

# BROOME ROAD INDUSTRIAL ESTATE

MASTERPLAN 22 MAY 2012



## **DISCLAIMER**

This report is prepared on the instructions of the party to whom or which it is addressed and is thus not suitable for use other than by that party. As the report involves future forecasts, it can be affected by a number of unforeseen variables. It represents for the party to whom or which it is addressed the best estimates of Urbis Pty Ltd, but no assurance is able to be given by Urbis Pty Ltd that the forecasts will be achieved.

## **URBIS STAFF RESPONSIBLE FOR THIS REPORT WERE:**

Director	Ray Haeren
Senior Consultant	Tim Dawkins
Senior Consultant	Stijn LeLarge
Consultant	Sean Morrison
Job Code	PA0673
Report Number	2 – Updated following approval of LWMS

Copyright © Urbis Pty Ltd  
ABN 50 105 256 228

All Rights Reserved. No material may be reproduced without prior permission. While we have tried to ensure the accuracy of the information in this publication, the Publisher accepts no responsibility or liability for any errors, omissions or resultant consequences including any loss or damage arising from reliance in information in this publication.

**URBIS**  
Australia Asia Middle East  
[www.urbis.com.au](http://www.urbis.com.au)

<b>1</b>	<b>Introduction and Background .....</b>	<b>1</b>
1.1	Introduction .....	1
1.2	Site Description .....	1
1.3	Location .....	2
1.4	Existing Land Uses .....	3
1.5	Surrounding Land Use and Development .....	3
1.6	Project Background .....	4
1.7	Inception Workshop .....	5
1.7.1	Outcomes/Objectives .....	5
<b>2</b>	<b>Existing Statutory Framework .....</b>	<b>6</b>
2.1	Shire of Broome Town Planning Scheme No.4 .....	6
<b>3</b>	<b>Site Analysis Assessment – Opportunities and Constraints .....</b>	<b>8</b>
3.1	Surrounding Land Use and Development .....	8
3.2	Climate .....	8
3.3	Landform / Topography .....	8
3.4	Hydrology .....	8
3.5	Landscape / Vegetation .....	11
3.6	Soils .....	12
3.7	Native Title .....	12
3.8	Indigenous Heritage .....	13
3.9	Non-Indigenous Heritage .....	14
3.10	Servicing Infrastructure .....	14
3.10.1	Sewerage .....	14
3.10.2	Water Supply .....	14
3.10.3	Power .....	14
3.10.4	Drainage .....	14
3.10.5	Telecommunications .....	15
3.10.6	Gas .....	15
3.11	Road Network .....	15
3.12	Opportunities and Constraints .....	17
3.12.1	Opportunities .....	17
3.12.2	Constraints .....	17
<b>4</b>	<b>Design Development .....</b>	<b>19</b>
4.1	Introduction .....	19
4.1.1	Summary of Key Workshop Outcomes .....	19
4.1.2	Design Refinement .....	20
<b>5</b>	<b>Master Plan .....</b>	<b>21</b>
5.1	Design Principals .....	21
5.2	Design Response .....	22
5.2.1	Drainage .....	22
5.2.2	Lot layout .....	23
5.2.3	Land use .....	23
5.2.4	Traffic .....	23
5.2.5	Earthworks .....	24
5.2.6	Buffers .....	24
5.2.7	Open Space .....	24



---

5.2.8 Landscape Design .....24

**6 Implementation and Staging .....26**

6.1 Implementation and Staging (LandCorp’s Proposed Landholdings).....26

**7 Conclusion .....27**

**Appendix A Master Plan.....28**

**Appendix B Concept Drawings .....29**

**Appendix C Landscape Concept Plan.....31**

**Appendix D Staging Plan .....32**

**FIGURES:**

**FIGURE 1 – CADASTRAL MAP ..... 2**

**FIGURE 2 – DISTRICT CONTEXT PLAN ..... 2**

**FIGURE 3 – LOCAL CONTEXT PLAN ..... 3**

**FIGURE 4 – CURRENT ZONING ..... 6**

**FIGURE 5 – OPPORTUNITIES AND CONSTRAINTS PLAN ..... 9**

**FIGURE 6 – LAND AREAS PROPOSED TO BE UNDER YAWURU OWNERSHIP UNDER ILUA ..... 13**

**TABLES:**

**TABLE 1 – LOT DETAILS ..... 1**

**TABLE 2 – SURROUNDING LAND USE ..... 3**

**TABLE 3 – SURROUNDING ZONINGS ..... 6**

**TABLE 4 – STAGING SUMMARY ..... 26**

# 1 Introduction and Background

## 1.1 Introduction

The development of a new industrial estate in Broome has been initiated in recognition of significantly increased economic activity and an associated need for additional well located general industry land. A 400 hectare site on the north-eastern periphery of the Broome town site on Broome Road has been identified which displays suitable attributes, in terms of physical topography and surrounding land uses, to accommodate industrial development. The site has been planned for industrial uses for some time, with the land becoming available through the purchase of the Waterbank Pastoral Station lease in 1996, and the subsequent rezoning in to 'Industry' in 2000.

The estate will provide Broome's industrial land supply into the medium to long-term. This will assist in ensuring that Broome's productive capacity is not hampered by shortages of suitable land to support its economic development. The development of the site will be undertaken to match demand for industrial and logistics based uses that will promote the continued growth of Broome.

This document sets out the background of the project, site conditions and rationale for its design and staging. Future subdivision on the site will be guided by this plan.

## 1.2 Site Description

The nominated site occupies approximately 400 hectares and is generally rectangular in shape, with the site narrowing from east to west. The site's northern boundary is defined by Broome Road.

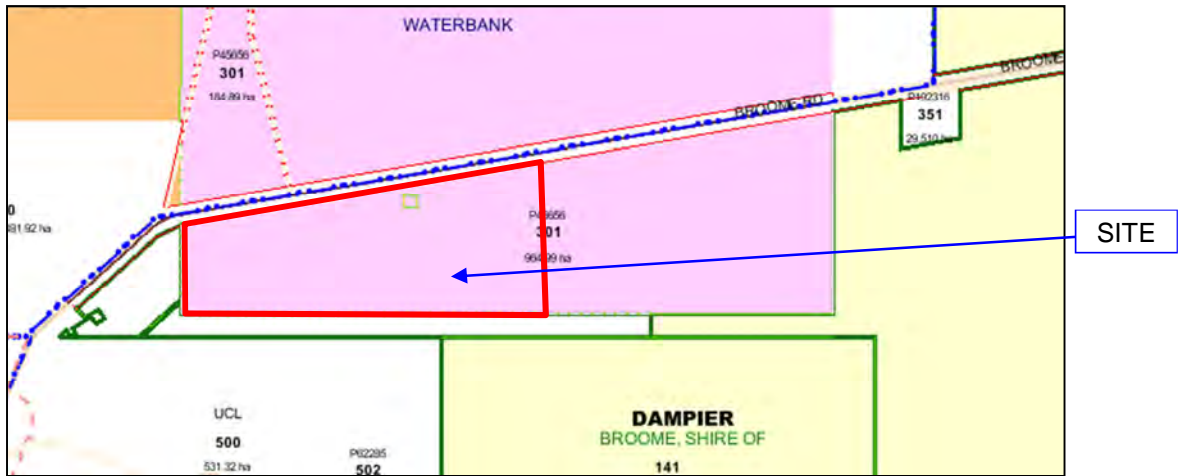
The site is flat in nature, with no notable topographical features. It slopes generally in a southwest direction with grades ranging from 0.5 to 1.0%.

**TABLE 1 – LOT DETAILS**

Lot	Area	Owner	Council Zoning
Part Lot 301 on P45656	400 ha	Crown Land Title Reserve under Management Order (Primary Interest Holder: Water Corporation)	Industry
Lot 214 on DP186115	1.69 ha	Crown Land Title Reserve under Management Order (Primary Interest Holder: Minister for Fisheries)	Industry

LandCorp will acquire the Crown Land through the Department of Regional Development and Lands. This will include extinguishing the management orders in favour of the Water Corporation and Minister for Fisheries (once the radio mast on the allotment has been relocated) that currently exist on the title.

FIGURE 1 – CADASTRAL MAP

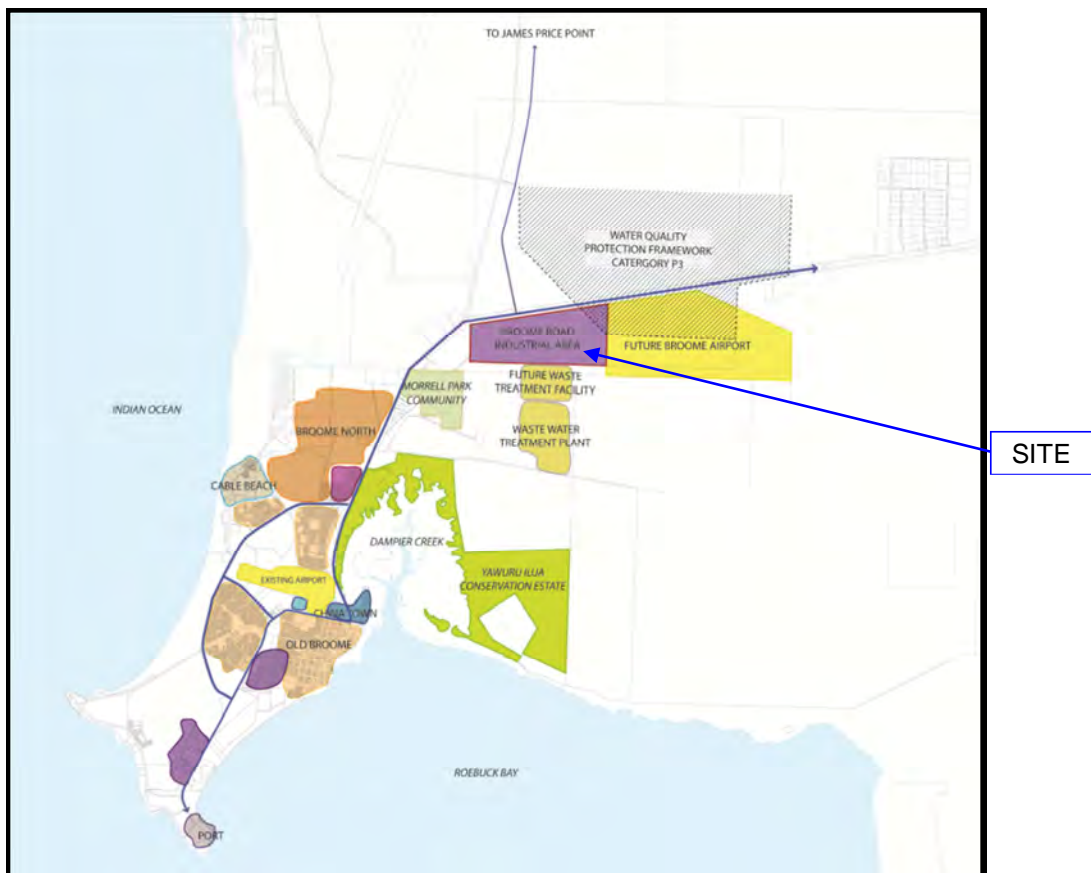


Source: Western Australian Land Information Authority 2010

### 1.3 Location

The site is located 8 kilometres north-east of the Broome townsite – within the Shire of Broome. Cape Leveque Road, which is currently being investigated for an upgrade to provide access to James Price Point, intersects with Broome Road in the vicinity of the site. The site is about 20 kilometres west of the intersection between Broome Road and Great Northern Highway.

FIGURE 2 – DISTRICT CONTEXT PLAN



Source: Urbis

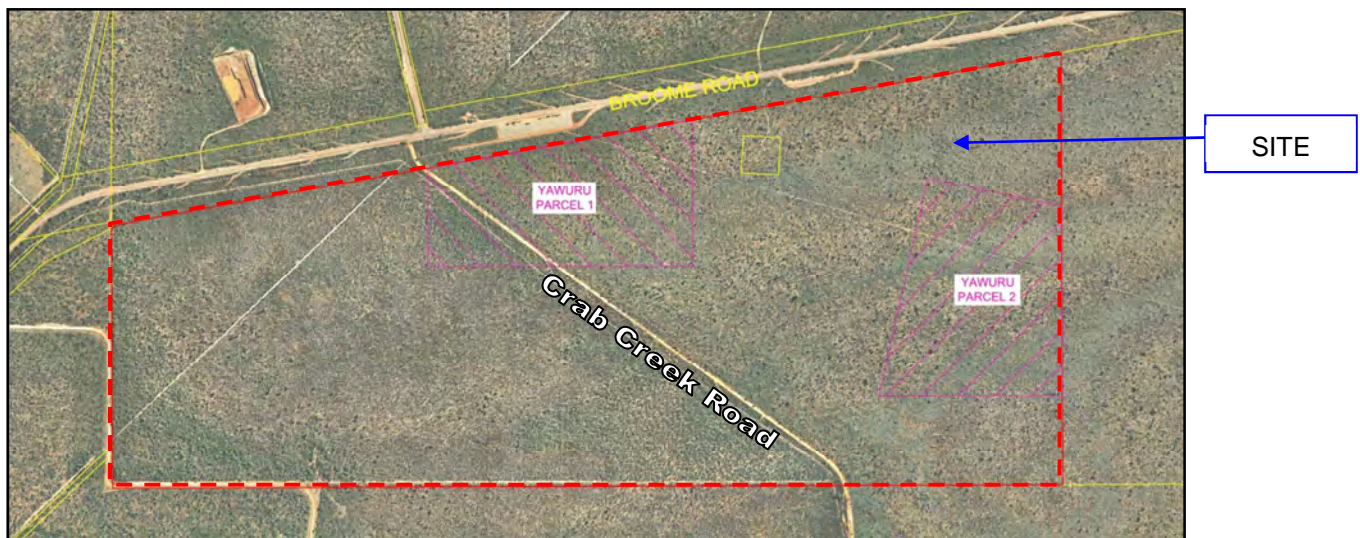
### 1.4 Existing Land Uses

The site is currently undeveloped and vegetated. The existing Crab Creek Road cuts through the middle of the site from Broome Road through to the south of the site, and continues onto the Roebuck Bay. This road is not gazetted and as such is merely an informal track, which needs to be resolved when the unallocated crown land is converted to freehold title.

There is an existing road train assembly area to the north of the site, within the Broome Road reserve, located approximately at the mid-point along the frontage of the site.

There is communication infrastructure located on Lot 214, consisting of two masts and associated equipment, which is located within a secure chain link fence enclosure.

**FIGURE 3 – LOCAL CONTEXT PLAN**



Source: Whelans (2010)

### 1.5 Surrounding Land Use and Development

**TABLE 2 – SURROUNDING LAND USE**

Direction	Immediately Adjoining	Further
North	Water Protection Area	Pastoral Lease areas and Unallocated Crown Land
East	Future (relocated) Airport Site	Pastoral Lease areas and Unallocated Crown Land
South	Nominated site for future waste management facility	Waste Water Treatment Plant, Dampier Creek and Yawuru ILUA Conservation Estate
West	Morrell Park Community	'Broome North' residential development and Cable Beach

## 1.6 Project Background

This Master Plan is the result of a significant period of investigation and planning to ensure that a suitable industrial estate to service Broome and the wider Kimberley region is delivered ahead of any critical shortage emerging.

The site was previously part of 'Waterbank Station', which ceased operation in 1996 after the pastoral lease was purchased by the State Government. The site was de-stocked at this point in time and it is understood that no livestock been run on the site since.

The subject site was rezoned in 2000 from 'Public Purpose – Water Supply' to 'Industry'. Amendment 4 of the Shire of Broome Town Planning Scheme No.4 states the purpose of the change in use was to *'create an industry zone for the development of an industrial estate which can also accommodate public utilities and infrastructure'*. The original intent was to accommodate a waste water treatment plant and a power station on the site, co-located with the industrial uses. Since this time, the waste water treatment plant has been located to the south of the site and the power station is no longer required in this location.

The Broome Planning Context Report (2004) identified a need to undertake preliminary investigations into the emerging corridor of activity along Broome Road. The 2005 Broome Planning Steering Committee also found that industrial development on Broome Road should be investigated so as to enable the relocation of undesirable industrial activity from existing areas closer to the centre of Broome.

The development site has been identified to facilitate the strategic provision of industrial land to service Broome's growth. The Shire of Broome has grown significantly over recent years to emerge as the key regional centre for the West Kimberley Region. Furthermore, the proposed development of the Browse LNG Precinct at James Price Point will considerably expand economic activity in Broome and the wider region. It is important that there is adequate supply of project ready industrial land to ensure that the Shire of Broome does not suffer from constraints that will impact on efficiency and productivity.

In mid-2010 LandCorp established a team of consultants to undertake detailed investigations and collaborate to prepare a robust Master Plan for the site. The team consists of:

- Planning & Design – Urbis
- Civil Engineering – Cossill and Webley
- Hydrology – JDA Consultant Hydrologists
- Traffic – Transcore
- Landscape Architecture – UDLA
- Environment – GHD
- Surveying – Whelans
- Land Owners - Nyamba Buru Yawuru (represented by MacroPlan)

The project team has worked closely as a group, and have activity brought key Stakeholders into the design process through one-on-one meetings as well as design workshops. The project team was established early to ensure that the final design of the Master Plan effectively dealt with the various issues associated with the development of the site.



## 1.7 Inception Workshop

### 1.7.1 Outcomes/Objectives

An inception workshop was held to share the knowledge of the site and development issues with the project team, in particular:

- Planning (Statutory and Strategic)
- Environment and Drainage
- Civil Engineering
- Market Demand (lot mix and parameters)

As part of this inception workshop a project vision was established by the project team to guide the development of the estate. The agreed vision statement for the project is:

***“Develop a well designed and functional industrial estate which is sensitive to the local Broome culture and environment and supports economic growth and community well-being”***

Using LandCorp’s sustainability objectives framework, the project team established a suite of project objectives to guide the project.

The following objectives were determined to have the highest priority for the development of the Broome Road Industrial Area:

- a) *Governance*
  - Compliance with Yawuru Indigenous Land Use Agreement (ILUA)
  - Ensure the community are well informed and engaged
- b) *Environmental Leadership*
  - Ensure appropriate management of stormwater quality and quantity
  - To maximise efficient use of space and respond to local environmental conditions
  - Promote energy efficiency and renewable energy (eg. Solar, wind)
- c) *Design Excellence*
  - Planning/design which responds to site and context
  - Design to suit logistics users
- d) *Economic Health*
  - Provide an affordable product to meet market demand
- e) *Community Wellbeing*
  - To create diverse employment and learning opportunities

The themes emanating from the workshop outcomes have driven the design of the Broome Road Industrial Area. The development of the Master Plan was subject to review at key points to evaluate the project, ensuring a static benchmark for project success is used.

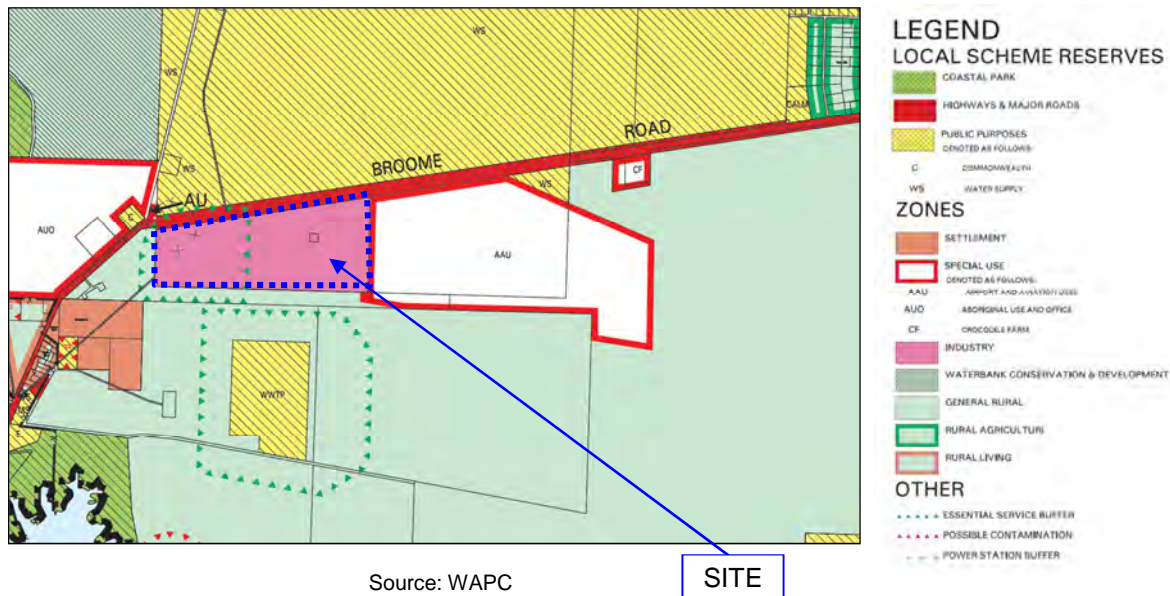
## 2 Existing Statutory Framework

### 2.1 Shire of Broome Town Planning Scheme No.4

The Shire of Broome *Town Planning Scheme No. 4* covers the subject site and surrounding land.

The site currently consists of native vegetation on vacant Crown Land. The subject site is zoned 'Industry' under the Shire of Broome TPS 4, with a portion of the site contained within a redundant essential services buffer related to the wastewater treatment plant and power station, which are no longer proposed to be developed on the site.

**FIGURE 4 – CURRENT ZONING**



The zonings in the above scheme map from the Shire of Broome's Town Planning Scheme No.4 are summarised in table 3 below.

**TABLE 3 – SURROUNDING ZONINGS**

Direction	Immediately Adjacent	Further
North	Public Purposes – Water Supply	Public Purposes – Water Supply
East	Special Use – Airport and Aviation Uses	General Rural
South	General Rural	General Rural
West	General Rural	Special use – Aboriginal Use and Office

The general aims of the Shire of Broome's Town Planning Scheme No.4 are to:

- a) assist the effective implementation of regional plans and policies endorsed by the council and the commission;
- b) ensure there is sufficient supply of serviced and suitable land for housing, employment, commercial activities, community facilities, recreation and open space;
- c) provide for housing choice and variety in neighbourhoods with community identity and high levels of amenity;
- d) assist employment and economic growth by facilitating the timely provision of suitable land for retail, commercial, industrial, entertainment and tourist developments, as well as providing opportunities for home-based employment;
- e) facilitate a diverse and integrated network of open space catering for both active and passive recreation, consistent with the needs of the community;
- f) incorporate Aboriginal heritage and cultural values into the land use planning for the Scheme Area;
- g) provide a range of tourist facilities and accommodation;
- h) promote the sustainable use of rural land for agricultural purposes whilst accommodating other rural activities;
- i) protect and enhance the environmental values and natural resources of the Scheme Area and to promote ecologically sustainable land use and development; and
- j) safeguard and enhance the character and amenity of the built and natural environment of the Scheme Area.

The general objectives of the Industry zone are to:

- a) provide for manufacturing industry, the storage and distribution of goods and associated uses, which by the nature of their operations should be separate from residential areas;
- b) encourage large storage and transport related land uses, noxious, hazardous and port related industry and other land uses which require large land parcels and/or separation from other land uses for health, safety or environmental reasons; and
- c) minimise the intensity of subdivision in the zone.

These aims and objectives have been taken into consideration as part of the planning processes associated with the development of the site. The Master Plan has been prepared with these objectives in mind and seeks to further the objectives relevant to the development. Importantly, the Master Plan does not compromise any of the general objectives.

## 3 Site Analysis Assessment – Opportunities and Constraints

### 3.1 Surrounding Land Use and Development

The Morrell Park residential community is located on the east side of Broome Road approximately 5 km north of Broome, to the south west of the subject site. Morrell Park is contained within the Settlement Zone and a Community Layout Plan (CLP) has been endorsed over the site to ensure that development proceeds in an orderly and planned manner.

There are a number of public utilities that are located around the subject site. Therefore the potential for conflict between land uses will need to be managed within the site through the use of interface treatments and buffers. A new Wastewater Treatment Plant (WWTP) is under construction to the south of the site along Crab Creek Road, and is expected to be operational by March 2011. The Shire of Broome has nominated the land between the WWTP and the site as the preferred location for a new waste management facility.

The land to the east of the site is reserved for the development of the new Broome International Airport. The airport's relocation from its existing location has been identified for some time, although no specific timeframes have been provided at present.

The land located to the north of the site is used for extracting subsurface water resources, which supplies Broome's drinking water. The subject site currently forms part of this water reserve, however only a small portion of the north east corner of the site is included within a priority protection area. The site does not contain any water supply bores.

*Please refer to Figure 5 for Opportunities and Constrains diagram.*

### 3.2 Climate

The climate in the Kimberley is generally characterised as a tropical climate, with a hot and humid 'wet season' approximately from December to March, and warm 'dry season' for the remainder of the year, with considerable variations and fluctuations occurring during each season. Intense rainfall from tropical storms and cyclones results in a mean average of 600.3mm of rainfall over 34.7 days during the wet season (Source: Bureau of Meteorology, 2010).

### 3.3 Landform / Topography

The site is flat in nature, with no notable topographical features. It slopes generally in a southwest direction with grades ranging from 0.5 to 1.0%.

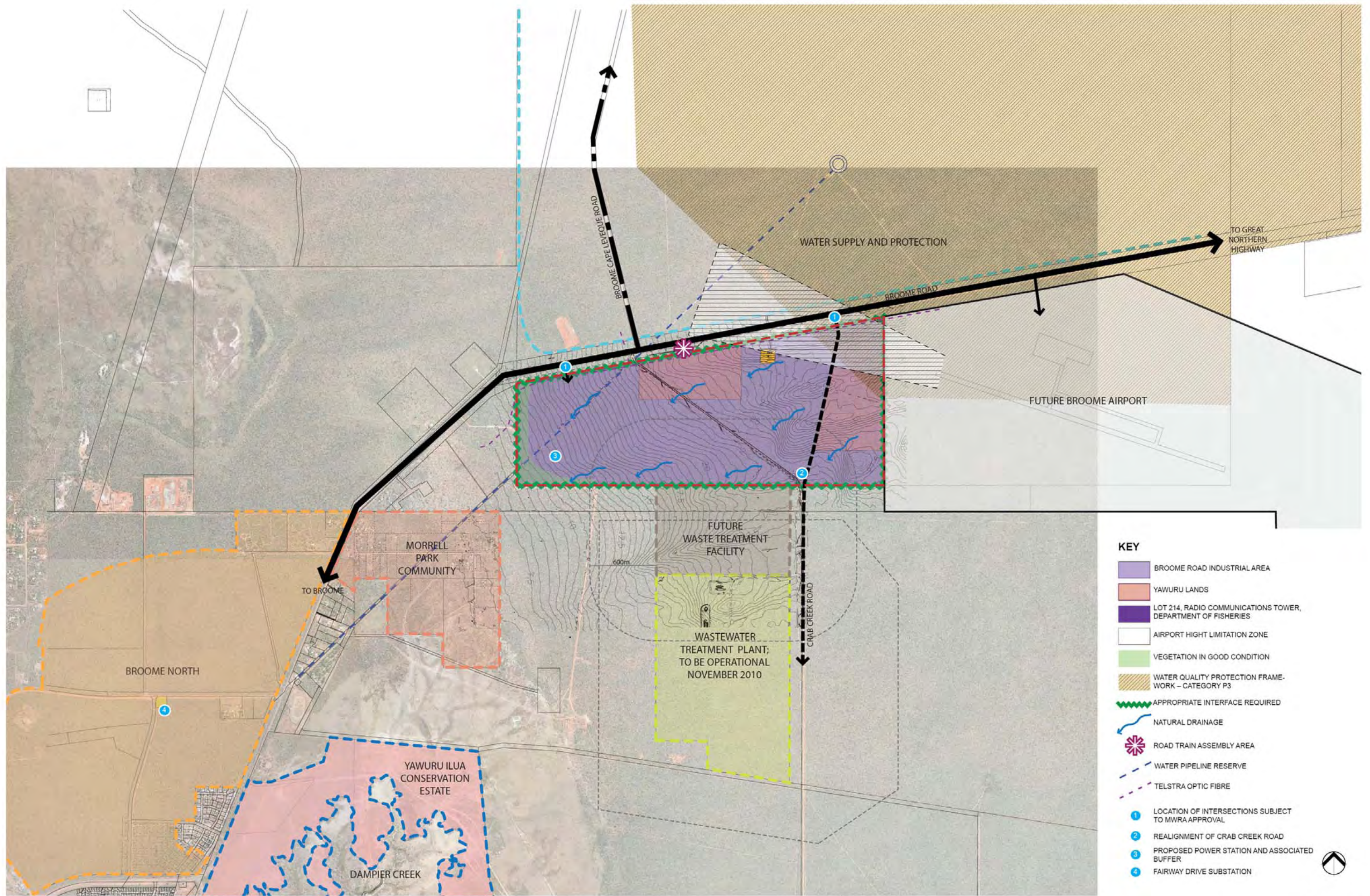
The topography of the site rises from a height of RL 10m AHD along the south western boundary to RL32.5m AHD on the north earth boundary.

This natural grade is suited to industrial development and the topography of the site presents no significant constraints to development.

### 3.4 Hydrology

There are no wetlands, natural surface water or drainage features within the site.

Information provided by the Department of Water indicates that groundwater levels at the site are well below ground surface and that groundwater is unlikely to be encountered during development of the site. A number of deep test pits have been undertaken on site as part of the geotechnical investigation and no ground water was detected. Water Corporation has advised groundwater levels near the southern most bore just north of the proposed industrial area were recorded between 0m and 5 m AHD.



- KEY**
- BROOME ROAD INDUSTRIAL AREA
  - YAWURU LANDS
  - LOT 214, RADIO COMMUNICATIONS TOWER, DEPARTMENT OF FISHERIES
  - AIRPORT HIGHT LIMITATION ZONE
  - VEGETATION IN GOOD CONDITION
  - WATER QUALITY PROTECTION FRAMEWORK - CATEGORY P3
  - APPROPRIATE INTERFACE REQUIRED
  - NATURAL DRAINAGE
  - ROAD TRAIN ASSEMBLY AREA
  - WATER PIPELINE RESERVE
  - TELSTRA OPTIC FIBRE
  - 1 LOCATION OF INTERSECTIONS SUBJECT TO MWRA APPROVAL
  - 2 REALIGNMENT OF CRAB CREEK ROAD
  - 3 PROPOSED POWER STATION AND ASSOCIATED BUFFER
  - 4 FAIRWAY DRIVE SUBSTATION

**FIGURE 5: OPPORTUNITIES AND CONSTRAINTS**  
 BROOME ROAD INDUSTRIAL AREA





The site is not located on a proclaimed surface water management area; however, a portion of the north-east corner it is located within the Broome Groundwater Area which is proclaimed under the *Rights and Water Irrigation Act 1914*. Therefore it is located within a Public Drinking Water Source Area (PDWSA). The boundary of the PDWSA currently being revised and it is expected that the site will be removed from the PDWSA.

The geology and climate of the region results in high rainfall and low infiltration rates, meaning that the bulk of the water needs to be directed out of the site. The management of stormwater drainage across the site is a significant issue and was a key consideration in the design development. Significant areas of the site will need to be dedicated to the drainage infrastructure. A significant challenge is designing a comprehensive drainage network that operates effectively to cater for peak flow events, whilst designed to be attractive throughout the year, during dry periods.

The site is located within the Cape Leveque drainage basin, with the closest arterial drainage system being Dampier Creek (3.5 km to the south west) and Crab Creek (10 km to the south east), both of which discharge into the RAMSAR listed Roebuck Bay. JDA Consultant Hydrologist conducted surface water monitoring during the wet season in 2011 in order to quantify flows leaving the site to establish a pre-development runoff coefficient. Various methodologies were applied to estimate the 100yr ARI peak flow, with the resultant estimates ranging from 53 m<sup>3</sup>/s to 65 m<sup>3</sup>/s.

### 3.5 Landscape / Vegetation

A level 2 flora and fauna survey was undertaken in April 2010 and a targeted (dry season) survey in August 2010 and the following conclusions were made:

- There are no reserves or conservation areas located in or around the site. However it is located within an environmentally sensitive area deemed to be associated with Dampier Creek and Roebuck Bay.
- The vegetation of the project area is classified as Pindan woodland and is dominated by Acacia species. There are also species of *Eucalyptus* and *Grevillea* located within the site. The Dampier district also includes areas of low tree savannah. It is recorded that 99.8% of the native vegetation still exists in the Dampier Interim Biogeographic Regionalisation of Australia (IBRA). There were no identified Commonwealth listed Threatened Ecological Communities. The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matter Search Tool identified only one significant listed flora taxon, *Keraudrenia exastia* (Fringed Keraudrenia), listed as critically endangered, within 10 kilometres of the site. The Department of Environment and Conservation's Rare Flora Database, the Western Australian Herbarium Database and the Naturemap Database identified only two Declared Rare Flora (DRF) species and 16 priority flora species in the general Broome area. There are no known records of DRF or priority flora species within the project area.
- Field investigations recorded the site vegetation types as Pindan woodland and Damp Pindan woodland. These types are representative of the wider Pindan vegetation which occurs along and near coastal areas from Derby to Port Hedland. The condition of the vegetation within the project area is degraded due to grazing and fire and some clearing for tracks. Much of the Pindan vegetation is affected by grazing and clearing across its range. The field survey recorded 173 taxa of flora from 47 families. These records included three priority flora species and 10 species of introduced flora within the project area.
- In regard to fauna, 73 vertebrate taxa were recorded within the project area, including 39 bird, 26 reptile and 8 mammal species. All of the mammals are considered widespread and common throughout the region. Birds were mostly kites, doves, parrots and cockatoos. No Federally listed, conservation significant, bird species were recorded, however, two Priority 4 birds under the Wildlife Protection Act, the Bush Stone Curlew and Australian Bustard were observed. No other conservation significant species were recorded. Four species of introduced mammals were recorded; these were cattle, dogs, feral cats and house mice.

Overall, the site was identified to be of good condition and not containing any threatened ecological communities (TEC) or other endangered/vulnerable flora or fauna. The Dampier Creek and Roebuck bay areas to the south of the site are Ramsar listed, with the mudflats constituting an Environmentally Sensitive Area under the Western Australian Environmental Protection Act. However, none of the project area includes mudflats, or in close proximity to them. With appropriate drainage management plans and design features any potential impacts to Roebuck Bay will be satisfactorily managed.

### 3.6 Soils

The principle soil type of the Dampier peninsular where the site is located is known as 'pindan'. This soil is a medium to fine grade sand that is orange/red in colour. The Geological Survey of Western Australia (1982) indicates that the geology of the study area comprises of "Red sand, fine to medium, minor silt: Aeolian".

A geotechnical investigation was conducted by ATC Williams. The field work consisted of digging a series of test pits and hand auger holes to a maximum depth of 3.0m. The subsurface conditions encountered at the site were visually consistent and comprised, medium dense to dense, fine and medium, red brown silty sand, known as "Pindan" throughout the region. Nuclear density meter tests and soil permeability tests were conducted on insitu soils at the test pit locations.

Laboratory tests consisting of Particle size distributions, Atterberg limits, moisture content and California bearing ratio tests were conducted. These give an indication of that the soil properties and capability of supporting development of buildings, roads, earthworks and buried services. Seasonal variations in the soil properties will occur due to changes in soil moisture content.

Groundwater was not encountered during the field investigation. Soil permeability is considered low, limiting the opportunity to dispose of stormwater by infiltration.

The geotechnical investigation indicated that the proposed site should be suitable for low rise industrial developments, providing the correct foundation preparation is carried out. Based on the results of the investigation it is considered that the site can be classified as Class "S" in accordance with AS2870. Further soil investigations by lot purchasers will be required to determine the site preparation methods appropriate to their respective locations and development types.

The risk of Acid Sulphate Soils is considered to be extremely low at this site area. Overall the soils on the site present no constraint to development.

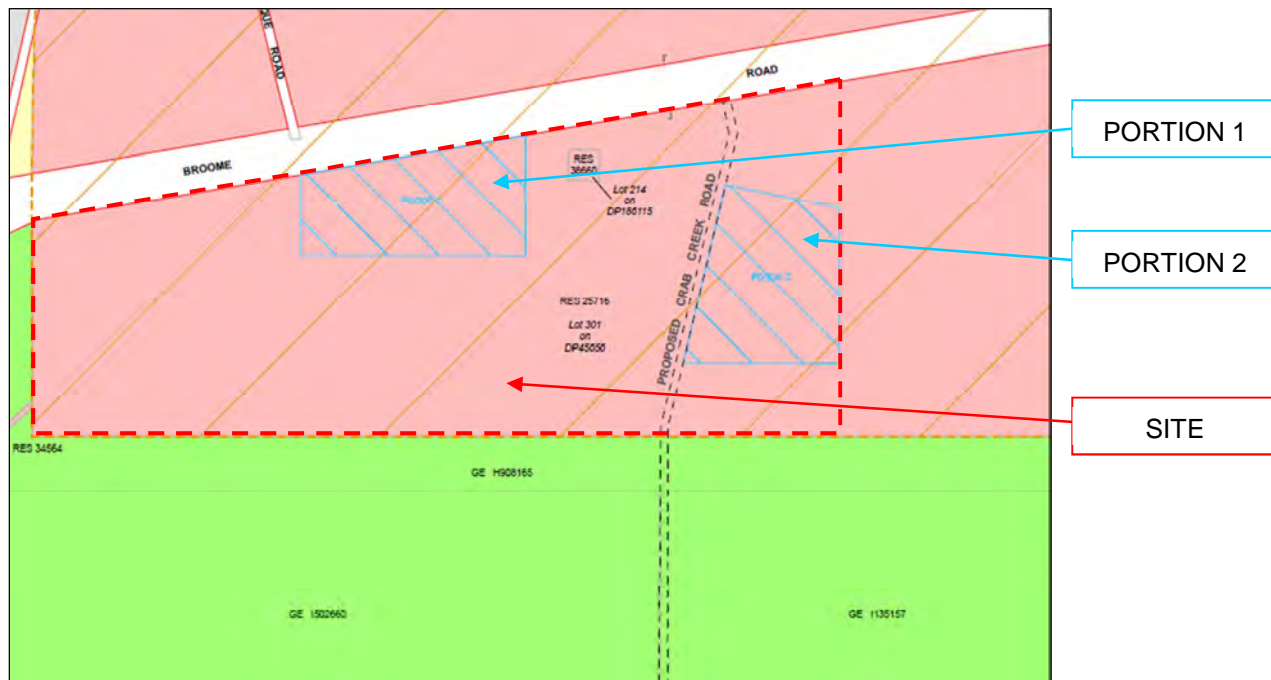
No known contaminated sites have been recorded within the project area and the risk of onsite contamination is considered low, given that its previous land use is uncleared native vegetation.

### 3.7 Native Title

Agreement was received with respect to native title Native Title by the Yawuru Indigenous Land Use Agreement (ILUA), which was registered in early 2010. As part of the agreement, two 40 hectare portions of land within the site will be transferred to Nyamba Buru Yawuru PBC. These portions have been identified in the image below.



FIGURE 6 – LAND AREAS PROPOSED TO BE UNDER YAWURU OWNERSHIP UNDER ILUA



Source: Western Australian Land Information Authority 2010

As part of the Yawuru ILUA there are a number of obligations that must be adhered to as part of the development of the Broome Road Industrial site. These are:

- **Seeds** – grant necessary authorisation to Yawuru to commercially exploit seeds collected.
- **Crown Land Titles** – create Crown Land Title for land the identified as ‘Portion 1’ and ‘Portion 2’ (refer figure 5) on or before 24 May 2011 and transfer relevant titles to Yawuru within 60 days of written request made on or after 24 May 2011.
- **Clearing Notice** – 120 days notice must be given to Yawuru before any clearing is intended to take place.
- **Topsoil** – transport unneeded top soil requested by Yawuru to one or more sites located on the Broome Road Industrial Area at no cost to Yawuru.
- **Development Obligations** – comply with obligations under section 28 of the *State Supply Commission Act 1991* during the development phase of Broome Road areas.
- **Tenders included Yawuru Community** – bids for the development phase of Broome Road industrial areas will be encouraged from and priority given to:
  - tenderers who are members of, or businesses or entities owned or controlled by the Yawuru Community; and
  - tenderers who have in place employment strategies that include a minimum of 10% of the tenderers’ or contractors’ employees are members of the Yawuru Community.

### 3.8 Indigenous Heritage

There are no registered Aboriginal heritage sites contained in the Aboriginal Heritage Inquiry System within the subject site.

An aboriginal heritage survey was undertaken February 2008, which also showed that the proposed development area does not include any significant sites.

### 3.9 Non-Indigenous Heritage

There are no heritage places registered with the Heritage Council of Western Australia affecting the subject site.

### 3.10 Servicing Infrastructure

#### 3.10.1 Sewerage

The proposed industrial area is outside the Water Corporation's licence area and sewer infrastructure will need to be extended to service the industrial area and proposed airport.

Using current water Corporation design criteria, the industrial area could be serviced by a new Type 180 wastewater pump station in the south west corner of the industrial area and pump eastwards through the industrial area road reserves and along Crab Creek Road to the Waste Water Treatment Plant (WWTP) to the south. The new WWTP would also need to be upgraded to accept industrial wastewater.

The Water Corporation has indicated that it prefers not to sewer industrial developments in country areas, due to the high cost of wastewater treatment infrastructure.

#### 3.10.2 Water Supply

Similarly to wastewater, there is currently no water planning for the proposed Broome Road Industrial Area and adjoining airport. An allowance has been allocated in the storage capacity of the existing supply tank, however, the elevation of this tank does not provide sufficient pressure to serve the majority of the site. The existing and proposed water supply tanks are located approximately 1km directly north of the subject site, east of Cape Leveque Road. Therefore, it is necessary to construct a storage tank downstream of the existing supply tanks along with a booster station and new pressure main to the site capable of delivering sufficient pressure.

Existing trunk mains which cross the site would place an unnecessary constraint on subdivision planning for the industrial area and will need to be relocated during development works.

#### 3.10.3 Power

Limited electrical infrastructure is available at the proposed industrial development site. Horizon Power has indicated that there is no spare capacity in the existing 11kV overhead power line along the north side of Broome Road to allocate to the site. Horizon Power has indicated that an electrical load in the order of 16 MVA will require an extension of 33kV feeder cables from the proposed Bilingurr zone substation in Fairway Drive (5km away and proposed to be constructed in 2014) and a new 33kV/11kV zone substation to be built within the site and may require an expansion to the Broome Power Plant.

#### 3.10.4 Drainage

A detailed Local Water Management Strategy (LWMS) is been prepared by JDA Consultant Hydrologists. The LWMS has been developed consistent with the framework and process detailed in the WAPC's Better Urban Water Management guidelines (2008).

The document includes the principles, objectives and requirements of total water cycle management and a detailed description of the environmental conditions of the site. The capacity of the site to sustain development, including consideration of acid sulphate soils, impacts from groundwater and surface water, impacts on ecosystems and biodiversity and impacts on existing infrastructure is also examined.

The LWMS is based around a proposed network of drainage swales located in the road reserves throughout the development. The swales will act as conveyance for major events and as detention and treatment mechanisms for stormwater in minor events.

The LWMS was approved by the Department of Water on 30 April 2012. Implementation of the LWMS will be undertaken through the preparation of a detailed Urban Water Management Plan (UWMP) under relevant conditions of subdivision. The UWMP will be submitted by the developer to the Department of Water and the Shire of Broome as required and will address:

- Stormwater management design including the size, location and design of swales, integrating major flood management capability;
- Landscape plants for the swales as related to stormwater function;
- Details of local geotechnical investigations and their impact on stormwater design;
- Measures to control velocity of stormwater discharge to minimise erosion and sediment transportation;
- Management of groundwater levels, and if any proposed dewatering is necessary;
- Agreed/approved measures to achieve water conservation and efficiencies of use including sources of water for non-potable uses and detailed designs, controls, management and operation of any proposed system;
- Management of sub-divisional works (management of soil/sediment including dust); and
- Implementation plan including monitoring program, roles, responsibilities, funding and maintenance arrangements. Contingency plans should also be indicated where necessary.

### 3.10.5 Telecommunications

Telstra has indicated that there is insufficient capacity in the existing main optic fibre link. Approximately 1400m of optic fibre from Lot 366 Broome Road would need to be extended to provide the provisions of basic Telstra communication services. Additional infrastructure would be required if specific data services were needed.

The recently formed National Broadband Network Company (NBNCo) is currently not in a position to advise how NBNCo will impact on the provision of telecommunications infrastructure at the Broome Road site. It is anticipated that pits and pipes for telecommunications services will be provided by the developer, which is the previous arrangement under Telstra for commercial sites.

### 3.10.6 Gas

WA Gas Networks have advised that there are no reticulated gas services in Broome. However, it is possible to install an LNG vessel storage compound within the industrial area. Presently, bulk gas in the form of LNG is trucked to Broome for use in the power station.

## 3.11 Road Network

The site has a frontage of approximately 3 kilometers to Broome Road, which includes the newly constructed road train assembly area. Broome Road is single carriageway in both directions and according to the most recent traffic count was undertaken by Main Roads WA in March 2009 carried an average of about 2200 vehicles per day in the vicinity of the subject site. Main Roads has indicated a preference to limit the industrial area to two access points to Broome Road.

Cape Leveque Road intersects Broome Road as a T-Junction along the frontage of the subject site. At the moment Cape Leveque Road only carries a small volume of traffic, 250 vehicles per day. Cape Leveque Road is currently unsealed in a number of places, however Main Road are currently investigating options for upgrading this road which may increase the volume of traffic in the future.

There is an ungazetted track that passes through the subject site known as Crab Creek Road. It is an unsealed, single carriageway that currently intersects with Broome Highway 60 metres to the west of the Cape Leveque Road intersection. Broome Road provides access to the Waste Water Treatment



Plant, as well as the Ramsar Wetland at Roebuck Bay and associated bird observatory. As part of the development of the subject site, Crab Creek Road will need to be formalised.

## 3.12 Opportunities and Constraints

In developing the concept design for the precinct, a range of considerations were taken into account to ensure the creation of a precinct that responded to the context and existing and future circumstances. The considerations were as follows:

### 3.12.1 Opportunities

- The subject site is strategically located in terms of freight and logistics. The site area is 8 kilometres north of the Broome Central Business District and only 3 kilometres east of the Broome North development area. It is located with exposure to the primary access road into town, and in close proximity to the future Broome International Airport. Direct access is also provided to the proposed Browse LNG Precinct at James Price Point via Cape Leveque Road to the north of the site. Main Roads are currently planning for the future dualling of Broome Road in the vicinity of the site.
- The site has a large frontage to Broome Road of 3371 metres, and has the ability to safely provide two entrance points into the estate.
- The existing industrial estate at Port Drive is approaching capacity, stimulating the need for an additional industrial estate. Many of the land uses at the existing Port Drive Industrial Estate are not related to the port operations or functions, therefore there is the opportunity for the relocation of these uses away from the port, freeing up sites within the Port Drive facility as well as providing the potential for heavy and noxious industry uses to be relocated away from the town centre.
- The waste water treatment plant is located within close proximity to the site and may offer water reuse opportunities within the industrial estate.
- Nutrients pose a lower risk in terms of impact on the local drainage system in industrial estates due to the minimal fertiliser application compared with an urban or rural use.
- The site is well elevated such that it does not suffer from flooding/inundation. The site slopes with a mild gradient from north-east to south-west, which enables the movement of water through the site, and will require minimal earth works to establish effective building sites.
- The site contains some mature vegetation which could be incorporated into the development.
- The site is located within a precinct with a number of utilities that can operate in harmony with industrial uses.
- The future airport to be constructed adjacent to the subject site provides the opportunity to establish a strong relationship between the future uses within the estate and the operations of the airport. The area on the eastern portion of the site may be developed to assist/support the airside operations of the airport, and directly provide landside services.

### 3.12.2 Constraints

- The geology and climate of the region results in high rainfall and low infiltration rates, meaning that stormwater needs to be directed out of the site. Significant areas of the site will need to be dedicated to drainage infrastructure, resulting in lower development yields as well as the imposition of infrastructure designed to cater for peak flow but will spend most of the year dry.
- The site is not attached to any defined drainage network, and stormwater needs to be discharged into crown land.
- Pre-development stormwater may already flow through to Dampier Creek. The post development impact will need to be appropriately designed to maintain a peak flow no greater than pre-development, and ensure the water quality in terms of gross pollutants (litter) as well

as smaller pollutants (sediment, chemicals, hydrocarbons, heavy metals and bacteria) is managed to a high level.

- The current zone does not allow for any commercial uses to occur within the estate. With an estate of this size, it standard practice to provide a commercial centre within it to support the users of the estate and provide localised amenity. This would include commercial facilities (such as post office, banks, etc) as well as some retail offer (snack bar, general store, etc).
- There is an essential services buffer located over the western portion of the site. This is now redundant, and will be removed by the Shire of Broome as part of their next review of the Scheme (as part of an omnibus amendment to TPS 4 or through the introduction of TPS 5).
- There is a management order over the site in favour of the Water Corporation. This will be extinguished as part of the conversion of the crown land title to freehold.
- Industrial areas can have up to 90% impervious surfaces, compared to 30% to 40% in residential areas, resulting in higher surface runoff rates. In Broome, surface runoff issues are erosion and sedimentation.
- On-site management will need to be enforced through the design guidelines to ensure that liquid chemical waste such as greases, fuel and lubrication are controlled to limit impact on the local drainage system.
- The relocation of the Department of Fisheries' Radio Communication Tower will need to be removed when development encroaches within its zone of influence.
- The future waste management facility may cause issues associated with odour and blown rubbish from uncovered loads.
- The future operation of the airport will require building height limitations to a portion of the site, as well as possible implications due to noise factors.
- The civil infrastructure will need to be expanded to provide the full range of services to the site. The costs are predicted to be considerable to extend the services to the site.
- The site is located on the main road into the Broome town site. Therefore, the treatment of the Broome Road frontage is expected to contribute to the 'gateway', and assist in providing a sense of arrival. There will be a need to balance the need for some business to gain exposure to the main road, with the desire to 'hide' the site behind a dense vegetation buffer.

## 4 Design Development

### 4.1 Introduction

A technical design workshop took place on 22<sup>nd</sup> October 2010, involving the entire project design team:

- Urbis (Planning & Urban Design)
- Cossill & Webley (Civil Engineering)
- UDLA (Landscape Architecture)
- GHD (Environment)
- Yawuru (Land Owner) - with representation from MacroPlan
- LandCorp (Developer)

This workshop developed a number of key themes and investigated various design options to capitalise on the opportunities and attenuate the constraints. From this design session three concept plans were developed to test strengths and weaknesses of the range of the different scenarios.

*Refer Appendix B for Concept Plans.*

On 9 November 2010, a stakeholder design workshop was held in Broome with the above project design team as well as the key stakeholders:

- Department of Planning
- Shire of Broome (Planning and Engineering Departments)
- Main Roads Western Australia

This workshop consisted of two phases. The first was an information sharing presentation from the planning and design, landscape architecture and civil engineering perspective to clearly set out the aim and objectives of the project along with the challenges that need to be overcome. The second phase was a collaborative design session whereby the three options that were developed out of the technical design session were assessed and tested by the group.

#### 4.1.1 Summary of Key Workshop Outcomes

Following the stakeholder design workshop, the following matters were identified as having the greatest importance in the development of the Master Plan.

##### **Treatment of Crab Creek Road**

The Master Plan should be developed in a manner that acknowledged the uses 'down stream' along Crab Creek Road. Crab Creek Road provides access to the future waste treatment facility, the soon to be commissioned waste water treatment plant, Roebuck Bay and fishing area, a Bird Sanctuary as well as various sites of cultural significance to the local Indigenous population. The Broome Bird Observatory attracts a number of visitors per year, and therefore the entrance through the estate should be appropriately designed to reflect the nature of some of the through traffic.

Therefore there is a need to balance the desire for commercial exposure to lots fronting Crab Creek Road with the need to provide the appropriate entry statement into the precincts to the south. Crab Creek Road is not well suited for the development of dual frontage lots.

The road is currently not sealed (4WD access only) and it is anticipated that after realignment it will be bituminised from Broome Road to the wastewater treatment plant.

## Broome Road Interface

Broome Road Industrial Area is strategically located adjacent the future Broome Airport site and signifies the entrance to Broome for all visitors, whether they arrive by road or air. Accordingly there is a need to maintain a significant vegetated buffer along all Broome Road as part of the arrival experience into Broome. The Master Plan needs to establish the desire to control the appearance/visibility of buildings from Broome Road (including associated advertising) as well as the need to control informal access onto Broome Road from individual allotments.

## Drainage

To mitigate any impacts on the surrounding areas (including the Ramsar wetlands), the project team will be working to ensure that the peak flow is within the vicinity of pre-development levels, with a focus on water quality leaving the site. The release of water from the site needs to be managed in a manner does not interfere with the existing ecological systems, replicating the current situation.

Drainage alignments should be provided with road frontage from a maintenance point of view and would assist in the prevention of illegal dumping and antisocial behaviour.

## Road Train Assembly Area

The Yawuru are currently in discussions with Caltex regarding the development of an unmanned fuel depot (1ha site required by Caltex) to develop synergies with road train assembly area. This has the potential to develop into the future with a permanent on site presence and a broader service offering. As part of the long term uses of the site, Main Roads (MRWA) has indicated that the development of the site cannot interfere with the heavy traffic movement associated with the Road Train Assembly Area, particularly if light vehicles are accessing the site.

## Roads

4-way intersections and roundabouts are not desirable, and should be avoided wherever possible. The design should allow for double and triple road trains through the site, whilst ensuring traffic is controlled to acceptable speeds and does not encourage 'rat-running'.

### 4.1.2 Design Refinement

Following the stakeholder design workshop, further discussions were held between LandCorp and Nyamba Buru Yawuru in order to finalise the Master Plan design. The key changes arising through this process were:

- Adding a notation showing the potential Service Centre location being investigated by the Nyamba Buru Yawuru; and
- Ensuring that regular shaped superlots were created to avoid any future land assembly requirement.



## 5 Master Plan

The Master Plan represents the design response that addresses the issues associated with the planning framework as well addressing the design objectives and the physical opportunities and constraints.

*Refer Appendix A for Master Plan.*

### 5.1 Design Principals

A number of broad design objectives were established at the beginning of the process, to guide the overall development of the Master Plan. These objectives are identified below.

#### **Roads and Access**

- Establish two access points from the estate onto Broome Road, realigning Crab Creek Road so the access point is further east.
- Locate access points in a manner that provides significant separation from the Road Train Assembly area and Cape Leveque Road intersection.
- Eliminate 4-way intersections.
- All road reserves designed to 50 metres within the estate to accommodate triple road train movement and drainage. Opportunities to reduce the widths investigated as part of the detailed drainage design at the time of the subdivision application.
- Provide a connection to the airport development to allow for future integration.
- Establish a logical and permeable road network to facilitate ease of access for large vehicles and limit the number of turning movement required to pass through the site.
- Provide a number of dual frontage lots to minimise on site manoeuvring.
- Create an appropriate gateway into the estate at the Crab Creek Road entry, and ensure that its design reflects the different traffic movements which will be using the road.
- Both entries to be created so they provide exposure from the Broome Road and set the theme of the estate as people enter.

#### **Lot Development**

- Larger lots are to be located adjacent the drainage swale to minimise the number of vehicle crossovers.
- Develop lots with vegetation in place to provide sediment control post development.
- Provide visual buffering to the Broome Road by retaining and enhancing the considerable vegetation existing within the road reserve which is to be retained.
- Retain existing vegetation in the south west corner of the site that is in good condition and of the highest value across the site.
- Provide a variety of lot sizes with lot mix distributed throughout the site, whilst still allowing for the clustering similar land uses.
- Located smaller lots (below 2.5 hectares) adjacent to the main entry roads, on the basis that the smaller lots will generate more traffic (have a higher concentration of workers and visitors) and therefore limits the movements throughout the site, and provides opportunities for more attractive buildings to create a unified streetscape.

- Largest lots generally located within the waste management facility buffer and within the air port surface limitation area.
- Design the estate so that the land holdings under different ownership can be developed independently.
- Provide an appropriate site for an electricity substation.

### Drainage

- Roads and drainage corridors are used as prime interface treatment to the public realm.
- Facilitate drainage through the site, and re-establish sheet flow before the water leaves the site and minimise pollutants (hydrocarbons, nutrient, sediment).
- Allotment swales are to be construction at building stage, controlled by design guidelines, to place appropriate responsibility for stormwater and erosion control with the lot owner.
- Develop lots with vegetation in retained to provide sediment control post development.
- Cut-off drains provided at the rear of lots they slope away from the street, to avoid the need of significant earthwork to alter the natural gradient so that it slopes towards the street.

## 5.2 Design Response

The design response is reflected in the Master Plan. The design of the estate has responded to the site opportunities and constraints in a manner that meets the design objectives.

### 5.2.1 Drainage

The need for an effective drainage system was the principle driver for the structure of the estate. The local pindan soils have low infiltration properties and overland drainage including fine sediment distribution is naturally controlled by broad low velocity sheet flows and existing vegetation. Soil stabilisation is also controlled by the low velocity sheet flows and established vegetation. Therefore the sites drainage design has reflected the natural site gradient and makes use of existing drainage movement, to minimise the extent of bulk earthworks and the removal of site vegetation. Drainage will be developed in a manner that minimises/eliminates the use of concrete channels, instead creating a more natural appearance – particularly during the dry season.

The drainage system is provided by a network of open drains that retard flows to slow the velocity of water and ensure that the peak flows of stormwater drainage do not significantly increase. This network is made up of a hierarchy of swales including the main swale within the road reserve, lot detention basins at the front of lots and the interlot swales that run north/south along the rear boundary of the lots. The lots will be generally at grade, with the vegetation retained on site, except where earth working is required to direct flows or for geotechnical reasons.

Lots will be required to detain the 1yr 1hr stormwater runoff within each lot. Stormwater runoff generated by the lots in excess of the 1yr 1hr and impervious areas of the road reserve will be collected in the swales system. All stormwater swales and storage areas are proposed to be ephemeral and no open water body lakes are proposed, consistent with the DoW's current policy.

The primary stormwater system conveyance pathway is via a southern drainage swale along the southern corridor of the site into the south west corner drainage basin. The basin consists of 15 outlets which will distribute stormwater evenly overland to mimic pre-development sheet flow from the Study Area. In addition to this basin, there will be two stormwater outlets to the north-west and south-east.

### 5.2.2 Lot layout

The lots are provided in a manner that responds to anticipated demand, and seeks to provide for a high degree of flexibility to ensure the uses can adapt and change over time. A range of lots have been provided, from 200,000 m<sup>2</sup> down to 6,000 m<sup>2</sup>, disbursed throughout the estate to enable a mix of lots to be provide as part of each stage of development.

### 5.2.3 Land use

The estate will provide for general industrial uses, in accordance with the zoning table in the Shire of Broome's planning scheme. There is currently no allowance for a commercial precinct, however, if in the future it is determined that a service centre is required, then a rezoning application will be provided at that point in time.

No residential uses are permitted under the Shire of Broome's TPS 4. There may be a need to provide occasional accommodation for the transport uses to ensure that the truck drivers can meet their mandatory requirement for breaks, however this is not to be an a regular basis in the form of a care taker or the alike. Uses such as tea rooms may be provided for security personnel or other similar services that operate out of standard business house, however they must not be provided in a manner that constitutes on-site accommodation.

### 5.2.4 Traffic

The design allows for a highly permeable and logical road network, providing a range of route options. The two entrance points onto Broome Road provide access into the estate, and the two strong east-west linkages provide permeability. The road design has been design to facilitate logical and effective staging. The design allows for the development of the estate in stages (including stages undertaken by the separate land owners) in a manner the does not require cal-de-sacs as an interim measure.

The estate has been designed to provide significant spacing between the access points and limit the incidence of four-way intersections. All roads will be trafficable by vehicles up to and including triple road trains, with heavy vehicles estimated to make up nearly 40% of total vehicle traffic within the estate (3% being road-trains). Traffic along Crab Creek Road will be a mixture of heavy vehicles and tourist traffic, and therefore the number of intersections along Crab Creek Road has been minimised and priority given to through traffic.

Crab Creek Road is proposed to be re-aligned, with the full movement intersection onto Broome Road shifting to eastern end of the estate. A new full movement intersection will be established 300 metres to the west of the Cape Leveque Road intersection, providing sufficient separation distance from Cape Leveque Road and the bend in the Broome Road.

Traffic modelling has been completed for the estate using a 24-hour typical weekday model. Intersections analysis identifies that both intersections will operate effectively whilst Broome Road is in its current configuration of single carriageway. It is predicted that some queues and delays are expected for the right turn traffic out of the western access intersection, but the level of queues and delays are not considered problematic.

The intersection analysis has also been undertaken for the scenario where Broome Road is duplicated to become a median separated dual carriageway. According to information received from Main Roads WA, duplication of Broome Road is being considered, however, it is a long term plan and highly unlikely to occur within the next 15 years. In this scenario, the western intersection would become congested for right turning movements as the estate reaches maturity. As a result, planning for the future duplication of Broome Road should allow for an intersection treatment such as a roundabout at this western access intersection. The eastern access intersection is expected to operate satisfactorily in this longer term scenario but should be monitored to determine future intersection requirements

### 5.2.5 Earthworks

Earthworks will be limited in the construction phase, with only the road and associated drainage infrastructure being established in as part of the creation of the lots. Future owners will undertake clearing and site preparation inline with their specific needs. On this basis it is hoped that a significant proportion of the existing vegetation can be retained, particular large established trees.

### 5.2.6 Buffers

The site is impacted by a buffer to the proposed waste management facility and generally industrial uses will not be affected by this buffer. Notwithstanding, the larger lots have been provided on these sites, as they are more likely to have less intensive uses, greater possibility of odour creating operations, longer operating hours, lower levels of staff on site, and fewer visitors.

Land uses within the obstacle limitation surface need to be controlled in terms of height and uses, to ensure that it does not cause any interference to the operations of the airport.

### 5.2.7 Open Space

No formal public open space has been provided within the estate for active recreation. Public open space of this nature is not generally required for industrial subdivision and it was determined that the nature of the proposed land uses, proposed lot sizes, potential worker numbers and local climatic conditions did not warrant the provision of any dedicated public open space. A significant portion of quality remnant vegetation will be retained within the south-western corner of the site. This area has a significant drainage (improvement of run off) function.

The design has sought to create linear open space through the creation of well vegetated drainage swales in a manner which will enable significant landscape corridors that will offer opportunities for shaded dual use paths and environmental cultural interpretation to improve the overall amenity of the estate.

### 5.2.8 Landscape Design

#### Philosophy

The landscape design shall consider the sites existing physical and cultural landscape in order to create a development that maintains a local 'sense of place'. This site specific design will acknowledge the Yawuru as the traditional owners of this land and develop a dialogue with the local community to gain a greater understanding of the site and nearby significant Roebuck Bay Ramsar Wetlands and appropriate methods for retaining the existing Broome environmental and cultural 'lifestyle'.

An approach to reflect 'country' and culture within the development can be achieved through the selection of materials and landscape themes within the design of streetscapes, open spaces and drainage swales. Therefore, existing remnant vegetation shall be retained and supplemented with local plant species where possible.

Please note it is the project teams' intention to supplement existing vegetation with a more bio diverse range of indigenous plant species. Due to site disturbance and constant fires biodiversity in this area is recognised as being depleted.

As discussed within the drainage section of this master plan report landscaping of drainage corridors are essential as part of site stabilisation, sediment and nutrient control.

#### Site topsoil

Site stock piled top soil is an important component of the revegetation process as it includes an endemic seed bank vital to maintain local seed pool biodiversity within the development area. This top soil will be used in the vegetated swales as a growing medium for existing seeds and supplementary planting.

Topsoil must be carefully protected where possible or otherwise removed, stored (according to best practice) and re-used where appropriate. Topsoil removed during construction is to be stockpiled for a short period only and reused on site.

### **Site mulch**

Mulch created onsite during the construction phases especially within the drainage and road corridors shall be stored (according to best practice) and re-used where appropriate. As with top soil, site mulch is a precious commodity as it also contains a local seed pool and is used for swale stabilisation and revegetation.

### **Planting**

Endemic plants showcase the unique landscape of the Northwest Region and act as a unique attraction. Use of local vegetation within a streetscape setting provides an opportunity to display unique flora and fauna, aiding in creating a 'sense of place' and fostering community pride.

The vegetated drainage swales will help to filter water runoff from the lots, stabilise the pindan and act as attractive features and ecological corridors for the site. Where the vegetated drainage line connects back to the street, the trees will provide shade amenity for the pedestrian and visually soften the development.

Re-vegetated swales are less prone to erosion, encourage further retardation of the drainage system and provide greater opportunities for further sediment and weed control.

A local plant palette will introduce a more bio diverse range, support the local landscape industry, reflecting a local sense of place and enable water wise outcomes that are adapted to local conditions and as a consequence requires little ongoing maintenance.

Trees will be planted as the predominant stock. Vital ground cover species such as Spinifex will germinate from stockpiled site soil and mulch.

### **Entry Statement**

It is proposed that an entry statement is placed at the intersection of Broome Rd and the realigned Crab Creek Rd to not only indicate the entry of the industrial area but also create a sense that reflects the sites broader environmental and cultural context. Crab Creek Rd extends south to the Roebuck Bay Ramsar wetlands which is culturally and internationally recognised ecological feature and the entry feature should recognise the close proximity to such a significant place. The signage will be designed in collaboration with the Yawuru traditional owners who hold extensive knowledge and stories about the site.

*Refer Appendix C for Landscape Concept Plan.*

## 6 Implementation and Staging

### 6.1 Implementation and Staging (LandCorp's Proposed Landholdings)

It is proposed that the development of LandCorp's land within the estate will occur in six stages. The staging may be further broken up or accelerated, dependant upon market demand.

**TABLE 4 – STAGING SUMMARY**

	Number of Lots	Gross stage area	Developable Area <sup>1</sup>
<b>Stage 1</b>	24	81.4 ha	46.9 ha
<b>Stage 2a</b>	10	16.9 ha	10.6 ha
<b>Stage 2b</b>	12	24.8 ha	17.0 ha
<b>Stage 3a</b>	10	22.4 ha	15.9 ha
<b>Stage 3b</b>	12	34.6 ha	23.9 ha
<b>Stage 4a</b>	21	67.6 ha	50.2 ha
<b>Stage 4b</b>	1	2.20 ha	1.9 ha
<b>Stage 5a</b>	19	33.5 ha	23.1 ha
<b>Stage 5b</b>	6	9.9 ha	8.3 ha
<b>Stage 6a</b>	2	6.6 ha	4.1 ha
<b>Stage 6b</b>	3	11.3 ha	7.6 ha
<b>Stage 6c</b>	2	13.8 ha	10.3 ha
<b>TOTAL</b>	<b>122</b>	<b>325 ha</b>	<b>219.8 ha</b>

<sup>1</sup> Interlot Drainage and Fibre Optic easements not included.

Staging of the development of the estate has been proposed to ensure an adequate provision of industrial land and to achieve the desired form and function of the estate in a rational manner that assists with the efficient provision of civil infrastructure and enables the drainage system to operate in a functional manner. Each stage provides a range of lot sizes to ensure a variety is brought to the market over the life of the estate.

Stage 1 of the development creates the western entry road into the estate and includes the establishment of the main open space area along the western boundary. It stage will also include the relocation of the water main through the site, and the creation of the allotment for the power sub-station.

Construction for development will need to be staged in order to maintain access through the site along the existing alignment of Crab Creek Road. The existing Crab Creek Road alignment will remain operational to provide continued unconstrained access to the Waste Water treatment Plan and other land uses further to the south during the early stages of development. The new alignment of Crab Creek Road does not need to occur until it has been constructed as part of the development of stage 4a.

Changing market conditions and land supply considerations may alter the proposed staging.

*Refer Appendix D for Staging Plan.*

## 7 Conclusion

This Master Plan has outlined the details and rationale of the proposed Broome Road Industrial Area. LandCorp's proposed landholdings within this estate will provide for 122 lots over an area of 320 hectares. The estate will meet the medium and long term needs of industrial development in Broome and assist in the wider economic activity that is occurring within the Kimberley and the State as a whole.

The Master Plan sets out a framework that is structured to respond to:

- The statutory requirements of the Shire of Broome and WAPC;
- The local site conditions;
- The need of current and future industry lot and land requirements;
- Immediate and long term access requirements; and
- A coordinated staging plan that will respond to construction timeframes and lot demand.

This new estate will allow for the relocation of currently undesirable industrial activity from the town and enhance the ability of Broome to respond to increased economic activity.







# Appendix A      Master Plan





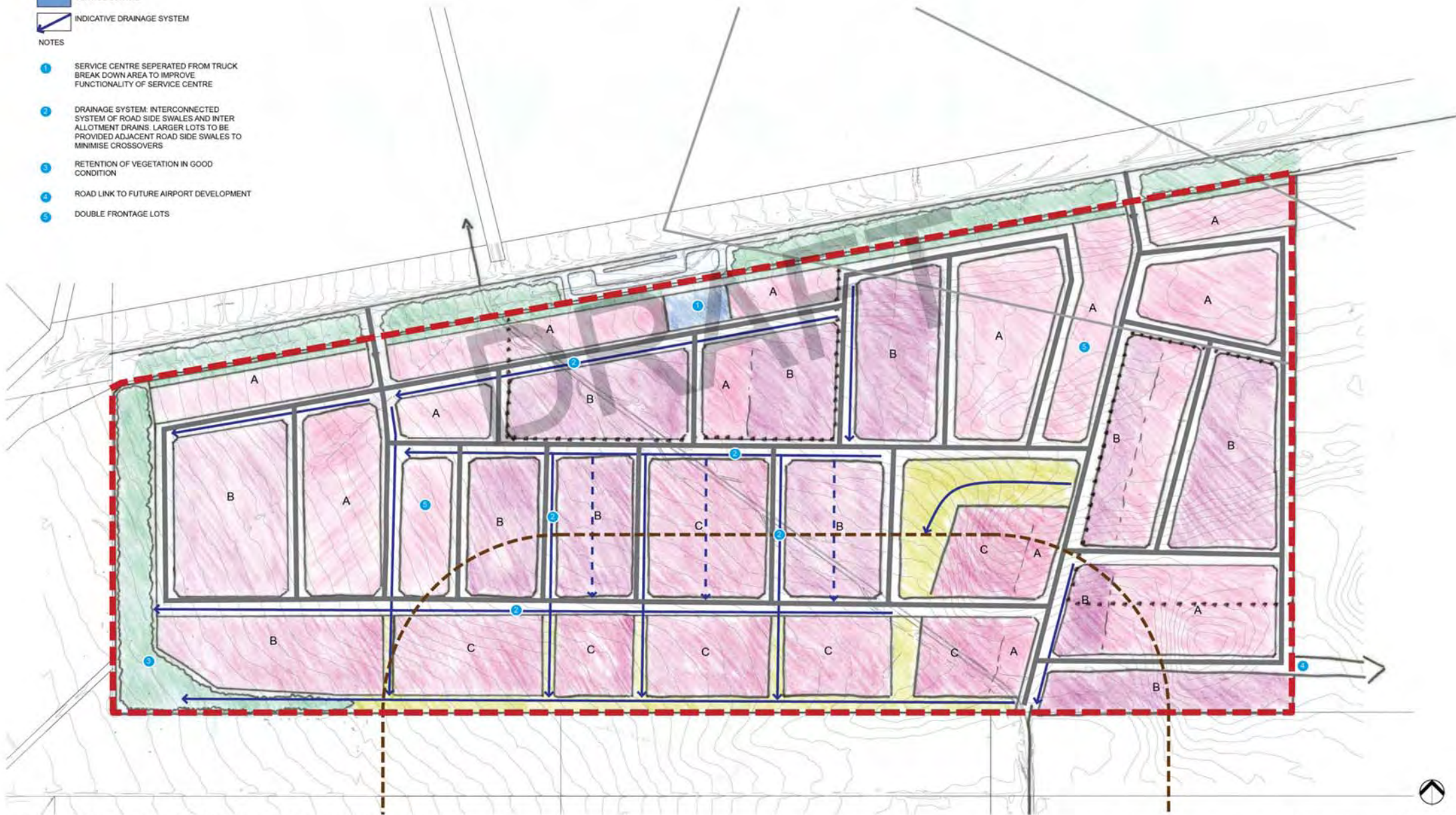
# Appendix B      Concept Drawings

**LEGEND**

-  BROOME ROAD INDUSTRIAL AREA
-  A LOTS < 2.5 HECTARES
-  B LOTS 2.5 HECTARES - 5 HECTARES
-  C LOTS > 5 HECTARES
-  SERVICE CENTRE
-  INDICATIVE DRAINAGE SYSTEM

**NOTES**

-  SERVICE CENTRE SEPERATED FROM TRUCK BREAK DOWN AREA TO IMPROVE FUNCTIONALITY OF SERVICE CENTRE
-  DRAINAGE SYSTEM: INTERCONNECTED SYSTEM OF ROAD SIDE SWALES AND INTER ALLOTMENT DRAINS. LARGER LOTS TO BE PROVIDED ADJACENT ROAD SIDE SWALES TO MINIMISE CROSSOVERS
-  RETENTION OF VEGETATION IN GOOD CONDITION
-  ROAD LINK TO FUTURE AIRPORT DEVELOPMENT
-  DOUBLE FRONTAGE LOTS



**PRELIMINARY DESIGN CONCEPT OPTION 1**

BROOME ROAD INDUSTRIAL AREA

DATE 01.11.2010

DWG NO 001

REV x

SCALE 1:5000 @ A1

Level 1, 55 St Georges Terrace,  
Perth, WA 6000 Australia







Tel +618 9346 0500  
Fax +618 9221 1779

info@urbis.com.au  
www.urbis.com.au






Urbis Pty Ltd ABN 50 105 256 288  
Australia, Asia, Middle East

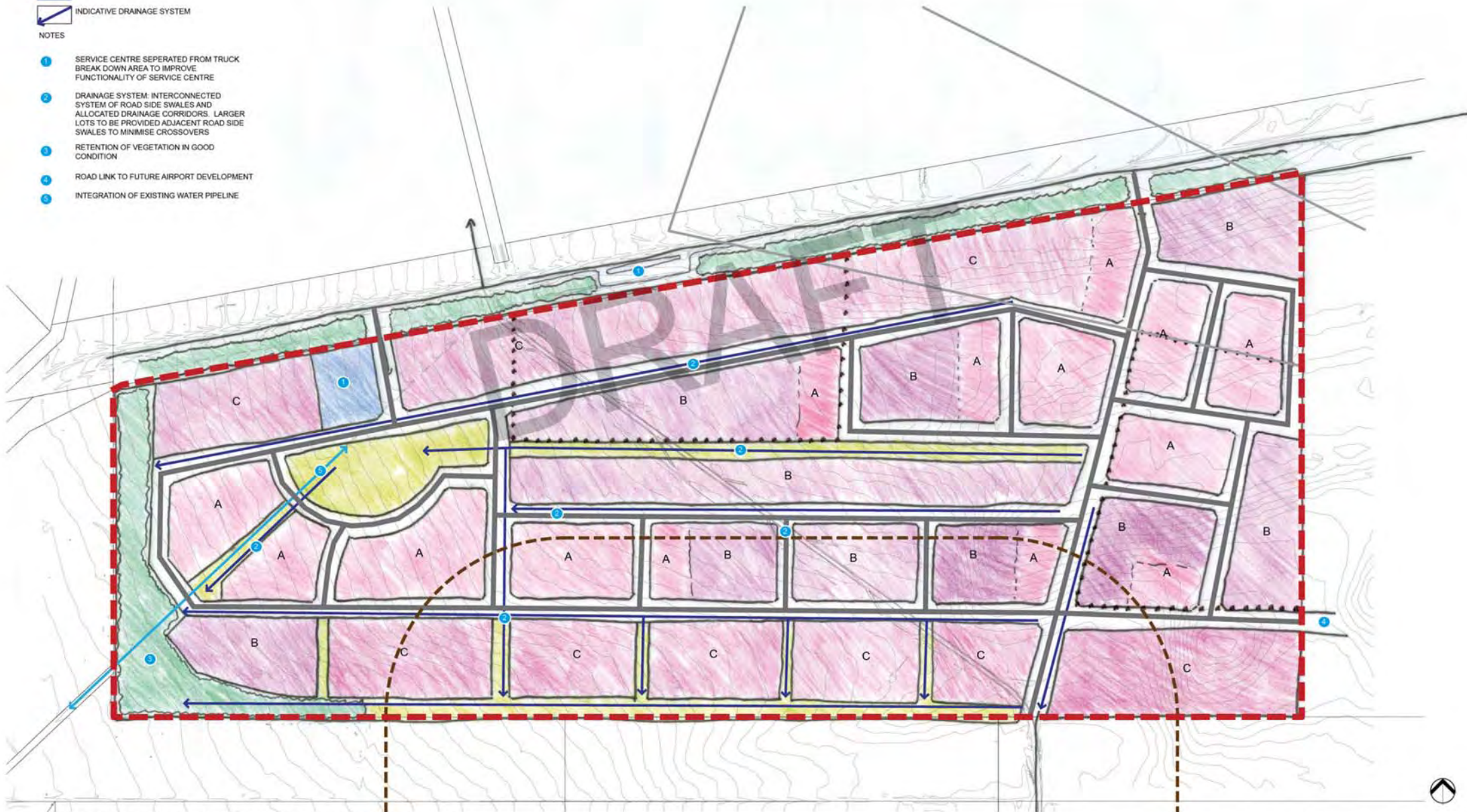


**LEGEND**

-  BROOME ROAD INDUSTRIAL AREA
-  A LOTS < 2.5 HECTARES
-  B LOTS 2.5 HECTARES - 5 HECTARES
-  C LOTS > 5 HECTARES
-  SERVICE CENTRE
-  INDICATIVE DRAINAGE SYSTEM

**NOTES**

-  SERVICE CENTRE SEPERATED FROM TRUCK BREAK DOWN AREA TO IMPROVE FUNCTIONALITY OF SERVICE CENTRE
-  DRAINAGE SYSTEM: INTERCONNECTED SYSTEM OF ROAD SIDE SWALES AND ALLOCATED DRAINAGE CORRIDORS. LARGER LOTS TO BE PROVIDED ADJACENT ROAD SIDE SWALES TO MINIMISE CROSSOVERS
-  RETENTION OF VEGETATION IN GOOD CONDITION
-  ROAD LINK TO FUTURE AIRPORT DEVELOPMENT
-  INTEGRATION OF EXISTING WATER PIPELINE



**PRELIMINARY DESIGN CONCEPT OPTION 2**

BROOME ROAD INDUSTRIAL AREA

DATE 01.11.2010

DWG NO 002

REV x

SCALE 1:5000@A1

Level 1, 55 St Georges Tce,  
Perth, WA 6000 Australia







Tel +618 9346 0500  
Fax +618 9221 1779

info@urbis.com.au  
www.urbis.com.au

Urbis Pty Ltd ABN 50 105 256 288  
Australia . Asia . Middle East

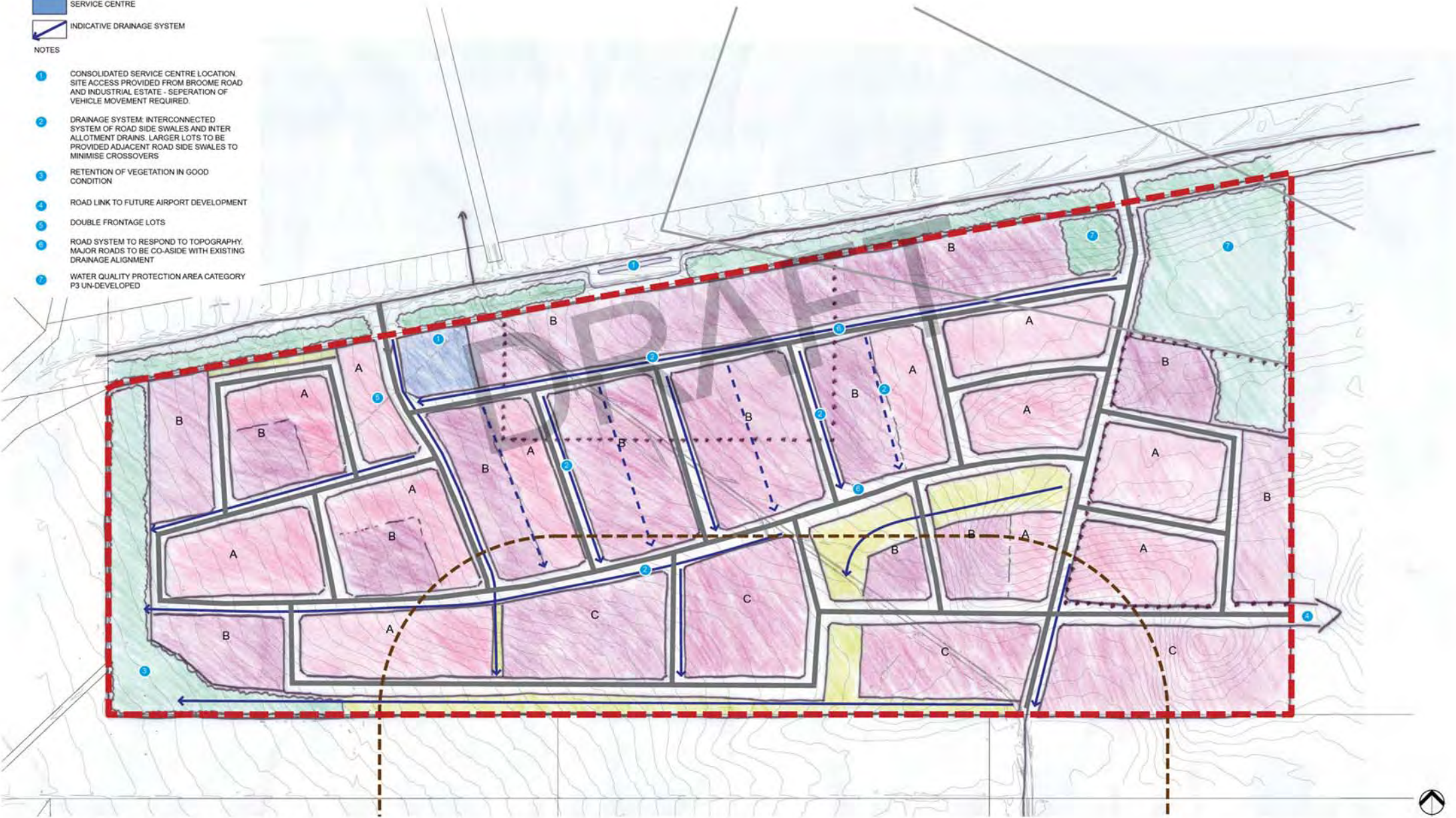


**LEGEND**

-  BROOME ROAD INDUSTRIAL AREA
-  A LOTS < 2.5 HECTARES
-  B LOTS 2.5 HECTARES - 5 HECTARES
-  C LOTS > 5 HECTARES
-  SERVICE CENTRE
-  INDICATIVE DRAINAGE SYSTEM

**NOTES**

- 1 CONSOLIDATED SERVICE CENTRE LOCATION. SITE ACCESS PROVIDED FROM BROOME ROAD AND INDUSTRIAL ESTATE - SEPERATION OF VEHICLE MOVEMENT REQUIRED.
- 2 DRAINAGE SYSTEM: INTERCONNECTED SYSTEM OF ROAD SIDE SWALES AND INTER ALLOTMENT DRAINS. LARGER LOTS TO BE PROVIDED ADJACENT ROAD SIDE SWALES TO MINIMISE CROSSOVERS
- 3 RETENTION OF VEGETATION IN GOOD CONDITION
- 4 ROAD LINK TO FUTURE AIRPORT DEVELOPMENT
- 5 DOUBLE FRONTAGE LOTS
- 6 ROAD SYSTEM TO RESPOND TO TOPOGRAPHY. MAJOR ROADS TO BE CO-ASIDE WITH EXISTING DRAINAGE ALIGNMENT
- 7 WATER QUALITY PROTECTION AREA CATEGORY P3 UN-DEVELOPED



**PRELIMINARY DESIGN CONCEPT OPTION 3**

BROOME ROAD INDUSTRIAL AREA

DATE 01.11.2010

DWG NO 003

REV x

SCALE 1:5000 @ A1

Level 1, 55 St Georges Terrace,  
Perth, WA 6000 Australia

Tel +618 9346 0500  
Fax +618 9221 1779

info@urbis.com.au  
www.urbis.com.au

Urbis Pty Ltd ABN 50 105 256 288  
Australia . Asia . Middle East











# Appendix C      Landscape Concept Plan






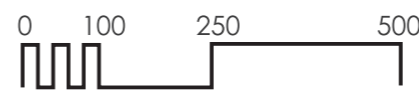
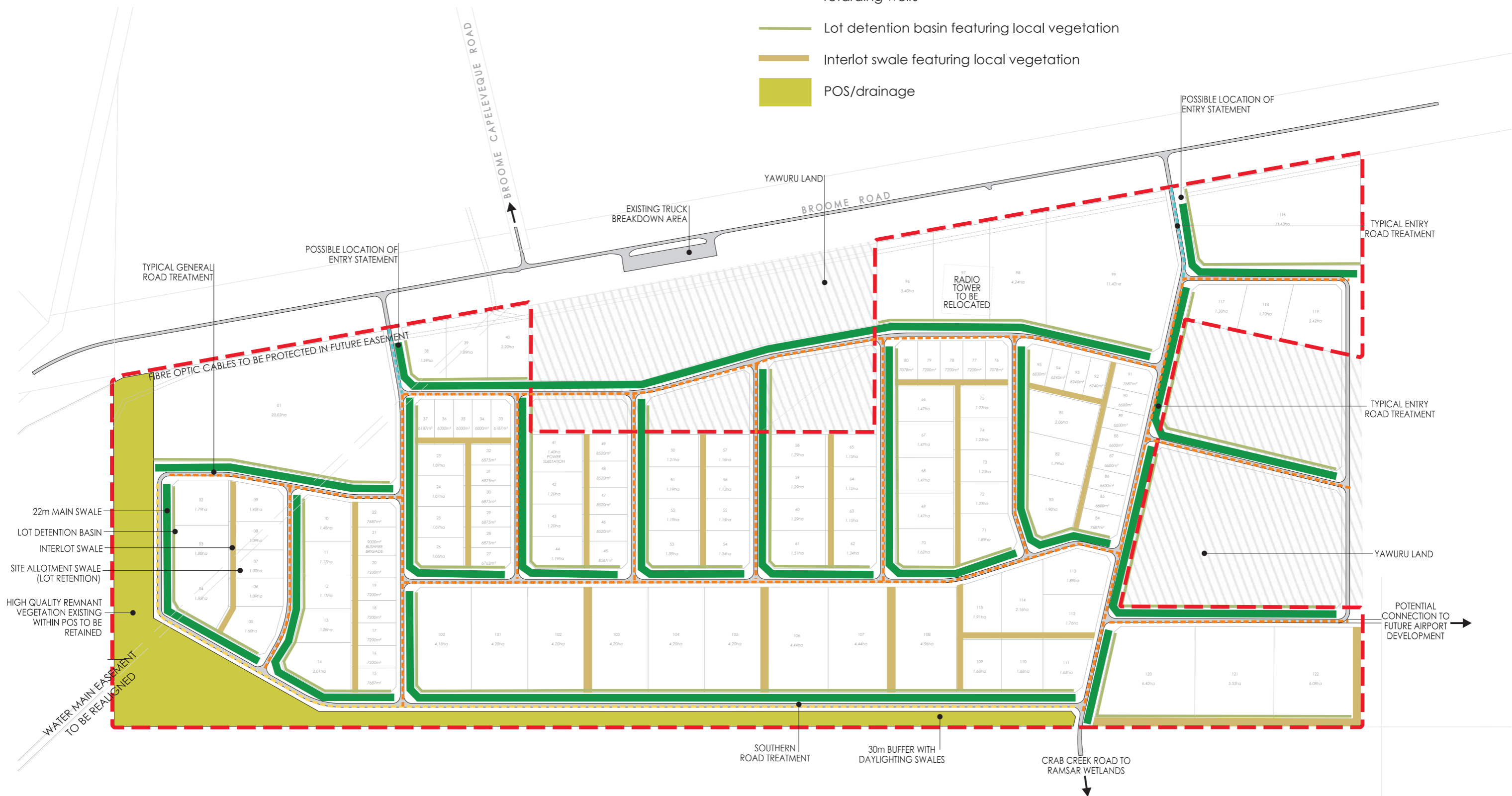


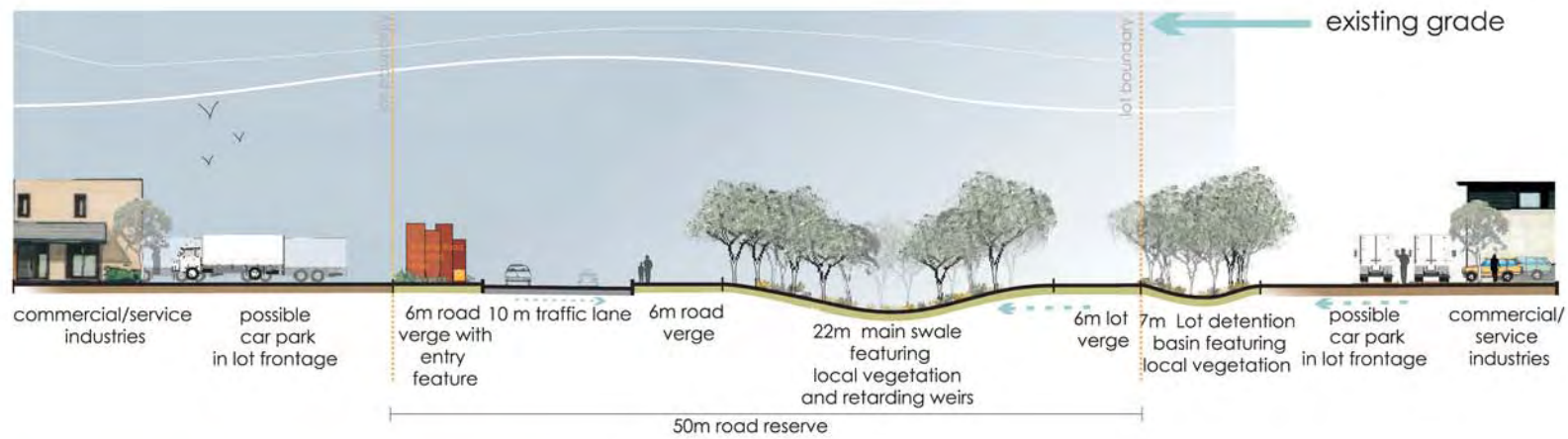
LEGEND

-  Site boundary
-  Yawuru land
-  Main swale featuring local vegetation and retarding weirs
-  Lot detention basin featuring local vegetation
-  Interlot swale featuring local vegetation
-  POS/drainage

Typical Road Treatments

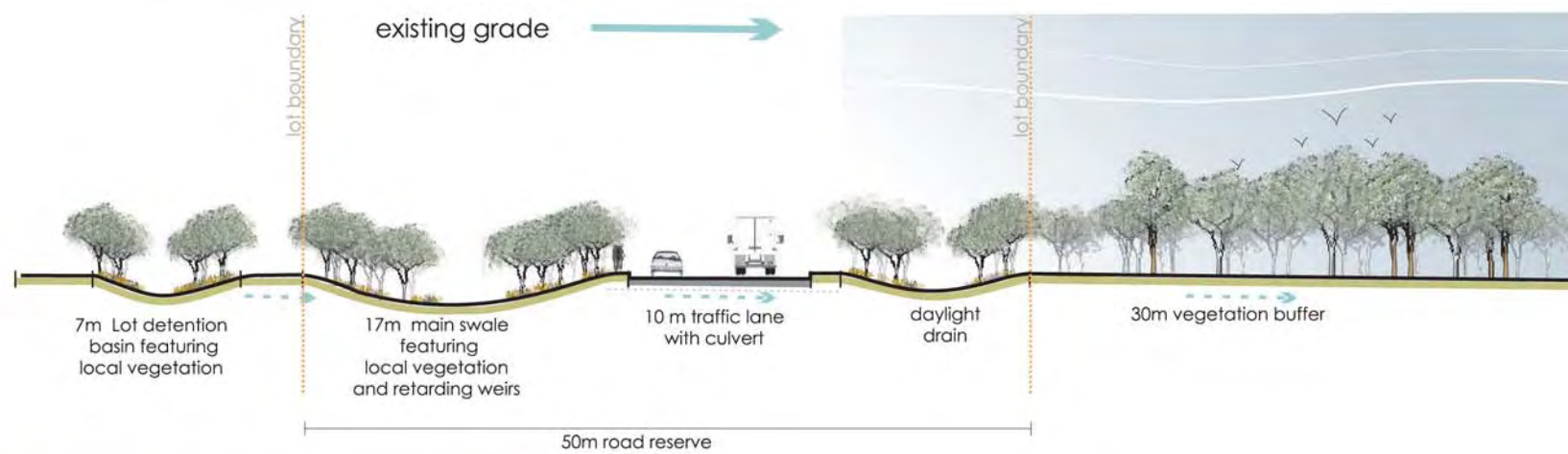
-  A - Entry road
-  B - Southern road
-  C - General road





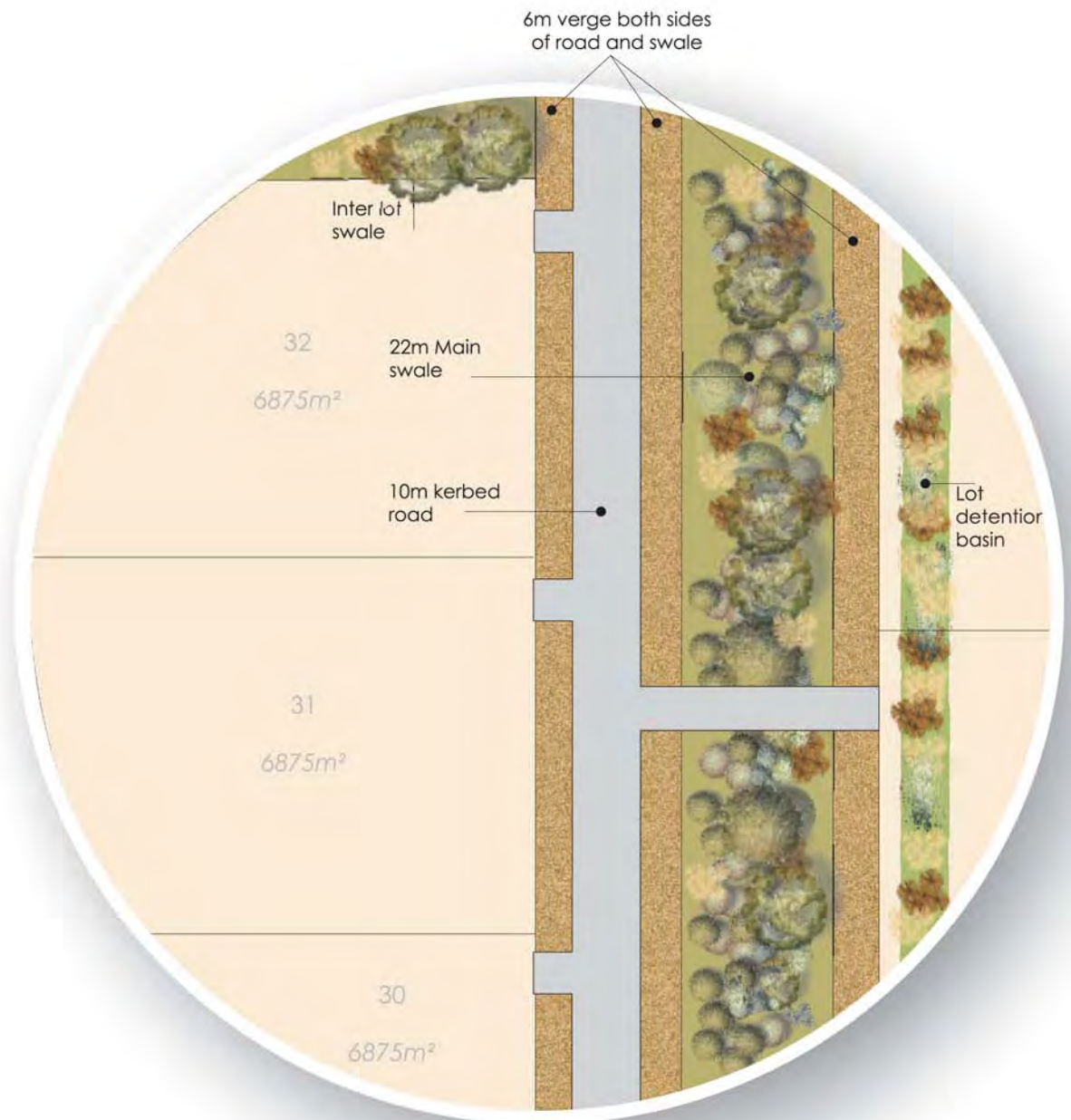
**A** Typical Entry Road with Entry Statements

Scale 1:500

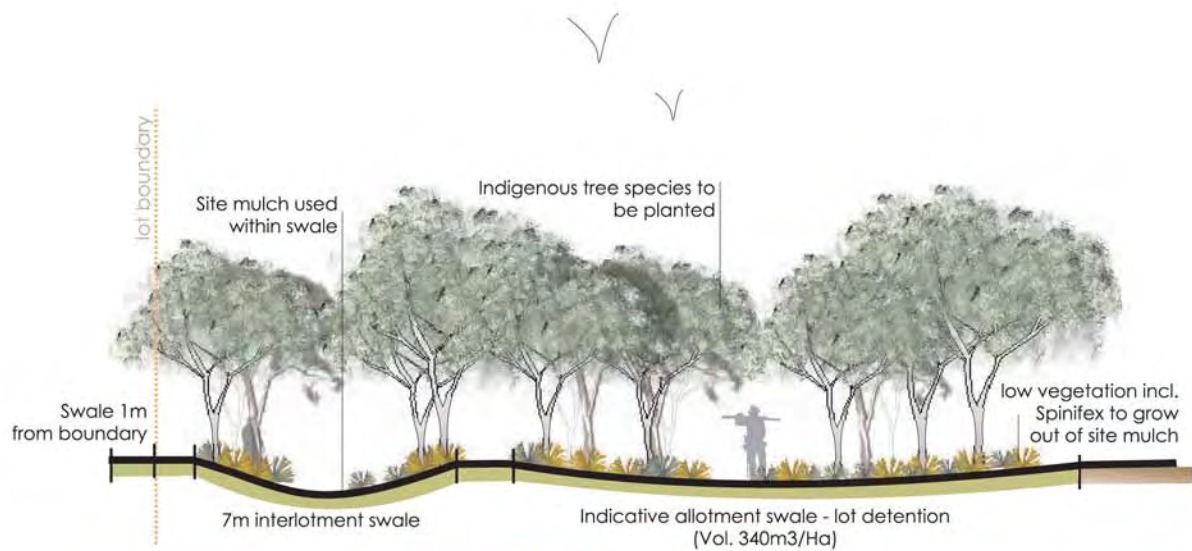


**B** Typical Southern Road Section Showing 30m Buffer

Scale 1:500



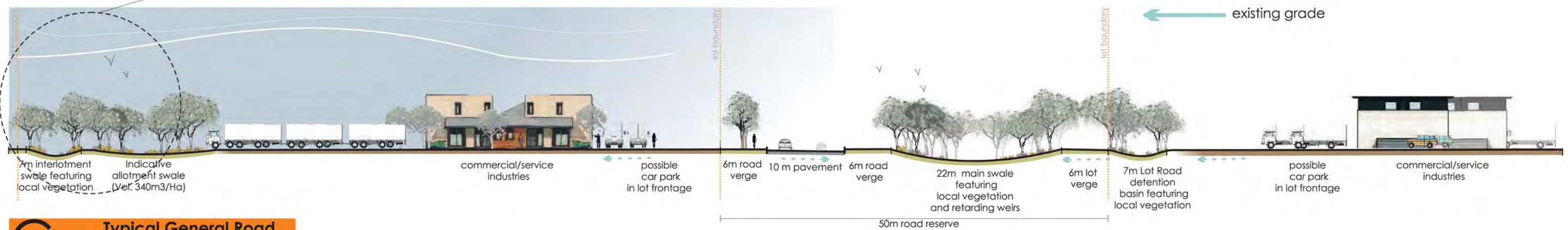
Typical Road Detail  
Road reserve = 50m  
Scale 1:1000



**Interlotment swale detail**  
Scale 1:200



**Typical swale example, Januburu Broome**



**Typical General Road Section Between Lots**  
Scale 1:500



# Broome Road Industrial Area Indicative Planting Palette

---

## TREES



**Corymbia dampieri**  
**Biilal**  
**Dampier's Bloodwood**

Height 11m  
Spread 8m



**Melaleuca dealbata**  
**Garnboorr**  
**Freshwater paperbark**

Height 8m  
Spread 8m



**Corymbia flavescens**  
**Gunurru**  
**White Gum**

Height 8m  
Spread 8m



**Terminalia petiolaris**  
**Marool**  
**Blackberry tree**

Height 8m  
Spread 8m



**Ficus opposita**  
**Wgamarnajina**  
**Sandpaper fig**

Height 8m  
Spread 8m



**Planchonia careya**  
**Mangaloo**

Tree or Shrub  
Height 1-5m



**Gyrocarpus americanus**  
**Mirda**  
**Stinkwood**

Height 8m  
Spread 8m



**Eucalyptus phoenicia**  
**Scarlet Gum**

Tree or mallee  
Height 4-12m



**Hakea macrocarpa**  
**Jarridiny**

Height 8m  
Spread 8m



**Acacia platycarpa**  
**Pindan Wattle**

Tree or Shrub  
Height 1.5-6m



**Lysiphyllum cunninghami**  
**Jigal**  
**Kimberley bauhinia**

Height 8m  
Spread 8m

---

## LARGE SHRUBS



**Acacia eripoda**  
**Yirragulu**  
**Broome Pindan wattle**  
Height 3m  
Spread 3m



**Dodonaea platyptera**  
**Alarrgarr**  
**Hopbush**  
Erect shrub or tree  
Height 1-6m



**Acacia monticola**  
**Warraka**  
**Scratchy wattle**  
Height 4m  
Spread 3m



**Crotonia cunninghamii**  
**Minmin**  
**Green birdflower tree**  
Height 2m  
Spread 0.5 - 1.5m



**Pandanus spiralis**  
**Common Screw pine**  
Tree-like monocot  
Height 5m



**Flueggea virosa**  
**Goowal**  
**Snowball bush**  
Height 2.5m  
Spread 2.5m

## MEDIUM SHRUBS



**Acacia bivenosa**  
**Nirliyangarr**  
**Dune wattle**  
Height 2m  
Spread 2m



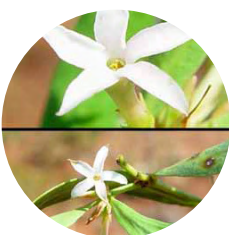
**Acacia hippuroides**  
**Balalagoord**  
Height 0.3-1.6m  
Spread Spreading shrub



**Acacia translucens**  
**Balalagoord**  
**Poverty Bush**  
Height 2m  
Spread 2m



**Acacia tumida**  
**Wongai**  
**Pindan Wattle**  
Open spreading or slender  
shrub or tree  
Height 7m



**Carissa lanceolata**  
**Gungkarra**  
**Conkerberry**  
Height 2m  
Spread 2m

---

## SMALL SHRUBS



**Trioda sp.**  
**Spinifex**

Height 0.3m  
Spread 0.8m



**Eucalyptus microtheca**  
**Coolibah**

Form tree  
Height 5-10m  
Bark rough, box type  
Flowers white. Dec-Feb



**Canavalia rosea**  
**Windi**

**Beach bean**  
Height 0.5m  
Spread 0.5m



**Terminalia petiolaris**  
**Marool, Blackberry tree**

Form semi-deciduous tree  
Height 4-14m  
Bark fissured, dark brown to black  
Flowers cream, white. Feb-May/  
Dec



**Acacia adoxa**  
**Prostrate Acacia**

Height 0.3m  
Spread 0.8m



**Terminalia petiolaris x**  
**Terminalia ferdinandiana**

**Red Gubinge**

Form tree  
Height 10m  
Bark rough bark  
Foliage Green



**Dodonaea lanceolata**  
**(Guradid)**

**Pirrungu**  
Height 1-3m  
Spread -



**Corymbia paractia**  
**Cable Beach Ghost Gum**

Form tree, often several stemmed  
Height 4-6m  
Bark Smooth White shedding in thin scales.  
Flowers white in clusters along leafless stems Apr-May/Oct-Dec

## STREET TREES



**Corymbia flavescens**  
**Wrinkle-leaf Ghost Gum**

Form tree  
Height 3-15m  
Bark Smooth, white, shedding in thin scales  
Flowers white, cream. Apr-Jun/Nov



**Corymbia ptychocarpa**  
**Swamp Bloodwood**

Form tree  
Height 4.5 - 18(-20)m  
Bark rough, tessellated  
Flowers Pink. Feb-May





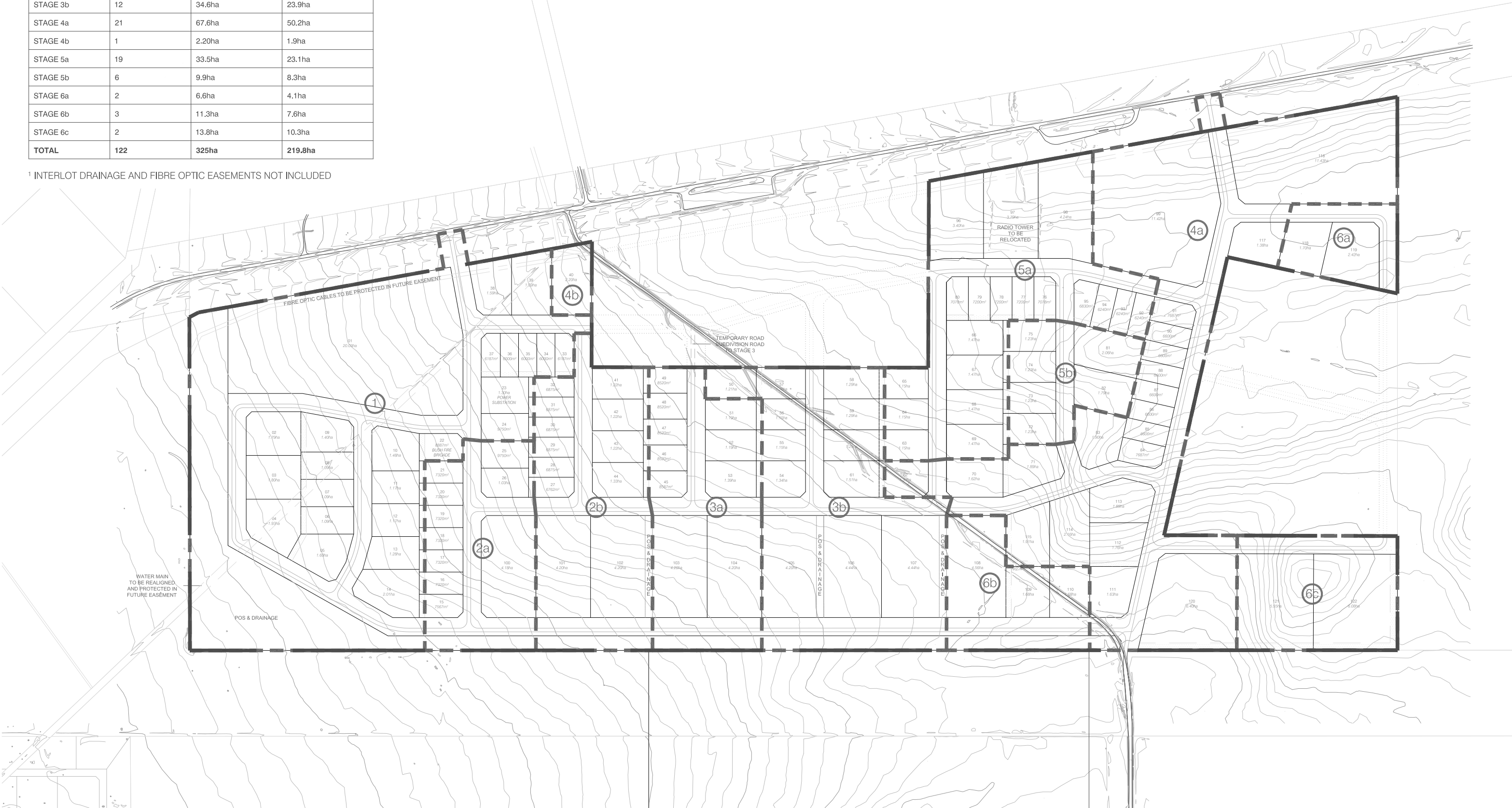
# Appendix D      Staging Plan



KEY  
 APPLICATION AREA  
 INTERLOT DRAINAGE

STAGE BREAKDOWN			
	LOTS	GROSS STAGE AREA	DEVELOPABLE AREA <sup>1</sup>
STAGE 1	24	81.4ha	46.9ha
STAGE 2a	10	16.9ha	10.6ha
STAGE 2b	12	24.8ha	17.0ha
STAGE 3a	10	22.4ha	15.9ha
STAGE 3b	12	34.6ha	23.9ha
STAGE 4a	21	67.6ha	50.2ha
STAGE 4b	1	2.20ha	1.9ha
STAGE 5a	19	33.5ha	23.1ha
STAGE 5b	6	9.9ha	8.3ha
STAGE 6a	2	6.6ha	4.1ha
STAGE 6b	3	11.3ha	7.6ha
STAGE 6c	2	13.8ha	10.3ha
<b>TOTAL</b>	<b>122</b>	<b>325ha</b>	<b>219.8ha</b>

<sup>1</sup> INTERLOT DRAINAGE AND FIBRE OPTIC EASEMENTS NOT INCLUDED



**DRAFT STAGING PLAN**  
**BROOME ROAD INDUSTRIAL AREA**



Date 16/02/11

DWG NO STG001 REV -

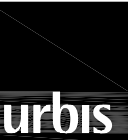
SCALE 1:5000@A1

Level 1, 55 St Georges Terrace  
 Perth WA 6000 Australia

Tel +618 9346 0500  
 Fax +618 9221 1779

info@urbis.com.au  
 www.urbis.com.au

Urbis Pty Ltd ABN 50 105 256 228  
 Australia, Asia, Middle East







#### Sydney

Level 21, 321 Kent Street  
Sydney, NSW 2000  
Tel: +61 2 8233 9900  
Fax: +61 2 8233 9966

#### Brisbane

Level 7, 123 Albert Street  
Brisbane, QLD 4000  
Tel: +61 7 3007 3800  
Fax: +61 7 3007 3811

#### Melbourne

Level 12, 120 Collins Street  
Melbourne, VIC 3000  
Tel: +61 3 8663 4888  
Fax: +61 3 8663 4999

#### Perth

Level 1, 55 St Georges Terrace  
Perth, WA 6000  
Tel: +61 8 9346 0500  
Fax: +61 8 9221 1779

Australia · Asia · Middle East  
[www.urbis.com.au](http://www.urbis.com.au)  
[info@urbis.com.au](mailto:info@urbis.com.au)