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**WOODSIDE ENERGY LTD**  
**JAMES PRICE POINT: LIGHT INDUSTRIAL AREA, WORKERS'**  
**ACCOMMODATION CAMP AND SOUTHERN PIPELINE**  
**VEGETATION AND FLORA SURVEY**

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**REV 4 OCTOBER 2012**

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## ACRONYMS

<b>ARRP Act</b>	<i>Agriculture and Related Resources Protection Act 1976</i>
<b>BoM</b>	Bureau of Meteorology
<b>DAF</b>	Department of Agriculture and Food
<b>DEC</b>	Department of Environment and Conservation
<b>DEFL</b>	The DEC's Threatened (Declared Rare) Flora Database
<b>SEWPaC</b>	Department of Sustainability, Environment, Water, Population and Communities
<b>DRF</b>	Declared Rare Flora
<b>ESA</b>	Environmentally Sensitive Area
<b>EPA</b>	Environmental Protection Authority
<b>EP Act</b>	<i>Environmental Protection Act 1986</i>
<b>EPBC Act</b>	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
<b>IBRA</b>	Interim Biogeographic Regionalisation for Australia
<b>LIA</b>	Light Industrial Area
<b>LNG</b>	Liquefied Natural Gas
<b>NEAT</b>	North East Access Track
<b>NVIS</b>	National Vegetation Information System
<b>PEC</b>	Priority Ecological Community
<b>Project Area</b>	Area encompassing all three of the survey areas; Light Industrial Area, Workers' Accommodation Camp and Southern Pipeline
<b>SAC</b>	Species Accumulation Curve
<b>SP</b>	Southern Pipeline
<b>Survey Area</b>	An individual component of the Project area. One of the Light Industrial Area, Workers' Accommodation Camp and Southern Pipeline
<b>TEC</b>	Threatened Ecological Community
<b>TM</b>	Thematic Mapper
<b>WAC</b>	Workers' Accommodation Camp
<b>WC Act</b>	Wildlife Conservation Act 1950

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## EXECUTIVE SUMMARY

Woodside Energy Ltd (Woodside), as operator of the proposed Browse LNG Development, plans to commercialise the Browse Joint Venture's three gas and condensate fields, Brecknock, Calliance and Torosa, located 425 km north of Broome off the Kimberley coast. Gas and Liquids from these fields will be extracted using offshore facilities then brought to an onshore Liquefied Natural Gas (LNG) plant for processing at the Western Australian Government's planned Browse LNG Precinct, near James Price Point, about 60 km north of Broome. The Department of State Development, as the precinct proponent, is conducting a strategic assessment of the area. A draft Strategic Assessment Report (SAR) has been released for the BLNG Precinct that includes commitments in relation to factors such as vegetation of medium to high conservation value (Department of State Development 2010). The LNG Precinct is proposed to include a Light Industrial Area (LIA), Workers' Accommodation Camp (WAC) and Southern Pipeline (SP).

*ecologia* Environment (*ecologia*) was commissioned by Woodside via Sinclair Knight Merz (SKM)/Consolidated Environmental Services (CES) Partnership to undertake a Level 2 flora and vegetation assessment for the LIA, WAC and SP survey areas. A targeted search for *Pittosporum moluccanum* (Priority 4) within the Monsoon Vine Thicket-Evergreen vegetation community was also commissioned.

A Level 2, single phase survey was undertaken to increase the knowledge of the survey areas. The survey combined the following methodological approaches.

1. Background research: to gather background information of the footprint of the survey areas (i.e. search of literature, data and map based information).
2. Detailed survey: to enhance the level of knowledge of the flora and vegetation at the local scale and its local context or significance.

A quadrat-based vegetation flora survey of the survey areas was completed between the 10<sup>th</sup> to 15<sup>th</sup> April and 27<sup>th</sup> April to the 8<sup>th</sup> May 2011. Seventy-two person days were expended.

## VEGETATION

Five vegetation types were recorded within the survey areas and include the monsoon vine thicket-evergreen, drainage basin, open forest, open woodland and pindan shrubland. Within the WAC and LIA only pindan shrubland was recorded, whereas all five were recorded within the SP. A description of each vegetation type is provided below.

### 1. Monsoon Vine Thicket-Evergreen

Isolated clumps of low trees of *Celtis philippensis*, *Diospyros humilis*, *Mimusops elengi* and *Sersalisia sericea* over tall shrubs of *Acacia monticola*, *Bridelia tomentosa*, *Exocarpos latifolius*, *Glycosmis macrophylla*, *G. trifoliata* and *Grewia breviflora* over vines including *Abrus precatorius*, *Caesalpinia major*, *Capparis lasiantha* and the invasive *Passiflora foetida* var. *hispida* with isolated tussock grasses of *Aristida holathera*, *Enneapogon caeruleus* and *Cymbopogon procerus*.

### 2. Drainage Basin

Low woodland of *Lophostemon grandiflorus* subsp. *grandiflorus* (P3), *Corymbia bella* over tall-mid shrubs of *Acacia coleii*, *Ehretia saligna*, *Hakea macrocarpa*, *Santalum lanceolatum* and *Senna costata* over mid-low shrubs of *Solanum cunninghamii*, *Croton habrophyllus* and *Bridelia tomentosa* with

dense grasses of *Aristida holathera* var. *holathera*, *Cymbopogon procerus* and *Setaria apiculata* and vines *Abrus precatorius*, *Passiflora foetida* var. *hispida* and *Tinospora smilacina*.

### 3. Open Forest

Open forest of *Eucalyptus miniata* and *Corymbia dampieri* over variably dense understorey of Acacias including *A. eriopoda*, *A. monticola*, *A. tumida*, and *A. platycarpa* and *Grevillea pyramidalis*, over low shrubs of *A. hippuroides*, *Dodonaea hispidula* var. *arida* and *Gossypium rotundifolium* over grasses of *Aristida holathera* var. *holathera*, *Sorghum plumosum* and *Triodia schinzii*.

### 4. Open Woodland

Open woodland with mid-low trees of *Eucalyptus miniata*, *E. jensenii* or *Corymbia polycarpa* over tall shrubs of *Acacia monticola*, *A. tumida*, *A. eriopoda*, *A. platycarpa* over *Bridelia tomentosa*, *Corchorus sidoides*, *Dodonaea hispidula* var. *arida*, *Microstachys chamaelea* and *Waltheria indica* over grasses *Aristida contorta*, *Cymbopogon procerus*, and vines *Cassytha filiformis*, *Passiflora foetida* var. *hispida*.

### 5. Pindan Shrubland

Scattered mid-low trees of *Corymbia dampieri* and *C. zygomphylla* over tall mixed *Acacia* species (commonly *A. eriopoda* and *A. tumida*) over shrubs of *Carissa lanceolata*, *Dodonaea hispidula*, *Trichodesma zeylanicum*, *Acacia adoxa*, *Gossypium australe* and *Waltheria indica* over grasses *Triodia schinzii*, *Chrysopogon pallidus*, *Aristida holathera* var. *holathera* and *Eriachne obtusa*.

One state-listed Threatened Ecological Community (TEC), Monsoon Vine Thicket (known to occur in Evergreen and Deciduous forms in the area), occurs within the boundaries of the SP survey area. The distribution of these vine thickets has been extensively mapped on the Dampier Peninsula using Landsat Thematic Mapper imagery. It is estimated that there are at least 830 hectares within the northern region of the peninsula (CSIRO 2010). The total area of the Monsoon Vine Thicket that occurs within the SP survey boundary is estimated to be 161 ha.

## FLORA

A total of 217 flora taxa were recorded in the survey areas. This number includes flora taxa from 57 families and 139 genera. Species accumulation curve analysis indicated that 97.4 % of the flora taxa estimated to be present in the survey areas were recorded.

Three Priority species were recorded: *Eriachne* sp. Dampier Peninsula (K.F. Kenneally 5946) (P3), recorded at 12 locations; *Lophostemon grandiflorus* subsp. *grandiflorus* (P3) recorded at one location) and *Pittosporum moluccanum* (P4), recorded at 11 locations. *Eriachne* sp. Dampier Peninsula (K.F. Kenneally 5946) appears to be scattered widely within the LIA and WAC areas and is probably relatively widespread in pindan vegetation in broader areas surrounding the survey sites and possibly further. Additional surveys by Woodside (in prep.) support this finding. *Lophostemon grandiflorus* subsp. *grandiflorus* was recorded in a single location by *ecologia* and two locations by Biota in 2009. These were all located in the drainage basin within the SP.

*Ecologia* conducted a targeted search for *Pittosporum moluccanum* (P4) in the evergreen vine thicket within the SP area. Despite the intensity of the targeted survey, the density of vegetation within the Monsoon Vine Thicket-Evergreen is such that additional records probably remain undetected within this area. Woodside has undertaken subsequent targeted priority flora assessments around this area although the results are not currently available to this report. However, it appears that the species is not abundant and generally occurs as isolated plants.

# 1 INTRODUCTION

## 1.1 PROJECT OVERVIEW

Woodside, as operator of the proposed Browse LNG Development, plans to commercialise the Browse Joint Venture's three gas and condensate fields, Brecknock, Calliance and Torosa, located 425 km north of Broome off the Kimberley coast. Gas and Liquids from these fields will be extracted using offshore facilities then brought to an onshore Liquefied Natural gas (LNG) plant for processing at the Western Australian Government's planned Browse LNG Precinct, near James Price Point, about 60 km north of Broome. The Department of State Development, as the precinct proponent, is conducting a strategic assessment of the area. A draft Strategic Assessment Report (SAR) has been released for the BLNG Precinct that includes commitments in relation to factors such as vegetation of medium to high conservation value (Department of State Development 2010).

*ecologia* Environment (*ecologia*) was commissioned by Woodside via Sinclair Knight Merz (SKM)/Consolidated Environmental Services (CES) Partnership to undertake baseline studies for vertebrate fauna, Short Range Endemic (SRE) invertebrate fauna and flora within the BLNG development area (approximately 42 km<sup>2</sup>) (Figure 1.1). This report comprises the results of the flora and vegetation studies for the survey area. The study was comprised the following three survey areas:

- Light Industrial Area (LIA);
- Workers' Accommodation Camp (WAC); and
- Southern Pipeline (SP) area.

The WAC is rectangular in shape and covers an area 20.6 km<sup>2</sup> aligned on a NEE-SSW bearing. This area is located approximately 1 km from the coast. The LIA is located north of the WAC and is almost rectangular in shape with the SW corner truncated. The LIA is 9.7 km<sup>2</sup> in area and approximately 1.5 km from the coast. The SP is a longitudinal polygon that runs along 5km of coastline between James Price Point and Quandong Point and encompasses an area of 11.5 km<sup>2</sup>.

The survey area provided to *ecologia* and referred to as the Southern Pipeline (SP) in this study represents a larger area than the currently approved disturbance footprint for the Southern Pipeline option of the BLNG Development. This report assesses the flora and vegetation of this larger area and further impact evaluation within the reduced disturbance footprint will occur as part of the relevant environmental referral documentation to be developed by Woodside.

## 1.2 LEGISLATIVE FRAMEWORK

The *Environmental Protection Act 1986* is "an Act to provide for an Environmental Protection Authority, for the prevention, control and abatement of environmental pollution, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing." Section 4a of this Act outlines five principles that are required to be addressed to ensure that the objectives of the Act are addressed. Three of these principles are relevant to native flora:

- *The Precautionary Principle*

Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

- *The Principles of Intergenerational Equity*

The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

- *The Principle of the Conservation of Biological Diversity and Ecological Integrity*

Conservation of biological diversity and ecological integrity should be a fundamental consideration.

Native flora in Western Australia that is formally recognised as rare, threatened with extinction, or as having high conservation value is protected at a federal level under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and at a state level under the *Wildlife Conservation Act 1950* (WC Act).

The EPBC Act was developed to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance, to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources, and to promote the conservation of biodiversity. The EPBC Act includes provisions to protect native species (and in particular to prevent the extinction and promote the recovery of threatened species). In addition to the principles outlined in Section 4a of the EPBC Act, Section 3a of the EPBC Act includes a principle of ecologically sustainable development dictating that decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations. Schedule 1 of the EPBC Act contains a list of species that are considered Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable and Conservation Dependent. Definitions of categories relevant to flora occurring or potentially occurring in the survey area are provided in Appendix E.

The Western Australia *Wildlife Conservation Act 1950* (WC Act) was developed to provide for the conservation and protection of wildlife in Western Australia. Under Section 14 of this Act, all native flora within Western Australia is protected; however, the Minister may, via a notice published in the *Government Gazette*, declare a list of flora identified as rare, likely to become extinct, or otherwise in need of special protection (Appendix E). The current listing was gazetted in August 2010.

### 1.3 SURVEY OBJECTIVES

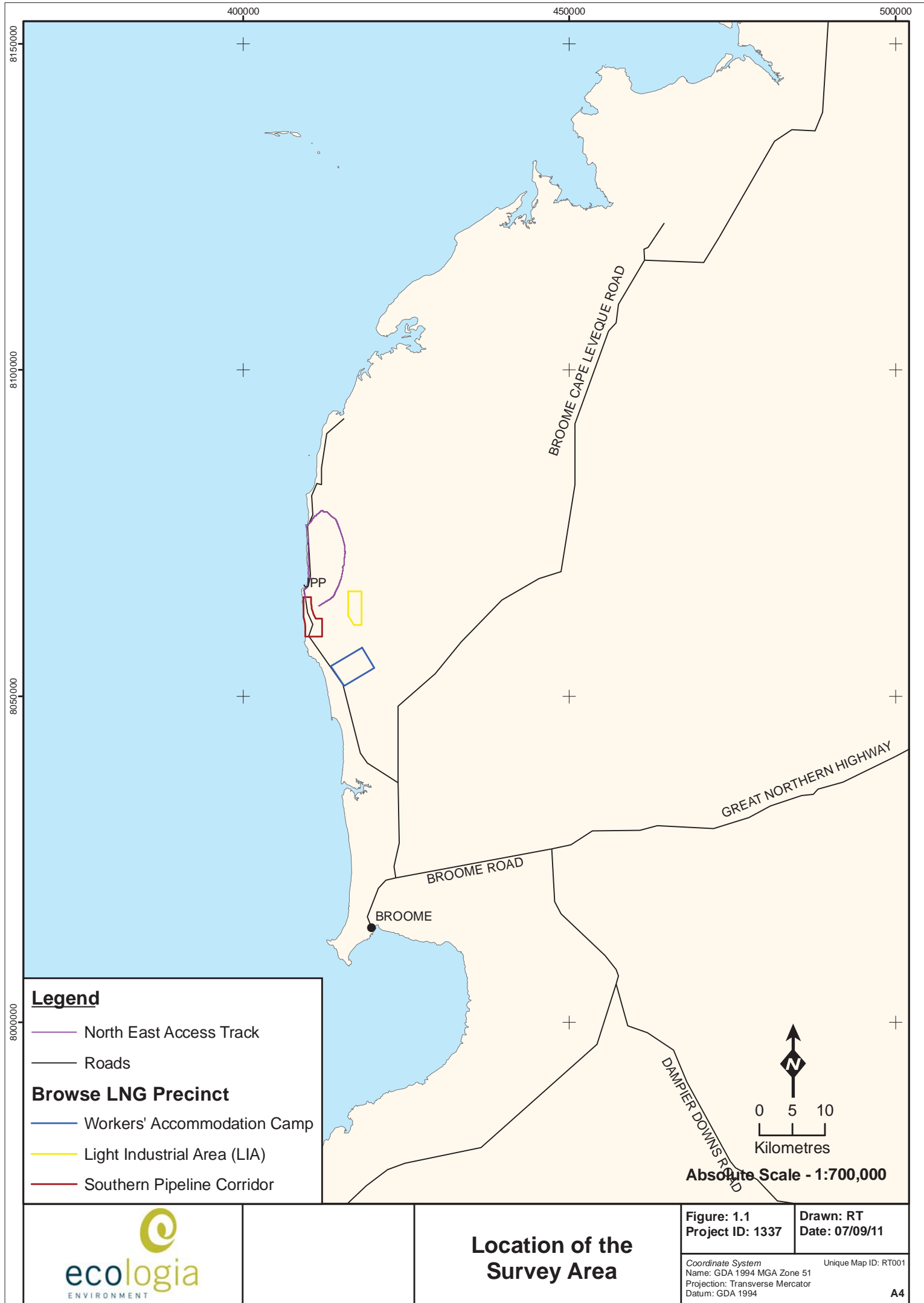
The EPA's objectives with regard to the management of native flora and vegetation are to:

- Avoid adverse impacts on biological diversity comprising the different plants and animals and the ecosystems they form, at the levels of genetic, species and ecosystem diversity.
- Maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.
- Protect Threatened Flora consistent with the provisions of the WC Act.
- Protect other flora species of conservation significance.

The primary objective of biological surveys is to provide sufficient information to the EPA to assess the impact of the development on the vegetation, flora and fauna of the Survey area, thereby ensuring that the EPA objectives will be upheld.

Specifically, this survey was to satisfy the requirements documented in the EPA's Guidance Statement 51 and Position Statement No. 3, thus providing:

- A review of background information (including literature and database searches).
- An inventory of vegetation types and flora species occurring in the Survey area (WA, LIA and SP) incorporating recent published and unpublished records.
- An inventory of species of biological and conservation significance recorded or likely to occur within the Project area and surrounds.
- A map and detailed description of vegetation types occurring in the Survey area.
- An appraisal of the current knowledge base for the area, including a review of previous surveys conducted in the area relevant to the current study.
- A review of regional and biogeographical significance, including the conservation status of species recorded in the Survey Area.





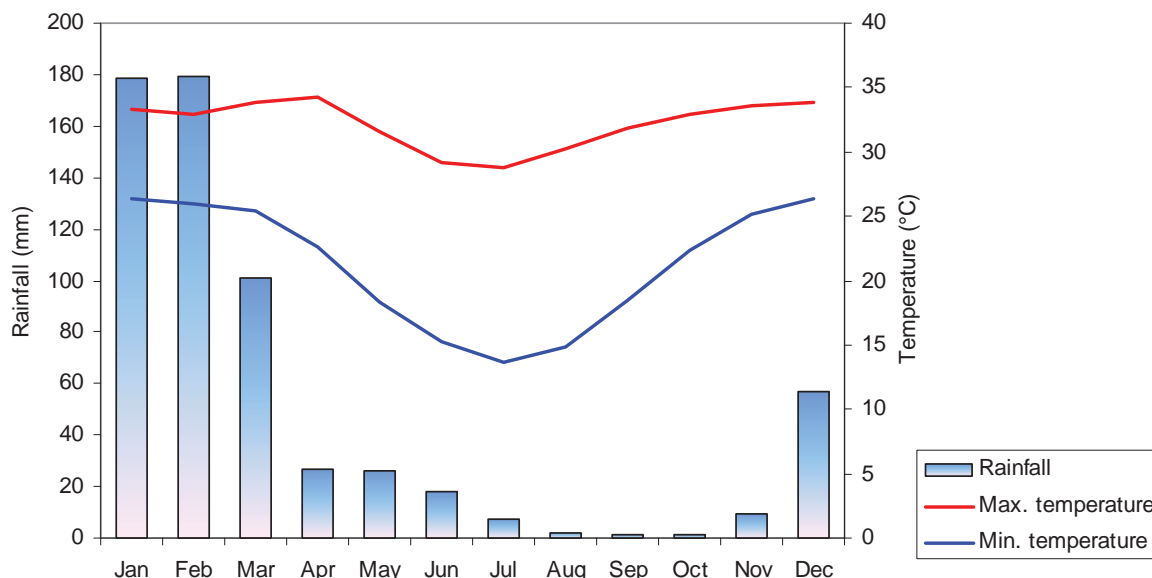
## 2 BIOPHYSICAL ENVIRONMENT

### 2.1 CLIMATE

The Project area is situated in the Kimberley region of Western Australia at the south-west edge of the Dampier Peninsula. The area has a dry, hot, tropical climate with two distinct seasons: the 'wet' from around December to March, and the 'dry' for the rest of the year. Rainfall is highly variable in the region due to the inconsistent nature of the movement and occurrence of thunderstorms and tropical systems. Tropical cyclones can occur as late as April, but are most common in January and February. Rainfall during the cooler months is usually associated with cloud bands originating from tropical waters to the north-west (BoM 2011). The average temperature over summer is over 33°C, with warm overnight minima of around 26°C (BoM 2011). Winter temperatures are quite mild, with average maximum and minimum temperatures in July being 26.9°C and 12.0°C respectively (BoM 2011).

The closest Bureau of Meteorology (BoM) weather station to the survey area is Broome Airport, located 51.8 km south of the Project area. This station was selected as a reference to provide the best indication of the local climatic conditions of the Project area (Figure 2.1).

The mean annual rainfall for Broome is 607 mm, although this can be quite variable with over 75% of the annual rainfall usually falling between January and March (BoM 2011). The mean number of rainfall days ( $\geq 1$  mm) a year is only 35.1. Generally, the wettest month is February, with a mean of 179.1 mm falling over an average of 9.1 rainfall days. In terms of temperature, the hottest month is April and the coldest is July, with means of 34.3°C and 28.8°C respectively (Figure 2.1).



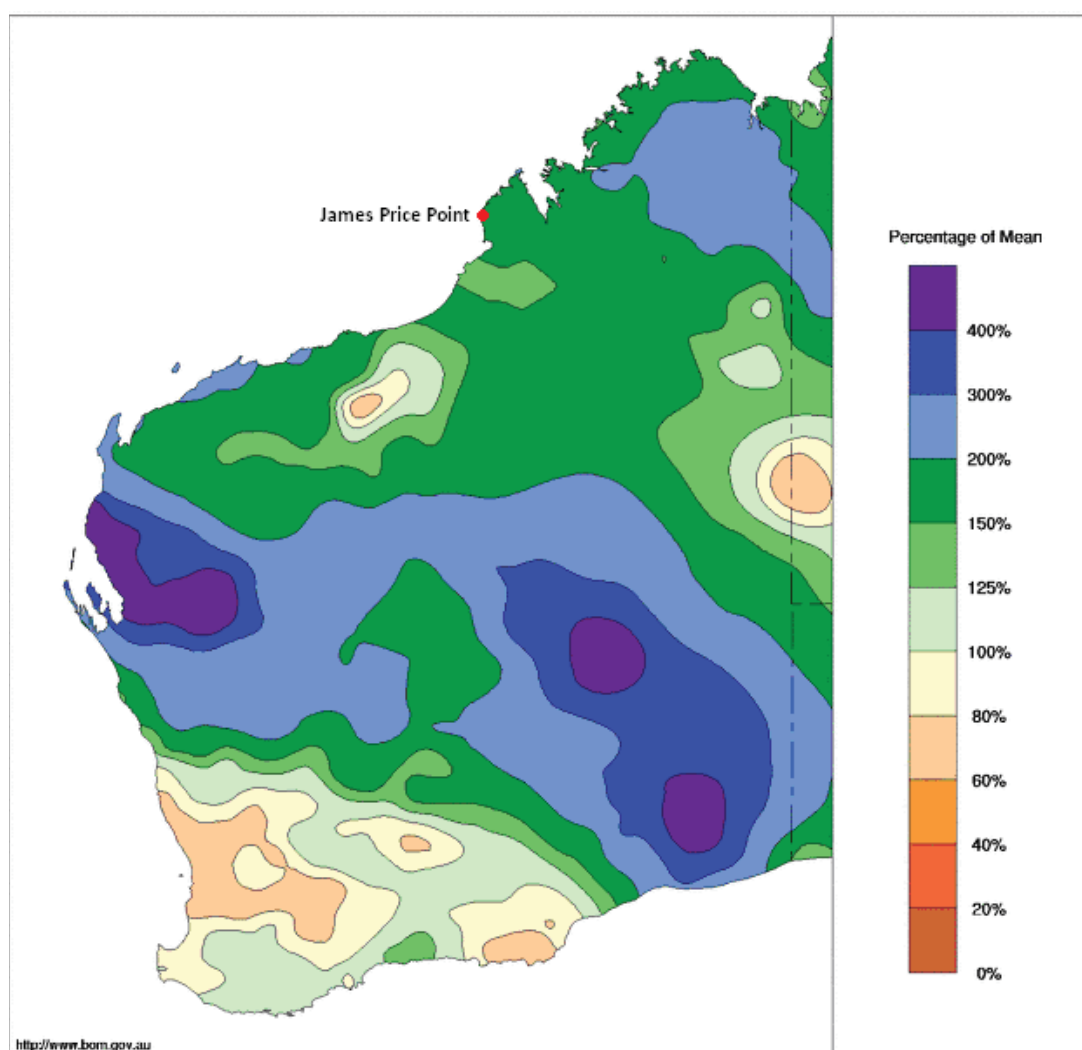
**Figure 2.1 – Climatic summary data at Broome Airport from 1939-2011(BoM 2011).**

Table 2.1 shows that rainfall at Broome Airport in the 2009 wet season (December 2008 – March 2009) was close to average. The 2010 wet season was extremely low, although the annual rainfall was somewhat made up by a large rainfall event in July. In contrast, the 2011 wet season had much higher rainfall than average due to the three tropical cyclones which occurred in the Kimberley region over this period. Figure 2.1 shows the effect these cyclones had on rainfall in Western Australia in

the six months prior to the surveys, with the Kimberley region receiving 150-300% of their typical rainfall.

**Table 2.1 – Rainfall preceding the survey (Broome Airport Records) (BoM 2011).**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
<b>Total Monthly Rainfall (mm)</b>													
<b>2009</b>	180.6	203.4	76.8	0	5.6	6.2	1	0.6	0	0.6	46.2	179.4	700.4
<b>2010</b>	140	6.4	31	71.6	26.4	0	110.8	1.8	4.4	7.8	57.8	85.8	543.8
<b>2011</b>	449.2	275	87.2	18.6	0.4								
<b>Mean Monthly Rainfall (mm)</b>													
<b>1939 - 2011</b>	178.5	179.1	100.8	26.7	26.4	18	7.4	1.7	1.4	1.4	9.1	56.8	607



**Figure 2.2 – Rainfall during the six months prior to the 31<sup>st</sup> May 2011 (BoM 2011).**

The rainfall received in the preceding months is provided in Table 2.1. The first survey in April 2011 had hot days, over 30°C, with overnight minima typically in the low 20's but cooling (reaching as low as 15.4°C) towards the end of the second survey in May 2011. The average maximum temperatures were a little cooler on the second survey than on the first, in the high 20's and low 30's. However, the minimum temperatures stayed above 20°C.

## 2.2 VEGETATION

The Dampier Peninsula in which the survey areas are located lies within the Northern Botanical Province. The vegetation of Western Australia was originally mapped at the 1:1,000,000 scale by Beard (1979), and was subsequently reinterpreted and updated to reflect the National Vegetation Information System (NVIS) standards (Shepherd *et al.* 2002). Two of the vegetation types identified by Shepherd *et al.* (2002) are found within the survey areas: Vegetation Associations 129 and 750. The majority of the three survey areas consist of vegetation type 750 (Figure 2.3), which is described as being mainly shrub-lands and pindan, comprised of *Acacia tumida* shrubs with medium height grey box and cabbage gum woodland, over ribbon grass and curly spinifex (Shepherd *et al.* 2002). The SP area also contains small areas of Vegetation Association 129, described as bare areas with drift sand. Both vegetation types are well represented outside the three survey areas, with less than 0.2% of their total post-European extent (Table 2.2).

**Table 2.2 – Vegetation associations in the survey areas**

Survey Area	Vegetation Association	Total Area in Western Australia (km <sup>2</sup> )	Area in survey area (km <sup>2</sup> )	Percent of the survey area	Percent of total Vegetation Association
Workers' Accommodation Camp	750	12415.59	20.60	100.00	0.17
Light Industrial Area	750	12415.59	9.70	100.00	0.08
Southern Pipeline	750	12415.59	11.54	99.90	0.09
	129	957.07	0.01	0.01	0.00

Vegetation of the James Price Point area, incorporating the current survey areas, was mapped at a finer scale by Biota (2010), with the general area of the current surveys mapped as containing eight vegetation communities (Table 2.3). *Ecologia* surveyed five on these vegetation communities in the current survey including Monsoon Vine Thicket-Evergreen; Drainage Basin; Open Forest, Open Woodland and Pindan Shrubland. Descriptions of each vegetation type based on the results of the current survey are provided below.

### 1. Monsoon Vine Thicket-Evergreen

Isolated clumps of low trees of *Celtis philippensis*, *Diospyros humilis*, *Mimusops elengi* and *Sersalisia sericea* over tall shrubs of *Acacia monticola*, *Bridelia tomentosa*, *Exocarpos latifolius*, *Glycosmis macrophylla*, *G. trifoliata* and *Grewia breviflora* over vines including *Abrus precatorius*, *Caesalpinia major*, *Capparis lasiantha* and the invasive *Passiflora foetida* var. *hispida* with isolated tussock grasses of *Aristida holathera*, *Enneapogon caeruleus* and *Cymbopogon procerus*.

### 2. Drainage Basin

Low woodland of *Lophostemon grandiflorus* subsp. *grandiflorus* (P3), *Corymbia bella* over tall-mid shrubs of *Acacia colei*, *Ehretia saligna*, *Hakea macrocarpa*, *Santalum lanceolatum* and *Senna costata* over mid-low shrubs of *Solanum cunninghamii*, *Croton habrophyllus* and *Bridelia tomentosa* with dense grasses of *Aristida holathera* var. *holathera*, *Cymbopogon procerus* and *Setaria apiculata* and vines *Abrus precatorius*, *Passiflora foetida* var. *hispida* and *Tinospora smilacina*.

### 3. Open Forest

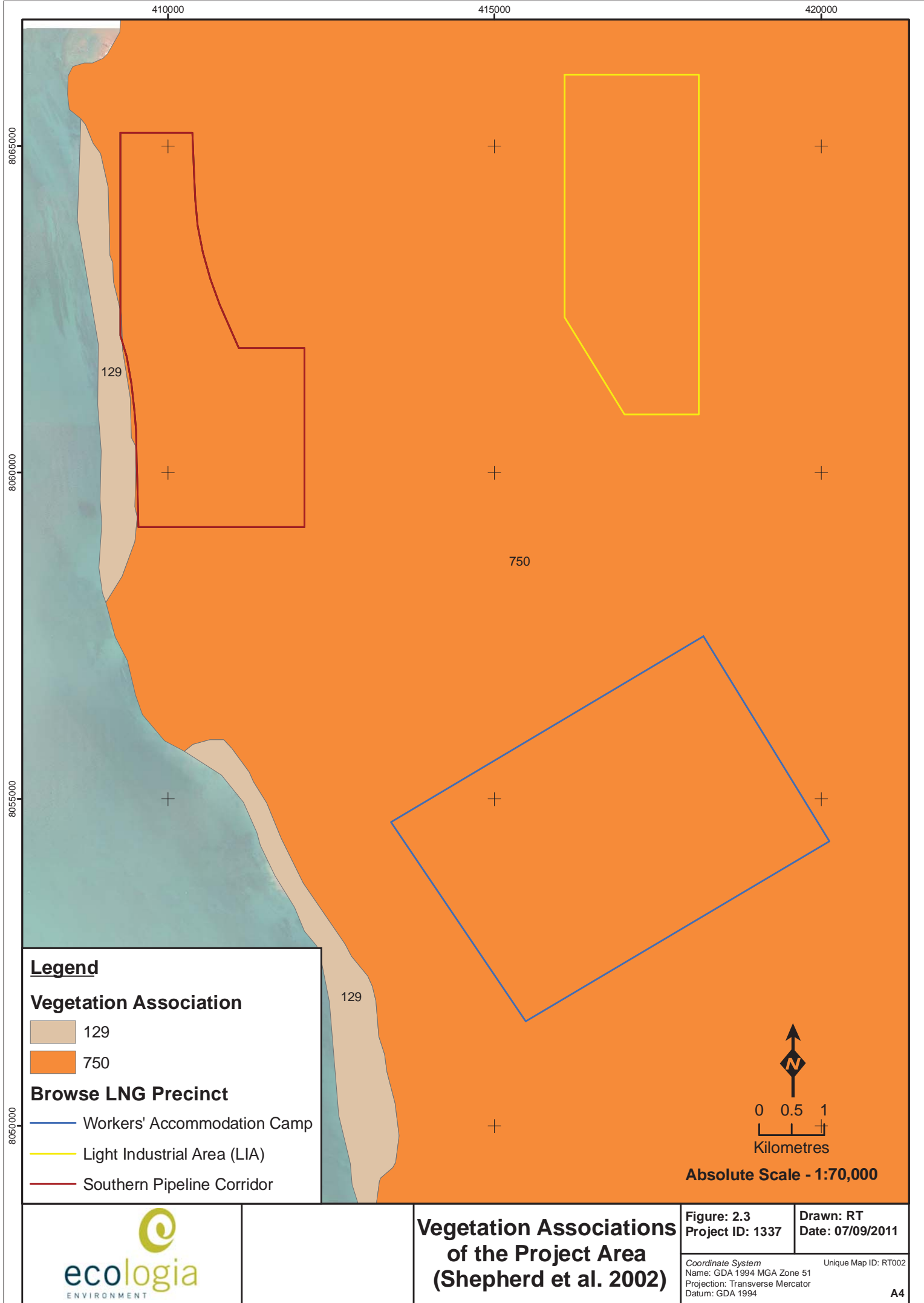
Open forest of *Eucalyptus miniata* and *Corymbia dampieri* over variably dense understorey of Acacias including *A. eripoda*, *A. monticola*, *A. tumida*, and *A. platycarpa* and *Grevillea pyramidalis*, over low shrubs of *A. hippuroides*, *Dodonaea hispidula* var. *arida* and *Gossypium rotundifolium* over grasses of *Aristida holathera* var. *holathera*, *Sorghum plumosum* and *Triodia schinzii*.

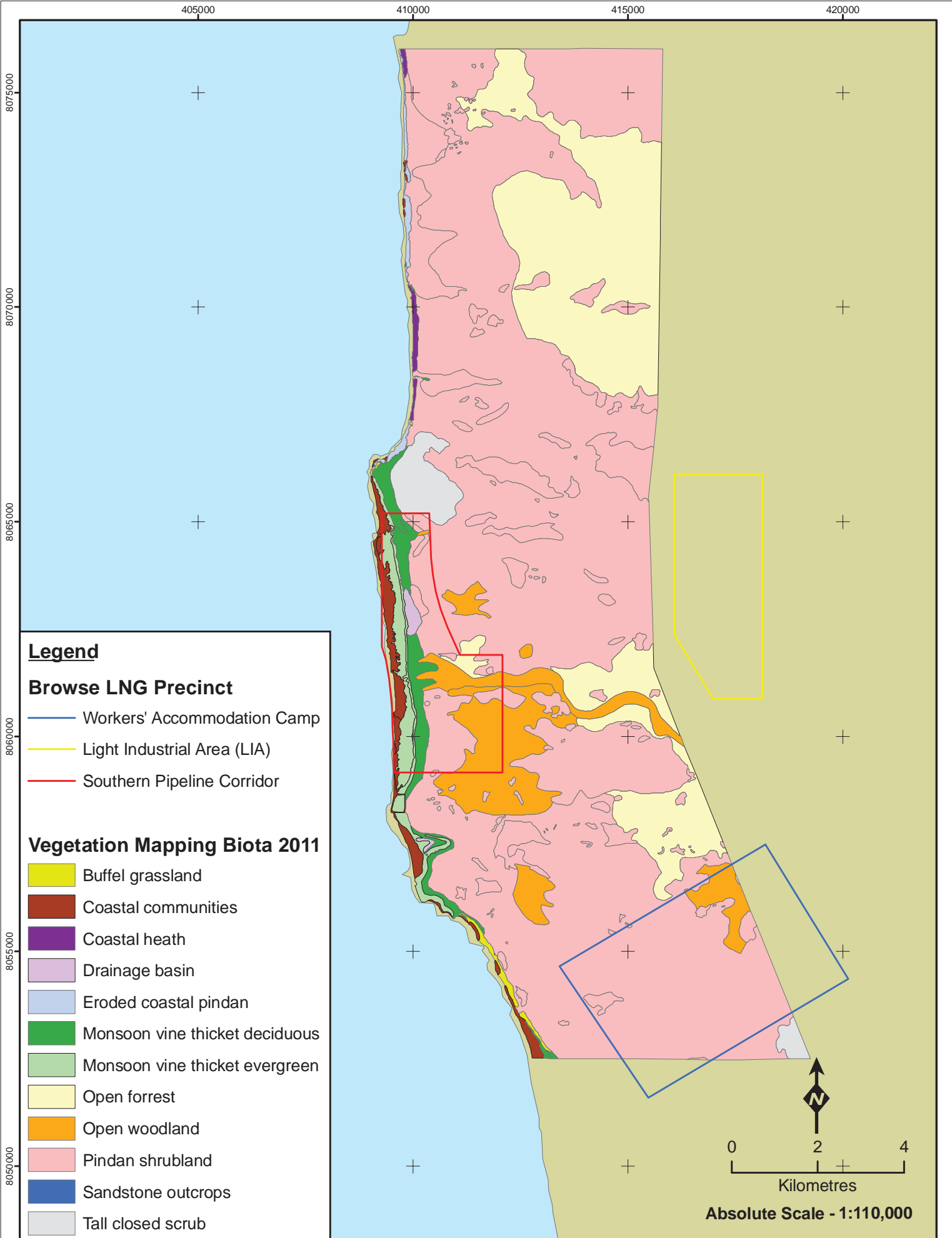
### 4. Open Woodland

Open woodland with mid-low trees of *Eucalyptus miniata*, *E. jensenii* or *Corymbia polycarpa* over tall shrubs of *Acacia monticola*, *A. tumida*, *A. eripoda*, *A. platycarpa* over *Bridelia tomentosa*, *Corchorus sidoides*, *Dodonaea hispidula* var. *arida*, *Microstachys chamaelea* and *Waltheria indica* over grasses *Aristida contorta*, *Cymbopogon procerus*, and vines *Cassytha filiformis*, *Passiflora foetida* var. *hispida*.

### 5. Pindan Shrubland

Scattered mid-low trees of *Corymbia dampieri* and *C. zygophylla* over tall mixed *Acacia* species (commonly *A. eripoda* and *A. tumida*) over shrubs of *Carissa lanceolata*, *Dodonaea hispidula*, *Trichodesma zeylanicum*, *Acacia adoxa*, *Gossypium australe* and *Waltheria indica* over grasses *Triodia schinzii*, *Chrysopogon pallidus*, *Aristida holathera* var. *holathera* and *Eriachne obtusa*.





**Table 2.3 – Vegetation Communities in the vicinity of the Project Area (Biota, 2010).**

Vegetation Type	Description
Coastal Communities (cc)	Sparsely vegetated mobile foredunes usually including Beach Spinifex ( <i>Spinifex longifolius</i> ), along with the sedges <i>Fimbristylis cymosa</i> and <i>F. sericea</i> , which were usually dominant in blow-out areas. Stabilised dunes were dominated by <i>Spinifex longifolius</i> .
Monsoon Evergreen Vine Thickets (evt)	Discrete, closed-canopy patches, more commonly on the coastal dunes and sometimes extending into the swales. The evergreen trees included <i>Celtis philippensis</i> , <i>Diospyros humilis</i> , <i>Mimusops elengi</i> , <i>Sersalisia sericea</i> and the P4 species <i>Pittosporum moluccanum</i> . Shrubs included <i>Exocarpos latifolius</i> , <i>Glycosmis macrophylla</i> and <i>G. trifoliata</i> . Typical vines included <i>Abrus precatorius</i> , <i>Caesalpinia major</i> , <i>Capparis lasiantha</i> , <i>Gymnanthera oblonga</i> , <i>Jacquemontia paniculata</i> , <i>Opilia amentacea</i> , <i>Sarcostemma viminalis</i> subsp. <i>brunonianum</i> , <i>Tinospora smilacina</i> and <i>Tylophora cinerascens</i> .
Monsoon Deciduous Vine Thickets (dvt)	Typical deciduous tree species included <i>Bauhinia cunninghamii</i> , <i>Croton habrophyllus</i> , <i>Grewia breviflora</i> , <i>Gyrocarpus americanus</i> and <i>Terminalia petiolaris</i> . Deciduous shrub species included <i>Bridelia tomentosa</i> , <i>Flueggea virosa</i> subsp. <i>melanthesoides</i> , <i>Grewia retusifolia</i> , <i>Pavetta kimberleyana</i> and <i>Premna acuminata</i> . Vine species were similar to those recorded in the evergreen vine thickets. The P3 grass <i>Eriachne semiciliata</i> (now known as <i>Eriachne</i> sp. Dampier Peninsula) was only recorded from deciduous vine thickets.
Drainage Basins (db)	Areas subject to ephemeral freshwater flooding, ponding, or seepage and were found behind coastal sand dunes subject to seasonal inundation. Such areas were often associated with monsoon vine thicket but were characterised by the occurrence of Lardik ( <i>Lophostemon grandiflorus</i> ) and the paperbark Karnbor ( <i>Melaleuca dealbata</i> ), neither of which were recorded from vine thicket.
Tall Closed Scrub (tcs)	Complex mosaic, devoid of eucalypts and dominated by dense wattles. The major dominants were <i>Acacia monticola</i> and <i>A. coleii</i> , with some <i>A. eriopoda</i> , <i>Hakea arborescens</i> and <i>H. macrocarpa</i> , with <i>Acacia hippuroides</i> , <i>Calytrix exstipulata</i> , <i>Dodonaea hispidula</i> and <i>Lithomyrtus retusa</i> in the understorey.
Pindan Shrubland (ps)	Ubiquitous grassland dominated by a sparse upper layer composed mainly of eucalypts with a variably dense thicket-forming middle layer of wattles. Dominated by mixed <i>Acacia</i> species (particularly <i>A. eriopoda</i> and <i>A. tumida</i> ), with widely scattered Ghost Gums ( <i>Corymbia flavescens</i> ) near the coast and scattered Bloodwoods ( <i>Corymbia dampieri</i> and <i>C. zygophylla</i> ) and occasional Darwin Box ( <i>Eucalyptus tectifica</i> ) elsewhere. Understorey shrubs included Conkerberry ( <i>Carissa lanceolata</i> ), <i>Dodonaea hispidula</i> , Camel Bush ( <i>Trichodesma zeylanicum</i> ), <i>Acacia adoxa</i> , <i>Gyrostemon tepperi</i> , Native Cotton ( <i>Gossypium australe</i> ), <i>Gonocarpus leptothecus</i> , <i>Waltheria indica</i> and <i>Solanum cunninghamii</i> . The principal grasses are Soft Spinifex ( <i>Triodia schinzii</i> ), Ribbon Grass ( <i>Chrysopogon pallidus</i> ), Sorghum ( <i>Sorghum stipoides</i> ) and Bunch Speargrass ( <i>Heteropogon contortus</i> ).
Open Woodland (ow)	Manowan or Woollybutt ( <i>Eucalyptus miniata</i> ) on sandy soils, with Long-fruited Bloodwood ( <i>Corymbia polycarpa</i> ) confined to seasonally inundated areas such as along Kundandu Creek. Localised patches of Wandii Ironbark ( <i>Eucalyptus jensenii</i> ) occurred throughout the open woodland, and were often associated with <i>Acacia monticola</i> .
Open Forest (of)	Relatively dense tree cover, with an upper layer of <i>Eucalyptus miniata</i> and an understorey of wattles that included <i>Acacia eriopoda</i> , <i>A. tumida</i> and <i>A. platycarpa</i> . Grass species were similar to those in the pindan shrubland but also included Annual Sorghum ( <i>Sorghum stipoides</i> ) and Bunch Speargrass ( <i>Heteropogon contortus</i> ).

Biota (2010)

## 2.3 LAND SYSTEMS

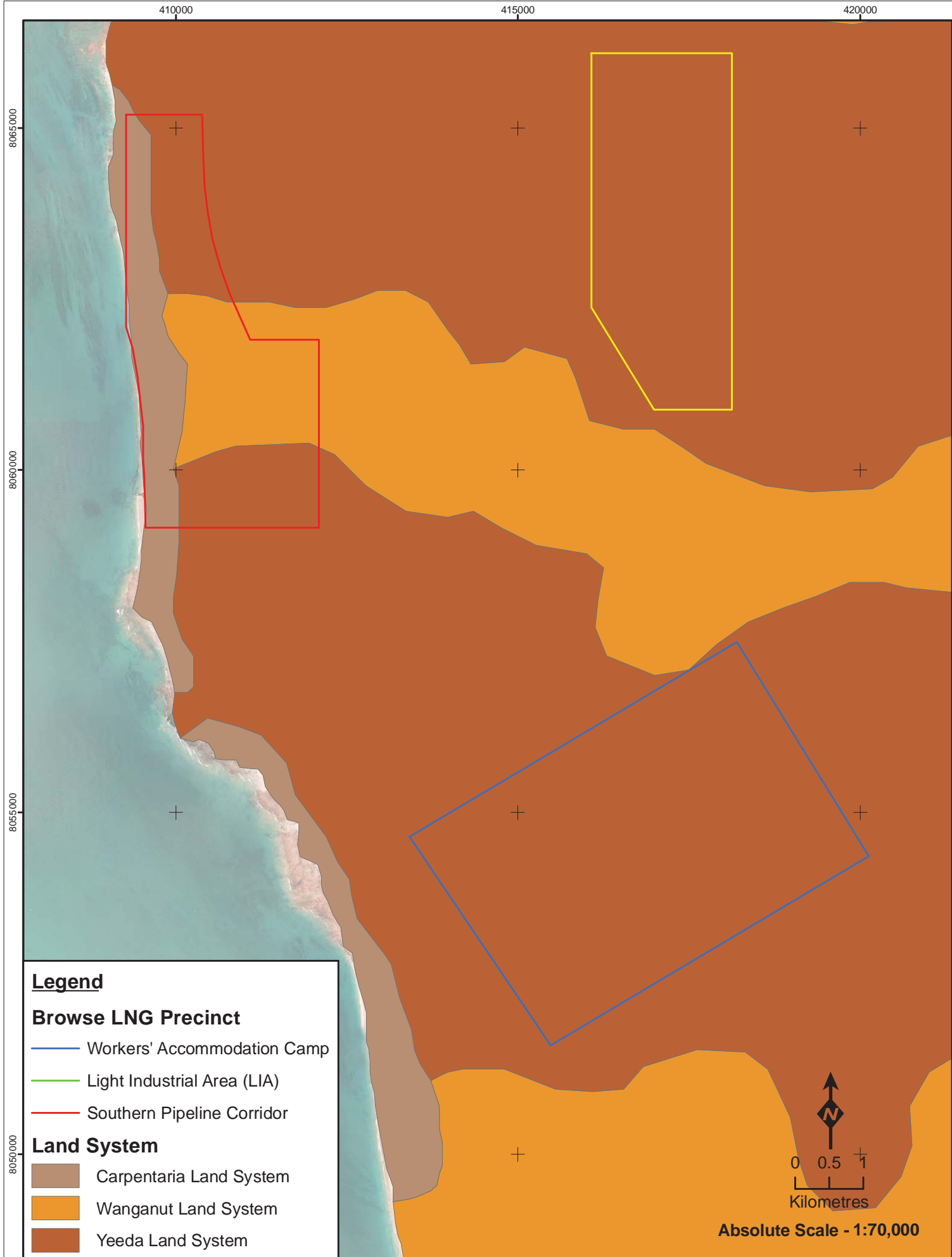
Land systems are described using the biophysical characteristics of geology, landforms, vegetation and soils. The survey areas contain three land systems: Wanganut, Yeeda and Carpentaria (Table 2.4 and Figure 2.5). The Wanganut land system is characterised as low-lying sandplains and dune fields with drainage formations, supporting pindan acacia shrublands with emergent eucalypt trees. The Yeeda land system is similarly described as being sandplains with red and yellow sands, supporting pindan acacia shrublands with emergent eucalypt trees. The Carpentaria land system consists of coastal flats and associated sandy margins and dunes, and saline sands and muds. Such terrain can support paperbark thickets, samphire meadows or extensive bare mud flats with fringing mangrove forests (McKenzie and Kenneally 1983).

The Yeeda land system is found throughout the WAC and LIA survey areas, and makes up the greatest portion of the SP area (39.8%). The SP area also contains the Wanganut and Carpentaria land systems. All three of the land systems found within the survey areas are well-represented outside of them, as each area makes up less than 0.5% of the total land system area in WA.

**Table 2.4 – Land Systems in the Survey Areas.**

Project Area	Land System	Total Area in Western Australia (km <sup>2</sup> )	Area in Survey Area (km <sup>2</sup> )	Percent of the Survey Area	Percent of Total Land System
Workers' Accommodation Camp	Yeeda	21244.38	20.59	100.00	0.10
Light Industrial Area	Yeeda	21244.38	9.71	100.00	0.05
Southern Pipeline	Wanganut	7187.99	3.92	34.06	0.06
	Yeeda	21244.38	4.58	39.79	0.02
	Carpentaria	6131.84	3.01	26.15	0.49



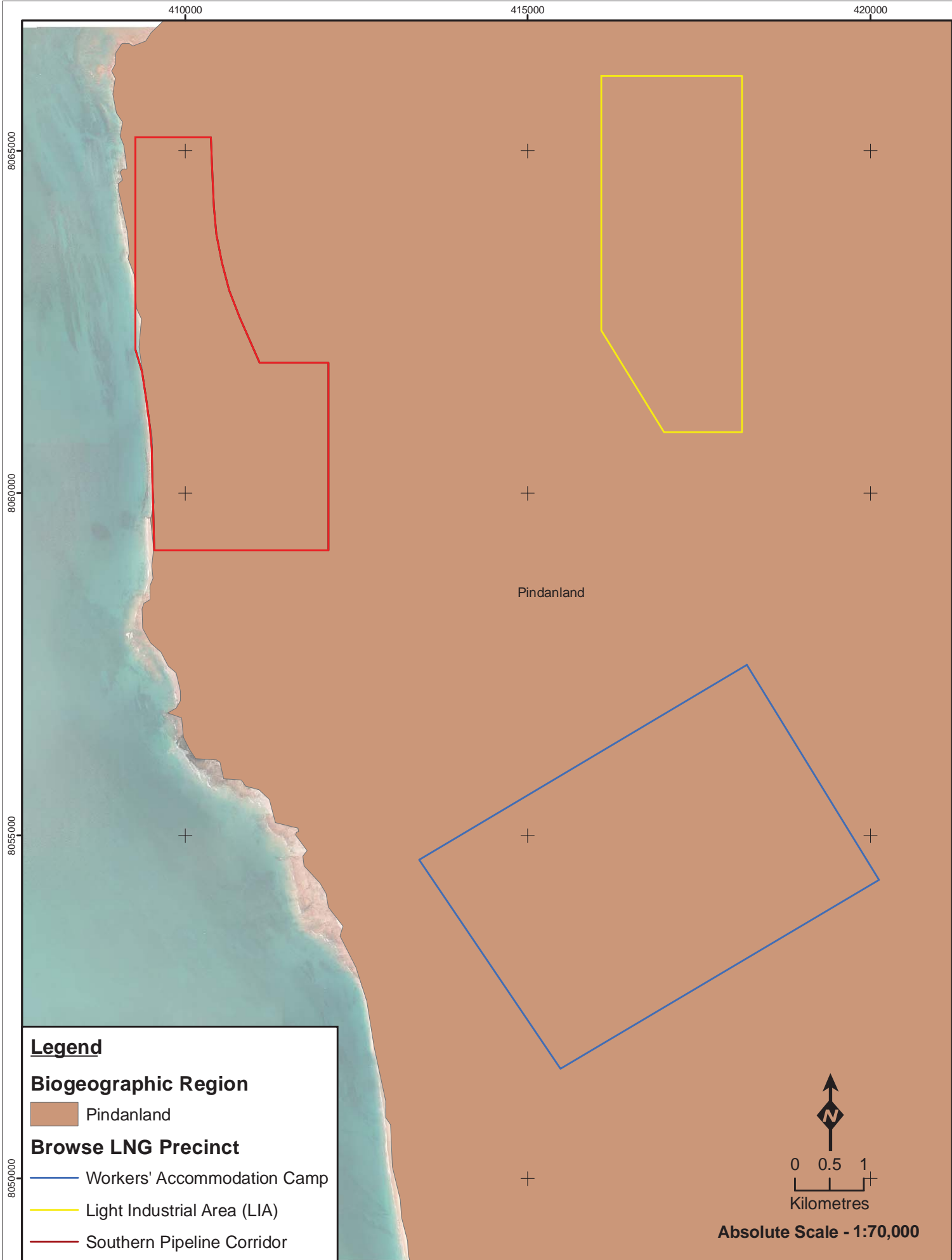


## 2.4 BIOGEOGRAPHY

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies the Australian continent into bioregions of similar geology, landform, vegetation, fauna and climate characteristics (SEWPaC 2010). According to IBRA (Version 6.1), the survey area is located in the Dampierland bioregion. With an area of 88,130 km<sup>2</sup>, the Dampierland bioregion is smaller than most. This is typical of bioregions situated along the coast where vegetation is less uniform than the arid interior.

The Dampierland bioregion is further divided into the subregions Fitzroy Trough (DL1) and Pindanland (DL2), the latter of which includes the Project area (Figure 2.6). The Pindanland subregion is made up of the western part of Dampierland (including the hinterland of Eighty Mile Beach), and the sandplains of the Dampier Peninsula, covering 51,989 km<sup>2</sup> (Graham 2001). The terrain of the Pindanland subregion is a fine-textured sand-sheet with subdued dunes, supporting vegetation that is described primarily as pindan.

The dominant land use categories within the Pindanland subregion are unallocated crown land, crown reserves and native pastures for grazing (Graham 2001). The principal limiting factors and threatening processes are considered to be feral animals (donkeys, cats, foxes), wildfire, weeds, land clearing (for agriculture or construction), erosion, human disturbance, and grazing or pastoral activities (Graham 2001). The IBRA protection level of the subregion is 0.01 – 5%, meaning that not only are ecosystems under-represented, the management of existing parks and reserves is also ranked as poor to fair. More pertinently, monsoon vine thicket ecosystems are considered to be inadequately represented and under threat (Graham 2001). The full extent is not known of the main threatening processes (wildfire, weeds, feral animals) in the Dampierland bioregion, compounding the paucity of knowledge on the status of critical weight range mammals there (Graham 2001).



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### 3 METHODS

The survey methods during the current survey were designed to be consistent with the recommendations of:

- Environmental Protection Authority's (EPA's) Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002b); and
- EPA Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a).

A Level 2, single phase survey was undertaken in the late wet season which combined the following methodological approaches:

Background research: to gather background information on the footprint or target area (*i.e.* search of literature, data and map-based information).

Detailed survey: to enhance the level of knowledge of the flora and vegetation at the local scale and its local context or significance (if the broader scale is well known).

#### 3.1 DETERMINATION OF SURVEY SAMPLING DESIGN AND INTENSITY

Prior to conducting the survey, a review was undertaken of factors likely to influence survey design using the EPA Guidance Statement No. 51 (EPA 2004a). These factors and the methodological actions taken in response are presented in Table 3.1.

**Table 3.1 – Factors Likely to Influence Survey Design**

Requirement	EPA Statement	Project Compliance
Sampling Design and Intensity at Two Levels – Regional and Area Specific	Guidance Statement No. 51	Twenty-eight quadrats were distributed within the Project area at a density of approximately 1 quadrat per 147 ha in the WAC, 1 quadrat per 108 ha in the LIA area and 1 quadrat per 213 ha in the SP area. When quadrats from Biota 2010, 2011 flora report are incorporated into the SP area there is a sampling density of 1 quadrat per 96 ha. The species accumulation curves produced from the current survey indicated that 92 % of the species present were recorded. This level of survey is considered adequate to record the vegetation communities present at a local scale in the Project area. Survey methodology is described in Sections 3.5. The survey limitations and constraints are described in Section 5. Regional data was available from a number of sources as described in Section 4.
Landform – Scale, Rarity, Heterogeneity	Guidance Statement No. 51	Aerial photography and land system mapping were used to select quadrat locations to ensure that the range of landforms present was assessed. The selection of quadrats was verified and modified during the survey based on access constraints.
Habitat – Scale, Rarity, Heterogeneity	Guidance Statement No. 51	Aerial photography was used to select quadrat locations. This ensured that all habitats displaying potentially different or unique vegetation communities were assessed during the survey. The selection of quadrats was verified and modified based on access constraints and observed variations in vegetation structure and composition.
Vegetation Structure, Diversity and Seasonality	Guidance Statement No. 51	The data collected from the 28 quadrats (14 quadrats in the WAC, 9 quadrats in the LIA and 5 quadrats in the SP) was analysed in combination with data from previous flora surveys (Biota 2010, 2011) using the multivariate analysis software SYSTAT™ to provide an objective measure of the degree of heterogeneity of vegetation and the similarities between different vegetation communities. The structure of the vegetation communities in the Project area is described using the conventions of the National Vegetation Information System (NVIS) and mapped (Section 4).
Potential for Conservation Significant Flora to occur, Based on Habitat Analysis	Guidance Statement No. 51	Using the habitat requirements for each Priority taxon previously recorded within the vicinity of the Project area and knowledge of the habitats present within the Project area based on the current survey, the likelihood of occurrence of Priority taxa in the Project area has been evaluated as detailed in Section 4.4.3 and Table 4.7.
Results Including Species/Area Curves, Species and Ecosystem diversity and Heterogeneity	Guidance Statement No. 51	The species accumulation curve (SAC) is included in Section 4.4. Details on the flora of the Project area are included in Section 4.2. Detailed vegetation descriptions, including the area covered by each vegetation community in the survey areas are provided in Section 4. The vegetation community map is provided in Figures 4.4, 4.5 and 4.6.
Information on Adjacent Areas – Previous Surveys and Herbarium Records	Guidance Statement No. 51	Information was requested from the relevant government databases and from WEL. The results from these searches are provided in Table 4.7.

### 3.2 DATABASE SEARCHES

Prior to the field survey a search of government databases was undertaken to determine species of conservation significance previously recorded in the vicinity of the Project area. Shape files of the survey areas including a 60 km buffer were searched.

The following databases were searched for conservation significant flora taxa within this buffer:

1. The DEC's Threatened (Declared Rare) Flora Database (DEFL); and
2. The DEC's Western Australian Herbarium Specimen Database.

The following database was searched for conservation significant taxa based on locations names:

3. The DEC's Declared Rare and Priority Flora List (Atkins 2008).

The following database was searched for vegetation communities of conservation significance:

4. The DEC's Threatened Ecological Community Database:
5. The DEC's Priority Ecological Community Database:

Results from the first three searches listed above are summarised in Table 4.7.

### 3.3 SURVEY TIMING

A single phase Level 2 vegetation and flora survey of the WAC, LIA and SP areas was completed in late wet season over two trips, the first from the 10<sup>th</sup> to the 15<sup>th</sup> April 2011 and the second from the 27<sup>th</sup> April to the 8<sup>th</sup> May 2011. Seventy-two person-days were expended over both survey periods.

**Table 3.2 – Summary of Survey Timing and Duration.**

Survey Dates	Duration (days)	Person Days
10-15 <sup>th</sup> April	6	24
27 <sup>th</sup> April- 8 <sup>th</sup> May	12	48
<b>Total</b>	<b>18</b>	<b>72</b>

Rainfall in the six months preceding the survey (April/May 2011) was 758.2 mm, 232.5 mm above the long-term mean of 525.7 mm (Table 3.3).

**Table 3.3 – Rainfall Recorded At Broome Airport (station 003003) prior to the Field Survey**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
<b>Total Monthly Rainfall (mm)</b>													
<b>2010</b>	-	-	-	-	26.4	0	110.8	1.8	4.4	7.8	57.8	85.8	-
<b>2011</b>	449.2	70.4	87.2	18.6	-	-	-	-	-	-	-	-	-
<b>Mean Monthly Rainfall (mm)</b>													
	178.5	179.1	100.8	26.7	26.4	18.0	7.4	1.7	1.4	1.4	9.1	56.8	607.0

### 3.4 SITE SELECTION

To ensure that the vegetation communities and habitats present within the Project area were adequately represented, sampling sites were selected using aerial photography, land systems, topographical features and field observations to represent as broad a range of vegetation communities as possible. Some modifications of the selected locations were necessary due to access constraints. The density of vegetation and lack of vehicular access resulted in the distribution of quadrats within the WAC being confined to approximately 80% of the area, accessible from the track immediately west. Similarly quadrats in the LIA area were confined to the most northern third of the area, as access further south could not be achieved within the daily time constraints. Within this more limited area, all habitats displaying potentially different or unique vegetation communities were assessed during the survey.

### 3.5 SAMPLING METHODS

The survey involved a combination of quadrat based sampling and some additional opportunistic sampling from field traverses. Quadrats were utilised to record floristic composition within vegetation units and the resultant species by quadrat matrix was used to conduct multivariate analysis. Both methods contributed to the delineation of small scale vegetation communities and the floristic species inventory of the Project area.

#### 3.5.1 Floristic Quadrats and Descriptions

Twenty-eight, 50 m x 50 m quadrats were established over the Project area (14 in the WAC, nine in the LIA and five in the SP). Quadrats within the SP were located to supplement the data previously collected in 47 quadrats by Biota (2010). In areas of linear vegetation where a 50 m x 50 m survey polygon could not be positioned within the vegetation an equivalent polygon of 2,500 m<sup>2</sup> was surveyed. The number of sites established was largely determined by the access availability to the areas, heterogeneity and time available.

Quadrat locations are provided within Appendix A and mapped in Figure 3.1. The following information was recorded at each quadrat.

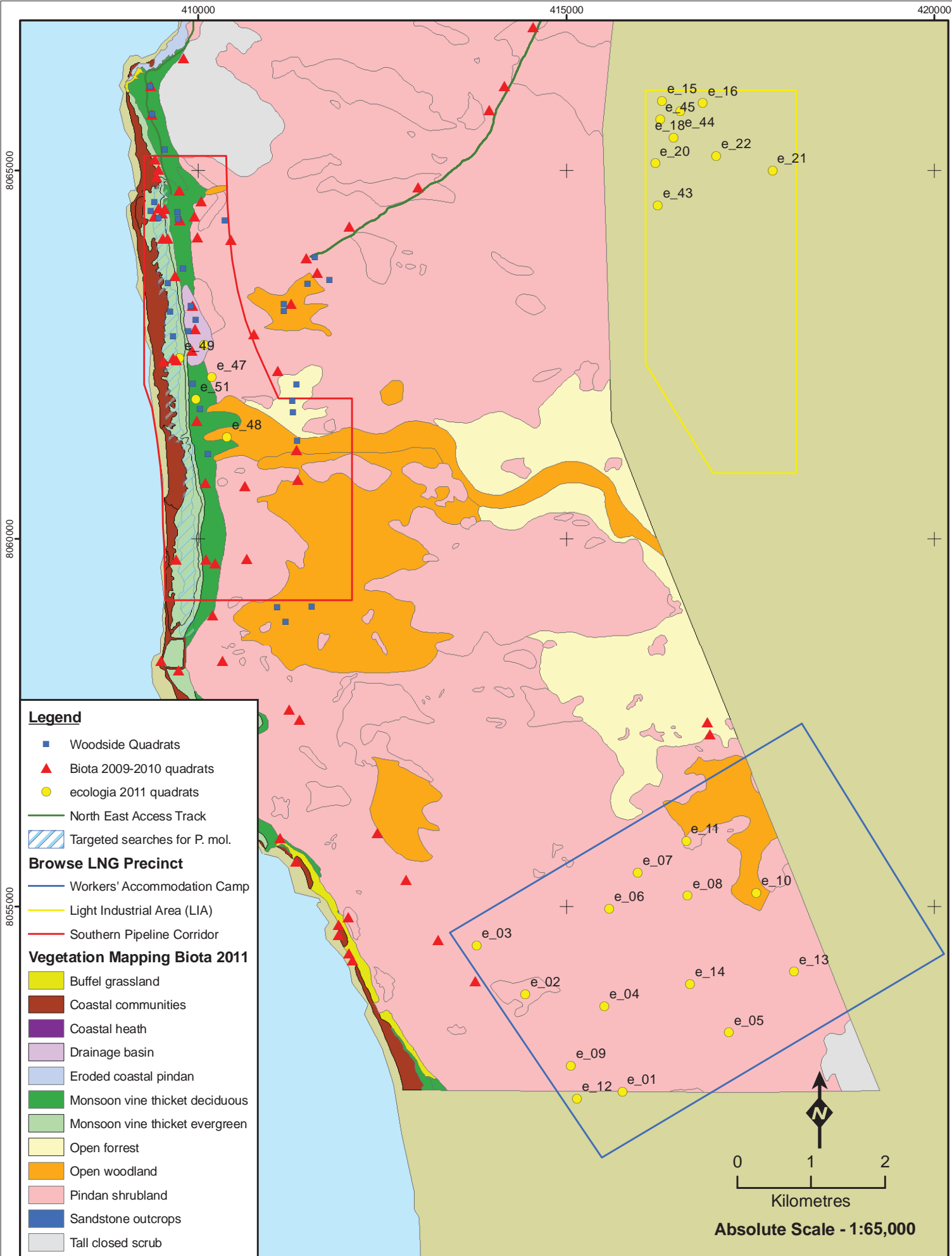
1. **Location including GPS coordinates:** Quadrats were aligned along a north-south bearing with each corner of the quadrat recorded using a Garmin GPSmap 76Cx GDA84.
2. **Photograph of vegetation structure:** A photograph of the vegetation structure was taken from the north-west corner of the quadrat with additional photographs taken throughout the area if needed to supplement the complexity of the site.
3. **Topography, surface soil composition and colour, and surface lithology:** Information on habitats, slope, drainage lines, surface layers, soil colour, soil texture, rock type, rock size and rock abundance were recorded at each quadrat location.
4. **Structural information describing the vegetation community:** Vegetation type, life-form strata and percentage cover for each stratum were recorded using the National Vegetation Information System (NVIS) vegetation classifications, as described in Appendix B.
5. **Height ranges and foliage canopy cover for each species recorded within the quadrat;** Height ranges and foliage canopy cover for each species were recorded using the National Vegetation Information System (NVIS) vegetation classifications, as described in Appendix B.



6. **Vegetation condition and the nature of disturbance:** Vegetation condition within the Project area was assessed at each quadrat using the rankings indicated in Table 3.4. Criteria considered when determining these levels were the presence of weeds, animal and vehicle tracks, litter, grazing, dust and any other ground disturbances, based on the criteria proposed by Trudgen 1988.
7. **Fire occurrence:** The estimated time since the last fire at each site.

**Table 3.4 – Vegetation condition classification and assesment (Based on Trudgen, M.E. 1988).**

Vegetation Condition	Criteria
Excellent	Pristine or nearly so, no obvious sign of damage caused by European human activities.
Very good	Some relatively slight signs of damage caused by the activities of European human activities <i>e.g.</i> damage to tree trunks by repeated fires, the presence of some relatively non-aggressive weeds or occasional vehicle tracks.
Good	More obvious signs of damage caused by the activities of European human activities, including some obvious impact to vegetation structure such as caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of European human activities such as grazing or partial clearing or very frequent fires. Presence of some more aggressive weeds.
Very poor	Severely impacted by grazing, fire, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weeds species including aggressive species.
Completely Degraded	Areas that are completely or almost completely without native vegetation <i>e.g.</i> areas that are cleared or parkland cleared with their flora comprising weed or crop species with isolated native trees or shrubs.



### 3.5.2 Opportunistic Collections

Opportunistic collections of introduced taxa and native taxa that were not recorded from within the quadrat surveys were made while walking between quadrats where possible to ensure a more comprehensive species inventory. However, the density of vegetation and the need to move as quickly as possible with limited time between quadrats meant that opportunistic collections were consequently also limited. Two transects dedicated to opportunistic collection were conducted in the WAC, traversing the area from the south eastern to north western boundaries. The location and local percentage cover was recorded for each collection. The locations of introduced flora and notes on the boundaries of the vegetation communities were recorded to facilitate the mapping of the vegetation communities.

### 3.5.3 Targeted Searches

A targeted search for the P4 flora species *Pittosporum moluccanum* was conducted in the Monsoon Evergreen Vine Thicket within the SP area. Foot transect searches were assessed either 25 m or 50 m apart (depending on density of the vegetation and width of the vegetation unit) along a north-south bearing between the southern and northern boundaries of the SP survey area. For each plant located the following information was recorded.

1. Location, including GPS coordinates;
2. Photograph of the individual plant;
3. Height of the individual plant; and
4. Condition and health of the individual plant.

## 3.6 VEGETATION MAPPING

Vegetation mapping is the hierarchical delineation of vegetation into groups or associations. The distinctive characteristics that these groups or communities share include species dominance, stratum structure and species composition. The sites were analysed for similarity and grouped via a dendrogram. Communities that were identified were used to interpret aerial photography that was mapped through a series of polygons in geographical information systems (GIS).

The vegetation of the James Price Point coastal area was mapped by Biota in 2009 with modifications made in 2010. This mapping overlays the SP and has been retained in the current survey. Existing mapping was refined and extended into the LIA and WAC using the units described by Biota (2010). The vegetation of the LIA and WAC has been mapped at a scale of 1:25,000 by *ecologia* on the basis of multivariate cluster analysis, field observation and aerial photography. To create the dendrogram, data from Biota (2010), Woodside's vegetation monitoring (2011) and quadrats surveyed by *ecologia* (2011) were analysed.

One modification to the vegetation mapping within the SP was created where a section of the Monsoon Vine Thicket-Deciduous vegetation community was reclassified as open woodland. This modification occurred as *ecologia* surveyed a quadrat within the boundaries of Biota's Monsoon Vine Thicket-Deciduous but following statistical analysis, this quadrat was grouped within the open woodland vegetation type.

### **3.7 TAXONOMY AND NOMENCLATURE**

Voucher specimens for species from all quadrats, opportunistic collections and targeted searches were collected and assigned a unique code for later identification or verification. Flora specimens were pressed daily and subsequently dried.

Identification and verification of specimens was completed by Dr. Andrew Craigie and Dr. Udani Sirisena with reference to specimens lodged at the Western Australian Herbarium.

Cryptic specimens were referred to Mr. Russell Barrett, a specialist taxonomist with extensive experience with the flora of the Kimberley region. Specimens of priority species will be lodged at the Western Australian Herbarium (2010).

Nomenclature and taxonomy follow the conventions currently adopted by the Western Australian Herbarium.

All data was entered following identification into a Microsoft Access Statistical Analysis

### **3.8 SURVEY ADEQUACY AND ANALYSIS**

#### **3.8.1 Species Richness**

The number of species present (species richness) is the simplest representation of species diversity (Fowler and Cohen 1990) and is a basic indicator of diversity used for this survey.

#### **3.8.2 Randomised Species Accumulation Curves**

Species accumulation curves (SAC) provide a theoretical basis for understanding the relationship between sampling effort and the accumulation of species, and therefore provide a means of estimating the survey adequacy. As sampling effort increases with a corresponding increase in survey area and time, the rate at which new species are recorded attenuates and the curve becomes asymptotic. At this point, where there is minimal increase in species inventory with continued sampling effort, the survey size is deemed sufficient.

There are three general methods of estimating species richness from sample data: extrapolating SAC, fitting parametric models of relative abundance, and using non-parametric estimators (Bunge and Fitzpatrick 1993; Colwell and Coddington 1994; Gaston 1996). In this report, the level of survey adequacy was estimated using SACs as computed by Mao Tao. In addition, a Michaelis-Menten enzyme kinetic curve was calculated. To eliminate features caused by random or periodic temporal variation, the sample order was randomised 10,000 times. The estimator applied to the data set was performed using EstimateS (version 8, Colwell 2009) (Figure 4.4).

#### **3.8.3 Vegetation Community Analysis**

A quadrat by species matrix was created and formed the basis of analysis. Annual and weakly perennial species, species recorded once (unless dominant in the vegetation) and opportunistic collections beyond the boundaries of quadrats were excluded from this analysis. Annual and weakly perennial species are excluded from the analyses as they often respond on mass in response to rainfall events across all vegetation types and can mask the differences between communities within the statistical analyses. Classification analysis was performed using an association matrix of the Bray-Curtis coefficient. The similarity between quadrats and the similarity between the occurrences of species was analysed using the multivariate statistical programme SYSTAT<sup>TM</sup>. These methods provide

an objective means to classify vegetation communities based on groups with similar species composition. A dendrogram was produced to statistically delineate the floristic communities present. The dendrogram and quadrat by species matrix are provided electronically in Appendix C.

### 3.9 SURVEY TEAM

The vegetation and flora assessment described in this document was planned, coordinated and executed by Carol Macpherson, Renee Tuckett, Shadila Venkatasamy, Andrew Craigie, Udani Sirisena and Matthew Macdonald with their Qualifications provided in Table 3.5 and flora license details provided in Table 3.6.

**Table 3.5 – Project staff and qualifications**

Staff Member	Qualifications	Experience	Position
Carol Macpherson (10 <sup>th</sup> – 15 <sup>th</sup> April; 27 <sup>th</sup> April – 4 <sup>th</sup> May)	B.Sc.	21 years	Project Manager, Principal Botanist
Dr. Renee Tuckett (10 <sup>th</sup> – 15 <sup>th</sup> April; 27 <sup>th</sup> April – 8 <sup>th</sup> May)	Ph.D.	4 years	Team Leader, Botanist
Dr. Shadila Venkatasamy (10 <sup>th</sup> – 15 <sup>th</sup> April; 27 <sup>th</sup> April – 8 <sup>th</sup> May)	Ph.D.	10 years	Botanist
Dr. Andrew Craigie (10 <sup>th</sup> – 15 <sup>th</sup> April; 27 <sup>th</sup> April – 8 <sup>th</sup> May)	Ph.D.	5 years	Botanist, Taxonomist
Dr. Udani Sirisena	Ph.D.	5 years	Taxonomist
Dr. Matthew Macdonald (5 <sup>th</sup> - 8 <sup>th</sup> May)	Ph.D.	15 years	Senior Botanist

**Table 3.6 – Flora license details.**

Licences - "Licence to Take Flora for Scientific Purposes"		
The vegetation and flora assessment described in this report was conducted under the authorisation of the following licences issued by the DEC:		
	Permit Number	Valid Until
Carol Macpherson	SL008965	30 <sup>th</sup> April, 2012
Renee Tuckett	SL009392	30 <sup>th</sup> April 2012
Shadila Venkatasamy	SL009413	30 <sup>th</sup> April 2012
Andrew Craigie	SL009012	30 <sup>th</sup> April 2012
Matthew Macdonald	SL008967	30 <sup>th</sup> April 2012

### **3.10 SURVEY LIMITATIONS AND CONSTRAINTS**

The survey limitations and constraints were analysed following the field trips. The surveys were reviewed for the following aspects:

- Sources of information and availability of contextual information;
- The scope;
- Proportion of flora collected and identified;
- Completeness and further work which might be needed;
- Mapping reliability;
- Timing/ weather season cycle;
- Disturbance;
- Intensity;
- Resources;
- Access problems; and
- Experience levels.

## 4 RESULTS

### 4.1 STATE AND NATIONALLY RECOGNISED THREATENED COMMUNITIES

#### 4.1.1 Threatened Ecological Communities

Ecological communities are naturally occurring biological assemblages located in a particular type of habitat. At a national level, Threatened Ecological Communities (TECs) are protected under the EPBC Act. TECs are listed under this Act as either 'Critically Endangered', 'Endangered' or 'Vulnerable'. A definition of these codes is provided in Appendix E. The DEC also maintains a list of TECs that are classified as being either 'Presumed Totally Destroyed', 'Critically Endangered', 'Endangered' or 'Vulnerable'. A definition of these codes is provided in Appendix E.

No nationally listed TECs occur within the Project area. However, it is understood that Monsoon Vine Thicket is currently being considered for national TEC listing.

Three state-listed TECs occur in the Dampierland bioregion: the species-rich faunal community of Roebuck Bay; assemblages of Bunda Bunda organic mound springs and vine thickets on coastal sand dunes of Dampier peninsula.

The only TEC that occurs within the Project area is the vine thickets on coastal sand dunes of Dampier peninsula, as described in Table 4.1.

**Table 4.1 – Threatened Ecological Communities within the Project Area.**

Threatened Ecological Community	Description	Conservation Code
Vine thicket on coastal sand dunes of Dampier Peninsula	Semi-deciduous vine thicket communities on leeward slopes of coastal sand dunes on Dampier Peninsula. Occur as discontinuous but discrete pockets of dense vegetation, ranging from a few trees to around 60 ha in size. Patches tend to be larger with increasing dune system size, and are generally better developed in structure and higher in species diversity at the northern end of the peninsula. The principal upper-storey tree species include: <i>Cassine melanocarpa</i> , <i>Celtis philippinensis</i> , <i>Diospyros ferrea</i> var. <i>humilis</i> , <i>Ficus virens</i> , <i>Melaleuca cajuputi</i> , <i>M. dealbata</i> , <i>M. viridiflora</i> , <i>Mimusops elengi</i> , <i>Pouteria sericea</i> , and <i>Terminalia petiolaris</i> . The understorey comprises shrub species such as: <i>Croton tomentellus</i> , <i>Dodonaea platyptera</i> , <i>Exocarpos latifolius</i> , <i>Pandanus spiralis</i> , <i>Plumbago zeylanica</i> , <i>Santalum lanceolatum</i> , and <i>Flueggea virosa</i> subsp. <i>melanthesoides</i> (syn. <i>Securinega melanthesoides</i> ). Vine species include: <i>Abrus precatorius</i> , <i>Adenia heterophylla</i> , <i>Caesalpinia globulorum</i> , <i>Gymnanthera nitida</i> , <i>Jacquemontia paniculata</i> , <i>Marsdenia cinerascens</i> , <i>Passiflora foetida</i> and <i>Tinospora smilacina</i> . Soils are deep dune sands, white except for a superficial dark grey organic layer, and covered by leaf litter up to 6 cm in depth (Beard and Kenneally 1993).	Vulnerable

#### 4.1.2 Priority Ecological Communities

The DEC maintains an additional list of Priority Ecological Communities (PECs), for communities that could potentially be classified as state-listed TECs, but are not currently adequately defined or surveyed. Communities are placed in this category while consideration can be given to their declaration as a TEC. Five priority codes exist for PECs, as defined in Appendix E.

Two PECs occur in the Dampier bioregion: the *Corymbia paractia* dominated community on dunes; and the Dwarf Pindan Heath community of the Broome coast. The distribution, description and conservation status of these communities is provided in Table 4.2. It is understood that the Dwarf Pindan Heath community may be upgraded to TEC status by the DEC in the near future.

No PEC's occur within the Project area.

**Table 4.2 – Priority Ecological Communities of the Dampierland Bioregion.**

Priority Ecological Community	Description	Conservation Code
<i>Corymbia paractia</i> dominated community on dunes	<i>Corymbia paractia</i> behind dunes, Broome township area, Dampier Peninsula. Transition zone where coastal dunes (with vine thickets) merge with Pindan (desert) vegetation. Also, port north of Broome.	P1
Dwarf Pindan heath community of the Broome coast	Occurs between the racecourse and Gantheame Point lighthouse. Insufficient survey outside of Broome townsite area to determine full extent. This ecological community is also known to occur north of James Price Point.	P1

### 4.1.3 Vegetation Condition of the Project Area

The assessments of vegetation condition within the WAC and LIA areas ranged from excellent to very good, with little weed invasion observed other than at the boundary with the existing track. The lack of disturbance or weed invasion is likely to result from the density of vegetation and remoteness from tracks, particularly of the LIA area. Invasive species were recorded within three quadrats (two, nine and six) within the WAC but these species were generally in lower abundances than those in the SP area.

The condition of vegetation within the SP was far more variable, with assessments ranging from good to excellent. The proximity to the coast and presence of a vehicle track has resulted in a higher level of litter, minor tracks throughout the vegetation and significantly more weed invasion, although weeds were nevertheless concentrated in areas adjacent to clearings.

Table 4.3 shows the percentage of quadrats within each vegetation condition ranking.

**Table 4.3 – Vegetation Condition Assessment**

Vegetation Condition	Proportion of the quadrats surveyed in the WAC (%) (14 quadrats)	Proportion of the quadrats surveyed in the LIA (%) (9 quadrats)	Proportion of the quadrats surveyed in the SP (%) (5 quadrats)	Proportion of Quadrats Surveyed in the Project area (%)	Disturbance Types
Excellent	92.86	88.89	40.00	82.14	Nil
Very good	7.14	11.11	40.00	14.29	Vehicle Tracks; Litter; Faeces; Animal Tracks; Grazing
Good	0	0	20.00	3.57	Weeds
Poor	0	0	0	0	N/A
Very poor	0	0	0	0	N/A
Completely Degraded	0	0	0	0	N/A




#### **4.1.4 Fire History of the Project Area**



All three survey areas of the James Price Point area have a variable burn history. Some locations appear to have been burnt in the last two years while at other locations no recent fire history was evident. The variation in burn history throughout the areas has resulted in a complex mosaic of vegetation structure.



#### **4.1.5 Vegetation Communities of the Project Area**

Five of the 12 vegetation types previously mapped in the Project area were recorded by *ecologia* in the current survey. Multivariate analysis (Appendix C) demonstrated that the species composition of *ecologia* quadrats correlated closely to that recorded in earlier surveys and thus vegetation units described by Biota (2010) were retained during the current mapping of the LIA and WAC (Figure 4.1 and Figure 4.2). Each of the vegetation types recorded by *ecologia* is summarised below in Table 4.4. The map of the SP is refined from Biota (2010) with modifications to the boundary of the open woodland (Figure 4.3). The maps of the WAC and LIA were produced, in keeping with the vegetation units described by Biota (2010).


Table 4.4 – Vegetation Communities Recorded in the Project Area

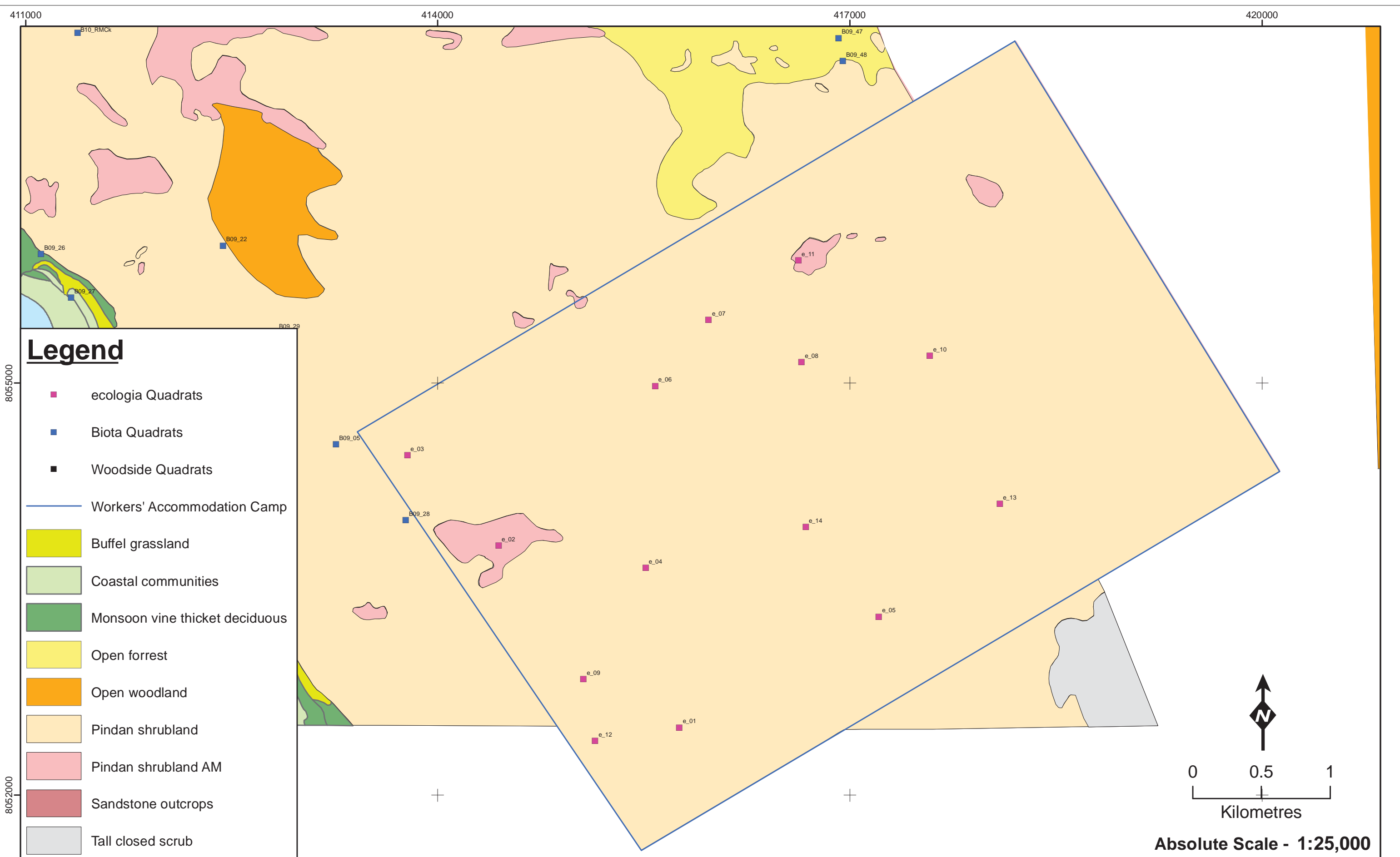
#	Vegetation Community and Area	Habitat, Land System and Vegetation Condition	ecologia Quadrat(s)	Photograph
1	<p><b>Monsoon Vine Thicket (Evergreen)</b></p> <p><i>Celtis philippensis</i>, <i>Diospyros humilis</i>, <i>Mimusops elengi</i>, <i>Sersalisia sericea</i> and the occasional P4 <i>Pittosporum moluccanum</i> over <i>Exocarpos latifolius</i>, <i>Glycosmis macrophylla</i> and <i>G. trifoliata</i> over vines including <i>Abrus precatorius</i>, <i>Caesalpinia major</i>, <i>Capparis lasiantha</i> and the invasive <i>Passiflora foetida</i> var. <i>hispida</i> with <i>Enneapogon caerulescens</i> and <i>Cymbopogon procerus</i>.</p> <p>Species Richness = 41.0</p> <p>Vegetation community 1 = 1.6 km<sup>2</sup> (3.85%) of the Study Area.</p>	<p><b>Habitat-</b> Undulating plain and swale</p> <p><b>Land System-</b> Carpentaria</p> <p><b>Vegetation Condition-</b> Very good</p> <p><b>Disturbance-</b> Animal tracks, litter and grazing</p> <p><b>Survey Area-</b> SP</p>	49	

#	Vegetation Community and Area	Habitat, Land System and Vegetation Condition	ecologia Quadrat(s)	Photograph
2	<p><b>Drainage Basin</b></p> <p><i>Lophostemon grandiflorus</i> subsp. <i>grandiflorus</i>, <i>Corymbia bella</i>, <i>Acacia colei</i>, <i>Ehretia saligna</i>, <i>Hakea macrocarpa</i>, <i>Santalum lanceolatum</i> and <i>Senna costata</i> over <i>Solanum cunninghamii</i>, <i>Croton habrophyllus</i> and <i>Bridelia tomentosa</i> with dense grasses of <i>Aristida holathera</i> var. <i>holathera</i>, <i>Cymbopogon procerus</i> and <i>Setaria apiculata</i> and vines <i>Abrus precatorius</i>, <i>Passiflora foetida</i> var. <i>hispida</i> and <i>Tinospora smilacina</i>.</p> <p>Species Richness = 55.0</p> <p>Vegetation community 2 = 0.27 km<sup>2</sup> (0.6 %) of the Study Area.</p>	<p><b>Habitat-</b> Plain</p> <p><b>Land System-</b> Carpentaria and Wanganut</p> <p><b>Vegetation Condition-</b> Good</p> <p><b>Disturbance-</b> Weeds</p> <p><b>Survey Area-</b> SP</p>	46	
3	<p><b>Open Forest</b></p> <p><i>Eucalyptus miniata</i> and <i>Corymbia dampieri</i> over variably dense understorey of Acacias including <i>A. eriopoda</i>, <i>A. monticola</i>, <i>A. tumida</i>, and <i>A. platycarpa</i> and <i>Grevillea pyramidalis</i>, over <i>A. hippuroides</i>, <i>Dodonaea hispidula</i> var. <i>arida</i> and <i>Gossypium rotundifolium</i> over <i>Aristida holathera</i> var. <i>holathera</i>, <i>Sorghum plumosum</i> and, <i>Triodia schinzii</i></p> <p>Mean species Richness = 38.5 ± 1.8 (n=6)</p> <p>Vegetation community 3 = 0.28 km<sup>2</sup> (0.7 %) of the Study Area.</p>	<p><b>Habitat-</b> Plain</p> <p><b>Land System-</b> Yeeda</p> <p><b>Vegetation Condition-</b> Excellent</p> <p><b>Disturbance-</b> N/A</p> <p><b>Survey Area-</b> WAC</p>	01, 05, 08, 09, 12, 14	

#	Vegetation Community and Area	Habitat, Land System and Vegetation Condition	ecologia Quadrat(s)	Photograph
4	<p><b>Open Woodland</b></p> <p><i>Eucalyptus miniata</i>, <i>E. jensenii</i> or <i>Corymbia polycarpia</i> over <i>Acacia monticola</i>, <i>A. tumida</i>, <i>A. eriopoda</i>, <i>A. platycarpa</i> over <i>Bridelia tomentosa</i>, <i>Corchorus sidoides</i>, <i>Dodonaea hispidula</i> var. <i>arida</i>, <i>Microstachys chamaelea</i> and <i>Waltheria indica</i> over grasses <i>Aristida contorta</i>, <i>Cymbopogon procerus</i>, and vines <i>Cassytha filiformis</i>, <i>Passiflora foetida</i> var. <i>hispidula</i>.</p> <p>Mean species Richness = <math>52.0 \pm 2.0</math> (n=3)</p> <p>Vegetation community 4 = 2.49 km<sup>2</sup> (6.0%) of the Study Area.</p>	<p><b>Habitat-</b> Plain</p> <p><b>Land System-</b>Wanganut</p> <p><b>Vegetation Condition-</b> Excellent- very good</p> <p><b>Disturbance-</b> Animal tracks and grazing by cattle</p> <p><b>Survey Area-</b> WAC</p>	47, 48, 51	
5	<p><b>Pindan shrubland</b></p> <p>Mixed <i>Acacia</i> species (commonly <i>A. eriopoda</i> and <i>A. tumida</i>) with scattered <i>Corymbia dampieri</i> and <i>C. zygophylla</i> over <i>Carissa lanceolata</i>, <i>Dodonaea hispidula</i>, <i>Trichodesma zeylanicum</i>, <i>Acacia adoxa</i>, <i>Gossypium australe</i> and <i>Waltheria indica</i> over <i>Triodia schinzii</i>, <i>Chrysopogon pallidus</i>, <i>Aristida holathera</i> var. <i>holathera</i> and <i>Eriachne obtusa</i>.</p> <p>Mean species Richness = <math>48.9 \pm 2.4</math> (n=14)</p> <p>Vegetation community 5 = 33.19 km<sup>2</sup> (79.4%) of the Study Area.</p>	<p><b>Habitat-</b> Plain</p> <p><b>Land System-</b> Yeeda</p> <p><b>Vegetation Condition-</b> Excellent – very good</p> <p><b>Disturbance-</b> Vehicle Tracks; Litter; Faeces</p> <p><b>Survey Area-</b> SP, WAC and Light Industrial Area</p>	03, 04, 06, 07, 10, 13, 15, 16, 18, 21, 22, 43, 44, 45	



#	Vegetation Community and Area	Habitat, Land System and Vegetation Condition	ecologia Quadrat(s)	Photograph
5a	<p><b>Pindan Shrubland with <i>Acacia monticola</i> thickets</b></p> <p><i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>, <i>Corymbia greeniana</i>, <i>C. zygomphylla</i>, <i>Gardenia pyriformis</i>, <i>Ficus scobina</i> and <i>Sersalisia sericea</i> over dense belts of <i>Acacia monticola</i>, <i>A. eriopoda</i>, <i>A. hippuroides</i>, <i>Dodonaea hispidula</i> var. <i>arida</i> and <i>Grevillea refracta</i> over <i>Aristida holathera</i> var. <i>holathera</i>, <i>Chrysopogon pallidus</i> and <i>Eriachne ciliata</i>.</p> <p>Mean species Richness = <math>39.3 \pm 3.3</math> (n=3)</p> <p>Vegetation community 5a = 1.11 km<sup>2</sup> (2.6 %) of the Study Area.</p>	<p><b>Habitat-</b> Plain</p> <p><b>Land System-</b> Yeeda</p> <p><b>Vegetation Condition-</b> Excellent</p> <p><b>Disturbance-</b> N/A</p> <p><b>Survey Area-</b> WAC and Light Industrial Area</p>	02, 11, 20	



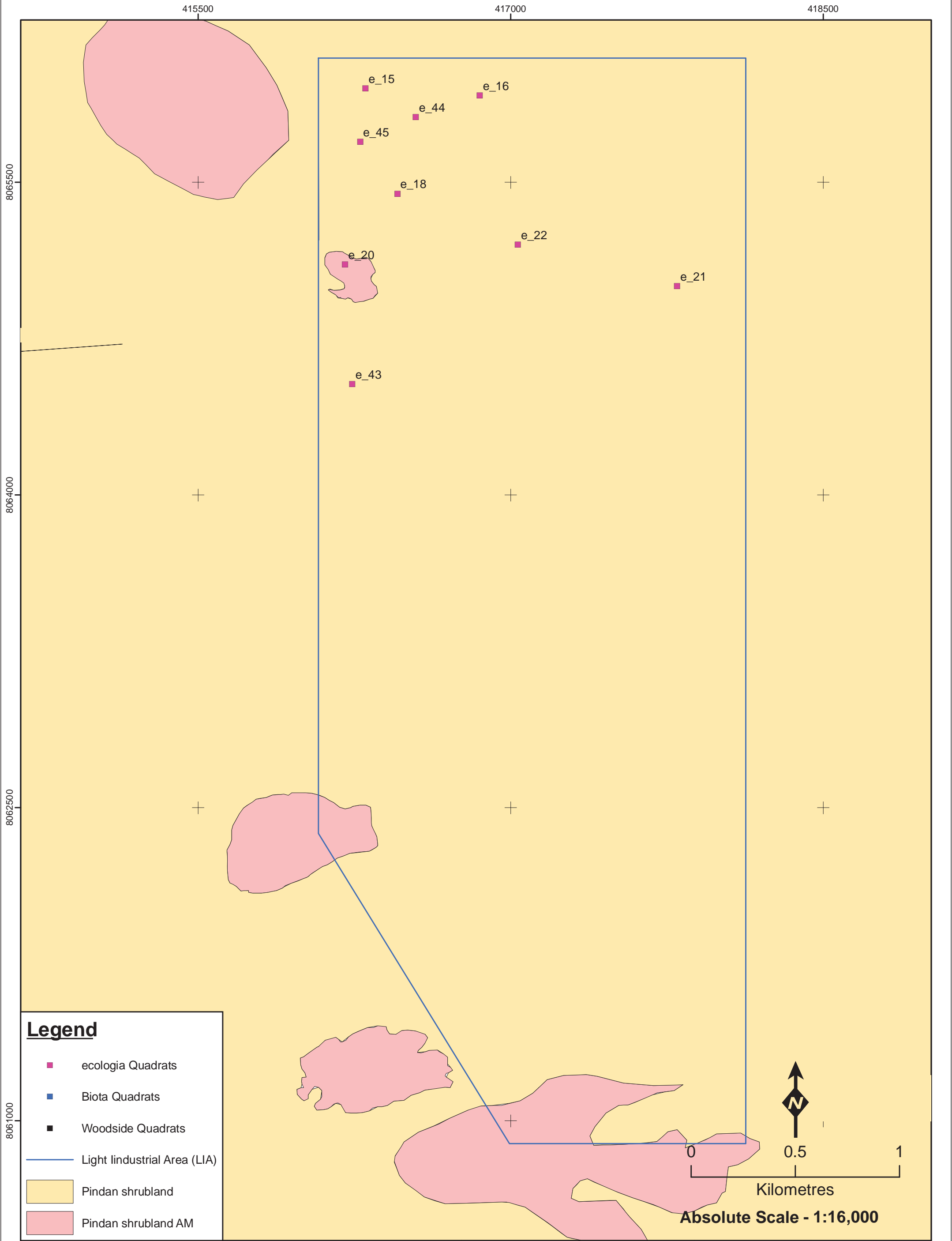
# Vegetation map of the Workers' Accommodation Camp

**Figure: 4.1**  
**Project ID: 1337**

**Drawn: RT**  
**Date: 07/09/11**

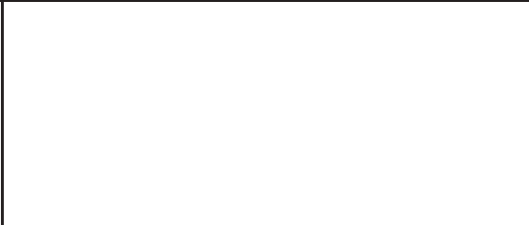
*Coordinate System*  
Name: GDA 1994 MGA Zone 51  
Projection: Transverse Mercator  
Datum: GDA 1994

Unique Map ID: RT007



**Legend**

- ecologia Quadrats
- Biota Quadrats
- Woodside Quadrats
- Light Industrial Area (LIA)
- Pindan shrubland
- Pindan shrubland AM



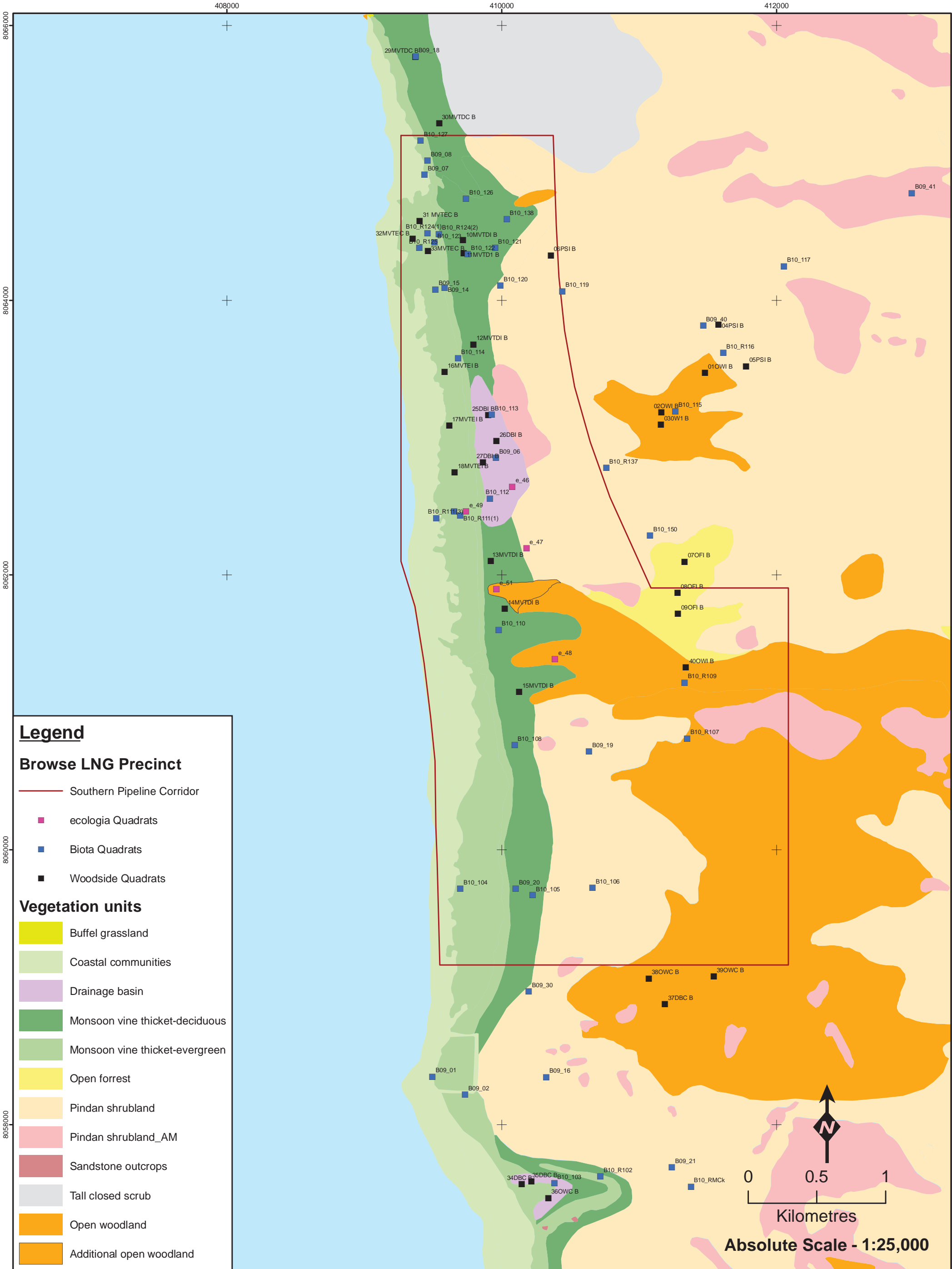
**Vegetation map  
of the Light  
Industrial Area**

**Figure: 4.2**  
**Project ID: 1337**

**Drawn: RT**  
**Date: 07/08/2011**

Coordinate System  
Name: GDA 1994 MGA Zone 51  
Projection: Transverse Mercator  
Datum: GDA 1994

Unique Map ID: RT008



## Legend

### Browse LNG Precinct

- Southern Pipeline Corridor
- ecologia Quadrats
- Biota Quadrats
- Woodside Quadrats

### Vegetation units

- Buffel grassland
- Coastal communities
- Drainage basin
- Monsoon vine thicket-deciduous
- Monsoon vine thicket-evergreen
- Open forrest
- Pindan shrubland
- Pindan shrubland\_AM
- Sandstone outcrops
- Tall closed scrub
- Open woodland
- Additional open woodland

## Vegetation map of the Southern Pipeline Area

Figure:4.3  
Project ID: 1337

Drawn: RT  
Date: 07/09/2011

Coordinate System  
Name: GDA 1994 MGA Zone 51  
Projection: Transverse Mercator  
Datum: GDA 1994

Unique Map ID: RT009



## 4.2 FLORA

A total of 202 flora taxa were recorded, including subspecies, varieties and hybrids, as detailed in Appendix D. The composition of the flora is summarised in Table 4.5 and Table 4.6.

**Table 4.5 – Taxonomic Composition of the Flora of the Project Area**

Area	Number Quadrats Surveyed	Number Taxa Recorded	Number Families	Number Genera	Number Families Represented by a Single Taxon	Number Genera Represented by a Single Taxon
Total	28	202	57	139	29	102
WAC	14	130	45	92	26	71
LIA	9	106	38	78	23	65
SP	5	126	42	92	26	70

Two taxa could not be identified to species level due to insufficient collection material; *Pterocaulon* sp., and *Tribulus* sp. These collections were the only specimens recorded within each of these genera and hence have been included in the totals above.

The families and genera represented by the greatest number of taxa and the most frequently recorded species in the Survey area are listed in Table 4.6.

**Table 4.6 – Most Frequently Recorded Families, Genera and Taxa in the Project Area**

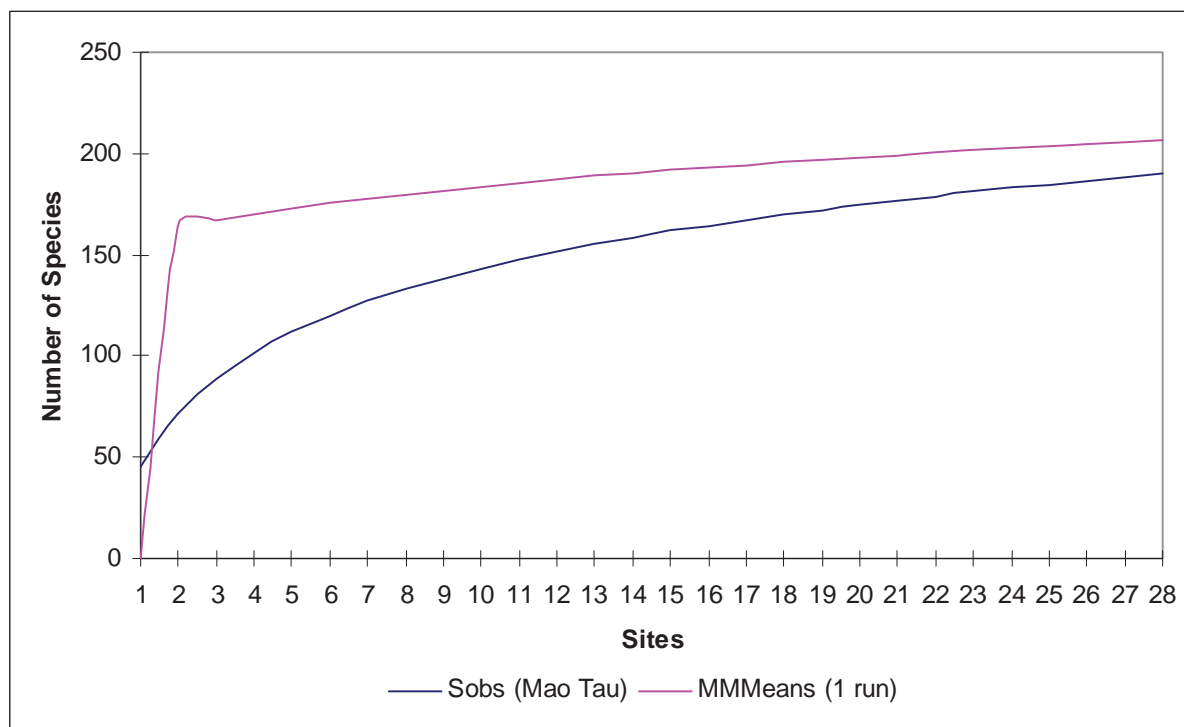
Most Common Families	Most Common Genera	Most Frequently Recorded Taxa
POACEAE (35 taxa) FABACEAE (31 taxa) MALVACEAE (15 taxa) MYRTACEAE (12 taxa)	<i>Acacia</i> (11 taxa) <i>Corymbia</i> (7 taxa) <i>Grevillea</i> (6 taxa) <i>Aristida</i> (5 taxa)	<i>Calandrinia strophiolata</i> (24 records) <i>Corchorus sidoides</i> subsp. <i>vermicularis</i> (25 records) <i>Goodenia sepalosa</i> var. <i>sepalosa</i> (23 records) <i>Gossypium rotundifolium</i> (23 records) <i>Marsdenia viridiflora</i> subsp. <i>tropica</i> (23 records) <i>Premna acuminata</i> (23 records) <i>Solanum cunninghamii</i> (23 records) <i>Waltheria indica</i> (24 records)

The highest species richness values in the Project area were recorded in quadrats located in the LIA and SP areas (mean species richness of 52.4 and 50.2 taxa, respectively). Lower species richness values were recorded in quadrats located in the WAC (mean species richness 39.9 taxa).

## 4.3 SAMPLING ADEQUACY AND SPECIES ACCUMULATION CURVE ANALYSIS FOR THE PROJECT AREA

Using SAC analysis (Colwell 2009) (Figure 4.4) and extrapolation of the curve to the asymptote using Michaelis-Menten modelling the incidence-based coverage estimator of species richness (ICE Mean,

Chao 2 Mean) was determined as 206.4. A total of 202 taxa were recorded in the Project area, suggesting that approximately 97.4% of the flora species potentially present within the Project area were recorded during the survey.



**Figure 4.4 – Average Randomised SAC for the Project Area**

#### 4.4 FLORA OF CONSERVATION SIGNIFICANCE

##### 4.4.1 Environment Protection and Biodiversity Conservation Act 1999

Flora species are protected at a National level under the Commonwealth EPBC Act. The EPBC Act contains a list of species that are considered either 'Critically Endangered', 'Endangered', 'Vulnerable', 'Conservation Dependent', 'Extinct' or 'Extinct in the Wild' (Appendix E).

Two species, *Keraudrenia exastia* and *Pandanus spiralis* var. *flammeus* are known to occur in the Dampierland bioregion. Neither of these EPBC Act listed species were recorded during the current survey or are expected to occur in the Project area.

##### 4.4.2 Wildlife Conservation Act 1950

Flora taxa protected under the *Western Australian Wildlife Conservation (Rare Flora) Notice 2010(2)* of the WC Act are known as Threatened taxa. This notice lists flora taxa that are extant and considered likely to become extinct or rare, defined as "taxa which have been adequately searched for and deemed to be either rare, in danger of extinction, or otherwise in need of special protection in the wild". These taxa are legally protected and their removal or impact to their surroundings cannot be conducted without Ministerial approval, obtained specifically on each occasion for each population (refer to Appendix E for category definitions).

A search of the DEC's Threatened Flora database indicated that currently, two Threatened taxa are listed as occurring in the Dampierland region; *Keraudrenia exastia* (critically endangered) and *Pandanus spiralis* var. *flammeus* (endangered) (Western Australian Herbarium, April 2011). These species, their preferred habitats, and an assessment of the probability of each species occurring within the Project area based on the suitability of habitats present are listed in Table 4.7.

No Threatened taxa were recorded in the Project area.

#### **4.4.3 Priority Flora with Potential to Occur in the Project Area**

The DEC maintains a list of Priority Flora taxa, which are considered poorly known, uncommon or under threat but for which there is insufficient justification, based on known distribution and population sizes, for inclusion on the DRF schedule. A Priority Flora taxon is assigned to one of four priority categories (Atkins 2008) as defined in Appendix E.

Currently, 61 Priority Flora taxa are listed as occurring in the Dampierland region (Western Australian Herbarium, June 2011).

Four Priority flora taxa occur within the Project Area; including *Eriachne* sp. Dampier Peninsula (P3), *Gomphrena pusilla* (P2), *Lophostemon grandiflorus* subsp. *grandiflorus* (P3) and *Pittosporum moluccanum* (P4).

A database search of the DEC's Threatened (Declared Rare) Flora Database (DEFL) and the DEC's Western Australian Herbarium (Western Australian Herbarium) Specimen Database indicated that 25 Priority Flora have previously been recorded within a 60 km buffer of the Project area (Table 4.7), 9 of which are considered to have the potential to occur within the study area. An additional nine species were identified in the DEC's Threatened and Priority Flora List search. These species are listed as occurring in the vicinity of Broome (nearest named place) but have been assessed as unlikely to occur in the Project area.

**Table 4.7 – Priority Flora within the 60 km buffer zone and assessment of potential to occur in the Project Area**

Cons. Code	Family	Taxa	Preferred Habitat	Known Distribution	Likelihood of Occurrence in the Project Area
P3	FABACEAE	<i>Acacia</i> sp. Riddell Beach (T. Willing 71)	On coastal cliffs and red sand/loam/rocky gullies.	Coastal cliffs on the Dampier Peninsula	Possible
P3	FABACEAE	<i>Aphyllodium glossocarpum</i>	On sand in Pindan shrubland	Dampier Peninsula and Brunswick Bay	Possible
P1	FABACEAE	<i>Aphyllodium parvifolium</i>	Sandy soils adjacent to Pindan shrubland often on edges of creeks or lagoons.	Dampier Peninsula and Taylors Lagoon E of Broome	Possible
P1	BYBLIDACEAE	<i>Byblis guehoi</i>	Sandy- loam and silty soils that are waterlogged part of the year	Dampier Peninsula near Beagle Bay	Unlikely
P3	EUPHORBIACEAE	<i>Croton aridus</i>	Deep red sands, pindan soils, sandplains or ridges. Also on spinifex sandplains.	Southern Dampier Peninsula and unconfirmed location in the Pilbara	Unlikely
P1	MYRTACEAE	<i>Corymbia paractia</i>	On skeletal soils, in the transition zone between coastal beach dunes & red pindan soils	Broome north to Barred Creek	Possible
P3	SAPINDACEAE	<i>Cupaniopsis anacardioides</i>	Vine thickets, coastal dunes	Far northern Kimberley	Unlikely
P1	CYPERACEAE	<i>Cyperus haspan</i> subsp. <i>haspan</i>	Peaty banks of springs	Northern Dampier Peninsula near Beagle Bay	Unlikely
P1	LORANTHACEAE	<i>Decaisnina signata</i> subsp. <i>cardiophylla</i>	Swampy flat plains	Northern Kimberley, Napier Broome Bay, Theda Station, Doogan Station, NT	Unlikely
P3	POACEAE	<i>Eriachne</i> sp. Dampier Peninsula (K.F. Kenneally 5946)	Sand or sandy clay, often in shallow skeletal soils.	Dampierland, Buccaneer Archipelago and Goody Goody.	Possible
P3	CYPERACEAE	<i>Fuirena incrassata</i>	Sand or sandy clay. Often found along swamps, creek beds, claypans and semi-saline lakes.	Isolated pockets in the eastern and western Kimberley and Pilbara.	Unlikely
P1	FABACEAE	<i>Glycine pindanica</i>	Plains of orange/red to brown sands in Pindan and often in disturbed soils such as road verges.	Western coastal margins of Dampierland.	Possible

Cons. Code	Family	Taxa	Preferred Habitat	Known Distribution	Likelihood of Occurrence in the Project Area
P2	AMARANTHACEAE	<i>Gomphrena pusilla</i>	On fine beach sands behind foredunes or on limestone.	Broome north to Barred Creek and Port Headland.	Possible
P4	HAEMODORACEAE	<i>Haemodorum gracile</i>	Open Eucalyptus or Melaleuca woodlands or Pindan on white to red sand or on sandy clays.	Dampierland and widespread in north-western Kimberley	Possible
P3	MALVACEAE	<i>Hibiscus kenneallyi</i>	Coastal soils, sandstone. In rock crevices, cliff tops	Northern Kimberley, Prince Regent N.R., Middle Osborn Is., Roe River, Vansittart Bay, Bougainville Peninsula Clader River, Napier Broome Bay	Unlikely
P1	CONVOLVULACEAE	<i>Ipomoea gracilis</i>	On black cracking clay or black sand often in irrigated areas.	Isolated scattered locations throughout the Kimberley.	Unlikely
P1	CONVOLVULACEAE	<i>Ipomoea</i> sp. A Kimberley Flora (L.J. Penn 84)	Eucalypt savannah woodland on margins of roads.	Dampierland and King Hall Island, Buccaneer Archipelago.	Possible
P1	CONVOLVULACEAE	<i>Jacquemontia</i> sp. Broome (A.A. Mitchell 3028)	<i>Acacia eriopoda</i> in disturbed pindan woodland.	North of Broome on Quandang Point road.	Possible
T (Extant)	MALVACEAE	<i>Keraudrenia exastia</i>	Relict desert dune swales along the coast and red sand in pindan.	Broome	Unlikely
P3	MALVACEAE	<i>Keraudrenia katatona</i>	Desert dunes in pindan, ranges, disturbed areas on red sands.	Broome and SE of Broome along transition between Dampierland and Great Sandy Desert.	Unlikely
P3	MYRTACEAE	<i>Lophostemon grandiflorus</i> subsp. <i>grandiflorus</i>	Damp habitats (swamps, seepages) <a href="http://florabase.calm.wa.gov.au/help/ibra/">http://florabase.calm.wa.gov.au/help/ibra/</a>	Sparse locations on the Dampier Peninsula and near Wyndham.	Occurs
P1	SOLONACEAE	<i>Nicotiana heterantha</i>	Seasonally wet flats on black clays	Scattered isolated populations in the Pilbara and coastal regions of Dampierland	Unlikely

Cons. Code	Family	Taxa	Preferred Habitat	Known Distribution	Likelihood of Occurrence in the Project Area
P2	MENYANTHACEAE	<i>Nymphoides beaglesensis</i>	Edges of permanent waterholes or in seasonally inundated claypans & depressions.	Dampierland and Northern Kimberley.	Unlikely
T (Extant)	PANDANACEAE	<i>Pandanus spiralis</i> var. <i>flammeus</i>	On white clay surrounding springs	Extremely localised 85 km south-west of Broome in the interior of the Dampier Peninsula	Unlikely
P1	APOCYNACEAE	<i>Parsonsia kimberleyensis</i>	Vine thickets	Far north of Dampier Peninsula	Unlikely
P3	POACEAE	<i>Phragmites karka</i>	Edges of pools and springs	Scattered locations throughout the Kimberley and Pilbara including Millstream, Doogan Station, Dampier Peninsula, Kununurra, Charnley River	Possible
P4	PHYLLANTHACEAE	<i>Phyllanthus aridus</i>	Various habitats including in sandy pindan, along creeks, sandstone ridges and rocky hillsides of sandstone, gravel, red sand.	Widely scattered throughout the Kimberley.	Unlikely
P4	PITTOSPORACEAE	<i>Pittosporum moluccanum</i>	On primary and secondary white sandy dunes.	Dampier Peninsula around James Price Point and Islands of Bonaparte Archipelago	Occurs
P3	ASTERACEAE	<i>Pterocaulon</i> sp. A Kimberley Flora (B.J. Carter 599)	Sandy coastal areas, saline sandy flats, and in pindan sandplains.	Scattered throughout Dampierland, western and far northern Kimberley.	Unlikely
P3	CYPERACEAE	<i>Schoenus punctatus</i>	Red sand along watercourses.	Few isolated populations in the Kimberley and one at Port Headland.	Unlikely
P3	STYLIDIACEAE	<i>Stylidium costulatum</i>	Sandy or clayey soils along creeks and seasonally wet areas	Dampierland and western Kimberley.	Unlikely
P1	FABACEAE	<i>Tephrosia andrewii</i>	Sand soils in Pindan shrublands	Isolated locations in coastal regions between Port Headland and Broome	Unlikely
P3	AIZOACEAE	<i>Tetragonia coronata</i>	Red clay and loamy soils, also found on calcrete outcrops.	Most locations are recorded around Shark Bay with a single location recorded from Broome.	Unlikely
P1	AIZOACEAE	<i>Tetragonia coronata</i>	On pindan plains near Broome, further south on red sands and loamy soils.	One population 12 Mile Broome, with other remaining populations around Shark Bay.	Unlikely

Cons. Code	Family	Taxa	Preferred Habitat	Known Distribution	Likelihood of Occurrence in the Project Area
P1	ASTERACEAE	<i>Thespidium basiflorum</i>	Creeklines and saline flats with sandy soils	Two populations recorded in Dampierland, one near Broome and the second near Beagle Bay.	Unlikely
P3	POACEAE	<i>Triodia acutispicula</i>	Red–orange sandy soils on river levees, pindan plains, rocky hillslopes & outcrops	Scattered populations in Dampierland and in the western Kimberley.	Unlikely

#### 4.4.4 Priority Flora Recorded in the Project Area

Three priority species were recorded in *ecologia's* 2011 vegetation survey: the P3 taxon *Eriachne* sp. Dampier Peninsula (K.F. Kenneally 5946), formally known as *Eriachne semiciliata*, P4 taxon, *Pittosporum moluccanum* and *Lophostemon grandiflorus* subsp. *grandiflorus* (P3).

##### 4.4.4.1 *Eriachne* sp. Dampier Peninsula (K.F. Kenneally 5946) – P3 flora

*Eriachne* sp. Dampier Peninsula is a delicate small annual grass typically 20-50 cm high with branching inflorescences.

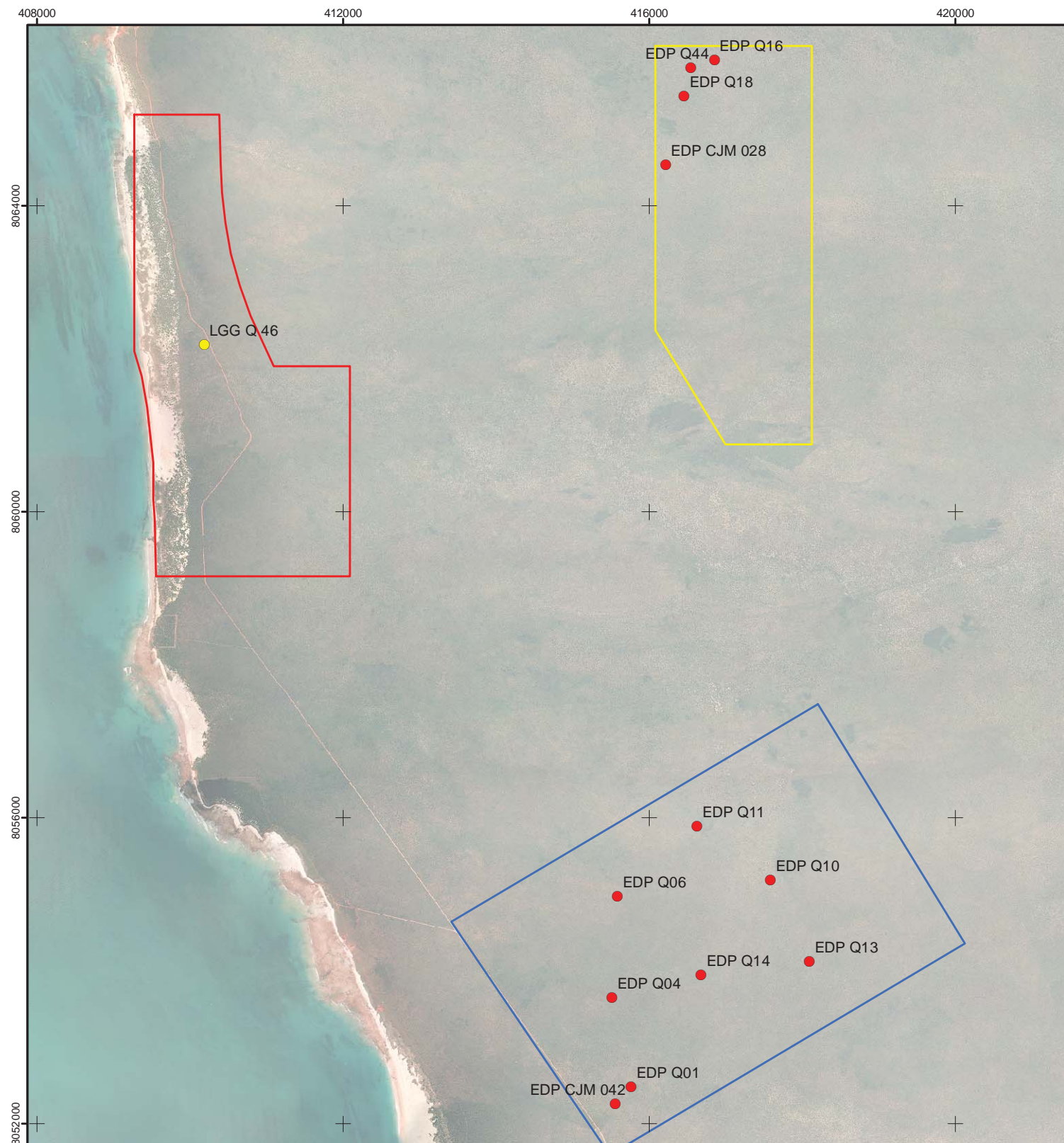
It is commonly found in skeletal, often gravelly, soils over sandstone, laterite, quartzite, conglomerate and shale, on hillslopes, ridges and rocky plateaux. It has also been recorded from disturbed ground, floodplains, red brown sandy loams, sand dunes and sandy clay 'pindan' plains.

Biota recorded this species numerous times in their 2009 survey, with the majority of records occurring closer to the coast. This taxon was recorded at 12 locations during the current survey, ten of which were in quadrats with two additional opportunistic collections. Seventy five percent of collections were within the WAC with the remainder within the LIA. No records were collected from the SP. The higher number of records in the WAC probably reflects the higher number of sites surveyed within this area due to greater access, rather than a higher local abundance. On the basis of the records to date, this taxon appears to be scattered widely at both the LIA and WAC and is probably relatively widespread in the pindan vegetation. Locations of *Eriachne* sp. Dampier Peninsula recorded during the current survey are provided in Table 4.8.

**Table 4.8 – Locations and cover class of *Eriachne* sp. Dampier Peninsula (K.F. Kenneally 5946) recorded by *ecologia* in 2011.**

Location	Area	Zone	Easting	Northing	Cover Class
Opportunistic Collection CJM 042	WAC	51K	415559	8052270	Isolated (<1%)
Opportunistic Collection CJM 028	WAC	51K	416216	8064552	Isolated (<1%)
Q01	WAC	51K	0415759	8052491	Isolated clumps (<5%)
Q04	WAC	51K	415514	8053653	Sparse (<20%)
Q06	WAC	51K	415583	8054979	Isolated clumps (<5%)
Q10	WAC	51K	417583	8055196	Isolated (<1%)
Q11	WAC	51K	416626	8055893	Isolated clumps (<5%)
Q13	WAC	51K	418092	8054122	Isolated clumps (<5%)
Q14	WAC	51K	416678	8053952	Isolated clumps (<5%)
Q16	LIA	51K	416851	8065917	Isolated clumps (<5%)
Q18	LIA	51K	416456	8065447	Isolated clumps (<5%)
Q44	LIA	51K	416544	8065814	Isolated (<1%)



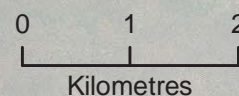


### Legend

- *Lophostemon grandiflorus* subsp. *grandiflorus*
- *Eriachne* sp. Dampier Peninsula

### Browse LNG Precinct

- Workers' Accommodation Camp
- Light Industrial Area (LIA)
- Southern Pipeline Corridor



**Absolute Scale - 1:70,000**

#### 4.4.4.2 *Pittosporum moluccanum* – P4 flora

*Pittosporum moluccanum* is a tall shrub or small to medium tree with smooth white bark. The leaves are whorled at the ends of the branches and are glossy dark green with undulate leaf margins.

*Pittosporum moluccanum* is spread throughout Formosa, the Philippines, Celebes, Moluccas, Malaysia, Eastern Java, Java and the lesser Sunda Island (Bakker 1957). In Australia its distribution extends from the Northern Territory to Western Australia. Mainly disjunct populations on stabilised coastal sand dunes occur at Cape Gambier, Melville Island west to Lee point in Darwin, and York Sound, far-north Western Australia and near James Price Point, Dampier Peninsula, Western Kimberley (Fig. 14; Koch 1992). The population at James Price Point is 480 km south-west of its nearest population on the coast of the far northern Kimberley.

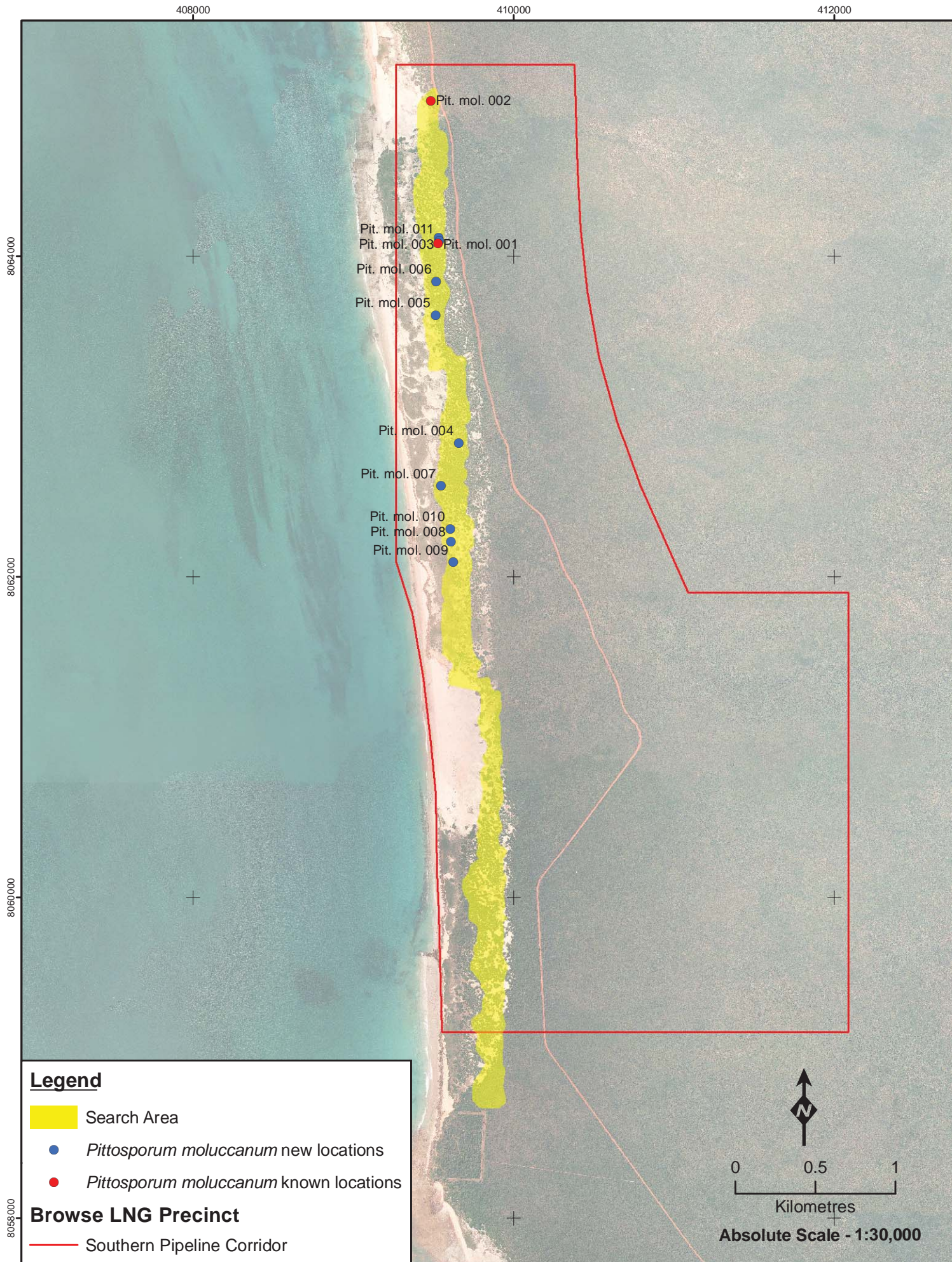
*Ecologia* conducted a targeted search for this species in the monsoon vine thicket evergreen in the SP area. A series of parallel transects were searched from the northern to southern boundary. Eleven specimens were recorded, nine of which are new collections based on Biota (2010).

Despite the intensity of the targeted survey, the density of vegetation within the evergreen vine thickets is such that additional records probably remain undetected within this area. However it appears that the species is not abundant and generally occurs as isolated plants.

**Table 4.9 – Locations of *Pittosporum moluccanum* and tree descriptors.**

<i>Pittosporum moluccanum</i> individual number	New location	Zone	Easting	Northing	Height	Health Notes
Pit. mol. 001	No	51K	4095289	8064081	1.5 m	Healthy
Pit. mol. 002	No	51K	409484	8064975	2 m	Healthy
Pit. mol. 003	Yes	51K	409534	8064122	3.5 m	Healthy
Pit. mol. 004	Yes	51K	409660	8062838	4 m	Healthy
Pit. mol. 005	Yes	51K	409514	8063638	2 m	Healthy
Pit. mol. 006	Yes	51K	409519	8063848	2.5 m	Healthy
Pit. mol. 007	Yes	51K	409547	8062569	2 m	Healthy
Pit. mol. 008	Yes	51K	409608	8062222	2.5 m	Healthy
Pit. mol. 009	Yes	51K	409625	8062094	2 m	Healthy
Pit. mol. 010	Yes	51K	409606	8062302	2 m	Healthy
Pit. mol. 011	Yes	51K	409538	8064097	2 m	Healthy





#### 4.4.4.3 *Lophostemon grandiflorus* subsp. *grandiflorus* – P3 flora

*Lophostemon grandiflorus* subsp. *grandiflorus* is an annual herb that is either erect or sprawling up to 20 cm high.

It is restricted in Western Australia to the Dampier Peninsula and around Port Headland behind foredunes and on fine beach sand with *Ipomea* sp., *Acacia* sp. and *Spinifex* sp. It has also been recorded to occur on limestone.

Biota recorded this species twice during their 2009 survey, once within the drainage basin vegetation and once opportunistically. During the current survey it was recorded once, also within the drainage basin vegetation unit.

The location of *Lophostemon grandiflorus* subsp. *grandiflorus* recorded during the current survey is provided in Table 4.10.

**Table 4.10 – Locations of *Lophostemon grandiflorus* subsp. *grandiflorus*.**

Location	Area	Zone	Easting	Northing
Q46	SP	51K	410182	8062194



#### 4.4.5 Range Extensions of Taxa Recorded in the Project Area

Based on records lodged at the Western Australia Herbarium (Western Australia Herbarium, May 2011), one taxa, *Thaumastochloa major* was recorded in the Project area which represents a significant extension of the range published by FloraBase (2011). The specimen collected at James Price Point occurs 150 km west of the nearest recorded population near Sawfish Point in King Sound. The locations where it was recorded are provided below.

**Table 4.11 – Locations of *Thaumastochloa major*.**

Location	Area	Zone	Easting	Northing
Q6	WAC	51K	415604	8054924
Q9	WAC	51K	415056	8052898
Q10	WAC	51K	417704	8055180
Q13	WAC	51K	418097	8054067
Q16	LIA	51K	416851	8065917
Q18	LIA	51K	416456	8065447
Q21	LIA	51K	417799	8065003
Q44	LIA	51K	416544	8065814
Q45	LIA	51K	416277	8065694
Q46	SP	51K	410182	8062194
Q47	SP	51K	409742	8062462

#### 4.5 INTRODUCED FLORA

##### 4.5.1 Weeds of National Significance (WONS)

At a national level there are twenty weed species listed as Weeds of National Significance (WONS). *The Commonwealth National Weeds Strategy: A Strategic Approach to Weed Problems of National Significance* describes broad goals and objectives to manage these species. Of these species, two are currently recorded within Dampierland (Mesquite *Prosopis* spp. and Parkinsonia *Parkinsonia aculeata*) but are not known from the Project area or from other studies at James Price Point.

No Weeds of National Significance were recorded in the Project area or have been recorded in previous surveys (Biota 2010).

##### 4.5.2 Declared Plants

Weeds that are, or have the potential to become, pests to agriculture can be declared formally under the *Agriculture and Related Resources Protection Act 1976 (ARRP Act)* (ARRP Act 1976) as declared plants. Weeds listed under this Act are listed with Standard Control Codes that outline the

requirements for their control. Five priority groupings exist (P1, P2, P3, P4 or P5) and more than one priority may be assigned to a weed species. Different municipal districts can use different priority levels. Details of these codes are included in Appendix F. Landholders having declared plants on their property are obliged to control them at their own expense, and are encouraged to follow the standard control codes. Information regarding the status of Declared Plants can be viewed at the Department of Agriculture and Food's (DAF) website:

[http://agspsrv95.agric.wa.gov.au/dps/version02/01\\_plantsearch.asp](http://agspsrv95.agric.wa.gov.au/dps/version02/01_plantsearch.asp)

Eighty eight plant species (or in some cases genera) are currently gazetted for Broome Region.

No Declared Plants were recorded by *ecologia* in the Project area, however *Sida acuta* (P1) was recorded by Biota 2010 at a single location within the drainage basin vegetation of the SP survey area.

#### 4.5.3 Environmental Weeds

A third and much more extensive categorisation of weeds has been developed by the Department of Environment and Conservation (DEC), formerly the Department of Conservation and Land Management (CALM) in an Environmental Weed Strategy for Western Australia (CALM, 1999). Weed species considered to adversely affect the communities they invade are evaluated based on the degree of invasiveness, distribution and environmental impacts. Weeds listed as Environmental Weeds are ranked into four categories using the above criteria and the scoring system:

- High; a species which scores as yes to all three of the above criteria. A rating of high indicates a species that should be prioritised for control and/or research;
- Moderate; a species which scores yes for two of the above criteria. A rating of moderate indicates a species which should be monitored. Control or research should be directed to it if funds are available;
- Mild; a species which scores yes to one of the criteria. A mild rating indicates monitoring or control if appropriate; and
- Low; a species which does not score yes for any of the criteria. A low rating indicates a low requirement for monitoring.

The assessment has recently been expanded to include a number of other criteria, although no revision of the Environmental Rating has been published.

Four weeds were recorded within the Project areas at nine locations; *Citrullus lanatus*, *Digitaria ciliaris*, *Eragrostis minor* and *Passiflora foetida* var. *hispida*. The locations are listed in Table 4.12 and mapped in Figure 4.7. The characteristics and broad distribution of these species are summarised in Table 4.13.





In addition to those species recorded by *ecologia* in the current survey, other serious environmental weeds have been recorded within the SP survey area including; *Aerva javanica*, *Cenchrus ciliaris*, and *Stylosanthes hamata* (Biota 2010). Further, species not recorded in the Project area but have been recorded to occur nearby that also pose threats include: *Bidens bipinnata*; *Cenchrus biflorus*; *C. setiger*; *Citrullus lanatus*; *Cucumis melo*; *Cynodon dactylon*; *Euphorbia tirucalli*; *Hyptis suaveolens*; *Leucaena leucocephala* subsp. *leucocephala*; *Macroptilium atropurpureum*; *Merremia aegyptia*; *M. dissecta*; *Pupalia micrantha*; *Trianthema portulacastrum*; *Triumfetta pentandra* and *Urochloa mosambicensis* (Biota 2010).

Table 4.12 – Introduced Flora Locations Recorded in the Project Area

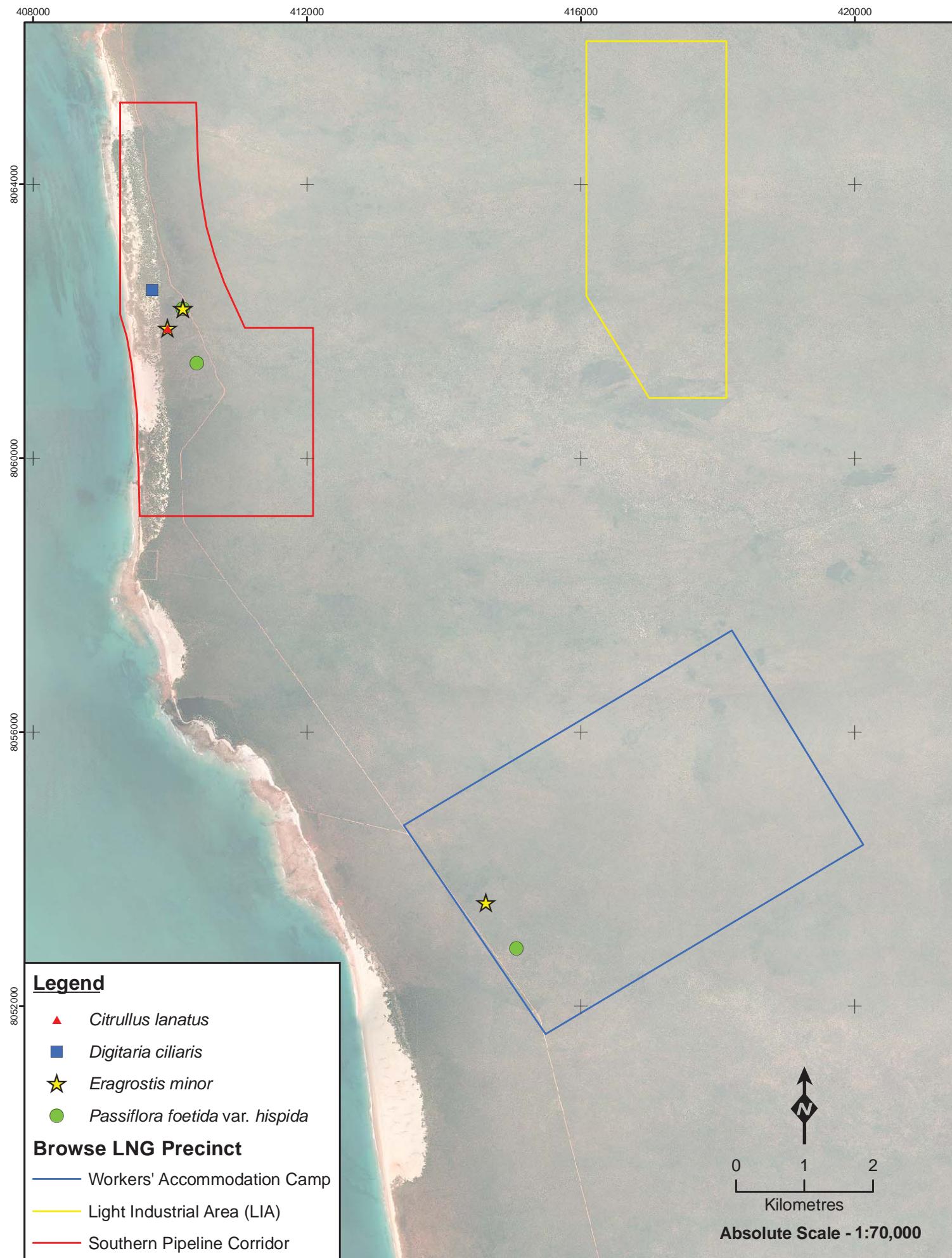
Family	Taxa	DEC Attribute Rankings Within Kimberley								Location within Project Area			
		Env. Rating	Current Distribution	Abundance	Ecological Impact	Invasiveness	Feasibility of Control	General Trend	Status	Area	Zone	Easting	Northing
CUCURBITACEAE	* <i>Citrullus lanatus</i>	Low	Limited	Occasional	Low	Slow	Medium	Unknown	Established	SP	51K	409962	8061896
POACEAE	* <i>Digitaria ciliaris</i>	Low	Moderate	Occasional	Low	Unknown	Low	Increasing	Established	SP	51K	409742	8062462
POACEAE	* <i>Eragrostis minor</i>	Low	Limited	Occasional	Low	Slow	Low	Increasing	Established	SP	51K	410182	8062197
										WAC	51K	414611	8053509
										SP	51K	410078	8062642
PASSIFLORACEAE	* <i>Passiflora foetida</i> var. <i>hispida</i>	High	High	Abundant	-	Rapid	Low	Increasing	Established	SP	51K	410078	8062642
										WAC	51K	415005	8052846
										SP	51K	410390	8061390

(WAC: Workers' Accommodation Camp; SP: Southern Pipeline)

**Table 4.13 – Introduced Flora Recorded in the Project Area**

Taxa & Number of Records	Description	Photograph
<p>* <i>Citrullus lanatus</i> (Pie Melon)</p> <p>1 record</p>	<p>* <i>Citrullus lanatus</i> is a trailing annual herb or climber with yellow flowers up to 2.1 m high and 4 m in diameter. It has broad leaves that are deeply dissected and palmately lobed up to 20 cm (Florabase 2011; Hussey et al. 2007). It grows in a wide variety of habitats including amongst tall to low woodlands, shrublands and in grasslands. It also occurs on the coast, in aquatic sites; river banks, centre of dry lakes, drains, plains, agricultural lands, in disturbed natural vegetation and on bare areas. In Western Australia it occurs throughout the state and is spread throughout the Northern Territory, South Australia, Queensland, New South Wales and Victoria (Florabase 2011).</p>	 <p><i>Citrullus lanatus</i> Photos: R. Randall &amp; J. Dodd Florabase (July 2011)</p>
<p>* <i>Digitaria ciliaris</i> (Henry's crabgrass, southern crabgrass)</p> <p>1 record</p>	<p>* <i>Digitaria ciliaris</i> is a decumbent, tufted annual grass ranging from 0.02–1 m high with long sprawling stems and erect inflorescences (Florabase 2011; Hussey et al. 2007). The many soft stems grow close to the ground in an open space or will push up through other grasses when crowded. It is able to flower and set seed repeatedly throughout the growing season. It is widespread occurring entirely throughout Western Australia and also in Queensland, Victoria, South Australia and the Northern Territory (Florabase 2011).</p>	 <p><a href="http://www.iewf.org">http://www.iewf.org</a> (July 2011)</p>
<p>* <i>Eragrostis minor</i> (Small stink grass, Small love grass)</p> <p>4 records</p>	<p>* <i>Eragrostis minor</i> is an erect, decumbent or prostrate annual grass ranging from 0.06–0.6 m high with an open green ovate panicle to 20 cm long (Florabase 2011; Hussey et al. 2007). It can sometimes be strongly odorous. It is often found along roadsides and railway lines. In Western Australia it has few isolated populations, however these are scattered throughout the entire state. It also occurs in Queensland, Victoria, South Australia and the Northern Territory (Florabase 2011).</p>	 <p><i>ecologia</i> (2011)</p>
<p>* <i>Passiflora foetida</i> var. <i>hispida</i> (Wild Passionfruit)</p> <p>3 records</p>	<p>* <i>Passiflora foetida</i> var. <i>hispida</i> is a woody climber or vine reaching heights of 9 m. It is a vigorous liana with tendrils, covered in sticky yellowish hairs and with an unpleasant smell. The vine is covered in soft hairs with solitary flowers up to 5 cm across (Florabase 2011; Hussey et al. 2007). It occurs amongst medium trees (and in herblands, vine thickets), along coastlines, in rocky or stony soil, gravelly soil, sand, loam and clay. It occupies coastal dunes, river and creek banks and gorges, rocky slopes, hill slopes valley plains and in disturbed natural vegetation. It was introduced originally from the West Indies and South America and has now spread throughout Western Australia, Northern Territory, Queensland and New South Wales. In Western Australia it occurs throughout the Kimberly and northern Pilbara (Florabase 2011).</p>	 <p><i>Passiflora foetida</i> var. <i>hispida</i> Photos: G. Byrne Florabase (July 2011)</p>





#### **4.6 SURVEY LIMITATIONS AND CONSTRAINTS**

According to the EPA Guidance Statement for Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a), vegetation and flora surveys may be constrained by several aspects, the relevance of which to the current survey is discussed in Table 4.14.

**Table 4.14 – Survey Limitations and Constraints**

Aspect	Constraint	Comment
Sources of information and availability of contextual information ( <i>i.e.</i> pre-existing background versus new material)	Minor	Information regarding vegetation at a regional scale is limited to the mapping of Beard (1975) at a scale of 1:000,000, and subsequently digitised and reinterpreted by Shepherd <i>et al</i> (2002). More recently the land systems (van Vreeswyk <i>et al.</i> 2004) provide a good source of regional information on vegetation communities and condition, based on land systems, again at a relatively broad scale of 1:250,000. The vegetation of an area of approximately 14920 ha which encompassed the current survey locations was mapped by Biota (2010) at a scale of 1:25,000. Woodside also provided additional floristic data for analysis.
The scope ( <i>i.e.</i> what life forms were sampled)	None	Vascular flora of the Survey Area was sampled.
Proportion of flora collected and identified (based on sampling, timing and intensity)	Moderate	A total of 1361 specimens were collected during the survey of the Project area from which 202 taxa were identified to species, subspecies or variety. Two taxa were limited to identification to genus level due to insufficient reproductive material. A species accumulation curve analysis indicated 98 % of the total vascular species likely to be present were recorded.
Completeness and further work which might be needed ( <i>e.g.</i> was the relevant area fully surveyed)	None	The Project area was surveyed at a density of one quadrat per 6.7 ha and, given the relatively homogenous vegetation over much of the area, this density is considered adequate to define the vegetation communities present. Limited access and the density of vegetation precluded an even coverage of the area with quadrats. Only 80 % of the WAC and the northern 30 % of the LIA was accessible to survey.
Mapping reliability	None	Colour aerial imagery was used to select sites and to map the vegetation of the Project area. Uncommon vegetation communities, which were not recognised in the pre-survey inspection of the aerial imagery but were encountered during the survey, were opportunistically sampled.
Timing/weather/season / cycle	Moderate	Rainfall recorded at Broome Airport in the six months preceding survey (April/May 2011) was 758 mm, 50 % higher than the long-term mean for the same six months (526 mm). Given the higher than average rainfall it is considered likely that most species of the area were present and collected.
Disturbances ( <i>e.g.</i> fire, flood, accidental human intervention)	None	Disturbance to vegetation of the LIA and WAC is minimal due to the limited access, density of vegetation and absence of pastoral activity. Disturbance to the SP is largely localised to the margins of the track which runs north-south through the area and to other small areas previously disturbed such as communication towers and campsites.
Intensity (in retrospect, was the intensity adequate?)	None	The survey intensity was unevenly distributed across the WAC and LIA areas due to limited access. However based on the homogeneity of the vegetation observed and appearance of the unsurveyed areas in aerial imagery, it is considered that the areas which were accessed were an adequate representation of the vegetation present in these areas as a whole. Data from the current survey considered in isolation does not adequately survey the vegetation of the SP but, when combined with data from more extensive surveys previously conducted in this area, is sufficient to allow the conservation significance of the vegetation to be assessed.
Resources	None	Resources were adequate for the botanical survey; 68 person days were invested in the field survey.
Access problems	Negligible	Portions of the LIA and WAC were inaccessible. The distance from the track and the density of vegetation resulted in the distribution of the quadrats in the WAC being confined to approximately 80 % of the area immediately west of the access track. Similarly within the LIA quadrats were confined to the most northern 30 % as access further south could not be achieved within the daily time constraints.

Aspect	Constraint	Comment
Experience levels (e.g. degree of expertise in plant identification to taxon level)	None	The five botanists conducting the survey had between four and 21 years of experience in conducting botanical surveys. Plant specimens were collected from each quadrat surveyed for verification. The taxonomists responsible are broadly experienced in identifying the flora of Western Australia, and cryptic specimens were referred to specialist taxonomist Russell Barrett, who has extensive experience with the flora of the Kimberley. The Project was overseen and reviewed by the Principal Botanist with 21 years of experience in environmental impact assessment. Qualifications of the Project staff are detailed in Section 3.9.

## **5 DISCUSSION**

### **5.1 VEGETATION COMMUNITIES CONSERVATION ASSESSMENT**

The significance of the vegetation of the Project area has been assessed at four spatial scales; national, state, regional and local.

Conservation significance is discussed for the whole Project area.

#### **5.1.1 Vegetation of National Significance**

National significance refers to those features of the environment which are recognised under legislation as being of importance to the Australian community. TECs listed under the EPBC Act are regarded as nationally significant. Currently, there are no nationally listed TECs listed under the EPBC act that occur within the Project area.

#### **5.1.2 Vegetation of State Significance**

State significance refers to those features of the environment that are recognised under State legislation as being of importance to the Western Australian community, in particular, communities listed as PECs. Ecological communities with insufficient information available to be considered a TEC, or which are rare but not currently threatened, are placed on the Priority list and referred to as PECs.

The Threatened Ecological Community, Monsoon Vine Thicket occurs within a section of the SP survey area. Vine thickets have been mapped on the Dampier Peninsula using TM imagery. It is conservatively estimated that there is at least 830 hectares on the northern region of the peninsula (CSIRO 2010). The total area within the SP Survey boundary is estimated to be 161 ha.

#### **5.1.3 Vegetation of Regional Significance**

Regional significance addresses the representation of species and habitats at a biogeographic regional level. Species or habitat types that are endemic to the Dampierland bioregion and with limited or unknown distributions are considered regionally significant.

Regional conservation significance of the vegetation communities of the Project area has been assessed based upon two sources of information; land systems (van Vreeswyk *et al.* 2004) and the digitised dataset of native vegetation (Shepherd, Beeston and Hopkins, 2001) which reinterpreted Beards (1975) vegetation mapping. These are the only broad-scale mapping Projects that have been conducted in the vicinity of the Project area from which the regional extent of each vegetation unit mapped at this scale can be quantified.

Based on the regional distribution (as discussed in Sections 5.1.3.1 and 5.1.3.2 below), it is considered that the vegetation communities recorded in the Project area are likely to be widespread throughout the Dampierland bioregion and have low conservation significance.

##### **5.1.3.1 Land System Analysis**

The Project area has been mapped into three land systems; the Wanganut, Yeeda and Carpentaria.



The Yeeda land system is found throughout the Workers' Accommodation and LIA survey areas, and makes up the greatest portion of the SP area (39.8%). The SP area also contains the Wanganut and Carpentaria land systems. All three land systems are well represented beyond the Project area, with each Project area comprising less than 0.5% of the total representation of each land system in Western Australia (Table 5.1).

**Table 5.1 – Land Systems of the Project Area**

Survey area	Land System	Total Area in Western Australia (km <sup>2</sup> )	Area in Survey Area (km <sup>2</sup> )	Percent of the Survey Area	Percent of Total Land System
WAC	Yeeda	21244.38	20.59	100.00	0.10
LIA	Yeeda	21244.38	9.71	100.00	0.05
SP	Wanganut	7187.99	3.92	34.06	0.06
	Yeeda	21244.38	4.58	39.79	0.02
	Carpentaria	6131.84	3.01	26.15	0.49

The Yeeda land system is widespread within Western Australia and encompasses 21,244 km<sup>2</sup>, or 17% of the state. It is characterised by Sandplains with red and yellow sands supporting pindan *Acacia* shrublands with emergent Eucalypt trees. The vast majority of the thirty-five hectares of this unit within the Project area (83% of the total Project area) was classified as excellent (95%) with 5% classified as very good.

Within the Project area this system is associated with the Pindan shrubland, open forest, open woodland, monsoon vine thicket deciduous and drainage basin.

The Wanganut land system encompasses 7,188 km<sup>2</sup> or 5.8% of Western Australia. It is characterised by low lying sandplains and dune fields with a through-going drainage supporting Pindan *Acacia* shrublands with emergent Eucalypt trees. The vast majority of the vegetation present in this unit within the study area was assessed as good (33.3%) or very good (33.3%) or excellent (33.3%). This unit constitutes 9.3% of the Project area and runs as an east-west band in the SP area. It is associated with the pindan shrubland, open woodland, open forest monsoon vine thicket deciduous and drainage basin vegetation communities.

The Carpentaria land system region and encompasses 6,132 km<sup>2</sup> or 15.3% of the state. It is characterised by coastal flats, associated sandy margins and dunes; saline sands and muds; paperbark thickets, samphire meadows, extensive bare mud flats with fringing mangrove forests. This system within the study area was assessed to be in very good condition.

The Carpentaria land system encompasses three hectares or 3.6 % of the Project area. This unit occurs on the western boundary of the SP area and is associated with the Coastal Communities and Monsoon Vine Thickets.

Due to the extensive representation and good condition of the Yeeda, Wanganut and Carpentaria land systems, they are not considered vulnerable using the threshold value of <30% of pre European extent.

### 5.1.3.2 Analysis of Shepherd *et al.* Dataset.

The vegetation mapping of Beard and Hopkins throughout Western Australia was subsequently digitised and updated to reflect the National Vegetation Information System (NVIS) standards (Shepherd *et al.* 2001). This data set allows the regional extent of units present within the Project area to be quantified and hence the conservation significance of units within the Project area to be assessed at a regional level. However the interpretation is limited by the following factors:

- The coarse scale of the regional vegetation mapping precludes assessing the regional distribution of communities types identified in the Project area during the current survey;
- Many minor land units including drainage channels present in the Project area are not mapped and cannot be correlated to the Beard mapping;
- As the mapping on which the database is based was completed in 1975, many taxonomic revisions have occurred and some species cited by Beard cannot be universally correlated to a current taxon;
- The vegetation was mapped by Beard on the basis of the extent assumed to occur prior to European settlement. The areas of each unit do not always reflect current extent or condition, particularly those units which are restricted in occurrence or particularly suited to pastoral or mining use.

The vegetation of the Project area was mapped by Shepherd *et al* into two communities.

#### **129 = Bare areas; drift sands**

The bare areas and drift sands of James Price Point comprise a small proportion of the Project area, and occur along the western boundary of the SP area. This vegetation type comprises less than 0.001% of the total area of bare areas and drift sands in Western Australia.

#### **750 = Pindan woodland on monotonous sandplain comprising *Eucalyptus tectifica* and *Corymbia grandifolia* woodland over *Acacia tumida* shrubland over *Chrysopogon* and *Triodia* grasslands.**

This unit covers almost the entire area surveyed by *ecologia* within the LIA, WC and SP. Vegetation type 750, occupies vast areas in Western Australia (12,416 km<sup>2</sup>) and thus the Project area comprises only 0.33% of the total area of this vegetation type in Western Australia. The coarse scale of Beard (1979) mapping of Western Australia does not identify the changes in vegetation over smaller distances. This unit predominately correlates to the pindan shrubland in The Project area.

Table 5.2 – Regional Representation of Shepherd *et al* (2001) Units Present

Shepherd <i>et al</i> Vegetation Unit	Shepherd <i>et al</i> Vegetation Description	Beard Vegetation Unit	Beard Vegetation Description	Current Extent in Western Australia (km <sup>2</sup> )	% Pre- European Extent Remaining	Area in Project Area (km <sup>2</sup> )	% Current Extent in Project Area	Vegetation Community Mapped within Current Survey to which Shepherd Unit Most Closely Correlates		
								No	Description	Area in Project Area (km <sup>2</sup> )
129	Bare areas; drift sands	ds	<i>Eucalyptus leucophloia</i> isolated low trees, over <i>Triodia wiseana</i> open hummock grassland.	517.47	54.1	0.01	1.93x10 <sup>-5</sup> %	Pindan shrubland	Mixed <i>Acacia</i> species (commonly <i>A. eriopoda</i> and <i>A. tumida</i> ) with scattered <i>Corymbia dampieri</i> and <i>C. zygophylla</i> over <i>Carissa lanceolata</i> , <i>Dodonaea hispidula</i> , <i>Trichodesma zeylanicum</i> , <i>Acacia adoxa</i> , <i>Gossypium australe</i> and <i>Waltheria indica</i> over <i>Triodia schinzii</i> , <i>Chrysopogon pallidus</i> , <i>Aristida holathera</i> var. <i>holathera</i> and <i>Eriachne obtusa</i> .	41.85
750	pindan woodland on monotonous sandplain comprising <i>Eucalyptus tectifica</i> and <i>Corymbia grandifolia</i> woodland over <i>Acacia tumida</i> shrubland over <i>Chrysopogon</i> and <i>Triodia</i> grasslands.	e <sub>50</sub> ,s <sub>1</sub> Mia <sub>29</sub> Sc cp <sub>3</sub> Gi	<i>Acacia inaequilatera</i> isolated tall shrubs, over <i>Triodia pungens</i> open hummock grassland.	12,944.65	100	41.84	3.2x10 <sup>-3</sup> %			



#### 5.1.4 Vegetation of Local Significance

Vegetation of local significance is confined to a specialised habitat type that is not common locally and whose disturbance or removal may lead to local extinction of that community type or of a particular taxon of conservation significance.

The areas of each community type mapped within The Project area are summarised in Table 5.3.

**Table 5.3 – Representation of Vegetation Communities with The Project area.**

Community Type		Landform	Vegetation Condition	Area within Survey area (km <sup>2</sup> )	%
1	<b>Monsoon Vine Thicket Evergreen</b>  <i>Celtis philippensis</i> , <i>Diospyros humilis</i> , <i>Mimusops elengi</i> , <i>Sersalisia sericea</i> and the occasional P4 <i>Pittosporum moluccanum</i> over <i>Exocarpos latifolius</i> , <i>Glycosmis macrophylla</i> and <i>G. trifoliata</i> over vines including <i>Abrus precatorius</i> , <i>Caesalpinia major</i> , <i>Capparis lasiantha</i> and the invasive <i>Passiflora foetida</i> var. <i>hispida</i> with <i>Enneapogon caeruleus</i> and <i>Cymbopogon procerus</i> .	Swale and dune	Very good	1.61	3.85
2	<b>Drainage Basin</b>  <i>Lophostemon grandiflorus</i> subsp. <i>grandiflorus</i> , <i>Corymbia bella</i> , <i>Acacia colei</i> , <i>Ehretia saligna</i> , <i>Hakea macrocarpa</i> , <i>Santalum lanceolatum</i> and <i>Senna costata</i> over <i>Solanum cunninghamii</i> , <i>Croton habrophyllus</i> and <i>Bridelia tomentosa</i> with dense grasses of <i>Aristida holathera</i> var. <i>holathera</i> , <i>Cymbopogon procerus</i> and <i>Setaria apiculata</i> and vines <i>Abrus precatorius</i> , <i>Passiflora foetida</i> var. <i>hispida</i> and <i>Tinospora smilacina</i> .	Plain	Good	0.27	0.65
3	<b>Open Forest</b>  <i>Eucalyptus miniata</i> and <i>Corymbia dampieri</i> over variably dense understorey of Acacias including <i>A. eriopoda</i> , <i>A. monticola</i> , <i>A. tumida</i> , and <i>A. platycarpa</i> and <i>Grevillea pyramidalis</i> , over <i>A. hippuroides</i> , <i>Dodonaea hispidula</i> var. <i>arida</i> and <i>Gossypium rotundifolium</i> over <i>Aristida holathera</i> var. <i>holathera</i> , <i>Sorghum plumosum</i> and, <i>Triodia schinzii</i>	Plain	Excellent	0.28	0.70

4	<b>Open Woodland</b>  <i>Eucalyptus miniata</i> , <i>E. jensenii</i> or <i>Corymbia polycarpa</i> over <i>Acacia monticola</i> , <i>A. tumida</i> , <i>A. eriopoda</i> , <i>A. platycarpa</i> over <i>Bridelia tomentosa</i> , <i>Corchorus sidoides</i> , <i>Dodonaea hispidula</i> var. <i>arida</i> , <i>Microstachys chamaelea</i> and <i>Waltheria indica</i> over grasses <i>Aristida contorta</i> , <i>Cymbopogon procerus</i> , and vines <i>Cassytha filiformis</i> , <i>Passiflora foetida</i> var. <i>hispida</i> .	Plain	Excellent	2.49	5.95
5	<b>Pindan Shrubland</b>  Mixed <i>Acacia</i> species (commonly <i>A. eriopoda</i> and <i>A. tumida</i> ) with scattered <i>Corymbia dampieri</i> and <i>C. zygophylla</i> over <i>Carissa lanceolata</i> , <i>Dodonaea hispidula</i> , <i>Trichodesma zeylanicum</i> , <i>Acacia adoxa</i> , <i>Gossypium australe</i> and <i>Waltheria indica</i> over <i>Triodia schinzii</i> , <i>Chrysopogon pallidus</i> , <i>Aristida holathera</i> var. <i>holathera</i> and <i>Eriachne obtusa</i> .	Plain	Excellent	33.19	79.31
5b	<b>Pindan Shrubland with <i>Acacia monticola</i> thicket</b>  <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> , <i>Corymbia greeniana</i> , <i>C. zygophylla</i> , <i>Gardenia pyrifolia</i> , <i>Ficus scobina</i> and <i>Sersalisia sericea</i> over dense belts of <i>Acacia monticola</i> , <i>A. eriopoda</i> , <i>A. hippuroides</i> , <i>Dodonaea hispidula</i> var. <i>arida</i> and <i>Grevillea refracta</i> over <i>Aristida holathera</i> var. <i>holathera</i> , <i>Chrysopogon pallidus</i> and <i>Eriachne ciliata</i> .	Plain	Excellent	1.11	2.65

Note: % column does not add up to 100 % as not all mapped vegetation units of Biota 2011 could be surveyed.

At the local scale it can be seen that Community Type five constitutes a large proportion of the Project area.

Community Type 1 is associated with swales and dunes. The P4 species *Pittosporum moluccanum* appears to be restricted to this community type and on that basis is considered of local significance.

The drainage basin is likely to support ephemeral annual species following big rainfall events which may not be supported elsewhere. It is restricted in occurrence at a local scale and on that basis is considered of local significance.

*Eriachne* sp. Dampier Peninsula is spread throughout communities 3, 5 and 5b and is considered likely to be widespread locally. Despite Community type 3 being uncommon within the Project area, there are no taxa known to be confined to this community type.

It should be noted that whilst the above community types are restricted within the Project area, they extend beyond the Project area boundaries in aerial imagery and are likely to be more widespread at a local scale.

## 5.2 FLORA CONSERVATION ASSESSMENT

The conservation significance of the flora of the Project area has been assessed at four spatial scales; national, state, regional and local.

### 5.2.1 Flora of National and State Conservation Significance

National significance refers to those features of the environment which are recognised under legislation as being of importance to the Australian community; in particular, species listed under the EPBC Act are regarded as nationally significant.

State significance refers to those features of the environment that are recognised under State legislation as being of importance to the Western Australian community, in particular, species listed as DRF under the WC Act are of state significance.

No flora of national or state significance was recorded in the Project area.

### 5.2.2 Flora of Regional and Local Conservation Significance

Regional significance addresses the representation of habitats at a biogeographic regional level. Priority Flora taxa that are endemic to the Dampierland bioregion and whose distributions are limited or unknown are considered regionally significant.

Flora are of local significance when their presence is confined to a specialised habitat type that is not common in the local area and whose disturbance or removal may lead to local extinction.

Three species of regional significance and local significance were recorded in the Project area of James Price Point, *Eriachne* sp. Dampier Peninsula (P3), *Lophostemon grandiflorus* subsp. *grandiflorus* (P3) and *Pittosporum moluccanum* (P4).

*Eriachne* sp. Dampier Peninsula (formerly *Eriachne semiciliata*) has limited collections from Western Australia but is spread throughout areas of Dampierland and the western Kimberley. *Eriachne* sp. Dampier Peninsula was recorded 12 times during the current survey, primarily in the WAC but also in the LIA. Biota (2010) and ENV (2008) also recorded this species an additional 14 times around the James Price Point study area. Previously higher percentages of records have been found closer to the coast (pindan shrubland, deciduous vine thicket, coastal heath, and tall closed scrub) however, all of the locations recorded in this survey were further

inland in the pindan shrubland and open forest and it is probably widespread throughout the Project area.

*Lophostemon grandiflorus* subsp. *grandiflorus* is known from scattered isolated population within the Kimberley. Within the vicinity of James Price Point it was recorded by Biota (2010), Biota 2011b) and by *ecologia* in the current survey. The *ecologia* and Biota (2010) records were recorded in the drainage basin vegetation unit.

*Pittosporum moluccanum* is known from the vicinity of James Price Point with ENV recording an individual in 2008 and an additional record being recorded by Biota in 2009. Both of these records were recorded in the evergreen monsoon vine thicket. A targeted search for *Pittosporum moluccanum* in the SP area during the current survey identified eleven individuals. Nine of these records are potentially new locations based on Biota (2010). The individuals were recorded in the northern half of the SP survey area, all of which were in the evergreen monsoon vine thicket.

While not recorded in the current survey, *Gomphrena pusilla* (P2) has been previously recorded within the coastal community (Biota 2010).

## 6 CONCLUSIONS

### VEGETATION

Five vegetation types were surveyed within the LIA, WAC and SP including the Monsoon vine thicket evergreen; Drainage Basin; Open Forest; Open Woodland and Pindan shrubland with patches of *Acacia monticola* thickets.

One state-listed TEC occurs within the SP area. The Threatened Ecological Community, Monsoon Vine Thicket occurs within the boundaries of the SP survey area (Biota 2010, 2011). These vine thickets have been extensively mapped on the Dampier Peninsula using TM imagery to map the total extent of the vine thicket and it was estimated that there is at least 830 hectares on the northern region of the peninsula (CSIRO 2010). The total area that occurs within the SP Survey boundary is estimated to be 161 ha.

### FLORA

A total of 202 taxa were recorded in the Project area. This number includes taxa from 57 families and 139 genera.

Species accumulation curve analysis indicated that 97.4% of the flora taxa estimated to be present in the Project area were recorded.

Four Priority species were recorded; *Eriachne* sp. Dampier Peninsula (P3) which was recorded 12 times throughout the survey, *Lophostemon grandiflorus* subsp. *grandiflorus* was recorded once and *Pittosporum moluccanum* (P4) which was recorded 11 times. *Eriachne* sp. Dampier Peninsula appears to be scattered widely at the LIA and WAC and is probably relatively widespread in the pindan vegetation. While not recorded in the current survey *Gomphrena pusilla* (P2) is known to occur within the Project area.

*Ecologia* conducted a targeted search for *Pittosporum moluccanum* (P4) in the Monsoon Vine Thicket Evergreen in the SP area. Despite the intensity of the targeted survey, the density of vegetation within the evergreen vine thickets is such that additional records probably remain undetected within this area. However it appears that the species is not abundant and generally occurs as isolated plants.

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## 7 REFERENCES

- Atkins, K. J. 2010. Declared Rare and Priority Flora List for Western Australia, Department of Environment and Conservation.
- Beard, J.S. 1979. Kimberley. The vegetation of the Kimberley area. Vegetation survey of Western Australia 1: 1,000,000 series, explanatory notes and map. University of Western Australia, Nedlands, WA.
- Biota Environmental Sciences 2010. A Vegetation and Flora Survey of James Price Point: Wet Season 2009. Appendix C-18 Browse Liquefied Natural Gas Precinct Strategic Assessment Report.
- Biota Environmental Sciences 2011a. James Price Point Flora and Vegetation Assessment March 2010. Unpublished Report for Environmental Resources Management and Woodside Energy Ltd.
- Biota Environmental Sciences 2011b. James Price Point, Vegetation Monitoring Program Phase 1 Data Report. Unpublished report for Sinclair Knight Merz and Woodside Energy Ltd.
- BOM. 2011. Climate Data Online, Bureau of Meteorology. Accessed <http://www.bom.gov.au/climate/data/>.
- Burbidge, A.A., N.L. McKenzie and K.F. Kenneally 1991. Nature Conservation Reserves in the Kimberley. Department of Conservation and Land Management.
- Burbidge, A. H., Harvey, M. S., and McKenzie, N. L. 2000. Biodiversity in the southern Carnarvon Basin. Records of the Western Australian Museum. Supplement 61:1 - 595.
- Colwell, R. K. 2009. EstimateS: Statistical estimation of species richness and shared species from samples. Version 8.
- Colwell, R. K. and Coddington, J. A. 1994. Estimating terrestrial biodiversity through extrapolation. Philosophical Transactions of the Royal Society (Series B). 345:101-118.
- Cotching, W.E. 2005. An Inventory of Rangelands in Part of the Broome Shire, Western Australia. Department of Agriculture. State Government of Western Australia.
- CSIRO 2010 Classification of Vine Thicket on Dampier Peninsula using TM Imagery Appendix C-21 Browse Liquefied Natural Gas Precinct Strategic Assessment Report.
- Department of Environment and Conservation 2006. List of Threatened Ecological Communities on the Department of Environment and Conservation's Threatened Ecological Community (TEC) Database endorsed by the Minister for the Environment. List prepared by the Department of Environment and Conservation Species and Communities Branch (correct to December 2006).
- DSD 2010. Browse Liquefied Natural Gas Precinct Strategic Assessment Report 2010 Department of State Development. Government of Western Australia.
- DEWHA 2009. Interim Biogeographic Regionalisation for Australia (IBRA), Version 6.1.

- EPA 2002. Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3. Perth, Environmental Protection Authority.
- EPA 2004. Guidance for the Assessment of Environmental Factors No. 51: Terrestrial flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, Environmental Protection Authority.
- Gaston, K. J. 1996. Species Richness: Measure and Measurement. In: Biodiversity, a Biology of Number and Difference. Blackwell Science, Cambridge.
- Hussey, B. M. J., G. J. Keighery, et al. 1997. Western Weeds. Kensington, W.A., The Plant Protection Society of Western Australia and Agriculture Western Australia.
- Kendrick, P. and N. McKenzie 2001. Pilbara 1 (PIL1 - Chichester subregion). A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002., DEC.
- McKenzie, N. L. and Kenneally, K. F. 1983. Part I: Background and Environment pp. 5-23 in McKenzie, N. L., ed. Wildlife of the Dampier Peninsula, South west Kimberley, Western Australia. Western Australian Wildlife Research Centre, Department of Fisheries and Wildlife, Perth, Western Australia.
- SEWPaC. 2010. Department of Sustainability, Environment, Water, Population and Communities. Interim Biogeographic Regionalisation for Australia (IBRA) version 6.1
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. 2002. Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture, Western Australia, South Perth.
- State of Western Australia 2000. Bush Forever Volume 2. Directory of Bush Forever Sites. Perth, State of Western Australia.
- Trudgen, M.E. 1988. A report on the Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.
- Western Australian Herbarium 2010. Western Australian Herbarium FloraBase, Government of Western Australia, Department of Environment and Conservation.
- Wildlife Conservation (Rare Flora) Notice 2010(2). Western Australian Government Gazette.



## Appendix A Quadrat Descriptions

## Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_01

**Botanist** RT & AC

**Date** 11/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0415759 mE 8052491 mN

**Habitat** Plain negligible slope

**Soil** Dark red sandy clay

**Rock Type** No rocks

**Vegetation** Brachychiton diversifolius subsp. diversifolius isolated low trees, over Acacia eriopoda and Grevillea pyramidalis subsp. pyramidalis sparse tall shrubland, over Acacia hippuroides and Corchorus sidoides subsp. vermicularis low shrubland, over Sorghum plumosum tussock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Brachychiton diversifolius subsp. diversifolius	1	Low tree <10m
Corymbia greeniana	1	Low tree <10m
Ehretia saligna	1	Low tree <10m
Acacia eriopoda	2	Tall shrub >2m
Grevillea pyramidalis subsp. pyramidalis	2	Tall shrub >2m
Acacia hippuroides	1	Mid shrub 1-2m
Grewia retusifolia	n	Mid shrub 1-2m
Premna acuminata	1	Mid shrub 1-2m
Trichodesma zeylanicum var. latisepalum	n	Mid shrub 1-2m
Ventilago viminalis	1	Mid shrub 1-2m
Abutilon otocarpum	n	Low shrub <1m
Acacia hippuroides	4	Low shrub <1m
Corchorus sidoides subsp. vermicularis	1	Low shrub <1m
Dodonaea hispidula var. arida	n	Low shrub <1m
Gyrostemon tepperi	1	Low shrub <1m
Sida sp. B Kimberley Flora (A.A. Mitchell 2745)	n	Low shrub <1m
Waltheria indica	1	Low shrub <1m
Evolvulus alsinoides var. decumbens	n	Vine
Galactia tenuiflora	1	Vine
Gossypium rotundifolium	1	Vine
Jasminum didymum	n	Vine
Melhania oblongifolia	n	Vine
Aristida holathera var. holathera	1	Grass

Name	Cover:	Height:
<i>Chrysopogon pallidus</i>	n	Grass
<i>Eriachne</i> sp. Dampier Peninsula (K.F.Kenneally 5946)	n	Grass
<i>Sorghum plumosum</i>	4	Grass
<i>Bulbostylis barbata</i>	n	Sedge
<i>Buchnera ramosissima</i>	n	Herb
<i>Calandrinia strophilata</i>	n	Herb
<i>Crotalaria brevis</i>	n	Herb
<i>Euphorbia alsiniflora</i>	n	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium leptaleum</i>	n	Herb
<i>Hibiscus leptocladus</i>	n	Herb
<i>Hybanthus aurantiacus</i>	1	Herb
<i>Murdannia graminea</i>	n	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	n	Herb
<i>Polycarpaea corymbosa</i>	n	Herb
<i>Polygala tepperi</i>	n	Herb
<i>Pterocaulon sphacelatum</i>	n	Herb
<i>Ptilotus corymbosus</i>	n	Herb
<i>Ptilotus polystachyus</i>	n	Herb
<i>Sida hackettiana</i>	1	Herb
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	n	Herb
<i>Tephrosia leptoclada</i>	n	Herb
<i>Trianthema pilosa</i>	n	Herb

## Photo



ecologia 2011

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_02

**Botanist** CM & SV

**Date** 11/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0414442 mE 8053817 mN ± 0.9

**Habitat** Plain negligible slope

**Soil** Orang-white sand

**Rock Type** No rocks

**Vegetation** Grevillea refracta subsp. refracta isolated low trees, over Grevillea refracta subsp. refracta and Acacia monticola closed tall shrubland, over Dodonaea hispidula var. arida sparse mid shrubland, over Dodonaea hispidula var. arida and Acacia hippuroides open low shrubland, over Marsdenia viridiflora subsp. tropica isolated vines, over Aristida holathera var. holathera open tussock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** >5 years

**Species List**

Name	Cover:	Height:
Brachychiton diversifolius subsp. diversifolius	1	Low tree <10m,
Corymbia greeniana	1	Low tree <10m
Ehretia saligna var. saligna	1	Low tree <10m
Ficus scobina	1	Low tree <10m
Grevillea pyramidalis subsp. pyramidalis	3	Low tree <10m
Sersalisia sericea	1	Low tree <10m
Acacia colei var. colei	1	Tall shrub >2m
Grevillea refracta subsp. refracta	3	Tall shrub >2m
Hakea macrocarpa	1	Tall shrub >2m
Hakea arborescens	1	Mid shrub 1-2m
Acacia eriopoda	1	Low shrub <1m
Acacia hippuroides	1	Low shrub <1m
Acacia monticola	3	Low shrub <1m
Codonocarpus cotinifolius	n	Low shrub <1m
Corchorus sidioides subsp. vermicularis	1	Low shrub <1m
Dodonaea hispidula var. arida	3	Low shrub <1m
Flueggea virosa subsp. melanthesoides	1	Low shrub <1m
Galactia tenuiflora	1	Low shrub <1m
Gossypium rotundifolium	1	Low shrub <1m
Gyrocarpus americanus subsp. pachyphyllus	1	Low shrub <1m
Premna acuminata	1	Low shrub <1m
Tephrosia remotiflora	1	Low shrub <1m
Ventilago viminalis	1	Low shrub <1m

Name	Cover:	Height:
<i>Cassytha filiformis</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	2	Grass
<i>Cymbopogon procerus</i>	1	Grass
<i>Eriachne ciliata</i>	1	Grass
<i>Schizachyrium fragile</i>	1	Grass
<i>Scleria brownii</i>	1	Grass
<i>Thaumatococcus pubescens</i>	1	Grass
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Euphorbia alsiniflora</i>	1	Herb
<i>Gonocarpus leptothecus</i>	1	Herb
<i>Hybanthus aurantiacus</i>	1	Herb
<i>Indigofera haplophylla</i>	1	Herb
<i>Mitrasacme exserta</i>	1	Herb
<i>Paspalidium rarum</i>	1	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Pterocaulon sphacelatum</i>	n	Herb
<i>Spermacoce occidentalis</i>	1	Herb
<i>Tephrosia leptoclada</i>	1	Herb
<i>Waltheria indica</i>	1	Herb
<i>Zornia prostrata</i> var. <i>prostrata</i>	1	Herb

### Photo



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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_03

**Botanist** CM & SV

**Date** 11/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0413779 mE 8054472 mN ± 0.9

**Habitat** Plain negligible slope

**Soil** Orang-white sand

**Rock Type** No rocks

**Vegetation** Mixed isolated low trees, over Acacia eriopoda sparse tall shrubland, over Acacia eriopoda open mid shrubland, over Aristida holathera var. holathera closed tussock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** >5 years

**Species List**

Name	Cover:	Height:
Brachychiton diversifolius subsp. diversifolius	1	Low tree <10m
Breynia cernua	1	Low tree <10m
Corymbia greeniana	1	Low tree <10m
Dolichandrone heterophylla	2	Low tree <10m
Ehretia saligna var. saligna	1	Low tree <10m
Ficus aculeata	1	Low tree <10m
Grevillea pyramidalis subsp. pyramidalis	1	Low tree <10m
Hakea arborescens	1	Low tree <10m
Persoonia falcata	1	Low tree <10m
Sersalisia sericea	1	Low tree <10m
Terminalia ferdinandiana	1	Low tree <10m
Acacia eriopoda	3	Tall shrub >2m
Acacia colei var. colei	1	Tall shrub >2m
Codonocarpus cotinifolius	1	Tall shrub >2m
Acacia adoxa var. adoxa	1	Low shrub <1m
Crotalaria medicaginea var. neglecta	1	Low shrub <1m
Dodonaea hispidula var. arida	1	Low shrub <1m
Flueggea virosa subsp. melanthesoides	1	Low shrub <1m
Grewia retusifolia	1	Low shrub <1m
Gyrostemon tepperi	1	Low shrub <1m
Maytenus cunninghamii	1	Low shrub <1m
Myoporum montanum	1	Low shrub <1m
Premna acuminata	1	Low shrub <1m
Santalum lanceolatum	1	Low shrub <1m
Solanum cunninghamii	n	Low shrub <1m
Tephrosia remotiflora	1	Low shrub <1m
Gossypium rotundifolium	1	Vine



Name	Cover:	Height:
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	5	Grass
<i>Cymbopogon procerus</i>	1	Grass
<i>Eriachne obtusa</i>	1	Grass
<i>Scleria brownii</i>	1	Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Byblis filifolia</i>	n	Herb
<i>Calandrinia strophiolata</i>	1	Herb
<i>Corchorus sidoides</i> subsp. <i>vermicularis</i>	1	Herb
<i>Cyanthillium cinereum</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Helichrysum lepidophyllum</i>	1	Herb
<i>Hybanthus aurantiacus</i>	1	Herb
<i>Microstachys chamaelea</i>	1	Herb
<i>Polygala tepperi</i>	2	Herb
<i>Pterocaulon sphacelatum</i>	1	Herb
<i>Ptilotus polystachyus</i>	1	Herb
<i>Spermacoce occidentalis</i>	1	Herb
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	1	Herb

### Photo



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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_04

**Botanist** RT & AC

**Date** 11/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0415563 mE 8053657 mN

**Habitat** Plain negligible slope

**Soil** Dark red sandy clay

**Rock Type** No rocks

**Vegetation** Acacia eriopoda and Ehretia saligna var. saligna open tall shrubland, over Dolichandrone heterophylla and Bauhinia cunninghamii open mid shrubland, over Acacia hippuroides and Corchorus sidoides subsp. vermicularis open low shrubland, over Triodia schinzii closed hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Ficus aculeata	1	Low tree <10m
Hakea arborescens	1	Low tree <10m
Acacia eriopoda	3	Tall shrub >2m
Corymbia greeniana	1	Tall shrub >2m
Ehretia saligna var. saligna	2	Tall shrub >2m
Gardenia pyriformis subsp. keartlandii	1	Tall shrub >2m
Bauhinia cunninghamii	2	Mid shrub 1-2m
Dodonaea hispidula var. arida	1	Mid shrub 1-2m
Dolichandrone heterophylla	2	Mid shrub 1-2m
Acacia hippuroides	3	Low shrub <1m
Breynia cernua	1	Low shrub <1m
Corchorus sidoides subsp. vermicularis	1	Low shrub <1m
Gyrostemon tepperi	n	Low shrub <1m
Ptilotus corymbosus	1	Low shrub <1m
Ptilotus polystachyus	n	Low shrub <1m
Sida rohlenae subsp. occidentalis	1	Low shrub <1m
Solanum cunninghamii	1	Low shrub <1m
Trichodesma zeylanicum var. zeylanicum	n	Low shrub <1m
Waltheria indica	n	Low shrub <1m
Galactia tenuiflora	2	Vine
Gossypium rotundifolium	1	Vine
Marsdenia viridiflora subsp. tropica	n	Vine
Aristida holathera var. holathera	1	Grass
Chrysopogon pallidus	2	Grass
Eriachne obtusa	1	Grass

Name	Cover:	Height:
Eriachne sp. Dampier Peninsula (K.F.Kenneally 5946)	n	Grass
Setaria surgens	n	Grass
Triodia schinzii	4	Hummock Grass
Calandrinia strophilata	1	Herb
Cucumis maderaspatanus	n	Herb
Euphorbia alsiniflora	1	Herb
Goodenia sepalosa var. sepalosa	n	Herb
Hybanthus aurantiacus	n	Herb
Polygala tepperi	n	Herb
Polymeria ambigua	n	Herb
Spermacoce occidentalis	n	Herb

**Photo**

ecologia 2011

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_05

**Botanist** RT & AC

**Date** 13/04/2011

**Size** 25 × 100 m

**Location (WGS) Zone 51K** 0417211 mE 8053297 mN ± 0.7

**Habitat** Plain negligible slope

**Soil** Orange sandy clay

**Rock Type** No rocks

**Vegetation** *Corymbia polycarpa* mid woodland, over *Corchorus sidoides* subsp. *vermicularis* and *Galactia tenuiflora* sparse low shrubland, over *Sorghum plumosum* closed tussock grassland.

**Condition** Very Good

**Fire** <1 years

**Species List**

Name	Cover:	Height:
<i>Corymbia polycarpa</i>	3	Mid tree 10-30m
<i>Corymbia greeniana</i>	1	Low tree <10m
<i>Ehretia saligna</i>	1	Low tree <10m
<i>Planchonia careya</i>	1	Low tree <10m
<i>Hakea macrocarpa</i>	n	Tall shrub >2m
<i>Acacia tumida</i> var. <i>kulparn</i>	n	Mid shrub 1-2m
<i>Bauhinia cunninghamii</i>	n	Mid shrub 1-2m
<i>Carissa lanceolata</i>	n	Mid shrub 1-2m
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	1	Mid shrub 1-2m
<i>Hakea arborescens</i>	1	Mid shrub 1-2m
<i>Abutilon otocarpum</i>	n	Low shrub <1m
<i>Acacia eriopoda</i>	2	Low shrub <1m
<i>Acacia hippuroides</i>	n	Low shrub <1m
<i>Acacia platycarpa</i>	1	Low shrub <1m
<i>Corchorus sidoides</i> subsp. <i>vermicularis</i>	1	Low shrub <1m
<i>Dolichandrone heterophylla</i>	1	Low shrub <1m
<i>Ehretia saligna</i>	1	Low shrub <1m
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	n	Low shrub <1m
<i>Galactia tenuiflora</i>	1	Low shrub <1m
<i>Grewia retusifolia</i>	1	Low shrub <1m
<i>Marsdenia angustata</i>	n	Low shrub <1m
<i>Melhaniea oblongifolia</i>	n	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Ventilago viminalis</i>	n	Low shrub <1m
<i>Gossypium rotundifolium</i>	1	Vine
<i>Tinospora smilacina</i>	n	Vine
<i>Chrysopogon pallidus</i>	2	Grass



Name	Cover:	Height:
<i>Sorghum plumosum</i>	5	Grass
<i>Yakirra australiensis</i> var. <i>intermedia</i>	1	Grass
<i>Triodia schinzii</i>	2	Hummock Grass
<i>Bulbostylis barbata</i>	n	Sedge
<i>Buchnera ramosissima</i>	n	Herb
<i>Calandrinia strophilata</i>	n	Herb
<i>Crotalaria brevis</i>	n	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium foliatum</i>	n	Herb
<i>Murdannia graminea</i>	n	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	n	Herb
<i>Polycarpaea corymbosa</i>	n	Herb
<i>Trianthema pilosa</i>	n	Herb

### Photo



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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_06

**Botanist** CM & SV

**Date** 12/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0415583 mE 8054979 mN ± 0.8

**Habitat** Plain negligible slope

**Soil** Orange-white sandy clay

**Rock Type** No rocks

**Vegetation** *Corymbia zygophylla* isolated low trees, over *Acacia eriopoda* open tall shrubland, over *Aristida holathera* var. *holathera* tussock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** >5 years

**Species List**

Name	Cover:	Height:
<i>Corymbia zygophylla</i>	1	Low tree <10m
<i>Persoonia falcata</i>	1	Low tree <10m
<i>Bauhinia cunninghamii</i>	1	Tall shrub >2m
<i>Acacia eriopoda</i>	4	Mid shrub 1-2m
<i>Ficus aculeata</i>	1	Mid shrub 1-2m
<i>Marsdenia angustata</i>	1	Mid shrub 1-2m
<i>Premna acuminata</i>	1	Mid shrub 1-2m
<i>Senna costata</i>	1	Mid shrub 1-2m
<i>Terminalia ferdinandiana</i>	1	Mid shrub 1-2m
<i>Acacia hippuroides</i>	1	Low shrub <1m
<i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>	1	Low shrub <1m
<i>Breynia cernua</i>	1	Low shrub <1m
<i>Codonocarpus cotinifolius</i>	1	Low shrub <1m
<i>Corchorus sidoides</i> subsp. <i>vermicularis</i>	2	Low shrub <1m
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	1	Low shrub <1m
<i>Dodonaea hispidula</i> var. <i>arida</i>	2	Low shrub <1m
<i>Ehretia saligna</i> var. <i>saligna</i>	1	Low shrub <1m
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	1	Low shrub <1m
<i>Galactia tenuiflora</i>	1	Low shrub <1m
<i>Gyrostemon tepperi</i>	1	Low shrub <1m
<i>Hybanthus aurantiacus</i>	1	Low shrub <1m
<i>Indigofera haplophylla</i>	1	Low shrub <1m
<i>Waltheria indica</i>	1	Low shrub <1m
<i>Hibiscus geranioides</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Polymeria ambigua</i>	n	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	4	Grass
<i>Chrysopogon pallidus</i>	1	Grass



Name	Cover:	Height:
<i>Eriachne obtusa</i>	2	Grass
<i>Eriachne</i> sp. Dampier Peninsula (K.F.Kenneally 5946)	1	Grass
<i>Scleria brownii</i>	1	Grass
<i>Thaumastochloa major</i>	1	Grass
<i>Yakirra pauciflora</i>	1	Grass
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Euphorbia alsiniflora</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium foliatum</i>	1	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	1	Herb
<i>Phyllanthus exilis</i>	1	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Pterocaulon</i> sp. (seedling)	1	Herb
<i>Spermacoce occidentalis</i>	1	Herb

### Photo



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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_07

**Botanist** CM & SV

**Date** 12/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0415972 mE 8055462 mN ± 1.0

**Habitat** Plain negligible slope

**Soil** Orange-white sandy

**Rock Type** No rocks

**Vegetation** Acacia eriopoda tall shrubland, over Corchorus sidoides subsp. vermicularis open low shrubland, over Aristida holathera var. holathera open tussock grassland, over Triodia schinzii open hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** >5 years

**Species List**

Name	Cover:	Height:
Brachychiton diversifolius subsp. diversifolius	1	Low tree <10m
Corymbia greeniana	1	Low tree <10m
Ficus aculeata	1	Low tree <10m
Premna acuminata	1	Low tree <10m
Terminalia ferdinandiana	1	Low tree <10m
Acacia eriopoda	4	Tall shrub >2m
Grevillea pyramidalis subsp. pyramidalis	1	Tall shrub >2m
Persoonia falcata	1	Tall shrub >2m
Acacia hippuroides	2	Low shrub <1m
Codonocarpus cotinifolius	1	Low shrub <1m
Corchorus sidoides subsp. vermicularis	3	Low shrub <1m
Corymbia zygophylla	n	Low shrub <1m
Ehretia saligna var. saligna	1	Low shrub <1m
Solanum cunninghamii	1	Low shrub <1m
Trichodesma zeylanicum var. zeylanicum	3	Low shrub <1m
Cassytha capillaris	1	Vine
Cucumis maderaspatanus	1	Vine
Gossypium rotundifolium	1	Vine
Marsdenia viridiflora subsp. tropica	1	Vine
Aristida holathera var. holathera	3	Grass
Chrysopogon fallax	2	Grass
Eriachne obtusa	3	Grass
Triodia schinzii	3	Hummock Grass
Byblis filifolia	1	Herb
Calandrinia strophilata	1	Herb
Crotalaria medicaginea var. neglecta	1	Herb
Evolvulus alsinoides var. decumbens	n	Herb

<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Gyrostemon tepperi</i>	1	Herb
<i>Heliotropium leptaleum</i>	1	Herb
<i>Hybanthus aurantiacus</i>	1	Herb
<i>Mitrasacme exserta</i>	1	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	n	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Spermacoce occidentalis</i>	1	Herb
<i>Thaumastochloa pubescens</i>	1	Herb

**Photo**

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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_08

**Botanist** RT & AC

**Date** 12/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416649 mE 8055154 mN ± 1.0

**Habitat** Plain negligible slope

**Soil** Dark red brown sandy clay

**Rock Type** No rocks

**Vegetation** Acacia eriopoda and Corymbia greeniana open mid shrubland over Chrysopogon pallidus sparse tussock grassland, over Triodia schinzii hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Corymbia zygophylla	1	Low tree <10m
Ehretia saligna	1	Tall shrub >2m
Ficus aculeata	1	Tall shrub >2m
Hakea macrocarpa	1	Tall shrub >2m
Acacia eriopoda	3	Mid shrub 1-2m
Corymbia greeniana	2	Mid shrub 1-2m
Dolichandrone heterophylla	1	Mid shrub 1-2m
Hakea arborescens	2	Mid shrub 1-2m
Jasminum didymum subsp. lineare	1	Mid shrub 1-2m
Acacia hippuroides	1	Low shrub <1m
Acacia tumida var. tumida	1	Low shrub <1m
Breynia cernua	n	Low shrub <1m
Codonocarpus cotinifolius	1	Low shrub <1m
Corchorus sidoides subsp. vermicularis	1	Low shrub <1m
Dodonaea hispidula var. arida	1	Low shrub <1m
Dolichandrone heterophylla	n	Low shrub <1m
Gyrostemon tepperi	n	Low shrub <1m
Solanum cunninghamii	n	Low shrub <1m
Cajanus marmoratus	n	Vine
Gossypium rotundifolium	1	Vine
Marsdenia viridiflora subsp. tropica	n	Vine
Chrysopogon pallidus	2	Grass
Eriachne obtusa	n	Grass
Triodia schinzii	4	Hummock Grass
Bonamia linearis	n	Herb
Calandrinia strophilata	1	Herb
Crotalaria brevis	n	Herb
Euphorbia aff. mitchelliana	n	Herb



<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	n	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	n	Herb
<i>Heliotropium foliatum</i>	n	Herb
<i>Hybanthus aurantiacus</i>	n	Herb
<i>Polygala tepperi</i>	n	Herb
<i>Tephrosia leptoclada</i>	n	Herb

**Photo**

ecologia 2011

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_09

**Botanist** CM & SV

**Date** 13/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0415061 mE 8052844 mN ± 1.0

**Habitat** Plain negligible slope

**Soil** Orange white sand

**Rock Type** No rocks

**Vegetation** *Corymbia flavescentis* open mid woodland, over *Acacia eripoda* open tall shrubland, over *Sorghum plumosum* open tussock grassland, over *Triodia schinzii* open hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** >5 years

**Species List**

Name	Cover:	Height:
<i>Corymbia flavescentis</i>	2	Mid tree 10-30m
<i>Bauhinia cunninghamii</i>	1	Low tree <10m
<i>Clerodendrum tomentosum</i>	1	Low tree <10m
<i>Corymbia dampieri</i>	1	Low tree <10m
<i>Corymbia grandifolia</i> subsp. <i>lamprocardia</i>	1	Low tree <10m
<i>Corymbia greeniana</i>	1	Low tree <10m
<i>Dolichandrone heterophylla</i>	1	Low tree <10m
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	2	Low tree <10m
<i>Passiflora foetida</i> var. <i>hispida</i>	1	Low tree <10m
<i>Persoonia falcata</i>	2	Low tree <10m
<i>Terminalia ferdinandiana</i>	1	Low tree <10m
<i>Acacia eripoda</i>	3	Tall shrub >2m
<i>Acacia tumida</i> var. <i>tumida</i>	2	Tall shrub >2m
<i>Ehretia saligna</i> var. <i>saligna</i>	1	Tall shrub >2m
<i>Ficus aculeata</i>	1	Tall shrub >2m
<i>Bridelia tomentosa</i>	1	Mid shrub 1-2m
<i>Clerodendrum floribundum</i> var. <i>ovatum</i>	1	Mid shrub 1-2m
<i>Santalum lanceolatum</i>	1	Mid shrub 1-2m
<i>Codonocarpus cotinifolius</i>	1	Low shrub <1m
<i>Corchorus sidioides</i> subsp. <i>vermicularis</i>	2	Low shrub <1m
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	1	Low shrub <1m
<i>Galactia tenuiflora</i>	2	Low shrub <1m
<i>Grevillea ceratocarpa</i>	1	Low shrub <1m
<i>Gyrostemon tepperi</i>	1	Low shrub <1m
<i>Hibiscus leptocladus</i>	1	Low shrub <1m
<i>Santalum lanceolatum</i>	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m



Name	Cover:	Height:
Waltheria indica	1	Low shrub <1m
Marsdenia viridiflora subsp. tropica	1	Vine
Eriachne obtusa	1	Grass
Sorghum plumosum	4	Grass
Thaumastochloa major	1	Grass
Triodia schinzii	3	Hummock Grass
Fimbristylis simulans	1	Sedge
Buchnera ramosissima	1	Herb
Goodenia sepalosa var. sepalosa	1	Herb
Gossypium rotundifolium	2	Herb
Murdannia graminea	1	Herb
Oldenlandia mitrasacmoides subsp. mitrasacmoides	1	Herb
Phyllanthus exilis	1	Herb
Polygala tepperi	1	Herb
Pterocaulon sp. (seedling)	1	Herb
Ptilotus corymbosus	1	Herb
Tephrosia leptoclada	1	Herb
Trichodesma zeylanicum var. zeylanicum	1	Herb

### Photo



ecologia 2011

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_10

**Botanist** CM & SV

**Date** 13/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0417583 mE 8055196 mN ± 1.1

**Habitat** Plain negligible slope

**Soil** Orange white sand

**Rock Type** No rocks

**Vegetation** Eucalyptus miniata open mid woodland, over Corymbia zygophylla and Brachychiton diversifolius subsp. diversifolius isolated low trees, over Acacia eriopoda open tall shrubland, over Dodonaea hispidula var. arida and Corchorus sidoides subsp. vermicularis sparse low shrubland, over Aristida holathera var. holathera open tussock grassland, over Triodia schinzii open hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** >5 years

**Species List**

Name	Cover:	Height:
Eucalyptus miniata	2	Mid tree 10-30m
Brachychiton diversifolius subsp. diversifolius	1	Low tree <10m
Corymbia zygophylla	1	Low tree <10m
Ficus aculeata	1	Low tree <10m
Terminalia ferdinandiana	1	Low tree <10m
Acacia eriopoda	3	Tall shrub >2m
Acacia platycarpa	2	Tall shrub >2m
Clerodendrum floribundum var. ovatum	1	Tall shrub >2m
Dolichandrone heterophylla	1	Tall shrub >2m
Persoonia falcata	1	Tall shrub >2m
Acacia ?retinervis	1	Mid shrub 1-2m
Flueggea virosa subsp. melanthesoides	1	Mid shrub 1-2m
Sersalisia sericea	1	Mid shrub 1-2m
Acacia hippuroides	1	Low shrub <1m
Codonocarpus cotinifolius	1	Low shrub <1m
Corchorus sidoides subsp. vermicularis	2	Low shrub <1m
Dodonaea hispidula var. arida	2	Low shrub <1m
Ehretia saligna var. saligna	1	Low shrub <1m
Grevillea pyramidalis subsp. pyramidalis	1	Low shrub <1m
Gyrostemon tepperi	1	Low shrub <1m
Hibiscus leptocladus	1	Low shrub <1m
Jasminum didymum	1	Low shrub <1m
Polygala tepperi	1	Low shrub <1m

Name	Cover:	Height:
<i>Sauropus trachyspermus</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Tephrosia remotiflora</i>	1	Low shrub <1m
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	1	Low shrub <1m
<i>Waltheria indica</i>	1	Low shrub <1m
<i>Aristida holathera</i> var. <i>holathera</i>	1	Vine
<i>Gossypium rotundifolium</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	3	Grass
<i>Eriachne</i> sp. Dampier Peninsula (K.F.Kenneally 5946)	2	Grass
<i>Mnesithea formosa</i>	1	Grass
<i>Schizachyrium fragile</i>	1	Grass
<i>Scleria brownii</i>	2	Grass
<i>Setaria surgens</i>	1	Grass
<i>Sorghum plumosum</i>	2	Grass
<i>Thaumastochloa major</i>	1	Grass
<i>Triodia schinzii</i>	4	Hummock Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophiolata</i>	1	Herb
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium</i> ? <i>leptaleum</i>	1	Herb
<i>Mitrasacme exserta</i>	1	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	1	Herb
<i>Pterocaulon</i> sp. (seedling)	1	Herb
<i>Pterocaulon sphacelatum</i>	1	Herb
<i>Spermacoce occidentalis</i>	1	Herb

**Photo**



*ecologia 2011*

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_11

**Botanist** RT & AC

**Date** 12/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416626 mE 8055893 mN ± 1.2

**Habitat** Plain negligible slope

**Soil** Dark red brown sandy-clay

**Rock Type** No rocks

**Vegetation** Acacia monticola and Acacia colei var. colei tall shrubland, over Grevillea refracta subsp. refracta isolated mid shrubs, over Acacia hippuroides, Dodonaea hispidula var. arida and Corchorus sidoides subsp. vermicularis open low shrubland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Corymbia greeniana	1	Low tree <10m
Acacia colei var. colei	2	Tall shrub >2m
Acacia monticola	4	Tall shrub >2m
Clerodendrum floribundum var. ovatum	1	Tall shrub >2m
Ficus aculeata	n	Tall shrub >2m
Grevillea refracta subsp. refracta	1	Tall shrub >2m
Acacia hippuroides	3	Mid shrub 1-2m
Clerodendrum floribundum var. ovatum	1	Mid shrub 1-2m
Corchorus sidoides subsp. vermicularis	1	Mid shrub 1-2m
Dodonaea hispidula var. arida	3	Mid shrub 1-2m
Maytenus cunninghamii	2	Mid shrub 1-2m
Terminalia ferdinandiana	1	Mid shrub 1-2m
Dodonaea hispidula var. arida	2	Low shrub <1m
Grevillea refracta subsp. refracta	1	Low shrub <1m
Lithomyrtus retusa	1	Low shrub <1m
Premna acuminata	n	Low shrub <1m
Solanum cunninghamii	n	Low shrub <1m
Waltheria indica	1	Low shrub <1m
Cassytha filiformis	1	Vine
Gossypium rotundifolium	n	Vine
Marsdenia viridiflora subsp. tropica	n	Vine
Aristida holathera var. holathera	1	Grass
Chrysopogon pallidus	1	Grass
Eriachne ciliata	1	Grass
Eriachne sp. Dampier Peninsula (K.F.Kenneally 5946)	1	Grass



Name	Cover:	Height:
<i>Paspalidium rarum</i>	1	Grass
POACEAE sp. 1	1	Grass
<i>Spermacoce occidentalis</i>	n	Herb
<i>Byblis filifolia</i>	n	Herb
<i>Calandrinia strophiolata</i>	n	Herb
<i>Gonocarpus leptothecus</i>	n	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	n	Herb
<i>Hybanthus aurantiacus</i>	n	Herb
<i>Jasminum molle</i>	n	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	n	Herb
<i>Sida</i> sp. B Kimberley Flora (A.A. Mitchell 2745)	n	Herb
<i>Spermacoce occidentalis</i>	n	Herb
<i>Tephrosia leptoclada</i>	n	Herb
<i>Thaumastochloa pubescens</i>	n	Herb
<i>Zornia prostrata</i> var. <i>prostrata</i>	n	Herb

## Photo



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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_12

**Botanist** RT & AC

**Date** 13/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0415147 mE 8052394 mN ± 0.9

**Habitat** Plain negligible slope

**Soil** Orange sandy-clay

**Rock Type** No rocks

**Vegetation** Acacia eriopoda open mid woodland, over Grevillea refracta subsp. refracta tall shrubland, over Dodonaea hispidula var. arida sparse mid shrubland, over Corchorus sidoides subsp. vermicularis isolated low shrubs, over Hybanthus aurantiacus and Polygala tepperi isolated herbs, over Eriachne obtusa sparse tussock grassland, over Triodia schinzii open hummock grassland.

**Condition** Excellent no obvious disturbance

**Fire** No evidence

**Species List**

Name	Cover:	Height:
Acacia eriopoda	2	Mid tree 10-30m
Ficus aculeata	1	Mid tree 10-30m
Breynia cernua	1	Low tree <10m
Corymbia greeniana	1	Low tree <10m
Persoonia falcata	2	Low tree <10m
Acacia colei var. colei	2	Tall shrub >2m
Codonocarpus cotinifolius	1	Tall shrub >2m
Grevillea refracta subsp. refracta	4	Tall shrub >2m
Dodonaea hispidula var. arida	2	Mid shrub 1-2m
Grewia breviflora	n	Mid shrub 1-2m
Premna acuminata	n	Mid shrub 1-2m
Acacia hippuroides	n	Low shrub <1m
Corchorus sidoides subsp. vermicularis	1	Low shrub <1m
Galactia tenuiflora	n	Low shrub <1m
Grevillea refracta subsp. refracta	n	Low shrub <1m
Gyrostemon tepperi	n	Low shrub <1m
Jasminum didymum subsp. lineare	n	Low shrub <1m
Melhania oblongifolia	1	Low shrub <1m
Sida rohlenae subsp. occidentalis	1	Low shrub <1m
Solanum cunninghamii	n	Low shrub <1m
Tephrosia leptoclada	n	Low shrub <1m
Waltheria indica	1	Low shrub <1m
Cassytha capillaris	n	Vine
Cucumis maderaspatanus	n	Vine



Name	Cover:	Height:
<i>Ipomoea pes-caprae</i>	n	Vine
<i>Lysiana spathulata</i> subsp. <i>spathulata</i>	n	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	n	Vine
<i>Tinospora smilacina</i>	n	Vine
<i>Aristida hygrometrica</i>	n	Grass
<i>Chrysopogon pallidus</i>	1	Grass
<i>Eriachne obtusa</i>	2	Grass
<i>Yakirra australiensis</i> var. <i>intermedia</i>	n	Grass
<i>Triodia schinzii</i>	3	Hummock Grass
<i>Calandrinia strophilata</i>	n	Herb
<i>Crotalaria brevis</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	n	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	n	Herb
<i>Gossypium rotundifolium</i>	n	Herb
<i>Heliotropium foliatum</i>	n	Herb
<i>Hybanthus aurantiacus</i>	1	Herb
<i>Mitrasacme exserta</i>	1	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	n	Herb
<i>Polygala tepperi</i>	1	Herb

### Photo



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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_13

**Botanist** RT & AC

**Date** 14/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0418092 mE 8054122 mN ± 0.8

**Habitat** Plain negligible slope

**Soil** Orange sandy-clay

**Rock Type** No rocks

**Vegetation** Corymbia zygophylla open low woodland, over Acacia monticola tall shrubland, over Dodonaea hispidula var. arida sparse mid shrubland, over Acacia hippuroides and Corchorus sidoides subsp. vermicularis sparse low shrubland, over Chrysopogon fallax sparse tussock grassland, over Triodia schinzii open hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Corymbia zygophylla	2	Mid tree 10-30m
Ficus aculeata	n	Mid tree 10-30m
Acacia hippuroides	1	Tall shrub >2m
Acacia monticola	4	Tall shrub >2m
Ehretia saligna var. saligna	1	Tall shrub >2m
Grevillea pyramidalis subsp. pyramidalis	2	Tall shrub >2m
Persoonia falcata	1	Tall shrub >2m
Dodonaea hispidula var. arida	2	Mid shrub 1-2m
Gardenia pyriformis subsp. keartlandii	1	Mid shrub 1-2m
Grevillea refracta subsp. refracta	1	Mid shrub 1-2m
Sersalisia sericea	1	Mid shrub 1-2m
Breynia cernua	1	Low shrub <1m
Clerodendrum floribundum var. floribundum	n	Low shrub <1m
Corchorus sidoides subsp. vermicularis	2	Low shrub <1m
Crotalaria medicaginea var. neglecta	n	Low shrub <1m
Dolichandrone heterophylla	1	Low shrub <1m
Gossypium rotundifolium	1	Low shrub <1m
Grevillea refracta subsp. refracta	n	Low shrub <1m
Gyrostemon tepperi	n	Low shrub <1m
Heliotropium leptaleum	n	Low shrub <1m
Melhania oblongifolia	n	Low shrub <1m
Myoporum montanum	n	Low shrub <1m
Premna acuminata	n	Low shrub <1m
Ptilotus polystachyus	n	Low shrub <1m

Name	Cover:	Height:
<i>Sauropus trachyspermus</i>	1	Low shrub <1m
<i>Sersalisia sericea</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Sida</i> sp. B Kimberley Flora (A.A. Mitchell 2745)	n	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Waltheria indica</i>	1	Low shrub <1m
<i>Cassytha capillaris</i>	n	Vine
<i>Cucumis maderaspatanus</i>	n	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	n	Vine
<i>Tinospora smilacina</i>	n	Vine
<i>Chrysopogon fallax</i>	2	Grass
<i>Eriachne obtusa</i>	1	Grass
<i>Eriachne</i> sp. Dampier Peninsula (K.F.Kenneally 5946)	n	Grass
<i>Setaria surgens</i>	1	Grass
<i>Thaumastochloa major</i>	1	Grass
<i>Yakirra australiensis</i> var. <i>australiensis</i>	n	Grass
<i>Triodia schinzii</i>	3	Hummock Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Fimbristylis oxystachya</i>	n	Sedge
<i>Buchnera ramosissima</i>	n	Herb
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	n	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	n	Herb
<i>Helichrysum lepidophyllum</i>	n	Herb
<i>Hybanthus aurantiacus</i>	n	Herb
<i>Mitrasacme exserta</i>	n	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	n	Herb
<i>Phyllanthus exilis</i>	n	Herb
<i>Polycarpaea corymbosa</i>	n	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Pterocaulon sphacelatum</i>	n	Herb
<i>Spermacoce occidentalis</i>	n	Herb
<i>Zornia prostrata</i> var. <i>prostrata</i>	1	Herb

**Photo**



*ecologia 2011*

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_14

**Botanist** RT & AC

**Date** 14/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416678 mE 8053952 mN ± 0.8

**Habitat** Plain negligible slope

**Soil** Dark red brown sandy clay

**Rock Type** No rocks

**Vegetation** Ficus aculeata and Brachychiton diversifolius subsp. diversifolius open low woodland, over Acacia eriopoda and Ehretia saligna var. saligna open mid shrubland, over Acacia hippuroides, Waltheria indica, Corchorus sidoides subsp. vermicularis and Sida rohlenae subsp. occidentalis sparse low shrubland, over Eriachne sp. Dampier Peninsula (K.F.Kenneally 5946) isolated tussock grasses, over Triodia schinzii hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Brachychiton diversifolius subsp. diversifolius	2	Low tree <10m
Ficus aculeata	1	Low tree <10m
Acacia platycarpa	n	Mid shrub 1-2m
Clerodendrum floribundum var. ovatum	1	Mid shrub 1-2m
Dolichandrone heterophylla	2	Mid shrub 1-2m
Hakea macrocarpa	1	Mid shrub 1-2m
Premna acuminata	1	Mid shrub 1-2m
Acacia eriopoda	3	Low shrub <1m
Acacia hippuroides	1	Low shrub <1m
Acacia tumida var. tumida	1	Low shrub <1m
Corchorus sidoides subsp. vermicularis	1	Low shrub <1m
Ehretia saligna var. saligna	1	Low shrub <1m
Hybanthus aurantiacus	n	Low shrub <1m
Ventilago viminalis	n	Low shrub <1m
Waltheria indica	1	Low shrub <1m
Galactia tenuiflora	1	Vine
Marsdenia viridiflora subsp. tropica	n	Vine
Aristida holathera var. holathera	1	Grass
Eriachne sp. Dampier Peninsula (K.F.Kenneally 5946)	1	Grass
Scleria brownii s.l.	1	Grass
Triodia schinzii	4	Hummock Grass
Calandrinia strophilata	1	Herb
Crotalaria brevis	n	Herb



Name	Cover:	Height:
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	n	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Gossypium rotundifolium</i>	n	Herb
<i>Gyrostemon tepperi</i>	1	Herb
<i>Heliotropium leptaleum</i>	n	Herb
<i>Hybanthus aurantiacus</i>	n	Herb
<i>Melhania oblongifolia</i>	n	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	n	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Herb
<i>Solanum cunninghamii</i>	n	Herb
<i>Stackhousia intermedia</i>	n	Herb
<i>Tephrosia leptoclada</i>	n	Herb
<i>Trianthema pilosa</i>	n	Herb

### Photo



ecologia 2011



Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_15

**Botanist** CM &cAC

**Date** 01/05/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416302 mE 8065950 mN ± 1.6

**Habitat** Plain negligible slope

**Soil** Dark red sandy clay

**Rock Type** No rocks

**Vegetation** *Corymbia zygophylla* low woodland, over *Acacia eriopoda* open tall shrubland, over *Grevillea refracta* subsp. *refracta* and *Acacia platycarpa* sparse mid shrubland, over *Acacia eriopoda* and *Acacia tumida* var. *tumida* sparse low shrubland, over *Chrysopogon fallax* and *Aristida holathera* var. *holathera* tussock grassland, over *Triodia schinzii* sparse hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
<i>Corymbia zygophylla</i>	3	Low tree <10m
<i>Persoonia falcata</i>	1	Low tree <10m
<i>Terminalia ferdinandiana</i>	1	Low tree <10m
<i>Acacia eriopoda</i>	3	Tall shrub >2m
<i>Acacia tumida</i> var. <i>tumida</i>	2	Tall shrub >2m
<i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>	1	Tall shrub >2m
<i>Breynia cernua</i>	1	Tall shrub >2m
<i>Clerodendrum floribundum</i> var. <i>ovatum</i>	1	Tall shrub >2m
<i>Corymbia dampieri</i>	1	Tall shrub >2m
<i>Ehretia saligna</i> var. <i>saligna</i>	1	Tall shrub >2m
<i>Ficus aculeata</i>	1	Tall shrub >2m
<i>Santalum lanceolatum</i>	1	Tall shrub >2m
<i>Acacia colei</i> var. <i>colei</i>	1	Low shrub <1m
<i>Acacia hippuroides</i>	1	Low shrub <1m
<i>Acacia platycarpa</i>	2	Low shrub <1m
<i>Calytrix exstipulata</i>	1	Low shrub <1m
<i>Codonocarpus cotinifolius</i>	1	Low shrub <1m
<i>Corchorus sidoides</i> subsp. <i>vermicularis</i>	1	Low shrub <1m
<i>Dodonaea hispidula</i> var. <i>arida</i>	2	Low shrub <1m
<i>Gardenia pyriformis</i> subsp. <i>keartlandii</i>	1	Low shrub <1m
<i>Grevillea refracta</i> subsp. <i>refracta</i>	2	Low shrub <1m
<i>Grewia retusifolia</i>	1	Low shrub <1m
<i>Gyrostemon tepperi</i>	1	Low shrub <1m
<i>Hibiscus leptocladus</i>	n	Low shrub <1m

Name	Cover:	Height:
<i>Premna acuminata</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Sida</i> sp. B Kimberley Flora (A.A. Mitchell 2745)	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Tephrosia remotiflora</i>	1	Low shrub <1m
<i>Cassytha capillaris</i>	1	Vine
<i>Gossypium rotundifolium</i>	1	Vine
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Rhynchosia minima</i>	1	Vine
<i>Tinospora smilacina</i>	1	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	1	Grass
<i>Chrysopogon fallax</i>	4	Grass
<i>Eriachne ciliata</i>	1	Grass
<i>Schizachyrium fragile</i>	2	Grass
<i>Scleria brownii</i>	1	Grass
<i>Setaria surgens</i>	1	Grass
<i>Thaumastochloa pubescens</i>	1	Grass
<i>Yakirra australiensis</i> var. <i>intermedia</i>	1	Grass
<i>Triodia schinzii</i>	2	Hummock Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Boerhavia gardneri</i>	1	Herb
<i>Buchnera ramosissima</i>	1	Herb
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophiolata</i>	1	Herb
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Gonocarpus leptothecus</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium leptaleum</i>	1	Herb
<i>Hybanthus aurantiacus</i>	1	Herb
<i>Mitrasacme exserta</i>	1	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	1	Herb
<i>Phyllanthus exilis</i>	1	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Polymeria ambigua</i>	1	Herb
<i>Pterocaulon sphacelatum</i>	1	Herb
<i>Spermacoce occidentalis</i>	1	Herb
<i>Tephrosia leptoclada</i>	1	Herb
<i>Waltheria indica</i>	1	Herb

**Photo**



*ecologia 2011*

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_16

**Botanist** RT & SV

**Date** 29/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416851 mE 8065917 mN ± 0.8

**Habitat** Plain negligible slope

**Soil** Orange sandy-clay

**Rock Type** No rocks

**Vegetation** *Corymbia zygophylla* open low woodland, over *Clerodendrum floribundum* var. *ovatum*, *Premna acuminata* and *Acacia eriopoda* open tall shrubland, over *Acacia platycarpa* open mid shrubland, over *Tinospora smilacina* isolated vines, over *Spermacoce occidentalis* sparse herbland, over *Aristida hygrometrica* and *Chrysopogon pallidus* open tussock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 2-5 years

**Species List**

Name	Cover:	Height:
<i>Corymbia zygophylla</i>	2	Low tree <10m
<i>Eucalyptus miniata</i>	1	Low tree <10m
<i>Terminalia ferdinandiana</i>	1	Low tree <10m
<i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>	1	Tall shrub >2m
<i>Clerodendrum floribundum</i> var. <i>ovatum</i>	3	Tall shrub >2m
<i>Codonocarpus cotinifolius</i>	1	Tall shrub >2m
<i>Ehretia saligna</i> var. <i>saligna</i>	1	Tall shrub >2m
<i>Ficus aculeata</i>	1	Tall shrub >2m
<i>Gardenia pyriformis</i> subsp. <i>keartlandii</i>	1	Tall shrub >2m
<i>Grevillea refracta</i> subsp. <i>refracta</i>	1	Tall shrub >2m
<i>Hakea arborescens</i>	1	Tall shrub >2m
<i>Premna acuminata</i>	2	Tall shrub >2m
<i>Santalum lanceolatum</i>	1	Tall shrub >2m
<i>Ventilago viminalis</i>	1	Tall shrub >2m
<i>Acacia eriopoda</i>	3	Mid shrub 1-2m
<i>Acacia tumida</i> var. <i>kulparn</i>	1	Mid shrub 1-2m
<i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>	1	Mid shrub 1-2m
<i>Acacia hippuroides</i>	1	Low shrub <1m
<i>Acacia platycarpa</i>	2	Low shrub <1m
<i>Corchorus sidoides</i> subsp. <i>vermicularis</i>	1	Low shrub <1m
<i>Dodonaea hispidula</i> var. <i>arida</i>	2	Low shrub <1m
<i>Grewia retusifolia</i>	1	Low shrub <1m
<i>Gyrostemon tepperi</i>	1	Low shrub <1m
<i>Persoonia falcata</i>	1	Low shrub <1m

Name	Cover:	Height:
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Sida</i> sp. B Kimberley Flora (A.A. Mitchell 2745)	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Waltheria indica</i>	1	Low shrub <1m
<i>Gossypium rotundifolium</i>	2	Vine
<i>Jasminum didymum</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Polymeria ambigua</i>	n	Vine
<i>Tinospora smilacina</i>	1	Vine
<i>Aristida hygrometrica</i>	2	Grass
<i>Chrysopogon pallidus</i>	2	Grass
<i>Eriachne melicacea</i>	1	Grass
<i>Eriachne obtusa</i>	2	Grass
<i>Eriachne</i> sp. Dampier Peninsula (K.F.Kenneally 5946)	1	Grass
<i>Schizachyrium fragile</i>	1	Grass
<i>Scleria brownii</i>	1	Grass
<i>Thaumastochloa major</i>	1	Grass
<i>Yakirra australiensis</i> var. <i>australiensis</i>	1	Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Buchnera ramosissima</i>	1	Herb
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Euphorbia alsiniflora</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Gonocarpus leptothecus</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium leptaleum</i>	1	Herb
<i>Hybanthus aurantiacus</i>	1	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	1	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Polymeria ambigua</i>	1	Herb
<i>Pterocaulon sphacelatum</i>	1	Herb
<i>Sauropus trachyspermus</i>	1	Herb
<i>Spermacoce occidentalis</i>	2	Herb
<i>Tephrosia remotiflora</i>	1	Herb

**Photo**



*ecologia 2011*



Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_18

**Botanist** AC & CM

**Date** 29/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416456 mE 8065447 mN ± 1.0

**Habitat** Plain negligible slope

**Soil** Red sandy-clay

**Rock Type** No rocks

**Vegetation** *Corymbia zygophylla* open low woodland, over *Acacia eriopoda*, *Acacia tumida* var. *tumida* and *Persoonia falcata* mid shrubland, over *Dodonaea hispidula* var. *arida* and *Waltheria indica* sparse low shrubland, over *Triodia schinzii* open hummock grassland.

**Condition** Very good; evidence of vehicle tracks; litter; animal faeces

**Fire** 2-5 years

**Species List**

Name	Cover:	Height:
<i>Corymbia zygophylla</i>	1	Low tree <10m
<i>Acacia eriopoda</i>	3	Tall shrub >2m
<i>Grevillea pyramidalis</i> subsp. <i>pyramidalis</i>	1	Tall shrub >2m
<i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>	1	Mid shrub 1-2m
<i>Dodonaea hispidula</i> var. <i>arida</i>	2	Mid shrub 1-2m
<i>Ficus aculeata</i>	1	Mid shrub 1-2m
<i>Persoonia falcata</i>	2	Mid shrub 1-2m
<i>Terminalia ferdinandiana</i>	1	Mid shrub 1-2m
<i>Acacia hippuroides</i>	1	Low shrub <1m
<i>Acacia tumida</i> var. <i>tumida</i>	3	Low shrub <1m
<i>Buchnera ramosissima</i>	1	Low shrub <1m
<i>Corchorus sidoides</i> subsp. <i>vermicularis</i>	1	Low shrub <1m
<i>Dolichandrone heterophylla</i>	1	Low shrub <1m
<i>Ehretia saligna</i> var. <i>saligna</i>	1	Low shrub <1m
<i>Gardenia pyrifolia</i> subsp. <i>keartlandii</i>	1	Low shrub <1m
<i>Grevillea refracta</i> subsp. <i>refracta</i>	1	Low shrub <1m
<i>Gyrostemon tepperi</i>	1	Low shrub <1m
<i>Premna acuminata</i>	1	Low shrub <1m
<i>Santalum lanceolatum</i>	1	Low shrub <1m
<i>Sauropus trachyspermus</i>	1	Low shrub <1m
<i>Sida</i> sp. B Kimberley Flora (A.A. Mitchell 2745)	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Ventilago viminalis</i>	1	Low shrub <1m
<i>Waltheria indica</i>	1	Low shrub <1m
<i>Gossypium rotundifolium</i>	1	Vine

Name	Cover:	Height:
<i>Jasminum didymum</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	2	Grass
<i>Eriachne obtusa</i>	1	Grass
<i>Eriachne</i> sp. Dampier Peninsula (K.F.Kenneally 5946)	1	Grass
<i>Heliotropium leptaleum</i>	2	Grass
<i>Setaria surgens</i>	1	Grass
<i>Thaumastochloa major</i>	1	Grass
<i>Triodia schinzii</i>	2	Hummock Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Hybanthus aurantiacus</i>	1	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Polymeria ambigua</i>	n	Herb
<i>Spermacoce occidentalis</i>	2	Herb
<i>Tephrosia leptoclada</i>	1	Herb

### Photo



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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_20

**Botanist** AC & CM

**Date** 29/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416205 mE 8065107 mN ± 1.4

**Habitat** Plain negligible slope

**Soil** Dark red sandy clay

**Rock Type** No rocks

**Vegetation** Eucalyptus miniata open mid woodland, over Corymbia zygophylla isolated low trees, over Acacia monticola and Calytrix exstipulata tall shrubland, over Dodonaea hispidula var. arida open low shrubland, over Chrysopogon pallidus and Aristida hygrometrica open tussock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Eucalyptus miniata	2	Mid tree 10-30m
Corymbia zygophylla	1	Low tree <10m
Gardenia pyriformis subsp. keartlandii	1	Low tree <10m
Terminalia ferdinandiana	1	Low tree <10m
Acacia monticola	3	Tall shrub >2m
Codonocarpus cotinifolius	1	Tall shrub >2m
Ehretia saligna var. saligna	1	Tall shrub >2m
Grevillea pyramidalis subsp. leucadendron	1	Tall shrub >2m
Grevillea refracta subsp. refracta	1	Tall shrub >2m
Lithomyrtus retusa	2	Tall shrub >2m
Pavetta sp.	1	Tall shrub >2m
Premna acuminata	1	Tall shrub >2m
Ventilago viminalis	1	Tall shrub >2m
Calytrix exstipulata	2	Mid shrub 1-2m
Dodonaea hispidula var. arida	2	Mid shrub 1-2m
Gardenia pyriformis subsp. keartlandii	3	Mid shrub 1-2m
Grewia retusifolia	1	Mid shrub 1-2m
Psydrax attenuata	1	Mid shrub 1-2m
Santalum lanceolatum	1	Mid shrub 1-2m
Corchorus sidoides subsp. vermicularis	1	Low shrub <1m
Hibiscus aff. leptocladus	1	Low shrub <1m
Maytenus cunninghamii	1	Low shrub <1m
Senna costata	1	Low shrub <1m
Sida rohlenae subsp. occidentalis	1	Low shrub <1m
Sida sp. B Kimberley Flora (A.A. Mitchell 2745)	1	Low shrub <1m

Name	Cover:	Height:
Waltheria indica	1	Low shrub <1m
Zornia prostrata var. prostrata	1	Low shrub <1m
Gossypium rotundifolium	1	Vine
Marsdenia viridiflora subsp. tropica	1	Vine
Aristida hygrometrica	2	Grass
Chrysopogon pallidus	2	Grass
Eriachne ciliata	1	Grass
Schizachyrium fragile	1	Grass
Buchnera ramosissima	n	Herb
Byblis filifolia	1	Herb
Calandrinia strophiolata	1	Herb
Cassytha filiformis	1	Herb
Dicliptera armata	1	Herb
Euphorbia alsiniflora	n	Herb
Evolvulus alsinoides var. decumbens	n	Herb
Gonocarpus leptothecus	1	Herb
Goodenia sepalosa var. sepalosa	1	Herb
Oldenlandia mitrasacmoides subsp. mitrasacmoides	1	Herb
Spermacoce occidentalis	1	Herb

### Photo



ecologia 2011

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_21

**Botanist** RT & SV

**Date** 01/05/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0417799 mE 8065003 mN ± 2.1

**Habitat** Plain negligible slope

**Soil** Orange Sand

**Rock Type** No rocks

**Vegetation** Corymbia polycarpa open low woodland, over Grevillea refracta subsp. refracta and Acacia eriopoda open tall shrubland, over Acacia tumida var. tumida and Dodonaea hispidula var. arida open mid shrubland, over Spermacoce occidentalis sparse herbland, over Thaumastochloa major, Aristida holathera var. holathera and Chrysopogon pallidus tussock grassland, over Triodia schinzii isolated hummock grasses.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Corymbia polycarpa	1	Low tree <10m
Acacia colei var. colei	1	Tall shrub >2m
Acacia eriopoda	2	Tall shrub >2m
Brachychiton diversifolius subsp. diversifolius	1	Tall shrub >2m
Grevillea refracta subsp. refracta	1	Tall shrub >2m
Hakea arborescens	1	Tall shrub >2m
Persoonia falcata	1	Tall shrub >2m
Terminalia ferdinandiana	1	Tall shrub >2m
Acacia platycarpa	2	Mid shrub 1-2m
Acacia tumida var. tumida	3	Mid shrub 1-2m
Codonocarpus cotinifolius	n	Mid shrub 1-2m
Corymbia bella	1	Mid shrub 1-2m
Dodonaea hispidula var. arida	1	Mid shrub 1-2m
Ehretia saligna var. saligna	1	Mid shrub 1-2m
Ficus aculeata	n	Mid shrub 1-2m
Premna acuminata	1	Mid shrub 1-2m
Santalum lanceolatum	n	Mid shrub 1-2m
Acacia adoxa var. subglabra	1	Low shrub <1m
Corchorus sidoides subsp. vermicularis	1	Low shrub <1m
Dolichandrone heterophylla	n	Low shrub <1m
Gossypium rotundifolium	1	Low shrub <1m
Grewia retusifolia	1	Low shrub <1m
Gyrostemon tepperi	1	Low shrub <1m

Name	Cover:	Height:
<i>Hybanthus aurantiacus</i>	1	Low shrub <1m
<i>Melhania oblongifolia</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Ventilago viminalis</i>	n	Low shrub <1m
<i>Waltheria indica</i>	1	Low shrub <1m
<i>Jasminum didymum</i>	n	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	2	Grass
<i>Chrysopogon pallidus</i>	3	Grass
<i>Eriachne obtusa</i>	1	Grass
<i>Schizachyrium fragile</i>	1	Grass
<i>Setaria surgens</i>	1	Grass
<i>Thaumastochloa major</i>	2	Grass
<i>Yakirra australiensis</i> var. <i>intermedia</i>	n	Grass
<i>Triodia schinzii</i>	1	Hummock Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Fimbristylis oxystachya</i>	n	Sedge
<i>Bonamia linearis</i>	1	Herb
<i>Buchnera ramosissima</i>	1	Herb
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	1	Herb
<i>Euphorbia alsiniflora</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium</i> ? <i>leptaleum</i>	1	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	1	Herb
<i>Polycarpaea corymbosa</i>	1	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Polymeria ambigua</i>	n	Herb
<i>Sauropus trachyspermus</i>	n	Herb
<i>Sida</i> aff. <i>hackettiana</i>	n	Herb
<i>Spermacoce occidentalis</i>	1	Herb



**Photo**



*ecologia 2011*

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_22

**Botanist** RT & SV

**Date** 30/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0417034 mE 8065202 mN ± 2.0

**Habitat** Plain negligible slope

**Soil** Orange Sandy-clay

**Rock Type** No rocks

**Vegetation** Acacia eriopoda open tall shrubland, over Clerodendrum floribundum var. ovatum and Grevillea refracta subsp. refracta open mid shrubland, over Acacia platycarpa sparse low shrubland, over Jasminum didymum isolated vines, over Spermacoce occidentalis and Polymeria ambigua open hermland, over Chrysopogon pallidus and Aristida contorta open tussock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Brachychiton diversifolius subsp. diversifolius	1	Low tree <10m
Corymbia dampieri	1	Low tree <10m
Dolichandrone heterophylla	1	Low tree <10m
Terminalia ferdinandiana	1	Low tree <10m
Acacia eriopoda	3	Tall shrub >2m
Acacia platycarpa	2	Tall shrub >2m
Bauhinia cunninghamii	1	Tall shrub >2m
Brachychiton diversifolius subsp. diversifolius	1	Tall shrub >2m
Clerodendrum floribundum var. ovatum	2	Tall shrub >2m
Ehretia saligna var. saligna	1	Tall shrub >2m
Ficus aculeata	1	Tall shrub >2m
Flueggea virosa subsp. melanthesoides	1	Tall shrub >2m
Grevillea refracta subsp. refracta	3	Tall shrub >2m
Hakea arborescens	1	Tall shrub >2m
Persoonia falcata	1	Tall shrub >2m
Premna acuminata	1	Tall shrub >2m
Santalum lanceolatum	1	Tall shrub >2m
Acacia colei var. colei	1	Mid shrub 1-2m
Premna acuminata	1	Mid shrub 1-2m
Acacia adoxa var. subglabra	1	Low shrub <1m
Acacia tumida var. tumida	1	Low shrub <1m
Breynia cernua	1	Low shrub <1m
Codonocarpus cotinifolius	1	Low shrub <1m
Corchorus sidoides subsp. vermicularis	1	Low shrub <1m

Name	Cover:	Height:
<i>Dodonaea hispidula</i> var. <i>arida</i>	1	Low shrub <1m
<i>Gardenia pyrifolia</i> subsp. <i>keartlandii</i>	1	Low shrub <1m
<i>Grewia retusifolia</i>	1	Low shrub <1m
<i>Gyrostemon tepperi</i>	1	Low shrub <1m
<i>Sersalisia sericea</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Sida</i> sp. B Kimberley Flora (A.A. Mitchell 2745)	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Tephrosia remotiflora</i>	1	Low shrub <1m
<i>Ventilago viminalis</i>	1	Low shrub <1m
<i>Breynia cernua</i>	1	Vine
<i>Gossypium rotundifolium</i>	1	Vine
<i>Jasminum didymum</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Tinospora smilacina</i>	1	Vine
<i>Aristida contorta</i>	2	Grass
<i>Chrysopogon pallidus</i>	3	Grass
<i>Eriachne ciliata</i>	1	Grass
<i>Schizachyrium fragile</i>	1	Grass
<i>Scleria brownii</i>	1	Grass
<i>Setaria apiculata</i>	1	Grass
<i>Sorghum plumosum</i> var. <i>plumosum</i>	1	Grass
<i>Thaumastochloa pubescens</i>	1	Grass
<i>Yakirra australiensis</i> var. <i>intermedia</i>	1	Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Bonamia linearis</i>	1	Herb
<i>Buchnera ramosissima</i>	1	Herb
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	1	Herb
<i>Euphorbia alsiniflora</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium leptaleum</i>	1	Herb
<i>Hybanthus aurantiacus</i>	1	Herb
<i>Mitrasacme exserta</i>	1	Herb
<i>Phyllanthus exilis</i>	1	Herb
<i>Polycarpha corymbosa</i>	1	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Polymeria ambigua</i>	2	Herb
<i>Pterocaulon sphacelatum</i>	1	Herb
<i>Spermacoce occidentalis</i>	2	Herb
<i>Waltheria indica</i>	1	Herb

**Photo**



*ecologia* 2011

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_43

**Botanist** CM & AC

**Date** 30/04/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416240 mE 8064534 mN ± 0.8

**Habitat** Plain negligible slope

**Soil** Dark-red Orange Sandy-clay

**Rock Type** No rocks

**Vegetation** *Corymbia polycarpa*, *Corymbia dampieri* and *Corymbia zygophylla* open low woodland, over *Hakea arborescens* and *Grevillea refracta* subsp. *refracta* sparse tall shrubland, over *Acacia eriopoda* open mid shrubland, over *Dodonaea hispidula* var. *arida* sparse low shrubland, over *Aristida contorta*, *Eriachne obtusa* and *Chrysopogon pallidus* open tussock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
<i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>	1	Low tree <10m
<i>Corymbia dampieri</i>	1	Low tree <10m
<i>Corymbia polycarpa</i>	1	Low tree <10m
<i>Corymbia zygophylla</i>	1	Low tree <10m
<i>Hakea arborescens</i>	1	Low tree <10m
<i>Terminalia ferdinandiana</i>	1	Low tree <10m
<i>Dolichandrone heterophylla</i>	1	Tall shrub >2m
<i>Grevillea refracta</i> subsp. <i>refracta</i>	2	Tall shrub >2m
<i>Hakea macrocarpa</i>	1	Tall shrub >2m
<i>Dodonaea hispidula</i> var. <i>arida</i>	3	Mid shrub 1-2m
<i>Ehretia saligna</i> var. <i>saligna</i>	1	Mid shrub 1-2m
<i>Ficus aculeata</i>	1	Mid shrub 1-2m
<i>Marsdenia angustata</i>	1	Mid shrub 1-2m
<i>Acacia eriopoda</i>	3	Low shrub <1m
<i>Bauhinia cunninghamii</i>	1	Low shrub <1m
<i>Clerodendrum floribundum</i> var. <i>floribundum</i>	1	Low shrub <1m
<i>Corchorus sidoides</i> subsp. <i>vermicularis</i>	1	Low shrub <1m
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	1	Low shrub <1m
<i>Gossypium rotundifolium</i>	1	Low shrub <1m
<i>Grewia retusifolia</i>	1	Low shrub <1m
<i>Gyrostemon tepperi</i>	1	Low shrub <1m
<i>Hybanthus aurantiacus</i>	1	Low shrub <1m
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Low shrub <1m
<i>Melhantha oblongifolia</i>	n	Low shrub <1m

Name	Cover:	Height:
<i>Phyllanthus exilis</i>	1	Low shrub <1m
<i>Premna acuminata</i>	1	Low shrub <1m
<i>Santalum lanceolatum</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Sida</i> sp. B Kimberley Flora (A.A. Mitchell 2745)	1	Low shrub <1m
<i>Solanum cunninghamii</i>	n	Low shrub <1m
<i>Waltheria indica</i>	2	Low shrub <1m
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	n	Vine
<i>Aristida contorta</i>	2	Grass
<i>Chrysopogon pallidus</i>	2	Grass
<i>Eriachne obtusa</i>	2	Grass
<i>Schizachyrium fragile</i>	1	Grass
<i>Setaria surgens</i>	1	Grass
<i>Thaumastochloa pubescens</i>	1	Grass
<i>Sauropus trachyspermus</i>	1	Sedge
<i>Buchnera ramosissima</i>	1	Herb
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Cyanthillium cinereum</i>	n	Herb
<i>Euphorbia alsiniflora</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	n	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium leptaleum</i>	1	Herb
<i>Polycarpaea corymbosa</i>	n	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Polymeria ambigua</i>	n	Herb
<i>Spermacoce occidentalis</i>	1	Herb



**Photo**



*ecologia* 2011

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_44

**Botanist** CM & AC

**Date** 03/05/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416544 mE 8065814 mN ± 0.9

**Habitat** Plain negligible slope

**Soil** Dark-red Sandy-clay

**Rock Type** No rocks

**Vegetation** Eucalyptus miniata and Corymbia polycarpa open mid woodland, over Corymbia zygophylla open low woodland, over Acacia eriopoda open tall shrubland, over Dodonaea hispidula var. arida open mid shrubland, over Acacia hippuroides sparse low shrubland, over Chrysopogon sp. and Aristida holathera var. latifolia tussock grassland, over Triodia schinzii sparse hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 2-5 years

**Species List**

Name	Cover:	Height:
Corymbia polycarpa	1	Low tree <10m
Corymbia zygophylla	1	Low tree <10m
Eucalyptus miniata	1	Low tree <10m
Persoonia falcata	1	Low tree <10m
Acacia eriopoda	3	Tall shrub >2m
Brachychiton diversifolius subsp. diversifolius	1	Tall shrub >2m
Dodonaea hispidula var. arida	2	Tall shrub >2m
Grevillea pyramidalis subsp. pyramidalis	1	Tall shrub >2m
Acacia colei var. colei	1	Mid shrub 1-2m
Acacia platycarpa	2	Mid shrub 1-2m
Acacia tumida var. tumida	2	Mid shrub 1-2m
Calytrix exstipulata	1	Mid shrub 1-2m
Clerodendrum floribundum var. ovatum	1	Mid shrub 1-2m
Ehretia saligna var. saligna	1	Mid shrub 1-2m
Premna acuminata	1	Mid shrub 1-2m
Acacia hippuroides	1	Low shrub <1m
Corchorus sidoides subsp. vermicularis	1	Low shrub <1m
Gardenia pyriformis subsp. keartlandii	1	Low shrub <1m
Gonocarpus leptothecus	1	Low shrub <1m
Gossypium rotundifolium	1	Low shrub <1m
Gyrostemon tepperi	1	Low shrub <1m
Hakea macrocarpa	1	Low shrub <1m
Hybanthus aurantiacus	1	Low shrub <1m
Lithomyrtus retusa	1	Low shrub <1m

Name	Cover:	Height:
<i>Persoonia falcata</i>	1	Low shrub <1m
<i>Polygala tepperi</i>	1	Low shrub <1m
<i>Santalum lanceolatum</i>	1	Low shrub <1m
<i>Sauropus trachyspermus</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Sida</i> sp. B Kimberley Flora (A.A. Mitchell 2745)	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Tephrosia leptoclada</i>	1	Low shrub <1m
<i>Tephrosia remotiflora</i>	1	Low shrub <1m
<i>Terminalia ferdinandiana</i>	1	Low shrub <1m
<i>Waltheria indica</i>	1	Low shrub <1m
<i>Jasminum didymum</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Aristida holathera</i> var. <i>latifolia</i>	3	Grass
<i>Chrysopogon</i> sp.	3	Grass
<i>Eriachne obtusa</i>	2	Grass
<i>Eriachne</i> sp. Dampier Peninsula (K.F.Kenneally 5946)	1	Grass
<i>Schizachyrium fragile</i>	2	Grass
<i>Thaumastochloa major</i>	1	Grass
<i>Triodia schinzii</i>	2	Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Buchnera ramosissima</i>	n	Herb
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium leptaleum</i>	1	Herb
<i>Polymeria ambigua</i>	1	Herb
<i>Spermacoce occidentalis</i>	1	Herb

**Photo**



*ecologia* 2011

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_45

**Botanist** RT & SV

**Date** 03/05/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0416277 mE 8065694 mN ± 1.5

**Habitat** Plain negligible slope

**Soil** Orange Sand

**Rock Type** No rocks

**Vegetation** *Corymbia zygophylla* low woodland, over *Acacia platycarpa* and *Acacia eriopoda* mid shrubland, over *Bulbostylis barbata* isolated sedges, over *Aristida holathera* var. *holathera* and *Chrysopogon fallax* open tussock grassland, over *Triodia schinzii* sparse hummock grassland.

**Condition** Excellent - no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
<i>Corymbia dampieri</i>	1	Low tree <10m
<i>Corymbia zygophylla</i>	3	Low tree <10m
<i>Eucalyptus miniata</i>	1	Low tree <10m
<i>Acacia colei</i> var. <i>ileocarpa</i>	1	Tall shrub >2m
<i>Acacia eriopoda</i>	3	Tall shrub >2m
<i>Acacia platycarpa</i>	3	Tall shrub >2m
<i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>	1	Tall shrub >2m
<i>Ehretia saligna</i> var. <i>saligna</i>	1	Tall shrub >2m
<i>Persoonia falcata</i>	1	Tall shrub >2m
<i>Premna acuminata</i>	1	Tall shrub >2m
<i>Grevillea refracta</i> subsp. <i>refracta</i>	1	Mid shrub 1-2m
<i>Terminalia ferdinandiana</i>	1	Mid shrub 1-2m
<i>Acacia hippuroides</i>	1	Low shrub <1m
<i>Breynia cernua</i>	1	Low shrub <1m
<i>Calytrix exstipulata</i>	1	Low shrub <1m
<i>Codonocarpus cotinifolius</i>	1	Low shrub <1m
<i>Corchorus sidoides</i> subsp. <i>vermicularis</i>	1	Low shrub <1m
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	1	Low shrub <1m
<i>Dodonaea hispidula</i> var. <i>arida</i>	2	Low shrub <1m
<i>Dolichandrone heterophylla</i>	1	Low shrub <1m
<i>Gardenia pyrifolia</i> subsp. <i>keartlandii</i>	1	Low shrub <1m
<i>Gossypium rotundifolium</i>	1	Low shrub <1m
<i>Gyrostemon tepperi</i>	1	Low shrub <1m
<i>Hakea arborescens</i>	1	Low shrub <1m
<i>Santalum lanceolatum</i>	1	Low shrub <1m

Name	Cover:	Height:
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Ventilago viminalis</i>	1	Low shrub <1m
<i>Cassytha capillaris</i>	1	Vine
<i>Jasminum didymum</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	2	Grass
<i>Chrysopogon fallax</i>	2	Grass
<i>Eragrostis olida</i>	1	Grass
<i>Eriachne ciliata</i>	1	Grass
<i>Schizachyrium fragile</i>	1	Grass
<i>Scleria brownii</i>	1	Grass
<i>Setaria surgens</i>	1	Grass
<i>Thaumastochloa major</i>	1	Grass
<i>Yakirra australiensis</i> var. <i>intermedia</i>	1	Grass
<i>Triodia schinzii</i>	2	Hummock Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Fimbristylis oxystachya</i>	1	Sedge
<i>Bonamia</i> aff. <i>oblongifolia</i>	1	Herb
<i>Buchnera ramosissima</i>	1	Herb
<i>Byblis filifolia</i>	1	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Dicliptera armata</i>	n	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	1	Herb
<i>Heliotropium leptaleum</i>	1	Herb
<i>Mitrasacme exserta</i>	1	Herb
<i>Phyllanthus exilis</i>	1	Herb
<i>Polycarpaea corymbosa</i>	n	Herb
<i>Polygala tepperi</i>	1	Herb
<i>Spermacoce occidentalis</i>	1	Herb
<i>Tephrosia leptoclada</i>	n	Herb
<i>Tephrosia remotiflora</i>	1	Herb
<i>Waltheria indica</i>	1	Herb



**Photo**



*ecologia 2011*

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_46

**Botanist** RT & SV

**Date** 07/05/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0410182 mE 8062194 mN ± 0.9

**Habitat** Plain negligible slope

**Soil** Orange-brown sandy-clay

**Rock Type** No rocks

**Vegetation** Lophostemon grandiflorus subsp. grandiflorus and Corymbia bella low woodland, over Acacia colei open tall shrubland, over Bridelia tomentosa sparse mid shrubland, over Solanum cunninghamii open low shrubland, over Indigofera hirsuta open vineland, over Bulbostylis barbata isolated sedges, over Cymbopogon procerus and Aristida holathera var. holathera open tussock grassland.

**Condition** Good with weeds

**Fire** 2-5 years

**Species List**

Name	Cover:	Height:
Corymbia bella	2	Low tree <10m
Corymbia polycarpa	1	Low tree <10m
Lophostemon grandiflorus subsp. grandiflorus	3	Low tree <10m
Acacia colei	3	Tall shrub >2m
Bauhinia cunninghamii	1	Tall shrub >2m
Ehretia saligna var. saligna	1	Tall shrub >2m
Flueggea virosa subsp. melanthesoides	1	Tall shrub >2m
Hakea macrocarpa	1	Tall shrub >2m
Santalum lanceolatum	1	Tall shrub >2m
Senna costata	1	Tall shrub >2m
Bridelia tomentosa	2	Mid shrub 1-2m
Croton habrophyllus	2	Mid shrub 1-2m
Gossypium australe	1	Mid shrub 1-2m
Waltheria indica	1	Mid shrub 1-2m
Abutilon otocarpum	1	Low shrub <1m
Achyranthes aspera	1	Low shrub <1m
Brachychiton diversifolius subsp. diversifolius	1	Low shrub <1m
Breynia cernua	1	Low shrub <1m
Chamaecrista absus	1	Low shrub <1m
Crotalaria medicaginea var. neglecta	1	Low shrub <1m
Grewia retusifolia	1	Low shrub <1m
Hibiscus geranioides	1	Low shrub <1m
Indigofera colutea	1	Low shrub <1m

Name	Cover:	Height:
<i>Jasminum molle</i>	1	Low shrub <1m
<i>Premna acuminata</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Solanum cunninghamii</i>	3	Low shrub <1m
<i>Tephrosia rosea</i> var. <i>rosea</i>	1	Low shrub <1m
<i>Abrus precatorius</i>	2	Vine
<i>Cassytha filiformis</i>	1	Vine
<i>Gymnanthera oblonga</i>	1	Vine
<i>Gymnanthera oblonga</i>	1	Vine
<i>Indigofera hirsuta</i>	2	Vine
<i>Jacquemontia paniculata</i>	1	Vine
<i>Jasminum molle</i>	1	Vine
<i>Passiflora foetida</i> var. <i>hispida</i>	2	Vine
<i>Rhynchosia minima</i>	1	Vine
<i>Tinospora smilacina</i>	2	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	2	Grass
<i>Cymbopogon procerus</i>	2	Grass
<i>Eragrostis minor</i>	1	Grass
<i>Eriachne ciliata</i>	1	Grass
<i>Setaria apiculata</i>	3	Grass
<i>Thaumastochloa major</i>	1	Grass
<i>Yakirra pauciflora</i>	1	Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Cleome viscosa</i>	1	Herb
<i>Euphorbia comans</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Hibiscus geranioides</i>	1	Herb
<i>Jasminum molle</i>	2	Herb
<i>Marsdenia</i> sp.	1	Herb
<i>Microstachys chamaelea</i>	1	Herb
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	1	Herb
<i>Phyllanthus maderaspatensis</i>	1	Herb
<i>Polycarpaea corymbosa</i>	1	Herb
<i>Polycarpaea longiflora</i>	1	Herb
<i>Ptilotus calostachyus</i>	1	Herb
<i>Sida hackettiana</i>	1	Herb
<i>Trianthema pilosa</i>	1	Herb
<i>Zornia prostrata</i> var. <i>prostrata</i>	1	Herb

Photo



*ecologia* 2011

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_47

**Botanist** MM & AC

**Date** 07/05/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0409742 mE 8062462 mN ± 0.8

**Habitat** Plain negligible slope

**Soil** Orange sandy-clay

**Rock Type** No rocks

**Vegetation** *Corymbia polycarpa* and *Gyrocarpus americanus* subsp. *pachyphyllus* open mid woodland, over *Acacia eriopoda*, *Bauhinia cunninghamii* and *Bridelia tomentosa* mid shrubland, over *Waltheria indica* and *Microstachys chamaelea* sparse low shrubland, over *Aristida contorta* tussock grassland.

**Condition** Excellent no obvious disturbance

**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
<i>Corymbia polycarpa</i>	2	Low tree <10m
<i>Gyrocarpus americanus</i> subsp. <i>pachyphyllus</i>	1	Low tree <10m
<i>Ehretia saligna</i> var. <i>saligna</i>	1	Tall shrub >2m
<i>Ventilago viminalis</i>	n	Tall shrub >2m
<i>Acacia colei</i> var. <i>colei</i>	1	Mid shrub 1-2m
<i>Acacia eriopoda</i>	3	Mid shrub 1-2m
<i>Bauhinia cunninghamii</i>	1	Mid shrub 1-2m
<i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>	n	Mid shrub 1-2m
<i>Bridelia tomentosa</i>	2	Mid shrub 1-2m
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	1	Mid shrub 1-2m
<i>Grevillea pyramidalis</i> subsp. <i>pyramidalis</i>	1	Mid shrub 1-2m
<i>Hakea arborescens</i>	1	Mid shrub 1-2m
<i>Premna acuminata</i>	1	Mid shrub 1-2m
<i>Santalum lanceolatum</i>	1	Mid shrub 1-2m
<i>Abutilon otocarpum</i>	1	Low shrub <1m
<i>Acacia ?lysiphloia</i>	1	Low shrub <1m
<i>Acacia tumida</i> var. <i>tumida</i>	1	Low shrub <1m
<i>Cleome viscosa</i>	1	Low shrub <1m
<i>Codonocarpus cotinifolius</i>	n	Low shrub <1m
<i>Corchorus sidoides</i> subsp. <i>vermicularis</i>	1	Low shrub <1m
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	1	Low shrub <1m
<i>Croton habrophyllus</i>	n	Low shrub <1m
<i>Cyanthillium cinereum</i>	1	Low shrub <1m

Name	Cover:	Height:
<i>Dodonaea hispidula</i> var. <i>arida</i>	1	Low shrub <1m
<i>Gossypium australe</i>	1	Low shrub <1m
<i>Grewia retusifolia</i>	1	Low shrub <1m
<i>Gymnanthera oblonga</i>	n	Low shrub <1m
<i>Hibiscus leptocladus</i>	n	Low shrub <1m
<i>Jasminum molle</i>	1	Low shrub <1m
<i>Melhania oblongifolia</i>	1	Low shrub <1m
<i>Microstachys chamaelea</i>	2	Low shrub <1m
<i>Opilia amentacea</i>	n	Low shrub <1m
<i>Persoonia falcata</i>	n	Low shrub <1m
<i>Ptilotus calostachyus</i>	n	Low shrub <1m
<i>Ptilotus polystachyus</i>	1	Low shrub <1m
<i>Senna costata</i>	1	Low shrub <1m
<i>Sida hackettiana</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Terminalia ferdinandiana</i>	1	Low shrub <1m
<i>Waltheria indica</i>	2	Low shrub <1m
<i>Gymnanthera oblonga</i>	n	Vine
<i>Jacquemontia paniculata</i>	1	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Aristida contorta</i>	4	Grass
<i>Cymbopogon procerus</i>	1	Grass
<i>Eragrostis minor</i>	1	Grass
<i>Eriachne ciliata</i>	1	Grass
<i>Paspalidium rarum</i>	1	Grass
<i>Schizachyrium fragile</i>	1	Grass
<i>Setaria surgens</i>	1	Grass
<i>Thaumastochloa major</i>	1	Grass
<i>Yakirra australiensis</i> var. <i>australiensis</i>	1	Grass
<i>Bulbostylis barbata</i>	1	Sedge
? <i>Gossypium rotundifolium</i>	n	Herb
<i>Calandrinia strophilata</i>	1	Herb
<i>Hybanthus aurantiacus</i>	n	Herb
<i>Phyllanthus exilis</i>	1	Herb
<i>Spermacoce occidentalis</i>	1	Herb
<i>Tinospora smilacina</i>	n	Herb
<i>Trianthema pilosa</i>	n	Herb



**Photo**



*ecologia 2011*

Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_48  
**Botanist** RT & SV  
**Date** 07/05/2011  
**Size** 50 × 50 m  
**Location (WGS) Zone 51K** 0410390 mE 8061390 mN ± 1.6  
**Habitat** Plain negligible slope  
**Soil** Orange sand  
**Rock Type** No rocks  
**Vegetation** Parinari nonda and Corymbia polycarpa low woodland, over Acacia eriopoda and Acacia tumida var. tumida open tall shrubland, over Dodonaea hispidula var. arida sparse low shrubland, over Cassytha filiformis sparse vines, over Corchorus sidoides subsp. vermicularis sparse herbland, over Aristida holathera var. holathera and Cymbopogon procerus open tussock grassland.  
**Condition** Excellent - no obvious disturbance  
**Fire** 1-2 years

**Species List**

Name	Cover:	Height:
Corymbia polycarpa	2	Low tree <10m
Eucalyptus miniata	1	Low tree <10m
Gyrocarpus americanus subsp. pachyphyllus	1	Low tree <10m
Parinari nonda	2	Low tree <10m
Acacia colei var. ileocarpa	1	Tall shrub >2m
Acacia eriopoda	3	Tall shrub >2m
Acacia tumida var. tumida	2	Tall shrub >2m
Bridelia tomentosa	2	Tall shrub >2m
Grevillea pyramidalis subsp. leucadendron	1	Tall shrub >2m
Grewia breviflora	1	Tall shrub >2m
Hakea macrocarpa	1	Tall shrub >2m
Premna acuminata	1	Tall shrub >2m
Santalum lanceolatum	1	Tall shrub >2m
Senna costata	1	Tall shrub >2m
Terminalia ferdinandiana	1	Tall shrub >2m
Dodonaea hispidula var. arida	2	Mid shrub 1-2m
Ehretia saligna var. saligna	1	Mid shrub 1-2m
Opilia amentacea	1	Mid shrub 1-2m
Abutilon otocarpum	1	Low shrub <1m
Atalaya variifolia	1	Low shrub <1m
Bauhinia cunninghamii	1	Low shrub <1m
Calytrix carinata	1	Low shrub <1m
Corchorus sidoides subsp. vermicularis	2	Low shrub <1m
Crotalaria medicaginea var. neglecta	1	Low shrub <1m

Name	Cover:	Height:
<i>Croton habrophyllus</i>	1	Low shrub <1m
<i>Cymbidium canaliculatum</i>	1	Low shrub <1m
<i>Diospyros humilis</i>	1	Low shrub <1m
<i>Gossypium rotundifolium</i>	1	Low shrub <1m
<i>Gyrostemon tepperi</i>	1	Low shrub <1m
<i>Hakea macrocarpa</i>	1	Low shrub <1m
<i>Hybanthus auranthiacus</i>	1	Low shrub <1m
<i>Jasminum molle</i>	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Tephrosia remotiflora</i>	1	Low shrub <1m
<i>Cassytha filiformis</i>	2	Vine
<i>Jacquemontia paniculata</i>	1	Vine
<i>Jasminum didymum</i>	1	Vine
<i>Passiflora foetida</i> var. <i>hispida</i>	1	Vine
<i>Aristida holathera</i> var. <i>holathera</i>	3	Grass
<i>Cymbopogon procerus</i>	2	Grass
<i>Setaria surgens</i>	1	Grass
<i>Yakirra australiensis</i> var. <i>intermedia</i>	1	Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Cyperus conicus</i>	1	Sedge
<i>Acacia platycarpa</i>	1	Rush
<i>Calandrinia strophilata</i>	1	Herb
<i>Euphorbia comans</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Hybanthus auranthiacus</i>	1	Herb
<i>Microstachys chamaelea</i>	1	Herb
<i>Mitrasacme exserta</i>	1	Herb
<i>Polymeria ambigua</i>	1	Herb
<i>Ptilotus corymbosus</i>	1	Herb
<i>Ptilotus polystachyus</i>	1	Herb
<i>Spermacoce occidentalis</i>	2	Herb
<i>Trianthema pilosa</i>	1	Herb
<i>Waltheria indica</i>	1	Herb
<i>Zornia prostrata</i> var. <i>prostrata</i>	1	Herb

**Photo**



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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_49

**Botanist** MM & AC

**Date** 07/05/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0409742 mE 8062462 mN ± 0.8

**Habitat** Swale and Dune

**Soil** Orange sand

**Rock Type** No rocks

**Vegetation** Celtis philippensis, Mimusops elengi and Sersalisia sericea low woodland, over Diospyros humilis sparse tall shrubland, over Tephrosia rosea var. rosea sparse mid shrubland, over Indigofera linifolia sparse low shrubland, over Cymbopogon procerus and Enneapogon caeruleus sparse tussock grassland.

**Condition** Very good with animal tracks and litter

**Fire** > 5 years

**Species List**

Name	Cover:	Height:
Glycosmis macrophylla	n	Mid tree 10-30m
Celtis philippensis	2	Low tree <10m
Corymbia bella	1	Low tree <10m
Mimusops elengi	2	Low tree <10m
Sersalisia sericea	2	Low tree <10m
Diospyros humilis	2	Tall shrub >2m
Breynia cernua	1	Mid shrub 1-2m
Bridelia tomentosa	1	Mid shrub 1-2m
Croton habrophyllus	n	Mid shrub 1-2m
Exocarpos latifolius	1	Mid shrub 1-2m
Tephrosia rosea var. rosea	2	Mid shrub 1-2m
Abrus precatorius	1	Low shrub <1m
Acacia colei var. ileocarpa	n	Low shrub <1m
Achyranthes aspera	n	Low shrub <1m
Caesalpinia major	1	Low shrub <1m
Capparis lasiantha	1	Low shrub <1m
Cleome viscosa	1	Low shrub <1m
Exocarpos latifolius	1	Low shrub <1m
Herissantia crispa	n	Low shrub <1m
Indigofera colutea	n	Low shrub <1m
Indigofera linifolia	2	Low shrub <1m
Jasminum didymum	1	Low shrub <1m
Santalum lanceolatum	n	Low shrub <1m
Tephrosia rosea var. rosea	n	Low shrub <1m
Amyema benthamii	1	Vine



Name	Cover:	Height:
<i>Cassytha filiformis</i>	n	Vine
<i>Gymnanthera oblonga</i>	1	Vine
<i>Jacquemontia paniculata</i>	1	Vine
<i>Marsdenia geminata</i>	n	Vine
<i>Sarcostemma viminale</i> subsp. <i>brunonianum</i>	1	Vine
<i>Tinospora smilacina</i>	1	Vine
<i>Cymbopogon procerus</i>	2	Grass
<i>Digitaria ciliaris</i>	n	Grass
<i>Enneapogon caeruleus</i>	2	Grass
<i>Enteropogon dolichostachyus</i>	1	Grass
<i>Sorghum plumosum</i> var. <i>plumosum</i>	n	Grass
<i>Yakirra australiensis</i> var. <i>intermedia</i>	n	Grass
<i>Sersalisia sericea</i>	s4	Hummock Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Cyperus zollingeri</i>	n	Sedge
<i>Amaranthus undulatus</i>	1	Herb
<i>Boerhavia gardneri</i>	1	Herb
<i>Euphorbia alsiniflora</i>	n	Herb
<i>Phyllanthus maderaspatensis</i>	n	Herb
<i>Plumbago zeylanica</i>	n	Herb

## Photo



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Woodside Energy Ltd James Price Point Vegetation and Flora Quadrat information

**Quadrat** e\_51

**Botanist** MM & AC

**Date** 07/05/2011

**Size** 50 × 50 m

**Location (WGS) Zone 51K** 0409962 mE 8061896 mN ± 1.4

**Habitat** Undulating Plain

**Soil** Red sandy-clay

**Rock Type** No rocks

**Vegetation** Gyrocarpus americanus subsp. pachyphyllus isolated trees, over Acacia monticola sparse tall shrubland, over Bridelia tomentosa and Grewia breviflora open mid shrubland, over Waltheria indica isolated herbs, over Aristida holathera sparse tussock grassland.

**Condition** Very good with animal tracks and grazing by cattle

**Fire** > 1-2 years

**Species List**

Name	Cover:	Height:
Gyrocarpus americanus subsp. pachyphyllus	1	Low tree <10m
Acacia monticola	2	Tall shrub >2m
Corymbia flavesces	n	Tall shrub >2m
Acacia colei var. ileocarpa	n	Mid shrub 1-2m
Acacia tumida var. tumida	1	Mid shrub 1-2m
Bridelia tomentosa	3	Mid shrub 1-2m
Grewia breviflora	1	Mid shrub 1-2m
Herissantia crispa	1	Mid shrub 1-2m
Persoonia falcata	1	Mid shrub 1-2m
Premna acuminata	n	Mid shrub 1-2m
Senna costata	1	Mid shrub 1-2m
Tephrosia rosea var. rosea	1	Mid shrub 1-2m
Terminalia ferdinandiana	1	Mid shrub 1-2m
Bauhinia cunninghamii	1	Low shrub <1m
Cleome viscosa	n	Low shrub <1m
Codonocarpus cotinifolius	1	Low shrub <1m
Crotalaria medicaginea var. neglecta	1	Low shrub <1m
Croton habrophyllus	n	Low shrub <1m
Diospyros humilis	1	Low shrub <1m
Gyrostemon tepperi	1	Low shrub <1m
Indigofera colutea	n	Low shrub <1m
Jasminum molle	1	Low shrub <1m
Melhanian oblongifolia	n	Low shrub <1m
Phyllanthus reticulatus	1	Low shrub <1m
Santalum lanceolatum	n	Low shrub <1m

Name	Cover:	Height:
<i>Sida hackettiana</i>	1	Low shrub <1m
<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	1	Low shrub <1m
<i>Solanum cunninghamii</i>	1	Low shrub <1m
<i>Waltheria indica</i>	1	Low shrub <1m
<i>Capparis jacobsonii</i>	n	Vine
<i>Citrullus lanatus</i>	1	Vine
<i>Jacquemontia paniculata</i>	n	Vine
<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	1	Vine
<i>Aristida holathera</i>	2	Grass
<i>Cymbopogon procerus</i>	1	Grass
<i>Eragrostis minor</i>	1	Grass
<i>Eriachne</i> sp. Dampier Peninsula (K.F.Kenneally 5946)	1	Grass
<i>Paspalidium rarium</i>	1	Grass
<i>Setaria apiculata</i>	1	Grass
<i>Yakirra australiensis</i> var. <i>intermedia</i>	1	Grass
<i>Yakirra pauciflora</i>	1	Grass
<i>Bulbostylis barbata</i>	1	Sedge
<i>Amaranthus undulatus</i>	1	Herb
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	1	Herb
<i>Polycarpaea longiflora</i>	1	Herb
<i>Ptilotus corymbosus</i>	1	Herb
<i>Ptilotus polystachyus</i>	1	Herb
<i>Trianthema pilosa</i>	n	Herb

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## **Appendix B National Vegetation Information System Vegetation Classification (NVIS)**

### NVIS Structural Formation Classes Used For Vegetation Classification

Height Range (m)		Tree	Shrub		Mallee	Grass	
>30		tall	-		-	-	
10-30		mid	-		tall	-	
<10		low	-		mid	-	
<3		-	-		low	-	
>2		-	tall		-	tall	
1-2		-	mid		-	tall	
0.5-1		-	low		-	mid	
<0.5		-	low		-	low	
Growth Form	Height (m)	Structural Formation Classes					
Foliage cover % (cover #)		70-100% (5)	30-70% (4)	10-30% (3)	<10% (2)	0-5% (1)	≈0% (N)
Tree	<10,10-30, >30	closed forest	open forest	woodland	isolated clumps of trees	isolated trees	isolated clumps of trees
Tree mallee	<3, <10, 10-30	closed mallee forest	open mallee forest	mallee woodland	isolated clumps of mallee trees	isolated mallee trees	isolated clumps of mallee trees
Shrub	<1,1-2,>2	closed shrubland	shrubland	open shrubland	isolated clumps of shrubs	isolated shrubs	isolated clumps of shrubs
Mallee shrub	<3, <10, 10-30	closed mallee shrubland	mallee shrubland	open mallee shrubland	isolated clumps of mallee shrubs	isolated mallee shrubs	isolated clumps of mallee shrubs
Heath shrub	<1,1-2,>2	closed heathland	heathland	open heathland	isolated clumps of heath shrubs	isolated heath shrubs	isolated clumps of heath shrubs
Chenopod shrub	<1,1-2,>2	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	isolated clumps of chenopod shrubs	isolated chenopod shrubs	isolated clumps of chenopod shrubs
Samphire shrub	<0.5,>0.5	closed samphire shrubland	samphire shrubland	open samphire shrubland	isolated clumps of samphire shrubs	isolated samphire shrubs	isolated clumps of samphire shrubs
Hummock grass	<2,>2	closed hummock grassland	hummock grassland	open hummock grassland	isolated clumps of hummock grasses	isolated hummock grasses	isolated clumps of hummock grasses
Tussock grass	<0.5,>0.5	closed tussock grassland	tussock grassland	open tussock grassland	isolated clumps of tussock grasses	isolated tussock grasses	isolated clumps of tussock grasses
Sedge	<0.5,>0.5	closed sedgeland	sedgeland	open sedgeland	isolated clumps of sedges	isolated sedges	isolated clumps of sedges
Rush	<0.5,>0.5	closed rushland	rushland	open rushland	isolated clumps of rushes	isolated rushes	isolated clumps of rushes

Source: Department of Environment and Heritage, 2003.

## Appendix C Site by Species Matrix and Dendrogram



Table C.1 Site by Species Matrix

Family	Taxon	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	18	20	21	22	43	44	45	46	47	48	49	51	OC
Acanthaceae	Dicliptera armata																		1					n						
Aizoaceae	Trianthema pilosa	n				n									n										1	n	1		n	n
Amaranthaceae	Achyranthes aspera																								1			n		
Amaranthaceae	Amaranthus undulatus																										1	1		
Amaranthaceae	Gomphrena brachystylis																													n
Amaranthaceae	Ptilotus calostachyus																								1	n				n
Amaranthaceae	Ptilotus corymbosus	n			1					1																		1	1	
Amaranthaceae	Ptilotus polystachyus	n		1	n									n												1	1		1	n
Apocynaceae	Carissa lanceolata					n																								
Apocynaceae	Gymnanthera oblonga																								1	n		1		
Apocynaceae	Marsdenia angustata					n	1															1								
Apocynaceae	Marsdenia geminata																											n		
Apocynaceae	Marsdenia sp.																								1					
Apocynaceae	Marsdenia viridiflora subsp. tropica		1	1	n		1	1	n	1	1	n	n	n	n	1	1	1	1	1	1	1	n	1	1		1		1	
Apocynaceae	Sarcostemma viminalis subsp. brunonianum																											1		
Asteraceae	Cyanthillium cinereum			1																			n			1				
Asteraceae	Helichrysum lepidophyllum			1										n																
Asteraceae	Pterocaulon sphacelatum	n	n	1							1			n		1	1				1									n
Bignoniaceae	Dolichandrone heterophylla			2	2	1			n	1	1			1	2			1		n	1	1		1						n
Boraginaceae	Ehretia saligna	a				1			1																					
Boraginaceae	Ehretia saligna var. saligna		1	1	2		1	1		1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Boraginaceae	Heliotropium foliatum					n	1		n				n																	1
Boraginaceae	Heliotropium leptaleum	n												n	n	1	1	2				1	1	1	1					
Boraginaceae	Trichodesma zeylanicum var. latisepalum	n																												n
Boraginaceae	Trichodesma zeylanicum var. zeylanicum			1	n			3		1	1																			n
Byblidaceae	Byblis filifolia		1	n			1	1			1	n		1		1	1	1	1	1	1	1	1	1	1					n
Cannabaceae	Celtis philippensis																											2		
Capparaceae	Capparis jacobsii																												n	
Capparaceae	Capparis lasiantha																											1		
Caryophyllaceae	Polycarpaea corymbosa	n				n								n						1	1	n		n	1					n
Caryophyllaceae	Polycarpaea longiflora																								1				1	
Celastraceae	Maytenus cunninghamii			1								2								1										1pl
Celastraceae	Stackhousia intermedia													n																1
Chrysobalanaceae	Parinari nonda																										2			
Cleomaceae	Cleome tetrandra																													n
Cleomaceae	Cleome viscosa																								1	1		1	n	
Combretaceae	Terminalia ferdinandiana			1			1	1		1	1	1				1	1	1	1	1	1	1	1	1		1	1		1	

Family	Taxon	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	18	20	21	22	43	44	45	46	47	48	49	51	OC
Commelinaceae	Murdannia graminea	n				n				1																				1
Convolvulaceae	Bonamia linearis								n											1	1									n
Convolvulaceae	Evolvulus alsinoides var. decumbens	n		1		n	1	n	n				n	n	n	1	1		n		1	n	1	1	1		1		1	
Convolvulaceae	Ipomoea pes-caprae												n																	
Convolvulaceae	Jacquemontia paniculata																								1	1	1	1	n	n
Convolvulaceae	Polymeria ambigua				n		n									1	n	n		n	2	n	1				1			n
Cucurbitaceae	* Citrullus lanatus																												1	
Cucurbitaceae	Cucumis maderaspatanus				n			1					n	n																
Cyperaceae	Bulbostylis barbata	n		1		n					1			1		1	1	1		1	1		1	1	1	1	1	1	1	1
Cyperaceae	Cyperus conicus																										1			
Cyperaceae	Cyperus zollingeri																											n		
Cyperaceae	Fimbristylis oxystachya													n						n				1						1
Cyperaceae	Fimbristylis simulans									1																				
Cyperaceae	Scleria brownii		1	1			1				2					1	1				1			1						
Ebenaceae	Diospyros humilis																										1	2	1	
Euphorbiaceae	Croton habrophyllus																								2	n	1	n	n	
Euphorbiaceae	Euphorbia alsiniflora	n	1		1		1										1		n	1	1	1						n		
Euphorbiaceae	Euphorbia comans																										1			
Fabaceae	Abrus precatorius																								2			1		
Fabaceae	Acacia adoxa var. adoxa			1																										n
Fabaceae	Acacia adoxa var. subglabra																			1	1									1
Fabaceae	Acacia colei																								3					
Fabaceae	Acacia colei var. colei		1	1								2	2			1				1	1		1			1				
Fabaceae	Acacia colei var. ileocarpa																							1			1	n	n	
Fabaceae	Acacia eriopoda	2	1	3	3	1	4	4	3	3	3		2		3	3	3	3		2	3	3	3	3		3	3			
Fabaceae	Acacia hippuroides	4	1		3	n	1	2	1		1	3	n	n	1	1	1	1					1	1						n
Fabaceae	Acacia monticola		3									4		4					3					1	1				2	
Fabaceae	Acacia platycarpa					1					2				n	2	2			2	2		2	3			1			2
Fabaceae	Acacia tumida var. kulparn					n											1													
Fabaceae	Acacia tumida var. tumida								1	2					1	2		3		3	1		2			1	2		1	
Fabaceae	Bauhinia cunninghamii				2	n	1			1											1	1			1	1	1		1	
Fabaceae	Caesalpinia major																											1		
Fabaceae	Cajanus marmoratus								n																					
Fabaceae	Chamaecrista absus																								1					
Fabaceae	Crotalaria brevis	n				n			n				1		n															nc
Fabaceae	Crotalaria crispata																													nc
Fabaceae	Crotalaria medicaginea var. neglecta			1			1	1			1			n		1		1		1	1	1		1	1	1	1		1	
Fabaceae	Desmodium brownii																													1

Family	Taxon	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	18	20	21	22	43	44	45	46	47	48	49	51	OC	
Fabaceae	Galactia tenuiflora	1	1		2	1	1			2			n		1											1			n	n	1
Fabaceae	Indigofera colutea																									1			n	n	
Fabaceae	Indigofera haplophylla		1				1																								
Fabaceae	Indigofera hirsuta																									2					
Fabaceae	Indigofera linifolia																											2			n
Fabaceae	Rhynchosia minima															1									1						n
Fabaceae	Senna costata						1												1						1	1	1		1	1pl	
Fabaceae	Tephrosia leptoclada	n	1						n	1		n	n		n	1		1					1	n							n
Fabaceae	Tephrosia remotiflora		1	1							1					1	1				1		1	1			1				n
Fabaceae	Tephrosia rosea var. rosea																								1			2	1		
Fabaceae	Zornia prostrata var. prostrata		1									n		1						1					1		1				1
Goodeniaceae	Goodenia sepalosa var. sepalosa	1		1	n	1	1	1	n	1	1	n	n	n	1	1	1	1	1	1	1	1	1	1							n
Goodeniaceae	Scaevola parvifolia subsp. parvifolia																														1
Goodeniaceae	Velleia panduriformis																														1pl
Gyrostemonaceae	Codonocarpus cotinifolius		n	1			1	1	1	1	1		1			1	1		1	n	1			1		n			1		
Gyrostemonaceae	Gyrostemon tepperi	1		1	n		1	1	n	1	1		n	n	1	1	1	1		1	1	1	1	1	1		1		1		
Haloragaceae	Gonocarpus leptothecus		1									n				1	1		1				1								1
Hernandiaceae	Gyrocarpus americanus subsp. pachyphyllus		1																							1	1		1		
Lamiaceae	Clerodendrum floribundum var. floribundum													n								1									n
Lamiaceae	Clerodendrum floribundum var. ovatum									1	1	1			1	1	1				2		1								n
Lamiaceae	Clerodendrum tomentosum									1																					12pl
Lamiaceae	Premna acuminata	1	1	1			1	1				n	n	n	1	1	2	1	1	1	1	1	1	1	1	1	1		n		n
Lauraceae	Cassytha capillaris							1					n	n		1								1							
Lauraceae	Cassytha filiformis		1									1							1						1		2	n			1
Lecythidaceae	Planchonia careya					1																									
Loganiaceae	Mitrasacme exserta		1					1			1		1	n		1					1			1			1				
Loranthaceae	Amyema benthamii																											1			
Loranthaceae	Lysiana spathulata subsp. spathulata												n																		n
Malvaceae	Abutilon otocarpum	n				n																				1	1	1			n
Malvaceae	Brachychiton diversifolius																														1
Malvaceae	Brachychiton diversifolius subsp. diversifolius	1	1	1			1	1			1				2	1	1	1		1	1	1	1	1	1	1	n				n
Malvaceae	Corchorus sidoides subsp. vermicularis	n	1	1	1	1	2	3	1	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1		1	2				
Malvaceae	Gossypium australe																									1	1				1
Malvaceae	Gossypium rotundifolium	1	1	1	1	1		1	1	2	1	n	n	1	n	1	2	1	1	1	1	1	1	1	1			1			
Malvaceae	Grewia breviflora												n															1		1	
Malvaceae	Grewia retusifolia	n		1		1										1	1		1	1	1	1			1	1					n
Malvaceae	Herissantia crispa																												n	1	
Malvaceae	Hibiscus geranioides						1																		1						1

Family	Taxon	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	18	20	21	22	43	44	45	46	47	48	49	51	OC
Malvaceae	Melhania oblongifolia	n				n							1	n	n					1		n				1				n
Malvaceae	Sida hackettiana	1																		1					1	n			1	n
Malvaceae	Sida rohlenae subsp. occidentalis	n			1						1		1	1	1	1	1		1	1	1	1	1	1	1	1			1	n
Malvaceae	Sida sp. B Kimberley Flora (A.A. Mitchell 2745)	n										n		n		1	1	1	1		1	1	1							n
Malvaceae	Waltheria indica	1	1		n		1			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	1		1	1
Menispermaceae	Tinospora smilacina					n							n	n		1	1				1				2	n		1		n
Moraceae	Ficus aculeata			1	1		1	1	1	1	1	n	1	n	1	1	1	1		n	1	1								
Moraceae	Ficus scobina		1																											
Myrtaceae	Calytrix carinata																										1			
Myrtaceae	Calytrix exstipulata															1				2			1	1						n
Myrtaceae	Corymbia bella																			1					2			1		
Myrtaceae	Corymbia dampieri									1						1					1	1		1						
Myrtaceae	Corymbia flavescens									2																			n	
Myrtaceae	Corymbia grandifolia subsp. lamprocardia									1																				
Myrtaceae	Corymbia greeniana	1	1	1	1	1		1	2	1		1	1																	
Myrtaceae	Corymbia polycarpa					3														1		1	1		1	2	2			1
Myrtaceae	Corymbia zygophylla						1	n	1		1			2		3	2	1	1			1	1	3						
Myrtaceae	Eucalyptus miniata										2						1		2				1	1			1			
Myrtaceae	Lithomyrtus retusa											1							2				1							n
Myrtaceae	Lophostemon grandiflorus subsp. grandiflorus																								1					
Nyctaginaceae	Boerhavia gardneri															1					1							1		
Oleaceae	Jasminum didymum	n									1						1	1		n	1		1	1			1	1		n
Oleaceae	Jasminum didymum subsp. lineare								1				n			1						1								
Oleaceae	Jasminum molle											n													1	1	1		1	
Opiliaceae	Opilia amentacea																									n	1			1
Orchidaceae	Cymbidium canaliculatum																										1			n
Orobanchaceae	Buchnera ramosissima	n				n				1				n		1	1	1	n	1	1	1	n	1						n
Passifloraceae	* Passiflora foetida var. hispida									1																2		1		
Phyllanthaceae	Breynia cernua			1	1		1		n				1	1		1					1			1	1			1		1
Phyllanthaceae	Bridelia tomentosa									1															2	2	2	1	3	
Phyllanthaceae	Flueggea virosa subsp. melanthesoides		1	1		1	1			1	1										1				1	1				
Phyllanthaceae	Phyllanthus exilis						1			1				n		1					1	1		1		1				1
Phyllanthaceae	Phyllanthus maderaspatensis																								1			n		
Phyllanthaceae	Phyllanthus reticulatus																												1	
Phyllanthaceae	Sauropus trachyspermus										1			1			1	1		n		1	1							
Plumbaginaceae	Plumbago zeylanica																											n		
Poaceae	Aristida contorta																				2	2				4				
Poaceae	Aristida holathera																													2

Family	Taxon	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	18	20	21	22	43	44	45	46	47	48	49	51	OC
Poaceae	Aristida holathera var. holathera	1	2	5	1		4	3			3	1			1	1		2		2				2	2		3			
Poaceae	Aristida holathera var. latifolia																						3							
Poaceae	Aristida hygrometrica												n				2		2											
Poaceae	Chrysopogon fallax							2						2		4								2						
Poaceae	Chrysopogon pallidus	n			2	2	1		2			1	1				2		2	3	3	2								
Poaceae	Chrysopogon sp.																						3							
Poaceae	Cymbopogon procerus		1	1																					2	1	2	2	1	4
Poaceae	* Digitaria ciliaris																											n		
Poaceae	Enneapogon caeruleus																											2		
Poaceae	Enteropogon dolichostachyus																											1		
Poaceae	* Eragrostis minor																								1	1			1	1
Poaceae	Eragrostis olida																							1						
Poaceae	Eriachne ciliata		1									1				1			1		1			1	1	1				
Poaceae	Eriachne melicacea																1													1
Poaceae	Eriachne obtusa			1	1		2	3	n	1			2	1			2	1		1		2	2							1
Poaceae	Heteropogon contortus																													10p
Poaceae	Mnesithea formosa										1																			
Poaceae	Paspalidium rarum		1									1														1		1		
Poaceae	Perotis rara																													3
Poaceae	POACEAE sp. 1											1																		
Poaceae	Schizachyrium fragile		1								1					2	1		1	1	1	1	2	1		1				
Poaceae	Setaria apiculata																					1			3				1	n
Poaceae	Setaria surgens				n						1			1		1		1		1		1		1		1	1			
Poaceae	Sorghum plumosum	4				5				4	2																			4
Poaceae	Sorghum plumosum var. plumosum																				1							n		
Poaceae	Thaumastochloa major					1				1	1			1			1	1		2				1	1	1	1			
Poaceae	Thaumastochloa pubescens		1					1				n				1					1	1								
Poaceae	Triodia schinzii				4	2		3	4	3	4		3	3		2		2		1			2	2						
Poaceae	Yakirra australiensis																													1
Poaceae	Yakirra australiensis var. australiensis													n			1									1				
Poaceae	Yakirra australiensis var. intermedia					1							n			1				n	1			1			1	n	1	n
Poaceae	Yakirra pauciflora						1																		1				1	1pl
Polygalaceae	Polygala tepperi	n	1	2	n		1	1	n	1	1		1	1	n	1	1	1		1	1	1	1	1						
Portulacaceae	Calandrinia strophilata	n	1	1	1	n	1	1	1		1	n	n	1	1	1	1	1	1	1	1	1	1	1		1	1			
Proteaceae	Grevillea ceratocarpa									1																				
Proteaceae	Grevillea pyramidalis																													n
Proteaceae	Grevillea pyramidalis subsp. leucadendron									2									1									1		
Proteaceae	Grevillea pyramidalis subsp. pyramidalis	2	3	1				1			1			2				1					1			1				

[illegible]



Dendrogram

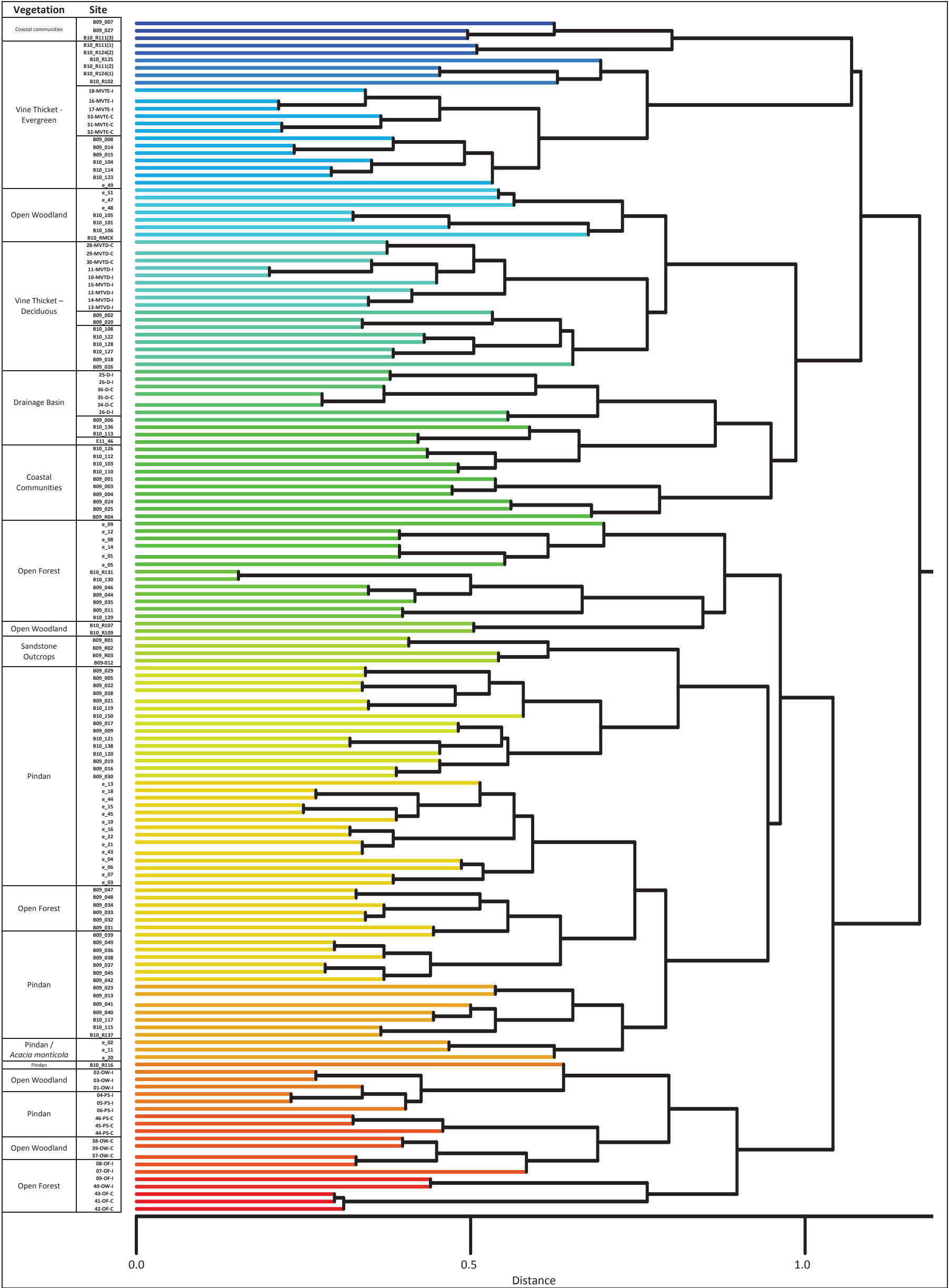


Figure A2.1 Dendrogram produced to delineate floristic communities present in the survey areas.

## Appendix D Flora Species List

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
Acanthaceae	<i>Dicliptera armata</i>				x
	<i>Hypoestes floribunda</i> var. <i>varia</i>	x	x		
Aizoaceae	<i>Trianthema pilosa</i>	x	x	x	x
	* <i>Trianthema portulacastrum</i>				
Amaranthaceae	<i>Achyranthes aspera</i>	x	x	x	x
	* <i>Aerva javanica</i>	x	x	x	
	<i>Amaranthus undulatus</i>	x	x	x	x
	<i>Gomphrena brachystylis</i>				x
	<i>Gomphrena flaccida</i>	x	x		
	<i>Gomphrena pusilla</i>	x	x		
	<i>Ptilotus calostachyus</i>				x
	<i>Ptilotus corymbosus</i>		x		x
	<i>Ptilotus decalvatus</i>		x		
	<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>		x		
	<i>Ptilotus fusiformis</i>		x		
	<i>Ptilotus lanatus</i> var. <i>lanatus</i>	x	x	x	
	<i>Ptilotus polystachyus</i> var. <i>arthrotrichus</i>	x	x	x	x
	<i>Ptilotus polystachyus</i> var. <i>polystachyus</i>		x	x	
	* <i>Pupalia micrantha</i>		x		
	<i>Crinum angustifolium</i>	x		x	
Apocynaceae	<i>Carissa lanceolata</i>	x	x	x	x
	<i>Cynanchum carnosum</i>	x			
	<i>Gymnanthera oblonga</i>	x	x	x	x
	<i>Marsdenia angustata</i>	x	x	x	x
	<i>Marsdenia geminata</i>				x
	<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	x	x	x	x
	<i>Parsonsia kimberleyensis</i>		x		
	<i>Sarcostemma viminalis</i> subsp. <i>brunonianum</i>	x	x		x
Apocynaceae	<i>Tylophora cinerascens</i>	x	x	x	

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>Wrightia saligna</i>	x	x	x	
Araliaceae	<i>Trachymene microcephala</i>		x	x	
Asparagaceae	<i>Asparagus racemosus</i>	x			
Asteraceae	<i>*Bidens bipinnata</i>	x	x		
	<i>Cyanthillium cinereum</i>	x	x		x
	<i>Pterocaulon serrulatum</i>	x			
	<i>Pterocaulon sphacelatum</i>	x	x	x	x
Bignoniaceae	<i>Dolichandrone heterophylla</i>	x	x	x	x
Boraginaceae	<i>Ehretia saligna</i> var. <i>saligna</i>	x	x	x	x
	<i>Heliotropium foliatum</i>	x	x		x
	<i>Heliotropium leptaleum</i>	x	x	x	x
	<i>Trichodesma zeylanicum</i> var. <i>latisepalum</i>		x		x
	<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>		x		x
Byblidaceae	<i>Byblis filifolia</i>	x	x	x	x
	<i>Byblis rorida</i>	x			
Cannabaceae	<i>Celtis philippensis</i>	x	x	x	x
	<i>Trema tomentosa</i>		x		
Capparaceae	<i>Capparis jacobsonii</i>				x
	<i>Capparis lasiantha</i>	x	x	x	x
Caryophyllaceae	<i>Polycarpaea corymbosa</i>	x	x		x
	<i>Polycarpaea longiflora</i>	x	x		x
Celastraceae	<i>Maytenus cunninghamii</i>	x	x	x	x
	<i>Stackhousia intermedia</i>		x		x
Chrysobalanaceae	<i>Parinari nonda</i>		x		x
Cleomaceae	<i>Cleome tetrandra</i>	x	x		x
	<i>Cleome viscosa</i>	x	x	x	x
Combretaceae	<i>Terminalia ferdinandiana</i>	x	x	x	x
	<i>Terminalia hadleyana</i>			x	
	<i>Terminalia petiolaris</i>	x	x	x	

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>Terminalia petiolaris x ferdinandiana</i>		x		
Commelinaceae	<i>Murdannia graminea</i>	x	x	x	x
Convolvulaceae	<i>Bonamia oblongifolia</i>		x	x	
	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	x	x	x	x
	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	x	x	x	
	<i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i>		x		x
	<i>Ipomoea polymorpha</i>	x	x		
	<i>Jacquemontia paniculata</i>	x	x	x	x
	* <i>Merremia davenportii</i>		x		
	<i>Operculina aequiseipala</i>	x			x
	<i>Operculina brownii</i>	x	x		x
	<i>Polymeria ambigua</i>		x		x
	<i>Polymeria distigma</i>		x		
	<i>Polymeria</i> sp. Broome (JR Clarkson 6527)	x		x	
	<i>Bonamia linearis</i>		x		x
Corioliaceae	<i>Daedalea</i> sp.		x		
	<i>Trametes</i> sp.	x			
Cucurbitaceae	* <i>Citrullus lanatus</i>	x	x		x
	<i>Cucumis maderaspatanus</i>	x	x		x
	* <i>Cucumis melo</i>		x		
Cyperaceae	<i>Bulbostylis barbata</i>	x	x	x	x
	<i>Cyperus bifax</i>	x	x		
	<i>Cyperus blakeanus</i>	x		x	
	<i>Cyperus bulbosus</i>	x	x		
	<i>Cyperus conicus</i>		x	x	x
Cyperaceae	<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	x	x		
	<i>Cyperus zollingeri</i>	x	x		x
	<i>Fimbristylis ammobia</i>		x		
	<i>Fimbristylis oxystachya</i>	x	x		x

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>Fimbristylis oxystachya</i>				x
	<i>Fimbristylis schultzei</i>	x			x
	<i>Fimbristylis sericea</i>	x	x		
	<i>Scleria brownii</i>	x	x	x	x
Ebenaceae	<i>Diospyros humilis</i>	x	x	x	x
Euphorbiaceae	<i>Croton aridus</i>	x	x		
	<i>Croton habrophyllus</i>	x	x	x	x
	<i>Euphorbia</i> aff. <i>Mitchelliana</i>	x	x		
	<i>Euphorbia alsiniflora</i>		x	x	x
	<i>Euphorbia coghlanii</i>	x	x		
	<i>Euphorbia comans</i>	x	x		x
	* <i>Euphorbia tirucalli</i>		x		
	<i>Microstachys chamaelea</i>	x	x	x	x
Fabaceae	<i>Abrus precatorius</i>	x	x	x	x
	<i>Acacia adoxa</i> var. <i>adoxo</i>				x
	<i>Acacia adoxa</i> var. <i>subglabra</i>		x		x
	<i>Acacia colei</i> var. <i>colei</i>	x	x	x	x
	<i>Acacia colei</i> var. <i>ileocarpa</i>	x	x		x
	<i>Acacia eriopoda</i>	x	x	x	x
	<i>Acacia eriopoda</i> x <i>monticola</i> (B.R. Maslin 7322)		x		
	<i>Acacia hippuroides</i>	x	x	x	x
	<i>Acacia monticola</i>	x	x	x	x
	<i>Acacia platycarpa</i>	x	x	x	x
	<i>Acacia tumida</i> var. <i>kulparn</i>	x	x	x	x
Fabaceae	<i>Acacia tumida</i> var. <i>tumida</i>	x	x		x
	<i>Bauhinia cunninghamii</i>	x	x	x	x
	<i>Caesalpinia major</i>	x	x	x	x
	<i>Cajanus marmoratus</i>	x	x	x	x
	<i>Canavalia rosea</i>	x	x	x	
	<i>Chamaecrista absus</i>	x	x		x



Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>Crotalaria brevis</i>				x
	<i>Crotalaria crispata</i>	x	x	x	x
	<i>Crotalaria cunninghamii</i>	x	x	x	
	<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	x	x	x	x
	<i>Crotalaria novae-hollandiae</i>			x	
	<i>Cullen martinii</i>		x	x	
	<i>Desmodium brownii</i>	x			x
	<i>Desmodium filiforme</i>		x		
	<i>Erythrophleum chlorostachys</i>	x	x	x	
	<i>Galactia tenuiflora</i>	x	x		x
	<i>Indigofera colutea</i>	x	x	x	x
	<i>Indigofera haplophylla</i>	x	x	x	x
	<i>Indigofera hirsuta</i>	x	x	x	x
	<i>Indigofera linifolia</i>	x	x		x
	<i>Indigofera linnaei</i>	x	x	x	
	<i>Indigofera trita</i>		x		
	* <i>Macroptilium atropurpureum</i>		x		
	<i>Rhynchosia minima</i>	x		x	x
	<i>Senna costata</i>	x	x		x
	<i>Senna goniodes</i>	x	x		
	<i>Senna notabilis</i>		x		
	* <i>Stylosanthes hamata</i>	x	x		
	<i>Tephrosia</i> aff. <i>rosea</i>			x	
Fabaceae	<i>Tephrosia crocea</i>	x	x	x	
	<i>Tephrosia leptoclada</i>	x	x	x	x
	<i>Tephrosia remotiflora</i>	x	x		x
	<i>Tephrosia rosea</i> var. <i>clementii</i>			x	
	<i>Tephrosia rosea</i> var. <i>rosea</i>	x	x	x	x
	<i>Tephrosia simplicifolia</i>			x	
	<i>Zornia muelleriana</i> subsp. <i>congesta</i>		x		x
	<i>Zornia prostrata</i> var. <i>prostrata</i>	x	x	x	x

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
Ganodermataceae	<i>Ganoderma steyaertanum</i>		x		
Goodeniaceae	<i>Goodenia sepalosa</i> var. <i>sepalosa</i>	x	x	x	x
	<i>Scaevola parvifolia</i> subsp. <i>parvifolia</i>	x			x
	<i>Velleia panduriformis</i>		x		x
Gyrostemonaceae	<i>Codonocarpus cotinifolius</i>	x	x	x	x
	<i>Gyrostemon tepperi</i>	x	x	x	x
Haloragaceae	<i>Gonocarpus leptothecus</i>	x	x	x	x
Hernandiaceae	<i>Gyrocarpus americanus</i> subsp. <i>pachyphyllus</i>	x	x	x	x
Lamiaceae	<i>Clerodendrum floribundum</i> var. <i>coriaceum</i>	x			
	<i>Clerodendrum floribundum</i> var. <i>floribundum</i>				x
	<i>Clerodendrum floribundum</i> var. <i>ovatum</i>	x	x		x
	<i>Clerodendrum tomentosum</i> var. <i>mollissima</i>	x	x		
	<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	x		x	x
	* <i>Hyptis suaveolens</i>		x		
	<i>Premna acuminata</i>	x	x	x	x
Lauraceae	<i>Cassytha capillaris</i>	x	x		x
	<i>Cassytha filiformis</i>	x	x	x	x
Lecythidaceae	<i>Planchonia careya</i>	x	x	x	x
Loganiaceae	<i>Mitrasacme exserta</i>		x		x
Loranthaceae	<i>Amyema benthamii</i>	x	x	x	x
	<i>Lysiana spathulata</i> subsp. <i>spathulata</i>	x	x		x
Malvaceae	<i>Abutilon indicum</i> var. <i>australiense</i>	x	x	x	
	<i>Abutilon otocarpum</i>	x	x	x	x
	<i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i>	x	x	x	x
	<i>Corchorus aestuans</i>		x		
	<i>Corchorus pumilio</i>			x	

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>vermicularis</i>				
	<i>Corchorus tridens</i>	x	x		
	<i>Gossypium australe</i>	x	x	x	x
	<i>Gossypium rotundifolium</i>	x	x		x
	<i>Grewia breviflora</i>	x	x	x	x
	<i>Grewia retusifolia</i>	x	x	x	x
	<i>Herissantia crispa</i>	x	x		x
	<i>Hibiscus</i> aff. <i>leptocladus</i>	x		x	
	<i>Hibiscus apodus</i>			x	
	<i>Hibiscus geranioides</i>	x	x	x	x
	<i>Hibiscus meraukensis</i>	x			
	<i>Melhania oblongifolia</i>	x	x	x	x
	* <i>Sida acuta</i>		x		
	<i>Sida hackettiana</i>	x	x		x
	<i>Sida rohlenae</i> subsp. <i>occidentalis</i>	x	x	x	x
	<i>Sida</i> sp. B Kimberley Flora (A.A. Mitchell 2745)	x	x	x	x
	<i>Triumfetta</i> ? <i>appendiculata</i>	x			
	<i>Triumfetta breviaculeata</i>		x		x
	<i>Triumfetta pentandra</i>	x	x		
	<i>Triumfetta simulans</i>		x		
	<i>Waltheria indica</i>	x	x	x	x
Menispermaceae	<i>Tinospora smilacina</i>	x	x	x	x
Moraceae	<i>Ficus aculeata</i> var. <i>aculeata</i>		x	x	
	<i>Ficus aculeata</i> var. <i>indecora</i>	x	x	x	x
	<i>Ficus scobina</i>				x
Myrtaceae	<i>Calytrix carinata</i>				x
	<i>Calytrix exstipulata</i>	x	x	x	x
	<i>Corymbia</i> aff. <i>bella</i>		x		
	<i>Corymbia bella</i>	x	x	x	x
	<i>Corymbia dampieri</i>	x	x.x	x	x

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>Corymbia flavescens</i>	x	x	x	x
	<i>Corymbia grandifolia</i> subsp. <i>lamprocardia</i>				x
	<i>Corymbia greeniana</i>		x	x	x
	<i>Corymbia polycarpa</i>	x	x	x	x
	<i>Corymbia zygophylla</i>	x	x	x	x
	<i>Eucalyptus jensenii</i>			x	
	<i>Eucalyptus miniata</i>	x	x	x	x
	<i>Eucalyptus tectifica</i>		x		
	<i>Lithomyrtus retusa</i>	x	x	x	x
	<i>Lophostemon grandiflorus</i> subsp. <i>grandiflorus</i> (P3)	x	x	x	x
	<i>Melaleuca dealbata</i>	x	x	x	
Nyctaginaceae	<i>Boerhavia burbridgeana</i>	x			
	<i>Boerhavia dominii</i>		x		
	<i>Boerhavia gardneri</i>	x	x	x	x
Oleaceae	<i>Jasminum didymum</i> subsp. <i>didymum</i>			x	
	<i>Jasminum didymum</i> subsp. <i>lineare</i>	x	x	x	x
	<i>Jasminum molle</i>	x	x	x	x
Opiliaceae	<i>Opilia amentacea</i>		x	x	
Orchidaceae	<i>Cymbidium canaliculatum</i>		x	x	x
Orobanchaceae	<i>Buchnera asperata</i>		x		
	<i>Buchnera ramosissima</i>		x		x
Passifloraceae	* <i>Passiflora foetida</i> var. <i>hispida</i>	x	x	x	x
Pedaliaceae	<i>Josephinia eugeniae</i>	x	x	x	
Phyllanthaceae	<i>Breynia cernua</i>	x	x	x	x
	<i>Bridelia tomentosa</i>	x	x	x	x
	<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	x	x	x	x
	<i>Phyllanthus exilis</i>	x	x	x	x
	<i>Phyllanthus maderaspatensis</i>	x	x	x	x
	<i>Phyllanthus reticulatus</i>			x	x

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>Sauropus trachyspermus</i>	x	x	x	x
Pittosporaceae	<i>Pittosporum moluccanum</i> (P4)		x		
Plantaginaceae	<i>Stemodia lathraia</i>				
Plumbaginaceae	<i>Plumbago zeylanica</i>	x	x	x	x
Poaceae	<i>Acrachne racemosa</i>	x	x		
	<i>Alloteropsis semialata</i>		x		
	<i>Aristida contorta</i>				x
	<i>Aristida holathera</i> var. <i>holathera</i>	x	x	x	x
	<i>Aristida holathera</i> var. <i>latifolia</i>	x		x	x
	<i>Aristida hygrometrica</i>	x	x	x	x
	<i>Aristida inaequiglumis</i>		x		
	<i>Brachyachne convergens</i>		x		
	* <i>Cenchrus biflorus</i>	x	x		
	* <i>Cenchrus ciliaris</i>		x	x	
	* <i>Cenchrus setiger</i>	x	x	x	
	<i>Chrysopogon fallax</i>	x			x
	<i>Chrysopogon pallidus</i>	x	x	x	x
	<i>Cymbopogon ambiguus</i>	x	x	x	
	<i>Cymbopogon bombycinus</i>	x			
	<i>Cymbopogon procerus</i>	x	x	x	x
	* <i>Cynodon dactylon</i>	x			
	<i>Dactyloctenium radulans</i>		x		
	<i>Digitaria bicornis</i>	x	x	x	
	<i>Digitaria brownii</i>	x	x		
	<i>Digitaria ciliaris</i>				x
	<i>Enneapogon caerulescens</i>				x
	<i>Enneapogon pallidus</i>	x	x		x
	<i>Enneapogon polyphyllus</i>			x	
	<i>Enteropogon dolichostachyus</i>	x	x	x	x
	<i>Eragrostis</i> aff. <i>eripoda</i>		x	x	
	<i>Eragrostis cumingii</i>	x	x		

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>Eragrostis eriopoda</i>	x			
	* <i>Eragrostis minor</i>		x		x
	<i>Eragrostis olida</i>				x
	<i>Eragrostis setifolia</i>	x	x		
	<i>Eriachne avenacea</i>			x	
	<i>Eriachne ciliata</i>	x	x	x	x
	<i>Eriachne melicacea</i>	x	x	x	x
	<i>Eriachne obtusa</i>	x	x	x	x
	<i>Eriachne</i> sp.	x		x	
	<i>Eriachne</i> sp. Dampier Peninsula (K.F. Kenneally 5946) (P3)	x	x	x	x
	<i>Heteropogon contortus</i>		x		x
	<i>Mnesithea formosa</i>	x	x		x
	<i>Panicum decompositum</i>		x		
	<i>Panicum effusum</i>	x	x		
	<i>Panicum seminudum</i> var. <i>cairnsianum</i>	x	x		
	<i>Paspalidium rarum</i>	x	x	x	x
	<i>Perotis rara</i>	x	x		x
	<i>Schizachyrium fragile</i>			x	x
	<i>Schizachyrium pachyarthron</i>	x			
	<i>Sehima nervosum</i>		x		
	<i>Setaria apiculata</i>	x	x	x	x
	<i>Sorghum ecarinatum</i>		x		
	<i>Sorghum plumosum</i> var. <i>plumosum</i>				x
	<i>Sorghum</i> sp.		x		
	<i>Spinifex longifolius</i>	x	x	x	
	<i>Thaumastochloa major</i>				x
	<i>Thaumastochloa pubescens</i>	x	x		x
	<i>Triodia microstachya</i>			x	
	<i>Triodia schinzii</i>	x	x	x	x
	<i>Triodia stenostachya</i>		x		



Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>Urochloa argentea</i>	x			
	* <i>Urochloa mosambicensis</i>		x		
	<i>Whiteochloa airoides</i>	x	x		
	<i>Yakirra australiensis</i> var. <i>australiensis</i>	x	x	x	x
	<i>Yakirra australiensis</i> var. <i>intermedia</i>	x	x		x
	<i>Yakirra pauciflora</i>				x
Polygalaceae	<i>Polygala tepperi</i>	x	x		x
Portulacaceae	<i>Calandrinia quadrivalvis</i>		x		
	<i>Calandrinia strophiolata</i>	x	x		x
	<i>Portulaca bicolor</i>	x	x		
	<i>Portulaca napiformis</i>		x		
	<i>Portulaca oleracea</i>	x			
	<i>Portulaca pilosa</i>		x		
Proteaceae	<i>Grevillea ceratocarpa</i>				x
	<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>				x
	<i>Grevillea pyramidalis</i> subsp. <i>pyramidalis</i>		x	x	x
	<i>Grevillea refracta</i> subsp. <i>refracta</i>		x	x	x
	<i>Hakea arborescens</i>	x	x	x	x
	<i>Hakea macrocarpa</i>	x	x	x	x
	<i>Persoonia falcata</i>	x	x	x	x
Rhamnaceae	<i>Ventilago viminalis</i>	x	x	x	x
Rubiaceae	<i>Gardenia pyriformis</i> subsp. <i>keartlandii</i>	x	x	x	x
	<i>Oldenlandia kochiae</i>				x
	<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>	x	x		
	<i>Pavetta kimberleyana</i>		x		x
	<i>Psydrax attenuata</i>			x	
	<i>Psydrax latifolia</i>			x	
	<i>Psydrax pendulina</i>			x	

Family	Species	Biota 2010	Biota 2011a	Biota 2011b	ecologia 2011
	<i>Spermacoce ? dolichosperma</i>	x			
	<i>Spermacoce ? sp. nov A</i>		x		
	<i>Spermacoce ? sp. nov B</i>		x		
	<i>Spermacoce aff. breviflora</i>		x		
	<i>Spermacoce breviflora</i>	x	x	x	
	<i>Spermacoce occidentalis</i>	x	x	x	x
	<i>Synaptantha scleranthoides</i>	x	x	x	
Rutaceae	<i>Glycosmis macrophylla</i>	x		x	x
	<i>Glycosmis sp.</i>	x	x		
	<i>Glycosmis trifoliata</i>	x		x	
Santalaceae	<i>Exocarpos latifolius</i>	x	x	x	x
Santalaceae	<i>Santalum lanceolatum</i>	x	x	x	x
	<i>Santalum lanceolatum</i>	x	x	x	x
Sapindaceae	<i>Atalaya variifolia</i>			x	x
	<i>Dodonaea hispidula var. arida</i>	x	x	x	
Sapotaceae	<i>Mimusops elengi</i>	x	x	x	x
	<i>Sersalisia sericea</i>	x	x	x	x
Scrophulariaceae	<i>Myoporum montanum</i>	x	x	x	x
Solanaceae	<i>Solanum cunninghamii</i>	x	x	x	x
	<i>Solanum diversiflorum</i>		x		
Violaceae	<i>Hybanthus aurantiacus</i>	x	x	x	x
Zygophyllaceae	<i>Tribulopsis angustifolia</i>		x		
	<i>Tribulus cistoides</i>		x		
	<i>Tribulus occidentalis</i>		x		

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## **Appendix E Threatened and Priority Ecological Communities & Threatened Flora Conservation Code Definitions**

### Definition of Codes for Threatened Ecological Communities

Conservation Code	Definition
PD: Presumed Totally Destroyed	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant.
CR: Critically Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
EN: Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future.
VU: Vulnerable	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

## Definition of Codes for Priority Ecological Communities

Conservation Code	Definition
P1: Priority One	Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or Pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2: Priority Two	Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3: Priority Three	<p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>(iii) Communities made up of large, and/or widespread occurrences that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
P4: Priority Four	<p>Ecological communities that are adequately known, Rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(a) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(c) Ecological communities that have been removed from the list of threatened communities during the past five years.</p> <p>P5: Priority Five Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>
P5: Priority Five	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.



### Definition of Threatened Flora Species Categories under the EPBC Act

Conservation Code	Definition
Extinct	A species is extinct if there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	A species is categorised as extinct in the wild if it is only known to survive in cultivation, in captivity or as a naturalised population well outside its past range; or if it has not been recorded in its known/expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	The species is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	The species is likely to become extinct unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate; or its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction.
Vulnerable	Within the next 25 years, the species is likely to become endangered unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate.
Conservation Dependent	The species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of five years.

### Definition of Declared Rare and Priority Flora Categories under the WC Act

Conservation Code	Definition
T: Threatened Flora (Declared Rare Flora — Extant)	Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the Wildlife Conservation Act 1950).
X: Presumed Extinct Flora (Declared Rare Flora — Extinct)	Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the Wildlife Conservation Act 1950).
P1: Priority One	Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P2: Priority Two	Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P3: Priority Three	Poorly Known Taxa. Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.
P4: Priority Four	Rare Taxa. Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

## Appendix F Control Codes for Declared Plants

### Control Codes for Declared Plants in Western Australia

Priority Level	Requirements
P1 Prohibits movement	The movement of plants or their seeds is prohibited within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P2 Aim is to eradicate infestation	Treat all plants to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.
P3 Aims to control infestation by reducing area and/or density of infestation	<p>The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery.</p> <p>Treat to destroy and prevent seed set for all plants:-</p> <ul style="list-style-type: none"> <li>- Within 100 metres inside of the boundaries of the infestation.</li> <li>- Within 50 metres of roads and high-water mark on waterways.</li> <li>- Within 50 metres of sheds, stock yards and houses.</li> </ul> <p>Treatment must be done prior to seed set each year.</p> <p>Of the remaining infested area:-</p> <ul style="list-style-type: none"> <li>- Where plant density is 1-10 per hectare treat 100% of infestation.</li> <li>- Where plant density is 11-100 per hectare treat 50% of infestation.</li> <li>- Where plant density is 101-1000 per hectare treat 10% of infestation.</li> </ul> <p>Properties with less than 2 hectares of infestation must treat the entire infestation.</p> <p>Additional areas may be ordered to be treated.</p>
P4 Aims to prevent infestation spreading beyond existing boundaries of infestation	<p>The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery.</p> <p>Treat to destroy and prevent seed set for all plants:-</p> <ul style="list-style-type: none"> <li>- Within 100 metres inside of the boundaries of the infested property.</li> <li>- Within 50 metres of roads and high-water mark on waterways.</li> <li>- Within 50 metres of sheds, stock yards and houses.</li> </ul> <p>Treatment must be done prior to seed set each year. Properties with less than 2 hectares of infestation must treat the entire infestation.</p> <p>Additional areas may be ordered to be treated.</p> <p>Special considerations.</p> <p>In the case of P4 infestations where they continue across property boundaries there is no requirement to treat the relevant part of the property boundaries as long as the boundaries of the infestation as a whole are treated. There must be agreement between neighbours in relation to the treatment of these areas.</p>
P5	Infestations on public lands must be controlled.