of the park, a landmark within the development. The park is the focal point for the community and may be landscaped with more hard paving and shade structures. Denser development will surround the park to allow the built form to provide some shade and surveillance over the public space.

LANDSCAPE VIEWS

Block orientation allows for the street view to terminate with landscaped areas.

3.1.2 Integration with Surrounding Development

Surrounding development consists of a caravan park to the north-west, an existing water tower between the two parent lots, existing residential development adjacent to the Stanley Street frontage, transient workers accommodation units to the south and the Pundulmurra Aboriginal College to the west.

The Development Plan area will effectively 'back on' to the existing caravan park, which given the private nature of this design interface is considered to be suitable. The caravan park, which is largely residential in nature and assuming appropriate management policies, will not impact on the amenity of future residents (i.e. noise / light spill).

The existing water tower separates the two sites subject to the Development Plan. The ability for road connections through this land have been investigated, however were not supported by the Water Corporation given future plans for duplication and the area needed for servicing and maintenance. Development on Lot 1693 will be separated by a 12m road reserve, which will include landscape and fencing treatments, developed in consultation with the Water Corporation. This existing public utility is not likely to impact on the amenity of future residents, but rather act as a landmark feature of the development.

Other surrounding uses are separated by existing road or drainage reserves, with all design being encouraged to front these public areas, increasing the amenity of the streetscape and surveillance of the street.

3.2 Movement Network

Located in an existing urban environment, the Development Plan integrates with the existing street network. The street network proposed by the Development Plan is a modified connected grid pattern and includes the following characteristics:

- A central boulevard entry-road with vista to public open space
- North-south road alignment allowing cooling breezes to flow between dwellings
- Legible road network, with connections from and back into the main boulevard
- Provision of dedicated on-street parking
- No vehicular access from North Circular Road

A detailed Transport Assessment Report (TAR) was prepared by Cardno Eppell Olsen (refer **Appendix 2**) which assesses the impacts of the proposed Parker Street Residential development on the adjacent road network. The following summarises these investigations:

3.2.1 Surrounding Road Network

The TAR concluded that North Circular Road/Wallwork Road and North Circular Road/Parker Street intersections are expected to operate well within acceptable performance limits for future year 2021 scenarios. No intersection upgrade works are therefore required. It is noted that North Circular Road/Stanley Street intersection was not analysed due to expected development traffic volumes equating to less than 5% of total movements at this location.

3.2.2 Local Streets

The internal road network includes predominantly 15m road reserves with 12m widths located adjacent to public open space or existing reserves (i.e. no requirement for services) and a 40m wide boulevard connecting Parker Street with the proposed development. The proposed road reserve of the boulevard will accommodate two way circulation, on-street parking and a 10m swale on each side. The landscaped swales and central medium will be heavily landscaped, increasing the visual amenity of this entry road. The boulevard will also allow adequate room for on-street refuse collection and for Heavy Rigid Vehicle's (HRV) to sufficiently negotiate the internal road layout.

Figure 5: Indicative Cross-Section of Boulevard (40m Reservation)

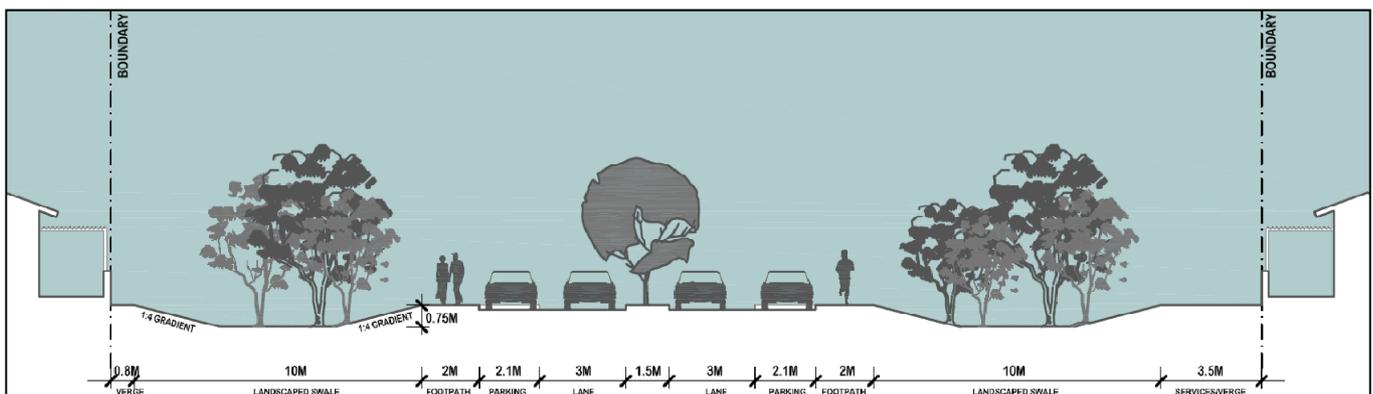


Figure 6: Indicative Cross-Section of Access Street (15m Reservation)

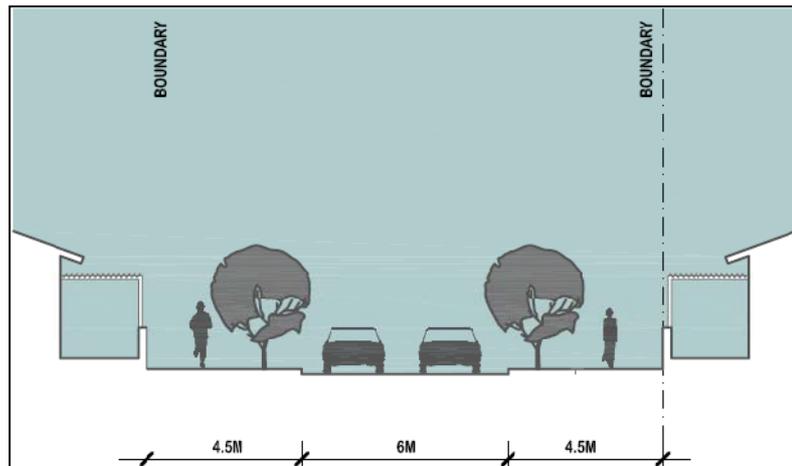
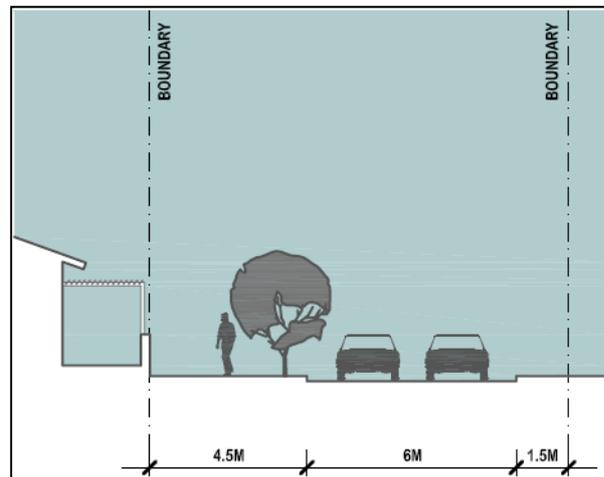


Figure 7: Indicative Cross-Section of Access Street (12m Reservation)



Source: Julie Harrold Architect

The Development Plan area connecting to Parker Street is characterised by a legible orientation towards the main entry (Boulevard) road. This central spine acts as the main thoroughfare for vehicle movement in and out of the development area via the sole entry/exit point connecting to Parker Street.

3.2.3 Intersection Spacing

All intersections are spaced so as to comply with the requirements of the Liveable Neighbourhoods. Accordingly, the Development Plan will result in a safe environment for pedestrians, cyclists and motorists.

3.2.4 Traffic Speed

The local streets proposed by the Development Plan are designed to produce the target vehicle speeds as prescribed by Liveable Neighbourhoods. The proposed local streets are short in length and do not create opportunities for speeding.

3.2.5 Public Transport

Two bus stops are located along Stanley and Hawkins Streets which are within approximately 400m walking distance from the eastern portion of the development.

3.2.6 Pedestrian Circulation and Amenity

The proposed path network will integrate and connect with the existing pedestrian and cycle system and will be developed in consultation with the Town of Port Hedland, responding to the objectives of the Town of Port Hedland Cycle Plan, which promotes a strong north-south link through the site.

The use of reduced front setbacks to dwellings is anticipated to increase the level of amenity for pedestrians, through the shading of footpaths and increased levels of surveillance by the built form.

3.2.7 Streetscape

The proposed street network has been designed to convey to its user its primary function, character and identify and encourages appropriate drive behaviour. Development will be subject to specific design provisions, promoting a high standard of design and passive surveillance of public areas.

3.3 Lot Layout

3.3.1 Density and Diversity

The Development Plan incorporates a mix of low and medium density lot sizes including Residential R25, R40 and Residential R60. A breakdown of the potential lot yield and density is provided in the table below:

Table 3: Lot Density and Diversity

LOT DENSITY AND DIVERSITY			
DENSITY CODE	AREA	ESTIMATED LOTS	ESTIMATED DWELLING UNITS¹
R25	6.904 ha	197	197
R40	0.978 ha	5	44
R60	0.146 ha	1	8
Total	8.028 ha	203	249
Average number of dwellings per hectare			31

¹Based on strict interpretation of the minimum average lot size requirements of the R-Codes

A variety of lot sizes are envisaged, and accordingly, it is not anticipated that the density of the subdivision will reflect the numbers shown in Table 3. These numbers are based on the strict interpretation of the minimum average lot size requirements of the R-Codes, and are therefore higher than what is anticipated to be delivered through the eventual subdivision. Initial concept planning suggests that approximately 120 R25 lots will be created, with the R40 and R60 sites potentially delivering approximately 37 grouped dwellings, equating to approximately **20** dwellings per hectare.

The Residential R40 sites are predominately located adjacent to the main boulevard road. These R40 sites will be developed as grouped housing with a common rear accessway (i.e. preventing vehicular access from main boulevard). An R40 site is also proposed adjacent to the southern drainage corridor, which will increase passive surveillance of this corridor through appropriately orientated development and landscape treatments.

The Residential R60 area within Lot 1693 is located adjacent to the public open space area. This site will be developed with rear access, with strong orientation towards the public realm.

The proposed density of the site will assist in delivering a balanced outcome of residential, affordable, key worker and social housing options. There are obvious existing supply issues with housing in this region, and the medium density sites will provide opportunities for affordable housing to be delivered. Development partners, such as Foundation Housing and BGC Modular, have a strong track-record in the delivery of affordable and well designed medium density housing in this region. Development at R40 and R60 will also enable a variety in housing choice, providing low-maintenance housing options, suited to the needs of a significant portion of residents in this region.

The physical density of the Development Plan area in context of the surrounding area, will not be inconsistent with the urban form, which is characterised by a mix of accommodation facilities, including a caravan park and transient workforce accommodation village. Furthermore, it should be acknowledged that there a number of permanent residents within these areas, highlighting the housing supply issues in this region.

The site is located within approximately 500m of various educational institutions, including the South Hedland Primary School, Hedland Senior High School and the Pundulmurra Aboriginal College, increasing the walkable catchment of these facilities and further supporting the proposed densities.

3.3.2 Lot Type and Shape

R25 areas will predominately include single residential lot product, generally characterised by wide frontages to allow cooling breezes to access living areas of dwellings. Indicative built form typologies have been prepared to illustrate how wider lots, with appropriate built form design measures, can respond to the climatic conditions in the Pilbara (refer **Appendix 3**).

An indicative development pattern has been illustrated on the Development Plan for the R40 and R60 sites, demonstrating how they could successfully be developed incorporating key design elements such as design orientation and controlled vehicular access points. The grouped dwelling sites will have a narrower lot dimension, however given the orientation, will still have access to cooling breezes. Indicative built form typologies have also been produced for these lots by Julie Harrold Architect (refer **Appendix 3**).

3.3.3 Climatic Responsiveness

In contrast to southern Australia, which experiences lower sun angles and cooler conditions, the northern orientation of the more overhead sun angle is not a strong climatic factor for individual lot solar orientation. Lot orientation that favours an east-west alignment will reduce solar exposure and therefore

reduce heat gain to otherwise large external walls. In addition, the east-west alignment encourages cross flow and the potential to capture the cooling westerly breezes. Importantly, the R25 areas, where typical single residential dwellings are likely to be located (rather than grouped or multiple), are predominately configured to facilitate an east-west lot orientation.

3.4 Public Open Space

3.4.1 Amount of Public Open Space

Following discussions with the Town of Port Hedland on the provision of public open space, it was evident that there is a preference to minimise public open space areas in this locality. Accordingly, a small public open space area has been proposed within the Development Plan, which is centrally located and highly accessible from future surrounding residential areas. The public open space area totals 1566m², representing approximately 1.36% of the total gross subdivisible area. The table below illustrates the provision of public open space as per the requirement of Liveable Neighbourhoods:

Table 4: Public Open Space Schedule

TOTAL SITE AREA		
Lots 1693 & 2119 Parker Street & Stanley Street, South Hedland	11.5054 ha	
Total	11.5054 ha	
Deductions		
Nil		
Gross Subdividable Area		11.5054 ha
Public Open Space Requirement (10% of gross subdividable area)		1.15054 ha
Minimum 80% unrestricted open space required	0.92 ha	
Maximum 20% restricted open space allowed	0.23 ha	
Provision of Unrestricted Public Open Space		
- POS Area I	0.0 ha	
Total Unrestricted POS		0.0ha
Provision of Restricted Public Open Space		
- POS Area I (1:5 year ARI)	0.1556 ha	
Total Restricted POS		0.1556 ha
TOTAL PUBLIC OPEN SPACE		0.1556 ha

It is proposed that the public open space will perform a dual-function, being drainage and passive recreation. Whilst it is envisaged that the total public open space area (0.1556ha) will, in conjunction with the drainage reserves, cater for the 1:5 average recurrence interval (ARI) event, it will still be functional as a passive recreation area, providing a focal point for development and an amenity feature for future residents.

The public open space is located centrally within the Development Plan area, increasingly accessibility for all future residents.

The shortfall in provision of POS responds to a general preference to minimise public open space areas in this locality, acknowledging the under use of existing POS areas and on-going maintenance issues identified by the Town of Port Hedland.

3.4.2 Landscape

It is envisaged that the function of the proposed public open space area will be for passive recreation and will include a mix of soft and hard landscaping treatments, characterised by low maintenance planting and physical shade structures. Final design will be confirmed at the detailed design phase, with the Town of Port Hedland.

The following provides an overview of the other proposed landscape treatments in and around the Development Plan area as proposed by landscape consultant UDLA:

- Landscaping will extend along the adjoining drainage reserve to the south of the Development Plan area.
- A 10-15m native tree buffer planting around the perimeter of water tower land.
- A 10-15m native tree buffer to interface between North Circular Road and the future residential areas. This landscaping would be located within the existing and planned road reserves.

3.4.3 Parkland Frontage and Surveillance

The location, layout and design of subdivision and development surrounding public open space should minimise potential problems relating to personal security, property security and poor visual amenity in relation to the park and its boundaries by providing high levels of passive surveillance through public road and direct lot frontage interface.

The layout of the Development Plan, where possible, frames the planned public open space area with streets, which will have houses overlooking the street and POS area as required by Liveable Neighbourhoods. Design provisions will be included for those lots which have direct frontage onto the public open space system, ensuring adequate surveillance and amenity is afforded.

3.5 Urban Water Management

To manage the increased runoff expected from urban development, the site has been divided into smaller sub-catchments to allow for stormwater management measures to be implemented throughout the site to manage stormwater close to source and to facilitate the infiltration of stormwater where possible. The drainage collection and disposal strategy for various events has been designed to ensure the site is protected from flooding during the major events. The stormwater management system incorporates the following measures:

Lot 1693 Parker Street

- Run-off from the road and lots shall be conveyed via the road network to vegetated swales along the Boulevard. The swales will have capacity to contain the 1 in 5yr storm event before discharging to Parker St.
- Larger rainfall events (>1:5 year ARI to 1:100 year ARI) will discharge to Parker Street and flow towards North Circular Drive. Stormwater shall be conveyed via the existing swales either side of Parker Street.

- Run-off will flow to an existing swale on North Circular road. To alleviate any flooding a culvert crossing shall be installed at the north-west corner of Lot 1693 to allow flow to pass under North Circular Drive to the existing drainage system to the north.
- The existing drainage system will ultimately discharge to South Creek via the existing drainage system.

Lot 2119 Stanley Street

- Run-off from the lots and road will discharge directly to Stanley Street via the road network.
- Stanley street is kerbed road and run-off shall gravitate north via the road.
- The run-off will be conveyed west to a kerb opening that discharges to the North Circular Drive swale.
- An existing culvert under North Circular Drive will allow the water to pass under North Circular Drive to the existing drainage system to the north, ultimately discharging to South Creek.

Further details will be outlined in the Local Water Management Strategy (LWMS) which will be lodged under separate cover with the Department of Water and Town of Port Hedland for approval, consistent with the Commission's requirements detailed in Better Urban Water Management (WAPC October 2008). The LWMS details the proposed stormwater management strategy, water conservation options and details regarding the landscaping and irrigation at the site.

3.6 Utilities

Wood & Grieve Engineers were commissioned by Cedar Woods to undertake a servicing investigation to establish the availability of services for the development of Lot 1693 Parker Street and Lot 2119 Stanley Street, South Hedland (refer **Appendix 4**).

A summary of the key findings of the investigation are provided below.

3.6.1 Sewerage

Investigations by Wood and Grieve identified that the South Hedland Wastewater Treatment Plant is nearing capacity and requires upgrade to support further population growth. Wood and Grieve are currently pursuing a response from the Water Corporation (WaterCorp) regarding the capacity of their infrastructure to allow for this development in the short term.

While there are capacity constraints at the current time, connection to physical infrastructure can be achieved.

Preliminary investigations into wastewater reticulation from Lot 1693 and Lot 2119, reveals that it can be extended to connect with existing wastewater reticulation mains within close proximity (approx. 150m) of the site. Consultation with the WaterCorp remains on-going with regards to any requirement for an additional pump station to service this site.

3.6.2 Water Reticulation

WaterCorp have advised that they are currently at their supply limit for the region and therefore the site is unable to be serviced by water. Connection to physical infrastructure however, is possible with reticulation mains running along Stanley Street and Parker Street adjacent to the subject site. These mains would serve as the connection points for the development.

3.6.3 Power

A summary of power connection for each site is summarised as follows:

Lot 1693 Parker Street

Power can be provided by cutting in and out of the existing high voltage line (western side of Parker Street) and establish a switchgear and transformer site on the northern side of the main boulevard (ideally the first group housing site). A second transformer site will be required in the vicinity of the POS at the eastern end of the boulevard.

Lot 2119 Stanley Street

Assuming there is sufficient capacity in the existing high voltage feeder (eastern side of Stanley Street) it is likely that a transformer site (approximately 4.0m x 3.7m) will be established in the vicinity of the proposed development and the transformer is likely to be supplied via drop out fuses off one of the existing high voltage poles. A less likely, but possible, scenario is that the existing low voltage network will have sufficient capacity to supply the proposed twelve lots. This will negate the requirement to establish the transformer site as only low voltage cabling and pillar units will be required.

3.6.4 Telecommunications

On the basis of the new Government initiative under the National Broadband Network (NBN), all telecommunications infrastructure will be provided to the development site by NBN Co.

3.6.5 Gas

Pilbara towns are not provided with a reticulated gas supply network. Gas bottles can be used for residences that would like access to gas for applications such as stove-top cooking.

3.7 Implementation and Staging

Following approval of the Development Plan, an application(s) for subdivision approval will then be prepared and lodged with the Western Australian Planning Commission. Additionally, a Detailed Area Plans (DAP) will be prepared in liaison with the Town of Port Hedland, for use in the assessment of applications for development approval. Design elements covered by the DAP may include, but will not be limited to, setbacks and open space.

4.0 CONCLUSION

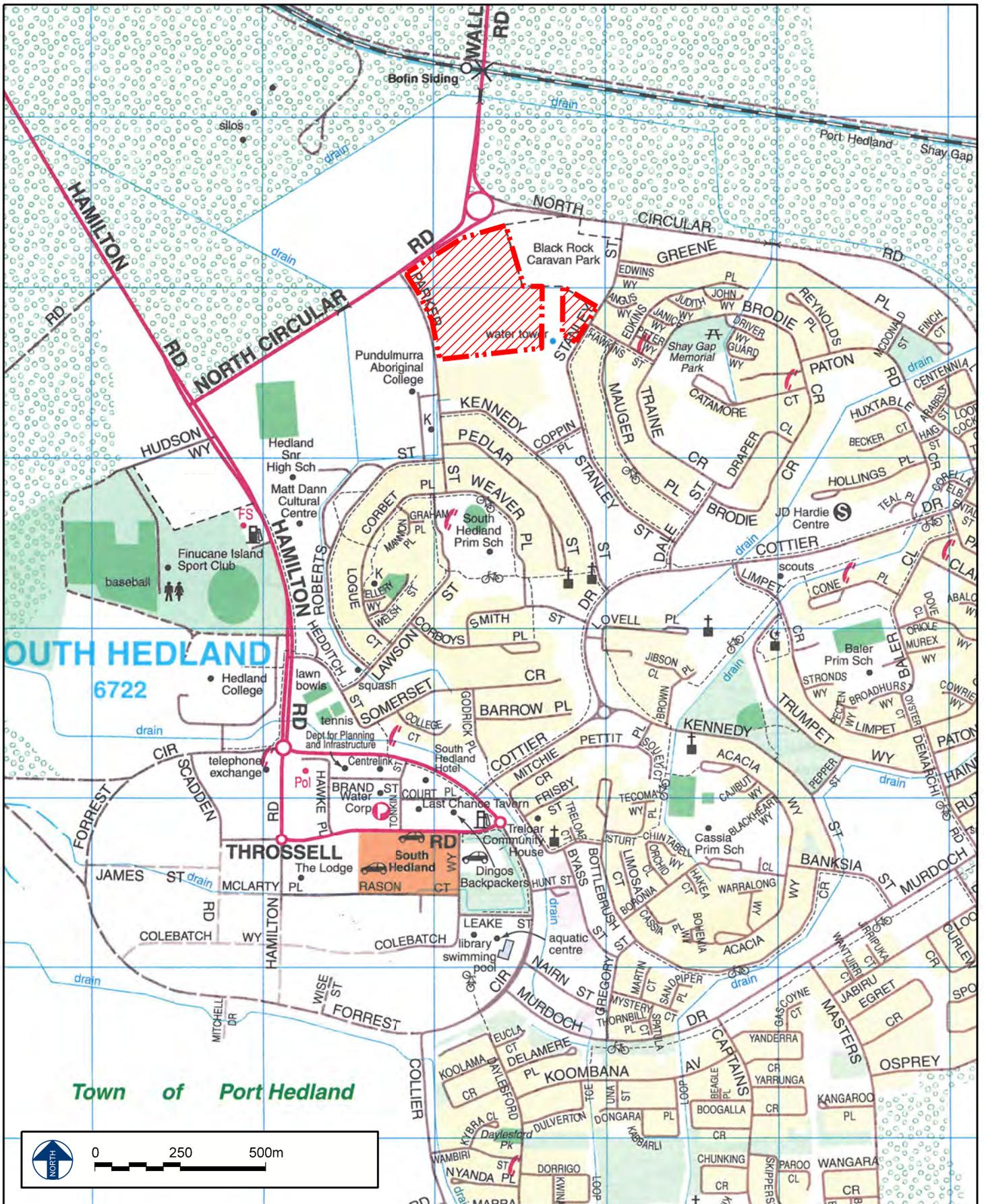
The Development Plan, prepared on behalf of Cedar Woods Properties, illustrates the preferred development option for Lot 1693 Parker Street and Lot 2119 Stanley Street, South Hedland.

The Development Plan will facilitate residential subdivision and development that will assist in meeting a demand for housing in this region.

The Development Plan has been based on a number of best-practice design principles, including climatic responsiveness, legibility, diversity and connectivity. Development will also integrate with the existing urban structure and land use.

A mix of residential densities have been proposed, encouraging a variety of lot sizes to cater for a diversity in housing options for existing and future residents of South Hedland.

The Development Plan has been prepared in accordance with the design requirements established by Liveable Neighbourhoods and approval of the Development Plan will facilitate the future subdivision and development of the subject land.



 Subject Site

LOCATION PLAN

Property Description
**Lot 1693 Parker Street &
 Lot 2119 Stanley Street,
 SOUTH HEDLAND**

Base data supplied by Landgate & Travellers Atlas 9th Edition
 Accuracy +/- 4m. Projection MGA Zone 50.
 Areas and dimensions shown are subject to final survey calculations.
 All cartlageways are shown for illustrative purposes
 only and are subject to detailed engineering design.

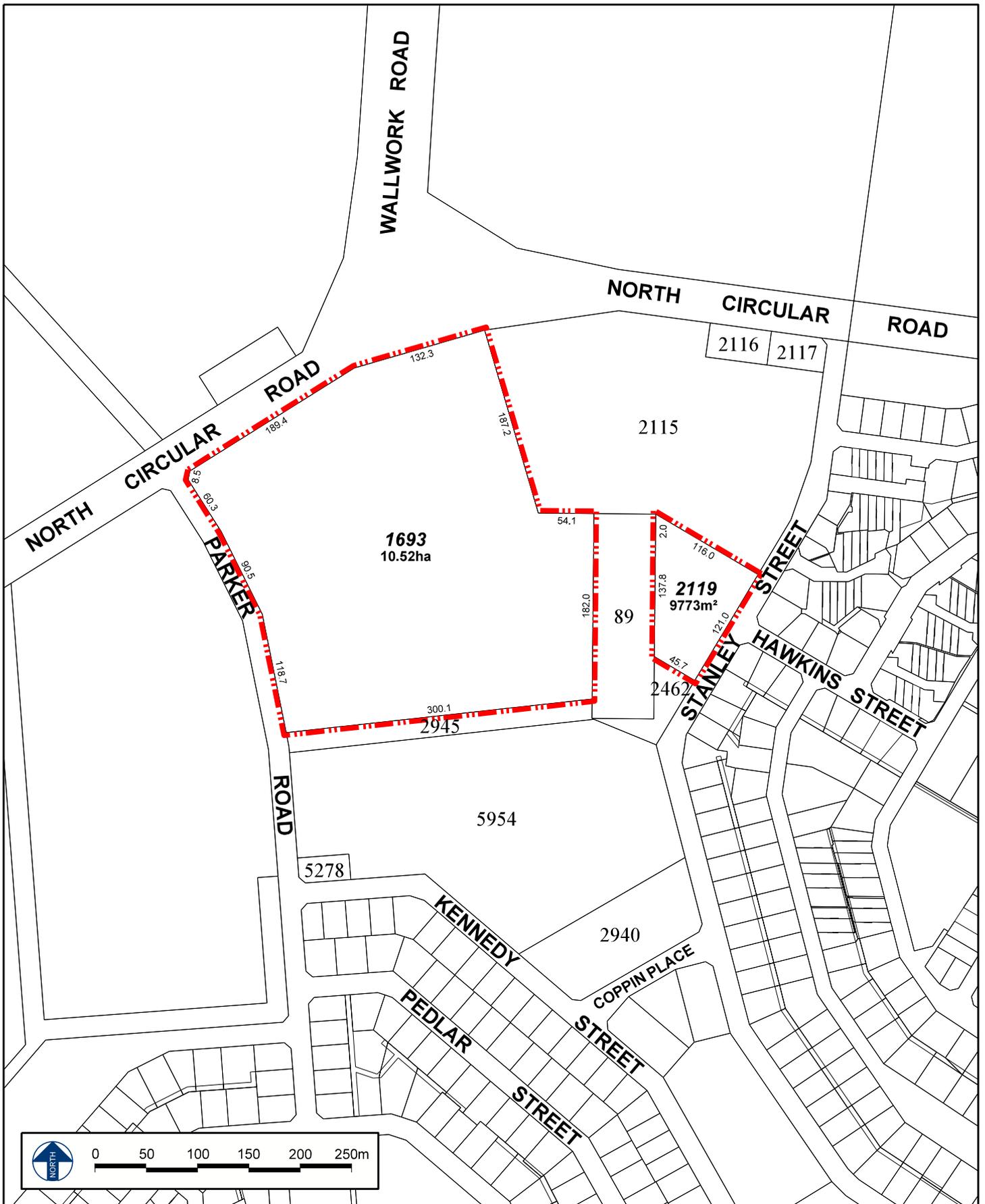
Cedar Wood
 Properties Ltd. : CLIENT
 1:15,000@A4 : SCALE
 14 July 2011 : DATE
 3884-5-001.dgn : PLAN No
 - : REVISION
 T.K. : PLANNER
 L.W. : DRAWN
 N.T. : CHECKED



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FIGURE 1



--- Subject Site

SITE PLAN

Property Description

**Lot 1693 Parker Street &
Lot 2119 Stanley Street,
SOUTH HEDLAND**

Base data supplied by Landgate.

Accuracy +/- 4m. Projection MGA Zone 50.

Areas and dimensions shown are subject to final survey calculations.

All carriageways are shown for illustrative purposes only and are subject to detailed engineering design.

Cedar Wood

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14 July 2011 : DATE

3884-5-002.dgn : PLAN No

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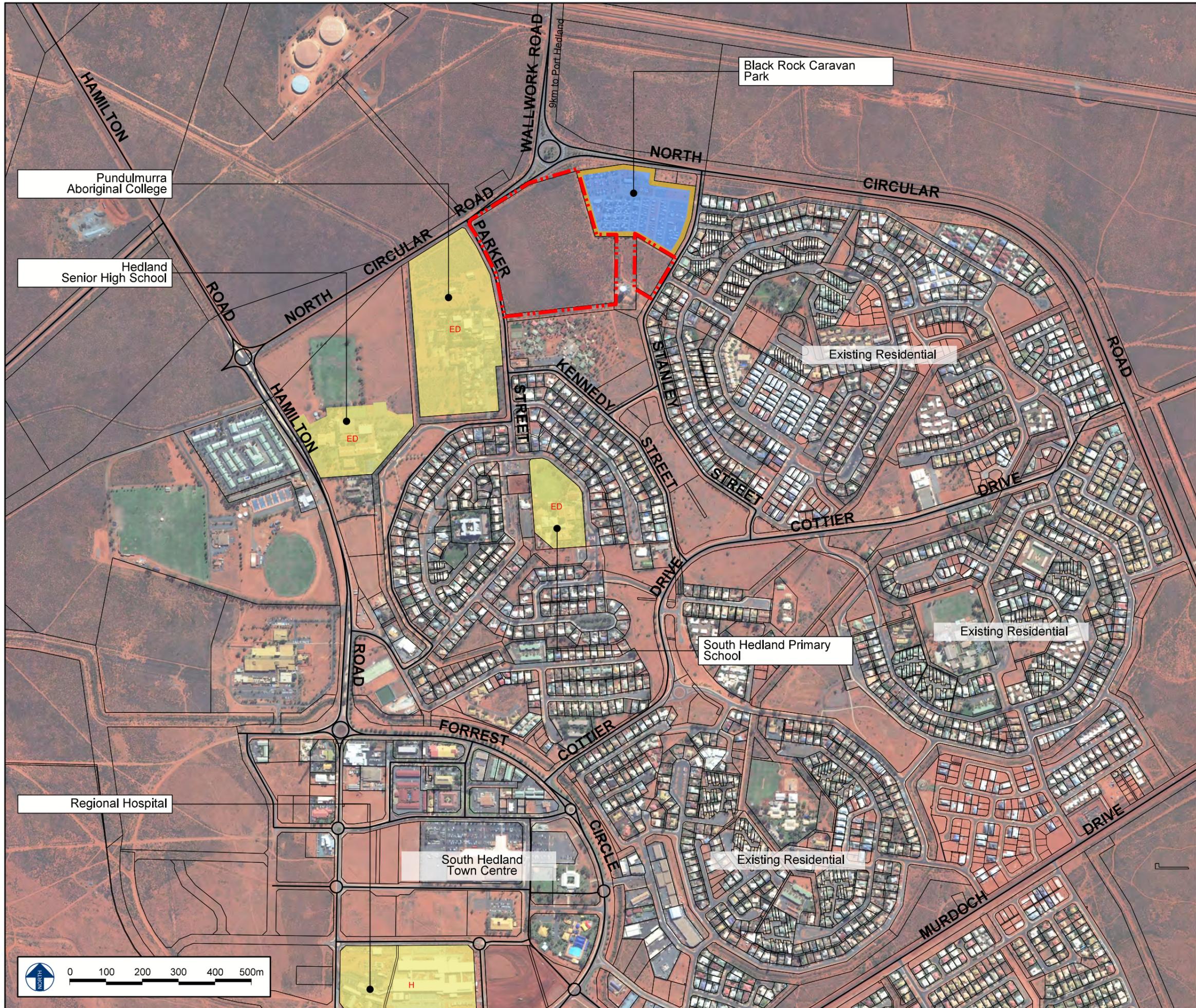
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LOCAL CONTEXT PLAN

Lot 1693 Parker Street &
Lot 2119 Stanley Street,
SOUTH HEDLAND



LEGEND

- - - Subject Site
- Existing Road Connection
- Community
denoted as follows:
ED Education
H Health
- Tourism

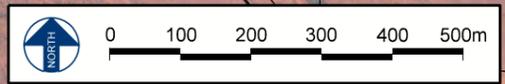
FIGURE 4

Cedar Woods Properties Ltd. : CLIENT
1:10,000@A3 : SCALE
14 July 2011 : DATE
3884-5-004.dgn : PLAN No
- : REVISION
T.K. : PLANNER
L.W. : DRAWN
N.T. : CHECKED

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APPENDIX I

Environmental Assessment Report

ENVIRONMENTAL ASSESSMENT REPORT

Lot 1693 Parker Street and Lot 2119
Stanley Street, South Hedland





ENVIRONMENTAL ASSESSMENT REPORT

**Lot 1693 Parker Street and Lot 2119
Stanley Street, South Hedland**

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Report No: **L10369**

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<i>Rev 0</i>	<i>Final for Issue</i>	<i>RebDaw</i>	<i>JohHal</i>	<i>07.07.11</i>	<i>DC 22.07.11</i>	<i>J. Halleen</i>	<i>26.07.11</i>
<i>Rev 1</i>	<i>Final for Issue</i>	<i>RebDaw</i>	<i>JohHal</i>	<i>15.08.11</i>	<i>DC 15.08.11</i>	<i>J. Halleen</i>	<i>16.08.11</i>

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EXECUTIVE SUMMARY

This Environmental Assessment Report (EAR) has been prepared for 1693 Parker Street and Lot 2119 Stanley Street, South Hedland on behalf of Cedar Woods who are proposing to develop the site for residential development consistent with the Town Planning Scheme (TPS) zoning.

The site is located in South Hedland, which is within the Town of Port Hedland and is approximately 12 hectares (ha) in area.

In November 2009, the Town of Port Hedland initiated a TPS Amendment No. 25 which proposed to rezone Lot 1693 and 2119 Parker Street South Hedland, from “Community” to “Urban Development”.

The TPS Amendment No. 25 was referred to the Environmental Protection Authority (EPA) in April 2010. The EPA in assessing TPS Amendment No. 25 did not identify any significant environmental factors (which included vegetation) on the site. Consequently the EPA determined that TPS Amendment No. 25 not be formally assessed.

The key environmental issue on the site which may pose a constraint to the proposed residential development is surface water. South Hedland experiences periodic cyclonic events resulting in high volume storm water flows. Stormwater management has been consisted in the environmental assessment of the site consistent with the objective outlined in the Better Urban Water Management (WAPC 2008) through the implementation of a Local Water Management Strategy and Urban Water Management Plans for the site.

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1.0 INTRODUCTION

This EAR has been prepared on behalf of Cedar Woods who are proposing to develop Lot 1693 Parker Street and Lot 2119 Stanley Street, South Hedland.

1.1 Objective

The objective of this EAR is to:

- Provide a brief environment context.
- Identify potential environmental issues associated with the residential development proposed for the site.
- Provide environmental management framework in response to the potential environmental issue, where applicable.

1.2 Planning Approval

TPS Amendment 25 was initiated by the Town of Port Hedland to rezone Lots 1693 and 2119 Parker Street South Hedland, from “Community” to “Urban Development”. This Scheme Amendment was recommended as ‘not assessed’ by the Environmental Protection Authority (EPA) in 2010 and the site is now zoned as “Urban Development” in the Town of Port Hedland’s TPS No.5.

Cedar Woods was the successful applicant for 11 lots of land in the Pilbara Cities initiative at South Hedland which included Lots 1693 and 2119 Parker Street.

The Cedar Woods’ successful bid included key alliances with Foundation Housing, BGC Modular, IBN Corporation and Gumala Aboriginal Corporation to provide a balanced outcome of residential, affordable, key worker, social and indigenous housing options.

The project is expected to yield approximately 150 residential lots, depending on lot sizes and planning outcomes

1.3 Concept Development Plan

The Concept Development Plan illustrates an indicative road layout for the site, including the type of residential development proposed and location of public open space (POS) (Figure 2).

2.0 EXISTING ENVIRONMENT

2.1 Location

The site is located in South Hedland, 1600 kilometres (km) north of Perth. The South Hedland town centre is located approximately 2 km to the south of the site (Figure 1).

A water corporation water storage tank located on land that divides the Lots 1693 and 2119 into two sites (Figure 2).

The site is bounded by residential development to the south and south-east. A caravan park to the north-east and an Ibn Corporation Campus to the west.

2.2 Climate

South Hedland is located within a hot, semi-arid climatic zone. Summers (October to April) are very hot with an average maximum temperature of 33.2 °C and daily maximum of up to 36.8 °C in March, the hottest month. Winter temperatures range from an average monthly minimum of 19.4 °C with a daily minimum as low as 12.3 °C in July (Bureau of Meteorology 2010).

Most of the annual rainfall occurs during the summer period from scattered thunderstorms and the occasional tropical cyclone. A secondary peak in rainfall occurs in May as a result of rainfall events caused by tropical cloud bands which intermittently affect the area.

Cyclones are most common in the South Hedland region between February and March and sometimes result in extreme rainfall events, on average the highest daily rainfall is typically recorded mid cyclone season in January.

2.3 Topography, Soils and Geology

2.3.1 Topography and Soils

A feature survey undertaken by McMullen Nolan Group identifies topography on the site as ranging between 9.75 m AHD and 15 m AHD and generally sloping in a westerly direction (Figure 3).

Soils of the South Hedland region are described as alluvial plains and sand plains of alluvial and marine deposits over rocks of the northern Pilbara Craton. They consist of red deep sandy duplexes with deep red loamy earths and some red/brown clays (Tille 2006). The soils can become very hard when dry and waterlogged when heavily watered.

Soils across the site are mapped as extensive sandy plains, chief soils are red earthy sands (Uc5.21) with extensive areas of red earth (Gn2.12) and with some red soils (Dr) along creek lines. Similar to AB21 but without sandstone residuals.

2.3.2 Acid Sulfate Soils

The site is identified in Western Australian Planning Commission (WAPC. 2003) Planning Bulletin 64 as having a “no known risk of Acid Sulfate Soil (ASS) within 3 m of the natural soil surface (or deeper)” and as such, Acid Sulfate Soils are not considered to be a constraint to the proposed development. Figure 4 shows the ASS risk mapping for the site.

2.4 Hydrogeology

The North Pilbara region consists of granite-greenstone bedrock, overlain by thin alluvial sediments in the river valleys (Dept. of Fisheries 2010). The most important groundwater resources are in the alluvial aquifers along the major rivers from the Ashburton to the De Grey. Groundwater is generally fresh ranging to brackish towards the coast (Dept. of Fisheries 2010).

The De Grey River Water Reserve, located north-east of South Hedland, provides the water supply for the Town of Port Hedland. As described by Davidson (1995), the aquifer is unconfined and consists of beds of highly permeable sand and gravel separated by low permeability silt and clay (Water and Rivers Commission (WRC). 2000). The aquifer is recharged largely by freshwater from river flow and rainfall during the wet season’s high intensity rainfall events. As the aquifer is unconfined and recharge is via rainfall and river flow, it is vulnerable to contamination. Any contaminants entering the aquifer from the south could potentially affect water quality.

2.5 Hydrology

2.5.1 Groundwater

A search of the DoW (2011) *Groundwater Bore Database* identified a WIN groundwater bore 5 km to the east with a groundwater depth of 11.58 m AHD. During the database search no water quality data was found to be available for the bores close to the site and no groundwater bore hydrographs were available for the study area.

Water quality within the De Grey River aquifer system is variable with total dissolved solids (TDS) ranging from 200 to 4000 mg/L TDS (WRC. 2000).

The water table in the De Grey River well field is approximately 6 m to 8 m below ground level. Regional groundwater flow is generally north to north-west (WRC. 2000).

2.5.2 Surface Water

Although average annual rainfall is low, the Port Hedland region is characterised by periodic cyclonic events yielding high volume storm flows. During extreme cyclonic events, stormwater may flood low lying areas and soils may become waterlogged.

GHD was commissioned by the Town of Port Hedland to undertake a flood study of South Hedland 2010. The GHD scope included modelling of the 1 in 5, 1 in 10 and 1 in 100 year flood events (GHD 2010). The results from the GHD flood study detail due to the elevated topography of the site, it is not impacted from the 1 in 100 year flood events (Figure 5). Therefore, unlikely that stormwater will remain on the site for extended periods. Stormwater management is addressed in the Local Water Management Plan for the site.

2.5.3 Drainage

Lots in vicinity of the site drain overland to adjacent road reserves and roads are graded to direct stormwater to a network of open channels. The open drains in the area are generally trapezoidal and vary between 1 to 2m deep and have a base width of 2 to 4m. Longitudinal grades are very low with most open drains less than 0.5% (GHD 2010).

The low frequency of storms results in significant accumulation of mobile sediment which quickly blocks pipes and inlet structures. These obstructions have the potential to severely limit the hydraulic capacity of the system resulting in upstream flooding of adjacent properties and roads.

2.6 Wetlands

There are no ecologically significant wetlands on or within vicinity of the site, therefore wetlands will pose no constraint on proposed development.

2.7 Flora and Vegetation

Vegetation in the area is sparse and mostly representative of the semi arid northern areas of the state. In a review of aerial photography of the site, vegetation appears degraded with an absence of any significant upper storey vegetation.

2.7.1 Vegetation

Vegetation complexes on the site are mapped as “hummock grasslands, dwarf shrub steppe; *Acacia translucens* over soft spinifex” (Beard 1971) (Figure 6).

A search of the DEC's Threatened Ecological database was undertaken in May 2011, No TECs were identified within vicinity of the site.

2.7.2 Conservation Significant Flora

A search of the DEC's Threatened (Declared Rare) Flora database, the Western Australian Herbarium Specimen database and the Declared Rare and Priority Flora List was undertaken on 18 May 2011.

A total of seven priority species as listed by the DEC, are documented as occurring within a 10 km radius of the site. These species are the *Acacia glaucocaesia* (P3), *Euphorbia dementii* (P1), *Gomphrena pusilla* (P2), *Gomphrena cucullata* (P2) *Heliotropium muticum* (P1), *Ptilotus appendiculatus var. minor* (P1), *Tephrosia andrewii* (P1) (Figure 7).

Due to the degraded nature of vegetation on the site it is considered highly unlikely that any of these species occur on site.

2.8 Fauna

A search of the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) website for matters of National Environmental Significance (NES) protected under the Environmental Protection and Biodiversity Conservation (EPBC) Act within the site area (undertaken on 26 May 2011) showed a number of listed species that potentially utilise the site (Appendix I).

A search of the DEC Threatened Species Database was undertaken on 16 May 2011 and identified species of conservation significance under Western Australian legislation (*Wildlife Conservation Act, 1950*) that may occur within the site.

Table I provides the species lists produced from these searches, and discusses the likelihood of their occurrence on the site and impact from the proposed development. None of the species are considered likely to inhabit the site and therefore should not be impacted by the proposed development.

Table I: Fauna Species of Conservation Significance that are Recognised to Potentially occur within the Subject Area (DEC Threatened Fauna Database)

Species	Common Name	WA Status	EPBC Status	Habitat Availability within Subject Area
Birds				
<i>Apus pacificus</i>	Fork-tailed Swift		M	The fork tailed swift mostly occurs over dry or open habitats and are also found in settled areas. Therefore, the Fork-tailed Swift may occur on the site, however due to their infrequent landings, the proposed development is considered unlikely to impact it.

Species	Common Name	WA Status	EPBC Status	Habitat Availability within Subject Area
<i>Ardea alba</i>	Great Egret (White Egret)		M	The Great Egret is considered unlikely to occur on site as it inhabits wetlands.
<i>Ardea ibis</i>	Cattle Egret		M	The Cattle Egret typically occurs in temperate and tropical grasslands, wooded areas and terrestrial wetlands, very rarely occurring in arid and semi arid areas. Therefore it is considered highly unlikely that the Cattle Egret occur on the site.
<i>Haliaeetus leucogaster</i>	White bellied Sea Eagle		M	As the habitat of the white bellied sea eagle includes large open areas of water (ocean, large rivers, swamps and lakes), it is unlikely that it would inhabit or utilise the site.
<i>Ardeotis australis</i>	Australian Bustard	P 4		Occurs on dry plains, grasslands and open woodlands. The site is not considered likely to provide significant habitat for the Australian Bustard.
<i>Falco peregrinus</i>	Peregrine Falcon	S 4		Occurs from woodlands to open grasslands and coastal cliffs. The site is not considered likely to provide significant habitat for the falcon.
<i>Hirundo rustica</i>	Barn Swallow		M	The Barn Swallow prefers open areas with low vegetation. However, as there are no perching or roosting areas present on the site, the proposed development is not considered likely to impact the swallow.
<i>Merops ornatus</i>	Rainbow Bee-eater		M	The Rainbow Bee eater occurs mainly in open forest and woodlands, shrublands and semi cleared habitats that are often located in close proximity to water. The Rainbow Bee-eater may infrequently visit the site, however due to the lack of vegetation, including perching habitat, it is unlikely that the proposed development will impact it.
<i>Charadrius veredus</i>	Oriental Plover (Oriental Dotterel)		M	Although the Oriental Plover occurs in both coastal and inland areas. It favours is not considered likely to occur on the site.
<i>Glareola maldivarum</i>	Oriental Pranticole		M	The Oriental Pranticole is considered unlikely to inhabit the site as although widespread across Northern Australia, it occurs infrequently inland.
<i>Numenius madagascariensis</i>	Eastern Curlew	P4	M	The Eastern Curlew has a primarily coastal distribution in Australia and are therefore considered unlikely to inhabit the site.
Mammals				
<i>Dasyurus hallucatus</i>	Northern Quoll	E (S 1)	E	The Northern Quoll prefers rocky areas and Eucalypt forests, therefore the site is considered unsuitable habitat.
<i>Macrotis lagotis</i>	Greater Bilby	V (S 1)	V	The Greater Bilby inhabits sandy desert areas inhabit with Spinifex grasslands. It is considered unlikely to occur on site due to the proximity to South Hedland and the sparse nature of vegetation on site.

Species	Common Name	WA Status	EPBC Status	Habitat Availability within Subject Area
<i>Rhinioncteris aurantia</i>	Pilbara Leaf-nosed Bat	S 1	V	The Pilbara leaf-nosed bat roosts in mine sites or caves. Therefore there is no habitat available on site.
<i>Dasycercus cristicauda</i>	Crest-tailed Mulgara	S 1	V	The crest tailed mulgara shelters in burrows and prefers vegetated sand dune habitats. It is considered unlikely that there is suitable habitat present on site.
<i>Dasycercus blythi</i>	Brush tailed Mulgara	P 4		Occurs in Spinifex grasslands. Due to the degraded nature of vegetation on site it is considered unlikely that this species occurs on site.

Schedule 1 = Rare or likely to become
Schedule 4 = Other specially protected fauna
P4 = Priority 4 (taxa in need of monitoring)
P5 = Priority 5 (taxa that are conservation dependent)
V = Vulnerable
E = Endangered
M = Migratory

2.9 Aboriginal Heritage

A search of the Department of Indigenous Affairs (DIA) Database on 26 May 2011 showed no registered Aboriginal heritage sites within the subject area. The results of the Department of Indigenous Affairs Aboriginal Heritage Enquiry System search is presented as Appendix 2.

All contractors working on the development will be made aware of their responsibilities under the *Aboriginal Heritage Act 1972* with regard to finding potential archaeological sites. In the event that a potential site is discovered, all work in the area will cease and the DIA will be contacted.

3.0 POTENTIAL IMPACTS AND MANAGEMENT

In response to the environmental values of the site mentioned in Section 3, the following section outlines the likely impacts and subsequent management measures to minimise and mitigate any impacts to the environment resulting from development of the site.

3.1 Acid Sulfate Soils

According to existing DEC mapping, there is no known risk of ASS occurring within the site. Based on this, it is not considered that any further works in regard to ASS will be required.

3.2 Water Management

Stormwater is likely to be the only hydrological constraint to the development due to the flash flooding likely to occur during storms and cyclone events. A Local Water Management Strategy will be undertaken as part of the structure plan approval process to address surface water issues.

Thereafter it is proposed that an Urban Water Management Plan be developed to address water management at the subdivision phase of development.

3.3 Flora and Vegetation

As outlined in Section 3.6, native vegetation on the site is mapped as “hummock grasslands, dwarf shrub steppe; *Acacia translucens* over soft spinifex” (Beard 1971). Shepherd, Beeston and Hopkins (2002) gives an estimate of the percentage of each of Beard’s vegetation associations that remains compared to its pre-European settlement extent, so an estimate of the scarcity of each vegetation association can be determined. For the vegetation association above, it is estimated that 100% of their pre-European settlement extent remains (Shepherd et al. 2002). Therefore, development of 12 hectares of this vegetation association will not have a significant environmental impact.

This vegetation is typical of that in the region and it is not considered likely that the proposed development will impact any significant vegetation on site.

Lots 2119 and 1693 have previously been assessed by the EPA under a Section 48A referral as “Town of Port Hedland TPS5 Amendment 25 Rezoning Lots 2115, 2116 and 2117 North Circular Road, Lot 2119 Stanley Street and Lot 1693 Parker Street South Hedland”. It was recommended that TPS Amendment No. 25 not be formally assessed as the amendment would not result in clearing of regional significant native vegetation.

Therefore, vegetation on site is not considered to pose a constraint to proposed development and no further work is considered necessary.

3.4 Fauna

As outlined above, the vegetation on the site is degraded with no over storey. As a result it is considered highly unlikely that the site contains any significant fauna habitat.

A search of the EPBC Protected Matters and the DEC Threatened and Priority Fauna databases produced a list of species of conservation significance listed under state and/or federal legislation that potentially occur on the site. Based on this search, it is considered unlikely that the site provides significant habitat for any of these species.

3.5 Potential Contamination

A search of the DEC's Contaminated Sites Database revealed no registered contaminated sites on or nearby the site. A Preliminary Site Investigation (PSI) is not considered necessary as there have been no obvious previous contaminating land uses.

4.0 CONCLUSION

Following review of environmental characteristics and values across the site, the likely impacts resulting from development of the site and the subsequent management commitments are summarised below.

Table 2: Potential Constraints and Management Recommendations

	Objective	Potential Impact	Management Recommendations
Wetlands	To maintain the integrity, ecological functions and environmental values of wetlands	There have been no wetlands identified within vicinity of the site. Therefore the proposed development will have no impact on wetlands.	No further work is considered necessary.
Acid Sulfate Soils	To ensure that ASS are not disturbed during earthworks and construction activities.	According to regional DEC mapping, it is unlikely that ASS will be encountered during ground disturbing activities.	No ASS investigations are considered necessary due to the DEC mapping over the site. However, geotechnical investigations to be undertaken on the site will confirm this.
Surface water	To maintain the quantity and quality of water so that existing and potential environmental values, including ecosystem function, are protected.	There are no ecologically sensitive ecosystems or wetlands within vicinity of the site that may be impacted by changes in the hydrological regime as a result of from development. Stormwater within the development will require management.	LWMS and UWMP will be prepared at appropriate planning and development stages in accordance with <i>Better Urban Water Management Guidelines</i> (WAPC 2008). These plans will provide further detail in respect to surface and ground water management relevant to detailed planning and engineering of the development design.
Vegetation	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.	Potential impacts to vegetation on site are minimal as vegetation on site is degraded and well represented with the region.	Vegetation is not considered likely to pose a constraint on the proposed development and no further assessments are considered necessary.

	Objective	Potential Impact	Management Recommendations
Surrounding Land Uses	To ensure surrounding land uses do not impact future development of the site.	Surrounding land uses are not considered likely to impact the proposed development. Dust and noise during construction however dust management will have to be undertaken to protect neighbouring residential land, caravan park and TAFE.	Dust and noise management should be addressed in a Construction Management Plan for the site
Site Contamination	To ensure previous land uses within and surrounding the site do not impact on proposed development of the site.	The DEC contaminated sites database shows no contaminated sites within vicinity of the site. Previous land uses are not considered likely to have contaminated soil or groundwater on site.	A Preliminary Site Investigation (PSI) is not considered necessary.
Fauna	To maintain the abundance, diversity, geographic distribution and productivity of native fauna at the species and ecosystem levels.	The site is not considered likely to contain important habitat for any significant fauna	No fauna species are considered likely to constrain the proposed development and no further work is considered necessary.

5.0 REFERENCES

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FIGURES

LEGEND

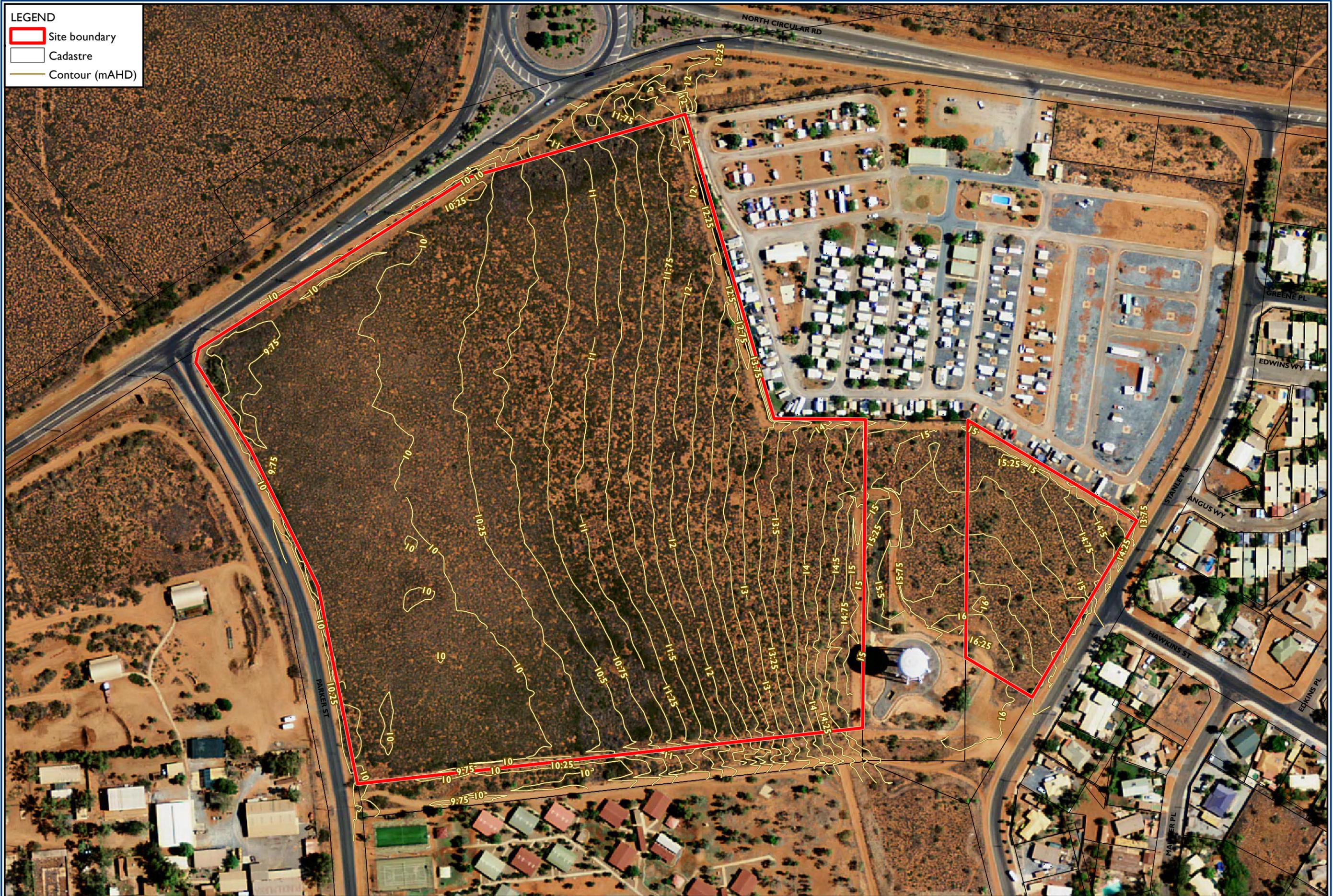
- Site boundary
- Cadastre





LEGEND

-  Site boundary
-  Cadastre
-  Contour (mAHD)



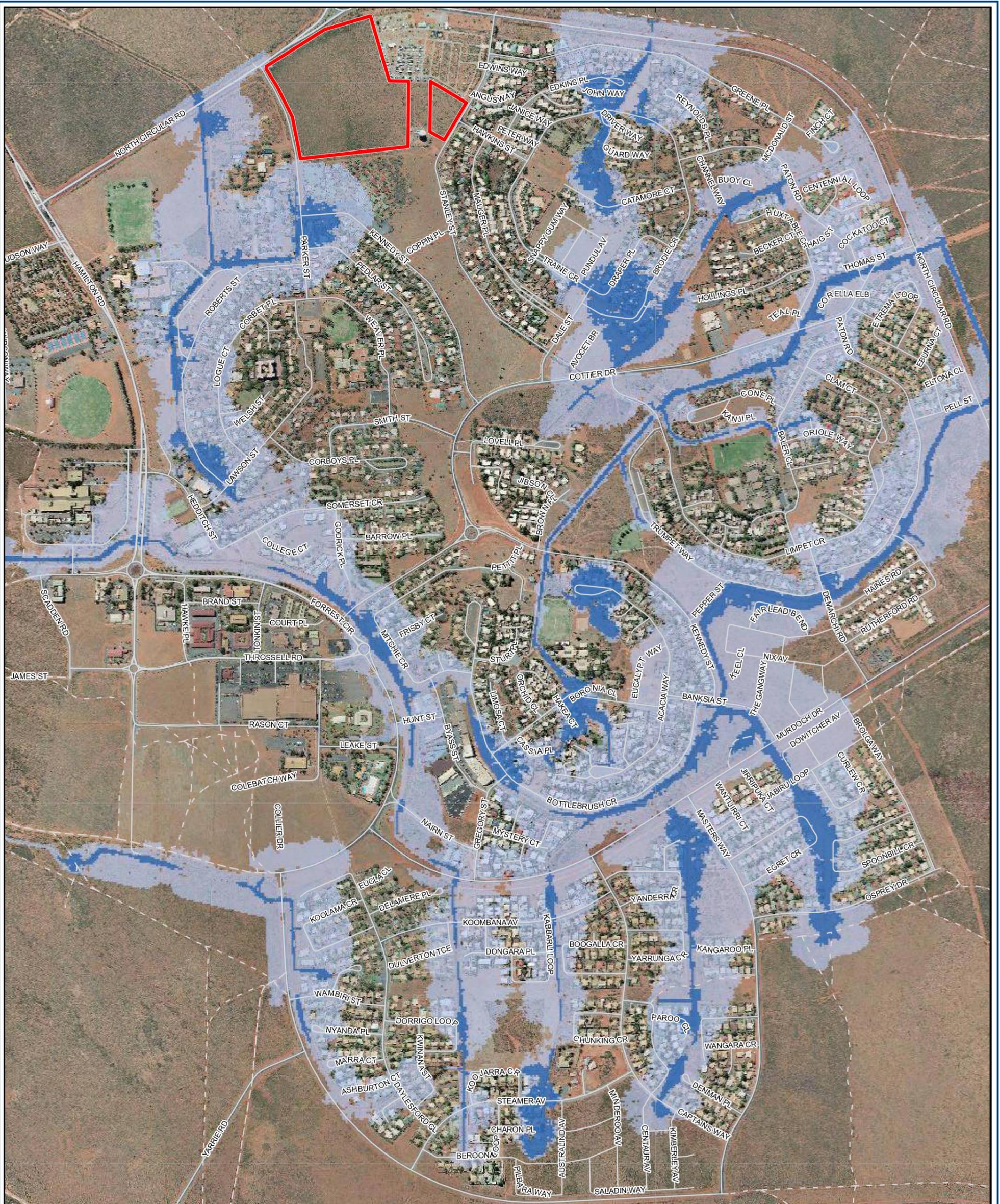


LEGEND

- Site boundary
- Cadastre
- High to moderate ASS disturbance risk (<3m from surface)
- Moderate to low ASS disturbance risk (<3m from surface)

Job Number: L10369
 Date: 16.06.11
 Scale: 1:25,000 @ A3
 Revision: A
 Drafted by: HT
 Source: Orthophoto - Landgate, 2009 Cadastre - Landgate, 2011, Soil Mapping - DEC 2010





LEGEND

- Site boundary
- 5 Year Expected Flood Extents
- 100 Year Expected Flood Extents

Roads

- Track
- Minor Unsealed Road
- Minor Sealed Road
- Main Road



LEGEND

- Site boundary
- Cadastre

Native Vegetation Extent by Type

- 127 - Bare areas; mud flats
- 589 - Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Hummock grasslands , grass steppe; soft spinifex
- 647 - Hummock grasslands, dwarf-shrub steppe; Acacia translucens over soft spinifex

Job Number: LI0369
 Date: 6.06.11
 Scale: 1:25,000 @ A3
 Revision: A
 Drafted by: HT
 Source: Orthophoto, Vegetation Mapping, Cadastre, - Landgate, 2009, 2010, 2011
 Threatened Flora - DEC 2010.



Figure 6

APPENDIX I

Protected Matters Search Results (EPBC Act)



Australian Government

Department of Sustainability, Environment,
Water, Population and Communities

EPBC Act Protected Matters Report: Coordinates

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: 26/05/11 11:04:43



[Summary](#)

[Details](#)

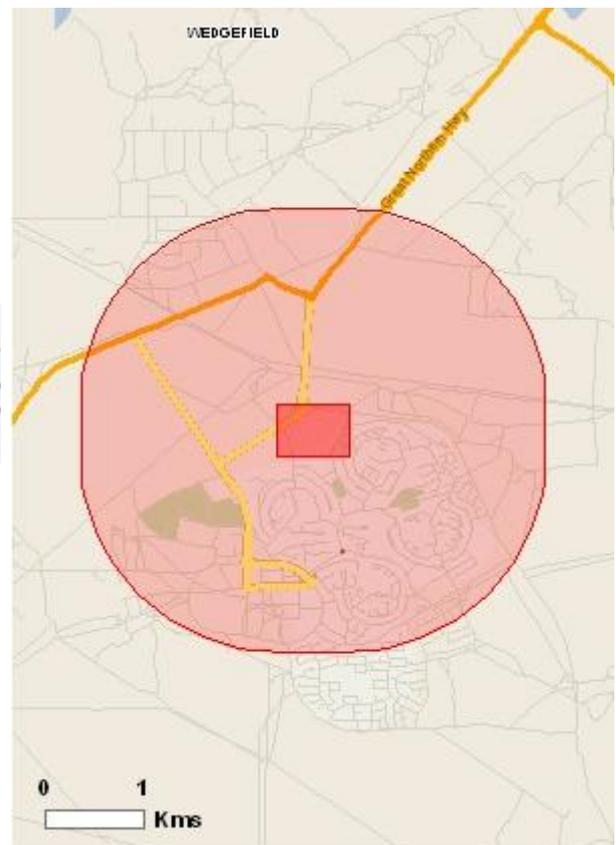
[Matters of NES](#)

[Other matters protected by
the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
©Commonwealth of Australia (Geoscience
Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 2.0Km

Summary

Matters of National Environmental 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>.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance (Ramsar Wetlands):	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	3
Migratory Species:	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>

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

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.au/epbc/permits/index.html>.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	8
Whales and Other Cetaceans:	None

Critical Habitats:	None
Commonwealth Reserves:	None

Report Summary for Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	None
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	7
Nationally Important Wetlands:	None

Details

Matters of National Environmental Significance

Threatened Species [[Resource Information](#)]

Name	Status	Type of Presence
MAMMALS		
Dasyurus hallucatus		
Northern Quoll [331]	Endangered	Species or species habitat likely to occur within area
Macrotis lagotis		
Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area

Migratory Species [[Resource Information](#)]

Name	Status	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba		

Great Egret, White Egret [59541] Ardea ibis	Species or species habitat may occur within area
Cattle Egret [59542] Charadrius veredus	Species or species habitat may occur within area
Oriental Plover, Oriental Dotterel [882] Glareola maldivarum	Species or species habitat may occur within area
Oriental Pratincole [840]	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [[Resource Information](#)]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land -

Listed Marine Species [[Resource Information](#)]

Name	Status	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678] Ardea alba		Species or species habitat may occur within area
Great Egret, White Egret [59541] Ardea ibis		Species or species habitat may occur within area
Cattle Egret [59542] Charadrius veredus		Species or species habitat may occur within area
Oriental Plover, Oriental Dotterel [882] Glareola maldivarum		Species or species habitat may occur within area
Oriental Pratincole [840] Haliaeetus leucogaster		Species or species habitat may occur within area
White-bellied Sea-Eagle [943] Hirundo rustica		Species or species habitat likely to occur within area
Barn Swallow [662] Merops ornatus		Species or species habitat may occur within area
Rainbow Bee-eater [670]		Species or species habitat may 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 Resources Audit, 2001.

Name	Status	Type of Presence
Mammals		
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area

[Oryctolagus cuniculus](#)

Rabbit, European Rabbit [128]

Species or species habitat likely to occur within area

[Vulpes vulpes](#)

Red Fox, Fox [18]

Species or species habitat may occur within area

Plants

[Cenchrus ciliaris](#)

Buffel-grass, Black Buffel-grass [20213]

Species or species habitat likely to occur within area

[Parkinsonia aculeata](#)

Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]

Species or species habitat may occur within area

[Prosopis spp.](#)

Mesquite, Algaroba [68407]

Species or species habitat likely to occur within area

[Salvinia molesta](#)

Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]

Species or species habitat may occur within area

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 resolutions.

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 information sources.

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.

Coordinates

-20.39251 118.59909,-20.39251 118.60571,-20.39733 118.60571,-20.39733 118.59909,-20.39251 118.59909

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.

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[Department of Sustainability, Environment, Water, Population and Communities](#)

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APPENDIX 2

**Department of Indigenous
Affairs Aboriginal Heritage
Inquiry System Search**



Search Criteria

0 sites in a search box. The box is formed by these diagonally opposed corner points:

MGA Zone 50	
Northing	Easting
7743382	666629
7744335	667840



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.

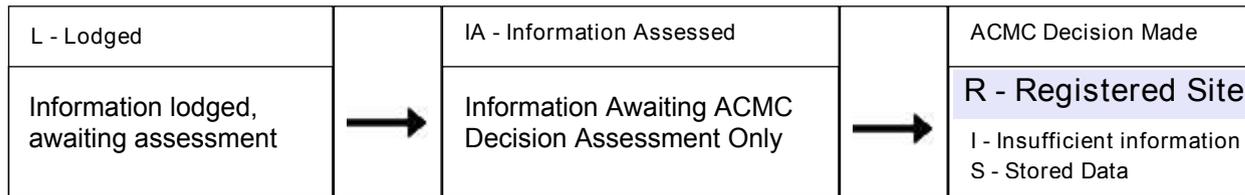
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Legend

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



*Explanation of Assessment

Sites lodged with the Department are assessed under the direction of the Registrar of Aboriginal Sites. These are not the final assessment.

Final assessment and decisions will be determined by the Aboriginal Cultural Material Committee (ACMC).

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.

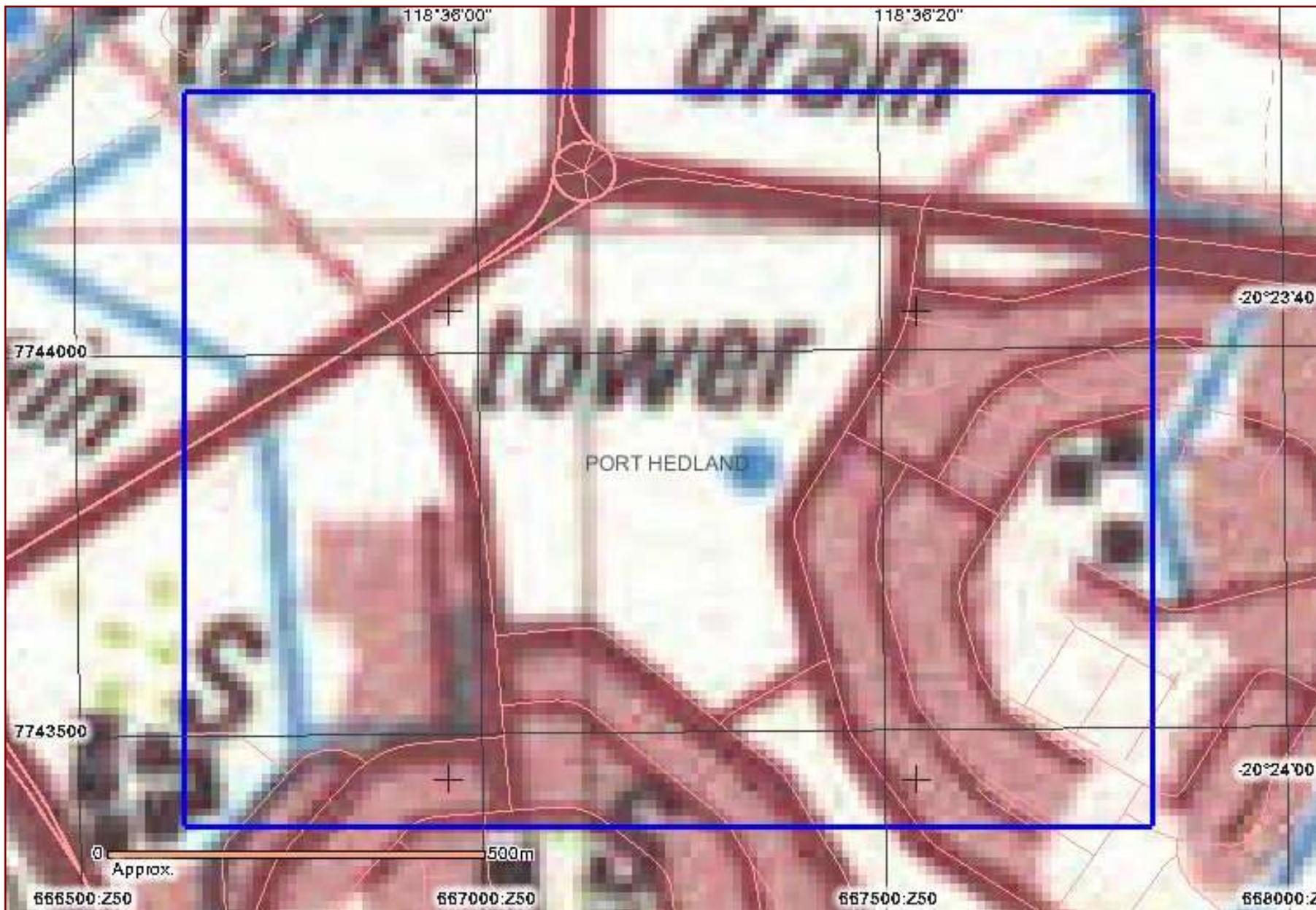
Sites Shown on Maps

Site boundaries may not appear on maps at low zoom levels



List of Registered Aboriginal Sites with Map

No results



Legend

- Selected Heritage Sites
-  Registered Sites
-  Town
-  Map Area
-  Search Area

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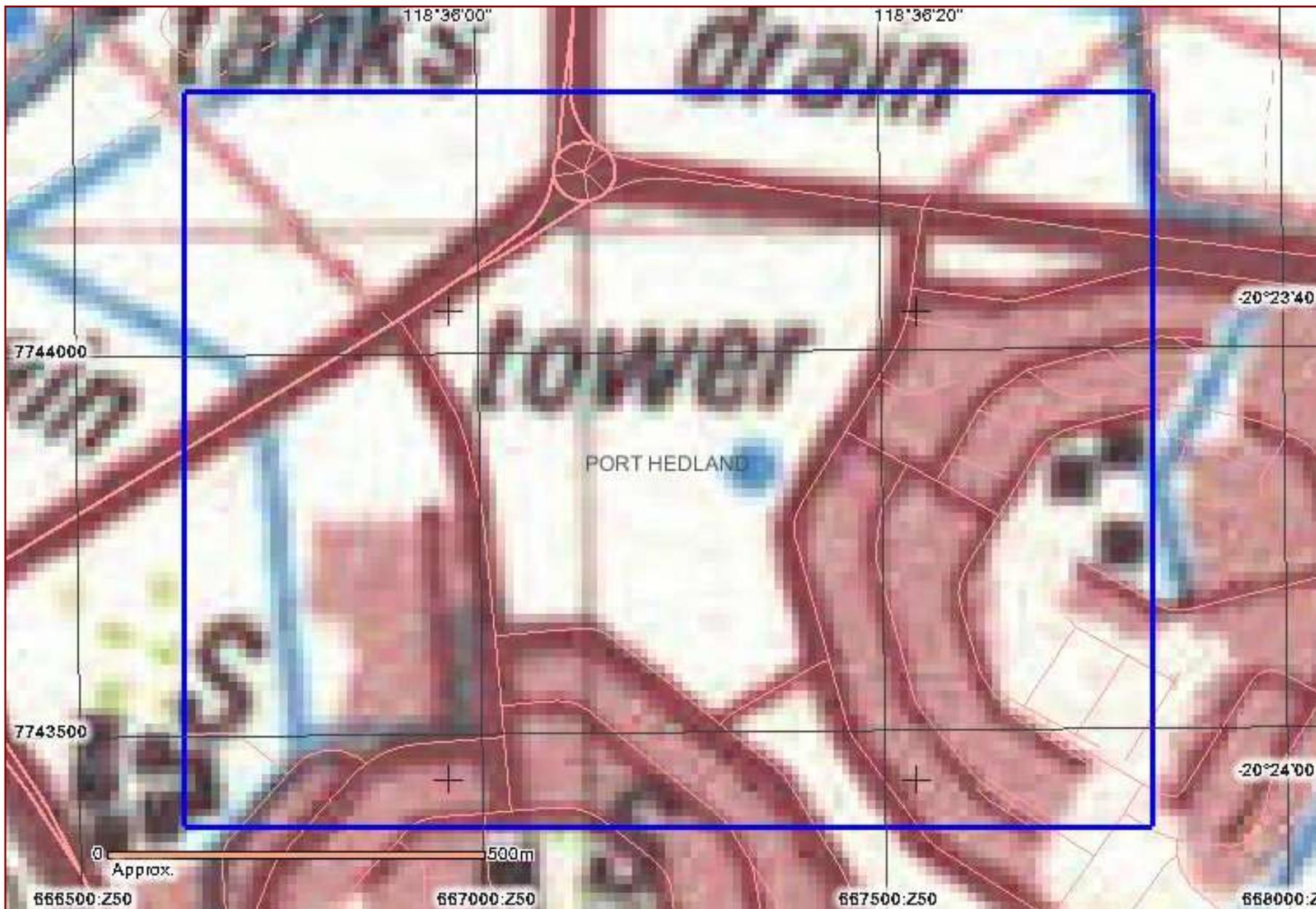
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List of Other Heritage Places with Map

No results



Legend

- Selected Heritage Sites
- Other Heritage Places
- Town
- Map Area
- Search Area

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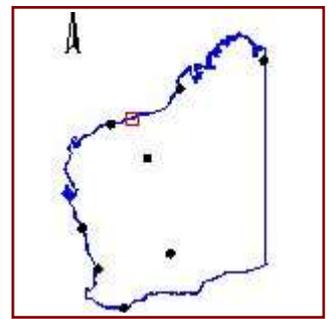
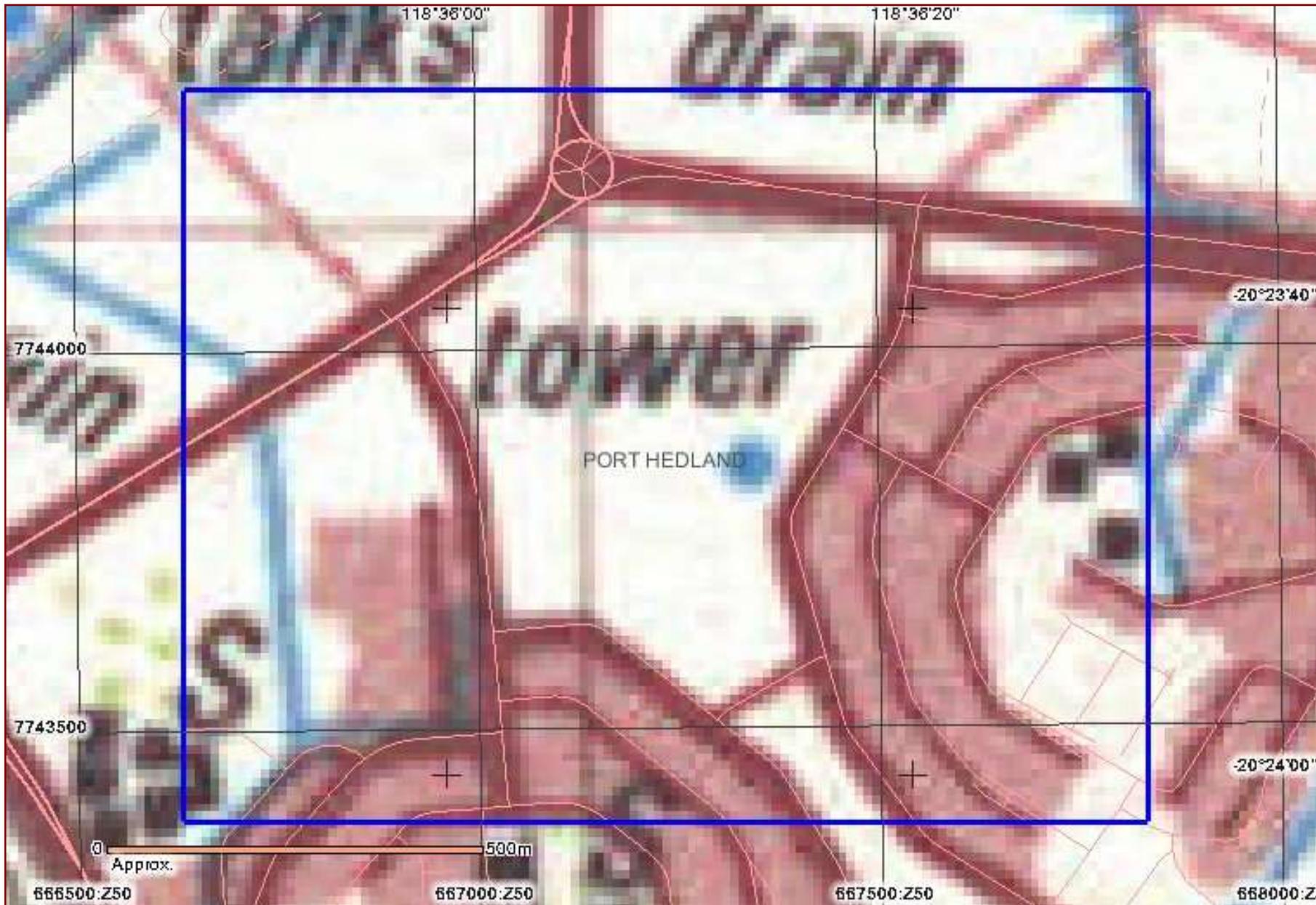
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Map Showing Registered Aboriginal Sites and Other Heritage Places



Legend

- Selected Heritage Sites
 - Registered Sites
 - Other Heritage Places
- Town
- Map Area
- Search Area

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APPENDIX 3

**EPA Advice on TPS
Amendment No. 25**

Environmental Protection Authority

Tuesday April 20 2010 12:5 PM

Weekly record of determinations for

S48A Referrals

Title: Town of Port Hedland TPS 5 Amendment 25 Rezoning Lots 2115, 2116 & 2117
North Circular Road, Lot 2119 Stanley Street and Lot 1693 Parker Street South
Hedland

Rec No: A297504 **Date Received** 12/04/2010 **Date More Info**

Referrer: Town of Port Hedland

Responsible Authority: Town of Port Hedland

Contact: Attn: Nichole Sullivan

Telephone: 9158 9321

LGA: Town of Port Hedland

Environ Native vegetation.

Factors:

Potential Amendment will not result in clearing of regionally significant native vegetation.

Significant

Effects:

Management: Nil.

Officer: Gerard O'Brien

Recommendations:
Scheme Amendment Not
Assessed (no appeals)

Chairman's comments:

Chairman's initials: 

Date Signed: 21.4.10

APPENDIX 2

Traffic Assessment Report

Parker and Stanley Street Residential,
South Hedland
Transport Assessment Report

Project Number: CEP02077



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Document Control:Parker and Stanley Street Residential, South Hedland- Transport Assessment Report					
Version	Date	Author		Reviewer	
		Name	Initials	Name	Initials
1 (DRAFT)	July 2011	Duncan Tjin	DT	Ray Cook	RC
2 (FINAL)	August 2011	Duncan Tjin		Ray Cook	

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Attachment A:

- Appendix A Parker and Stanley Street Residential Plans
- Appendix B Town of Port Hedland Plans
- Appendix C SIDRA results

1 INTRODUCTION / BACKGROUND

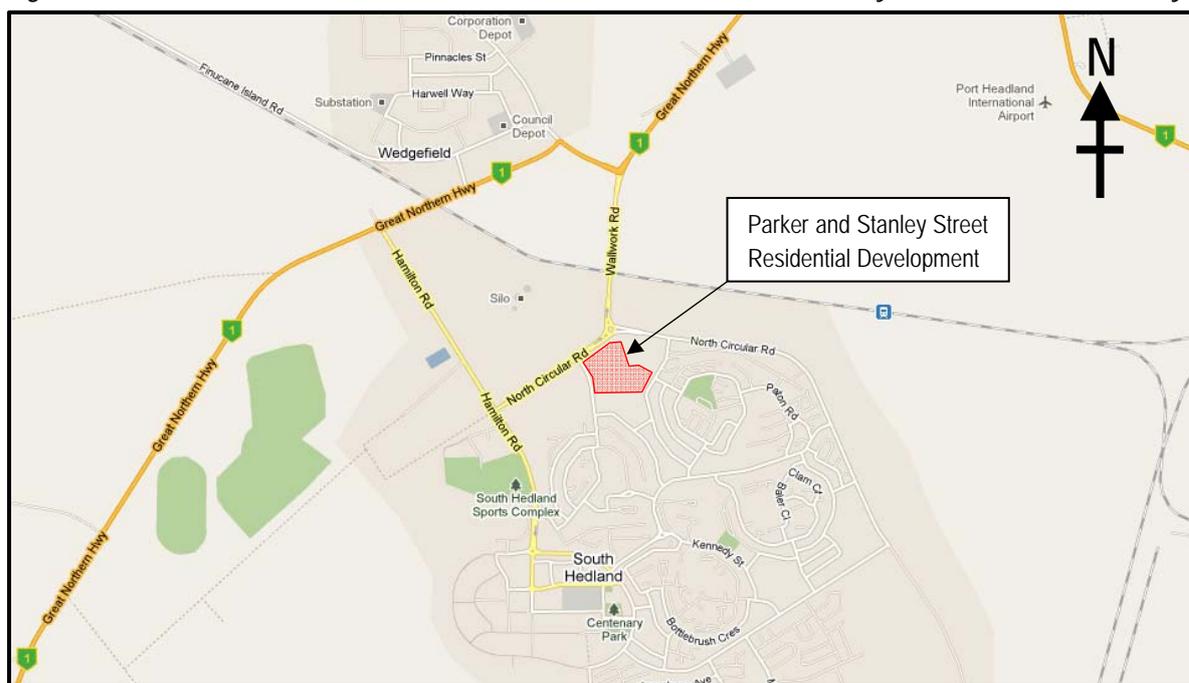
Cedar Woods Properties Limited (Cedar Woods) has commissioned Cardno Eppell Olsen (Cardno) to prepare a *Transport Assessment* for the Parker and Stanley Street Residential development, South Hedland. The development is located within the *South Hedland Entry* development area as described by the *Town of Port Hedland: Town Planning Scheme No.5*. The development is bounded by North Circular Road to the north and Parker and Stanley Streets to the west and east respectively.

This report has been prepared in accordance with the Western Australian Planning Commission (WAPC) *Transport Assessment Guidelines for Developments: Volume 3 – Subdivisions (2006)*. Specifically, this report aims to assess the impacts of the proposed Parker Street Residential development upon the adjacent road network, with a focus on traffic operations, circulation and car parking.

The proposed development will comprise both low and medium density residential uses to provide additional supply within the South Hedland area as illustrated on **Figure 1**.

Figure 1

Parker and Stanley Street Residential Locality



Information received from Council regarding existing traffic count data as well as existing public transport, pedestrian and cycle networks are referenced within the report. Additionally, reference is made to a traffic study currently being undertaken within the South Hedland area that assesses the existing road network and provides recommendations, if required, for future road infrastructure upgrade.

2 DEVELOPMENT PROPOSAL

2.1 PARKER AND STANLEY STREET RESIDENTIAL

The proposed development comprises a mixture of low and medium density accommodation on an existing green field site. It is understood that the proposed residential area will provide additional accommodation supply within the South Hedland area to service the expected growth within the greater Port Hedland region.

2.2 LAND USES

Cedar Woods are proposing to develop the Parker and Stanley Street Residential development on existing vacant land, at Lots 1693 and 2119 South Hedland. The development plans included at **Appendix A**, prepared by Julie Harrold Architect, comprise the following elements:

- 125 residential R30 dwellings (125 lots connecting to Parker Street)
- up to 100R60 dwellings (70 dwellings connecting to Parker Street and 30 dwellings connecting to Stanley Street).

2.3 ACCESS ARRANGEMENT

The development proposes to connect with Parker Street and Stanley Street, as illustrated at **Appendix A**. The Parker Street intersection, proposed as an un-signalised T-intersection arrangement is expected to accommodate 125 low density lots and up to 70 medium density dwellings. Further, the access locations on Stanley Street proposed as a three way Give Way controlled configuration will service 30 medium density sites.

2.4 DEVELOPMENT GENERATED TRAFFIC

Trip generation for the development has been estimated generally in accordance with *The Institute of Transportation Engineers (ITE): Trip Generation 7th Edition*. For the purpose of determining potential trip generation rates, the proposed development has been classified as per the following ITE classifications:

- Residential R30, ITE Classification 210 - Single Family Detached House
- Residential R60, ITE Classification 230 - Residential Condominium/Townhouse

Table 1 summaries the ITE trip generation rates for each peak and daily time period.

Table 1 *ITE Trip Generation Rates*

Land Use	ITE Land Use Code	Trip Generation Rates		
		AM Peak Hour	PM Peak Hour	Week Day
Residential R30	210	0.77 trips per dwelling	1.02 trips per dwelling	9.57 trips per dwelling
Residential R60	230	0.44 trips per dwelling	0.52 trips per dwelling	5.86 trips per dwelling

Additionally, the trip directionality of the each land use type is as per the **Table 2**.

Table 2

ITE Directionality Rates

Land Use	AM Peak Hour		PM Peak Hour	
	IN	OUT	IN	OUT
Residential R30	26%	74%	64%	36%
Residential R60	18%	82%	64%	36%

By applying the above trip and directionality rates to the proposed land use yield, **Table 3** summaries the trip generation for the Parker Street development.

Table 3

Parker Street Development Trip Generation

Land Use	Development Yield	AM Peak Hour		PM Peak Hour	
		IN	OUT	IN	OUT
Residential R30	125 lots	25 trips	71 trips	92 trips	46 trips
Residential R60	100 dwellings	8 trips	36 trips	33 trips	19 trips
Total Traffic Generation		33 trips	107 trips	115 trips	65 trips

2.5 DEVELOPMENT TRIP DISTRIBUTION

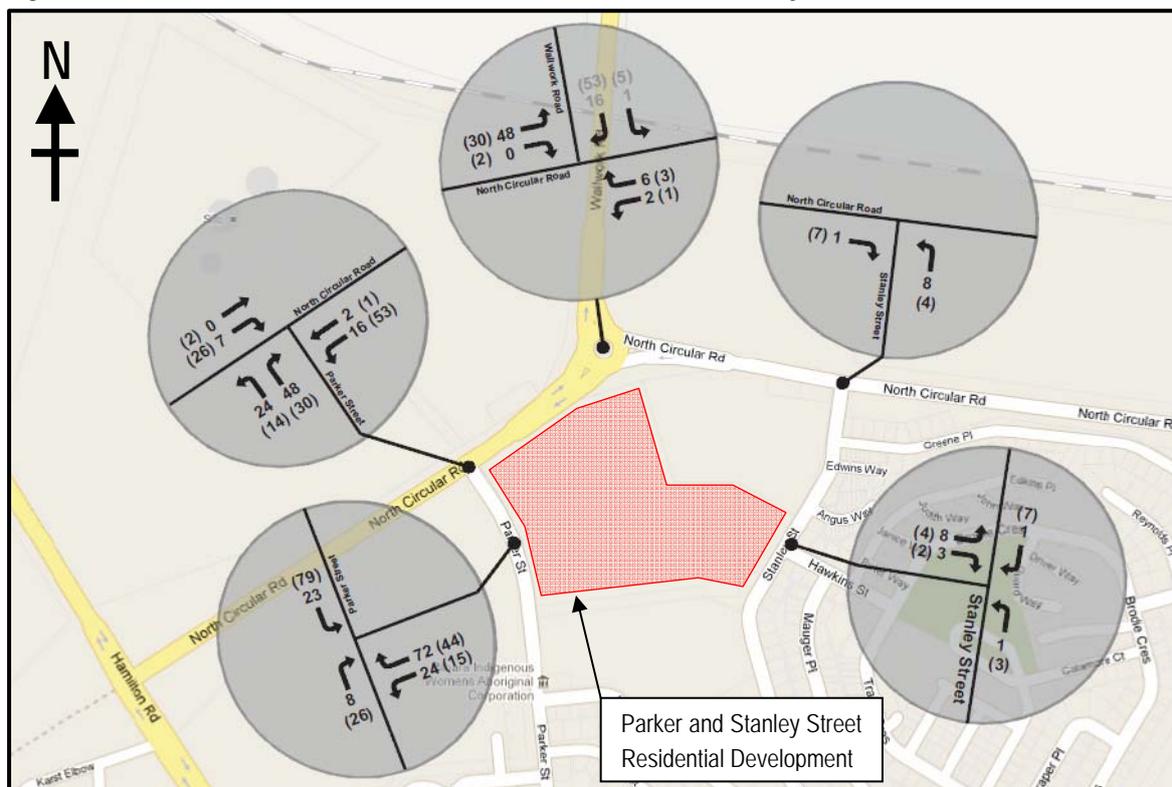
The trip distribution for the proposed development considers the trips that impact the surrounding road network as well as the land use currently and expected in the area. It is surmised and also taken from existing traffic counts that there is an approximate 50%/50% distribution between vehicles traveling north to Port Hedland including Wedgefield and vehicles remaining within South Hedland. The following trip distributions included within this assessment are:

- 50% North to Port Hedland and Wedgefield via Wallwork Road
- 50% South within South Hedland, of which
 - 25% travel via Parker Street and Stanley Street
 - 25% travel via Hamilton Road

2.6 DEVELOPMENT TRAFFIC VOLUMES

Figure 3 diagrammatically illustrates the traffic volumes generated from the development and distributed to the surrounding road network.

Figure 3 Parker and Stanley Street Residential Traffic Volumes



2.7 INTERNAL ROAD LAYOUT

From the development plans included within **Appendix A**, the internal road network includes predominantly 15m road reserves with 12m widths located along the boundaries and 40m wide boulevard corridor connecting Parker Street with the development. It is noted that the proposed road reserve will accommodate two way circulation, on-street parking as well as on-street refuse collection. Swept path analysis utilising a Heavy Rigid Vehicle (HRV) has been undertaken to investigate accommodation for removalist and waste collection activities. It is noted that a HRV can sufficiently negotiate the internal road layout.

2.8 DEVELOPMENT PARKING PROVISION

A detailed assessment of the parking provision required to service the proposed redevelopment of the site has been undertaken to assess the adequacy of the proposed supply in the context of future anticipated demand. Local and State Government planning policies referenced in the context of this assessment include a review of the Town of Port Hedland *Town Planning Scheme No.5* and the Western Australian Planning Commission's (WAPC) *Residential Design Codes (RDC)*.

The Parker Street Residential development proposes 433 parking spaces to be distributed for each land use component according to **Table 4**.

Table 4 Parker Street Residential Parking Requirement

Land Use	Development Yield	Town of Port Hedland Parking Rate	Statutory Parking Supply
Residential R30	125 dwellings	2 spaces per dwelling	250 spaces
Residential R60	100 dwellings	2 bays per dwelling for first 4 dwellings, 1.5 bays per dwelling thereafter + 10% extra for visitors	183 spaces
Total Parking Requirement			433 spaces

It is noted that the parking supply for the R30 residential component will be incorporated within each individual lot. Additionally, parking required for the R60 residential components will be supplied within each individual grouping as per the development plans.

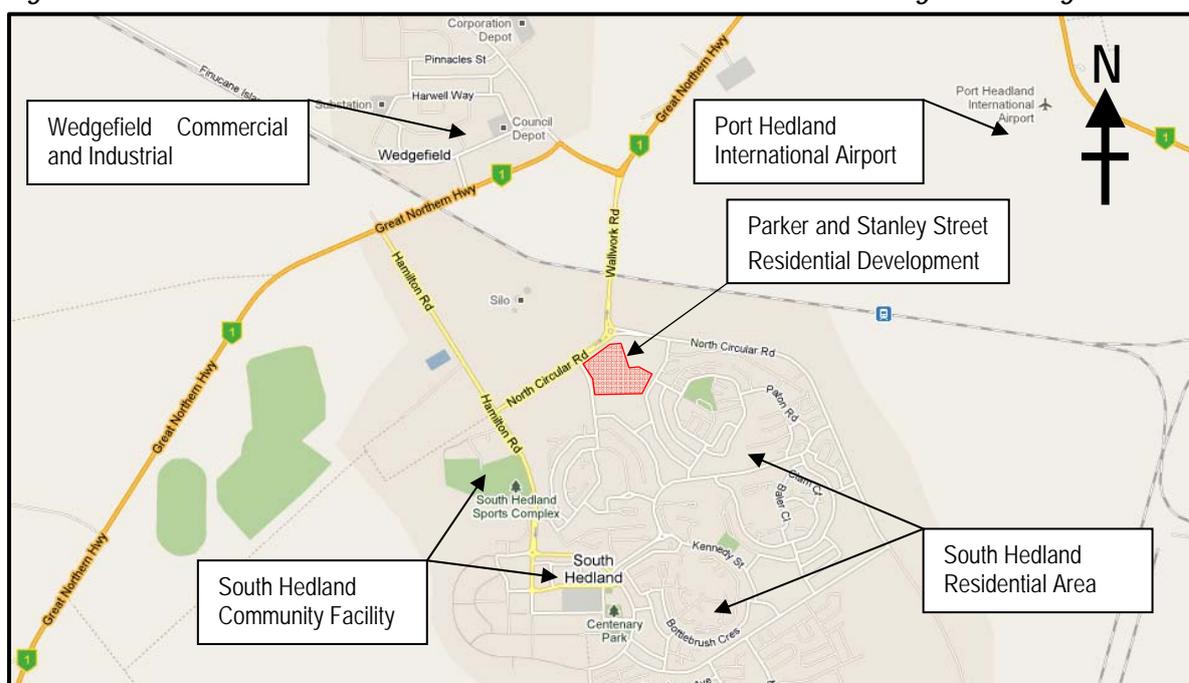
3 EXISTING SITUATION

3.1 GENERAL

Currently the location of the proposed development is a green field site with no vehicle access, site traffic generation and/or parking demand. As indicated on **Figure 4**, the surrounding area consists of residential land uses to the south, east and west with additional green field land to the north. Further afield the Port Hedland Airport as well as the Wedgefield commercial and industrial area is located to the north and South Hedland Community centres and retail to the south.

Additionally, the development is bound by North Circular Road at the northern boundary and Parker and Stanley Street to the west and east respectively.

Figure 4 Existing Surrounding Land Use



3.2 EXISTING ROAD NETWORK

The following discusses the characteristics of the surrounding road network:

- North Circular Road, bounds the development to the north providing a connection between local roads (Stanley and Parker Streets) with the Regional Road network (Great Northern Highway). According to the Town of South Hedland Planning Scheme this road is classified as a District Road (as included at **Appendix B**). In terms of operation, the North Circular Road is a limited access two way road with a combination of kerbed and unsealed shoulder sections.
- Parker Street, in the vicinity of the development is an unmarked two way road with unsealed shoulders providing access for residents and local community centres to North Circular Road. Additionally, according to Town Planning Scheme No.5 Scheme Map 9, Parker Road is classified as a Local Road.

- Stanley Street, located on the east boundary of the development provides a north-south link for surrounding residents connecting with North Circular Road. This road operates as a two way kerbed corridor providing direct access. Stanley Street is classified as a Local Road under the Town Planning Scheme No.5.

3.3 EXISTING INTERSECTIONS

Further, the intersections that surround the development are:

- North Circular Road/Parker Street, is an un-signalised T-intersection operating as an unofficial Give Way control. All legs comprise one approach and departure lane, with Parker Street exhibiting a central traffic median.
- North Circular Road/Stanley Street, operates as an unofficial Give Way controlled T-intersection comprising single approach and departure lanes with an additional right turn lane into Stanley Street.
- North Circular Road/Wallwork Road, is a single circulating lane three way roundabout with two approach and departure lanes at each leg.

3.4 EXISTING TRAFFIC VOLUMES

In determining the existing traffic volumes for the surrounding road network, link count data as well as existing land use and expected population growth for the region were considered. Link count data was sourced from the Town of Port Hedland for various times of the day and days during the year which provided through traffic demands for the above identified roads. The through traffic volumes in consideration with the expected land use in the area provided an estimate to turning movements for each intersection within the assessment herein. Adopted traffic volumes for the existing situation are illustrated on Figure 5.

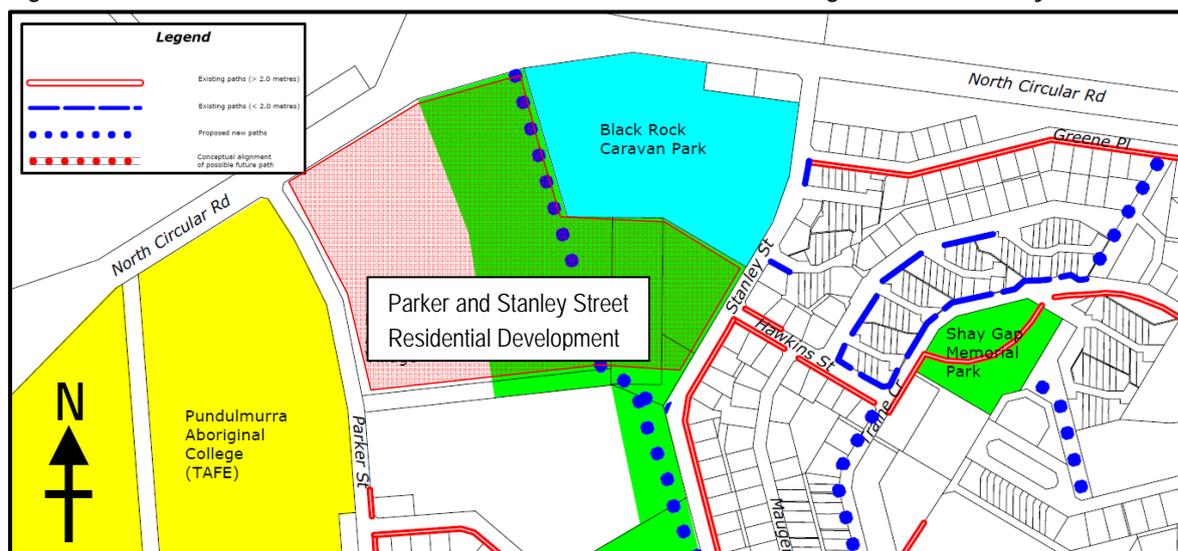
Figure 5 Existing Traffic Volumes



3.5 EXISTING PEDESTRIAN / CYCLE NETWORKS

The existing pedestrian / cycle networks in the immediate area surrounding the development site is illustrated on **Figure 6**. This figure is an extract from the Town of Port Hedland Cycle Plan, *Plan 7 South Hedland Existing Paths* included at **Appendix B**.

Figure 6 Existing Pedestrian and Cycle Facilities



Note: the figure above is an extract from Town of Port Hedland Cycle Plan, *Plan 7 South Hedland Existing Paths*, Appendix B contains the entire plan.

As indicated, no path facilities are provided on the western and northern boundaries of the proposed development. For the eastern side, a 2m path is provided south of Hawkins Street which connects with path corridors that lead toward nearby schools and community land uses.

From a review of the entire South Hedland pedestrian and cycle network, facilities connecting surrounding land uses comprise a variety of paths that range in width with sections identified as requiring new infrastructure.

It is noted that disconnections of facilities may inhibit future demands in cycling and walking as a transport mode.

3.6 EXISTING PUBLIC TRANSPORT SERVICES

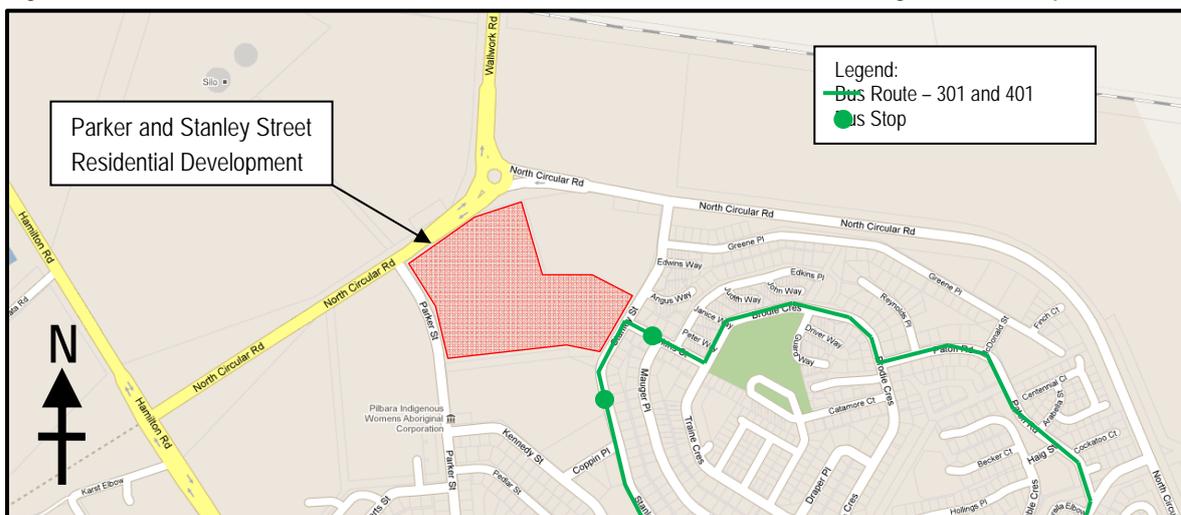
The public transport provision the area includes the following routes:

- Route 301 South Hedland
- Route 401 South Hedland
- Route 501 Port Hedland – South Hedland
- School Bus Route

Information regarding Routes 301 and 401 in the vicinity of the proposed development has been reproduced indicatively on **Figure 7**, the entire route is included at **Appendix A** provides a loop service connecting the eastern portion of South Hedland with the South Hedland Shopping Centre. As indicated two bus stops are located along Stanley and Hawkins Streets which are approximately within a 400m walking distance from the eastern portion of the development.

Figure 7

Existing Public Transport Routes



At the time of preparation of this document, information regarding Route 501 and the school route was not available, therefore interchange connections between all routes as well as frequency was not determined. However it is noted that Route 501 does provides connection between Port Hedland and South Hedland and the school route facilitates the connection between the residential areas and surrounding schools.

4 ANALYSIS OF TRANSPORT NETWORK

4.1 TRANSPORT ASSESSMENT

Future traffic conditions have been analysed for year 2021 which is the approximate 10 year horizon after development completion. The assessment herein quantifies the effect that additional development traffic has on the surrounding road network, specifically the roundabout at North Circular Road/Wallwork Road.

4.1.1 Growth Rates

For the surrounding road network, a review of traffic data provided by Council indicated a growth in volumes over various year periods. For each road the following was determined:

- Wallwork Road, growth between the years 2004 and 2009 indicate around 9% with growth for 2011 reducing to around 2%
- Parker Street, between survey years of 2001 and 2010 growth is estimated at approximately 5%
- Stanley Street, growth was estimated at 8% for the same year period.

From a review of the available land in South Hedland and considering the expected growth for Town of Port Hedland as well as the reduction in observed traffic demand along Wallwork Road, it is considered that the rate of traffic growth will reduce on the road network surrounding the development.

For the purposes of this assessment a linear growth rate of 4% (applied to background traffic volumes) is deemed appropriate for the road network and future plans.

4.2 ASSESSMENT SCENARIOS

The assessment undertaken in this study considers the following two scenarios for the forecast year 2021:

- Scenario 1 – 2021 Base Condition (without development)
- Scenario 2 – 2021 Development Conditions (with development)

Scenario 1 has been developed utilising the existing traffic count information multiplied by an adopted 4% growth rate to forecast volumes for the 2021 design year. The following outlines the calculation for the future base case condition:

$$\text{Scenario 1 - 2021 Base Condition} = \text{existing traffic volumes} \times 4\%$$

For Scenario 2, this traffic demand case has been developed through the addition of Scenario 1 and the Parker Street development.

$$\text{Scenario 2 - 2021 Development Condition} = \text{Scenario 1} + \text{Parker Street development}$$

Figures 8 and 9 illustrate the traffic volumes expected at the design year 2021.

Figure 8

Scenario 1 - 2021 Base Conditions Traffic Volumes



Figure 9

Scenario 2 - 2021 with Development Conditions Traffic Volumes



4.3 ROAD NETWORK ASSESSMENT

Analysis of the traffic impacts of the proposed development has been carried out for the following external intersections:

- North Circular Road/Wallwork Road – three way roundabout
- North Circular Road/Parker Street – three way un-signalised intersection

It is noted that North Circular Road/Stanley Street is not assessed herein as the expected traffic volumes from the development at this location amounts to less than 5% of total and movement demand.

Further, Council are currently undertaking an existing and future road infrastructure study that investigates requirements for upgrade and/or new connections to accommodate the expected future traffic conditions. At the time of this report, initial advice indicated that recommendations have not been finalised. However, it was suggested that at this stage of the investigation no upgrade works are envisaged for the road network surrounding the Parker and Stanley Street Residential development.

The two identified intersections have been analysed for each scenario using the SIDRA v5.1 analysis program. This program calculates the performance of intersections based on input parameters, including geometry and traffic volumes. As an output SIDRA v5.1 provides values for the Degree of Saturation (DOS), queue lengths and delays. The generally accepted upper limits for the DOS (where it is considered that the operation of the intersection is constrained) are:

- 0.80 for un-signalised intersections
- 0.85 for roundabouts
- 0.95 for signalised intersections

A DOS exceeding these values indicates that the intersection is exceeding its practical capacity. Above these values, users of the intersection are likely to experience unsatisfactory queuing and delays during the peak hour periods.

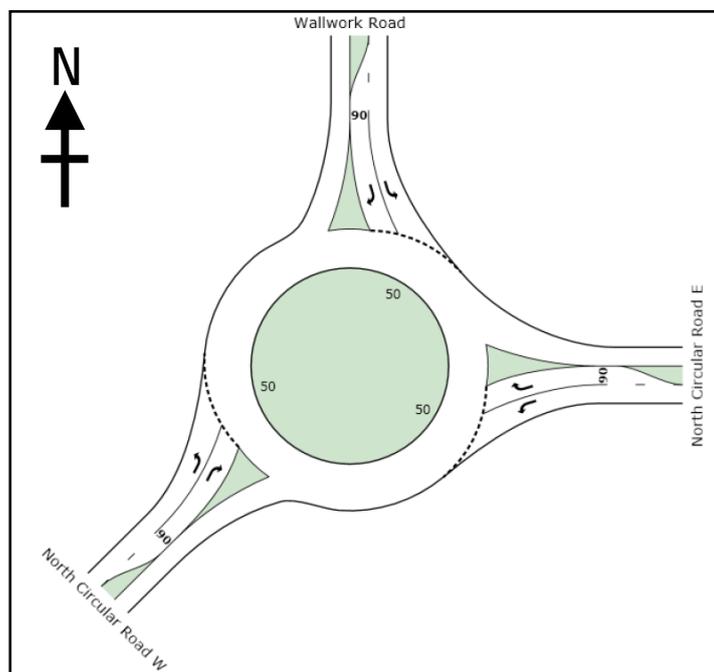
All SIDRA outputs referenced herein are included at **Appendix C**.

4.3.1 North Circular Road/Wallwork Road Intersection Assessment

The assessment below analyses the North Circular Road/Wallwork Road intersection for both scenarios according to the existing three-way roundabout configuration. **Figure 10** is a SIDRA layout representation of the intersection at this location.

Figure 10

North Circular Road/Wallwork Road Intersection Layout



The results of the SIDRA analysis for both Scenario's 1 and 2 (without and with development) in Tables 5 and 6 quantifies the developments impact on the surrounding road network for both the AM and PM peak hours.

Table 5 North Circular Road/Wallwork Road Intersection Performance– AM Peak

Intersection Approach		2021 Scenario 1 (Background without Development)				2021 Scenario 2 (Background with Development)			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
North Circular Road – E	L	0.01	2.8	A	0.3	0.01	2.8	A	0.3
	R	0.29	11.4	A	9.9	0.29	11.4	A	10.2
Wallwork Road – N	L	0.15	4.3	A	5.7	0.15	4.3	A	5.7
	R	0.05	9.9	A	1.3	0.06	9.9	A	1.7
North Circular Road – W	L	0.25	4.4	A	10.9	0.29	4.4	A	12.8
	R	0.02	11.7	A	0.5	0.02	11.7	A	0.5

As indicated in Table 5, the current intersection configuration will accommodate the traffic demands during the AM peak hour period for the design year of 2021. It is noted each intersection movement results in a LOS of A and when comparing Scenario 1 with Scenario 2, the development does not adversely impact intersection operations.

Table 6 *North Circular Road/Wallwork Road Intersection Performance – PM Peak*

Intersection Approach		2021 Scenario 1 (Background without Development)				2021 Scenario 2 (Background with Development)			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
North Circular Road – E	L	0.01	3.9	A	0.4	0.01	4.1	A	0.4
	R	0.20	12.4	A	7.9	0.21	12.7	A	8.6
Wallwork Road – N	L	0.24	4.3	A	9.6	0.24	4.3	A	9.7
	R	0.28	10.0	A	10.0	0.32	10.0	A	11.8
North Circular Road – W	L	0.15	3.5	A	6.2	0.17	3.5	A	7.2
	R	0.01	11.0	A	0.4	0.01	11.0	A	0.4

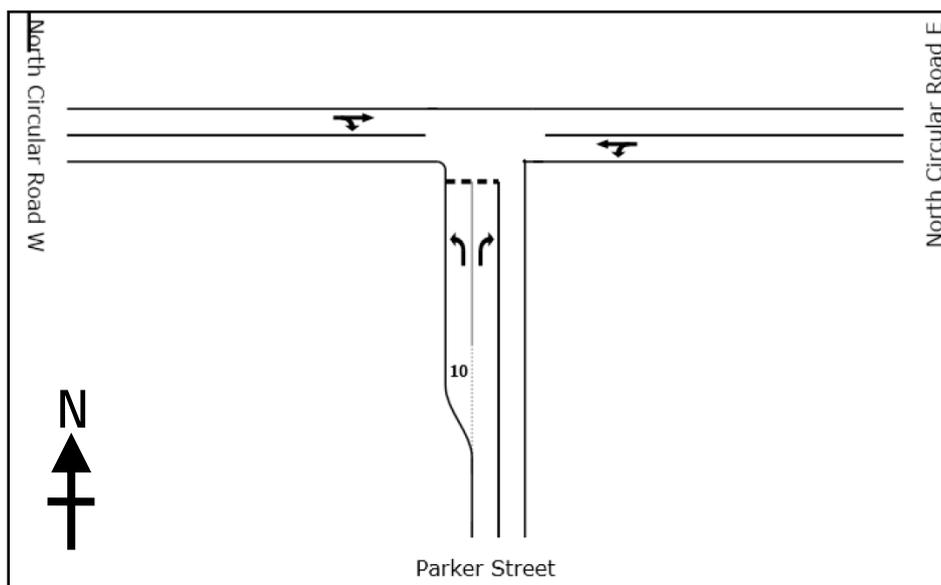
Table 6 indicates this location will perform well within the acceptable operational roundabout limit for the future year conditions. Similarly, the intersection delay and LOS results indicate that the proposed development will have minimal impact on the operation of NorthCircular Road/Wallwork Road roundabout.

It is recommended that no intersection upgrade works are required at this location.

4.3.2 North Circular Road/Parker Street Intersection Assessment

The assessment below analyses the North Circular Road/Parker Road intersection for both scenarios according to the existing three-way intersection as represented using a SIDRA diagram on **Figure 11**.

Figure 11 *North Circular Road/Parker Street Intersection Layout*



The results of the SIDRA analysis for both Scenario's 1 and 2 (without and with development) in **Tables 7** and **8** quantifies the developments impact on the surrounding road network for both the AM and PM peak hours.

Table 7 *North Circular Road/Parker Street Intersection Performance – AM Peak*

Intersection Approach		2021 Scenario 1 (Background without Development)				2021 Scenario 2 (Background with Development)			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Parker Road	L	0.01	8.4	A	0.0	0.04	8.6	A	0.5
	R	0.16	13.3	A	3.8	0.26	14.2	A	6.9
North Circular Road – E	L	0.03	8.3	A	0.0	0.04	8.3	A	0.0
	T	0.03	0.0	A	0.0	0.04	0.0	A	0.0
North Circular Road – W	T	0.17	0.3	A	6.7	0.18	0.3	A	7.0
	R	0.17	8.7	A	6.7	0.18	8.8	A	7.0

For the future AM 2021 assessment, as indicated in the above table for North Circular Road/Parker Street intersection is expected to operate well within acceptable performance limits. It is noted that due to intersection configuration and future traffic demands, a LOS of A has resulted for all movements, therefore no upgrades are recommended during the AM period.

Table 8 *North Circular Road/Parker Street Intersection Performance – PM Peak*

Intersection Approach		2021 Scenario 1 (Background without Development)				2021 Scenario 2 (Background with Development)			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Parker Road	L	0.01	10.4	A	0.2	0.04	10.7	A	0.6
	R	0.15	19.5	B	3.3	0.28	23.2	B	6.9
North Circular Road – E	L	0.22	8.3	A	0.0	0.25	8.3	A	0.0
	R	0.22	0.0	A	0.0	0.25	0.0	A	0.0
North Circular Road – W	L	0.15	2.4	A	8.0	0.19	2.9	A	9.7
	R	0.15	10.8	A	8.0	0.19	11.4	A	9.7

As indicated in **Table 8**, the three-way un-signalised intersection is expected to operate well below constrained conditions for both without and with development scenarios.

Additionally, the results of this analysis indicate that the development traffic is expected to not adversely impact this intersection, therefore no upgrade works are required at this location.

It is noted that according to Figure 4.9(b) in the Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* due to the amount of through as well as turning traffic volumes at this location, treatments for both short auxiliary right and left turn lanes are warranted. However, as noted within the Austroads document short turn lanes may be recommended as an acceptable solution. Cardno notes that as the intersection is expected to operate well within capacity limits and considering costs associated at this location right and/or left turn lanes are not required for operational purposes.

5 CHANGES TO SURROUNDING TRANSPORT NETWORKS

From the assessment above, both intersections are expected to operate within acceptable performance levels for future year scenarios, therefore no intersection upgrade works are required.

6 CONCLUSIONS

This Transport Assessment considers the impact of the Parker and Stanley Street Residential development on the surrounding road network as well as provides discussion regarding pedestrian, cycle and public transport considerations.

This report has been prepared in accordance with the *WAPC Transport Assessment Guidelines for Developments: Volume 4 – Individual Developments (2006)* for lodgement with the Town of Port Hedland.

The following conclusions have been made in regards to the Parker and Stanley Street Residential development:

- existing traffic volumes surrounding the development were determined from link count data provided by Council as well as a review of existing and expected land use demands. Additionally, this information also formulated the growth rate to determine future year traffic demands.
- North Circular Road/Wallwork Road and North Circular Road/Parker Street intersections are expected to operate well within acceptable performance limits for future year 2021 scenarios. It is noted that North Circular Road/Stanley Street intersection was not analysed due to expected development traffic volumes equating to less than 5% of total and movement demand.
- according to Austroads *Guide to Road Design: Part 4A Unsignalised and Signalised Intersections* the North Circular Road/Parker Street intersection may include a right and left turn lane provision due to expected traffic volumes, however due to intersection performance and expected costs the turn lane configurations are not required for operational purposes.
- parking requirements for the development are calculated as 250 spaces for the R30 and 183 spaces for the R60 components of the development. It is noted that the rate of 2 spaces per dwelling for the low density element shall be accommodated within each lot, therefore reducing the requirement for on-street parking. For the high density dwellings all private parking as well as visitor spaces will be provided on-site.
- the internal road design is able to accommodate a heavy rigid vehicle for removalist and well as waste collection activities.

Appendix A

Development Plans



- LEGEND**
- - - DEVELOPMENT PLAN AREA
 - RESIDENTIAL R30
 - RESIDENTIAL R60
 - PUBLIC OPEN SPACE
 - DRAINAGE SWALE
 - INDICATIVE LAYOUT [R60 GROUP HOUSING SITES]
 - FOOTPATHS

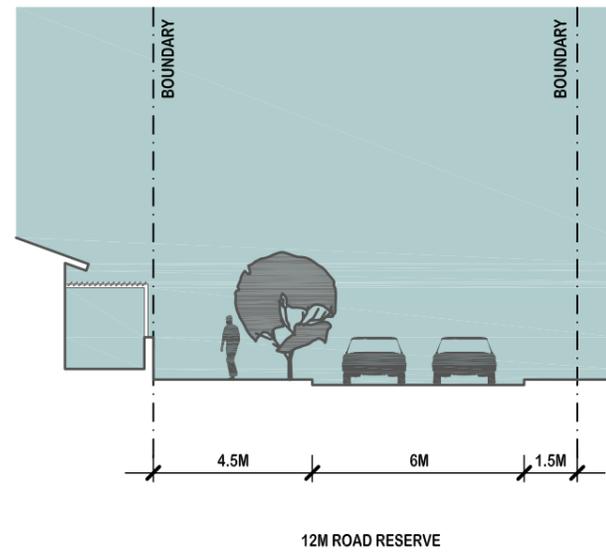
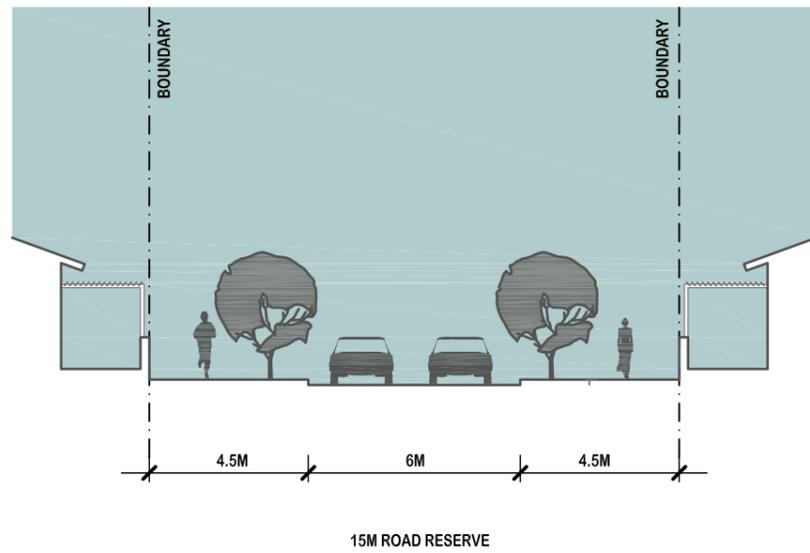
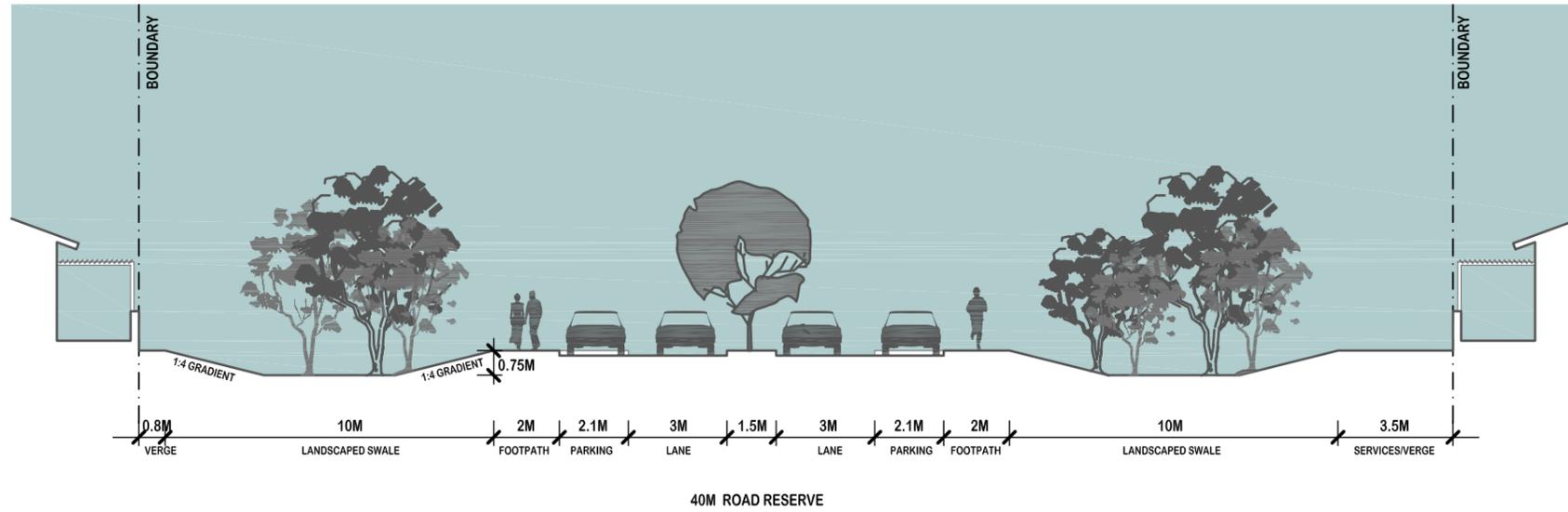


DEVELOPMENT PLAN
 LOT 1693 PARKER ST AND
 LOT 2119 STANLEY ST



prepared by julie harrold *architect*
 for Cedar Woods Properties

scale:	1:2000 @a3	date:	09 08 2011
ref:	cwp sth dp 01a	initials:	jha



DATE	REV	DESCRIPTION
05.08.11	B	BOULEVARD SWALES ADDED
13.07.11	A	FOR ISSUE

**South Hedland
STREET CROSS SECTIONS**

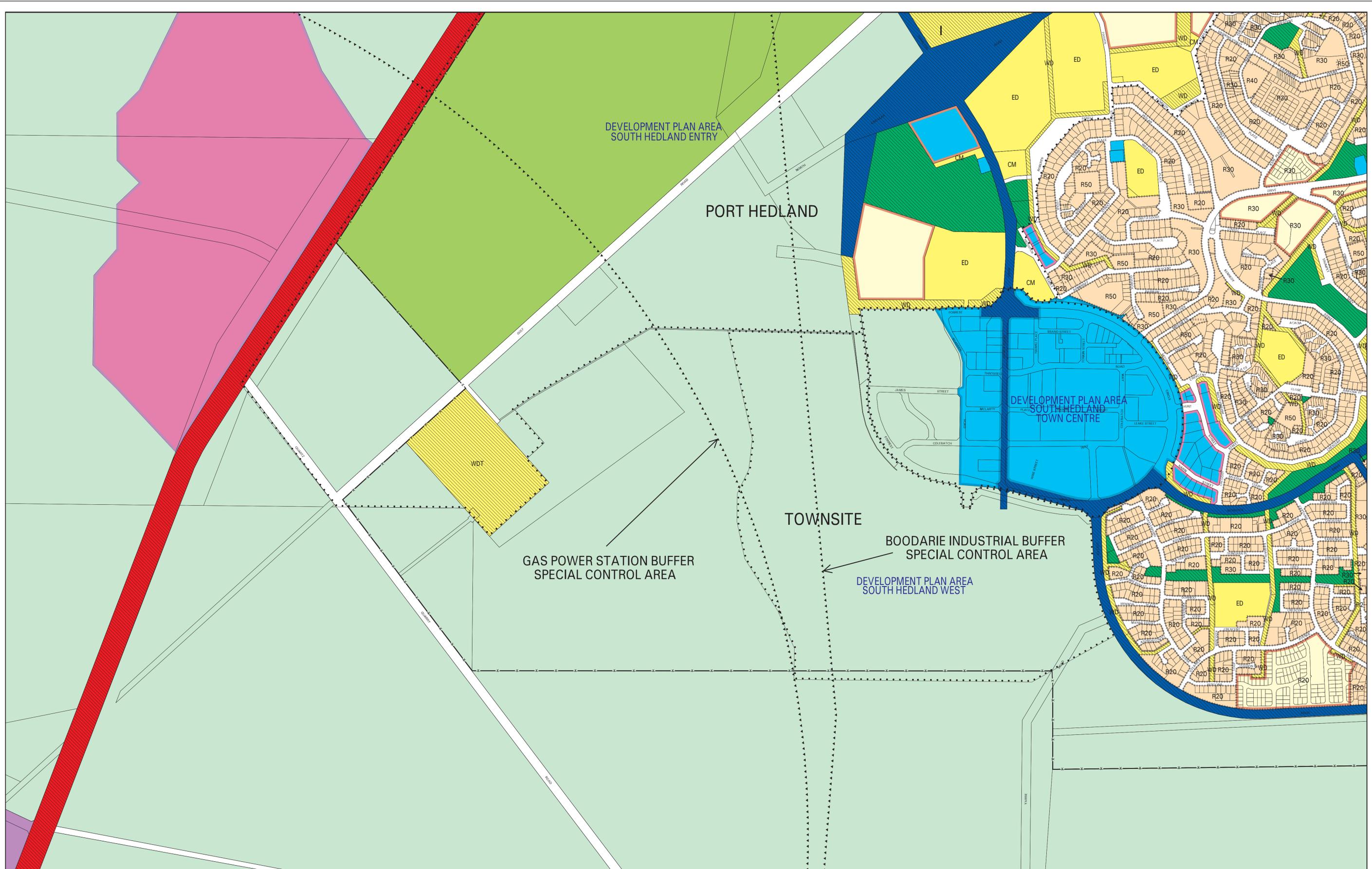
08

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prepared by julie harrold *architect*
for Cedar Woods

Appendix B

Town of Port Hedland Plans



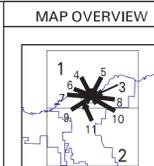
Produced by Mapping and GeoSpatial Data Branch,
Department of Planning.

Whilst all care has been taken to accurately portray the current Scheme provisions, no responsibility shall be taken for any omissions or errors in this documentation.

Consultation with the respective Local Government should be made to view a legal version of the Scheme. Please advise the Department of Planning of any omissions or errors in the document.

Base Information Supplied by the Western Australian Land Information Authority, GL248-2007-2

TOWN OF PORT HEDLAND
TOWN PLANNING SCHEME NO 5
 (DISTRICT SCHEME)



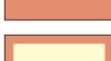
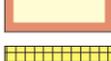
Authorised: Victor Chew
 Plot date: 17 Jun 2011
 G. Gazette: 31-August-2001

LEGEND

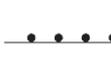
LOCAL SCHEME RESERVES

	CONSERVATION RECREATION AND NATURAL LANDSCAPES		OTHER PURPOSES
	DISTRICT ROAD		DENOTED AS FOLLOWS:
	LOCAL ROAD	EX	EXPLOSIVES SAFTY AREA
	OTHER PUBLIC PURPOSES	I	INFRASTRUCTURE
	OTHER PUBLIC PURPOSES		PARKS AND RECREATION
	DENOTED AS FOLLOWS:		STATE AND REGIONAL ROAD
C	CEMETERY		
E	ENERGY		
P	PORT FACILITIES		
T	TELECOMMUNICATIONS		
WD	WATER AND DRAINAGE		
WDT	WASTE DISPOSAL AND TREATMENT		
	OTHER PURPOSES		

ZONES

	RESIDENTIAL		COMMUNITY
	TRANSIENT WORKFORCE ACCOMMODATION		DENOTED AS FOLLOWS:
	URBAN DEVELOPMENT	CM	COMMUNITY
	AIRPORT	ED	EDUCATION
	COMMERCIAL	H	HEALTH
	MIXED BUSINESS		INDUSTRIAL DEVELOPMENT
	TOURISM		INDUSTRY
	TOWN CENTRE		LIGHT INDUSTRY
	TRANSPORT DEVELOPMENT		STRATEGIC INDUSTRY
	COMMUNITY		RURAL
			RURAL RESIDENTIAL

OTHER

	R CODES		SPECIAL CONTROL AREAS
	SCHEME BOUNDARY		DEVELOPMENT PLAN AREAS
	LOCAL GOVERNMENT BOUNDARY		NO ZONE
	TOWNSITE -- LAND ACT		

VERSION No 1

TOWN OF PORT HEDLAND

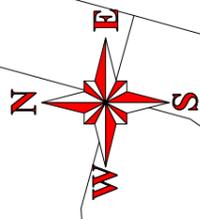
TOWN PLANNING SCHEME NO. 5

(DISTRICT SCHEME)

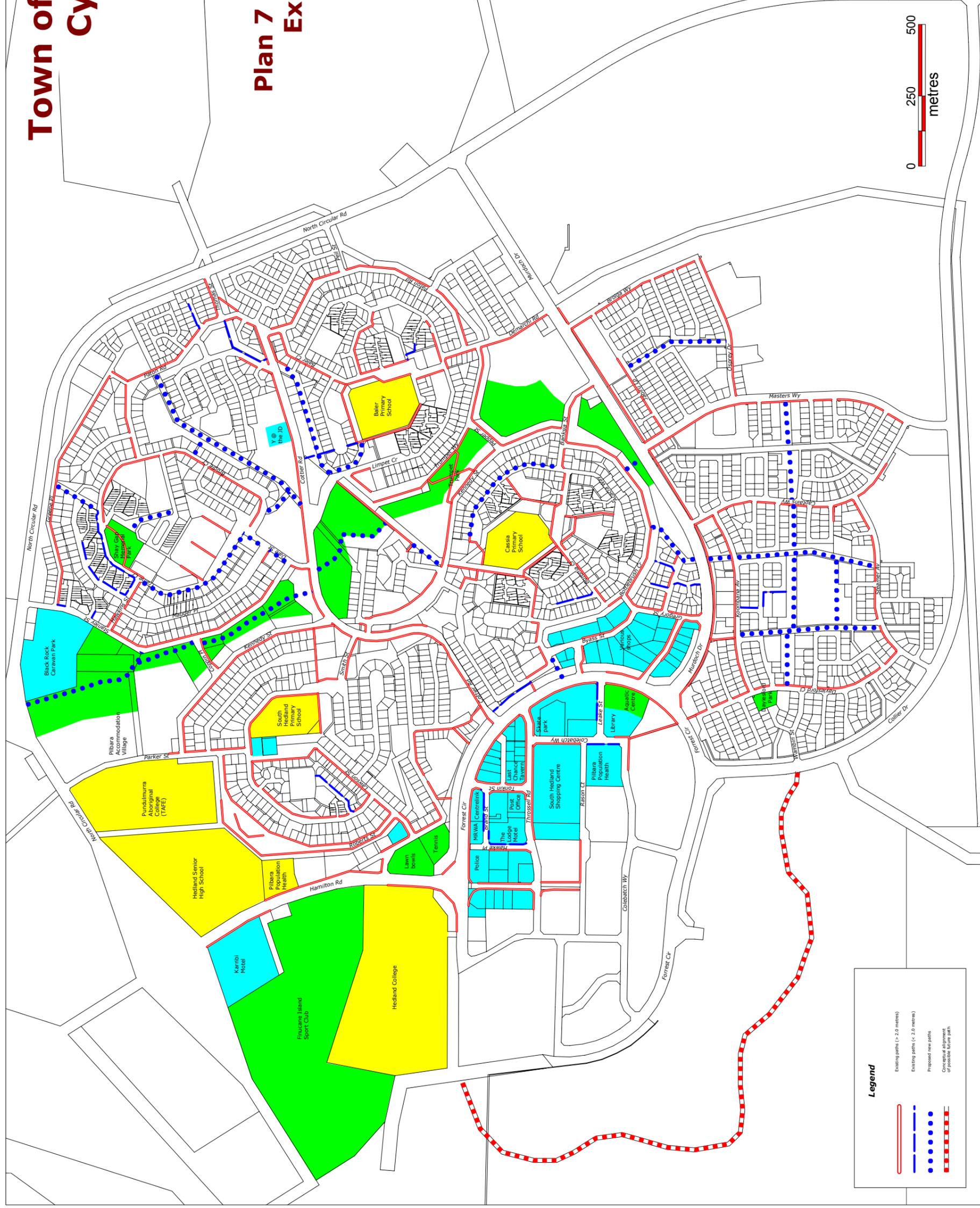
Town of Port Hedland Cycle Plan



Plan 7 - South Hedland Existing Paths

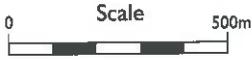


February 2008

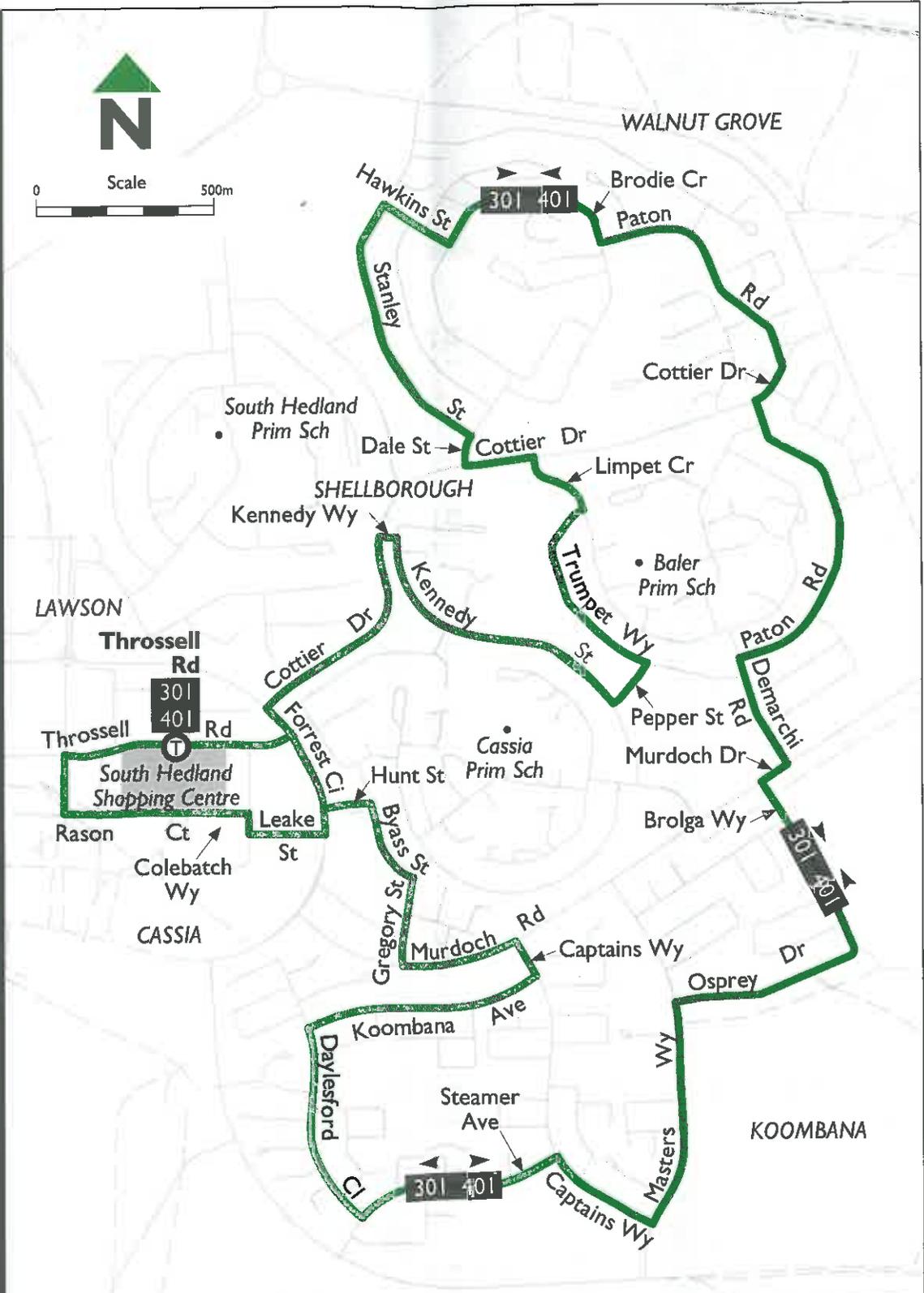


Legend

- Existing paths (> 2.0 metres)
- Existing paths (< 2.0 metres)
- Proposed new paths
- Conceptual alignment of possible future path



Map routes 301 & 401

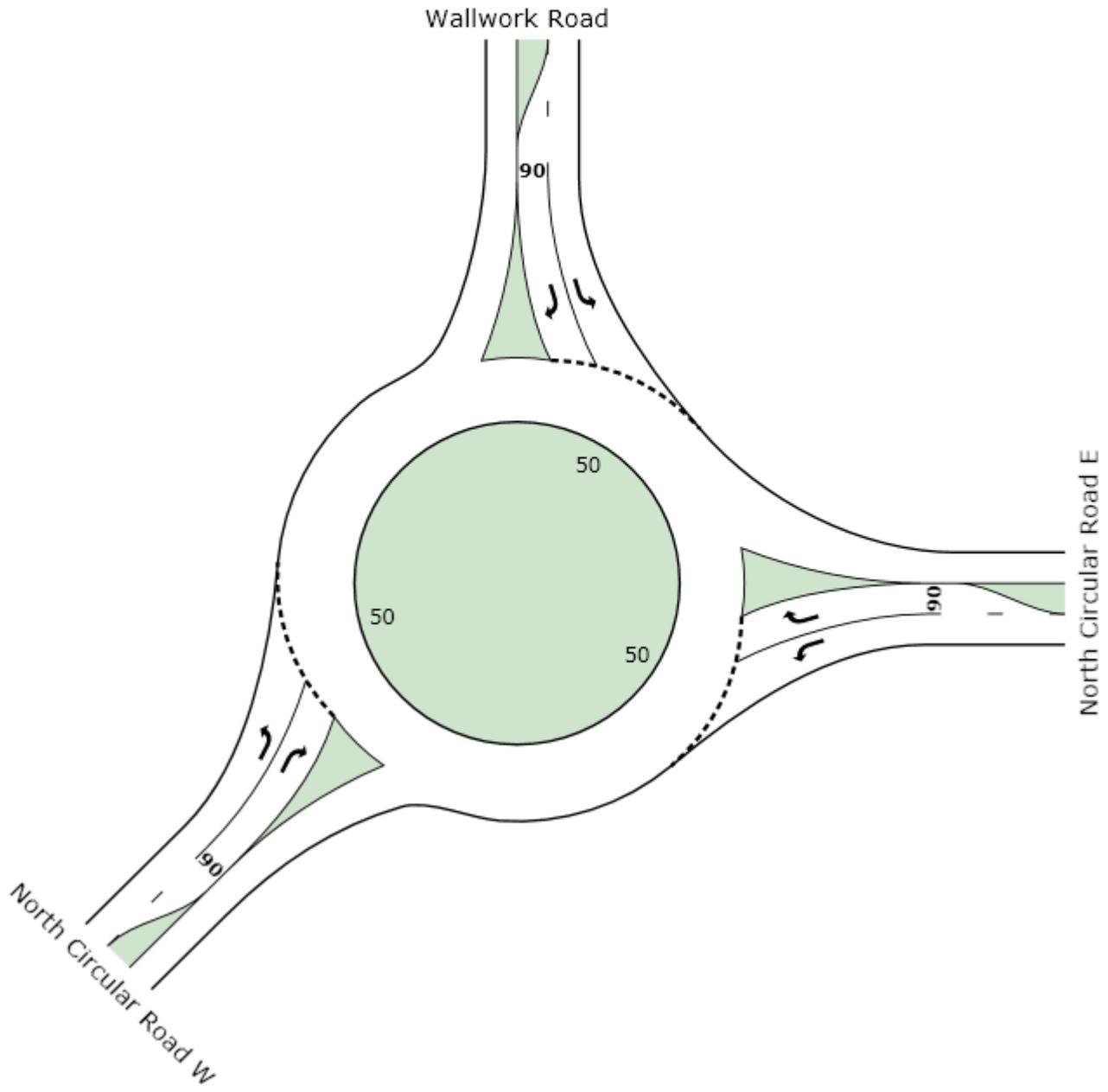


Legend

- Bus Route Terminus
- Railway

Appendix C

SIDRA Outputs



MOVEMENT SUMMARY

Site: North Circular Rd-Wallwork Road AM

CEP02077 - North Circular Road/Wallwork Road
2021 AM Background Traffic Volumes
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
East: North Circular Road E												
4	L	14	5.0	0.010	2.8	LOS A	0.0	0.3	0.16	0.25	54.5	
6	R	512	5.0	0.290	11.4	LOS A	1.6	9.9	0.18	0.61	46.5	
Approach		526	5.0	0.290	11.2	LOS A	1.6	9.9	0.18	0.60	46.6	
North: Wallwork Road												
7	L	291	5.0	0.149	4.3	LOS A	0.9	5.7	0.09	0.37	53.1	
9	R	59	5.0	0.045	9.9	LOS A	0.2	1.3	0.09	0.60	47.8	
Approach		350	5.0	0.149	5.3	LOS A	0.9	5.7	0.09	0.41	52.0	
South West: North Circular Road W												
30	L	384	5.0	0.254	4.4	LOS A	1.7	10.9	0.59	0.43	50.5	
32	R	17	5.0	0.015	11.7	LOS A	0.1	0.5	0.53	0.61	45.6	
Approach		401	5.0	0.254	4.7	LOS A	1.7	10.9	0.59	0.44	50.2	
All Vehicles		1277	5.0	0.290	7.5	LOS A	1.7	10.9	0.28	0.50	49.0	

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

Processed: Wednesday, 13 July 2011 4:51:57 PM

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INTERSECTION

MOVEMENT SUMMARY

Site: North Circular Rd-Wallwork Road PM

CEP02077 - North Circular Road/Wallwork Road
2021 PM Background Traffic Volumes
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Circular Road E											
4	L	14	5.0	0.011	3.9	LOS A	0.1	0.4	0.46	0.38	51.6
6	R	321	5.0	0.200	12.4	LOS A	1.3	7.9	0.50	0.66	45.0
Approach		335	5.0	0.200	12.1	LOS A	1.3	7.9	0.49	0.65	45.2
North: Wallwork Road											
7	L	462	5.0	0.236	4.3	LOS A	1.5	9.6	0.08	0.37	53.1
9	R	398	5.0	0.279	10.0	LOS A	1.6	10.0	0.19	0.55	47.2
Approach		860	5.0	0.279	6.9	LOS A	1.6	10.0	0.14	0.45	50.1
South West: North Circular Road W											
30	L	251	5.0	0.154	3.5	LOS A	1.0	6.2	0.46	0.34	51.6
32	R	14	5.0	0.011	11.0	LOS A	0.1	0.4	0.44	0.58	46.0
Approach		265	5.0	0.154	3.9	LOS A	1.0	6.2	0.46	0.35	51.2
All Vehicles		1460	5.0	0.279	7.6	LOS A	1.6	10.0	0.28	0.48	49.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: North Circular Rd-Wallwork Road AM

CEP02077 - North Circular Road/Wallwork Road
2021 AM Background + Development Traffic Volumes
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Circular Road E											
4	L	16	5.0	0.011	2.8	LOS A	0.1	0.3	0.19	0.26	54.2
6	R	518	5.0	0.293	11.4	LOS A	1.6	10.2	0.21	0.61	46.3
Approach		534	5.0	0.293	11.2	LOS A	1.6	10.2	0.20	0.60	46.5
North: Wallwork Road											
7	L	292	5.0	0.150	4.3	LOS A	0.9	5.7	0.09	0.37	53.1
9	R	75	5.0	0.057	9.9	LOS A	0.3	1.7	0.09	0.60	47.8
Approach		367	5.0	0.150	5.5	LOS A	0.9	5.7	0.09	0.41	51.8
South West: North Circular Road W											
30	L	432	5.0	0.288	4.4	LOS A	2.0	12.8	0.61	0.44	50.3
32	R	17	5.0	0.015	11.7	LOS A	0.1	0.5	0.54	0.61	45.5
Approach		449	5.0	0.288	4.7	LOS A	2.0	12.8	0.61	0.44	50.1
All Vehicles		1350	5.0	0.293	7.5	LOS A	2.0	12.8	0.31	0.50	48.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: North Circular Rd-Wallwork Road PM

CEP02077 - North Circular Road/Wallwork Road
2021 PM Background + Development Traffic Volumes
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Circular Road E											
4	L	15	5.0	0.013	4.1	LOS A	0.1	0.4	0.50	0.40	51.3
6	R	324	5.0	0.208	12.7	LOS A	1.4	8.6	0.54	0.68	44.8
Approach		339	5.0	0.208	12.3	LOS A	1.4	8.6	0.54	0.66	45.0
North: Wallwork Road											
7	L	467	5.0	0.239	4.3	LOS A	1.5	9.7	0.09	0.37	53.1
9	R	451	5.0	0.316	10.0	LOS A	1.9	11.8	0.22	0.55	47.1
Approach		918	5.0	0.316	7.1	LOS A	1.9	11.8	0.15	0.46	49.8
South West: North Circular Road W											
30	L	281	5.0	0.174	3.5	LOS A	1.1	7.2	0.48	0.34	51.5
32	R	16	5.0	0.013	11.0	LOS A	0.1	0.4	0.45	0.58	46.0
Approach		297	5.0	0.174	3.9	LOS A	1.1	7.2	0.47	0.35	51.1
All Vehicles		1554	5.0	0.316	7.6	LOS A	1.9	11.8	0.30	0.48	48.8

Level of Service (LOS) Method: Delay (RTA NSW).

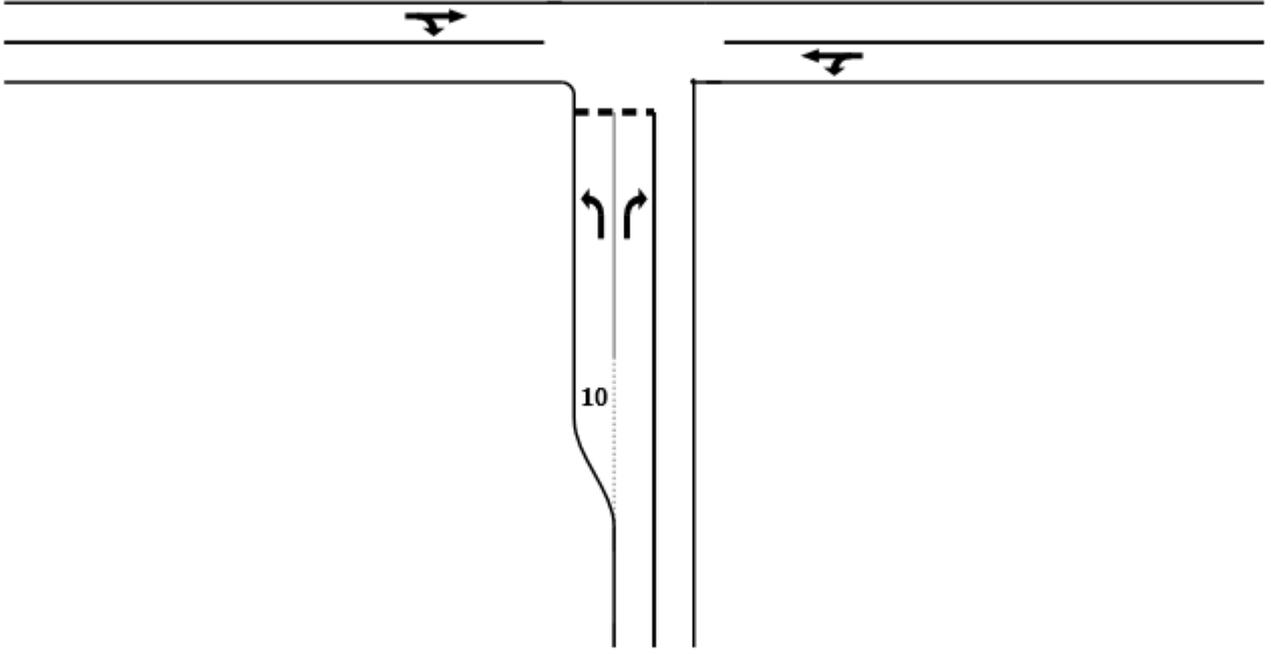
Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

North Circular Road W



North Circular Road E

Parker Street

MOVEMENT SUMMARY

Site: North Circular Rd-Parker St
AM

CEP02077 - North Circular Road/Parker Street
2021 AM Background Traffic Volumes
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Parker Street												
1	L	1	5.0	0.002	8.4	LOS A	0.0	0.0	0.13	0.61	48.4	
3	R	78	5.0	0.155	13.3	LOS A	0.6	3.8	0.54	0.82	44.0	
Approach		79	5.0	0.155	13.2	LOS A	0.6	3.8	0.53	0.81	44.0	
East: North Circular Road E												
4	L	13	5.0	0.032	8.3	LOS A	0.0	0.0	0.00	0.96	49.0	
5	T	46	5.0	0.032	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
Approach		59	5.0	0.032	1.8	NA	0.0	0.0	0.00	0.21	57.2	
West: North Circular Road W												
11	T	305	5.0	0.172	0.3	LOS A	1.1	6.7	0.18	0.00	56.5	
12	R	14	5.0	0.172	8.7	LOS A	1.1	6.7	0.18	0.98	49.0	
Approach		319	5.0	0.172	0.6	NA	1.1	6.7	0.18	0.04	56.1	
All Vehicles		457	5.0	0.172	3.0	NA	1.1	6.7	0.22	0.20	53.7	

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: North Circular Rd-Parker St
PM

CEP02077 - North Circular Road/Parker Street
2021 PM Background Traffic Volumes
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Parker Street												
1	L	6	5.0	0.012	10.4	LOS A	0.0	0.2	0.43	0.66	46.8	
3	R	43	5.0	0.147	19.5	LOS B	0.5	3.3	0.71	0.91	39.0	
Approach		49	5.0	0.147	18.4	LOS B	0.5	3.3	0.67	0.88	39.9	
East: North Circular Road E												
4	L	66	5.0	0.221	8.3	LOS A	0.0	0.0	0.00	0.99	49.0	
5	T	347	5.0	0.221	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
Approach		413	5.0	0.221	1.3	NA	0.0	0.0	0.00	0.16	57.9	
West: North Circular Road W												
11	T	262	5.0	0.154	2.4	LOS A	1.3	8.0	0.55	0.00	50.5	
12	R	14	5.0	0.154	10.8	LOS A	1.3	8.0	0.55	0.96	48.8	
Approach		276	5.0	0.154	2.8	NA	1.3	8.0	0.55	0.05	50.4	
All Vehicles		738	5.0	0.221	3.0	NA	1.3	8.0	0.25	0.17	53.4	

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: North Circular Rd-Parker St
AM

CEP02077 - North Circular Road/Parker Street
2021 AM Background + Development Traffic Volumes
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Parker Street												
1	L	24	5.0	0.039	8.6	LOS A	0.1	0.5	0.15	0.62	48.3	
3	R	126	5.0	0.259	14.2	LOS A	1.1	6.9	0.58	0.87	43.2	
Approach		150	5.0	0.259	13.3	LOS A	1.1	6.9	0.51	0.83	44.0	
East: North Circular Road E												
4	L	29	5.0	0.042	8.3	LOS A	0.0	0.0	0.00	0.88	49.0	
5	T	48	5.0	0.042	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
Approach		77	5.0	0.042	3.1	NA	0.0	0.0	0.00	0.33	55.3	
West: North Circular Road W												
11	T	305	5.0	0.177	0.3	LOS A	1.1	7.0	0.22	0.00	55.9	
12	R	21	5.0	0.177	8.8	LOS A	1.1	7.0	0.22	0.96	49.0	
Approach		326	5.0	0.177	0.9	NA	1.1	7.0	0.22	0.06	55.4	
All Vehicles		553	5.0	0.259	4.6	NA	1.1	7.0	0.27	0.31	51.7	

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Wednesday, 13 July 2011 4:56:54 PM
SIDRA INTERSECTION 5.1.5.2006

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Project: T:\PROJECTS\CEP02077 South Hedland TIA\Technical\SIDRA\CEP02077 - South Headland - 2021
Background and Dev.sip
8000955, CARDNO, ENTERPRISE

SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: North Circular Rd-Parker St
PM

CEP02077 - North Circular Road/Parker Street
2021 PM Background + Development Traffic Volumes
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker Street											
1	L	20	5.0	0.040	10.7	LOS A	0.1	0.6	0.45	0.70	46.5
3	R	73	5.0	0.279	23.2	LOS B	1.1	6.9	0.77	0.96	36.6
Approach		93	5.0	0.279	20.5	LOS B	1.1	6.9	0.70	0.91	38.3
East: North Circular Road E											
4	L	119	5.0	0.251	8.3	LOS A	0.0	0.0	0.00	0.94	49.0
5	T	348	5.0	0.251	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		467	5.0	0.251	2.1	NA	0.0	0.0	0.00	0.24	56.7
West: North Circular Road W											
11	T	264	5.0	0.187	2.9	LOS A	1.5	9.7	0.59	0.00	49.7
12	R	40	5.0	0.187	11.4	LOS A	1.5	9.7	0.59	0.96	48.1
Approach		304	5.0	0.187	4.1	NA	1.5	9.7	0.59	0.13	49.5
All Vehicles		864	5.0	0.279	4.8	NA	1.5	9.7	0.28	0.27	51.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Wednesday, 13 July 2011 4:56:52 PM

SIDRA INTERSECTION 5.1.5.2006

Project: T:\PROJECTS\CEP02077 South Hedland TIA\Technical\SIDRA\CEP02077 - South Headland - 2021

Background and Dev.sip

8000955, CARDNO, ENTERPRISE

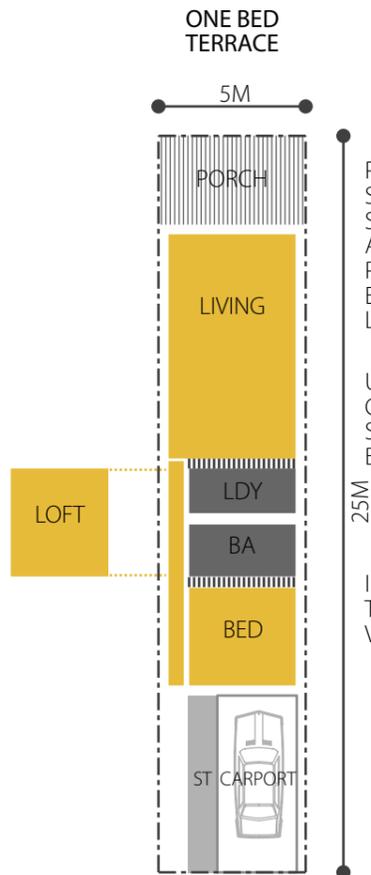
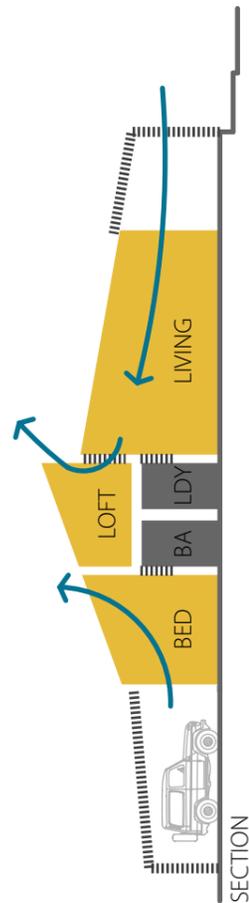
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SIDRA
INTERSECTION

APPENDIX 3

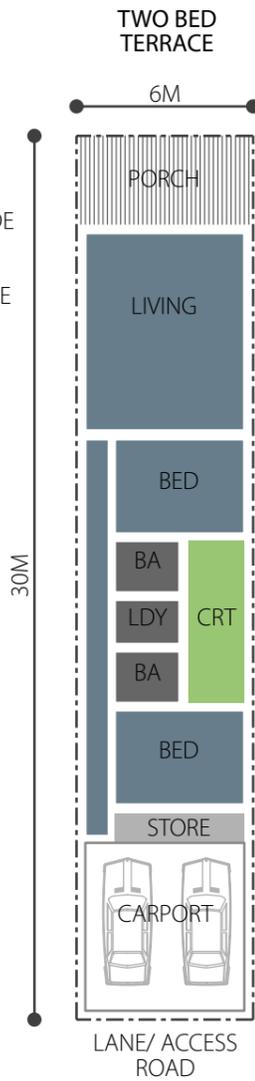
Indicative Built Form Typologies



PORCH COULD BE SEMI-ENCLOSED - LATTICE, SCREENS, PLANTING TO PROVIDE A SHADED, OUTDOOR SPACE. PLANTING WILL FACILITATE EVAPORATIVE COOLING FOR THE LIVING SPACE.

UTILISE ROOF FORM TO ALLOW CROSS VENTILATION. LOFT SPACE COULD BE SECOND BEDROOM OR STUDY.

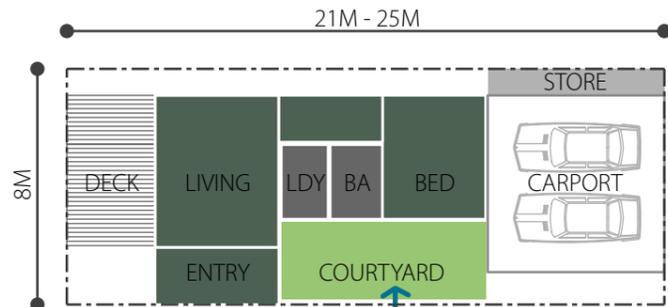
INCORPORATE BREEZE WALLS TO FACILITATE CROSS VENTILATION.



LIVING SPACE WITH MAXIMUM OPENINGS TO PORCH SPACE TO ENSURE NORTH AND NORTH-WESTERLY BREEZES ENTER THE SPACE.

COURTYARD TO ALLOW LIGHT AND VENTILATION INTO ALL HABITABLE ROOMS.

TWO BED TOWNHOUSE
2 STOREY



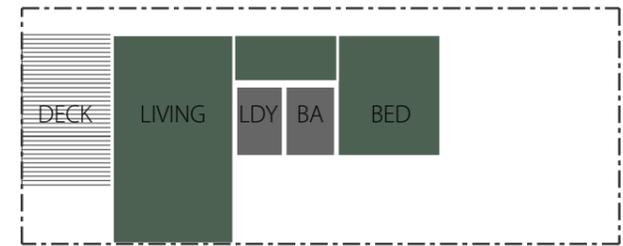
GROUND

SOME SIDE SETBACKS TO ALLOW FOR RAINWATER FALL/ AVOID THE USE OF BOX GUTTERS.

BREEZES FROM THE NORTH AND NORTH-WEST. USE COURTYARD TO ACHIEVE CROSS VENTILATION

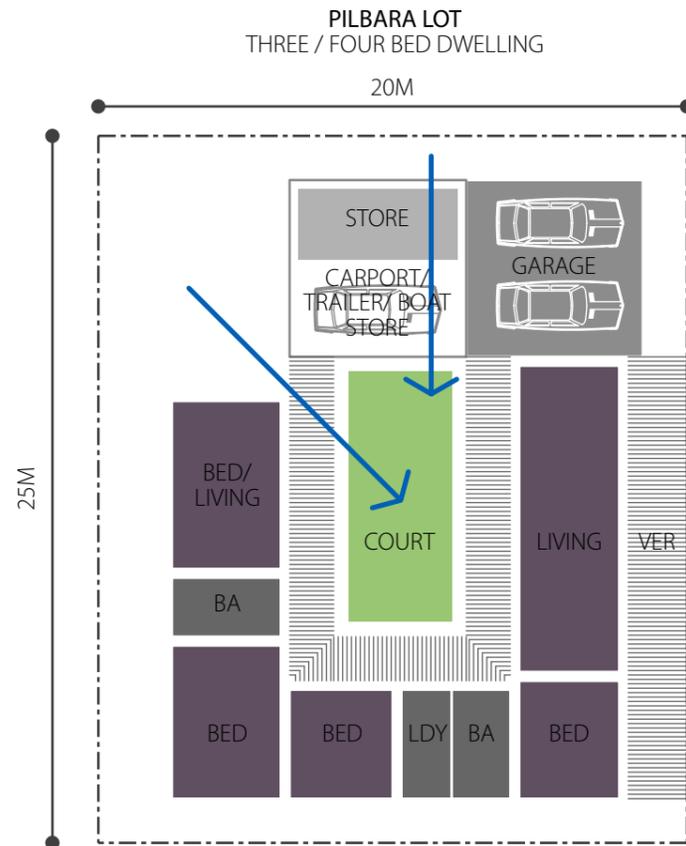


UPPER



UPPER - ALTERNATIVE

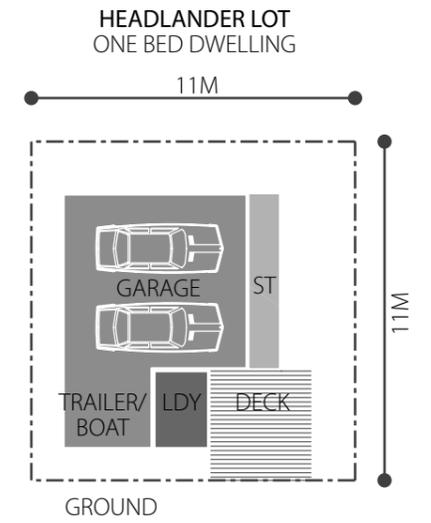
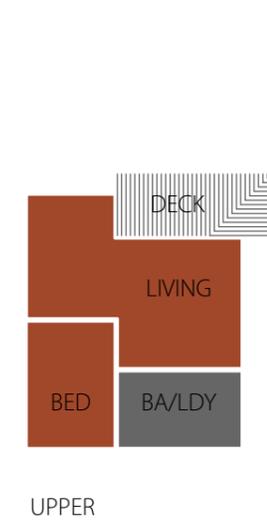
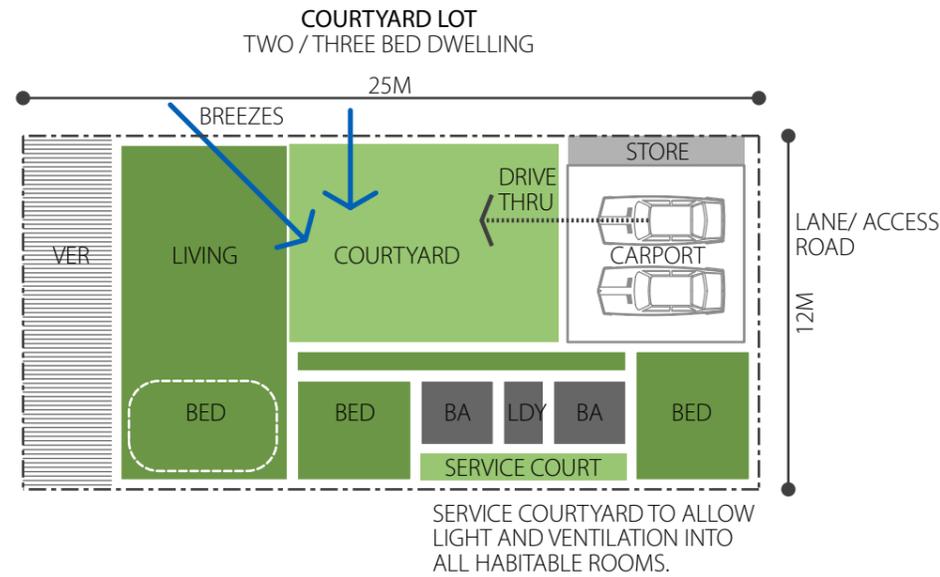
OPPORTUNITY FOR SEPARATE ACCOMMODATION WITHIN UPPER LEVEL.



PRIMARY STREET

PORCH COULD BE SEMI-ENCLOSED - LATTICE, SCREENS, PLANTING TO PROVIDE A SHADED, OUTDOOR SPACE. PLANTING WILL FACILITATE

EVAPORATIVE COOLING FOR THE LIVING SPACE FROM THE NORTH AND NORTH-WESTERLY BREEZES ACROSS LANDSCAPED COURTYARD .



APPENDIX 4

Servicing Report

Lot 1693 Parker Street & Lot 2119 Stanley Street South Hedland

Servicing Report & Estimate of Development Costs

22 July 2011

Revision No. 1

Prepared by Justin Zelones Project Number: 22556-PER-C

Level 3, 3 Plain Street, East Perth WA 6004

Phone (08) 6222 7000 Fax (08) 6222 7100 Email wge@wge.com.au Web www.wge.com.au



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3. Wastewater	3
4. Power	4
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6. Gas	6
7. Earthworks	7
8. Stormwater	8
9. Roadworks	9
10. Estimate of Development Costs	10
APPENDIX 1	EXISTING WATER RETICULATION PLAN
APPENDIX 2	EXISTING WASTEWATER RETICULATION PLAN
APPENDIX 3	EXISTING POWER PLAN
APPENDIX 4	EXISTING TELSTRA SERVICES PLAN
APPENDIX 5	STORMWATER FLOODING AND DRAINAGE
APPENDIX 6	SUBDIVISION CONCEPT PLAN AND TYPICAL ROAD CROSS SECTIONS
APPENDIX 7	PRELIMINARY CONSTRUCTION COST ESTIMATE



1. Introduction

Wood & Grieve Engineers have been commissioned by Cedar Woods Properties Ltd to undertake a servicing investigation to establish the availability of services for the development of Lot 1693 Parker Street and Lot 2119 Stanley Street South Hedland.

In addition to this we have reviewed the Town of Port Hedland's document Design Standards for New Residential Developments and incorporated these requirements in our review.

This investigation also provides an estimate of development costs based on a subdivision concept plan provided by Cedar Woods Properties Ltd on 8 July 2011



2. Water

The supply of bulk potable water to the Town of Port Hedland is provided through the Water Corporation which operates the Port and South Hedland Water Supply Scheme. The scheme is reliant on groundwater extraction from the Yule and DeGrey rivers which is piped to a central facility near Wallwork Road and North Circular Drive in South Hedland and then distributed to the surrounding areas. The Water Corporation have advised that they are currently at their supply limit.

The Water Corporation's current extraction licence from the Department of Water allows for a total of 13.5 gegalitres a year to be extracted from these sources, although this is expected to be increased to 18.5 gegalitres over the next 24 months. It is unclear how much of this additional volume has already been allocated to their current customers.

We note that the Water Corporation are currently investigating a third borefield (West Canning Basin), however any pressure this borefield may relieve on the current borefields to supply the Town would be in the order of five years away in the best case.

Although there are supply constraints at the current time, connection to physical infrastructure should be an easier prospect. Water reticulation can be connected into for each lot as follows:

- Lot 1693 Parker Street – A 200AC reticulation main runs along Parker Street adjacent to the site. This main would serve as the connection point for the development. It is also noted that the lot is adjacent to the South Hedland Water Tank which the Water Corporation is currently investigating duplicating. Distribution mains also exist in the reserve to the south of the site and in Parker Street.
- Lot 2119 Stanley Street – A 150AC reticulation main runs along Stanley Street adjacent to the site. This main would serve as the connection point for the development. It is also noted that the lot is adjacent to the South Hedland Water Tank which the Water Corporation is currently investigating duplicating.

Plans showing the location of the Water Corporation's existing water infrastructure are provided in Appendix 1.



3. Wastewater

Wastewater reticulation for South Hedland is ultimately discharged to the Water Corporation's wastewater treatment plant in Shoata Road South Hedland. The South Hedland Wastewater Treatment Plant is nearing capacity and requires upgrade to support further population growth. We note that we are pursuing a response from the Water Corporation regarding the capacity of their infrastructure to allow for this development in the short term.

It is noted that the Water Corporation received funding in January 2011 (\$106 million) to relocate the Port Hedland Wastewater Treatment Plant to a combined upgraded facility in South Hedland. The expected completion time for this project is approximately 2014.

Although there are capacity constraints at the current time, connection to physical infrastructure should be an easier prospect. Wastewater reticulation can be connected into for each lot as follows:

- Lot 1693 Parker Street – We expect that wastewater reticulation will be able to be extended approximately 150m from the south of the lot along Parker Street and connected to the existing 225P wastewater reticulation main in Kennedy Street near the existing sewer pump station. We are aware that your discussions with the Water Corporation have noted an alternative outfall and pump station requirement, however we are waiting a response from the Water Corporation to confirm this. It is noted that the estimate allows for gravity connection to Kennedy Street.
- Lot 2119 Stanley Street – We expect that wastewater reticulation will be able to be extended approximately 150m from the north of the lot along Stanley Street to an existing 150VC wastewater reticulation main to serve the site.

Existing wastewater infrastructure is provided in plans in Appendix 2.



4. Power

Horizon Power is the supply authority operator of the Pilbara power supply grid. Power supply in South Hedland is supplied via a high voltage supply scheme network of 22kV which is made up of a combination of overhead lines and underground power cables fed from a zone substation located in Murdoch Drive. The Murdoch Drive zone substation has three transformers in operation and cannot accommodate additional transformers.

A plan showing the indicative location of Horizon Power infrastructure is provided in Appendix 3.

A summary of power connection for each site is summarised as follows:

- Lot 1693 Parker Street – Assuming that there is enough capacity in the existing high voltage feeders (western side of Parker Street) we would in all likelihood cut in and out of the high voltage line and establish a switchgear and transformer site (approximately 6.2m x 4.0m) on the northern side of the main boulevard (ideally the first group housing site). A second transformer site will be required in the vicinity of the POS at the eastern end of the boulevard. The dimensions of this site will approximately be 4.0m x 3.7m.
- Lot 2119 Stanley Street – Assuming there is sufficient capacity in the existing high voltage feeder (eastern side of Stanley Street) it is likely that a transformer site (approximately 4.0m x 3.7m) will be established in the vicinity of the proposed development and the transformer is likely to be supplied via drop out fuses off one of the existing high voltage poles. A less likely, but possible, scenario is that the existing low voltage network will have sufficient capacity to supply the proposed twelve lots. This will negate the requirement to establish the transformer site as only low voltage cabling and pillar units will be required.

When preparing our estimate for underground power reticulation, the following assumptions have been applied:

- It is assumed that the existing infrastructure has the capacity to take on the additional load.
- It is assumed that the connection point for all sites is within 50 meters from the property boundary and no allowance has been made for any headwork's charges should the network be at full capacity.
- All sites are to be constructed individually under separate Horizon Power projects.
- All estimates have been based on a per lot fees from average prices of similar projects in the Karratha / South Hedland region.
- An ADMD of 7kVA has been allowed for in the load calculations. It should be noted that Horizon Power intends on undergrounding a portion of South Hedland as part of their Pilbara underground power project (PUPP) which is forecasted to occur in 2012/2013 and should this be the case the ADMD is likely to increase to 10KVA per lot. This will push up the cost per lot as more infrastructure will be required to accommodate the increase in load.



5. Telecommunications

Currently telecommunications infrastructure throughout the Town of Port Hedland is provided by Telstra. Plans of existing Telstra infrastructure have been provided in Appendix 4.

Telstra's provision of telecommunication services to the Town of Port Hedland has been affected by the new government initiative under the National Broadband Network (NBN) policy to provide Fibre To The Premises (FTTP). The policy took effect on 1 January 2011, with new developments (greenfield sites) with 100 premises or more within the NBN Co. coverage zone prioritised by NBN Co. to have fibre infrastructure installed. The new policy clarifies that NBN Co. will fund the provision of fibre and backhaul to new housing estates, with developers funding the provision of a conduit & pit system. The Town of Port Hedland has been identified as falling within NBN Co. coverage zone.

Based on this information the subdivision's telecommunication infrastructure will be provided by NBN Co. There will be a cost implication on the development in the form of pit and pipe infrastructure which is now installed at the developers expense. This change has been reflected in our estimate of development costs.



6. Gas

Despite being located in a region that provides a significant proportion of Western Australia's domestic gas supply, Pilbara towns are not provided with a reticulated gas supply network.

From discussions with WA Gas Networks, they have indicated that there are no current plans to provide reticulated gas to the Town of Port Hedland. WA Gas Networks also indicated that their position on the provision of reticulated gas was unlikely to change due to the high establishment costs of installing the initial network.

WA Gas Networks also noted that as heating is not required in winter and solar hot water systems are quite functional, the base load demand for a reticulated gas supply is relatively small compared to southern areas of Western Australia. For residences that would like access to gas for applications such as stove-top cooking then a cheaper supply method would be through gas bottles.



7. Earthworks

Based on contour information provided by McMullen Nolan a ridge line can be seen running approximately through the Water Corporation lot separating Lot 1693 Parker Street and Lot 2119 Stanley Street generating a fall to the west for Lot 1693 towards Parker Street and a fall to the east for Lot 2119 towards Stanley Street.

Lots 1693 Parker Street and Lot 2119 Stanley Street are constrained in level by the existing road network and adjacent lot levels. Any earthworks we have allowed for are based solely on achieving a minimum serviceability level for sewer. Based on this information import fill material will be required for Lot 1693 Parker Street. No fill importation is expected for Lot 2119 Stanley Street. It is noted however that this may change should unsuitable material or high groundwater levels be encountered during the course of a geotechnical investigation.

Please note that the availability of suitable fill sources within the Town of Port Hedland is quickly becoming exhausted. On top of this the cost to supply suitable import fill material to development sites is approximately twice as expensive (approximately \$40/m³) as it is currently in Perth.

Although finished lot levels within South Hedland are typically dictated by the need to be above the 1 in 100 year flood level, flood mapping for South Hedland indicates that flooding is not an issue for your site.

We have not made any allowance for the construction of retaining walls. Retaining walls are not typically used in Port Hedland due to the availability of materials increasing the cost significantly. Limestone blocks, such as those used in Perth for retaining walls, are not readily available in Port Hedland and would need to be transported from Perth.

Please be aware that early application to the Water Corporation and the Department of Water should be made for construction water and a dewatering and/or bore licence so that dust suppression measures may be undertaken on site. Otherwise delays to the construction programme may result.



8. Stormwater

The Town of Port Hedland is subject to cyclonic activity typically occurring from December through to March. Such activity makes the Town of Port Hedland susceptible to storm surge and flooding. As identified in the previous section, mapping provided in a recent flood study suggest that your site will not be prone to flooding.

The treatment of stormwater drainage within South Hedland is typically by the routing of run-off to open drains via the road network which eventually discharge to creeks. Due to the intensity of storms pit and pipe drainage systems are not typically used within the Town of Port Hedland. This is due to the large pipe sizes required for storm events and the high maintenance costs associated with keeping a pit and pipe system clean and operational.

In the instance of Lot 1693 and Lot 2119 run-off will be directed to Parker Street and Stanley Street respectively where it will run north and be intercepted and passed under North Circular Drive. The stormwater will then be intercepted by existing district drainage channels where it will ultimately be discharged to the west into South Creek.

In the specific case of Lot 1693 the Town of Port Hedland have advised that they will require the 1 in 5 year storm event to be stored on-site prior to discharging to the existing swale on Parker Street. To allow for the detention of stormwater run-off some consideration will need to be given to storage areas within the development plan. Currently the POS is the only area suitable for this purpose, however the POS is reasonably high in the catchment and will only be able to provide detention for a small portion of the catchment.



9. Roadworks

Road infrastructure will need to be provided in accordance with the Town of Port Hedland document Design Standards for New Residential Developments. Reviewing this document against the typical road cross sections provided in Appendix 6, the Town of Port Hedland has noted that the minimum road reserve width is to be 15m, which would apply to local roads expecting no greater than 300 vehicles per day. As such this will mean that the 12m wide road reserves indicated on the concept subdivision plan will need to be increased to 15m unless otherwise negotiated with the Town of Port Hedland.

The 24m wide boulevard cross section may also need to be altered to allow a traffic lane width of a least 3.1m and as much as 3.6m per the guidelines. Again this is also subject to further negotiation with the Town of Port Hedland.

Our roadworks estimate allows for the construction of a black asphalt seal with mountable kerbing adjacent to residential lots and semi-mountable kerbing at intersections with widths and parking bays as provided in the typical road cross sections. The Town of Port Hedland guidelines note that a 25mm asphalt wearing course on top of a 100mm basecourse and 150mm sub-base is sufficient for residential areas in Port Hedland. We would strongly recommend that geotechnical advice confirm this pavement design is suitable for your site.

We have made an allowance for the construction of footpaths.

We have allowed for 3m high twinside fencing along the northern boundary of Lot 1693 Parker Street where it abuts North Circular Road as per your request. No allowance for fencing has been made for any other location.

Appendix 1

Existing Water Reticulation Plan



LEGEND

--- EXISTING WATER PIPE



REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS

WOOD & GRIEVE ENGINEERS

Wood & Grieve Engineers Ltd
A.C.N. 117 869 619
Level 3, Hyatt Centre
3 Plain Street, East Perth
Western Australia 6004
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PERTH
MELBOURNE
SYDNEY
BRISBANE
GOLD COAST
ALBANY
BUSSELLTON
SHENKLEN

CLIENT:
CEDAR WOODS PROPERTIES LIMITED

PROJECT:
LOT 1693 PARKER STREET & LOT 2119 STANLEY STREET

TITLE:
EXISTING WATER PLAN

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED:	SCALE: A1 @ 1:1000
DESIGNED: J.ZELONES	APPROVED FOR TENDER:	DATUM: A.H.D.
DRAWN: C.FITZPATRICK	APPROVED FOR CONSTRUCTION:	WAPC: -

PROJECT No. 22556-PER-C	DRAWING No. W1	REVISION A
-----------------------------------	--------------------------	----------------------

PLAN
SCALE 1:1000

100
90
80
70
60
50
40
30
20
10
0

Appendix 2

Existing Wastewater Reticulation Plan

Appendix 3

Existing Power Plan

	Cable Joint		Water Feature
	Circuit Breaker		Obstacle
	Join Underground		Oil Pipe
	Join		Otc Underground Cable
	Tee Junction		Lodged Centroids
	Carrier Approximation		Planned Subdivisions
	Data Overhead		Turquoise Precalc Centroids
	Data Underground		Turquoise Precalc Int Lot Boun
	Perth Fibre Conduit Ug Carrier		Turquoise Precalc Road Front
	Kiosk		Green Legal Centroids
	L. V. Distribution Frame		Obsolete Centroids
	Pillar		
	Ring Main Unit		
	Substation		
	Underground Crossing		
	St. Lt. Pilot, Overhead		
	St. Lt. Pilot, Underground		
	Fuse Disconnecter, Overhead		
	St. Lt. Circuit, Overhead		
	St. Lt. Circuit, Underground		
	Distribution Pipe		
	Link Pipe		
	Trunk Pipe		
	Bright Conduit Ug Carrier		
	Communication Pit		
	66kv Underground		
	66kv Termination		
	132kv Underground		
	132kv Termination		
	330kv Underground		
	High Voltage Busbar		
	H. V. Underground		
	Single Phase Underground		
	Capacitor Bank		
	Disconnecter		
	Fuse Switch		
	Hv Cable Pole Termination		
	Metering Unit		
	Non Load Break Connector		
	Reactor		
	Surge Divertor		
	Switch Disconnecter		
	Low Voltage Busbar		
	L. V. Underground		
	Circuit Breaker Disconnecter		
	Disconnecter, Underground		
	Fuse Disconnecter, Underground		
	Lamp		
	Lv Cable Pole Termination		
	Building Lines To 10000		
	Building Lines To 5000		
	Ces Scheme		
	Easements		



WALLWOR

WALLWORK (X'ING)

ON

BHP/DRI PUMPS

WATER CORP TX1
WATER CORP TX2

NORTH CIRCULAR RD

STANLEY CARAVAN PARK

NORTH C

GREENE WEST

STANLEY NORTH

JUDITH

JOHN

PUNDULMARRA COLLEGE

PUNDULMARRA VILLAGE

JANICE

GUARD

HAMILTON

MAUGER

TRAINS CRES

3x6/4.75-7/1.60

1963

3x6/4.75-7/1.60 ACSRIAZ

3x6/4.75-7/1.60 ACSRIAZ

3x6/4.75-7/1.60 ACSRIAZ

3x6/4.75-7/1.60 ACSRIAZ

3898

483

578

576

597

593

577

570

561

551

729

ON 1300

1325

ON 1303

620

672

3x6/4.75-7/1.60 ACSRIAZ

HAMILTON RD

PARKER ST

PARKER ST

PARKER ST

PEDLAR ST

KENNEDY ST

KENNEDY ST

MAUGER PL

HAWKINS ST

PETER WY

JANICE WY

EDWARDS PL

EDWARDS PL

EDWARDS PL

EDWARDS PL

EDWARDS PL

EDWARDS PL

MAUGER PL

HAWKINS ST

PETER WY

JANICE WY

EDWARDS PL

EDWARDS PL

EDWARDS PL

EDWARDS PL

EDWARDS PL

EDWARDS PL

EDWIN WY

ANGUS WY

EDKINS PL

JUDITH WY

EDKINS PL

EDKINS PL

EDKINS PL

EDKINS PL

EDKINS PL

EDKINS PL

ON

Appendix 4

Existing Telstra Services Plan

TELSTRA INFRASTRUCTURE PLAN



Appendix 5

Stormwater Flooding and Drainage





Stormwater Drainage Outfalls

Appendix 6

Subdivision Concept Plan and Typical Road Cross Sections

- LEGEND**
- DEVELOPMENT PLAN AREA
 - RESIDENTIAL R25
 - RESIDENTIAL R40
 - RESIDENTIAL R60
 - PUBLIC OPEN SPACE
 - DRAINAGE SWALE
 - INDICATIVE LAYOUT [R60 GROUP HOUSING SITES]

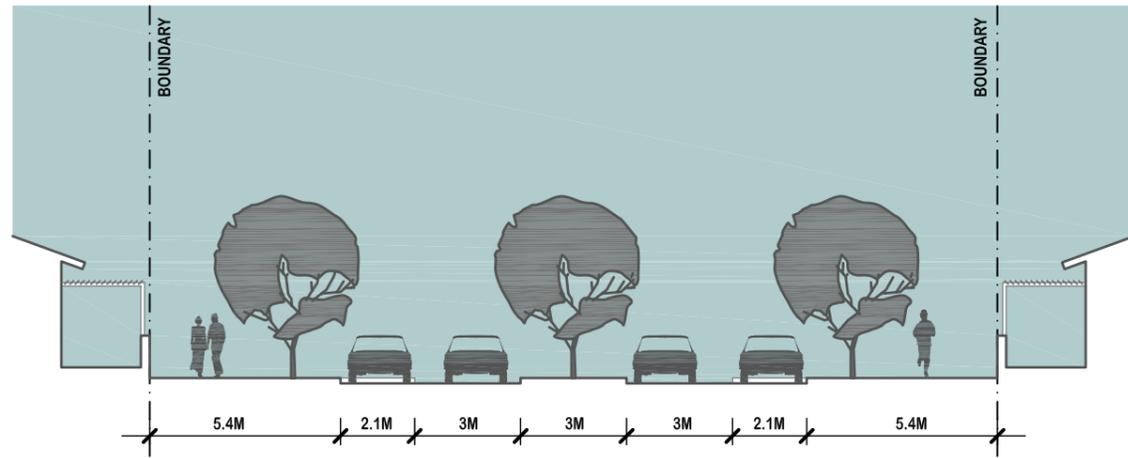


DEVELOPMENT PLAN
 LOT 1693 PARKER ST AND
 LOT 2119 STANLEY ST

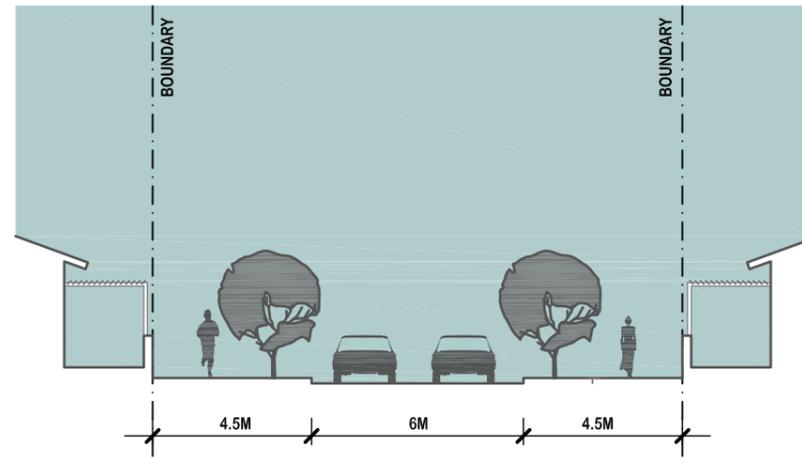


prepared by julie harrold *architect*
 for Cedar Woods Properties

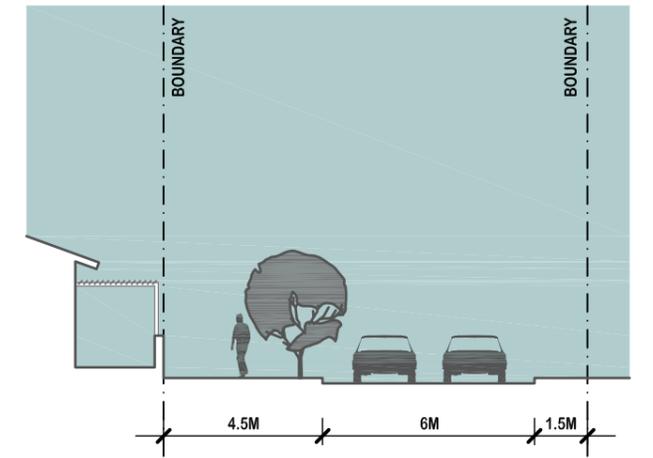
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24M ROAD RESERVE



15M ROAD RESERVE



12M ROAD RESERVE

13.07.11	A	FOR ISSUE
DATE	REV	DESCRIPTION

South Hedland
STREET CROSS SECTIONS

08

file ref: cwp sth con 10a
scale: 1:200@ a3

prepared by julie harrold *architect*
for Cedar Woods

