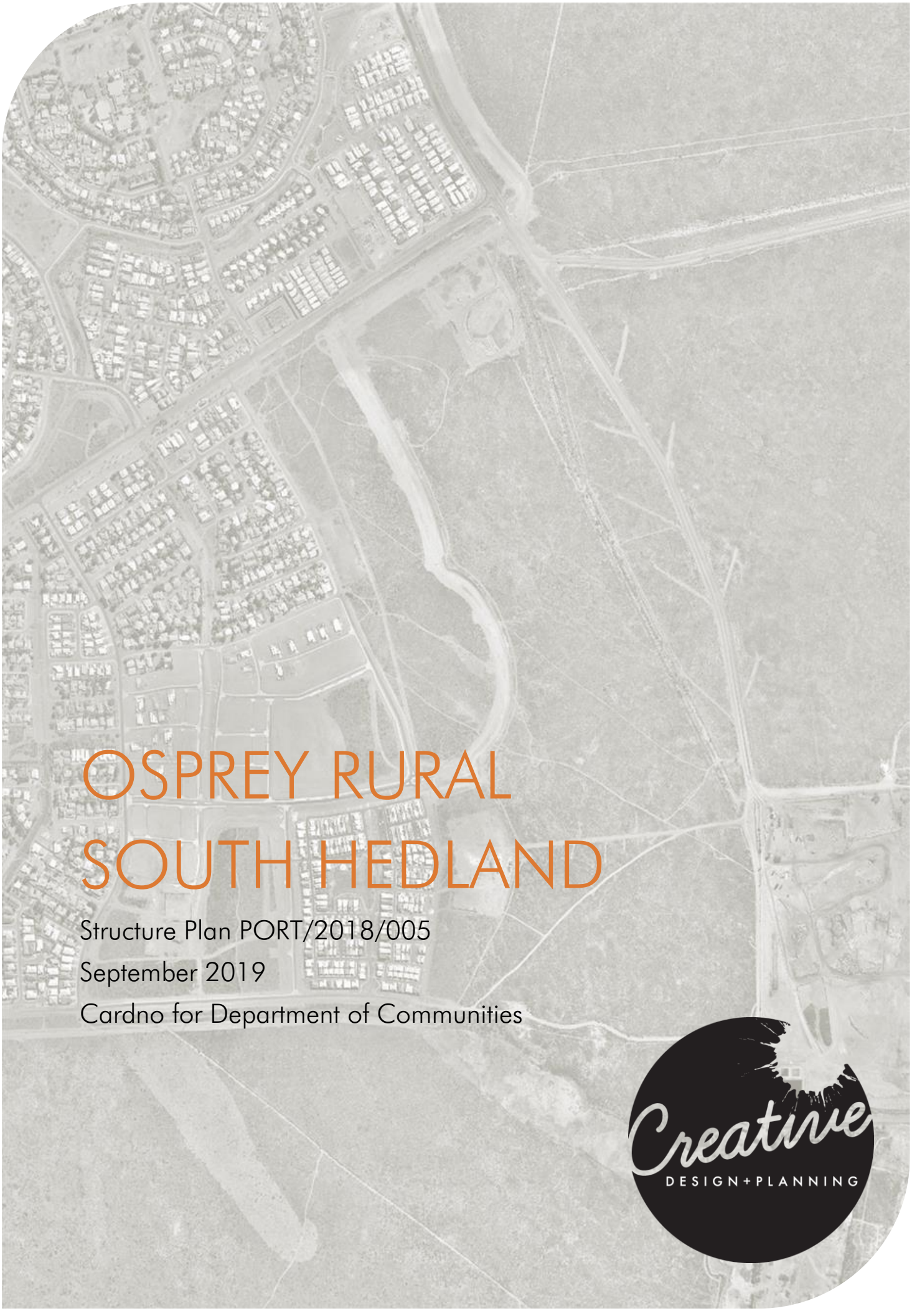


# OSPREY RURAL SOUTH HEDLAND

Structure Plan PORT/2018/005

September 2019

Cardno for Department of Communities

Creative DESIGN+PLANNING

# OSPREY RURAL – STRUCTURE PLAN

## September 2019


Prepared for:

Hannelie Evans
Department of Communities
99 Plain Street
East Perth WA 6004

T: 9222 4666 F: 9221 1388 E: Hannelie.Evans@communities.wa.gov.au

Prepared by:

Creative Design + Planning
2/464 Murray Street
PERTH WA 6000

T: 6333 1888 E: info@creativedp.com.au

In Collaboration With:

Cardno
11 Harvest Terrace
West Perth WA 6005

T: 9273 3888 F: 9486 8664 E: perth@cardno.com.au


DOCUMENT STATUS

| VERSION | COMMENT | PREPARED BY | REVIEWED BY | APPROVED BY | ISSUE DATE |
|---|---|---|---|---|---|
| 1 | Draft | CD+P | DM | JH | 16.11.2017 |
| 2 | Client edits | CD+P | HE | DM | 22.11.2017 |
| 3 | WAPC Amendments | CD+P | HE | DM | 19.09.2019 |
| 4 | Minor text correction | CD+P | DM | DM | 27.09.19 |
| | | | | | |

## ENDORSEMENT

This Structure Plan is prepared under the provisions of the Town of Port Hedland Local Planning Scheme No. 5.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON

.....**2 October 2019** ..... Date

Signed for and on behalf of the Western Australian Planning Commission:

.....

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

..... Witness

.....**2 October 2019**.....Date

.....**2 October 2029**..... Date of Expiry

## Table of Modifications to Part One and Structure Plan Map

| MODIFICATION NO. | DESCRIPTION OF MODIFICATION | DATE ENDORSED BY COUNCIL | DATE ENDORSED BY WAPC |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

## Table of Density Plans

| DENSITY PLAN NO. | AREA OF DENSITY PLAN APPLICATION | DATE ENDORSED BY WAPC |
|---|---|---|
| | | |
| | | |
| | | |

# EXECUTIVE SUMMARY

This Structure Plan applies to the land bounded by Murdoch Drive in the north, Brolga Way on the west, Collier Drive road reserve on the south, and the southern extent of North Circular Road on the east. The land comprises five separate parcels of land owned by the Department of Communities. It is traversed by an overhead powerline controlled by Alinta Energy and by a major drainage channel that connects drains on other sites to a culvert adjacent to the intersection of Murdoch Drive and North Circular Road (south).

The Structure Plan is intended to make the land development-ready for future residential development and includes a small Local Centre, public open space and a school site. The Structure Plan anticipates a mixture of low density (R20) and medium density (R40) residential development designed to suit the Port Hedland climate. Realignment of the drainage channel is proposed to achieve more efficient subdivision of the site, and to allow the Local Centre to front onto Murdoch Drive.

This Structure Plan comprises:

a) Part 1 – Implementation Section

This section contains the Structure Plan Map and recommended planning provisions and requirements.

b) Part 2 – Explanatory section

This section to be used as reference guide to interpret and justify the implementation of Part One.

The following table provides a summary of the proposed land uses and yields.

| ITEM | DATA | SECTION NUMBER REFERENCED WITHIN THE STRUCTURE PLAN REPORT (PART TWO) |
|---|---|---|
| Total area covered by the Structure Plan | 121.36 hectares | 1.2.2 |
| Area of each land use proposed:<br>• Residential<br>• School (K – 12)<br>• Local Centre<br>• Powerline corridor (existing)<br>• Drainage channels<br>• Roads<br>Total estimated lot yield | Hectares / Lot yield<br>53.3 / 1,184<br>12.5 / 1<br>2.7 / 2<br>4.54 / 2 (reserve)<br>13.67 / N/A<br>24.33 / N/A<br>1,780 lots | 4.2 |
| Estimated number of dwellings | 1,177 dwellings | 4.3.2 |
| Estimated residential site density | 20 dwellings per site / hectare | 4.3.1 |
| Estimated population | 3,060 people @ 2.6 per household | 4.3.2 |
| Number of schools | 1 K-12 schools | 4.4 |
| Estimated commercial floor space | <1,500m$^2$ net lettable area | 4.5 |
| Estimated number and percentage of public open space given over to:<br>• District<br>• Neighbourhood parks | • 3.55 hectares; 1 park<br>• 5.094 hectares 6 parks | 4.6 |

# CONTENTS

Part One – Implementation Section



Part Two – Explanatory Section

## FIGURES



## PLANS

## TABLES PART ONE



## TABLES PART TWO



## PLATES



## APPENDICES

| | |
|---|---|
| AHG | Australian Height Datum |
| AASS | Actual Acid Sulphate Soils |
| ASS | Acid Sulphate Soils |
| AS | Australian Standard |
| CPTED | Crime Prevention Through Environmental Design |
| DA | Development Area |
| DCA | Development Control Area |
| DCP | Development Control Policy |
| DoC | Department of Communities |
| DBCA | Department of Biodiversity, Conservation and Attractions |
| DPLH | Department of Planning, Lands and Heritage |
| DWER | Department of Water and Environmental Regulation |
| EPA | Environmental Protection Authority |
| ESD | Environmentally Sustainable Development |
| FMP | Foreshore Management Plan |
| GLA | Gross Lettable Area |
| Ha | Hectare |
| HV | High Voltage |
| Km | Kilometre/s |
| kV | kilovolt |
| LDP | Local Development Plan |
| LWMS | Local Water Management Strategy |
| NLA | Net Lettable Area |
| POS | Public Open Space |
| PSP | Primary Shared Path |
| RL | Reduced Level |
| TMP | Traffic Management Plan |
| UWMP | Urban Water Management Plan |
| WC | Water Corporation |
| WAPC | Western Australian Planning Commission |
| WSUD | Water Sensitive Urban Design |
| ZS | Zone Substation |

# PART ONE

## Implementation Section

### OSPREY RURAL STRUCTURE PLAN

1. Structure Plan Area
2. Operation
3. Staging
4. Subdivision and Development Requirements
5. Local Development Plans
6. Additional Information

# OSPREY RURAL STRUCTURE PLAN – PART ONE IMPLEMENTATION SECTION

## 1. Structure Plan Area

This Part (Part One) applies to the Osprey Rural Structure Plan, consisting of all land contained within the inner edge of the line denoting the Structure Plan boundary on the Structure Plan Map (Plan 1), being Lot 9001 on Deposited Plan 75754, and Lots 570-574 on Deposited Plan 76673.

The Structure Plan is identified as the *Osprey Rural Structure Plan.*

## 2. Operation

The date the Structure Plan comes into effect is the date the Structure Plan is approved by the WAPC. The Structure Plan is to be given due regard when considering applications for subdivision within the Structure Plan Area.

## 3. Staging

The development of the Structure Plan area will be implemented in multiple stages. Timing, location and composition of the future stages will be dependent on market demand.

The staging will commence in the northern portion of the site, with access provided via Brolga Way. The staging will then move westwards along Murdoch Drive, then southwards. Subject to negotiation with the Town of Port Hedland it is anticipated that the District Open Space and adjacent road access will be provided in Stage 4.

The provision of engineering infrastructure and the primary internal road network will also need to be staged to suit development demand and/or suitable access at an early stage. A detailed programme for this will be prepared as part of ongoing detailed planning and design of service infrastructure.

In summary, the development will be staged based on:

- provision of infrastructure, namely electricity, water, sewer, and drainage including realignment of the existing drainage channel;
- construction of roads, including the need to construct culverts across the drainage channel;
- removal or mitigation of the hazard buffers associated with the landfill site and the mining leases to the south-east and south of the Structure Plan area; and
- market demand for residential land.

## 4. Subdivision and Development Requirements

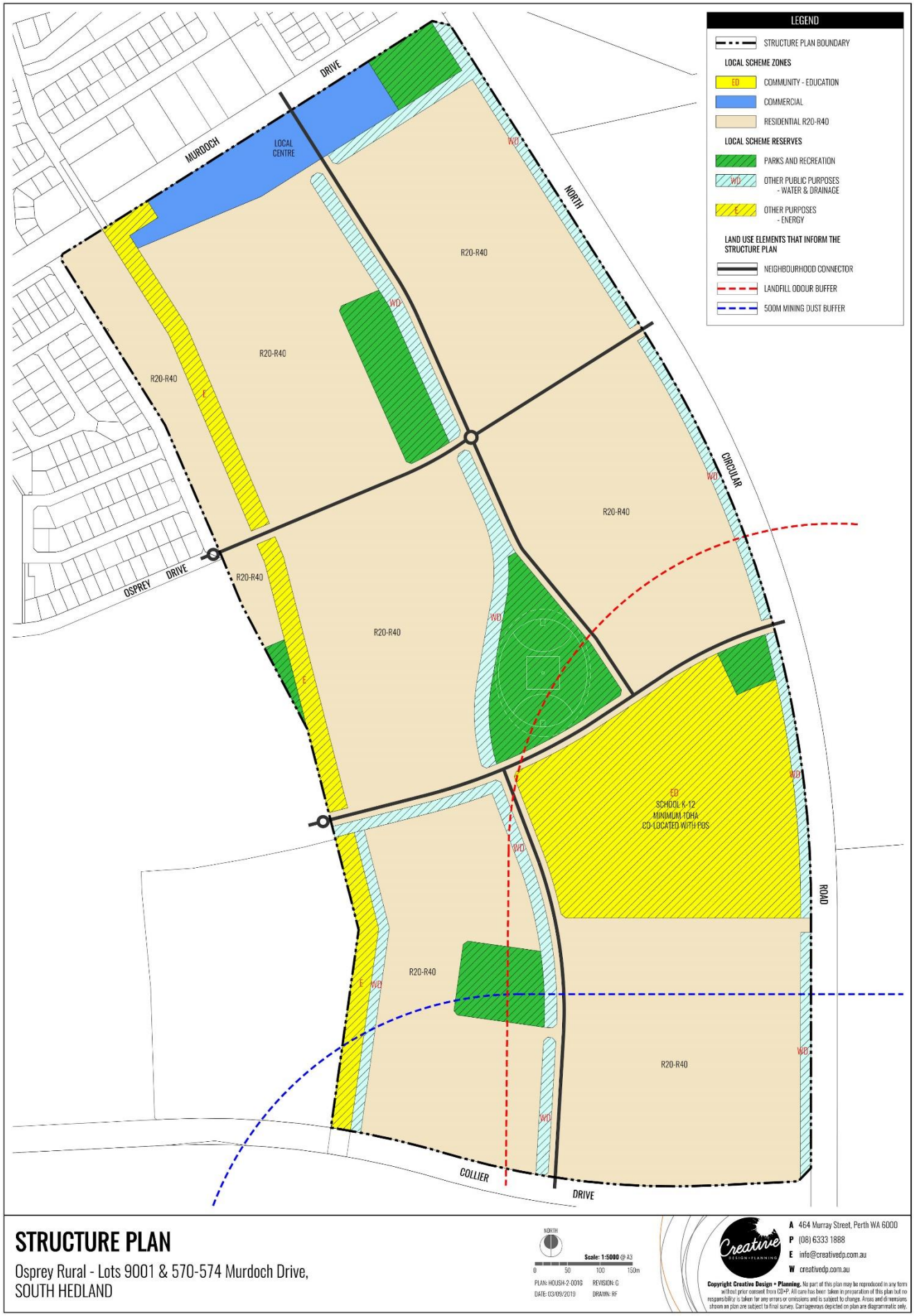
### 4.1. Zones and Reserves

Future zones and reserves corresponding with the proposed land uses are shown on the Structure Plan Map (Plan 1). It is anticipated that once construction is sufficiently advanced, an amendment will be made to the Local Planning Scheme to reflect these zones and reserves.

### 4.2. Land Use Permissibility

Land use permissibility within the Structure Plan area is to be in accordance with the corresponding zone or reserve under the Scheme. Where the use of discretion is required for a proposed land use within the proposed Local Centre, this should be exercised with a preference towards land uses that will be supportive of community development, health and sustainability.

## Plan 1: Structure Plan Map




**STRUCTURE PLAN**

Osprey Rural - Lots 9001 & 570-574 Murdoch Drive,
SOUTH HEDLAND

NORTH
Scale: 1:5000 @ A3
0 50 100 150m
PLAN: HOUSH-2-0018 REVISION: C
DATE: 03/09/2019 DRAWN: RF


A 464 Murray Street, Perth WA 6000
P (08) 6333 1888
E info@creativedp.com.au
W creativedp.com.au

## 4.3. Hazards and Buffer Areas

### 4.3.1. Bushfire Risk Management

All subdivision and development applications for land identified as a bushfire prone area should be accompanied by appropriate supporting information which demonstrates that the proposal is consistent with *State Planning Policy 3.7: Planning in Bushfire Prone Areas.*

### 4.3.2. Buffer Special Control Areas Requirements

#### 4.3.2.1. BUFFER SPECIAL CONTROL AREAS WITHIN THE STRUCTURE PLAN AREA

Parts of the Structure Plan area is subject to special control areas in the *Town of Port Hedland Local Planning Scheme No .5* for the South Hedland Landfill Odour Buffer and the Mining Dust Buffers for Mining Leases M45/531 and M45/689. The extent of these special control areas is shown on the Structure Plan and Scheme maps.

#### 4.3.2.2. SUBDIVISION AND DEVELOPMENT WITHIN THE BUFFER AREAS

a) Subdivision and development of land for sensitive land uses should not occur within the abovementioned special control areas until it is appropriately demonstrated that there would be no significant amenity impacts associated with the operation of the South Hedland Landfill Facility or sand mining activities.

b) The requirements that need to be addressed are outlined in clauses 6.6 (South Hedland Landfill Odour Buffer Special Control Area) and 6.7 (Mining Dust Buffer Special Control Area (Basic Raw Material Extraction Area Mining Leases M45/531 and M45/689) of the *Town of Port Hedland Local Planning Scheme No. 5.*

### 4.3.3. Murdoch Overhead Power Transmission Line

Development including road construction in or near the Murdoch Overhead Power Transmission Line that runs through the Structure Plan area must be undertaken in accordance with the safety requirements of Alinta Energy current at the time. Alinta Energy should be contacted prior to subdivision to determine the design and other requirements relating to this infrastructure.

## 4.4. Major Infrastructure

a) Realignment of the drainage corridor through the Structure Plan area is to be in accordance with Plan 1 and designed in accordance with the parameters set out in the Local Water Management Strategy. Additional drainage to accommodate drainage generated by the subdivision will be added to the realigned existing drain.

b) Neighbourhood connector roads are to be provided generally as shown in Plan 1.

## 4.5. Residential Density

### 4.5.1. Dwelling Target

It is intended that the Structure Plan area will provide for a minimum of 1,177 dwellings in a range of typologies to suit different household types and lifestyle preferences. A higher yield is possible depending on the final subdivision design and the number of grouped and multiple dwellings ultimately developed. Residential development in the form of grouped dwellings or multiple could also be integrated within the Local Centre.

### 4.5.2. Density Targets

a) Plan 1 defines the range of residential densities intended to apply to areas within the Structure Plan. Lot specific residential densities, within the defined residential density ranges, are to be subsequently assigned in accordance with a Density Plan approved by the WAPC.

b) A Density Plan that indicates the R-Code applicable to each lot within the subdivision is to be submitted to the WAPC at the time of application for subdivision. The R-Codes applied are to be generally consistent with the Structure Plan, the densities identified on Plan 1, and the locational criteria contained in Table 1-1.

c) The Density Plan is to include a summary of the proposed dwelling yield of the subdivision.

d) Approval of the Density Plan is to be undertaken at the time of determination of the subdivision application by the WAPC. The approved Density Plan will then form part of the Structure Plan and will be used to guide the determination of future development applications.

e) Variations to the Density Plan will require further approval of the WAPC, with a revised Density Plan submitted generally consistent with the approved plan of subdivision issued by the WAPC. The revised Density Plan shall be consistent with Residential Density ranges identified on Plan 1 and the locational criteria contained in Table 1-1.

f) A revised Density Plan, consistent with Paragraph 4.5.3 will replace, wholly or partially, the previously approved Density Plan, and shall then form part of the Structure Plan as outlined in paragraph d).

g) Density Plans are not required if the WAPC considers that the subdivision is for one or more of the following:

i) The amalgamation of lots;

ii) Consolidation of land for "superlot" purposes to facilitate land assembly for future development;

iii) The purposes of facilitating the provision of access, services or infrastructure; or

iv) Land which by virtue of its intended zoning or reservation under the Structure Plan will not be developed for residential purposes.

### 4.5.3. Locational Criteria

The allocation of residential densities will generally be in accordance with the locational criteria set out in Table 1-1.

Table 1-1: Density Locational Criteria

| R-CODE | GENERAL LOCATION PRINCIPLES | CRITERIA |
|---|---|---|
| R20 | Applies to majority of Structure Plan area supporting delivery of traditional front-loaded product. | Except as otherwise provided by this Structure Plan, a base density coding of R20 should apply. |
| R40 | Located in proximity to public open space, public transport routes and the Local Centre. | Applies to land which is:<br>• located adjacent or directly opposite to public open space;<br>• fronting a neighbourhood connector road or a public transport route; or<br>• located within the Local Centre or within 400 metres of it. |

## 4.6. Commercial

The combined maximum retail and commercial floorspace Net Lettable Area (NLA) for the Structure Plan is as shown in Table 1-2.

Table 1-2: Commercial Floorspace Allocation

| CENTRE | MAXIMUM NET LETTABLE AREA |
|---|---|
| Local Centre | 1,500m$^2$ |

## 4.7. Public Open Space

a) The Structure Plan (Plan 1) nominates an area of 8.644ha as creditable POS. The proposed POS exceeds the minimum 10% requirement as outlined in Part Two of this report.

b) Public open space is to be provided generally in accordance with Plan 1, with an updated public open space schedule to be provided at the time of subdivision for determination by the WAPC, upon the advice of the Town of Port Hedland.

## 4.8. Education Facilities

The land indicated as 'Public Purposes Reserve – Primary School' is available for development of a school catering from kindergarten to Year 12.

# 5. Local Development Plans

a) A Local Development Plan is to be prepared for the Local Centre pursuant to the *Local Development Plan Framework* and Schedule 2, 'Deemed Provisions for Local Planning Schemes' of the *Planning and Development (Local Planning Schemes) Regulations 2015.*

b) The Local Development Plan is to include provisions that address:

- Interface and functional integration with adjacent POS and residential development;
- Pedestrian access and circulation;
- Crime Prevention Through Environmental Design;
- Vehicle access and circulation including service vehicles;
- Land use mix;
- Location of car parking and service areas to avoid negative amenity impacts on residential land and reduce the need for vehicles using the centre to traverse local access roads;
- Provision of bicycle parking, and end-of-trip facilities for employees.
- Site setbacks;
- Site Landscaping;
- Creation of an 'entry statement' into the Structure Plan area.

# 6. Additional information

| ADDITIONAL INFORMATION | APPROVAL STAGE | CONSULTATION REQUIRED |
|---|---|---|
| Landscaping Plan/ POS Development Plan | Condition of subdivision approval. | Town of Port Hedland |
| Residential Density Plans | Submitted with subdivision applications. | Town of Port Hedland<br>WAPC |
| Bushfire Management Plan | Submitted with subdivision or development applications. | Town of Port Hedland |
| Urban Water Management Plan | Submitted with subdivision applications. | Department of Water and Environmental Regulation. |

# PART TWO

## Explanatory Section

### OSPREY RURAL STRUCTURE PLAN

1. Planning Background
2. Site Conditions and Constraints
3. Land Use and Subdivision Requirements

# OSPREY RURAL STRUCTURE PLAN – PART TWO EXPLANATORY SECTION

## 1. Planning Background

### 1.1. Introduction and Purpose

The Osprey Rural Structure Plan (SP) (refer to Map 1) has been prepared on behalf of the Department of Communities (DoC), the proprietor of Lot 9001 on Deposited Plan 75754, and Lots 570-574 on Deposited Plan 76673 (hereafter referred to as 'the subject site'). It is the intent of the DoC to provide a range of affordable housing options for the locality. An indicative Concept Plan (refer to section 4.1) has also been prepared in accordance with the Osprey Rural SP to depict how the subject site could be developed.

The Osprey Rural SP provides a planning framework for the future development of the subject site and establishes a context for its future subdivision. This report examines the subject site, its location, physical characteristics and relationship with adjoining areas and investigates any potential items that might be considered constraints to the residential development of the SP area. The SP will guide the development of this area in a manner consistent with the objectives of the broader South Hedland area, to ensure it proceeds in a timely and sustainable manner, facilitating the objectives of the Western Australian Planning Commission as described in *Liveable Neighbourhoods* (January 2009), and in accordance with the objectives of the Town of Port Hedland.

### 1.2. Land Description

#### 1.2.1. Location

The subject site is situated within the Town of Port Hedland and it is located approximately 12Km south of the Port Hedland Townsite in South Hedland. The road frontages include Murdoch Drive to the north, Brolga Way to the west, Collier Drive to the south and North Circular Road to the east. Figure 1 is a location plan of the subject site.

#### 1.2.2. Area and Land Use

The combined area of the lots comprising the Osprey Rural SP area is 121.33 ha.

The subject site is vacant land that is mostly vegetated with low scrub. An overhead powerline owned by Alinta Energy traverses the western portion of the site from north to south. A large open drainage channel traverses the site, as depicted on the aerial photo (refer to Figure 2). The interface of development with the drainage channel and overhead powerline is addressed in the design of the Structure Plan concept.

Land to the north and west of the subject site is zoned 'Residential'. The Osprey Urban ('key workers') estate situated to the west of the subject site is also a Department of Communities development.

Land adjoining the subject site to the south is Unallocated Crown Land zoned 'Rural'. A mining tenement for the purposes of sand mining occupies this land. Abutting the site to the east is land reserved for public purpose including a Waste Disposal and Treatment plant and vacant land set aside for water and drainage purposes. These uses represent constraints to development of the subject site and are discussed in further in sections 3.7 and 3.8 of this Part.

#### 1.2.3. Legal Description and Ownership

The subject land is Crown land leased by the Housing Authority (care of Department of Communities). The legal description of each lot is shown in Table 1-1. Figure 3 shows the disposition of the lots comprising the SP area. Lot 574 is the drain, and Lots 572 and 573 are the overhead powerlines corridor.

Table 1-1: Title Details

| OWNER | LOT | PLAN | VOLUME | FOLIO | AREA (ha) |
|---|---|---|---|---|---|
| Housing Authority care of Department of Communities | 9001 | 75754 | LR3163 | 845 | 4.5243 |
| | 570 | 76673 | LR3163 | 483 | 92.8269 |
| | 571 | 76673 | LR3163 | 484 | 15.1624 |
| | 572 | 76673 | LR3163 | 485 | 3.1172 |
| | 573 | 76673 | LR3163 | 486 | 1.355 |
| | 574 | 76673 | LR3163 | 487 | 4.3735 |

Figure 1: Location Plan

Figure 2: Aerial Photo

Figure 3: Land Parcels

## 1.3. Planning Framework

### 1.3.1. Zoning and Reservations

*Town of Port Hedland Town Planning Scheme No.5* (TPS5) is the main statutory document controlling development within the district. The general objectives of TPS5 are to:

a) encourage an appropriate balance between economic and social development, conservation of the natural environment, and improvements in lifestyle and amenity;

b) implement strategic planning for the municipality, including the recommendations of the State Planning Strategy and relevant regional planning strategies;

c) reserve certain portions of land required for public purposes;

d) zone the balance of the land within the Scheme Area for purposes described in the Scheme;

e) define the uses and types of development to be permitted on land within the Scheme Area; and

f) control and regulate the development of land, erection and demolition of buildings and the carrying out of works.

Under the provisions of TPS5 the land is zoned 'Urban Development'. 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. This Structure Plan has been prepared to guide the future residential development of the subject site.

## 1.4. Regional and Sub Regional Strategies

### 1.4.1. Pilbara Planning and Infrastructure Framework

The Pilbara Planning and Infrastructure Framework (the Framework) was published by the WAPC in January 2012. The Framework addresses the scale and distribution of future population growth and housing development, as well as identifying strategies for economic growth, environmental issues, transport, infrastructure, water resources, tourism and the emerging impacts of climate change. Port Hedland is one of two cities designated within the Pilbara Region.

The Framework represents an agreed 'whole of government' position on the broad future planning direction for the Pilbara, setting out regional planning principles, goals, objectives and that will guide the preparation of local planning strategies and local planning schemes.

As a major population and service centre within the Pilbara, Port Hedland is expected to provide a range of housing opportunities. The Osprey Rural SP is part of planning for anticipated future growth.

### 1.4.2. Port Hedland Land Use Master Plan

Prepared in 2007 by a steering committee representing government and industry in Port Hedland, the *Port Hedland Land Use Master Plan* was intended to guide the growth and development of Port Hedland over the next 20 - 25 years. It focused on the use of land and its development character, defining the community's long-range vision of how the physical form of the town should develop.

The plan proposed phasing priorities so that development would progress in an orderly manner to best use of infrastructure. At the time of preparation, the (then) Department of Housing and Works was embarking on a major program of improvements through the New Living Program and co-ordination was required with other development proposals.

The subject land was identified as being within the last development phase (Phase 5), but the Master Plan also recognised that conditions constantly change and that it is difficult to predict future needs with any certainty, therefore recommending that the plan needs to be reviewed regularly to ensure its provisions remain relevant to the current conditions. Whilst many of the principles and policy objectives outlined in the Master Plan remain relevant, subsequent work by the Town of Port Hedland and Landcorp in 2012 to prepare the *Pilbara's Port City Growth Plan* and *Implementation Plan* (see 1.4.3.1) were effectively revisions of the Master Plan.

### 1.4.3. Local Planning Strategies

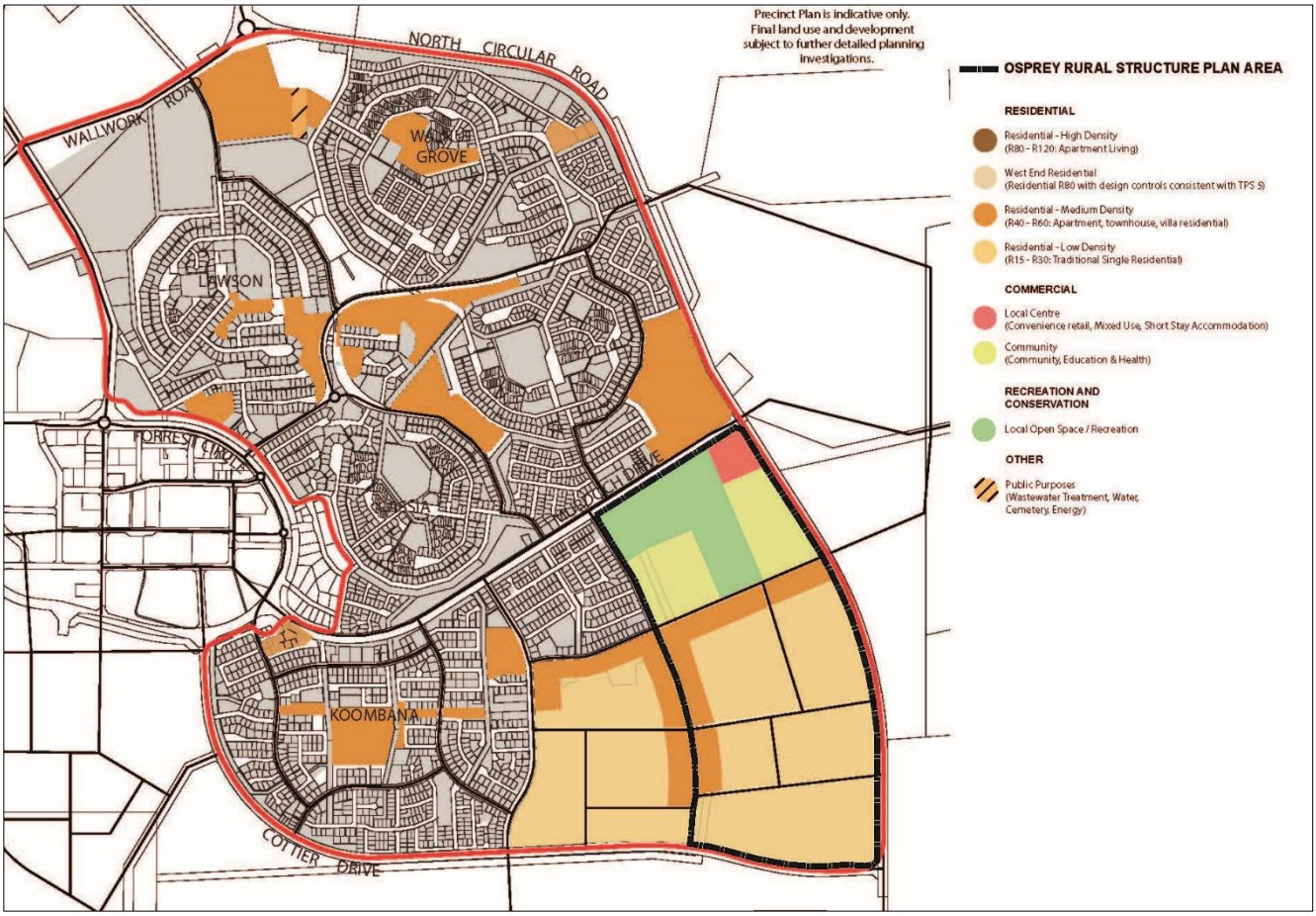
#### 1.4.3.1. PILBARA'S PORT CITY GROWTH PLAN & IMPLEMENTATION PLAN

The *Pilbara's Port City Growth Plan* forms the Local Planning Strategy for the Town of Port Hedland and considers a range of objectives for the growth of Port Hedland. It provides guidance for long term planning to achieve a city of 50,000 people supported by the necessary social and physical infrastructure.

The *Pilbara's Port City Implementation Plan* is the companion document to the Growth Plan, and details the actions required to de-constrain land in the identified precincts, prioritisation of activities, and the broad roles and responsibilities of the key stakeholders involved in ensuring a timely delivery of the projects.

The subject land is with within Precinct 12, 'South Hedland East' and represents a significant greenfields opportunity. Noting that the Precinct Plan is indicative only, the Growth Plan identifies locations for a primary school, high school, co-located district open space, a Local Centre and low and medium density housing within the subject land. This indicative plan has provided the starting point for preparation of this Structure Plan. All elements shown for Precinct 12 are addressed in the Osprey Rural SP. An edited extract from the Precinct 12 Precinct Plan is reproduced in **Figure 4**. The Osprey Rural SP area is highlighted.

Figure 4: Port City Growth Plan Precinct 12




# 2. Policies

### 2.1.1. State Planning Policies

The following State Government policies are considered relevant and applicable to the SP area:

- SPP 7.3 Residential Design Codes
- SPP 3.7 Planning in Bushfire Prone Areas
- SPP 4.1 State Industrial Buffer Policy
- SPP 5.4 Road and Rail Transport and Freight Considerations in Land Use Planning

#### 2.1.1.1. SPP 7.3 RESIDENTIAL DESIGN CODES (2015)

The purpose of the R-Codes is to provide a comprehensive basis for the control of residential development throughout Western Australia.

This Structure Plan uses the R-Codes as the basis for the controlling the density of future residential development on the subject site. Local variations to some design elements may be proposed by design guidelines and/or Detailed Area Plans for particular lots within the future subdivision.

#### 2.1.1.2. SPP 3.7 PLANNING IN BUSHFIRE PRONE AREAS (2015)

The intent of this policy is to implement effective, risk-based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure.

The policy is read in conjunction with:

- the *Deemed Provisions* contained in the *Planning and Development (Local Planning Schemes) Amendment Regulations 2015*, which form part of every local planning scheme;
- where relevant, any supplementary provisions of a scheme;
- the supporting Guidelines; and
- *Australian Standard 3959: Construction of buildings in bushfire-prone areas*.

SPP 3.7 and the Guidelines are applicable to every stage of the planning process. Structure plans are to be accompanied by a Bushfire Management Plan, which includes a Bushfire Hazard Level assessment or BAL Contour Map. It is important that structure plans consider the requirements of the bushfire protection criteria at this level, to ensure that Hazard Separation Zones and Asset Protection Zones can be established at a subsequent planning stage.

Bushfire hazard has been assessed for the subject site. It is discussed in section 3.5 of this Part, and the Bushfire Management Plan is included in Appendix 1.

#### 2.1.1.3. SPP 4.1 STATE INDUSTRIAL BUFFER POLICY (1997)

This policy is relevant to Osprey Rural due to the proximity of the South Hedland Landfill site and 'live' Mining Leases M45/531 and M45/689, both of which are within 500m of the subject site (refer to sections 3.7 and 3.8 of this Part).

The stated objectives of this policy are:

- To provide a consistent state-wide approach for the definition and securing of buffer areas around industry, infrastructure and some special uses.
- To protect industry, infrastructure and special uses from the encroachment of incompatible land uses.
- To provide for the safety and amenity of land uses surrounding industry, infrastructure and special uses.
- To recognise the interests of existing landowners within buffer areas who may be affected by residual emissions and risks, as well as the interests, needs and economic benefits of existing industry and infrastructure which may be affected by encroaching incompatible land uses.

Restriction of development on land within defined buffer areas is expected, to minimise the risk of adverse impacts being experienced.

SPP 4.1 references EPA environmental protection policies and guidelines. The currently operative EPA guidance is *EPA Guidance for the Assessment of Environmental Factors No.3 Separation Distances between Industrial and Sensitive Land Uses*. A draft revised version of this guidance was issued for public consultation in 2015 but has not yet been adopted. SPP 4.1 is itself under review, with a consultation version issued in 2009 but not yet adopted.

#### 2.1.1.4. SPP 5.4 ROAD AND RAIL TRANSPORT AND FREIGHT CONSIDERATIONS IN LAND USE PLANNING (2009)

This policy is relevant to Osprey Rural to the extent that development has potential to be affected by the presence approximately 890m to the east, of the Mount Newman Railway (measured from aerial photography).

The stated objectives of this policy are to:

- protect people from unreasonable levels of transport noise by establishing a standardised set of criteria to be used in the assessment of proposals;
- protect major transport corridors and freight operations from incompatible urban encroachment;

- encourage best-practice design and construction standards for new development proposals and new or redeveloped transport infrastructure proposals;
- facilitate the development and operation of an efficient freight network; and
- facilitate the strategic co-location of freight handling facilities.

The policy and associated guidelines apply to proposals for new noise-sensitive developments, new railways or major roads, major redevelopments of existing railways or major roads, and new freight handling facilities. It does not apply to existing development or minor redevelopment of existing facilities.

A preliminary assessment based on the *Implementation Guidelines for State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning* (WAPC 2014) suggests that no further measures under SPP 5.4 would be necessary if the noise-sensitive location is not:

a) within 300m of a major freeway, primary freight road, freight railway or terminal;

b) within 100m of a passenger railway or secondary roads; or

c) otherwise reasonably close to current or future road and rail infrastructure at the discretion of WAPC or local government.

In this instance, the railway is at least 800m and further away, on the other side of the South Hedland Landfill site.

### 2.1.2. Development Control and Operational Policies

The following Development Control and operational policies of the WAPC have been taken into consideration in the formulation of this SP and will be considered at the subdivision design stage:

- 1.1 Subdivision of Land - General Principles
- 1.5 Bicycle Planning
- 1.7 General Road Planning
- 2.2 Residential Subdivision
- 2.3 Public Open Space in Residential Areas
- 2.4 School Sites

#### 2.1.2.1. LIVEABLE NEIGHBOURHOODS

*Liveable Neighbourhoods* (January 2009) is a strategic operational policy of the WAPC for the design and assessment of structure plans (region, district and local) and subdivision for new urban (predominantly residential) areas in the metropolitan area and country centres. *Liveable Neighbourhoods* encourages street networks that have a high level of internal connectivity and good external linkages to cycle, pedestrian and bus networks. The road design should also be legible and minimise car travel.

*Liveable Neighbourhoods* encourages diversity in residential densities and dwelling types thereby providing more choice for changing household types.

This SP uses the design principles of *Liveable Neighbourhoods* and response to local conditions to derive a flexible layout able to accommodate a range of housing types and local services.

*Liveable Neighbourhoods* is currently under review.

### 2.1.3. Local Planning Policies

There are no local planning policies relevant to the SP. LPP 12 Control of Signs and Advertising Devices will apply to any commercial premises and home businesses that may be established in Osprey Rural in future.

# 3. Site Conditions and Constraints

## 3.1. Climate

The climate of Port Hedland is an important influence on lifestyle, amenity and infrastructure.

Summer temperatures are high, generally ranging between 25°C and 35°C but with several days exceeding 45°C typical. During the short winter, temperatures generally range between 12°C and 30°C. At night, summer temperatures still exceed thermal comfort limits and humidity remains high, regularly exceeding 50%. Buildings require cooling for most of the year and although natural ventilation is adequate much of the time, mechanical cooling is typically required during the hot summers.

Being in the tropics, Port Hedland summers are humid although rainfall is variable and quite low, being mainly associated with thunderstorms and tropical cyclones. Port Hedland is located within one of the most severe cyclonic regions in Australia (Region D, Category 2). Storm surge is a major threat, and cyclonic events coinciding with a high tide can result in localised flooding. Most thunderstorms occur in the summer, with up to 30 a year affecting inland areas and slightly fewer closer to the coast. Despite the relatively low total rainfall, intense rainfall during storms can lead to heavy deluges. For this reason, South Hedland has an extensive network of drainage channels and swales to manage stormwater, including those that run through the subject site. Swales direct water from roads into channels where it can gradually permeate into the pindan soil.

Because of the storms and cyclones, summer is the cloudiest time of year, although skies are clear for most of the year (around 10 months). This makes passive solar power on buildings an effective option.

Aside from cyclones and storms, wind patterns vary across the seasons. In winter, breezes are generally from the east or south-east in the mornings, swinging to north-east in the afternoons. In summer there may be morning easterly winds, with the usual pattern being north-westerly to westerly. Although areas close to the coast may benefit from cooling sea breezes, being further inland South Hedland rarely benefits from these.

## 3.2. Biodiversity and Natural Area Assets

### 3.2.1. Environmentally Sensitive Areas

Environmentally sensitive areas (ESAs) are declared by the Minister for Environment under section 51B of the *Environmental Protection Act 1986* (EP Act). There are no Environmentally Sensitive Areas (ESA) within the site as classified under the current *Environmental Protection ESA Notice, 2005*.

### 3.2.2. Vegetation

In 2011, ENV Australia Pty Ltd (ENV) undertook a Level 2 Regional Flora and Vegetation Assessment of the Port Hedland area. Lots 9001, 570-572 and 574 were included in the assessment. The assessment involved a review of previous surveys conducted in the area and a site-specific field survey.

The assessment identified that vegetation associations on site can be described as an open *Acacia colei var. colei* shrublands over low *Acacia stellaticeps* shrublands over *Triodia epactia* and *Triodia secunda* hummock grasslands/low *Acacia stellaticeps* shrublands over *Triodia epactia* and *Triodia secunda* hummock grasslands mosaic. Remnant vegetation over an area covering the site was considered in a desktop assessment to be in 'Very Good' condition with areas associated with tracks, drainage lines and infrastructure having greater levels of disturbance than the surrounding vegetation (ENV, 2011). However, a site visit revealed that the site has been historically cleared and the remnant vegetation is mainly degraded.

### 3.2.3. Declared and Rare Flora

#### 3.2.3.1. THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

Communities of plants are described as Threatened Ecological Communities (TECs) if they have been defined by the Western Australian Threatened Ecological Communities Scientific Advisory Committee and gazetted under the *Wildlife Conservation Act 1950*.

Some communities which are under consideration for listing as TEC's but do not meet the defined criteria, or have not yet been adequately surveyed for a decision to be made, are added to the Department of Biodiversity, Conservation and Attractions (DBCA) list of Priority Ecological Communities (PEC's). PEC categories are ranked in order of survey priority for evaluation of conservation status (Priority 1 to 3), are rare but not threatened (Priority 4) or conservation dependent (Priority 5).

DBCA Threatened and Priority Ecological Communities database searches were conducted in March 2014. The searches indicated that there are no TECs or PECs located within the site or within 50Km of the site.

#### 3.2.3.2. THREATENED AND PRIORITY FLORA

Species of flora acquire 'Declared Rare' Flora (DRF) or 'priority' conservation status where populations are restricted geographically or threatened by local processes. DBCA recognises these threats and subsequently applies regulations towards population protection and species conservation. DBCA enforces regulations under the *Wildlife Conservation Act 1950* to conserve DRF species and protect significant populations.

Searches of DBCA's Threatened (Declared Rare) and Priority Flora database, the Western Australian Herbarium Specimen database and Threatened and Priority Flora List were undertaken in March 2014 within a 5Km radius of the site. DBCA records showed none of the species nominated by DBCA were located within or within a 5Km radius of the site.

#### 3.2.3.3. ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT PROTECTED MATTERS

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) threatened species and ecological community areas are afforded protection as matters of National Environmental Significance. These threatened species are listed in categories defined in Section 179 of the EPBC Act. Any action that is likely to have a significant impact on listed threatened species and ecological communities under the EPBC Act must be referred to the Minister and undergo an environmental assessment and approval process.

Searches of the Department of Environment *Nationally Significant Environmental Matters* database and DBCA *NatureMap* online database were undertaken in March 2014. Results indicated that no threatened or priority flora species were located within the site, and within 5Km of the site.

### 3.2.4. Fauna

Any native fauna identified to be under threat of extinction, rare, or in need of special protection is provided protection for under the *Wildlife Conservation Act 1950*. Native fauna protected under this Act is classified as 'threatened' (DBCA, 2014). DBCA maintains a database to help protect and conserve these species and communities which lists taxa that are threatened with extinction as well as taxa that are rare and threatened.

The results of the DBCA Threatened Fauna database search indicated that there were no records of Threatened and Priority Fauna within the site. A broader search was conducted which identified seven land-based fauna located within a 10Km radius of the site. The species and their conservation code are provided in Table 3-1.

Table 3-1: Threatened Fauna within 10Km

| SPECIES NAME | COMMON NAME | CONSERVATION CODE |
|---|---|---|
| Ctenotus angusticeps | Airlie Island Ctenotus, Airlie Island Skink | Threatened (T) |
| Dasycercus cristicauda | Crest-tailed Mulgara | T |
| Dasyurus hallucatus | Northern Quoll | T |
| Dasycercus blythi | Brush-tailed Mulgara, Ampurta | Priority 4 |
| Mormopterus loriae subsp. cobourgiana | Little North-western Mastiff Bat | Priority 1 |
| Aspidites ramsayi | Woma | S |
| Natator depressus | Flatback Turtle | T |

A search of the DBCA NatureMap online database indicated that two additional threatened land-based fauna species are likely to occur within the site and within a 5Km radius of the site. These are listed in Table 3-2.

Table 3-2: Threatened Fauna within 5Km

| SPECIES NAME | COMMON NAME |
|---|---|
| Lagostrophus fasciatus subsp. fasciatus | Bernier Is. Banded Hare-wallaby, Mernine |
| Pogona minor subsp. minima | Dwarf Bearded Dragon (Houtman Abrolhos Is. |

A search of the Department of Environment *Nationally Significant Environmental Matters* database indicated that four threatened species and three vulnerable species are likely to occur within the site, and within a 5Km radius of the site. Table 3-3 shows the species name, common name, status and the potential for the species to occur within the site.

Table 3-3: Nationally Significant Species

| SPECIES | COMMON NAME | STATUS | PRESENCE |
|---|---|---|---|
| *Rostratula australis* | Australian Painted Snipe | Endangered | Species or species habitat may occur within area |
| Mammals | | | |
| Dasyurus hallucatus | Northern Quoll | Endangered | Species or species habitat likely to occur within area |
| Macrotis lagotis | Greater Bilby | Vulnerable | Species or species habitat likely to occur within area |
| Notoryctes caurinus | Karkarratul, Northern Marsupial Mole | Endangered | Species or species habitat likely to occur within area |
| Rhinonicteris aurantia (Pilbara form) | Pilbara Leaf-nosed Bat | Vulnerable | Species or species habitat likely to occur within area |
| Reptiles | | | |
| Ctenotus angusticeps | Airlie Island Ctenotus | Vulnerable | Species or species habitat likely to occur within area |
| Migratory Marine Birds | | | |
| Apus pacificus | Fork-tailed Swift | | Species or species habitat likely to occur within area |
| Fregata ariel | Lesser Frigatebird, Least Frigatebird | | Species or species habitat likely to occur within area |
| Migratory Terrestrial Species | | | |
| Haliaeetus leucogaster | White-bellied Sea-Eagle | | Species or species habitat likely to occur within area |
| Hirundo rustica | Barn Swallow | | Species or species habitat likely to occur within area |
| Merops ornatus | Rainbow Bee-eater | | Species or species habitat likely to occur within area |
| Migratory Wetlands Species | | | |
| Ardea alba | Great Egret, White Egret | | Species or species habitat likely to occur within area |
| Ardea ibis | Cattle Egret | | Species or species habitat likely to occur within area |
| Charadrius veredus | Oriental Plover, Oriental Dotterel | | Species or species habitat likely to occur within area |
| Glareola maldivarum | Oriental Pratincole | | Species or species habitat likely to occur within area |
| Rostratula benghalensis (sensu lato) | Painted Snipe | Endangered | Species or species habitat likely to occur within area |

(Department of Environment, 2014)

As the remnant vegetation on site is degraded, it is highly unlikely any species listed in Table 3-3 would be present. Given that the site has been historically cleared and the remnant vegetation has been identified as being mainly degraded, it would be unlikely to provide a significant habitat for fauna.

## 3.3. Landform and Soils

### 3.3.1. Topography

The natural ground surface for the site is typified by shallow gradient with an elevation range from 15m Australian Height Datum (mAHD) in the southeast corner to 12.5mAHD in the northwest corner. There is a gentle slope across the site to the northeast corner where the lowest point is 11.9mAHD. The invert elevation of the large channel that traverses from the southwest corner of the site to the northeast corner falls from approximately 13mAHD to approximately 11.5mAHD before flowing offsite. Average gradient across the channel is approximately 0.1%.

### 3.3.2. Soil Types

Port Hedland Geological Survey of Western Australia, *1:50,000 Urban Geology Series*, (Department of Lands and Surveys, 1983) indicates that shallow sub-surface conditions comprise shelly silty sand, possibly overlain by former mud flats. Strong gravelly and cemented layers occur within the silty sand. This silty sand is known in the Pilbara Region as Pindan and is typical of semi-arid environments. Pindan is a collapsible silty-sand or clayey-sand soil, typically red in colour. Although collapsible, many Pindan sands display a self-cementation property on drying (Sand-clay Pindan Material in Pavements as a Structural Layer, Emery. S.J, et al, 2003).

The digital database titled *Geology Mapping Series of Western Australia, 1:250,000*, (Department of Mines and Petroleum, 2008) indicates that the site is within an area of floodplain deposits comprising sand, silt, clay and gravel adjacent to main drainage channels.

### 3.3.3. Acid Sulphate Soils

Acid Sulphate Soils (ASS) are naturally occurring soils that contain iron sulphide (iron pyrite) minerals. If disturbed by dewatering, drainage or soil excavation, the pyrites can oxidise thereby releasing iron compounds and sulphuric acid. The potential for ASS to occur within the site may be assessed by examining the type of soil present and the depth to groundwater. The Landgate *WA Atlas* on-line mapping database provides broad-scale risk maps for several regions of WA. The database indicates that no mapping is available for the site and the nearest mapped area to the site is 5.3Km to the north. This general area is classified 'moderate to high risk of ASS occurring within three metres of the natural soil surface'. However, there is a low probability of ASS occurrence on the subject land.

### 3.3.4. Geotechnical Conditions

Cardno conducted fieldwork in April 2014 to investigate the geotechnical conditions present on the site. Twenty test pits were dug, and a further ten shallow boreholes were drilled, and samples taken for laboratory testing. Detailed findings can be found in Appendix 3. The typical generalised sub-surface profile encountered in the test pits is described as Silty Sand, which is 'fine to medium grained, red, brown, loose to very dense, very dry, weakly to strongly cemented, friable with fine to coarse gravel and iron staining encountered to a depth of 2.5m and the maximum test pit depth explored of 2.6m' (Cardno, 2015).

In-situ percolation testing found that hydraulic conductivity ranged across the site from 5.5m/day to 18m/day.

The geotechnical investigation concluded that the site is suitable for residential development. Significant problems are not expected, however the report notes a few matters that should be taken into account during design and construction, such as:

- The highly erosive characteristics of the sandy soils, as evident in the existing drainage channels and the results of dispersion testing;
- The variable cementation of the sandy soils;
- The potential loss of strength and difficulty trafficking of the sandy soils due to disturbance, construction activity or change in moisture condition;
- The difficulty in compacting the unconfined sands and the need to moisture condition during engineered filling;
- Slope stability and erosion can be an issue for exposed embankments within the sands;
- The difficulty in maintaining vegetation and groundcover used in erosion control in the drier and hotter times of the year.

In the Preliminary Site Investigation (Appendix 2), Cardno recommended that further investigation is required to characterise potential contamination associated with identified sources/activities. This is anticipated to comprise:

- Preparation of a Sampling and Analysis Quality Plan in accordance with DWER Guidelines.
- Further targeted investigation to be undertaken at areas of potential environmental concern identified in the Conceptual Site Model to characterise the Site with respect to current and proposed future-use.

## 3.4. Groundwater and Surface Water

A previous investigation (Parsons Brinckerhoff, 2012) indicated that there is no groundwater within 3m of the surface on the subject land. DWER boreholes with available groundwater level information show groundwater levels to be:

- 12.8mAHD within 4.7 Km to the north of the site (ARMY C51); and
- 11.58mAHD within 4.5 Km to the north east of the site (ARMY C48).

On-site testing (Cardno, 2015) confirmed that no groundwater is present within 2.6m of the surface.

### 3.4.1. Groundwater Quality

The *Hydrogeological Atlas* (http://www.water.wa.gov.au/idelve/hydroatlas/), accessed March 2014, indicates that the hydrogeology beneath the site comprises surficial sediments with the Pilbara Coastal Saline deposits overlying Pilbara Alluvial deposits which are typically 'brackish'. The atlas also indicates that the total dissolved solids (TDS) of the groundwater beneath the subject land correspond to between 'fresh' and 'brackish'. However, this may not be accurate at a local scale. A search of DWER boreholes indicated that the groundwater within boreholes ARMY C51 (5Km north) and ARMY C48 (4.5Km southeast) had TDS levels corresponding to 'saline' and 'brackish'. A third borehole, Baynes Well, was identified within 5Km of the site during the search, but no groundwater quality monitoring has been undertaken at this location.

### 3.4.2. Groundwater Use

No information has been obtained that suggests that groundwater at or down-gradient of the site is abstracted for use, other than for monitoring and irrigation. The DWER database for registered boreholes indicates that Baynes Bore and ARMY C48 are used for livestock watering the other is reportedly used for garden irrigation.

### 3.4.3. Surface Water

There are many existing interlinking drainage channels throughout South Hedland. As South Hedland is generally flat with a gentle slope toward the north west and north east divided by a low ridge running north south through the centre of the town. Throughout most parts of the town, lots drain overland to adjacent road reserves and roads are graded to direct stormwater to a network of open channels. The open drainage channels convey stormwater through culverts and small bridges to the natural drainage line immediately west of the South Hedland and to a large infiltration/evaporation basin east of North Circular Road.

A flood study for the town of South Hedland (GHD, 2011) produced flood maps of the area that showed that the current drainage system for the town (as of 2010) did not inundate the site. Since that time, a man-made drainage channel (see Plate 1) has been constructed that traverses the subject site. It connects with existing drainage channels along the North Circular Road and flows north. The Osprey Urban housing development located to the west of the site uses the channel to transfer runoff to the infiltration basin.

Plate 1: Drainage channel adjacent to Murdoch Drive with culvert in the north-east corner of the site under Circular Drive

### 3.4.4. Wetlands

A review of the Landgate WA Atlas indicates that there are no geomorphic wetlands of any classification on or in a 10 Km radius of the site

### 3.4.5. Public Drinking Water Source Area

To protect the State's drinking water resources, the DoW has defined certain areas of the State as Public Drinking Water Source Areas (PDWSA). These areas are given one of the following classifications:

- Priority 1 - managed with the principle of risk avoidance to ensure there is no degradation of the water resource. These cover land where the prime land use value is providing the highest quality drinking water.
- Priority 2 - managed with the principle of risk minimisation to ensure that there is no increase in the risk of pollution to the resource. These are declared over land where low intensity development (such as rural development) already exists.
- Priority 3 - managed to limit the risk of pollution to the water source. These are declared over land where water supply sources need to co-exist with other land uses.

The register of drinking water catchments within the Town of Port Hedland local government area, presented in the document titled Public *Drinking Water Source Areas of Western Australia, Water Quality Protection Note* (DoW, 2008), indicated that the site is not located within a PDWSA.

There is a PDWSA within 10Km to the south-west of the site which has not been assigned a 'Priority' classification. This is the Turner River Water Reserve which has no risk avoidance, minimisation or management plan associated with it. The PDWSA is up-gradient of the subject site and therefore will not be impacted by its development as proposed by this Structure Plan.

## 3.5. Bushfire Hazard

A Bushfire Management Plan (BMP) for the subject land was prepared by RUIC in support of the rezoning of the land from Rural to Urban Development in 2016. The site is identified as being Bushfire Prone on the State Bushfire Prone Maps. The BMP is included as Appendix 1 to this report.

A Bushfire Hazard Level Assessment (BHLA) was completed within 100 metres of the subject land in accordance with the *Guidelines for Planning in Bushfire Prone Areas*. The pre-development vegetation structures within 100 metres of the site consist of:

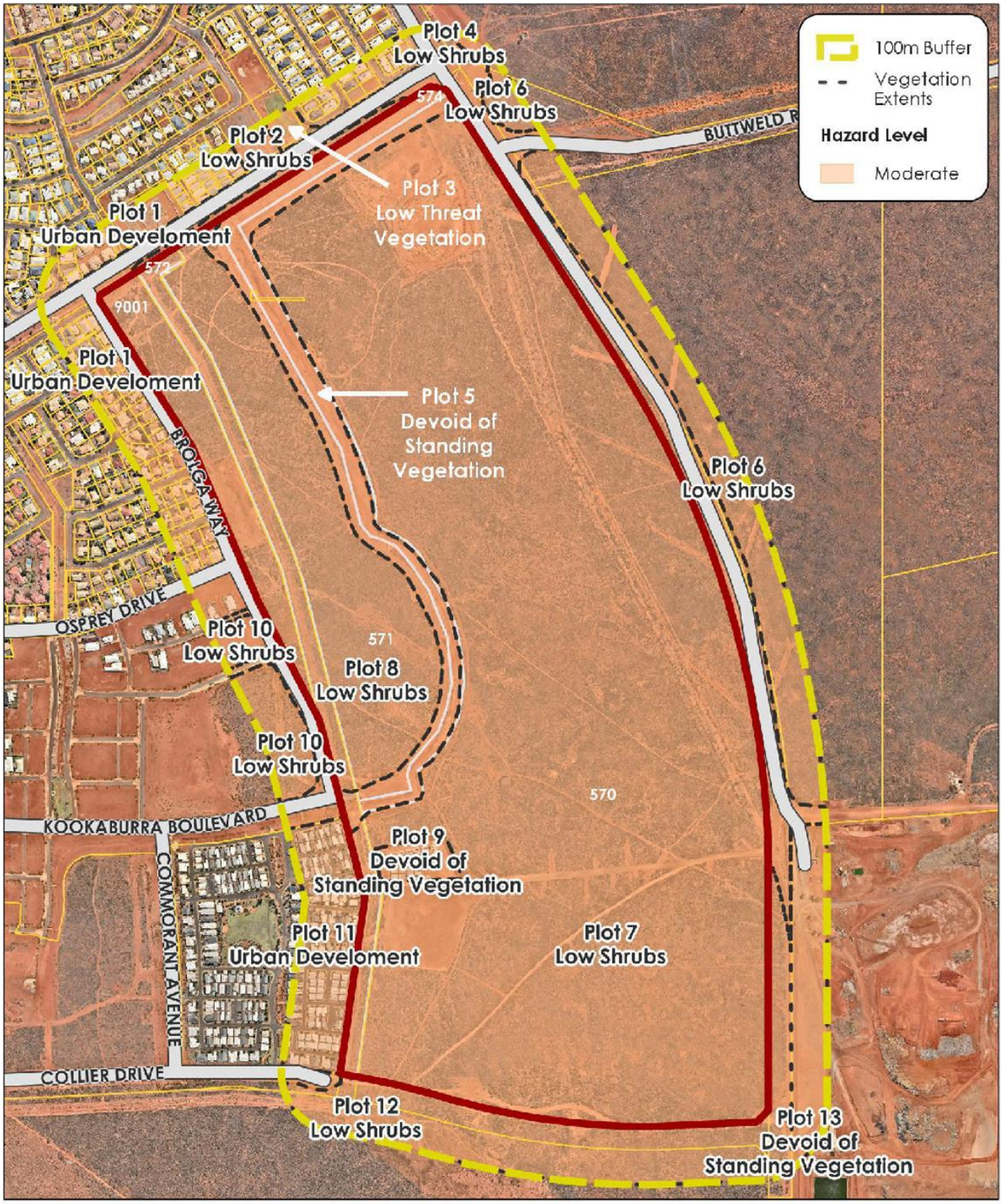
- Areas devoid of vegetation;
- Low shrubs; and
- Low threat managed areas.

In its current state, high definition satellite imagery (17/04/2016) supported by a site ground truthing inspection (13/06/2016) revealed that the subject land contains 100% by land area Moderate Hazard vegetation.

From the Bushfire Hazard Assessment Map (see Figure 5) the following bushfire hazard issues were identified:

- The entire development site adopts a moderate hazard level.
- Proposed future lots within the development area are likely to be impacted by radiant heat and embers from external vegetation threats from the east and south.
- The hazard level of the development is expected to decrease to low for most of the development area post vegetation clearing works, except for areas within 100 metres of external vegetation, which will retain a moderate hazard level.
- The subdivision design will ensure that no lot is subjected to a Bushfire Attack Level (BAL) rating above BAL-29 and will be assessed at the subdivision stage of planning approvals.
- The Asset Protection Zone (APZ) is a low fuel area immediately surrounding a building and is designed to minimise the likelihood of flame contact with buildings. All lots within the development are proposed to be low threat and able be classified as an asset protection zone across the entirety of the lots.
- Public open space (POS) areas will be subject to a Landscape Management Plan at the subdivision stage of planning to ensure that any POS is managed in accordance with AS3959-2009 exclusions 2.2.3.2 (b) or (c) or (d) or (f) and/or POS location and design provides adequate separation to proposed lots with habitable buildings.
- Construction standards will be applied to relevant buildings in accordance with AS3959 as part of the Building Permit. In this regard, a hazard separation zone (HSZ) is not required for this development.
- The development achieves at least two different vehicular access routes, both connecting to the public road network to provide egress to two different destinations at all times. Final subdivision design will ensure every lot has at least two access routes.
- Any balance title lots are required to have a fire break installed unless otherwise required to be an APZ or low threat vegetation area. This will be addressed in the subdivision stage of planning when development staging is known.
- The site will be serviced by reticulated scheme water and firefighting hydrants. Existing fire hydrants are located within urban areas along the north and west of the site.
- The development proposes to include a school that would be classified as a Vulnerable Land Use. An Emergency Evacuation Plan is required at the Development Application stage of planning. At this stage of planning, no high-risk land uses have been identified. Should school buildings be located greater than 50 metres from the public road, construction of private driveways and turnaround areas is required in accordance with the standards outlined in the BMP.

Figure 5: Bushfire Hazard Assessment




RUIC FIRE
1300 797 607
ruicfire.com.au

**BUSHFIRE MANAGEMENT PLAN MAP**
**Osprey Road, Port Hedland**

**Bushfire Hazard Assessment**

Site Boundary
Lot Boundaries
Cadastre
Main Road

## 3.6. Heritage

### 3.6.1. Aboriginal Heritage

Archaeological and Heritage Management Solutions Pty Ltd (AHMS) undertook archaeological and ethnographic Site Identification surveys for the subject site in early 2014. Representatives of the Kariyarra Native Title Claim (WC 99/003), as nominated by Marapikurrinya Pty Ltd participated in field survey. The AHMS report is reproduced in **Appendix 5** and the complementary report by AHMS sub-consultants, Amergin Consulting, is reproduced in **Appendix 6**.

The survey was commissioned to identify Aboriginal sites, objects or Aboriginal cultural heritage values within the subject area and determine whether the proposed development would impact upon these values and, in consultation with the Kariyarra Native Title Claimants, to determine appropriate heritage management recommendations.

A search of the Department of Aboriginal Affairs (WA) *Aboriginal Heritage Inquiry System* revealed no previously registered Aboriginal sites or heritage reports associated with the area.

The surveys were undertaken in March 2014 by personnel from AHMS and Amergin Consulting, with the cooperation and participation of Kariyarra Native Title claimants. The entire survey area was systematically assessed by a five-person team using pedestrian transects. Ground surface visibility was poor as it was variously obscured by vegetation, dumped rubbish and/or the effects of recent construction activity. These factors greatly reduced assessment visibility and the ability to detect archaeological materials. Nevertheless, AHMS is confident that the coverage achieved was sufficient and appropriate for the purpose of identifying archaeological sites that meet the criteria under section 5 of the *Aboriginal Heritage Act 1972*.

No archaeological features or sites were located during this survey. No ethnographic sites were reported within the study area by the Kariyarra representatives during the ethnographic consultations and they expressed no opposition to the proposed development of the lot.

It is recommended that:

1. All surveyed areas documented in the AHMS report be granted archaeological and ethnographic clearance for ground disturbance to proceed;
2. The Department of Communities, in discussion with Marapikurrinya Pty Ltd and the Kariyarra Native Title claimants, explore contracting and employment opportunities arising from the development of the land;
3. The Department of Communities continue liaison with the Marapikurrinya Pty Ltd on behalf of the Kariyarra Native Title claimants regarding the proposed development in the survey area. Consultation should be undertaken with the Kariyarra Native Title claimants in relation to the broader interpretation of Aboriginal cultural heritage throughout the proposed development;
4. The Kariyarra Native Title claimants be provided with the opportunity to review, comment and participate in any subsequent archaeological and ethnographic investigations undertaken before and/or during development;
5. The Department of Communities, in discussion with Marapikurrinya Pty Ltd on behalf of the Kariyarra Native Title claimants consider initiation of an appropriate process by which the results of the survey and any subsequent archaeological surveys in the project area be made publicly available, in due course, for consideration by consultants and researchers undertaking future archaeological studies of the Pilbara region. Such an initiative would facilitate building of the available knowledge base regarding Aboriginal occupation of northwest Australia and may result in on-going cumulative efficiencies for business and heritage focussed research in the region;
6. If any Aboriginal objects and/or sites are identified during any proposed development, works must stop near the find, and the Department of Aboriginal Affairs (WA) be notified to identify the relevant legislative requirements and protocols to appropriately manage the Aboriginal objects and/or sites; and
7. If any human skeletal remains are identified during any proposed development works must stop near the find, and the Western Australian Police, in the first instance, should be contacted to identify the relevant legislative requirements and protocols to appropriately manage the remains.

### 3.6.2. Non-Aboriginal Heritage

A search of the State Heritage Office's *InHerit* database did not identify any heritage places on the subject site. The database includes places that have been entered onto the State Planning Register as well as places on other heritage lists.

## 3.7. South Hedland Landfill

The Town of Port Hedland Landfill facility is located on North Circular Road, adjacent to the south-eastern boundary of the SP area. It is a Class 2 which means that it is authorised to accept certain hazardous wastes including asbestos, synthetic mineral fibres and some potentially hazardous industrial materials. The site receives an average of167,000 tonnes we receive on of waste per year, of which around 150,000 tonnes is industrial waste.

The presence of the landfill is a significant constraint to development that falls within the designated 500m buffer around the site. The potential impacts from a Class 2 landfill site include noise, dust, odour, and gas. The specified separation distance from sensitive land uses (subdivisions)specified by *EPA Guidance for the Assessment of Environmental Factors No.3 Separation Distances between Industrial and Sensitive Land Uses* is 500m, 150m for single residences and an internal buffer of 35m from the boundary.

A desktop Calpuff Dispersion Modelling Assessment of the South Hedland Landfill site was commissioned in support of the rezoning of the subject site from 'Rural' to 'Urban Development' and is included as Appendix 7.

Based on these conservative projections the incidence of unacceptable odour impacts beyond 500 metres to the west and north-west are not expected.

Although the landfill has a limited life and there is a longer time intention to relocate it, until this happens it will not be possible to develop land within the buffer for residential or other sensitive land uses such as a school. For this reason, the buffer is shown on the Structure Plan Map (Figure 8), and the development will be staged from the north, outside the buffer area.

## 3.8. Sand Mine

Two active and surveyed sand mining leases, M45/531 and M45/689, known as the Pippingarra Sand Pit, are within 500 metres of the subject site to the south. A third mining lease, M45/800 extends west of M45/531 on the same northern alignment. This is a 'Pending' licence which if approved would have a similar impact on the site, being the same distance away as M45/531, and would also impact on existing urban development to the west. An exploration licence, E45/3239 covers a large area of South Hedland including the southern half (approximately) of the subject site. The exploration licence is not a serious concern as exploration operations are limited in scale and may never convert to a live mining lease. There is no requirement for separation distances to apply from exploration leases. The leases (correct as at 31/08/17) are illustrated in Figure 6.

A buffer distance of between 300m and 500m depending on size is specified by *EPA Guidance for the Assessment of Environmental Factors No.3 Separation Distances between Industrial and Sensitive Land Uses*. The sand mining operation provides fill 'on demand', meaning that it is only operated when an order is placed.

An assessment of the buffer requirements for the site undertaken as part of the process of rezoning the subject site from 'Rural' to 'Urban Development' was undertaken by Air Assessments and is included as Appendix 8. Factors that influence the dust impact and the generally very small operations support only a 300m buffer being required to the north of the sand pit. Against this however, is that strong SE winds do occur in the morning, such that dust could potentially impact the south-western side of the subject site if the exposed areas in the sand pit are erodible, which is unknown. Additionally, though the operations are typically small, a 2013 excavation at the pit indicates that large excavations could occur.

It is considered that dust from vehicles on the unpaved roads outside the lease will create more of an impact on the proposed residential areas (due to amount of dust emitted and much closer proximity). As such, improvements to these road surfaces should be considered dependent on the vehicular numbers on these roads.

It is considered likely that a 300m buffer will be sufficient to the north of the sand pit, but given that there are large bare areas of unknown erodibility and the possibility of a future large mining campaign, a buffer of 500m is shown on the Structure Plan Map (Figure 8) as a precaution. This buffer area overlaps the buffer from the South Hedland landfill.

Figure 6: Mining Leases


## 3.9. Port Hedland Airport

The subject site is located to the south of Port Hedland Airport. The *Port Hedland International Airport Master Plan* (Airbiz 2012) states that a desktop assessment of airport noise related to the Australian Noise Exposure Forecast (ANEF) System was carried out to determine if the airport required an update of its airport noise contours based on the future aircraft traffic mix and number of aircraft movements.

The study confirmed that based on the aircraft movement forecasts and due to the location of the airport in relation to the town and associated residential development, no existing communities are likely to be adversely affected by a projected increase in aircraft type or frequency. The orientation of the runways at the airport do not suggest that the subject site is likely to be affected by aircraft noise.

## 3.10. Mount Newman Railway

The BHP Mount Newman Railway transports iron ore from mine sites to Port Hedland and operates 24 hours a day. At its closest point the railway is approximately 890m east of the subject site, on the other side of the South Hedland Landfill. BHP has previously expressed concern that noise generated by trains using this line has the potential to cause a nuisance to residents and requested that consideration be given to requiring noise attenuation measures in dwellings potentially impacted. However, the railway is much further east of the subject site than the 300m that would normally trigger the need for a noise screening assessment under SPP 5.4 (refer to 2.1.1.3 on page 7 of this part).

Nevertheless, as part of the documentation provided in support of the rezoning of the subject land from 'Rural' to 'Urban Development', an acoustic assessment study was commissioned to assess noise received at future residences within the site from trains travelling on the adjacent railway line and where applicable, comment on possible noise attenuation measures that could control noise intrusion to acceptable levels.

The report, by Herring Storer Acoustics, concluded that without any noise amelioration, noise received at the residences located closest to the railway line would be below the night period "Target" noise level. Therefore, under SPP5.4, there are no requirements for this development. The assessment report is provided as **Appendix 9**.

# 4. Land Use and Subdivision Requirements

## 4.1. Design Intent

The Structure Plan is based upon an indicative development concept plan that was prepared in response to:

- Regional and local strategic planning objectives such as the City Growth Strategy;
- Department of Communities objectives;
- Stakeholder consultation;
- Site investigations;
- Opportunities and constraints analysis.

After a series of iterations and internal design reviews, the concept plan selected by the Department of Communities is shown in Figure 7. This concept will inform more detailed planning and design as the Structure Plan is implemented. The design philosophy is to create a central, linear multi-use corridor which offers areas of public open space and provides for a safe and desirable pedestrian connection linking the Local Centre with the school. This 'green' spine will provide a distinctive and attractive visual focus for the development.

The design retains the existing overhead power line corridor controlled by Alinta Energy and connecting to a sub-station on Murdoch Drive. Relocation or undergrounding of this power line would not be feasible. The presence of the existing major drainage system cutting unevenly through the site presented a significant design challenge and after review of the possibilities and practicalities it was ultimately decided to realign the drainage corridor that, to provide better configuration and orientation of street blocks and land uses. The drains still limit the number of east-west connections that are possible, but the design works to achieve good north-south connectivity along a network of roads, footpaths, shared paths, and public open space.

It is a deliberate strategy to avoid having housing backing on to the drains wherever possible. As the drains are an unavoidable feature of urban development in Port Hedland, it is considered better to visually integrate them as far as possible and to provide them with visual surveillance to maximise safety and minimise anti-social use of these areas.

Additional drainage corridors have been integrated within the design concept as identified in hydrological work undertaken by GHD consultants. It is anticipated the local road network in combination with the drainage system will allow for adequate storm water runoff.

Lot and street orientation are intended to:

- Facilitate drainage towards the major channels;
- Protect against strong, hot easterly winds that can carry dust;
- Allow for views along east-west oriented streets towards areas of public open space;
- Provide opportunities for simple solar control for most houses;
- Allow east and west walls on narrow lots oriented north-south to be shaded by neighbouring buildings.

The design has considered the local climatic conditions and the desire to have a well-connected development where every home is within walking distance of a park.

## 4.2. Land Uses

The Structure Plan Map (see Figure 8) shows the general disposition of land uses proposed.

Osprey Rural will be a residential estate on the outer fringes of South Hedland with allowance made for a mix of residential densities supported through the provision of community facilities including a Local Centre, public open space, and an integrated kindergarten, primary school and high school (K-12). Spatially, the concept incorporates two neighbourhoods, one focussed on the proposed Local Centre, and the other on the proposed school.

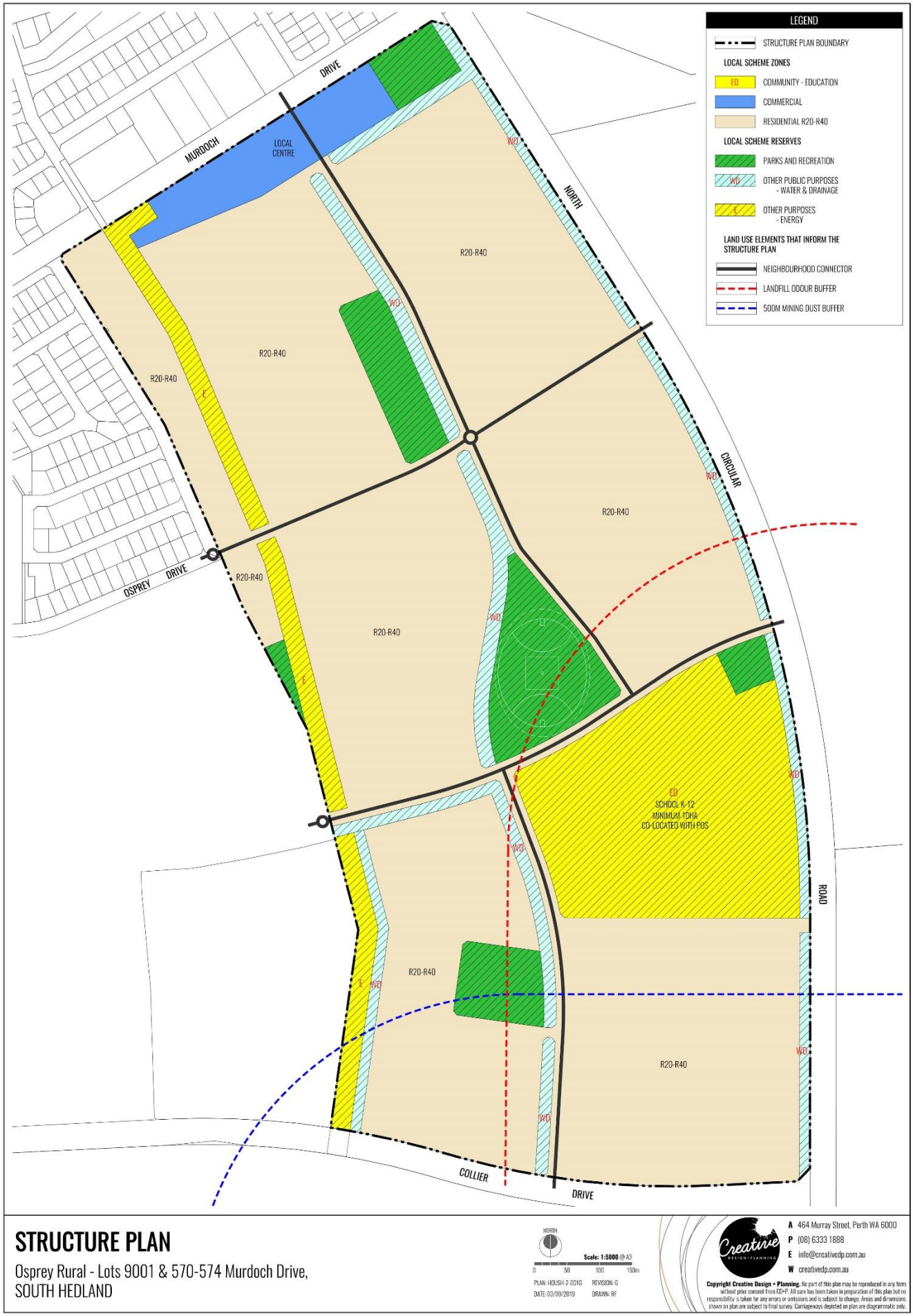
The majority of proposed development falls within a 400m catchment of either the Local Centre or the proposed school.

The design takes into account a 500m odour buffer related to the existing landfill facility to the south-east, and a 300 – 500m dust buffer associated with the sand mining lease south of the site. These buffers represent a constraint to development until the land fill and sand mining cease to generate odour or dust hazards. The buffers do not prevent development of unaffected land in the meantime.

The proposed land uses are summarised in the Executive Summary on page v of this document, and in Table 4-1.

Figure 7: Indicative Development Concept

Figure 8: Structure Plan Map



As defined by *Liveable Neighbourhoods*, gross subdivisible area includes house lots, access roads, and any land incidental to the subdivision. It excludes areas for schools, shopping centres/ activity centres, infrastructure (such as land required for sewer pumping stations), dedicated drainage sites not having a recreational function, and land set aside for arterial roads and other non-residential uses.

Table 4-1 provides a summary of proposed land uses and shows the calculation of gross subdivisible area. The existing powerline corridor is contained within Lots 572 and 573 and totals 4.5ha. Although it will be realigned, the existing drainage corridor serves areas external to the subdivision, a function that must be retained. It has not been dedicated but is located within Lot 487 and once realigned will be dedicated as part of the subdivision of the SP area. The current area of drain is 4.3735ha. A modest allowance of 0.5ha is made for 'contingencies' such as sewer pumping stations that may be required once detailed design has been undertaken.

Table 4-1: Land Use Summary and POS schedule

| OSPREY RURAL – PUBLIC OPEN SPACE SCHEDULE | | |
|---|---|---|
| Calculation of Required POS Provision | | |
| Total site area (ha) | | 121.36 |
| *Deductions* | | |
| Infrastructure | | |
| Power corridor | 4.54 | |
| Drainage corridor | 13.76 | |
| Non-Residential Land Uses | | |
| Integrated school, years K - 12 | 12.919 | |
| Local Centre | 3.23 | |
| Contingencies | 0.5 | |
| *Total Deductions* | *34.949* | |
| Total Deductions | | 34.949 |
| Gross Subdivisible Area (total site area minus deductions) | | 86.411 |
| Required Public Open Space (10%) | | 8.64 |
| Breakdown of POS Provided | | |
| Restricted Public Open Space | | |
| 1 in 5 year drainage event | 0 | |
| Conservation | 0 | |
| *Total Restricted POS* | 0 | |
| Total Permitted Restricted POS Credited to a maximum of 20% | | 1.73 |
| Surplus Restricted POS Not Credited i.e. over the maximum 20% (refer Note 3) | -1.73 | |
| Unrestricted Public Open Space: by function (refer Note 4) | | |
| Sport | 3.55 | |
| Recreation | 5.094 | |
| Nature | 0 | |
| *Total Unrestricted POS* | 8.644 | |
| Total Unrestricted POS | | 8.644 |
| Total | | 8.64 |
| POS Provision as Percentage of Gross Subdivisible Area | | 10% |

## 4.3. Residential

During the mining boom of 2004 – 2014 a severe shortage of housing in the Pilbara resulted from a lack of development-ready land. Although that high level of demand has since eased considerably, this Structure Plan is intended to ensure that such a situation will not occur in future, by providing a 'development-ready' site.

Osprey Rural will be primarily a residential development. Located at the south-easternmost corner of the planned South Hedland urban area, there is no justification for high density residential development, however allowance is made for a mix of low and medium density product, with R-Codes between R20 and R40 proposed for the land to be zoned Residential.

### 4.3.1. Density Targets

The developable area of the SP area is approximately 86.4 hectares. Of this, approximately 53 hectares will be available for residential subdivision (ie: gross subdivisible area less POS less roads).

It is intended that the average density across the development will be R20 (ie: 450m$^2$ average site area per dwelling). At an average of 450m$^2$ per dwelling, no less than 1,177 dwellings should be achievable. A range of densities from R20 to R40 is allowed for, to provide the flexibility to provide a range of lot sizes and dwelling types. To ensure that the target density is achieved across the total development, which will be staged, Density Plans will be required for each subdivision stage.

R20 will be the default density, applicable to lots 350m$^2$ and larger. The largest lots should generally be towards the periphery of the development to the south and east, and adjacent to drainage corridors that do not adjoin areas of POS.

Medium density lots are proposed primarily within areas of higher amenity, close to the Local Centre and opposite public open space. Low density lots are proposed to provide an interface with the drainage corridors and other service infrastructure at the periphery of the site.

Medium density housing may also be developed within the Local Centre, subject to detailed design and demand analysis. This housing would be in the form of town houses and/or apartments within a low-scale mixed use development.

Elsewhere, medium density housing is likely to be a combination of small lot product, grouped dwellings and low scale multiple dwellings (apartments). Low density housing is expected to be primarily single, detached dwellings, with some grouped housing sites.

Criteria for the location of higher density lots will be applied, as follows:

Applies to:

- Lots overlooking or adjacent to POS;
- Land fronting a neighbourhood connector or a public transport route;
- Within the Local Centre or within 400metres walking distance of it;

### 4.3.2. Dwelling Forecasts

The *Liveable Neighbourhoods* target is 22 dwellings per site hectare, or 1,172. The proposed development aims to achieve an average density of R20, which would equate to 1,177 dwellings, and thus will meet this target.

Projected dwelling yields are subject to subdivision design and detailed review of site constraints. Preferred lot mix and market demand at the time of land release will also affect dwelling yields.

At an average household occupancy rate of 2.6 people (Port Hedland average at 2016 Census), the forecast dwelling yield could accommodate a population of around 3,060.

This number may vary depending on the final configuration adopted, with a lesser lot yield to accommodate some larger lots suitable for grouped dwellings and apartments (multiple dwellings), or a higher yield to accommodate more single residential lots at higher densities (eg: cottage lots, narrow frontage lots). Within each density area a range of lot sizes will be created to accommodate a range of building typologies to meet the needs of different household types. The exact mix of lots and typologies will be determined at the time of subdivision in response to market conditions at that time. Lots are intended to allow for larger setbacks to facilitate climate responsive building design, site drainage and shade planting.

### 4.3.3. Housing Design

It will be important that housing design is appropriate to the climate, making use of passive design elements to minimise the requirements for mechanical controls and hence reducing energy consumption. Similarly, homes and gardens should make minimal use of potable water whilst achieving a level of amenity that makes living in Osprey Rural a comfortable, enjoyable and affordable experience.

For this reason, the Department of Communities intends to prepare guidelines prior to development design that will outline the minimum design elements required to achieve an appropriate standard that compromises neither amenity nor affordability. The principles outlined in the Port Hedland section of the *Pilbara Vernacular Handbook* (LandCorp 2015) should inform the development of design guidelines for this site. These will include (but not limited by) the following elements:

- Climate responsive design to substantially minimise reliance on and use of utility infrastructure;
- Narrow lots oriented north-south to allow neighbouring buildings to shade east and west walls. Wider lots oriented east-west to reduce surface area of east and west walls and limit heat ingress;
- Increased setbacks to allow for generous vegetation planting around the perimeter of new houses which can provide effective passive shading;
- Solar control methods to mitigate solar heat gain into the house;
- Compact building form to reduce the amount of material exposed to solar radiation;
- Use of projected roofs, verandahs, shading devices, trees, surrounding walls and ancillary buildings to achieve additional shade;
- Use of plants with low water requirements once established, with a preference for local species where appropriate for purpose if possible;
- Low water and energy use fixtures and fittings.

## 4.4. Education Facilities

A school site of approximately 13 hectares has been allocated for the provision of an integrated facility incorporating a kindergarten, primary and high school. The site area is more than adequate for this purpose as WAPC *Development Control Policy 2.4 – School Sites* recommends 10 – 12 ha for combined primary and secondary schools. Its location at the intersection of the neighbourhood connectors allows for a walkable catchment from within the proposed development as well as access to and from the broader South Hedland area by road.

The Department of Education advised that it has no requirement for a public education facility. The reason for providing a school site here when there is an as-yet undeveloped public primary school site just west of the SP area on the north-west corner of Kookaburra Way and Brolga Way is that the Department of Communities wishes to leave the option open for a private school in South Hedland in future.

The Department of Communities considers that its mandate includes considering the possibility of community functions such as private schools that are not standard requirements in planning for new suburbs. The Department therefore required that the school site be tested to ensure that it could be developed for residential purposes if use of the site for a school is not ultimately pursued. Such a proposal would require a modification to the Structure Plan however the design concept is robust enough that should there be no requirement for an additional school in this area by the time the land is ready or development the land can be used for residential purposes instead.

The school site is on land currently affected by the odour buffer associated with the land fill site so would not be available for development until after the land fill has ceased operation. As there is no short-term requirement for either a public or private school in this location this delay is not considered to be problematic.

## 4.5. Activity Centres and Employment

A Local Centre is proposed to provide for the daily needs of the local community and to provide a local community focal point and meeting place. It is located to be visible from Murdoch Drive so that it will also benefit from passing trade and it is for this reason that the drainage channel will be located away from its current location immediately adjacent to Murdoch Drive. The location may suit a small convenience store that could serve commuters as well as locals. The centre will be accessible from within the SP area on foot or by bicycle via the proposed network of shared paths and footpaths (see Figure 14).

The *Pilbara's Port City Growth Plan* indicated that there was a shortage of retail floor space supply in South Hedland in 2010, particularly to grocery and food outlets. Changes in the economy since that time are likely to have reduced demand, however, the main purpose of locating a centre here is to provide a local community focus. It is anticipated that the centre would provide small-scale retail and commercial opportunities and community services. It is located adjacent to an area of public open space to allow for synergies to develop between the two (for example, a café integrated with a community or retail use overlooking a children's playground in the park would provide a social gathering place for stay-at-home parents of young children, amongst others).

Consideration should be given to how the Local Centre could serve the community by addressing issues such as improved access to fresh and healthy food, perhaps by accommodating a local food market, potentially complemented by a community garden within the centre or in the adjacent POS. Uses that involve local business and support positive community interaction should be given preference where possible.

Any land within the Local Centre not required for retail, commercial or community purposes can be developed for medium density residential. Retail is expected to be only a minor component and as a Local Centre, retail and commercial floorspace would not in any case exceed 1,500m$^2$ NLA.

Two indicative concepts for the Local Centre were developed during planning, which are shown in Figure 9 and Figure 10. These illustrate some possible ways in which the two sites that make up the centre could be developed. (Note that these concepts were developed before the final overall concept was adopted, so show slightly different configurations of adjacent land and drainage channels). A Local Development Plan should be prepared for the Local Centre, with a focus on the disposition of land uses, interface with the adjacent public open space, pedestrian and cyclist access and amenity, and treatment of building elevations to ensure an attractive appearance from outside the centre's boundaries. Attention to the way the centre presents to the very different environments of Murdoch Drive (north) and residential areas (south) will be required. The north-south neighbourhood connector could include some 'shop front' development to create a small 'main street'.

A 'Town Centre' zone is the most appropriate available zone to apply to this centre.

Figure 9: Indicative Local Centre Concept 1

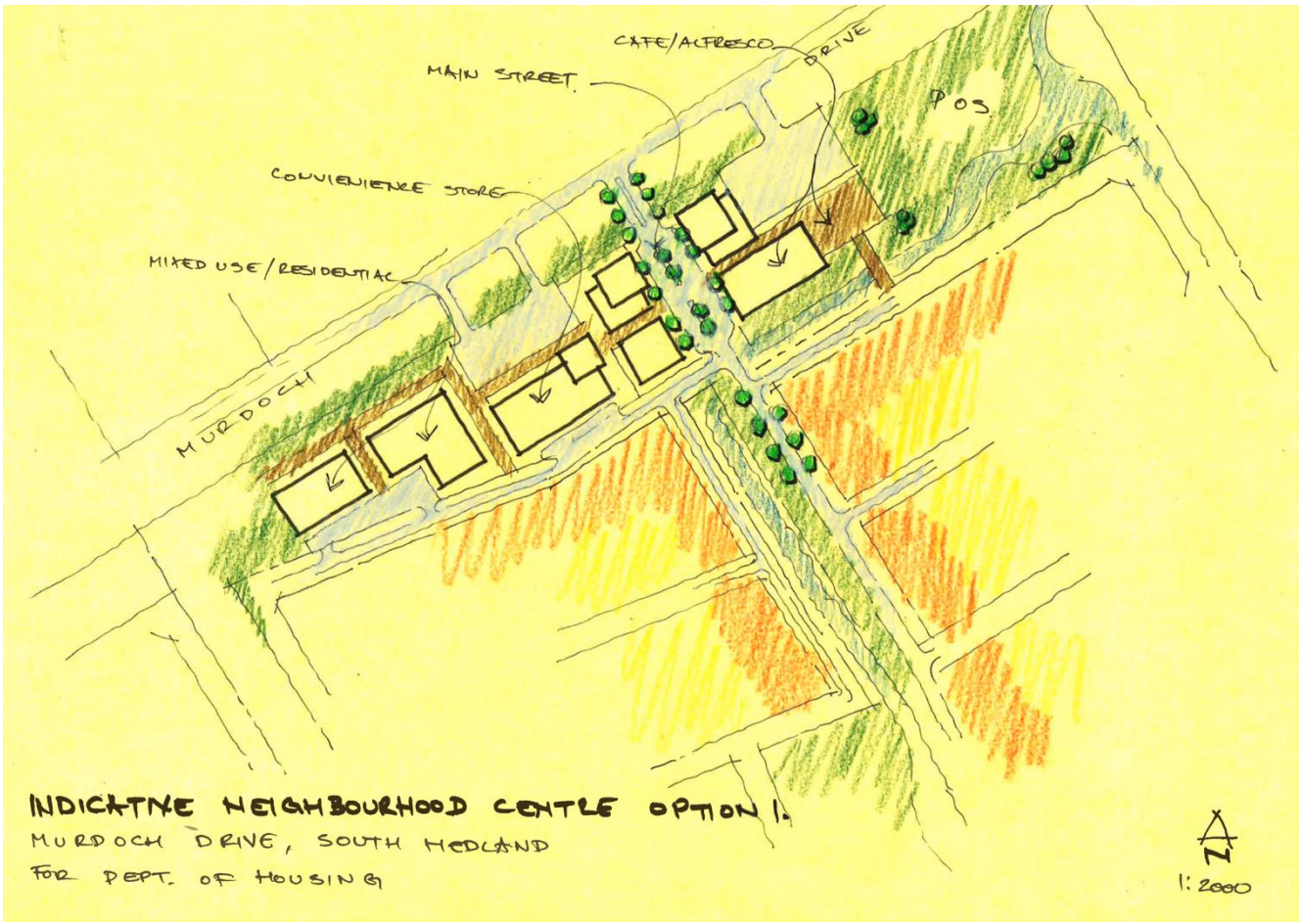
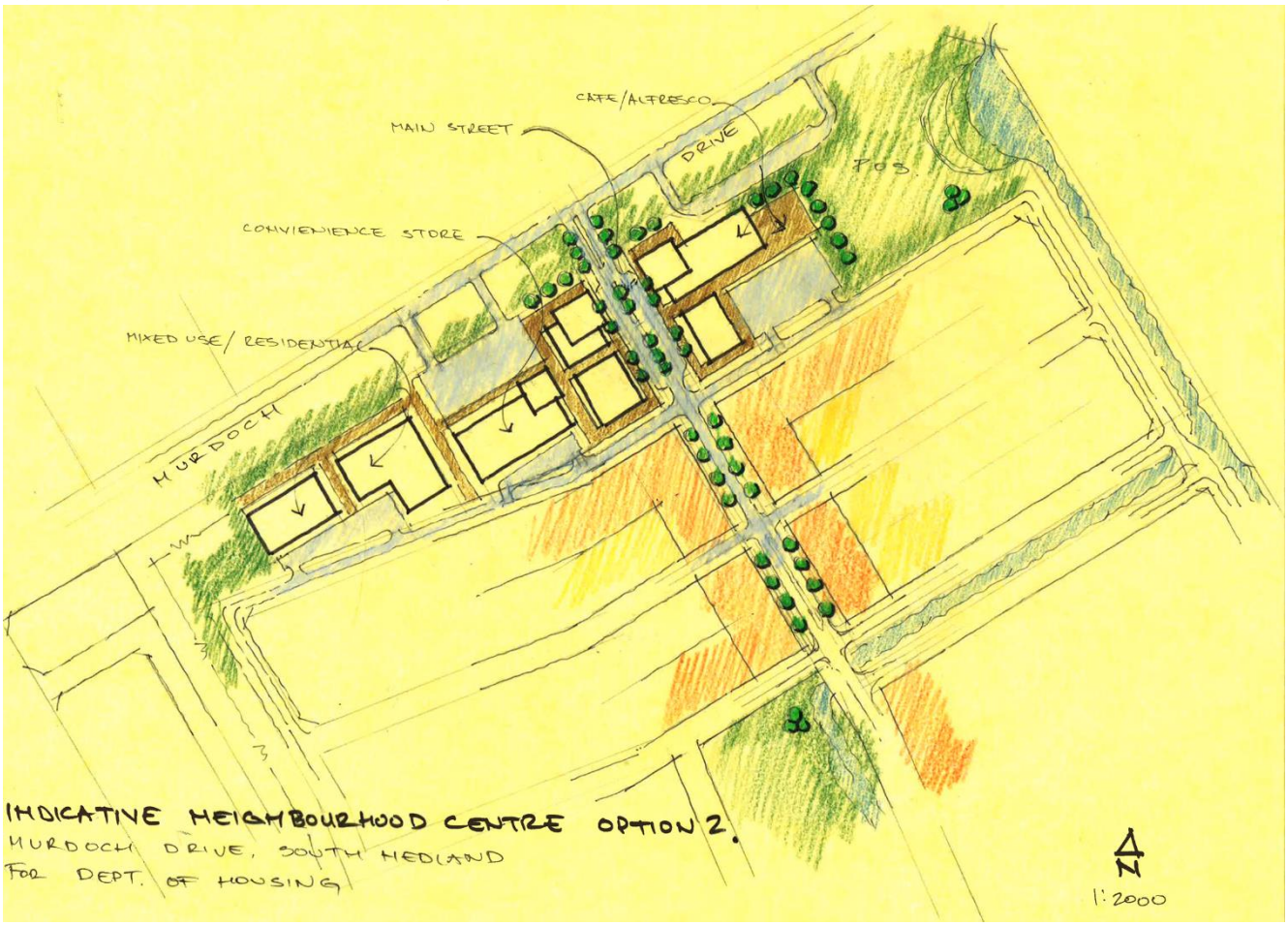



Figure 10: Indicative Local Centre Concept 2



## 4.6. Public Open Space

Areas of public open space (POS) have been strategically distributed to be easily accessible to the residents of the SP area and to form the termination of vistas along streets. The areas have been sized to adequately provide for active and passive recreational pursuits.

Although parks will be designed to assist overland drainage, there are no areas of permanent inundation proposed, hence 100% of the POS provided is creditable. The calculation is indicated in Table 4-1 on page 23.

Six distinct areas of POS are proposed, as shown on the indicative development concept and in **Figure 11**. The development contains only neighbourhood and local parks.

*Liveable Neighbourhoods* specifies 3,000m$^2$ as the minimum suitable for neighbourhood parks. It is noted that it is the Town's preference for any area of POS to be at least 5,000m$^2$. All but one proposed area of POS (Park C) exceeds 5,000m$^2$. In considering the draft Structure Plan, the WAPC required Park C to be reduced to 2,300m$^2$ and for the northern portion on the corner of Osprey Drive and Brolga Way to be designated as Residential. All homes will be within easy walking distance of a park, and each park will be large enough to accommodate a range of recreational activities.

- Park A (1.0ha) is located at the corner of Murdoch Drive and North Circular Drive, adjacent to the proposed Local Centre and the culvert at the intersection of these two roads. It will act as an attractive entry statement into the estate from the east and be designed to accommodate overflow flood storage should it be required, without the need for detention basins. Importantly, the park is intended to be integrated visually and functionally with the Local Centre. Potentially, this park could incorporate a community garden and/or playground to integrate with community and retail functions in the Local Centre.
- Park B (1.875ha) is a linear park with good proportions located on the western side of the central drainage channel and parallel with the north-south entry road. It will provide visual amenity from this road, as well as from homes that front onto it and along the adjacent east-west streets.
- Park C (0.23ha) will be accessible from homes west of the overhead powerline corridor. There is potential, subject to detailed design and negotiation with Alinta Energy, to extend the landscaping of this park beneath the powerline to the subdivisional road on its eastern perimeter, providing visual and potentially physical access from both sides. Residential development on the corner of Osprey Drive and Brolga Way will be required to address this park as well as the street frontages.
- Park D (3.551ha) has the potential to function as District Open Space and is large enough to accommodate a senior AFL oval and ancillary uses such as parking. It is centrally located at the intersection of the future north-south entry road and the future east-west Neighbourhood Connector road. Opposite the proposed school site, the combination of the school and park will provide a second community focal point within the development (the first being the Local Centre). The park is part of the linear north-south pedestrian link connecting the school and the local centre.
- Park E (1.49ha) is located in the south-eastern cell of the SP area and will serve homes within the southern part of the development.
- Park F (0.5ha) will be collocated with the school. It is indicatively shown in the north-eastern corner of the school site where it can provide both visual appeal and assist with overland drainage to the drainage channel, but detailed design of the school site prior to subdivision may see it reconfigured. Ideally, it will be integrated into the design of the school playing fields, which could also be made available for public use after hours.

To the extent possible, the POS and the adjacent drainage channels should be designed as a continual space so that when dry the drainage channels can be used as a continuation of the public open space. There are technical aspects to the design of the channels that must be considered so that they can take high volumes of water when necessary without undue scouring (refer to **Appendix 11** and 4.8.4 of this part). However, the steep sides and depth of some of the channels constructed in Port Hedland, though functional, can be unattractive and potentially unsafe. By locating POS adjacent to the relocated drainage channel, it is expected that the opportunity will be taken to provide a friendlier, visually attractive, and safer interface. This will require the landscape architects and engineers designing the drain to work together to achieve a functional and attractive outcome.

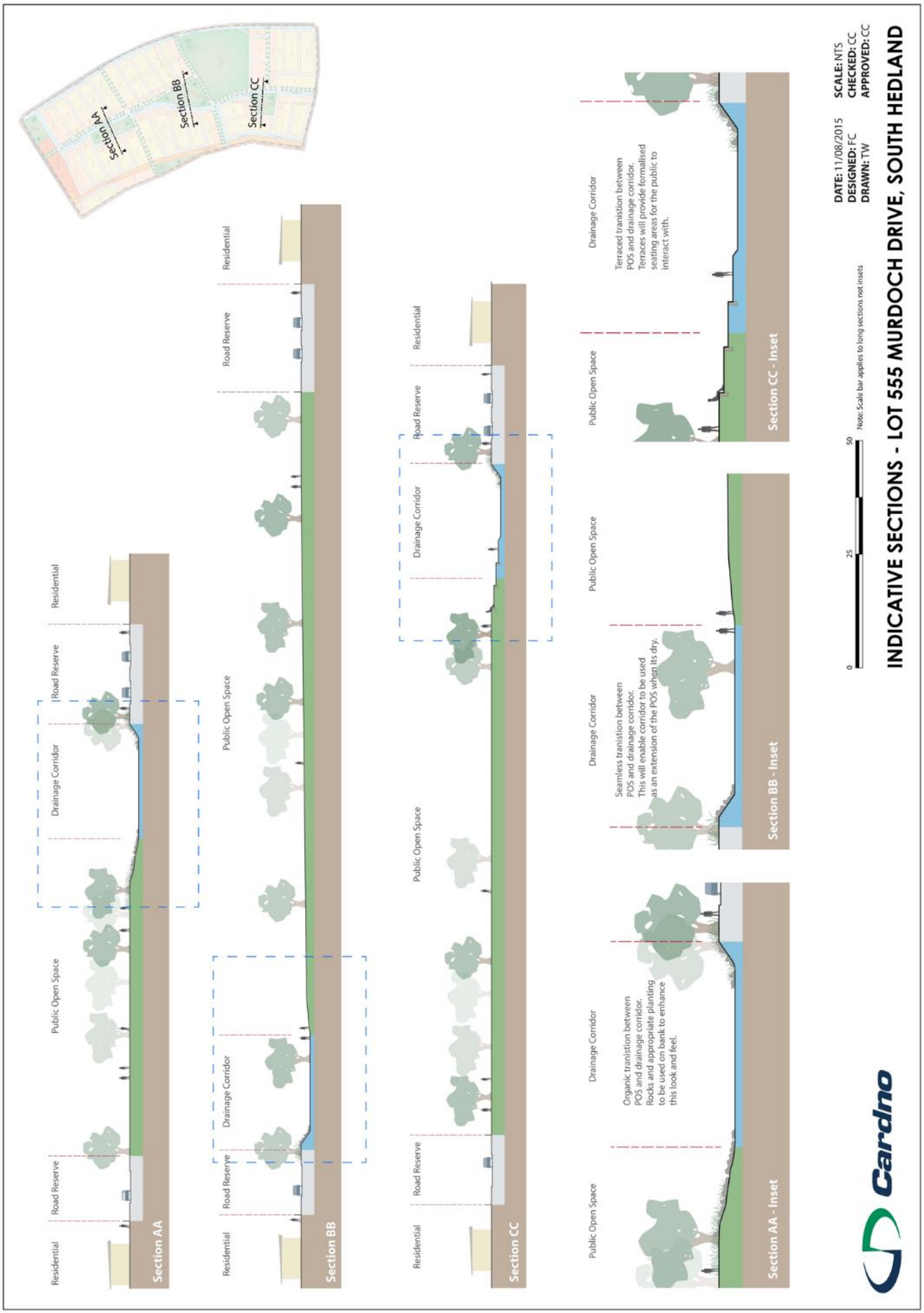
**Figure 12** shows cross sections across three different locations within the Structure Plan to illustrate how parks and the drains could be integrated using level changes and landscaping and detailed design should seek to achieve similar outcomes.

A landscape strategy will be required as a next stage of design development. This will include the treatment of road reserves as well as parks. An objective will be to introduce as much shade and greenery as possible, whilst achieving 'water-wise' outcomes and using climatically sustainable species and low maintenance materials.

Ongoing maintenance requirements of the Town of Port Hedland will be an important consideration in landscape design, particularly in parks, where it will not always be practical to have reticulated grassed areas for the whole area. Hydrozoning (clustering plants with similar water requirements together) and xeriscaping (landscapes that reduce or eliminate the need for supplemental water from irrigation) are techniques likely to be employed in developing a climate-appropriate landscape that provides genuine visual and functional amenity for residents whilst minimising maintenance requirements.

Figure 11: Public Open Space Plan

Figure 12: Indicative sections POS and Drains



## 4.7. Movement Networks

The road network is proposed to utilise a neighbourhood connector layout which forms legible connections from the existing street network outside the site on the north and west, allowing access through the proposed development to the distributors on the outer periphery of the site. The neighbourhood connectors seek to link the neighbourhood centres and hence the major community facilities within the site allowing for desired pedestrian connections and access to areas of public open space.

The local road network has been designed in a rectilinear configuration which offers efficiency and legibility. The design of the local road layout has considered the existing and proposed open drain network. To this extent the local roads have been aligned perpendicular to the open drains to function as an overland flow path in the occurrence of a storm event.

The existing and proposed movement network is identified in the report prepared by Cardno in accordance with the WAPC *Transport Assessment Guidelines for Development*, included in **Appendix 10** and summarised in this section.

### 4.7.1. Existing Road Hierarchy

The SP area has no internal road network but is bounded by Murdoch Drive, Brolga Way, North Circular Road, and Collier Drive (unconstructed adjacent to the site). Under TPS 5 Murdoch Drive, North Circular Road and Collier Drive are designated as Local Scheme Reserves – 'District Road'.

- **Murdoch Drive** – located on the northern boundary of the SP area, it links the site and surrounding residential streets to the South Hedland town centre and to North Circular Road which continues north towards Wallwork Road. Wallwork Road is one of the two major access roads to Port Hedland. This road has been classified as a Local Distributor in the Main Roads Western Australia (MRWA) Main Roads Functional Hierarchy (MRFH) with a posted speed limit of 70 Km/h.
- **North Circular Road** – located on the eastern boundary of the SP area, it provides a connection between Murdoch Drive and access roads on the northern side of South Hedland. According to the MRFH this road is classified as a Regional Distributor north of Murdoch Drive, and Access Road south of Murdoch Drive. The posted speed limit is 80 Km/h.
- **Brolga Way** – located on the western boundary of the SP area, it provides a connection between Murdoch Drive and access roads on the western side of the SP. According to the MRFH this road is classified as an Access Road with a posted speed limit of 50 Km/h.
- **Collier Drive** – located on the southern side of the SP area. It is currently unconstructed adjacent to the SP area, however in time the road is expected to extend east and connect to North Circular Road.

### 4.7.2. Proposed Road Hierarchy

The proposed road hierarchy for the internal transport network has been designed to support the daily traffic volumes expected on the network. The proposed road hierarchy is illustrated in **Figure 13**.

All roads are intended to function as two-way. SIDRA analysis of the existing and future intersections for the full build-out scenario indicates that all the intersections will always operate at an acceptable level of service. The external road network has enough capacity to cater for the expected traffic increase resulting from the SP.

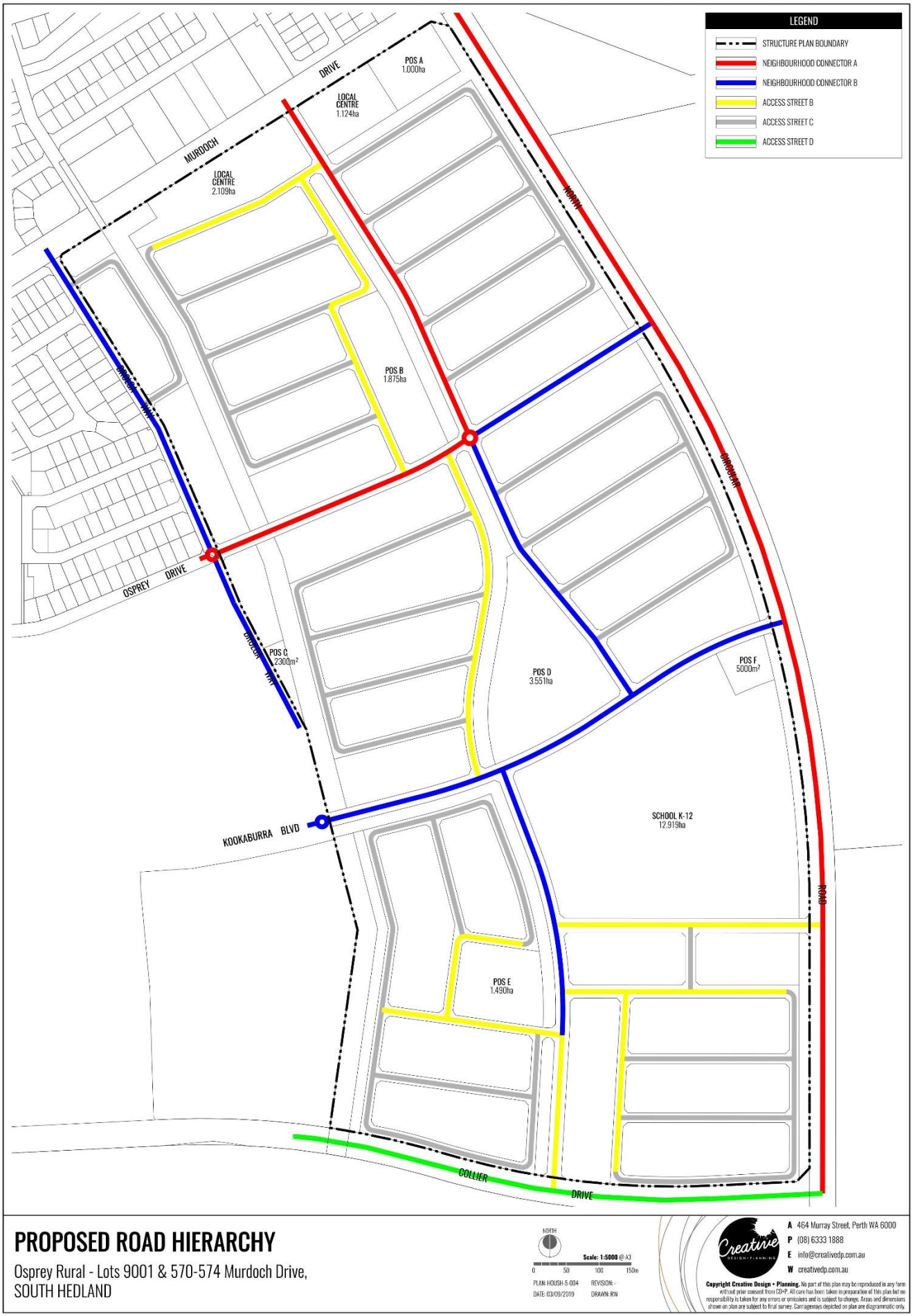
**Table 4-2** identifies the expected road reserve widths based on the 2015 draft *Liveable Neighbourhoods* standards for maximum volumes and functionality.

**Figure 13** shows the forecast daily traffic flows on the proposed road network. The highest volume will be adjacent to the proposed Local Centre, reflecting vehicles accessing the site via Murdoch Drive. Trips generated from within the SP area to external locations are likely to head north towards commercial and employment centres in the Wedgefield Industrial Area, Port Hedland, South Hedland Town Centre, and schools outside the SP area.

Table 4-2: Internal Road Transport Network

| LIVEABLE NEIGHBOURHOODS DESIGNATION | DESIRABLE MAXIMUM VOLUME (vpd) | ROAD RESERVATION WIDTH (m) | KERB TO KERB WIDTH (m) | SPEED LIMIT (Km/h) | DESCRIPTION |
|---|---|---|---|---|---|
| Neighbourhood Connector A | 7,000 | 24.6 | 14.6 | 50 | Predominantly residential suited to higher dwelling densities and Neighbourhood Centres. Generally dual carriageway. Cycling infrastructure via a shared path on one side. |
| Neighbourhood Connector B | 3,000 | 21.6 | 11.6 | 50 | Typically front residential dwellings and Neighbourhood Centres. Generally single carriageway with no median. Cycling infrastructure provided via a shared path on one side. |
| Access Street B | 3,000 | 20.1 | 10.1 | 50 | Typically residential street supporting housing density to R40, fronting grouped and/or multiple dwellings with vehicular access from a secondary street or laneways. On-street parking may be provided, suitable for high demand land uses including schools. |
| Access Street C | 3,000 | 17.2 | 7.2 | 50 | Suited to low density residential streets. Pavement width generally sufficient to allow on-street parking on one side of the road without impeding traffic flow. Expected to support safe cycling in mixed traffic. |
| Access Street D | 1,000 | 15.5 | 5.5 | 50 | Limited to low traffic volume and low parking demand streets and for streets fronting bushland. |

Figure 13: Road Hierarchy



### 4.7.3. Pedestrian and Cycle Network

A network of internal shared paths and pedestrian paths has been proposed to support active transport within and from the SP. This network of paths will provide accessibility and connectivity for pedestrians and cyclists. The proposed network is illustrated in Figure 14.

It is proposed that a shared path be provided on one side of all Neighbourhood Connectors, in addition to footpaths on the other side. A shared path should be provided along all school frontage roads to cater for students arriving by bike as well as on foot. Footpaths should be provided on at least one side of every residential street.

The WAPC *Transport Assessment Guidelines* provide guidance on the levels of traffic volumes that are likely to affect the ability for pedestrians to cross various types of road. Based on that guidance, an undivided two-lane road should be acceptable for pedestrians crossing traffic volumes up to 1,100 vehicles per hour and a four-lane road with a median island the threshold is 1,600 vehicles per hour. All roads within the SP area are expected to operate well below these thresholds.

Safe routes to the proposed school on Kookaburra Boulevard are provided by the proposed shared paths along Kookaburra Boulevard, Future North-South Road, and Future East-West Road, as indicated in Figure 14.

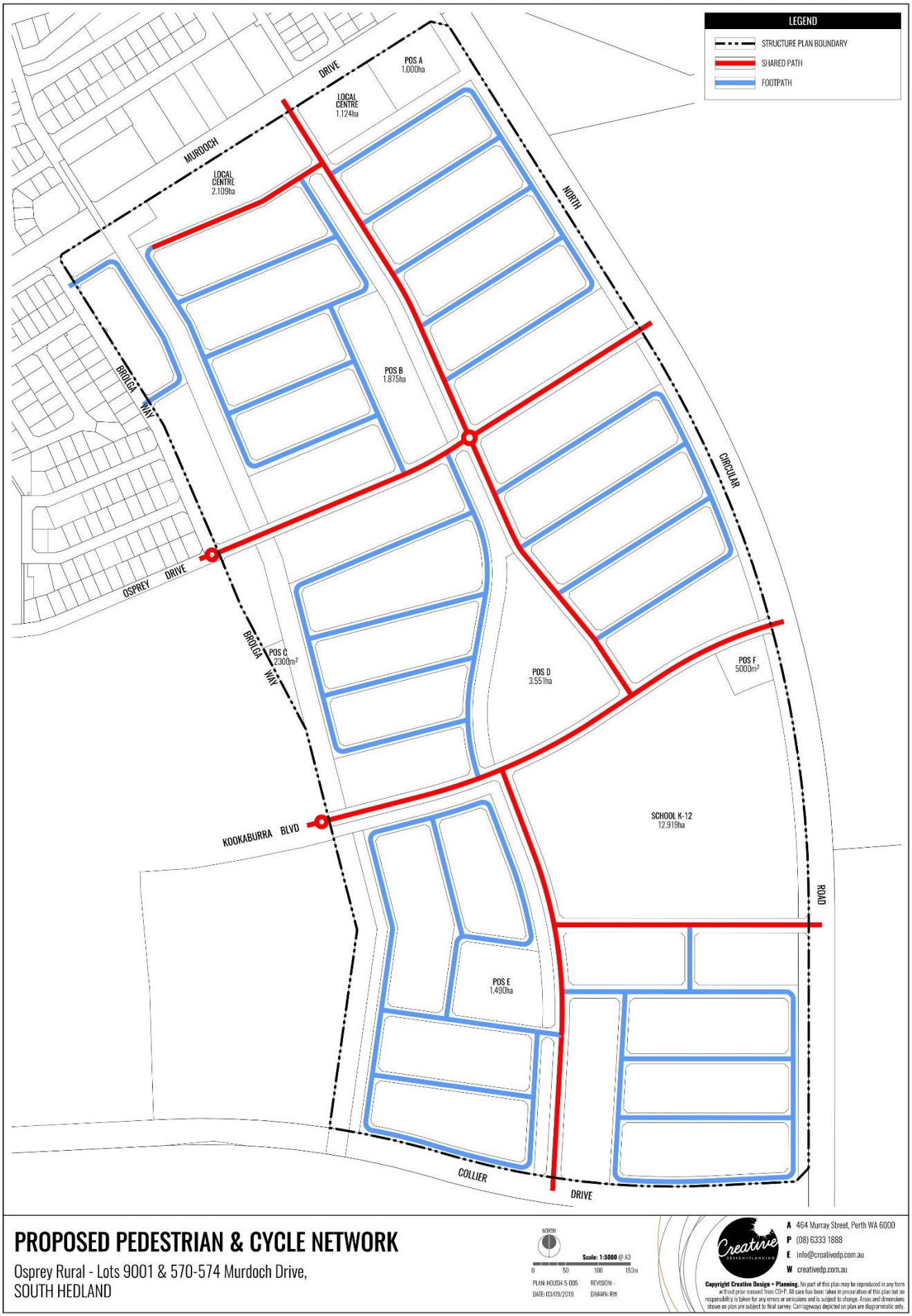
### 4.7.4. Public Transport

There are no public transport services within the SP area. The public transport provision for the area includes the following routes:

- Route 870: South Hedland – Port Hedland Provides connection between Port Hedland and South Hedland Shopping Centre. This route provides a maximum of 8 services per day on weekdays.
- Route 871 and Route 872: South Hedland Circular Route. These routes provide a loop service within South Hedland. While the coverage of routes 871 and 872 is considered sufficient for the existing area, covering all major attractors within South Hedland and most of the residential areas, the service frequency is only 6 per day, so it is not expected that these bus services will form a major mode share for the future residents within Osprey Rural. The closest existing bus stops to the SP area are located at the western edge, along Brolga Way.

It is suggested that Route 871 and Route 872 be realigned to provide access and mobility for the SP. The proposed route would travel along the Future north-south road and Kookaburra Road, servicing the proposed District Open Space (POS D) and the future primary school located adjacent to Brolga Way / Kookaburra Boulevard. Consultation with the Public Transport Authority will be required to determine the best public transport outcome for the SP and the wider South Hedland area, particularly when the school is to be constructed.

Figure 14: Proposed Pedestrian and Cycle Network



## 4.8. Water Management

Cardno has prepared a Local Water Management Strategy (LWMS) consistent with the WAPC *Better Urban Water Management*. The LWMS is contained within **Appendix 11** and summarised in this section. The adopted development concept proposes to relocate the major internal drainage corridor centrally within the site. This drain was built to service the Osprey Estate to the south-west of the site, at a time when the SP area was still zoned 'Rural'. The current alignment of the drain compromises the site's potential for effective urban development and hence it is proposed to relocate it.

Plate 2: Kookaburra Boulevard intersection and Osprey key worker housing development to the south-west of the site. Visible is road drainage leading to the open drainage channel that enters the site immediately south of this intersection.

### 4.8.1. Total Water Cycle Management

Total water cycle management recognises the finite limit to a region's water resources, and the inter-relationships between the uses of water and its role in the natural environment. It addresses physical and environmental aspects of water resource use and planning and integrates other social and economic concerns. The overall objective for preparing a total water cycle management plan for the proposed development is to mitigate flooding, minimise sediment transport and maintain an appropriate water balance. This objective is central to the LWMS.

A potable water balance based on general assumptions (outlined in Appendix D of the LWMS report) was conducted to determine the effectiveness of the water conservation strategy. The assumed rates and calculation methodology presented in the Water Corporation Spreadsheet *Water Corporation $H_2$Options_Water_Balance_Tool_.xls* were adapted to model the effects of using water efficient appliances within each lot. The resulting water consumption for the development is presented in **Table 4-3** with the household usage target of 100 kL/person/year achieved.

Table 4-3: Water Consumption Requirements for Development

| Drinking Water (ML/year) | Non-Drinking Water (ML/year) | Development Total (ML/year) | Per Person (ML/year) |
|---|---|---|---|
| 170.38 | 187.56 | 357.95 | 99.60 |

Source: Cardno LWMS 2019

### 4.8.2. Water Conservation

Total water cycle management aims for sustainable consumption of potable water and consideration of all water sources. For this reason, the use of water within the development will be minimised wherever possible. The design criteria for water conservation are detailed as follows:

- Minimise household water usage to meet the target of 100 kL/person/year (Government of Western Australia, 2007);
- Minimise water requirements for the establishment of any vegetated areas;
- Minimise water requirements for the maintenance of POS; and
- Minimise water requirements for basin maintenance.

A water conservation strategy for the development would address development and lot scale measures, as follows.

Development Scale Water Conservation Measures

- Landscaping: Landscaping design and POS management measures will be implemented to achieve the design criteria, including:
  - Retention of existing vegetation where possible to reduce demand for irrigation;
  - Retention of native vegetation within drainage and POS areas (where possible) to reduce demand for water during establishment;
  - Minimal turf will be employed for POS to reduce irrigation demands;
  - Turf used in POS will be of a species that requires minimal water and fertiliser.
- Irrigation: Irrigation management measures that will be implemented to achieve the design criteria include:
  - Irrigation systems designed and installed according to best water efficient practices;
  - Irrigation of revegetated areas within POS can be established on a two-year sacrificial irrigation drip system, to be decommissioned following the establishment of planting; and
  - Management of irrigation practices to minimise losses to evaporation.

  Irrigation of POS and landscaped areas may be undertaken using groundwater, treated wastewater and/or greywater.

Lot Scale Water Conservation Measures

- Potable Water Supply: The Water Corporation has confirmed its intention to support the current network with reinforcement works along Masters Way and a new main along Collier Drive. The proposed reticulation network will be determined by the proposed development layout and will be advised by Water Corporation once more detailed plans are available at the Urban Water Management Plan (UWMP) stage.
- Alternative Water Supply: The potable scheme water supplied by Water Corporation can be conserved by utilising low quality water, such as greywater, for uses that do not require water of a higher quality.
- Water Efficient Appliances: Significant reductions in water uses can be achieved with the use of water efficient appliances. The water conservation strategy proposes all lots use water efficient appliances.

### 4.8.3. Wastewater Management

Although there is extensive sewer to the west of the site, the most likely direction for the development wastewater infrastructure to flow is south to north, in line with the topography of the site. Preliminary design will confirm the proposed infrastructure required to service the development at the UWMP stage.

### 4.8.4. Stormwater Management

Due to the large rainfall intensities and volumes experienced in South Hedland, conveyance of stormwater will be via roads rather than underground pipes to:

- Protect properties and infrastructure from flooding;
- Establish effective drainage flow paths for safe conveyance of stormwater;
- Prevent maintenance issues incurred in a pit and pipe system and
- Reduce velocities to minimise erosion.

### Depressed Road Drainage System

The depressed road drainage system was derived to achieve greater use the road surface for the disposal of runoff. The roads are designed to accept runoff from adjoining properties and almost no pipes or pits are used. The roads are kerbed and the levels selected so that they are generally lower than the fronting properties, acting as a collector of runoff. Road grades and levels are designed so that an interconnecting, self-draining system is formed which leads to a suitable outfall location.

Appendix D of the LWMS (Appendix 11) provides further detail on this system, which should be considered in future detailed design of the roads within the SP area.

### Local Stormwater Management

The Structure Plan has been influenced by the alignment of drainage swales to maintain the existing flow paths through the site. The stormwater drainage system has been designed using a major/minor approach. Figures 7 and 8 of Appendix 11 (LWMS) show typical depths and widths of the drainage channels required to accommodate one-, five- and hundred-year ARI stormwater events. To the extent possible the detailed design of the channels should be integrated with the landscape design of adjacent public open spaces to provide safe and visually contiguous areas and avoid any need for safety fencing. This will require the landscape architects and engineers designing the drain to work together to achieve a functional and attractive outcome.

- Major Drainage System: The major drainage system includes the use of roads, swales, drainage reserves, detention basins and open spaces to provide safe passage of stormwater runoff from major storm events greater than 5yr ARI and up to the 100yr ARI. Key points of the major drainage system strategy are as follows:

  - Roads graded to direct flow overland to the lowest point in each catchment based on a depressed road drainage system. The ultimate road low point will be adjacent to POS, with overflow flood storage provided within the POS. The POS design should aim to create flood storage in an informal manner, minimising formal drainage basin areas;

  - 100yr ARI flows are consistent with flows derived by earlier studies by others;

  - 100yr ARI storm contained within the road reserve with a minimum 300mm freeboard to adjacent properties finished floor level;

  - 100yr ARI storm contained within major waterways with a minimum 500mm freeboard above finished floor levels;

  - No water ponding after 96hrs to minimise mosquito breeding; and

  - Reduce stormwater velocities to prevent mobilisation and export of sediments to effectively manage erosion.

- Minor Drainage System: The minor drainage system is defined as the series of kerbs and roadways designed to convey runoff generated by minor storms up to and including the 5yr ARI storm event. The minor drainage system incorporates a treatment train of best management practice water quality structural controls such as weirs within drainage channels that provide water quality treatment.

  Key points of the minor drainage system strategy are as follows:

  - As per standard practice, houses are unlikely to have gutters. Lots will retain some stormwater through landscaped areas preventing direct run-off from impervious areas to the road drainage system

  - Drainage treatment via small weirs within channels (see below) bio-retention swales (see below) with capacity to treat 15 mm of rainfall;

  - Kerb breaks and flush kerbing to be utilised around POS and swales to encourage overland flow; and

  - Landscaped POS areas are to be at least 80% native plants.

  It is proposed to include small weirs within the drainage channels to enable frequently occurring events to be retained and infiltrated on site. The spacing of the weirs will be determined based on detailed engineering design. Ideally the weirs should be located to enable the following tailwater from the preceding weir to reach the next weir, to reduce erosion potential.

### 4.8.5. Stormwater Quality Management

Management of erosion and sediment transport within the site must occur at all levels of planning from preconstruction until handover of the drain areas to the local government. Strategies that could be adopted to minimise erosion and control sediment transport prior to and during construction include:

- Vegetation along the road verge is proposed to be retained;
- The development will be cleared in stages to minimise erosion opportunities;
- Ground disturbance activities will be avoided during intense rainfall events;
- Temporary offline sedimentation basins would be utilised, if required, to collect fine sediments should drainage from the stage being developed not follow the overall drainage strategy;
- Revegetation will occur as soon as possible; and
- An Erosion and Sediment Control Program will be documented for the development.

Long term stormwater quality management within the site will occur within the basin and drain areas. This can be achieved through:

- Drains will include weirs to reduce velocities within the drains; and
- Rock armouring to prevent scour, particularly on bends in the arterial drainage system.

### 4.8.6. Groundwater Management

The adopted design criteria for groundwater management are:

- Minimise changes to underlying groundwater levels as a result of the development.
- Ensure that groundwater quality leaving the site is at the same or better than the water entering the site.

Investigations have found that there is no groundwater within 3m of the existing ground surface. It is not anticipated that the development will negatively impact groundwater levels in the area. The Town of Port Hedland has advised that no groundwater monitoring will be required to inform the UWMP.

### 4.8.7. Implementation

#### Urban Water Management Plan (Subdivision)

Processes defined in *Better Urban Water Management* (WAPC, 2008) require an UWMP at subdivision stage.

Further work that is identified for inclusion in the UWMP:

- Acid Sulphate Soil investigations;
- Groundwater resource investigations as a non-potable water source;
- Scour protection analysis for the drainage system. An Erosion and Sediment Control Program to be documented for the development.
- Design of vegetated swales and dry/ephemeral storages;
- Refinement of the final configuration and location of drainage channels dependent on final earthworks and road design levels; and
- Confirmation of groundwater design levels.

#### Construction Management

At construction stage management of various aspects (e.g. sediment, dust, surface runoff, noise, traffic etc.) will be required. Sediment transport and dust generation must be minimised during construction works.

#### Stormwater System Operation and Management

The operation and maintenance of the drainage system will initially be the responsibility of the developer, ultimately reverting to the Town of Port Hedland. The surface and subsoil drainage system will require regular maintenance to ensure its efficient operation.

### Monitoring Programme and Contingency Planning

It is proposed that the overall condition of POS area monitoring be undertaken for two years, from completion of the civil and landscaping works. Reporting to the Town of Port Hedland will occur annually, detailing the monitoring performed to date. At the end of the two-year monitoring and reporting period, the condition of the POS areas will be assessed, and reported to the Town within the final monitoring report.

A visual assessment will be undertaken on a bi-annual basis to monitor the condition of drains to ascertain that the maintenance activities specified within Section 3.8 of the LWMS achieve the objectives of the Maintenance and Management Plan.

### Groundwater Monitoring

As a requirement of *Better Urban Water Management*, post development monitoring of groundwater level and quality should be undertaken. The specifics of the post development groundwater monitoring regime should be proposed during the UWMP stage.

## 4.9. Infrastructure Coordination, Servicing and Staging

Cardno has provided findings and recommendations regarding the future infrastructure and servicing requirements that are needed to accommodate the development of the subject site, as depicted in the Indicative Concept Plan (**Figure 7**). An infrastructure and servicing strategy prepared by Cardno is included in **Appendix 12**.

Cardno's assessment of the infrastructure required for the proposed Osprey Rural development can be summarised as follows:

- The subject site faces a shortfall in existing supply of wastewater, water and power infrastructure to service the proposed residential and commercial activity.
- A working group between Water Corporation and Horizon Power should be set up to help plan and coordinate precinct development and staging with any headworks infrastructure capital works.
- The Department of Communities could implement a minimum Green Star, NABERS or Waterwise accreditation requirement for new development. Minimum energy conservation requirements can help reduce peak electricity demand, reduce water demand, increase load diversity and reduce greenhouse gas emissions. These measures may delay to onset of the medium-long term infrastructure requirements.
- National Broadband Network (NBN) will likely roll its infrastructure across the entire precinct as development occurs.
- Bottled gas is the likely mechanism o service new dwellings should a gas supply be required, the cost of which would probably be borne by the homeowner.

Based on advice received from the relevant service authorities Cardno concludes that there should be no reason from a servicing point of view that the development as contemplated in the Indicative Concept Plan could not be implemented.

### 4.9.1. Water Infrastructure

There is currently no potable water infrastructure traversing the subject site, however there are existing water reticulation networks servicing development to the west. Water Corporation, which is the main service provider for water supply and infrastructure in the area, has provided its proposed planning for the area that is intended to support the current network.

The land is located within the boundary of the South Hedland water supply zone. There are several existing water distribution mains as well as a large reticulation main in the vicinity. Water services can be provided to the future subdivision of the land by the developer undertaking extensions of suitably sized reticulation mains looping through the subdivision area to support smaller diameter mains serving the lots.

At the subdivision stage, Water Corporation would prepare a schematic reticulation plan based on the Structure Plan layout.

In summary, the water infrastructure headworks would comprise of the following infrastructure upgrades:

- 600mm Steel extension off Murdoch drive to service the Northern side of the development;
- 375mm AC extension off Osprey Drive currently located to the adjacent western development;
- 250mm PVC off Kookaburra Drive currently located to the adjacent western development; and
- 200mm PVC off Turtledove Court currently located to the adjacent western development.

Water Corporation will typically fund headworks (mains 300mm in diameter and over) through its capital investment program subject to availability of funds in the program at the time of construction. Once the Structure Plan is received, the proposed works will be placed on the program. The cost of reticulation must be funded by the developer; this is any mains under 300mm in diameter.

### 4.9.2. Wastewater Infrastructure

Water Corporation Western Australia is the state authority regulating the distribution, storage and disposal infrastructure for wastewater in the area.

There is currently no wastewater infrastructure traversing the proposed Osprey Rural site. The development to the west contains local wastewater networks serviced through several Water Corporation operated pumping stations.

The Water Corporation has advised that:

- The long-term planning places this land within the gravity catchment of a future wastewater pump station (WWPS 'G') to be located on other land to the northeast of the SP area. This WWPS will be a large transfer station and is not required in the short term, with present indications being that capital for this project will be required around year 2030 onwards.
- If development of the SP area were to occur in the shorter term, the planning will need to be revised to investigate the possibility of a staging solution for this land, eg: grading some of it to the west towards existing sewers, or installing a temporary wastewater pumping station within the site and pumping to a suitable discharge point (most likely westwards towards existing WWPS 'D' Hamilton Rd). The possibility of a temporary staging solution for wastewater disposal will need to be investigated by the developer in liaison with our Headworks Delivery team (Russell Nelson) at the subdivision stage.

It is noted that implementation of the Structure Plan in the short term is not anticipated, and also that the presence of buffers relating to the existing landfill site in particular will mean that development in the south-east part of the SP area will not take place until these restrictions are removed. This opens an opportunity for any necessary interim wastewater solution to take place within the existing buffer areas.

### 4.9.3. Power Infrastructure

Horizon Power is the responsible agency for the power distribution and generation within the Pilbara region. Alinta Energy owns and operates the High Voltage transmission lines which electrically transmit power to Alinta Energy's customers and the North West Interconnected System (NWIS). The overhead 66KV transmission line running north-south through the western part of the site is controlled by Alinta Energy.

Although the older adjacent developments mainly use overhead high (HV) and low voltage (LV) distribution wires, new developments are constructed with underground supply networks. The local area is serviced off the Murdoch substation located at the intersection of Murdoch Drive and Demarchi Road, with a main HV network running off and along Murdoch Drive from Brolga Way to the east.

The maximum power requirement for the development has been calculated using Horizon Power's recommended Design Maximum Demand of 10kVA.

Initial advice from Horizon Power is that there are capacity restraints within Murdoch substation, and a feasibility study will determine what network reinforcements would be required to supply this subdivision. A Design Information Package for the site is required to be commissioned in order to progress design development.

### 4.9.4. Telecommunications Infrastructure

The general South Hedland area is well serviced by telecommunications infrastructure with optical fibre running throughout adjacent developments.

Mobile network coverage in the area is well serviced with 4G covering the entire Osprey Rural site under the Telstra network; other network providers may vary. The National Broadband Network (NBN) has rolled out fixed line connections in areas adjacent to the development. Typically, NBN will enter into an agreement for large developments and will therefore likely roll out infrastructure as development occurs.

Should a developer wish to register a development with Telstra Smart Communities (https://www.telstra.com.au/smart-community), this must be done twelve weeks prior to construction.

The infrastructure within a development will be installed by the developer. Telstra can be engaged to install infrastructure within a development at the developer's expense. Telstra's commercial pit and pipe service will generally not be offered in developments where NBN Co has confirmed agreement to install NBN Co fibre within a development stage. The Department of Communities should review the Best practice guide for councils when initially dealing with NBN Co.

### 4.9.5. Gas Infrastructure

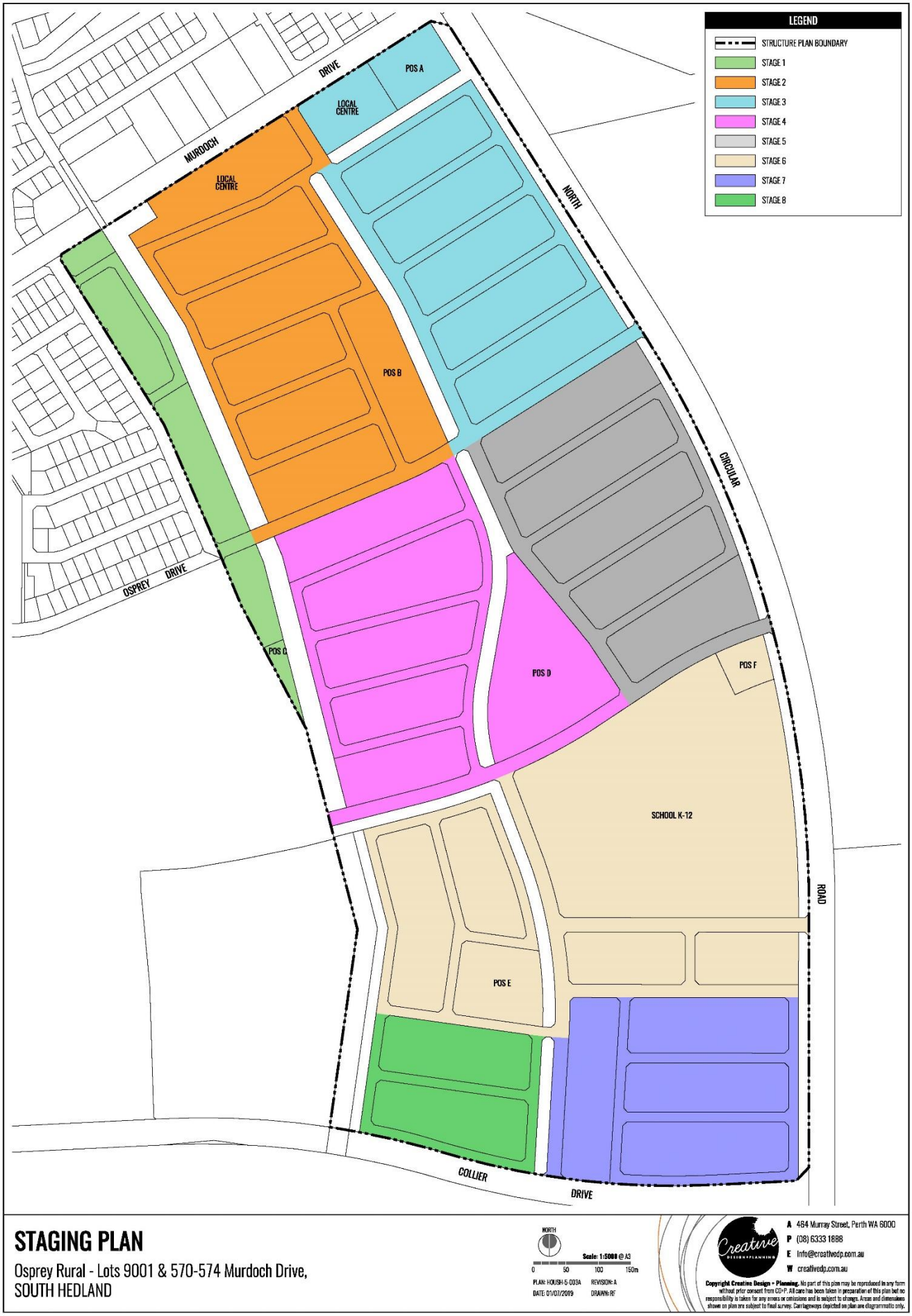
ATCO Gas, the main provider and distributor of reticulated gas in Western Australia, has advised that it currently has no infrastructure within the area. ATCO also advised that it has no current plans to expand its network to the development.

Bottled gas is the likely the mechanism to service new dwellings within the development should the development require a gas supply. This would most likely be implemented by the eventual lot owners as required. It is not anticipated that the developer would have to fund the provision of bottled gas.

### 4.9.6. Staging

Based on the need to construct roads and connect to existing services, an indicative staging plan is shown in Figure 15. Relocation of the drain will be required before Stage 2 can commence. Depending on demand, stages may be developed in phases. Stages 7 and 8, and the eastern part of Stage 6 will not commence until the constraints associated with the landfill and mining buffers are removed or can be managed.

Figure 15: Indicative Staging Plan



## 4.10. Developer Contribution Arrangements

Developer contribution arrangements are not proposed as the land to be developed is in single ownership. The usual servicing and headworks charges, as required, will be paid for by the developer.

Plate 3: The Alinta Energy powerline that traverses the site north-south and typical site vegetation.

# 5. Technical Appendices Index

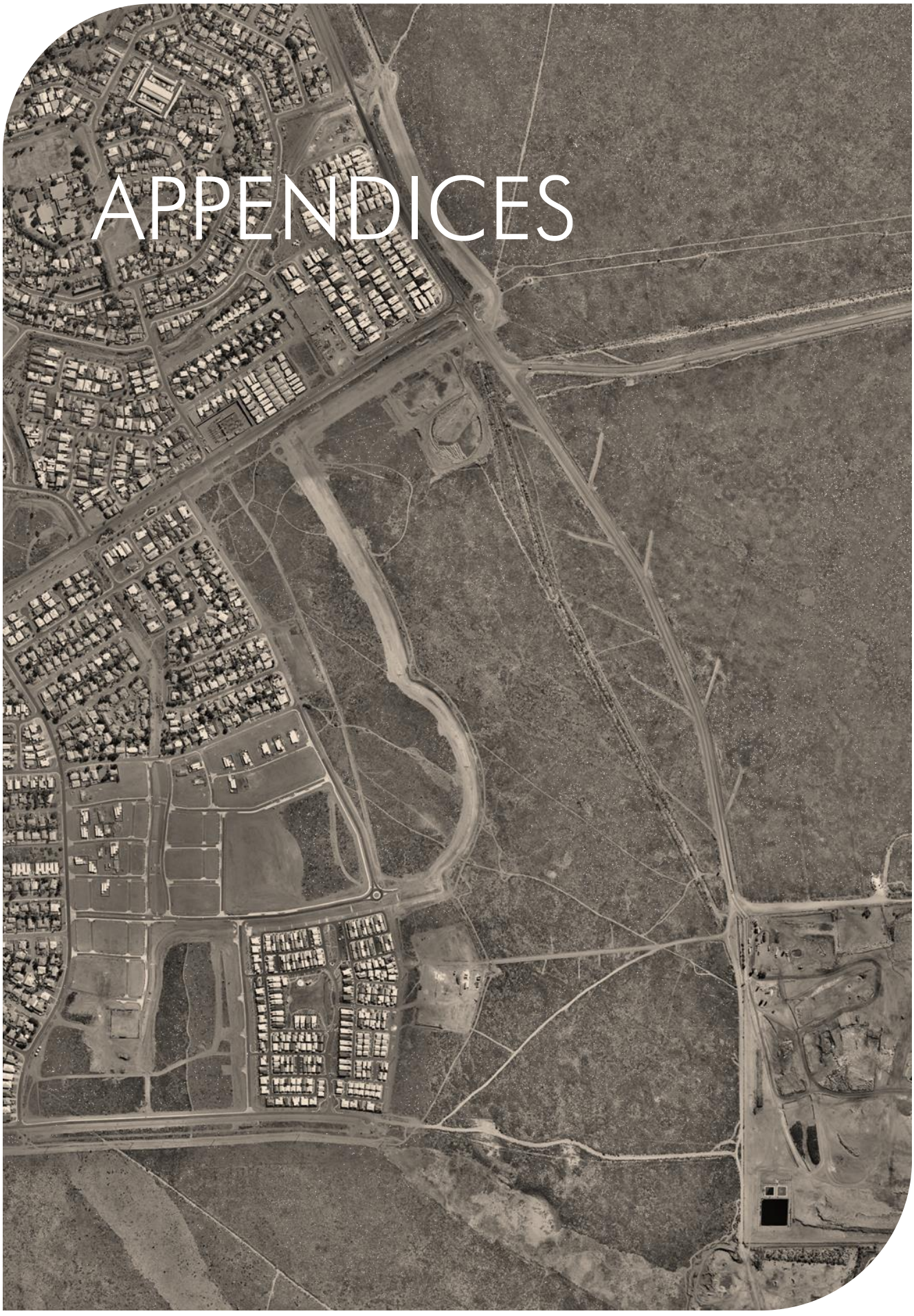
The following technical reports are appended to this Structure Plan[1].

Table 5-1: Technical Appendices Index

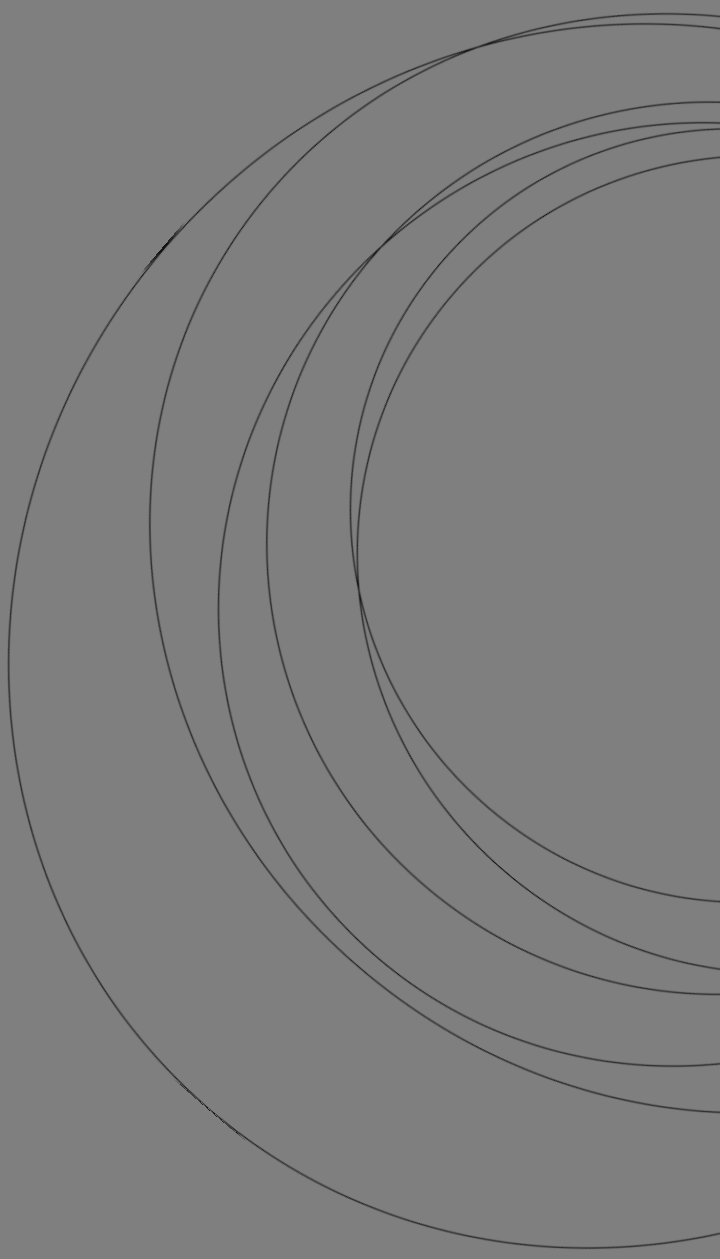
| APPENDIX No. | DOCUMENT TITLE | AUTHOR & DATE | DOCUMENT TYPE |
|---|---|---|---|
| 1 | Bushfire Hazard Strategic Assessment | RUIC, July 2016 | Final |
| 2 | Preliminary Site Investigation (Contaminated Land) | Cardno, 13/07/16 | Final |
| 3 | Geotechnical Investigation of Proposed Residential Subdivision Lot 9001, 570-572 & 574 Murdoch Drive, South Hedland | Cardno, 27/01/15 | Final |
| 4 | Environmental Site Conditions and Constraints | Cardno, 08/12/14 | Final |
| 5 | Aboriginal Archaeological and Ethnographic Site Identification Survey | Archaeological & Heritage Management Solutions, January 2015 | Final |
| 6 | Report of an Ethnographic Survey of Lots 555 and 9001 Murdoch Drive, South Hedland, Western Australia | Bryn Coldrick & Edward M. McDonald; Amergin Consulting (Australia) Pty Ltd, September 2014 | Final |
| 7 | Desktop Calpuff Dispersion Modelling Assessment of South Hedland Landfill | The Odour Unit, July 2016 | Final |
| 8 | Buffer Requirement for Mining Leases M45/531 and M45/689 | Air Assessments, 07/07/16 | Final |
| 9 | SPP 5.4 Acoustic Assessment - Lots 9001, 570 – 572 & 574 Murdoch Drive, South Hedland | Herring Storer, June 2016 | Final |
| 10 | Transport Impact Assessment vE | Cardno 05/09/19 | Final |
| 11 | Local Water Management Strategy vD | Cardno 05/09/19 | Draft for approval by Town of Port Hedland, DWER |
| 12 | Local Infrastructure and Servicing Report vC | Cardno 01/08/19 | Final |

[1] Some technical reports refer to the Housing Authority. Due to restructuring after the commencement of this project, the housing development section of the Housing Authority became part of the Department of Communities, and references to 'Housing Authority' should therefore be read as 'Department of Communities'.

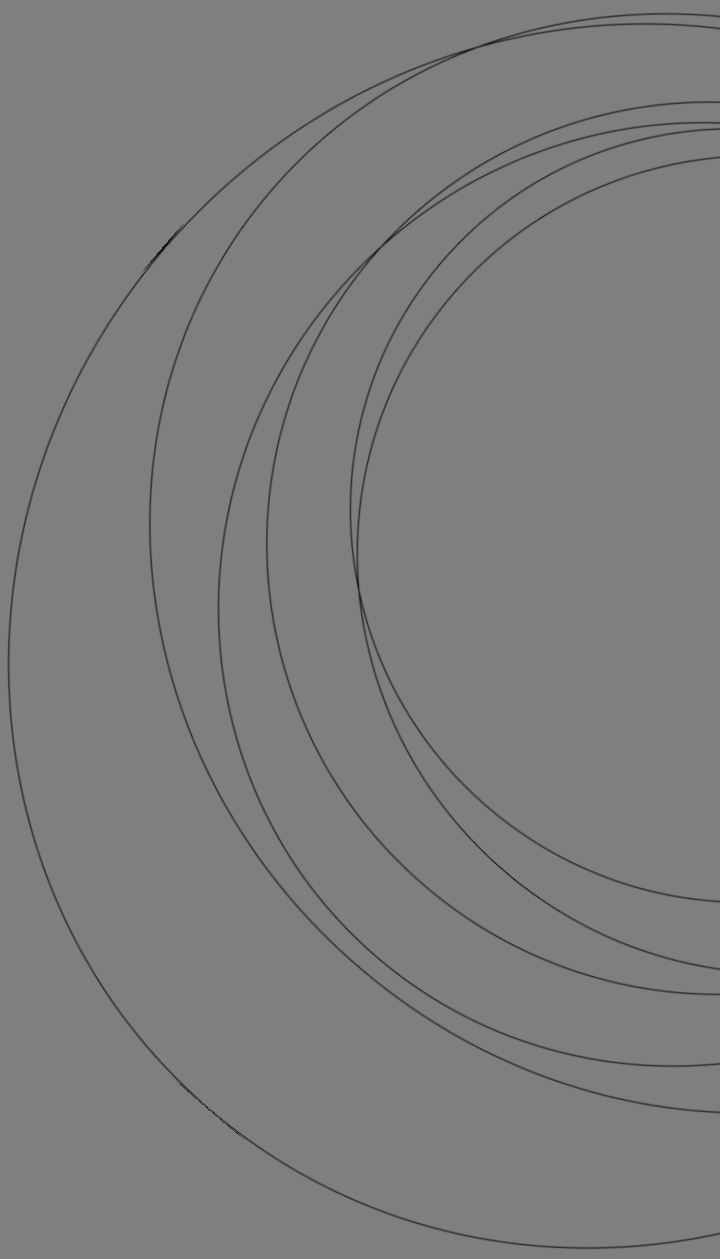
# APPENDICES



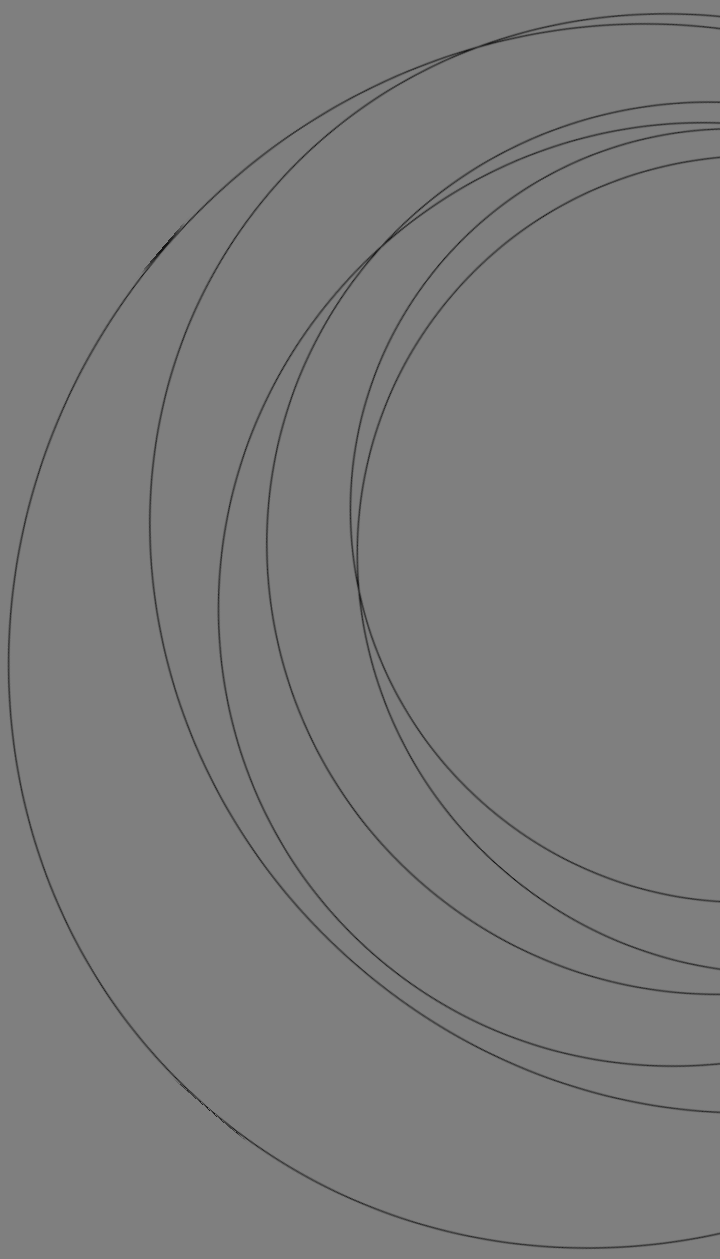
# Appendix 1
# Bushfire Management Plan



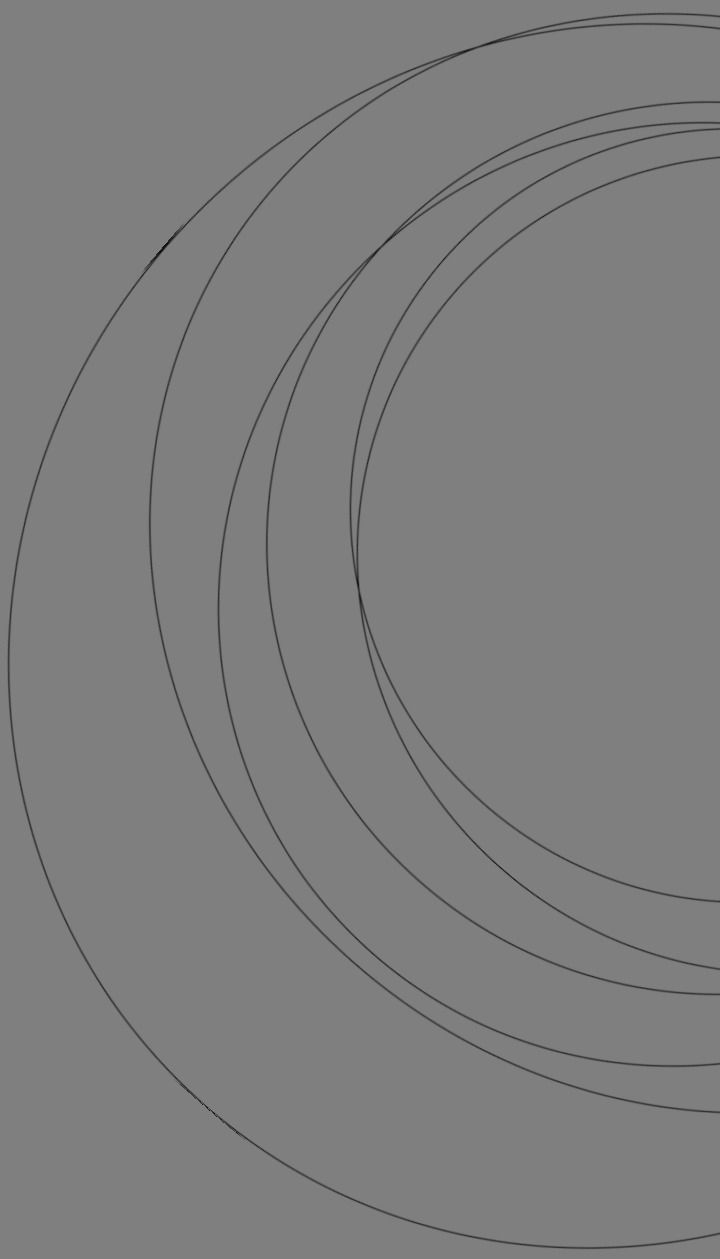
# Appendix 2
# Preliminary Site Investigation



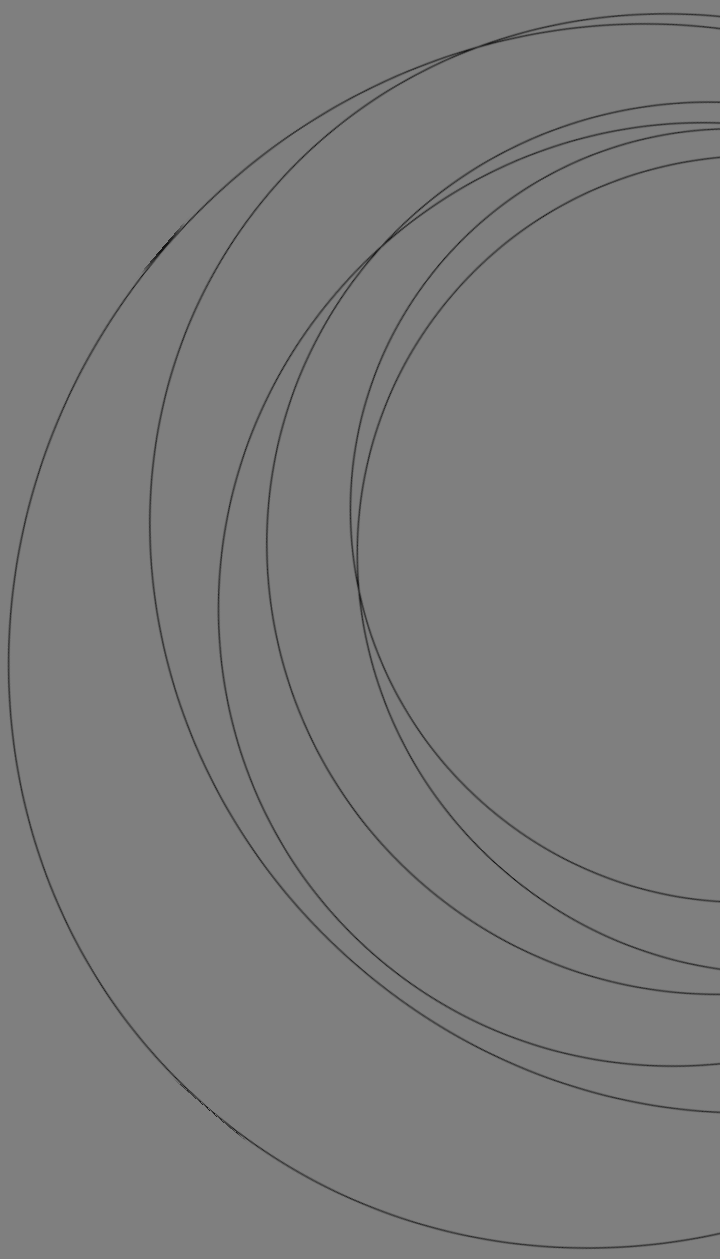
# Appendix 3
# Geotechnical Investigation



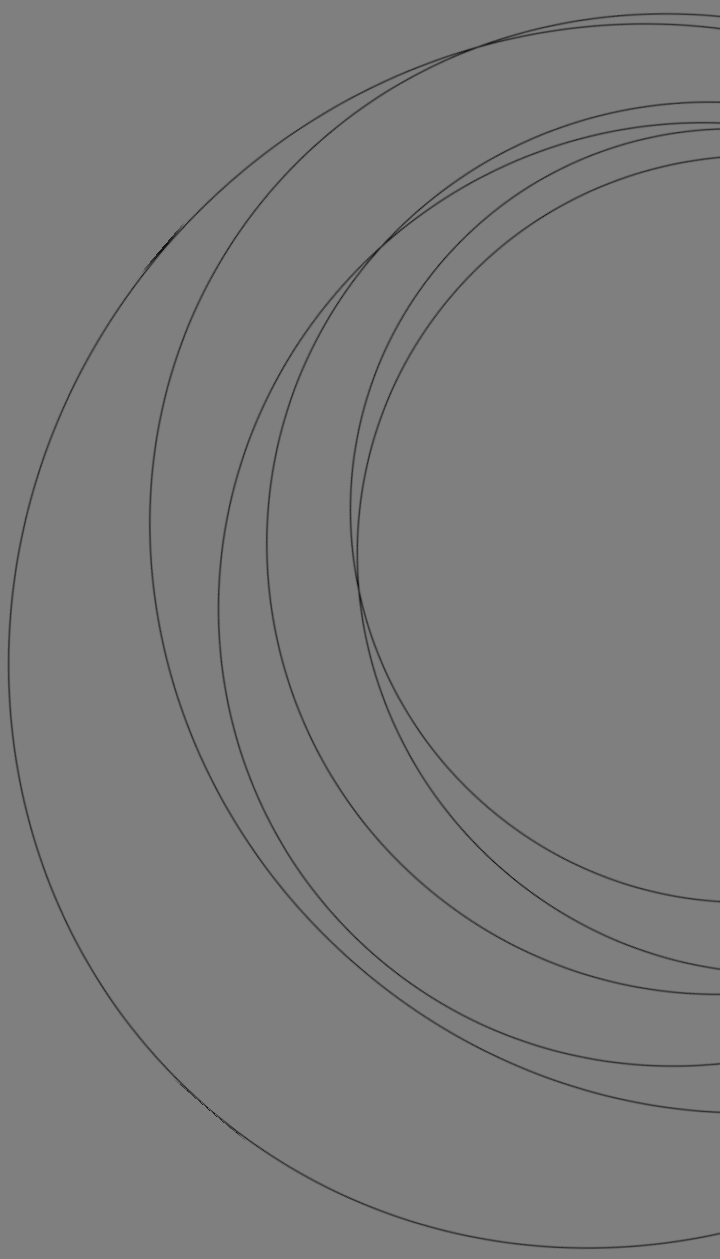
# Appendix 4
# Environmental Site Conditions & Constraints



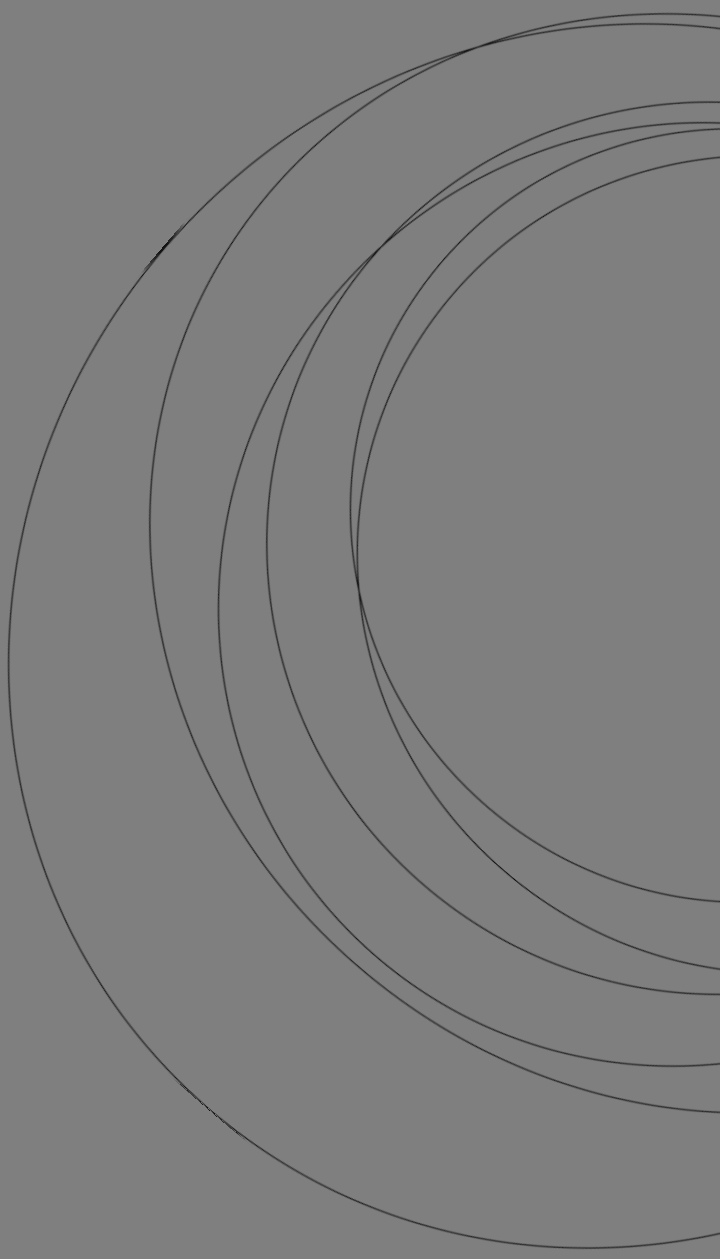
# Appendix 5
# Archaeological & Ethnographic Site Identification Survey



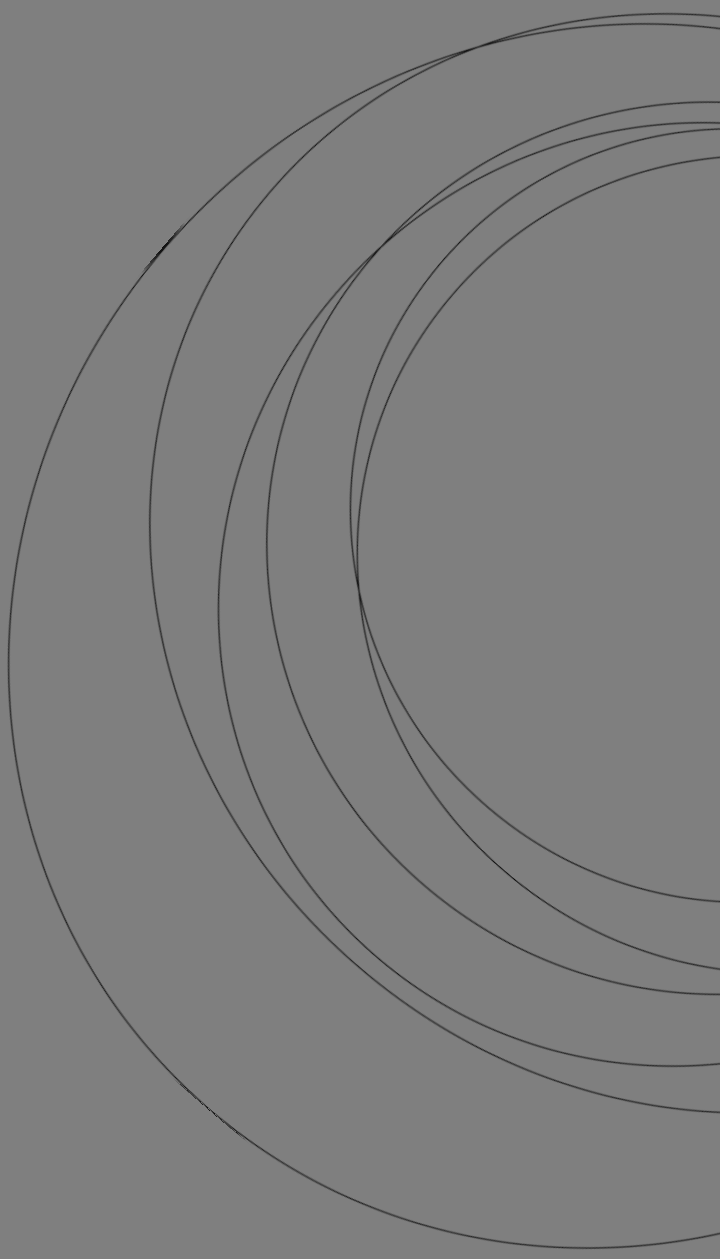
# Appendix 6
# Ethnographic Survey



# Appendix 7
# Desktop Calpuff Disperson Modelling Assessment

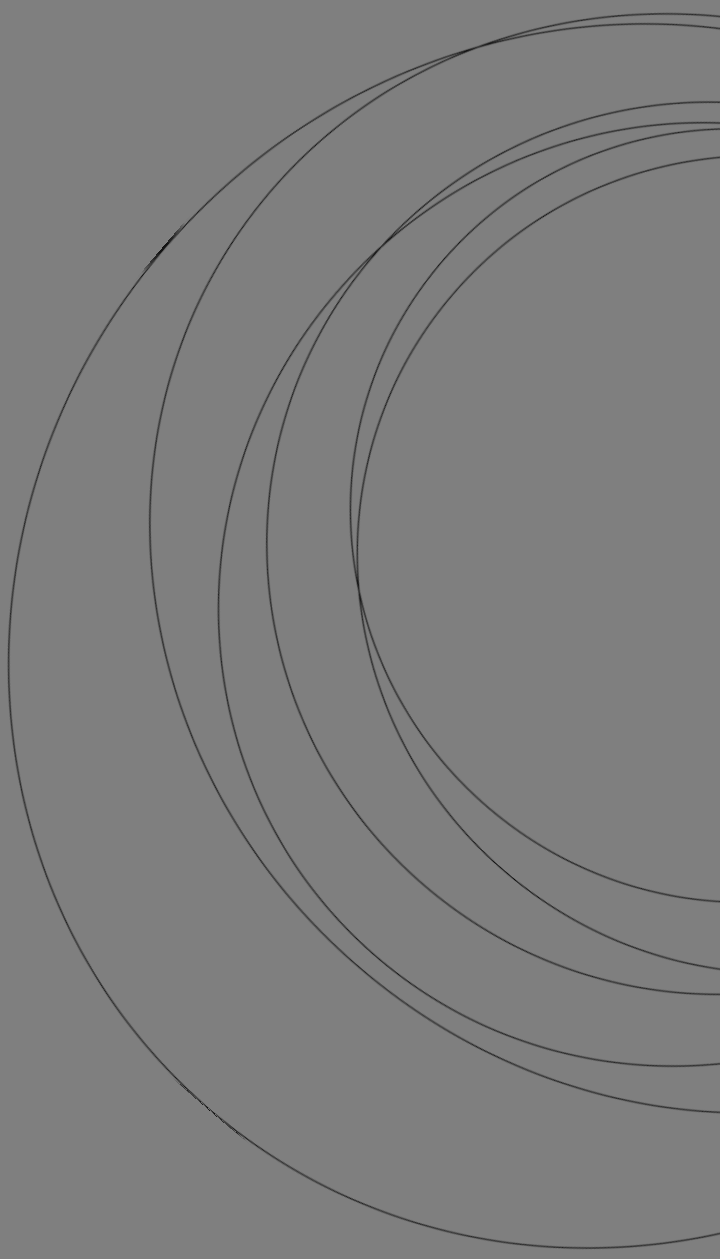


# Appendix 8Mining Lease Buffer Requirements

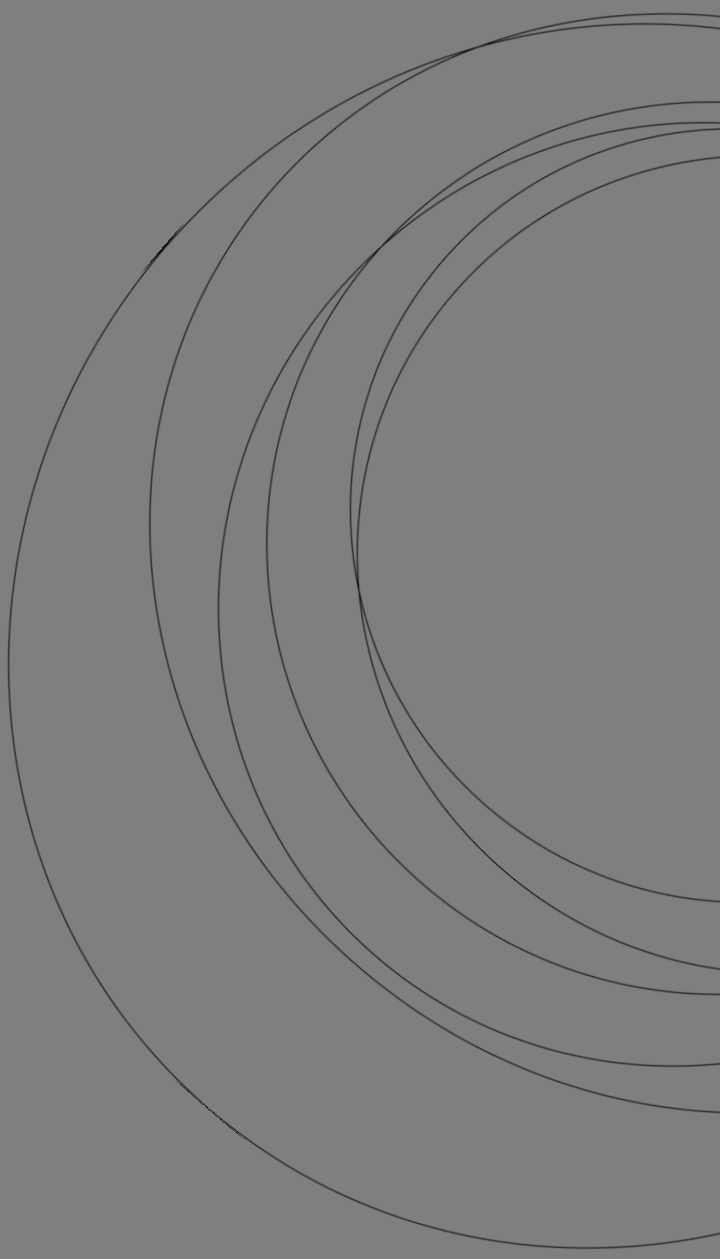


# Appendix 9
# Acoustic Assessment of Railway

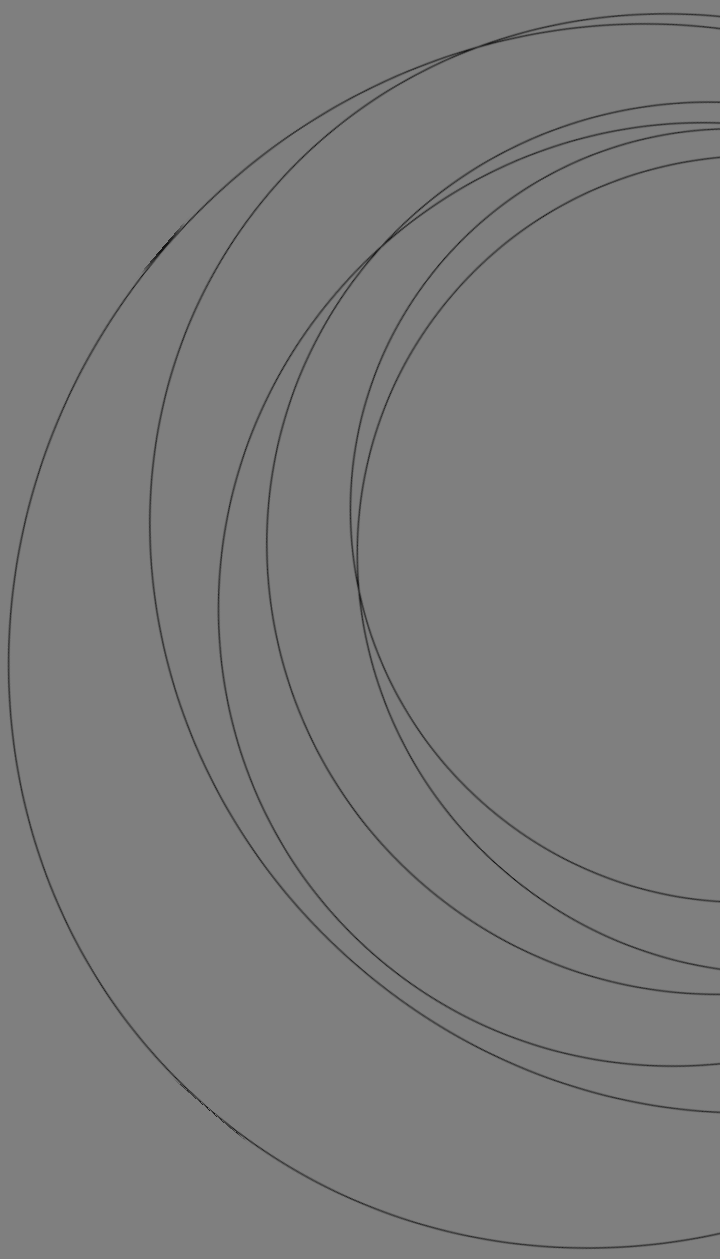
# Appendix 10
# Transport Assessment



# Appendix 11
# Local Water Management Strategy



# Appendix 12
# Infrastructure & Servicing Assessment



**Creative Design + Planning**
464 Murray Street
PERTH WA 6000

T: +61 8 6333 1888 | E: info@creativedp.com.au