



# Karratha to Cape Lambert Transmission Line Corridor: Native Vegetation Clearing Permit Report



**Prepared for Rio Tinto Iron Ore**

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# Karratha to Cape Lambert Transmission Line: Native Vegetation Clearing Permit Report

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# 1.0 Introduction

## 1.1 Project Background

Rio Tinto Iron Ore (RTIO), via Pilbara Iron (PI), operates the Pilbara Power System, one of the largest privately owned electricity systems in Australia. This system provides power to mining and port operations throughout the Pilbara, as well as the towns of Dampier, Wickham, Tom Price, Pannawonica and Paraburdoo. These systems are connected to existing Alinta and Horizon (ex Western Power) infrastructure, forming the North West Interconnected System (NWIS). As a consequence of the predicted increase in power system load demand from the rapidly growing Pilbara mining sector, it is necessary to upgrade the generation capacity of the Pilbara system (Sinclair Knight Merz (SKM) 2007).

To meet the forecast growth in demand for power, ensure power system reliability in its Pilbara operations and continue supplies to the NWIS, RTIO Expansion Projects (RTIOEP) is in the process of undertaking engineering feasibility studies for a strategic upgrade of the Pilbara Power System. As part of the Pilbara Power System Upgrade (PSU), RTIOEP is considering the gradual decommissioning of these sites and construction of more efficient generation units at a coastal site west of Karratha to provide approximately 160MW initially of electricity (and potentially 240MW in the future) to both its Pilbara operations and to the NWIS (SKM 2007).

The proposed gas-fired power station is to be constructed on the Pilbara coast, west of Karratha, within the Dampier 7-Mile area. This area is owned by the Crown and leased to Hamersley Iron, with a portion (the 7-Mile rail yard) being used for industrial purposes (SKM 2007).

In addition to the 7-mile power station development, Rio Tinto Pty. Ltd. is proposing to construct a 220kV transmission line from the 7-mile power station to Cape Lambert. The purpose of this transmission line is to connect the power station to Rio Tinto's existing operation at Cape Lambert and to ensure improved reliability of power supplies once the existing Cape Lambert Power Station is decommissioned.

In March 2008, Pilbara Iron commissioned Biota Environmental Sciences (Biota) to undertake a biological assessment of the Transmission Line, in order to provide the background information required to support an application for a Native Vegetation Clearing Permit (NVCP) for these areas. Access issues meant that the entire corridor could not be surveyed at one time. Thus the report refers to the Transmission line corridor, which is located off Mt Welcome Station, and the Mt Welomce Station Corridor, which are the areas surveyed on the station. Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, applications to clear more than 1 ha of vegetation are required to be assessed against 10 principles of native vegetation protection (see Section 5.0)

## 1.2 Description of the Proposed Clearing

**Pilbara Iron has specified two separate infrastructure areas for the Transmission Line Corridor development, as shown in Table 1.1. and summarised below in**

. It is anticipated that only a proportion of each of these areas will actually be cleared, with the broader areas nominated to allow for optimal siting of the infrastructure during the planning process.

The proposed development includes:

- Transmission Line Corridor - A 63 kilometre corridor of mostly 100 metres in width with a total area of approximately 680 hectares; extending from an unsealed access road near Dampier Salt/Rio Tinto Minerals operations to an area near the Cape Lambert coastal port operations.

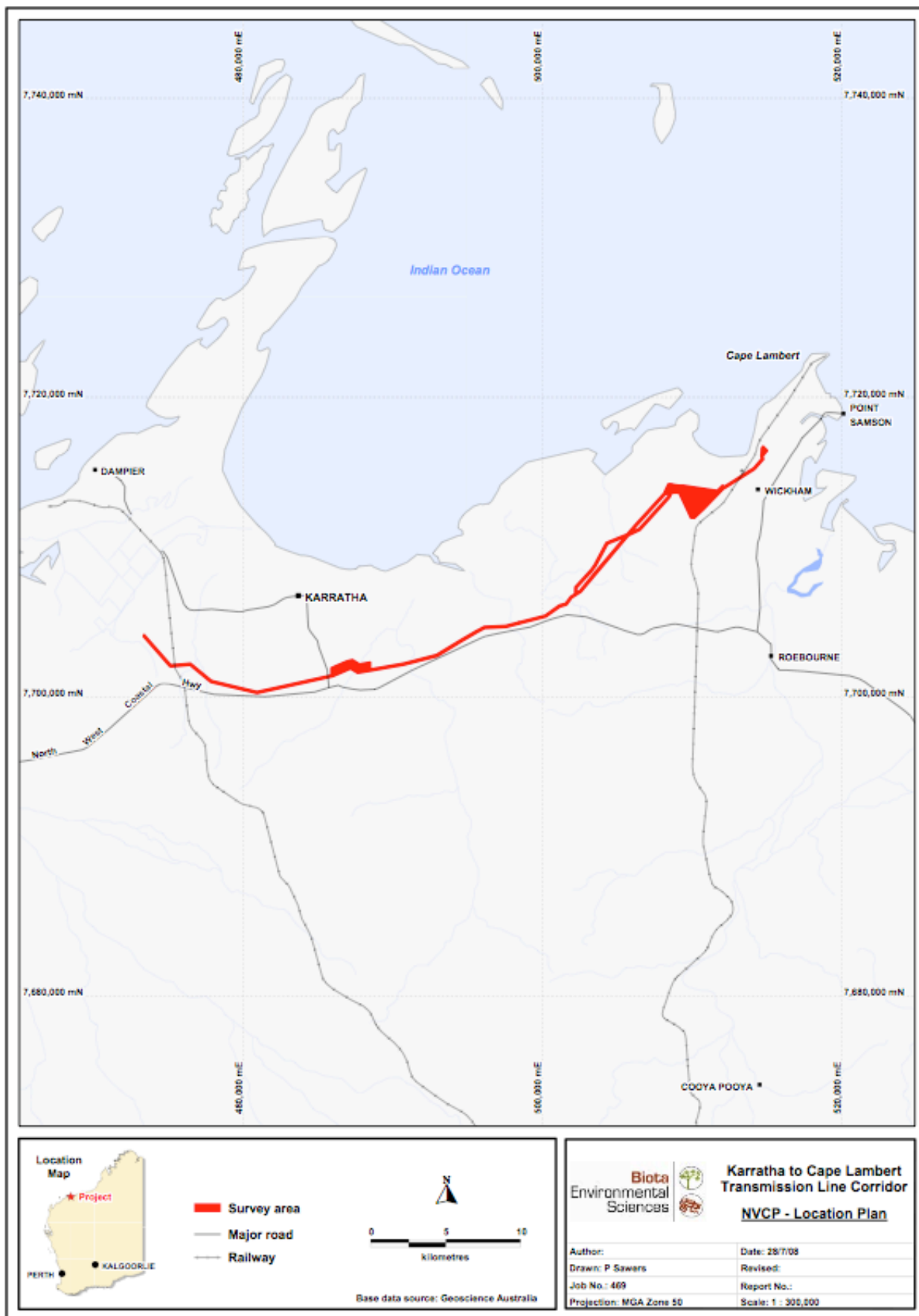


Figure 1.1: Regional location of the Karratha to Cape Lambert Transmission Line Corridor.



**Table 1.1: Description of Proposed Clearing**

Study Area	Study Area (ha)	Area Disturbed During Construction (ha)	Total Clearing Area (ha)
Transmission Line	1078	38	26

During construction, each tower for the transmission line requires a footprint of 30 m X 30 m to erect the tower. Additionally, a 4 m wide access road and line stringing areas between each tower. At works completion each tower requires a 10 m X 10 m pad, with the access track retained to allow for inspection and maintenance.

## 1.3 Scope and Limitations of this Document

### 1.3.1 Scope and Purpose of this Report

This report is intended as a supporting document to Pilbara Iron's application for a permit to clear native vegetation for the purposes of constructing a transmission line and its associated infrastructure. This permit is required under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. The report has been prepared largely on information gathered from a recent flora and vegetation survey, fauna database information and other published information. Regional context was provided by reference to land systems mapping completed by the Agriculture Department of Western Australia (Van Vreeswyk et al. 2004) and by other regional-scale work completed by Beard (1975) and the then Department of Conservation and Land Management (Burbidge et al. 2000).

The document describes the native flora and vegetation, and fauna habitats, of the survey area based on the available data, and provides an assessment of the proposed clearing against the 10 principles of native vegetation protection outlined in the Regulations.

### 1.3.2 Limitations of this Study

The conditions for the first survey were not optimal due to low rainfall in the recent cyclone season, however, conditions were excellent for the second and third flora surveys after substantial rainfall in late March and early April, some taxa (such as Spring-flowering Asteraceae) would not have been present.

Only a partial survey of the Mount Welcome Station study area was conducted due to time and access constraints. In addition, as a specific route for the Transmission Line Corridor was not provided references made to the Mount Welcome Transmission Corridor refers to a non-descript corridor within the Mount Welcome Station study area.

### 1.3.3 Botanical Team and Timing

Three separate surveys were conducted by a total of four botanists (Britta Mathews, Raimond Orifici, Rachel Butler and Hanouska Marmarac) all from Biota. The survey of the Transmission Line Corridor took place on two separate occasions due to inclement weather interruption; the first on 26th to the 30th of March 2008 and the second 22nd to the 27th of April 2008. A third survey was conducted for the Mount Welcome Station part of the corridor between 28th of May until 1st of June 2008.

## 2.0 Vegetation and Flora of the Study Areas

### 2.1 IBRA Bioregion and Subregion

The proposed clearing areas fall into the Pilbara bioregion (PIL) as defined in the most recent update of the Interim Bioregionalisation of Australia (IBRA) (Environment Australia 2000).

The Pilbara bioregion is described in four major components:

**Chichester subregion (PIL1):** Archaean granite and basalt plains support shrub steppe characterised by *Acacia pyrifolia* over *Triodia pungens* hummock grasses; *Eucalyptus leucophloia* tree steppes occur on the ranges;

**Fortescue Plains subregion (PIL2):** Alluvial plains and river frontages; salt marsh, mulga-bunch grass, and short bunch grass communities characterise alluvial plains; Rivergum woodlands fringe the drainage lines;

**Hamersley subregion (PIL3):** Mountainous area of Proterozoic sedimentary ranges and plateaux, supporting mulga low woodland over bunch grasses on fine textured soils, and *Eucalyptus leucophloia* woodlands over *Triodia brizoides* hummock grasslands on skeletal sandy soils; and

**Roebourne subregion (PIL4):** Quaternary alluvial plains with a grass savannah with mixed bunch and hummock grasses, and dwarf shrub steppe of *Acacia stellaticeps* over *Triodia pungens*; Samphires, *Sporobolus* and mangal occur on marine alluvial flats; climate is arid tropical with summer rain (Environment Australia 2000).

Kendrick and McKenzie (2001) place the project area in both the PIL1 (Chichester) and PIL4 (Roebourne) biological subregions within the Pilbara bioregion. The Karratha to Cape Lambert Transmission Line Corridor and the corridor on Mount Welcome station lies towards the northern limit of the Chichester subregion and the Transmission Line Corridor lies towards the north eastern limit of the Roebourne subregion.

The Chichester subregion is 9,044,560 ha in size and is described as:

'Comprising the northern section of the Pilbara Craton. Undulating Archaean granite and basalt plains include significant areas of basaltic ranges. Plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges. The climate is Semi-desert tropical and receives 300mm of rainfall annually. Drainage occurs to the north via numerous rivers (e.g. De Grey, Oakover, Nullagine, Shaw, Yule, Sherlock).' (Kendrick and McKenzie, 2001).

The subregion comprises an inland section of the Pilbara IBRA bioregion and has 6.5% of its area reserved (Kendrick and McKenzie, 2001).

The Roebourne subregion is 2,008,983 hectares in size and is described as:

'Quaternary alluvial and older colluvial coastal and sub-coastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of *Acacia stellaticeps* or *A. pyrifolia* and *A. inaequilatera*. Uplands are dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* woodlands. Samphire, *Sporobolus* and mangal occur on marine alluvial flats and river deltas. Resistant linear ranges of basalts occur across the coastal plains, with minor exposures of granite. Islands are either Quaternary sand accumulations, or composed of basalt or limestone, or combinations of any of these three. Climate is arid (semi-desert) tropical with highly variable rainfall, falling mainly in summer. Cyclonic activity is significant, with several systems affecting the coast and hinterland annually' (Kendrick and Stanley (2001).

The subregion comprises the coastal section of the Pilbara IBRA bioregion, and has 9.5% of its area reserved (Kendrick and Stanley (2001).

The vegetation under consideration in the northern eastern part of the study area is mainly of the type described in the Roebourne subregion (PIL4): grass savannah of mixed bunch and hummock grass species dominated by *Triodia wiseana* hummock grassland on alluvial clay plains or areas with shrubland of *Acacia stellaticeps* or *A. pyrifolia* and *A. inaequilatera* (Kendrick and Stanley (2001)).

The vegetation under consideration in the western part of the study area is mainly Chichester subregion (PIL1): plains supporting a shrub steppe of *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands (Kendrick and Stanley (2001)).

Land System (Rangelands) mapping covering the study area has been prepared by Agriculture Western Australia (Van Vreeswyk et al., 2004). These are broad units each consisting of a series of land units that occur on characteristic physiographic types within the Land System.

## 2.2 Land Systems

One hundred and seven (107) Land Systems occur in the Pilbara bioregion. In total eight Land Systems occur across the study area. The Transmission Line corridor in Mount Welcome Station and the two corridors south of the station comprise the Boolgeeda Land System. Within the station lie Mallina and Rocklea Land Systems. North of Mount Welcome, along the Transmission Line Corridor to Cape Lambert, lie Uaroo and Ruth Land Systems. The Transmission Line Corridor from Karratha comprises mostly the Horseflat Land System, along which is a mosaic of Macroy, Ruth and River Land Systems (Appendix 1).

## 2.3 Beard's Vegetation Mapping

Beard (1975) mapped the vegetation of the Pilbara at a scale of 1:1,000,000. The current study areas lie entirely within the Fortescue Botanical District of the Eremaean Botanical Province as defined by Beard. The vegetation of this province is typically open, and frequently dominated by spinifex, wattles and occasional eucalypts.

The western to central part of the Karratha to Cape Lambert Transmission Line was mapped by Beard (1975) as Abydos Plain-Roebourne unit 589, which comprises a mosaic of short bunch grassland (*Eragrostis* aff. *setifolia* tussock grassland) with soft spinifex (*Triodia pungens*) hummock grassland. The central part of the survey area to the northern section, including the Transmission Line corridor in Mount Welcome Station, was mapped as by Beard (1975) as Abydos Plain-Chichester unit 157, which comprises *Acacia* sparse shrubs over *Triodia wiseana* (sometimes other species) hummock grassland. Both of these units are widespread and well represented through the Pilbara bioregion (Table 2.1).

Given the broad scale of Beard's mapping, this unit is only broadly applicable to the vegetation types identified during the field survey of the Karratha to Cape Lambert Transmission Line and Mount Welcome Station Transmission Line Corridor study areas.

**Table 2.1: Beard's mapping units occurring within the components of the current study area and their pre-European extent in the Pilbara bioregion**

Mapping Unit	Pre-European Extent in the Pilbara bioregion	Extent in the Transmission Line Corridor and Mount Welcome Transmission Line Corridor areas
Abydos Plain - Chichester-157	809,639 ha	647.76 ha
Abydos Plain - Roebourne-589	418,526 ha	430.88 ha

**Table 2.2: Land Systems present in the study area and their representations in the wider regions**

Land System	Description	Subregion	Extent within bioregion (ha)	Extent within PIL1 subregion (ha)	Extent within PIL4 subregion (ha)	Extent within survey area (ha)	% of total within subregion
Rocklea (ROC)	basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	Chichester	2,881,200	2,125,314		117.55	0.006
Uaroo (UAR)	broad sandy plains supporting hard and soft spinifex grasses.	Chichester	987,066	488,753		10.11	0.002
Boolgeeda (BGD)	stony plains and slopes adjacent to hills supporting hard and soft spinifex grasslands and mulga shrublands	Chichester	961,634	167,663		189.75	0.113
Mallina (MAL)	sandy surfaced alluvial plains supporting soft spinifex (occasionally hard spinifex) grasslands.	Chichester	335,753	196,271		28.18	0.014
Horseflat (HOF)	gilgaided clay plains supporting tussock grasslands and minor grassy snakewood shrublands.	Chichester and Roebourne	328,122	27,140	125,456	3.53	0.013
						361.13	0.288
Ruth (RUT)	hills and ridges of volcanic and other rocks supporting hard spinifex (and occasionally soft spinifex) grasslands.	Chichester and Roebourne	169,300	137,109	11,940	298.65	0.218
						23.08	0.193
Macroy (MAC)	stony plains and occasional tor fields based on granite supporting hard and soft spinifex species.	Roebourne	1,331,614		2667	43.37	1.626
River (RIV)	active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft Spinifex grasslands.	Roebourne	482,175		107,322	3.3	0.003
<b>Total Area impacted within subregions</b>		Chichester				647.76	0.366%
		Roebourne				430.88	2.11%

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## 3.0 Vegetation of the Study Areas

Twenty vegetation types were described from the entire study area. Mapping showing the distribution of the various vegetation types is presented in Appendix 1.

Vegetation structure was described and condition (health) was ranked according to the classifications in Appendix 2 (equivalent condition rankings used in Bush Forever are also presented therein).

### 3.1 Vegetation of the Transmission Line Corridor

#### 3.1.1 Vegetation of Broad Flat Plains

**ApAbAstCEcCEs** *Acacia pyrifolia*, *Acacia bivenosa* tall open shrubland over *Acacia stellaticeps* low open shrubland over \**Cenchrus ciliaris* and \**Cenchrus setiger* tussock grassland.

This vegetation type occurred in the northern part of the Transmission Line Corridor in flat habitat. Other associated species included: *Acacia tumida* var. *pilbarensis*, *Acacia trachycarpa*, *Trianthema triquetra* and *Triodia epactia*. This vegetation type was in Very Poor to Poor condition due to a high level of infestation of \**Cenchrus ciliaris* (Buffel Grass), \**C. setiger* (Birdwood Grass) and \**Trianthema portulacastrum*. This vegetation comprised 1.81 ha of the study area. Plate 3.1

**AbTw** *Acacia bivenosa* tall shrubland over *Triodia wiseana* hummock grassland.

This vegetation occurred along scattered areas of the Transmission Line Corridor where the habitat was broad plains. Other associated species included: *Diplopeltis eriocarpa*, *Corymbia hamersleyana*, *Hakea chordophylla*, *Scaevola spinescens* and *Sorghum plumosum*. This vegetation was in Excellent condition, although in some instances there were few to many individuals of \**Cenchrus ciliaris* present. This vegetation comprised 123.62 ha of the study area. A mosaic of this vegetation and Tw comprised 18.64 ha of the study area. Plate 3.2

**AxERAxERIBtIa** *Acacia xiphophylla* open heath over *Eragrostis xerophila*, *Eriachne benthamii* open tussock grassland with *Triodia lanigera* very open hummock grassland.

This vegetation occurred in scattered areas along the Transmission Line Corridor. Occasionally the *Acacia xiphophylla* was present as scattered individuals in the *Eragrostis xerophila* open tussock grassland. Other associated species included: \**Cenchrus ciliaris*, *Maireana georgei*, *Sarcostemma viminale* and *Eriachne benthamii*. This vegetation type was in Very Good condition. This vegetation comprised 20.91 ha of the study area. Plate 3.3

#### 3.1.2 Vegetation of Clayey Plains

**AbAaAiTw** *Acacia bivenosa*, *A. ancistrocarpa*, *A. inaequilatera* tall shrubland over *Triodia wiseana* hummock grassland on stony clay plains

This vegetation occurred in scattered areas along the Transmission Line Corridor where the habitat was broad, flat open plains. This vegetation also occurred in the western part of Mount Welcome Station where this habitat was present. Other associated species included: *Hybanthus aurantiacus*, *Indigofera monophylla* and *Ptilotus astrolasius* var. *astrolasius*. This vegetation type was found to be in Good to Very Good condition, with some scattered individuals of \**Cenchrus ciliaris*. This vegetation comprised 79.64 ha of the study area. Plate 3.4

**SPv** *Sporobolus virginicus* tussock grassland.

This vegetation type occurred in the northern part of the Transmission Line Corridor towards the Cape Lambert port facility. Associated species included: *Neptunia dimorphantha*, *Indigofera colutea*, *Corchorus tridens*, *Ipomoea coptica* and *Alysicarpus muelleri*. This vegetation type was in Excellent condition. This vegetation comprised 3.15 ha of the study area. Plate 3.5

**ERAx**      ***Eragrostis xerophila* tussock grassland.**

This vegetation occurred regularly along the Transmission Line Corridor and is consistent with the Roebourne Plains coastal grasslands Priority Ecological Community (PEC) (Dr Stephen van Leeuwen, Department of Environment and Conservation, pers. comm. 2008). Other associated species included *Acacia xiphophylla*, *Eriachne benthamii* and *Sorghum plumosum*. This vegetation type was found to be mostly in Very Good to Excellent condition, but varied to Good condition towards Cape Lambert. This vegetation comprised 290.49 ha of the total study area (including the Mount Welcome section of the corridor). Plate 3.6



Plate 3.1:      **ApAbAstCEcCEs (DPS02).**



Plate 3.2:      **AbTw (site DPS14 and DPS08).**



Plate 3.3:      **AxERAxERibTla (site DPS07).**



Plate 3.4:      **AbAaAiTw (Map Note 09).**



Plate 3.5:      **SPv (site DPS05).**



Plate 3.6:      **ERAx (sites DPS01 and DPS11).**

### 3.1.3 Vegetation of Drainage Lines

**EvMgAcAamTaCEc** *Eucalyptus victrix*, *Melaleuca glomerata* low open forest *Acacia coriacea* subsp. *coriacea*, *Acacia ampliceps* tall open shrubland over *Triodia angusta* very open hummock grassland and \**Cenchrus ciliaris* tussock grassland.

This vegetation occurred in a major river line. Associated species included: *Scaevola spinescens*, \**Vachellia farnesiana* (an introduced species), *Acacia pyrifolia*, *Alternanthera nana*, *Vigna lanceolata* var. *lanceolata*, *Hibiscus austrinus*, *Eulalia aurea* and *Stemodia grossa*.

The floodplain and banks adjacent to this drainage line consisted of *Acacia sclerosperma* tall shrubland over a dense infestation of \**Cenchrus ciliaris* tussock grassland. This vegetation comprised 2.54 ha of the study area. Plate 3.7

**MliAcTeTsCEc** *Melaleuca linophylla*, *Acacia coriacea* subsp. *coriacea* low woodland over *Triodia epactia*, *Triodia schinzii* hummock grassland over \**Cenchrus ciliaris* open tussock grassland.

This vegetation occurred in a major drainage area near the Cape Lambert port facility. Associated species included: *Santalum lanceolatum*, *Acacia stellaticeps*, *Acacia colei* var. *colei*, \**Cenchrus setiger*, *Dolichandrone heterophylla*, *Waltheria indica* and *Eragrostis eriopoda*. This vegetation type was in Good condition, due to a high level of \**Cenchrus ciliaris* cover. This vegetation comprised 2.67 ha of the study area. Plate 3.8

**EvAcEUa** *Eucalyptus victrix*, *Acacia coriacea* subsp. *coriacea* tall shrubland over *Eulalia aurea* tussock grassland.

This vegetation occurred throughout the study area in minor creek lines. Associated species included: *Corymbia hamersleyana*, *Acacia bivenosa*, *Sesbania cannabina*, *Santalum lanceolatum*, *Abutilon amplum* and *Themeda triandra*.

The floodplain and banks adjacent to this drainage line consisted of *Acacia sclerosperma* tall shrubland over a dense infestation of \**Cenchrus ciliaris* tussock grassland. This vegetation comprised 11.98 ha of the study area. (No photo available).

**ChTeCHF** *Corymbia hamersleyana* low open woodland over *Triodia epactia* hummock grassland and *Chrysopogon fallax* scattered tussock grasses.

This vegetation occurred in only a few areas along the Transmission Line Corridor. This vegetation occurred in floodplain areas, often adjacent to drainage lines. Associated species included: *Acacia maitlandii*, *Acacia pyrifolia* and *Indigofera monophylla*. This vegetation was in Very Good condition. This vegetation comprised 9.02 ha of the study area. Plate 3.9

### 3.1.4 Vegetation of Low Rises

**Tw** *Triodia wiseana* hummock grasslands.

This vegetation occurred on low, rocky rises or gently undulating plains in scattered areas along the Transmission Line Corridor. Associated species included: mixed *Acacia* species (*Acacia bivenosa*, *A. inaequilatera*, *A. pyrifolia*), *Senna* species and \**Cenchrus ciliaris*. This vegetation type was in Very Good to Excellent condition. This vegetation comprised 98.45 ha of the study area. Plate 3.10

### 3.1.5 Vegetation of Slopes

**AstTeTs** *Acacia stellaticeps* low open shrubland over *Triodia epactia*, *Triodia schinzii* hummock grassland.

This vegetation type occurred in the northern part of the study area towards the Cape Lambert port facility. Associated species included: *Acacia bivenosa*, *Solanum diversiflorum* and *Tribulus suberosus*. This vegetation type was in Excellent condition, with only some minor signs of disturbance. This vegetation comprised 3.12 ha of the study area. Plate 3.11



**AsfTw      *Acacia stellaticeps* low shrubland over *Triodia wiseana* hummock grassland.**

This vegetation type occurred in the central part of the Transmission Line Corridor and at the Cape Lambert end of the Transmission Line Corridor at the base of slopes. Associated species included: *Corchorus* aff. *parviflorus*, *Indigofera monophylla* and *Diplopeltis eriocarpa*. This vegetation type was in Excellent condition. This vegetation comprised 5.07 ha of the study area. Plate 3.12.



Plate 3.7:      EvMgAcAamTaCEc (site DPS18).



Plate 3.8:      MliAcTeTsCEc (site DPS04).



Plate 3.9:      ChTeChf (site DPS15).



Plate 3.10:      Tw (sites DPS17, DPS13, DPS06).



Plate 3.11:      AsfTeTs (site DPS03).



Plate 3.12:      AsfTw (site DPS16).

## 3.2 Vegetation of Mount Welcome Station Transmission Corridor

### 3.2.1 Vegetation of Plains

**ChAstTsTe** *Corymbia hamersleyana* low open woodland over *Acacia stellaticeps* low open shrubland over *Triodia schinzii*, *T. epactia* hummock grassland.

This vegetation was found on broad alluvial plains within Mount Welcome Station.

Associated species include: *Hakea chordophylla*, *Acacia inaequilatera*, *A. tumida* var. *pilbarensis*, *Ptilotus astrolasius* var. *astrolasius* and *Grevillea wickhamii*. This vegetation was found to be in Very Good condition. This vegetation was comprised of a mosaic of this vegetation type and the vegetation type below and comprised 101.71 ha of the study area. Plate 3.13

**ChAtuGwAstTeTw** *Corymbia hamersleyana* scattered low trees over *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* tall shrubland over *Acacia stellaticeps* open shrubland over *Triodia epactia*, *T. wiseana* open hummock grassland.

This vegetation was located on broad plains. Associated species include: *Ptilotus astrolasius* var. *astrolasius*, *Paraneurachne muelleri*, *Bonamia pannosa*, *Hybanthus aurantiacus* and *Ptilotus calostachyus* var. *calostachyus*. This vegetation was found to be in Excellent condition. Plate 3.14

**ERAx** *Eragrostis xerophila* tussock grassland.

This vegetation was located on plains between rocky hills within Mount Welcome Station.

Associated species included: *Rhynchosia minima*, *Dichanthium sericeum* subsp. *humilius*, *Ptilotus exaltatus*, *Dactyloctenium radulans*, *Neptunia dimorphantha*, *Salsola tragus*. This vegetation was found to be in Excellent condition. Plate 3.15

### 3.2.2 Vegetation of Hills and Slopes

**Te** *Triodia epactia* hummock grassland.

This vegetation occurred on slopes and ranges within Mount Welcome Station and also slightly North and South of Mount Welcome along the Transmission Line Corridor where hill slope habitats were present. Associated species included: *Corymbia hamersleyana*, *Gomphrena cunninghamii*, *Indigofera monophylla*, *Triodia wiseana*, *Eriachne mucronata*, *Acacia bivenosa* and *A. inaequilatera*. This vegetation was in Excellent condition. This vegetation comprised 136.91 ha of the study area. Plate 3.16

**AbAiTw** *Acacia bivenosa*, *A. inaequilatera* open shrubland over *Triodia wiseana* hummock grassland.

This vegetation occurred on stony lower slopes of hills within Mount Welcome Station and in minor areas where this habitat occurred in the Northern part of the Transmission Line Corridor.

Associated species include: *Acacia pyrifolia*, *Corchorus incanus* subsp. *incanus*, *Sida echinocarpa*, *Triumfetta clementii*, *Crotalaria medicaginea* var. *neglecta*, *Hibiscus sturtii* and *Senna notabilis*. This vegetation was found to be in Very Good condition. This vegetation comprised 90.71 ha of the study area. Plate 3.17

**EHsFbCspGpDaCEc** *Ehretia saligna* var. *saligna* and *Ficus brachypoda* scattered low trees over *Capparis spinosa* var. *nummularia* and *Grevillea pyramidalis* scattered shrubs over *Dicliptera armata* scattered low shrubs and *\*Cenchrus ciliaris* very open tussock grassland.

This vegetation occurred in Mount Welcome Station on bare rock piles. Associated species included: *Acacia inaequilatera*, *Cyperus cunninghamii*, *Ficus aculeata* var. *indecora*, *Rhynchosia minima* and *Trichosanthes cucumerina*. This vegetation was found to be in Good condition, but condition is likely to vary according to the level of infestation with *\*Cenchrus ciliaris*. This vegetation comprised 34.54 ha of the study area. (Bare rock piles visible in the distance of Plate 3.17).

### 3.2.3 Vegetation of Broad Drainage Lines

**ChAtuTeCEc** *Corymbia hamersleyana* low open woodland over *Acacia tumida* var. *pilbarensis* tall open shrubland over *Triodia epactia* very open hummock grassland over \**Cenchrus ciliaris* very open tussock grassland.

This vegetation occurred in broad valley drainage areas at the base of hills within Mount Welcome Station. Associated species included: *Cleome viscosa*, *Vittadinia virgata*, *Dicliptera armata* and *Grevillea pyramidalis*. This vegetation was found to be in Good condition. This vegetation comprised 25.78 ha of the study area. Plate 3.18

## 3.3 Threatened and Priority Ecological Communities

There are currently only two listed Threatened Ecological Communities (TECs) for the Pilbara, one of which is a stygofaunal community. The other comprises the tussock grasslands on cracking clay dominated by *Themeda* sp. Hamersley Station (M.E. Trudgen 11431), which occur primarily on Hamersley Station in the Hamersley subregion of the Pilbara. Neither TEC occurs within either of the two current study areas.

In addition to listed TECs, the DEC also maintains a list of Priority Ecological Communities (PECs) for Western Australia, which are considered 'other ecosystems at risk'. Two of these PECs are associated with the Roebourne Plains and both are listed as Priority One ecosystems, which are:

"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" (DEC 2008).

These PECs are described further in the following:

**Roebourne Plains coastal grasslands:** comprise cracking clays on Sherlock Station, Roebourne Common, the airport reserve (between Dampier and Karratha), and Seven Mile Creek (Kendrick and Stanley 2001). This community is under threat from grazing and weed invasion, and the specific areas identified have been nominated because they are in excellent condition as a result of their exclusion from grazing (largely a function of their location). It has been suggested that this PEC may be nominated for upgrade to a TEC in future. While the vegetation types ERAx mapped as part of the Karratha to Cape Lambert Transmission Line Corridor is included under the 'Roebourne Plains coastal grasslands' category, many sections along the corridor were only in Good condition and others were somewhat degraded due to grazing and would not be considered to be high quality examples of this PEC. However, areas previously mapped (Dr Stepehn van Leeuwen pers. comm.) as ERAx at the western end of the Transmission Line corridor are in Excellent condition (See Appendix 1.)

**Stony Chenopod association of the Roebourne Plains area:** this community is not very common, occurring on the Roebourne Common and airport, and is preferentially grazed by stock. It is described as being under threat from weed invasion as well as grazing (Kendrick and Stanley 2001). While the description of the community is not overly specific, none of the vegetation types within the Karratha to Cape Lambert Transmission Line Corridor or Mount Welcome Station are believed to comprise this PEC.

## 3.4 Flora of the Development Areas

### 3.4.1 Transmission Line Corridor

A total of 237 taxa of vascular flora from 116 genera belonging to 41 families were recorded from the Transmission Line Corridor survey area (see Appendix 3). This total includes 16 taxa of introduced flora/weed species (from 15 genera and 11 families). There were 128 taxa, which were recorded only in the Transmission Line Corridor, but not in the Mt. Welcome survey area. A total of 109 taxa were recorded in both survey areas.

The families and genera with the greatest number of taxa in the Transmission Line Corridor area outside Mount Welcome Station are shown in Table 3.1

**Table 3.1: Most species rich families and genera within the Transmission Line Corridor area**

Family	Number of Native Taxa (Weed Taxa)
Poaceae (Grass family)	38 (4)
Papilionaceae (Pea family)	24 (3)
Mimosaceae (Wattle family)	21 (1)
Malvaceae (Mallow family)	19 (1)
Amaranthaceae (Amaranth family)	13 (1)
Genus	Number of Taxa
<i>Acacia</i> (Wattles)	19
<i>Ptilotus</i> (Mulla-mullas)	8
<i>Sida</i> (Sidas)	7
<i>Cassia</i> (Sennas/Cassias)	6
<i>Eragrostis</i>	6

### 3.4.2 Mt. Welcome Station Transmission Line Corridor Area

A total of 159 taxa of vascular flora from 87 genera belonging to 35 families were recorded from the Mt. Welcome survey area (see Appendix 3). This total includes three taxa of introduced flora/weed species (from three genera and three families). There were 50 taxa, which were recorded only in the Mt. Welcome survey area, but not in the Transmission Line Corridor. A total of 109 taxa were recorded in both survey areas.

The families and genera with the greatest number of taxa in the Mt. Welcome Station area are shown in Table 3.2.

**Table 3.2: Most species rich families and genera within the Mt. Welcome Station area**

Family	Number of Native Taxa (Weed Taxa)
Poaceae (Grass family)	35 (1)
Malvaceae (Mallow family)	13 (0)
Papilionaceae (Pea family)	12 (0)
Amaranthaceae (Amaranth family)	11 (1)
Mimosaceae (Wattle family)	11 (0)
Genus	Number of Taxa
<i>Acacia</i> (Wattles)	10
<i>Ptilotus</i> (Mulla-mullas)	9
<i>Eragrostis</i>	5
<i>Euphorbia</i> (Spurges)	5

The total number of vascular flora species in both survey areas was considered an average number for the size of the areas and the habitats recorded. Many ephemeral species were

recorded during the surveys, especially in the Transmission Line Corridor area, as there had been significant rainfall in the areas one to two months prior to the survey.

### 3.5 Flora of Conservation Significance

A search of the DEC Threatened Flora Database was carried out for the proposed clearing areas. The search coordinates used were 20° 21' 07' S and 116° 11' -117° 39' E (GDA94). The rectangular search area was a polygon that was shaped along the coast and extended approximately 50 km around the survey area (Appendix 5).

There were no records of Declared Rare Flora (DRF) from within the study area, and no records of DRF were returned from the wider search area. Only two DRF are currently listed for the Pilbara, and neither would be expected to occur on the basis of their known distributions and habitat preferences. There is no suitable habitat for *Thryptomene wittweri* (mountain crests of >1000 m elevation) in the vicinity of Dampier and Karratha, and the known distribution of this species is much further inland. There is no suitable habitat for *Lepidium catapycnon* (stony plains and hills) within the Transmission Line Corridor, however suitable habitat could be found in Mount Welcome Station. The nearest known populations are ~200 km to the south.

One Priority flora species was recorded from the Transmission Line Corridor study area; *Hibiscus brachysiphonius*, which is listed as a Priority 3 species by the DEC. It is a low-lying herb or shrub to approximately 25-30 cm, which is typically found on heavier clay soils, on clay flats or near creeklines (FloraBase). It was recorded only once from the Transmission Line Corridor area, in a site (DPS-07) located in a clay flat.

Most of the Priority species previously recorded in the Dampier locality (see Appendix 5) are either perennial shrubs/trees or large herbs that should have been visible at the time of survey (if present). For a number of the other species, there is no suitable habitat present in the study area. A brief description of each of the Priority flora species listed from the DEC database searches follows:

- *Goodenia pallida* (Priority 1) is currently known from a single record from the vicinity of Karratha. This species is a herb to 50 cm tall growing in red soil.
- *Helichrysum oligochaetum* (Priority 1) is a herb to 25 cm which is known from scattered records through the Pilbara and northern Gascoyne bioregions, occurring on red clay.
- *Stackhousia clementii* (Priority 1) is a perennial herb to ~50 cm which has been recorded from sandstone hills. It has a relatively broad distribution extending from the Pilbara through the Carnarvon, Little Sandy Desert and Murchison bioregions. There is no suitable habitat for this species within the study areas.
- *Gomphrena pusilla* (Priority 2) is a small herb to ~20 cm which has been recorded from scattered locations from the Pilbara to the Dampierland bioregion, occurring on beach sand behind foredunes and on limestone. There is no suitable habitat for this species in the current study areas.
- *Acacia glaucocaesia* (Priority 3) is a large shrub to small tree which is typically found on red loam, sandy loam or clay soils of floodplain areas. Current records are mainly from the Pilbara, with one record from the Dampierland bioregion.
- *Goodenia nuda* (Priority 3) is an erect herb to 50 cm with a broad but scattered distribution across the Pilbara bioregion, and is particularly frequent in the Newman locality. There was a single record of this species from the Dampier Salt saltfield expansion area (Biota 2008a), however no individuals were seen within the current survey.
- *Goodenia pascua* (Priority 3) is an erect herb to 50 cm with a broad but scattered distribution across the Pilbara bioregion, recorded from red sandy soils, clays and basaltic plains.

- *Gymnanthera cunninghamii* (Priority 3) is an erect shrub to 2 m, which has a relatively broad but scattered distribution from the Carnarvon bioregion through to the Great Sandy Desert bioregion.
- *Hibiscus brachysiphonius* (Priority 3) is a perennial herb to low shrub which has a broad distribution, extending from the Carnarvon bioregion through the Pilbara to the Ord-Victoria Plains and Tanami bioregions, but is largely restricted to clay substrates. Suitable habitat for the species was present in the study area and there was a single recording at site DPS07. This species was recorded 11 times during a survey of the adjacent Dampier Salt saltfield expansion area (Biota 2008a),
- *Rhynchosia bungarensis* (Priority 3) is a sticky creeper which typically occurs in moderate to large creeklines, and has a distribution extending from near Karratha to the inland Pilbara. There is no suitable habitat for this species in the current study areas, however individuals are known from the Dampier Salt/ Rio Tino Minerals facility (R. Orifici pers. comm.).
- *Terminalia supranitifolia* (Priority 3) is a tall shrub to low tree which typically grows on basalt rockpiles and is so far only known from the Pilbara bioregion. There is no suitable habitat for this species within any of the study areas.
- *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) is a perennial tussock grass restricted to heavy clay soils. Its current distribution extends from near Dampier through to the southern Pilbara. This species was recorded once from the Dampier Salt saltfield expansion area (Biota 2008a) but was not observed within the clayey plains habitat of the Transmission Line Corridor.

Two additional species, *Nicotiana heterantha* (P1) and *Acacia balsamea* (P4), came up in the Threatened species search but are unlikely to be recorded in the study area. *Acacia balsamea* has been recorded in inland Pilbara areas, and its suitable habitat of rocky hills was not recorded in the development areas. *Nicotiana heterantha* has been recorded in coastal areas south of Broome, in seasonally wet flats.

### 3.6 Introduced Flora (Weeds)

A total of 16 introduced (weed) species were recorded from within the study areas, with all of these present in the Transmission Line Corridor and three of the 16 species present in the Mt. Welcome study area. These introduced species were *\*Aerva javanica* (Kapok Bush), *\*Bidens bipinnata* (Bipinnate Beggartick), *\*Cenchrus ciliaris* (Buffel Grass), *\*C. setiger* (Birdwood Grass), *\*Clitoria ternatea* (Butterfly Pea), *\*Cucumis melo* subsp. *agrestis* (Ullcardo Melon), *\*Cynodon dactylon* (Couch Grass), *\*Echinochloa colona* (Awnless Barnyard Grass), *\*Indigofera oblongifolia*, *\*Malvastrum americanum* (Spiked Malvastrum), *\*Melochia pyramidata*, *\*Passiflora foetida* (Stinking Passion Flower), *\*Portulaca oleracea* (Pigweed/Purslane), *\*Stylosanthes hamata* (Verano Stylo), *\*Trianthema portulacastrum* (Giant Pigweed) and *\*Vachellia farnesiana* (Mimosa Bush). The locations of these weed species within the study areas are presented in Appendix 7.

Of the introduced species recorded, *\*Aerva javanica*, *\*Cenchrus ciliaris*, *\*C. setiger* and *\*Malvastrum americanum* are common and widespread weed species in the Pilbara bioregion, while the remaining species are less frequent to uncommon. The species of *Portulaca* and *Vachellia* recorded during the surveys (*\*Portulaca oleracea* and *\*Vachellia farnesiana*), have only recently been assigned 'introduced species' status. They were previously considered to be native species in the northern part of Western Australia, but are now listed as alien/weed species on 'FloraBase'. A brief discussion of each species follows, with the information on each species sourced from FloraBase and Hussey et al. (1997):

*\*Aerva javanica* (Kapok Bush) is an erect, short-lived, perennial herb that grows to about 1m tall, and is typically found on sandy soils in areas of disturbed natural vegetation. It grows amongst tall trees, medium trees (*Eucalyptus* woodland), low trees, low (sclerophyll) shrubland, grassland and in Spinifex grassland. This species was recorded at three sites in the Transmission Line Corridor, three sites in the Mt. Welcome survey area and opportunistically as

scattered individuals in areas that had been previously disturbed (tracks, roads, past excavations).

- \**Bidens bipinnata* (Bipinnate Beggartick) is a common weed of Mulga (*Acacia aneura*) vegetation and creeklines of the Pilbara. This annual daisy may occur in very high densities within suitable habitat and given appropriate conditions, but on its own does not appear to cause exclusion of native flora species. The species was recorded in a floodplain area, at one site in the Transmission Line Corridor.
- \**Cenchrus ciliaris* (Buffel Grass) and the less common \**Cenchrus setiger* (Birdwood Grass) were introduced by pastoralists as fodder species. Buffel Grass has demonstrated allelopathic capacities, whereby it releases chemicals that inhibit the growth of other plants, and both species are aggressive and effective competitors with native flora species. However, they are not listed as Declared Plants by the Western Australian Department of Agriculture and Food due to their importance to the pastoral industry. These perennial grasses often form dense tussock grasslands, particularly along creeklines, floodplains and in sandy coastal areas. Infestations of both species are common along the Pilbara Coast. Buffel Grass was recorded from nine of the 13 sites set up in the Transmission Line Corridor, and from five of the seven sites set up in the Mt. Welcome survey area. It was also recorded opportunistically at disturbed or non-disturbed sites throughout the survey areas. Birdwood Grass was not as widespread and was only recorded from three of the sites in the Transmission Line Corridor.
- \**Clitoria ternatea* (Butterfly Pea) is a climbing perennial that has become naturalised on creek banks and around waterholes around coastal settlements in the Pilbara. This species was recorded once opportunistically in a major drainage area in the Transmission Line Corridor.
- \**Cucumis melo* subsp. *agrestis* (Ulcardo Melon) is a trailing, annual herb or climber that was recorded growing amongst native vegetation in loam or clay soils of the Transmission Line Corridor. This species was recorded from three sites, located in or adjacent to drainage areas in the Transmission Line Corridor.
- \**Cynodon dactylon* (Couch Grass) is a prostrate, perennial grass, which spreads by rhizomes and stolons which root at the nodes. It grows in sandy, loamy or clay soils and is widely planted as a lawn grass. The species was recorded from disturbed vegetation at one site in the Transmission Line Corridor.
- \**Echinochloa colona* (Awnless Barnyard Grass) is a tufted, annual grass that grows on sand or clay near watercourses and swamps. The species was recorded once opportunistically in the Transmission Line Corridor.
- \**Indigofera oblongifolia* is an erect, spreading, perennial shrub to approximately 2m tall. It is abundant on road verges and roadside drains in the Port Hedland area, and some other coastal locations. It is typically recorded growing on brown sandy clay, clay over limestone or in alluvial soils. The species was recorded from disturbed vegetation at one site in the Transmission Line Corridor.
- \**Malvastrum americanum* (Spiked Malvastrum) is a common weed of Mulga, creeklines and claypan vegetation in the Pilbara. The species grows to a height of 1m and is often associated with areas of heavy cattle grazing. It was recorded at two sites, located in or adjacent to drainage areas in the Transmission Line Corridor.
- \**Melochia pyramidata* is a sprawling to erect, annual or perennial herb or shrub to 1m. It is found growing in alluvium, sand or black clay along rivers and creeks. It was recorded once opportunistically, near a major drainage area in the Transmission Line Corridor.
- \**Passiflora foetida* (Stinking Passion Flower) is a common woody climber/vine that is found in disturbed coastal areas on river and creek banks from the Kimberley to Carnarvon. This species was recorded once opportunistically in a drainage area in the Transmission Line Corridor.
- \**Portulaca oleracea* (Purslane/Pigweed) is a prostrate, succulent, annual herbaceous species that grows to a height of up to 20cm. It is often found at sites that have been previously disturbed, and prefers sandy or clay-loam soils. This species occurs commonly in the Pilbara, and during the field surveys was recorded at two sites in the Transmission Line Corridor and at

two sites in the Mt. Welcome survey area. 'FloraBase' has only recently changed the classification of this species from 'native to WA' to an 'introduced/alien' status.

\**Stylosanthes hamata* (Verano Stylo) is a member of the pea family that has been imported into the Pilbara as a fodder crop for cattle. This species produces yellow flowers from April to August and has a hairy pod, which often splits in two. It was recorded once opportunistically, from the Transmission Line Corridor.

\**Trianthema portulacastrum* (Giant Pigweed) is a spreading, annual herb to a height of 20cm. It grows in clay or sand soils, on roadsides, disturbed or cultivated areas. The species was recorded from disturbed vegetation at one site in the Transmission Line Corridor.

\**Vachellia farnesiana* (Mimosa Bush) is a dense, sprawling, spiny shrub that grows to a height of 4m. It is a widespread weed of roadsides, creeks, rivers and disturbed flood plains, from the Kimberley to Carnarvon. In the Pilbara region, it is regularly seen around areas that have been heavily grazed by cattle or at livestock watering points. This species is originally from South America, and has been widely introduced in the tropics. It was introduced to Australia prior to European settlement, and has only recently been given an introduced/weed status on 'FloraBase'. Prior to this, it was considered a native species in WA.

None of these introduced species are Declared Plants for the Pilbara under the *Agriculture and Related Resources Protection Act 1976*, however \**Aerva*, \**Cenchrus* and \**Stylosanthes* species are considered to be serious environmental weeds.

### 3.7 Summary of Threatened Communities and Species

No TECs occur in the study area, however the 'Roebourne Plains coastal grasslands' PEC occurs in sections of the Transmission Line Corridor. This vegetation type, mapped as vegetation type ERAx, comprises a Very Good to Excellent condition example of this PEC in the western parts of the Transmission Line Corridor, however as the Transmission line progresses towards the north east (Cape Lambert), ERAx becomes degraded and is in Good condition mostly due to grazing or possibly the effects of low rainfall (see Section 3.1.2).



## 4.0 Assessment of Fauna and Fauna Habitats

### 4.1 Methodology and Limitations of the Fauna Review

While the application area has not been subject to a systematic fauna survey, the fauna habitats were assessed at a desktop level by Biota zoologists.

Databases maintained by the WA Museum and the Department of Environment and Conservation (DEC) were searched for Schedule and Priority fauna, with the search area encompassing a 50 km radius around Dampier and Cape Lambert (see Appendix 6). A search for Protected Matters in the locality according to the *Environment Protection and Biodiversity Conservation (EPBC Act) 1999* was also conducted (see Appendix 6).

### 4.2 Fauna Habitats

#### 4.2.1 Fauna of Conservation Significance Potentially Occurring in the Area

The framework for assigning conservation significance rankings to WA fauna species is presented in Appendix 4.

Based on the results of the various database searches (see Appendix 6), 13 fauna species of particular conservation significance may potentially occur within the current study areas on the basis of their known distributions. Species were included in this list if they were either:

- listed in the Federal *EPBC Act 1999* Protected Matters report for the vicinity of the study area (not including potential avian 'flyover' species);
- listed in DEC's Threatened Fauna database for the locality; and/or
- listed in the Biota internal database in the vicinity of the study area.

Note that listed marine mammals, marine turtles and seabirds have been excluded. None of these species would not be expected to occur in the current study areas.

**Table 4.1: Terrestrial fauna of conservation significance yielded by databases searches of the Dampier and Cape Lambert localities.**

Species	Status	
	State	Federal
Northern Quoll ( <i>Dasyurus hallucatus</i> )	Schedule 1	Endangered
Mulgara ( <i>Dasyercus cristicauda</i> )	Schedule 1	Vulnerable
Pilbara Leafnosed-bat ( <i>Rhinonicteris aurantius</i> )	Schedule 1	Vulnerable
Pilbara Olive Python ( <i>Liasis olivaceus barroni</i> )	Schedule 1	Vulnerable
<i>Lerista quadrivincula</i>	Priority 1	
Little Northern Free-tail Bat ( <i>Mormopterus loriae cobourgiana</i> ^)	Priority 1	
Spectacled Hare-wallaby ( <i>Lagorchestes conspicillatus leichardti</i> )	Priority 3	
Australian Bustard ( <i>Ardeotis australis</i> ^)	Priority 4	
Short-tailed Mouse ( <i>Leggadina lakedownensis</i> ^)	Priority 4	
Ghost Bat ( <i>Macroderma gigas</i> )	Priority 4	
Western Pebble-mound Mouse ( <i>Pseudomys chapmani</i> )	Priority 4	
Star Finch ( <i>Neochmia ruficauda subclarescens</i> )	Priority 4	
Rainbow Bee-eater ( <i>Merops ornatus</i> )		Migratory

^ denotes species recorded during the Dampier Salt Saltfield Expansion fauna survey (Biota 2008b).

Numerous migratory bird species and marine birds listed under the *EPBC Act* may potentially occur in the Dampier and Cape Lambert localities (see Appendix 6). As the current study areas

do not comprise core habitat (eg. tidal mudflats), these are not discussed further, with the exception of the Rainbow Bee-eater (Section 4.2.3).

#### 4.2.2 Schedule 1 Species

##### **Northern Quoll *Dasyurus hallucatus* (Schedule 1, Endangered)**

The Northern Quoll was originally recorded across Northern Australia from the North-west Cape in Western Australia to south-east Queensland, but has declined in recent years. Its distribution is now restricted to six main areas: the north and western top end of the Northern Territory, north of Cape York, the Atherton-Cairns area, the Carnarvon Range-Bowen area of Queensland (Menkhorst and Knight 2001), and the northwest Kimberley and Pilbara regions of Western Australia (Braithwaite and Griffiths 1994).

There are numerous records of this species from the Dampier locality, mainly from the Burrup Peninsula, and occasional records from near Cape Lambert (Appendix 6). Although the Northern Quoll may potentially occur within the area, it is unlikely due to a lack of suitable habitat. This species is most abundant in open, rocky habitat and is also commonly found in gorges and near creek lines, where breeding is successful (Strahan 2004). Major creek lines are absent from the study area, as are gorges and significant rocky habitat, resulting in sub-optimal habitat for this species.

While it is possible that the Northern Quoll may forage through the habitats encompassed by the study area, it is unlikely that the proposed developments will have any effect on the conservation status of this species, given the small scale of clearing required and the lack of core habitat for this species in the project disturbance areas.

##### **Mulgara *Dasyercus cristicauda* (Schedule 1, Vulnerable)**

The Mulgara was formerly widespread in sandy deserts but is now rare and patchily distributed. Recent records are from the Great Victoria, Gibson, Great Sandy, Little Sandy and Tanami Deserts, the Pilbara, Gascoyne, Murchison, north-eastern Goldfields, Central Ranges region and Carnarvon basin (Kennedy Range). In the Pilbara, this species is most commonly recorded from Triodia-dominated sandy or sandy clay plains. The Mulgara has not been recorded from the Dampier area to date, and is highly unlikely to occur in the current study area.

##### **Banded Hare-wallaby *Lagostrophus fasciatus fasciatus* (Schedule 1; Vulnerable)**

This species was formerly more widespread through Western Australia, but is now restricted to Dorre and Bernier Islands in Shark Bay (Menkhorst and Knight 2001). Although there is a historic sighting of this species from Cossack, the Banded Hare-wallaby is now considered extinct on the mainland and would not occur within the study area.

##### **Pilbara Orange Leafnosed-bat *Rhinonicteris aurantius* (Schedule 1, Vulnerable)**

Historically, this species has been recorded from a range of locations across the Pilbara since 1925. The perception that the species had declined was founded on the reduction in animal numbers at two mine sites previously known to contain roosting populations (Environment Australia 1999). However, widespread recent records of foraging animals and individuals caught in traps indicate that the species may not have contracted in its distribution, but actually persists across its former range. This species is more influenced by the availability of suitable roost caves than by habitat type (Churchill 1998). In the Pilbara, they are thought to be restricted to caves where at least semi-permanent water is nearby (Dr Kyle Armstrong, Kyoto University Museum, pers. comm. 2005). This species has not been recorded from the Dampier areas to date. Although it is possible that the Orange Leafnosed-bat may forage over the current study area, given the lack of any suitable roosting habitat (caves) within or immediately adjacent to the project areas, it is unlikely that the proposed clearing will have any impact on this species.

##### **Pilbara Olive Python *Liasis olivaceus barroni* (Schedule 1, Vulnerable)**

Regarded as a Pilbara endemic, this subspecies has a known distribution that coincides roughly with the Pilbara bioregion (Environment Australia 2000). The Pilbara Olive Python occurs in rocky areas within the Pilbara, showing a preference for rocky habitats near water, particularly rock

pools. There are several records of this species from the Burrup Peninsula. Given its preference for gorges and escarpments, this species is unlikely to occur within the study area due to a lack of suitable habitat, both within the study area and in the immediate surrounds. The conservation status of this species is therefore unlikely to be altered by the proposed clearing. Normal management practice is to remove any individuals from harm's way if encountered.

#### 4.2.3 Schedule 4 Species

- **Peregrine Falcon *Falco peregrinus* (Schedule 4)**

The Peregrine Falcon has an almost cosmopolitan distribution, but is absent from most deserts and the Nullarbor Plain (Johnstone and Storr 1998). This species has been recorded from the Burrup Peninsula (Appendix 6) and has the potential to occur within the study area. Given the mobility of this species, its preference for riverine and breakaway habitats in the Pilbara, and the small scale of the proposed development, it is unlikely that the proposed clearing will adversely impact the conservation status of this species.

#### 4.2.4 Priority Species

- **Little Northern Freetail Bat *Mormopterus loriae cobourgiana* (Priority 1)**

This taxon is endemic to Australia, with a distribution in Western Australian coastal areas from Derby to the Exmouth Gulf (Churchill 1998). It is a mangrove specialist which is restricted to mangrove forest and adjacent areas (Churchill 1998). This species was recorded from calls from areas of mangrove in the vicinity of Dampier (Biota 2008b) and Cape Lambert (Biota 2008c), and is also known from Cape Preston, Cowrie Cove and the Burrup (Appendix 6). Although these bats could potentially forage over Karratha to Cape Lambert Transmission Line Corridor, there is no suitable habitat for roosting (ie. mangal) within the study area. The conservation status of this species is therefore unlikely to be altered by the proposed clearing.

- ***Lerista quadrivincula* (Priority 1)**

This species is known from a single specimen at the Maitland River on the arid coastal plain near Karratha (Wilson and Swan 2003). As the species has not been recorded again since its first sighting, despite extensive pit-trapping in the region and targeted searches in the collection locality, its status remains uncertain. *L. quadrivincula* has not been recorded from the Dampier locality to date (see Biota 2008b and Biota 2008c.).

- **Spectacled Hare-wallaby (mainland) *Lagorchestes conspicillatus leichardti* (Priority 3)**

This species occurs through the Pilbara, and remains widespread and locally common through a broad swathe of the Northern Territory and northern Queensland. It has declined drastically in the Great Sandy Desert (Menkhorst and Knight 2001). It typically inhabits tussock or hummock grassland with mid-dense or sparse tree and shrub cover. The last relevant record from the Dampier locality is a sighting from Mardie in 1979, and this species is unlikely to occur in the current study area.

- **Short-tailed Mouse *Leggadina lakedownensis* (Priority 4)**

This species inhabits coastal northern Australia from the Pilbara through to the Kimberley. Regional records suggest that the primary mainland habitat in the Pilbara comprises areas of cracking clay and adjacent habitats, although this species has also been recorded from hill tops (Dr Peter Kendrick, DEC Karratha, pers. comm. 2003) and sandy coastal areas near Onslow. This species was recorded from three sites within the Dampier Salt saltfield expansion area, including from *Eragrostis xerophila* tussock grassland equivalent to that within the 7-Mile power station envelope and heavy access route (Biota 2008b) which includes the western end of the Transmission Line Corridor. It is also known from Mardie (Appendix 6). Given the small scale of clearing required for the Transmission Line Corridor, the conservation status of this species is unlikely to be altered by the proposed development, if it occurs in the area.

- **Ghost Bat *Macroderma gigas* (Priority 4)**

The Ghost Bat was previously distributed across most of inland and northern Australia, but is now restricted to the tropical north of the continent (Churchill 1998). There is a single record of this

species from the Burrup Peninsula (Appendix 6). While the Ghost Bat may forage over the current study areas, no suitable roosting sites are present within or immediately adjacent to the areas. The proposed clearing is therefore unlikely to impact on the conservation status of this species.

- **Western Pebble-mound Mouse *Pseudomys chapmani* (Priority 4)**

This species is common to very common in suitable habitat within the Hamersley and Chichester subregions of the Pilbara bioregion, and is well known for its behaviour of constructing extensive mounds of small stones, typically on scree slopes and stony plains. It has been recorded from locations including Karratha, the Burrup Peninsula, Mt Anketell, Zebra Hill and Mardie prior to 1986 (Appendix 6), however it has not been recently recorded from the Dampier locality (see Biota 2008b and in Biota 2008c.). No pebble-mounds (either active or inactive) were noted in the current study area.

- **Eastern Curlew *Numenius madagascariensis* (Priority 4, Migratory)**

The Eastern Curlew occurs throughout coastal Western Australia, south to Bunbury (Johnstone and Storr 1998). This species breeds in northern Asia and is a summer migrant to Australia; it is moderately common in the Pilbara. The Eastern Curlew occurs mainly on tidal mudflats, and also on sandy beaches and rarely near coastal lakes (including saltfield ponds) (Johnstone and Storr 1998). This species was recorded on three occasions during the Cape Lambert Port Expansion fauna survey on tidal mudflats adjacent to mangroves (Biota 2008c), and was also observed on mudflats near the Dampier Salt saltfield (Biota 2008b). There are also two records from Nickol Bay (Appendix 6). The Eastern Curlew is unlikely to occur in the Transmission Line Corridor due to a lack of suitable habitat.

- **Australian Bustard *Ardeotis australis* (Priority 4)**

The Australian Bustard occurs over much of Western Australia, and prefers open or lightly wooded grassland including *Triodia* sandplains (Johnstone and Storr 1998). There is a record from Mardie Station from 2000 and a record from Mt Anketell in 2007 (Appendix 6). Four birds were sighted within habitats near the 7-Mile power station envelope and heavy access route (Biota 2008b), and it is probable that this species would occasionally occur in the study area. The small-scale habitat loss associated with clearing for the proposed project would not be expected to impact the conservation status of this species.

- **Bush Stone-curlew *Burhinus grallarius* (Priority 4)**

This species is widespread in Australia and southern New Guinea. While it remains common in tropical Australia, it has declined alarmingly in temperate Australia and has disappeared from many regions (Marchant and Higgins 1993). It is found in the Kimberley and western portion of the remainder of the state west of a line joining Port Hedland, Leonora and Albany. Populations in the Pilbara are apparently secure (Ron Johnstone, WA Museum, pers. comm. 2003). There is a single record of this species from the Burrup Peninsula (Appendix 6), and it may occur within the study area at times. Given the amount of clearing required for the proposed project, the development would not be expected to impact the conservation status of this species.

- **Star Finch *Neochmia ruficauda subclarescens* (Priority 4)**

This species is endemic to Australia, occurring from the Pilbara to south-eastern Australia. In the Pilbara, this taxon shows a preference for dense reedbeds and adjacent vegetation communities along permanent waterways. It is unlikely that this species occurs in the current study area due to a lack of suitable habitat. Given its widespread distribution and mobile nature, the proposed clearing is unlikely to alter its conservation status.

- **Flock Bronzewing *Phaps histrionica* (Priority 4)**

This species occurs on coastal riverine plains of north-west WA, extending south to Carnarvon, and also occurs in the Kimberley and arid/semiarid north-eastern interior of Australia (Johnstone and Storr 1998). It typically inhabits treeless or sparsely wooded grassy plains within reach of open water. Database searches indicate only two records of relevance to the Dampier locality, comprising a single sighting of 300 individuals at Nickol Bay from 1968, and a sighting of 50 individuals at Warambie in 1985 (Appendix 6). The Flock Bronzewing is considered an occasional visitor to the Pilbara, and is highly unlikely to occur in the current study area.

#### 4.2.5 Migratory Species

Eight bird species listed as either migratory and/or marine under the *EPBC Act 1999* were recorded within the Cape Lambert port expansion study area (Biota 2008c). None of these were recorded from the current study area, however one may occur.

- **Rainbow Bee-eater *Merops ornatus* (Migratory)**

This species is widespread and common through the Pilbara, particularly in drainage habitats. This species was recorded once during the survey of the Cape Lambert port expansion area, from a site located on a secondary dune in *Acacia coriacea* shrubland over *Cenchrus ciliaris* tussock grassland (Biota 2008c). The Rainbow Bee-eater may occur within the Transmission Line Corridor and Mount Welcome Station study area. Given the small amount of vegetation clearing proposed for the development this would not be expected to impact on the conservation status of this species.

#### 4.2.6 Other Species of Potential Conservation Significance

- ***Lerista neviniae***

The skink *Lerista neviniae* was recorded on 25 occasions from six trapping sites at Cape Lambert, all within dune habitat (Biota 2008c). This species was formally part of the *Lerista muelleri* species complex, which has recently undergone taxonomic revision (Smith and Adams 2007). Although *L. neviniae* is not currently assigned a conservation listing in either the *EPBC Act 1999* or the *Wildlife Conservation Act 1950-1979*, it should be noted that to date records of this species are known solely from Cape Lambert. It is unlikely that this species occurs in the current study area due to a lack of suitable dune habitat.

## 5.0 Assessment Against the Ten Clearing Principles

### 5.1 Overview

Rio Tinto proposes to clear an area for the proposed Transmission Line Corridor which will include a continuation of the corridor through Mount Welcome Station. The vegetation map in Appendix 1 illustrates the area of the Purpose Permit Application. It is anticipated that the maximum total area to be cleared will be approximately 38 ha of the total 1400 ha nominated.

It is considered that the proposed clearing is not at variance with the Ten Clearing Principles, each of which is addressed below.

### 5.2 Clearing Principles

#### 5.2.1 Potential Impact on a High Level of Biological Diversity

*Native vegetation should not be cleared if it comprises a high level of biological diversity.*

Twenty vegetation types were recorded from the current study areas (Section 3.0) all of which are relatively typical of such habitats in the Karratha to Cape Lambert localities. The areas of clayey plain within the Transmission Line Corridor would have the highest species richness of the vegetation types identified (specifically vegetation unit ERAx). Clayey plains are widespread in the area, and the limited amount of clearing arising from the current proposal would not be considered to affect the status of this vegetation in the locality. The total number of native species recorded from the study area is within the expected range for areas of this size in this locality, and is not considered to represent a high diversity (more precisely: species richness). The proposed clearing will therefore not impact any features of high diversity.

#### 5.2.2 Potential Impact to any Significant Habitat for Indigenous Fauna

*Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.*

We are interpreting the intent of this principle to be:

- does the vegetation represent an unusual habitat for the locality?; and/or
- does the vegetation represent a core or primary habitat for fauna species of conservation significance?

The primary habitats present within the current study area (Section 4.0) are widespread in the Karratha to Cape Lambert localities. While some Scheduled or Priority fauna species may utilise these habitats (see Section 4.2), neither the landforms nor vegetation types represent core habitat for any of these species of conservation significance.

#### 5.2.3 Potential Impact to any Rare Flora

*Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.*

No Declared Rare Flora were recorded from the study area. One Priority flora species, *Hibiscus brachysiphonius* was recorded in the Transmission Line Corridor.

## 5.2.4 Potential Impact on any Threatened Ecological Communities

*Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.*

No Threatened Ecological Communities occur within the current study areas. A stand of Roebourne Plains coastal grassland (currently a Priority Ecological Community) which includes the eastern section of the Transmission Line Corridor (see Appendix 1) has been nominated for inclusion as a TEC. Rio Tinto proposes to clear 1.5 ha of this vegetation. This was selected based on the majority being in excellent condition (being protected from grazing, weed invasion and other disturbance). Areas of Roebourne Plains coastal grassland further along the Transmission Line Corridor varied in condition, with some areas of scattered weeds and occasional signs of grazing.

## 5.2.5 Potential Impact on any Native Vegetation Remnant in an Area that has been Extensively Cleared

*Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.*

Most of the Pilbara bioregion has never been cleared, however a combination of weed invasions, hot frequent bushfires, feral predators and grazing by exotic herbivores is causing a loss of soil fertility and vegetation cover through some pastoral areas. Erosion from increased runoff velocities is also occluding drainage lines in places (McKenzie et al. 2002). While considerable historic clearing has obviously taken place in the vicinity of Dampier and Cape Lambert, this is negligible in comparison to the Pilbara-wide representation of Beards broad vegetation unit mapped for the study area (see Section 2.3). The vegetation types identified within the project area thus do not represent remnant stands of extensively cleared vegetation units.

## 5.2.6 Potential Impact on any Watercourse and/or Wetland

*Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.*

There are no significant watercourses or wetlands in the study area.

## 5.2.7 Potential to Cause Appreciable Land Degradation

*Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.*

The soil of much of the Transmission Line Corridor and Mount Welcome Station study area is clay based, and is likely to be susceptible to erosion following disturbance to the soil profile. Part of the study area has already been subject to considerable ground disturbance from historical activities, and is therefore not in a pristine state. In addition, sections of the area already show a moderate level of invasion by weeds, particularly \**Cenchrus ciliaris* (Buffel Grass). While clearing of some of the remaining intact native vegetation may exacerbate the spread of weeds through these areas, this is unlikely to cause any appreciable degradation much beyond the immediate clearing envelope. Strict weed hygiene measures should be implemented to ensure that the weeds present within the study areas are not transferred to areas beyond, particularly to the adjacent areas of Roebourne Plains coastal grassland PEC.

## 5.2.8 Potential Impact on Adjacent or Nearby Conservation Areas

*Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.*

There are no conservation areas in the vicinity of the Karratha to Cape Lambert study area. The closest reserves are a series of (mostly unnamed) A- and C-class reserves on islands approximately 15 km to the north, and the A-class Millstream-Chichester National Park, 50 km south-south-east. The current clearing proposal will therefore have no impact on any conservation areas.

### **5.2.9 Potential Deterioration in Water Quality**

*Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.*

There are no surface drainage features within the study area. Given the small scale of clearing required for the proposed project, there is no reason to expect that surface or groundwater quality in the area would be affected.

### **5.2.10 Potential to Cause or Exacerbate Flooding**

*Native vegetation should not be cleared if clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.*

Flooding of the low-lying clayey habitat in the Transmission Line Corridor and Mount Welcome Station study area would occur periodically as a result of heavy rainfall triggered by cyclonic activity and sporadic thunderstorms. The small amount of additional vegetation clearing proposed for the study area would not be expected to exacerbate either the frequency or the intensity of flooding in this area.



## 6.0 Management Recommendations

The following recommendations are made to minimise impact to the vegetation and flora of the two study areas and their surrounds:

1. After the construction phase of the Transmission line towers is complete, Rio Tinto should rehabilitate all non-permanent disturbance areas so that the final impact from the towers is reduced from 38 ha to 26 ha.
2. Impact to areas of the PEC 'Roebourne plains coastal grasslands' which remains in Excellent condition should be kept to a minimum and the areas fenced from grazing.
3. Strict weed hygiene protocols should be implemented to prevent vehicles and machinery contaminated with weed seed or soil material spreading or introducing further species to either project area, or to weed-free areas beyond the area following construction.

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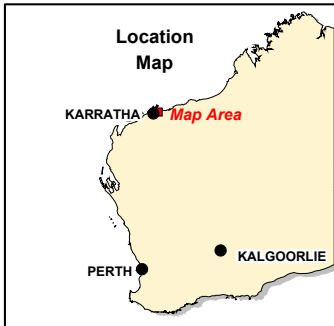
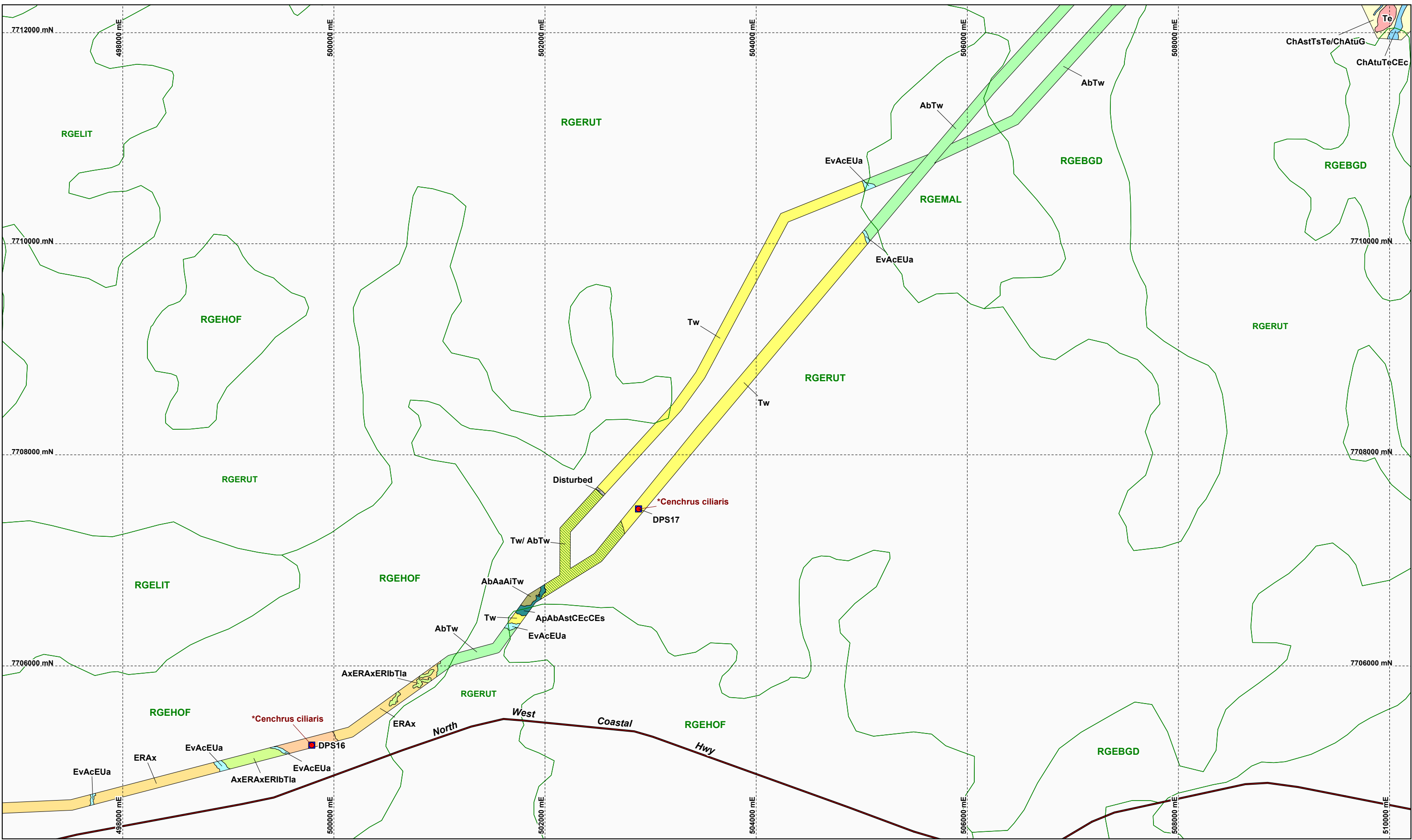
# Appendix 1

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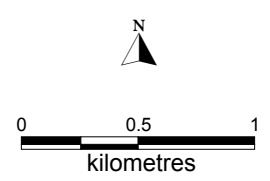
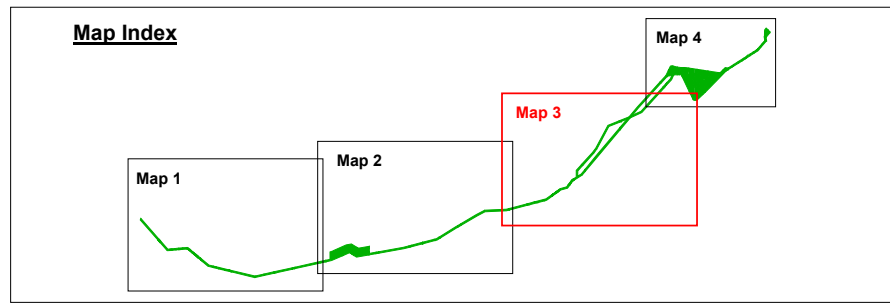
## Vegetation Map for the Karratha to Cape Lambert Transmission Line Corridor and Mount Welcome Station Transmission Line Corridor Study Areas



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- Quadrat Sites
- Weeds
- Rangelands



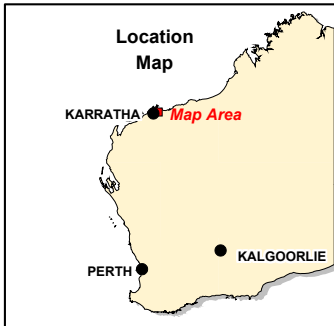
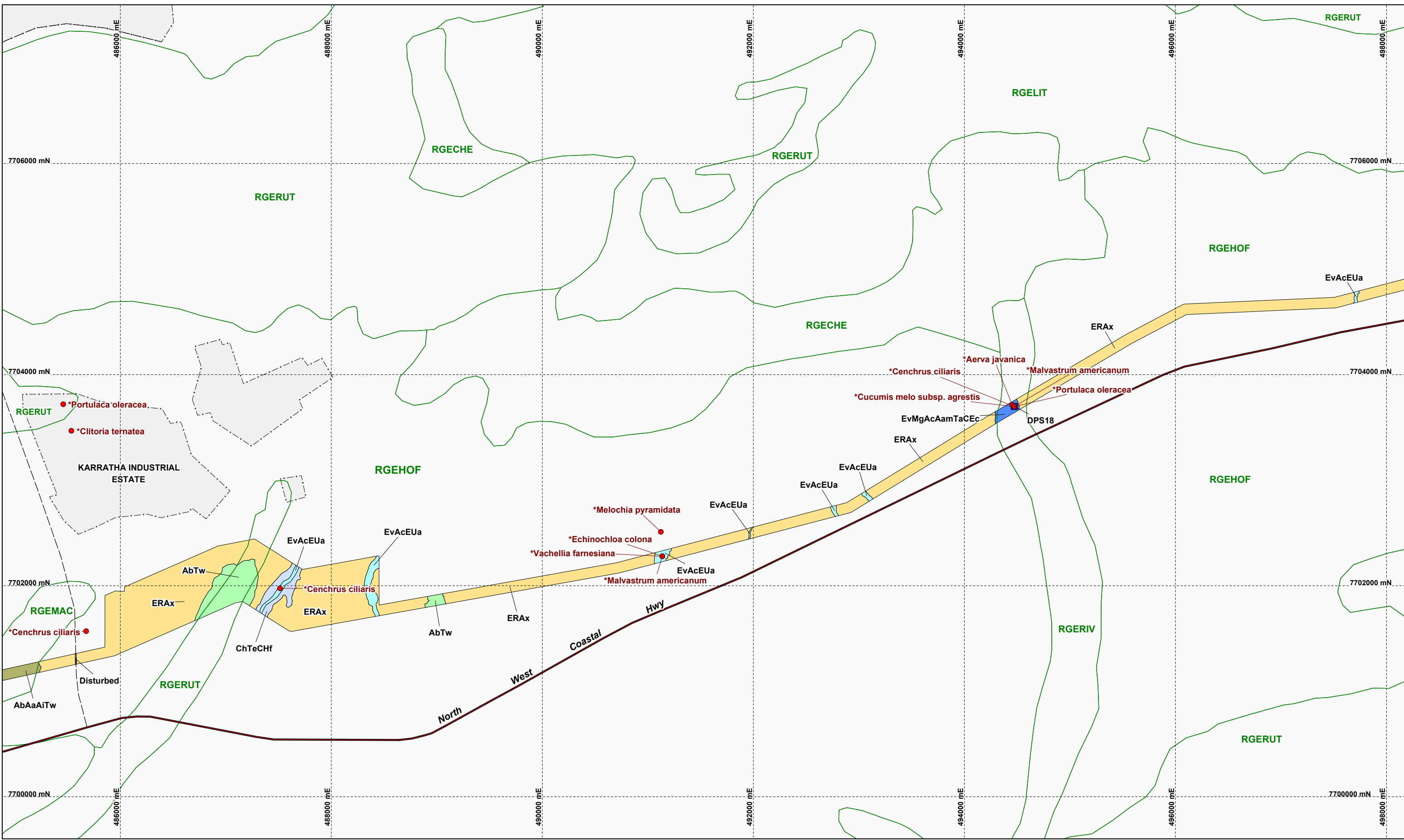
Note: Land systems mapping - Dept. of Agriculture WA 2002

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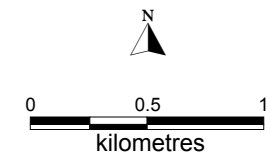
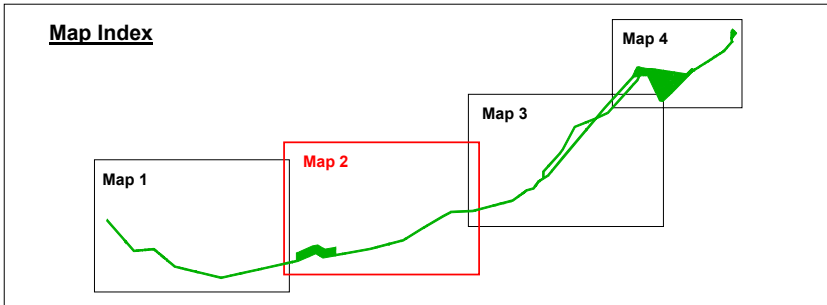
### Karratha to Cape Lambert Transmission Line Corridor NVCP

Author:	Date: 26/07/2008
Drawn: P Sawers	Revised:
Job No.: 469	Report No.:
Projection: MGA Zone 50	Scale:

Map 3 of 4



- Quadrat Sites
- Weeds
- Rangelands



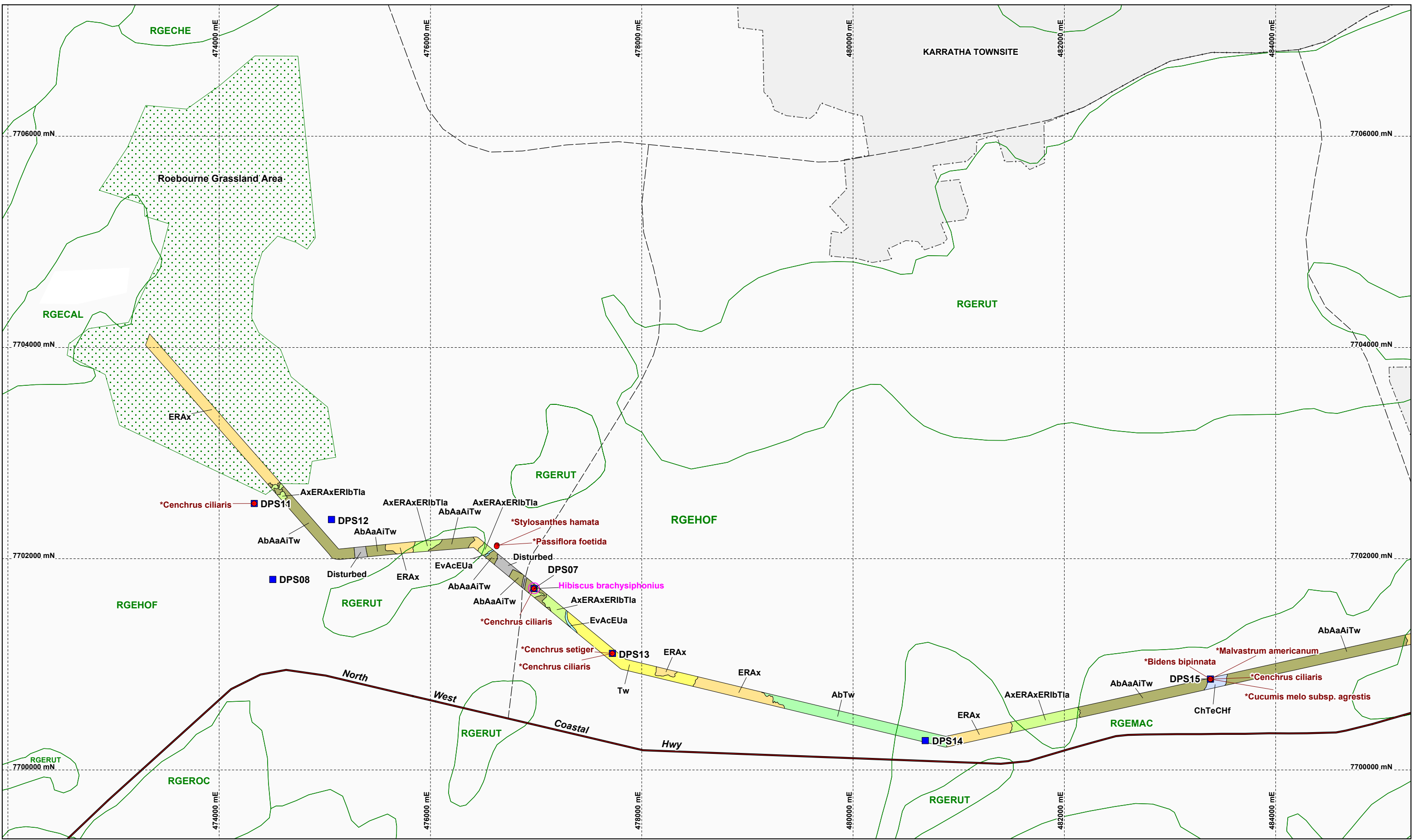
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Map 2 of 4

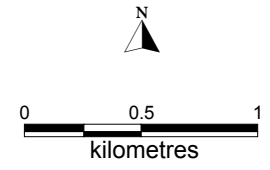
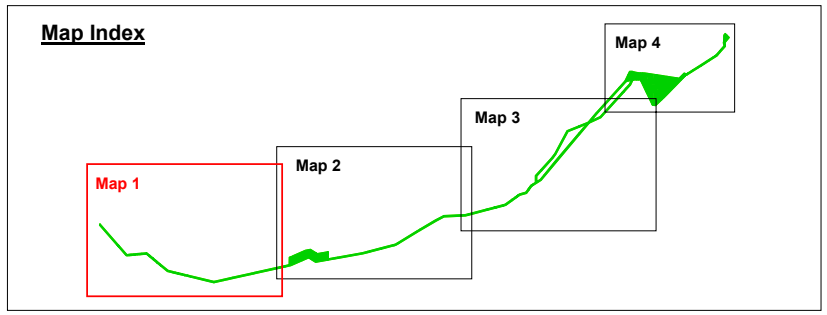
### Karratha to Cape Lambert Transmission Line Corridor NVCP

Author:	Date: 26/07/2008
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- Quadrat Sites
- Weeds
- Priority Species
- Rangelands

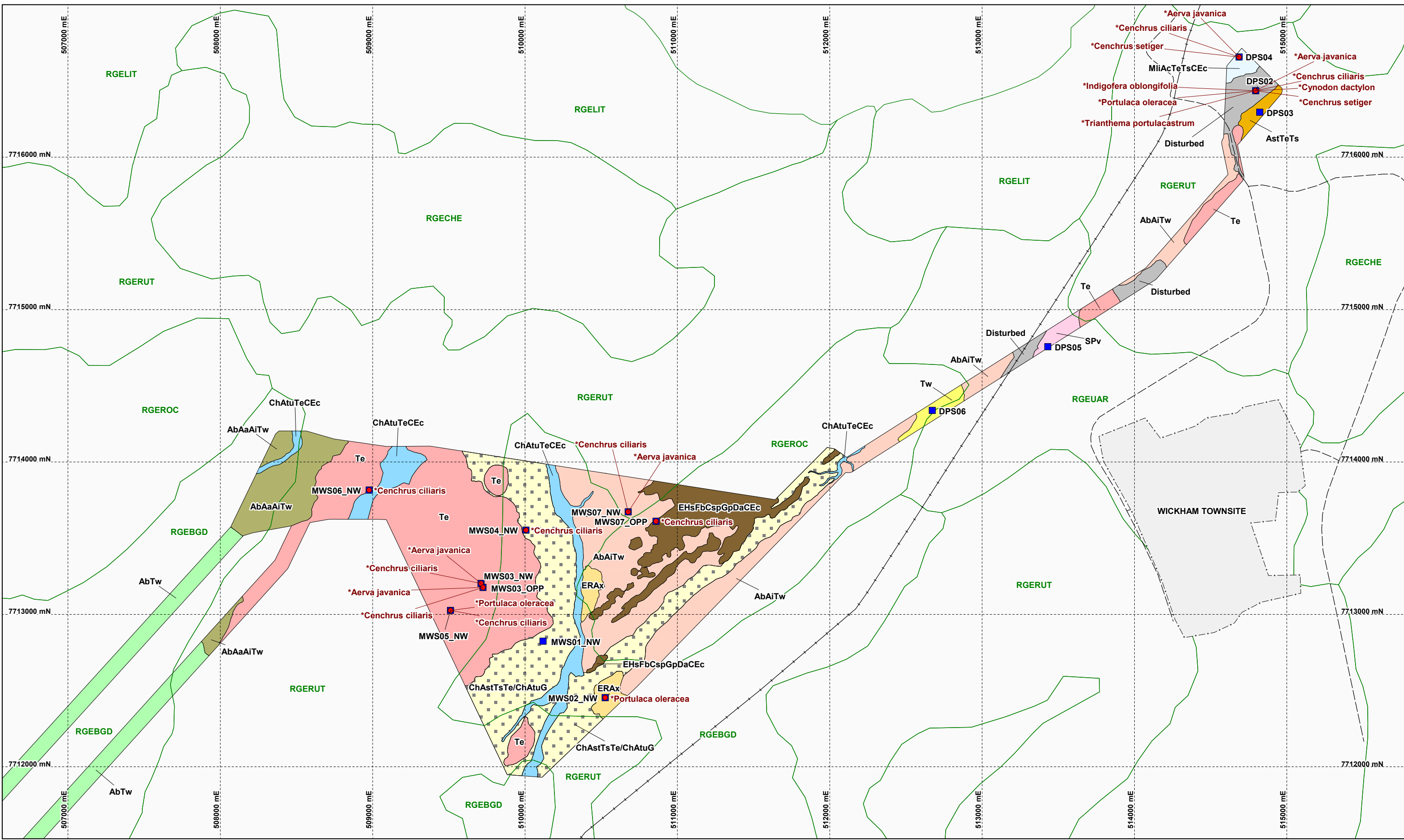


Note: Land systems mapping - Dept. of Agriculture WA 2002

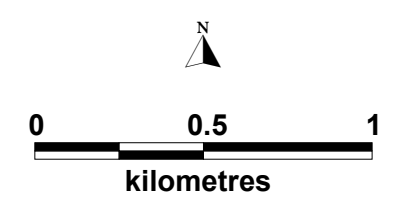
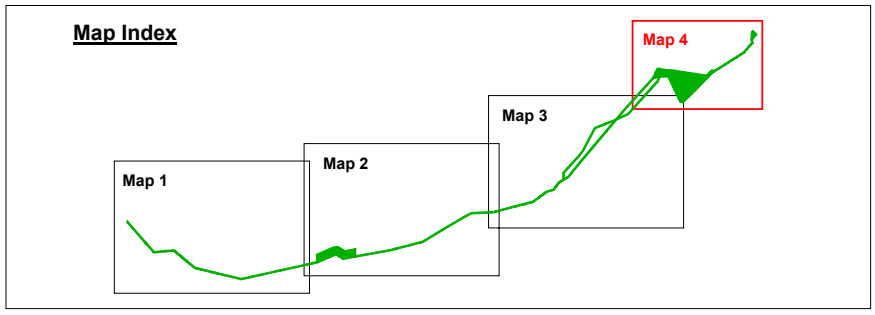
Map 1 of 4

### Karratha to Cape Lambert Transmission Line Corridor NVCP

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Projection: MGA Zone 50	Scale:



- Quadrat Sites
- Weeds
- Rangelands



Note: Land systems mapping - Dept. of Agriculture WA 2002

**Map 4 of 4**

**Biota Environmental Sciences**

**Karratha to Cape Lambert Transmission Line Corridor NVCP**

Author:	Date: 26/07/2008
Drawn: P Sawers	Revised:
Job No.: 469	Report No.:
Projection: MGA Zone 50	Scale:

<b>Vegetation of Broad Flat Plains</b>		
	<b>ApAbAstCEcCEs</b>	<i>Acacia pynfolia</i> , <i>Acacia bivenosa</i> tall open shrubland over <i>Acacia stellaticeps</i> low open shrubland over * <i>Cenchrus ciliaris</i> and * <i>Cenchrus setiger</i> tussock grassland
	<b>AbTw</b>	<i>Acacia bivenosa</i> tall shrubland over <i>Triodia wiseana</i> hummock grassland
	<b>AxERAxERibTia</b>	<i>Acacia xiphophylla</i> open heath over <i>Eragrostis xerophila</i> , <i>Eriachne benthamii</i> open tussock grassland with <i>Triodia lanigera</i> very open hummock grassland
<b>Vegetation of Plains &amp; Clayey Plains</b>		
	<b>AbAaAITw</b>	<i>Acacia bivenosa</i> , <i>A. ancistrocarpa</i> , <i>A. inaequilatera</i> tall shrubland over <i>Triodia wiseana</i> hummock grassland on stony clay plains
	<b>SPv</b>	<i>Sporobolus virginicus</i> tussock grassland
	<b>Erax</b>	<i>Eragrostis xerophila</i> tussock grassland on clay plains
	<b>ChAtuGwAstTeTw</b>	<i>Corymbia hamersleyana</i> scattered low trees over <i>Acacia tumida</i> var. <i>pilbarensis</i> , <i>Grevillea wickhamii</i> tall shrubland over <i>Acacia stellaticeps</i> open shrubland over <i>Triodia epactia</i> , <i>T. wiseana</i> open hummock grassland
	<b>ChAstTsTe</b>	<i>Corymbia hamersleyana</i> low open woodland over <i>Acacia stellaticeps</i> low open shrubland over <i>Triodia schinzii</i> , <i>T. epactia</i>
<b>Vegetation of Broad Drainage Lines</b>		
	<b>ChAtuTeCEc</b>	<i>Corymbia hamersleyana</i> low open woodland over <i>Acacia tumida</i> var. <i>pilbarensis</i> tall open shrubland over <i>Triodia epactia</i> very open hummock grassland over * <i>Cenchrus ciliaris</i> very open tussock grassland
<b>Vegetation of Drainage Lines</b>		
	<b>EvMgAcAamTaCEc</b>	<i>Eucalyptus victrix</i> , <i>Melaleuca glomerata</i> low open forest <i>Acacia coriacea</i> subsp. <i>coriacea</i> , <i>Acacia ampliceps</i> tall open shrubland over <i>Triodia angusta</i> very open hummock grassland and * <i>Cenchrus ciliaris</i> tussock grassland
	<b>MIIAcTeTsCEc</b>	<i>Melaleuca linophylla</i> , <i>Acacia coriacea</i> subsp. <i>coriacea</i> low woodland over <i>Triodia epactia</i> , <i>Triodia schinzii</i> hummock grassland over * <i>Cenchrus ciliaris</i> open tussock grassland
	<b>EvAcEUa</b>	<i>Eucalyptus victrix</i> , <i>Acacia coriacea</i> subsp. <i>coriacea</i> tall shrubland over <i>Eulaia aurea</i> tussock grassland
	<b>ChTeCHF</b>	<i>Corymbia hamersleyana</i> low open woodland over <i>Triodia epactia</i> hummock grassland and <i>Chrysopogon fallax</i> scattered tussock grasses
<b>Vegetation of Low Rises</b>		
	<b>Tw</b>	<i>Triodia wiseana</i> hummock grasslands
	<b>Tw/AbTw</b>	
Legend Sheet 1 of 2	<b>Vegetation Mapping for Karratha to Cape Lambert Transmission Line Corridor NVCP</b>	<b>Biota Environmental Sciences</b> 

<b>Vegetation of Slopes</b>		
	<b>AstTeTs</b>	<i>Acacia stellaticeps</i> low open shrubland over <i>Triodia epectia</i> , <i>Triodia schinzii</i> hummock grassland
	<b>AstTw</b>	<i>Acacia stellaticeps</i> low shrubland over <i>Triodia wiseana</i> hummock grassland
<b>Vegetation of Hills and Slopes</b>		
	<b>Te</b>	<i>Triodia epectia</i> hummock grassland
	<b>AbAiTw</b>	<i>Acacia bivenosa</i> , <i>A. inaequilatera</i> open shrubland over <i>Triodia wiseana</i> hummock grassland
	<b>EHsFbCspGpDaCEc</b>	<i>Ehretia saligna</i> var. and <i>Ficus brachypoda</i> scattered low trees over <i>Triodia schinzii</i>
<b>Other</b>		
	<b>Disturbed</b>	
<p>Legend Sheet 2 of 2      <b>Vegetation Mapping for Karratha to Cape Lambert Transmission Line Corridor NVCP</b>      <b>Biota</b> Environmental Sciences </p>		

## Appendix 2

# Vegetation Structural Classification and Condition Ranking Scale





**Vegetation Structural Classes\***

Stratum	Canopy Cover (%)				
	70-100%	30-70%	10-30%	2-10%	<2%
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland	Scattered tall trees
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland	Scattered trees
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs over 2 m	Tall closed scrub	Tall open scrub	Tall shrubland	Tall open shrubland	Scattered tall shrubs
Shrubs 1-2 m	Closed heath	Open heath	Shrubland	Open shrubland	Scattered shrubs
Shrubs under 1 m	Low closed heath	Low open heath	Low shrubland	Low open shrubland	Scattered low shrubs
Hummock grasses	Closed hummock grassland	Hummock grassland	Open hummock grassland	Very open hummock grassland	Scattered hummock grasses
Grasses, Sedges, Herbs	Closed tussock grassland / bunch grassland / sedgeland / herbland	Tussock grassland / bunch grassland / sedgeland / herbland	Open tussock grassland / bunch grassland / sedgeland / herbland	Very open tussock grassland / bunch grassland / sedgeland / herbland	Scattered tussock grasses / bunch grasses / sedges / herbs

\* Based on Muir (1977), and Aplin's (1979) modification of the vegetation classification system of Specht (1970): Aplin T.E.H. (1979). The Flora. Chapter 3 In O'Brien, B.J. (ed.) (1979). *Environment and Science*. University of Western Australia Press; Muir B.G. (1977). Biological Survey of the Western Australian Wheatbelt. Part II: Vegetation and habitat of Bending Reserve. *Records of the Western Australian Museum, Suppl. No. 3*; Specht R.L. (1970). Vegetation. In *The Australian Environment*. 4th edn (Ed. G.W. Leeper). Melbourne.

**Vegetation Condition Scale\***

<p><b>E = Excellent</b> (=Pristine of BushForever)</p> <p>Pristine or nearly so; no obvious signs of damage caused by the activities of European man.</p>
<p><b>VG = Very Good</b> (= Excellent of BushForever)</p> <p>Some relatively slight signs of damage caused by the activities of European man. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds such as <i>*Ursinia anthemoides</i> or <i>*Briza</i> spp., or occasional vehicle tracks.</p>
<p><b>G = Good</b> (= Very Good of BushForever)</p> <p>More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones such as <i>*Ehrharta</i> spp.</p>
<p><b>P = Poor</b> (= Good of BushForever)</p> <p>Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man, such as grazing, partial clearing (chaining) or frequent fires. Weeds as above, probably plus some more aggressive ones such as <i>*Ehrharta</i> spp.</p>
<p><b>VP = Very Poor</b> (= Degraded of BushForever)</p> <p>Severely impacted by grazing, very frequent fires, 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 weed species including very aggressive species.</p>
<p><b>D = Completely Degraded</b> (= Completely Degraded of BushForever)</p> <p>Areas that are completely or almost completely without native species in the structure of their vegetation; ie. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.</p>

\* Based on 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.





## Appendix 3

List of Flora Species recorded from the  
Karratha to Cape Lambert Transmission  
Line Corridor and Mount Welcome  
Station Transmission Line Corridor Study  
Areas





**Vascular Flora Species List for the Mt. Welcome Study Area**

<b>Family and Family Number</b>	<b>Species</b>
<b>031 - Poaceae</b>	<i>Aristida burbridgeae</i> <i>Aristida contorta</i> <i>Aristida holathera</i> var. <i>holathera</i> <i>Aristida hygrometrica</i> <i>Brachyachne convergens</i> <i>Brachyachne prostrata</i> * <i>Cenchrus ciliaris</i> <i>Cymbopogon ambiguus</i> <i>Dactyloctenium radulans</i> <i>Dichanthium sericeum</i> subsp. <i>humilius</i> <i>Digitaria ctenantha</i> <i>Enneapogon caeruleus</i> <i>Eragrostis cumingii</i> <i>Eragrostis dielsii</i> <i>Eragrostis eriopoda</i> <i>Eragrostis exigua</i> <i>Eragrostis xerophila</i> <i>Eriachne benthamii</i> <i>Eriachne mucronata</i> <i>Eriachne pulchella</i> subsp. <i>dominii</i> <i>Eriachne pulchella</i> subsp. <i>pulchella</i> <i>Iseilema macratherum</i> <i>Panicum decompositum</i> <i>Paraneurachne muelleri</i> <i>Paspalidium clementii</i> <i>Paspalidium rarum</i> <i>Paspalidium tabulatum</i> <i>Perotis rara</i> <i>Schizachyrium fragile</i> <i>Sporobolus australasicus</i> <i>Themeda triandra</i> <i>Triodia epactia</i> <i>Triodia schinzii</i> <i>Triodia wiseana</i> <i>Xerochloa laniflora</i> <i>Yakirra australiensis</i> var. <i>australiensis</i>
<b>032 - Cyperaceae</b>	<i>Bulbostylis barbata</i> <i>Bulbostylis turbinata</i> <i>Cyperus cunninghamii</i> <i>Cyperus</i> ? <i>cunninghamii/dactylotes</i> <i>Fimbristylis dichotoma</i> <i>Fimbristylis simulans</i>
<b>087 - Moraceae</b>	<i>Ficus aculeata</i> var. <i>indecora</i> <i>Ficus brachypoda</i>
<b>090 - Proteaceae</b>	<i>Grevillea pyramidalis</i> <i>Grevillea wickhamii</i> <i>Hakea chordophylla</i>
<b>105 - Chenopodiaceae</b>	<i>Dysphania rhadinostachya</i> <i>Salsola tragus</i> <i>Sclerolaena bicornis</i>

<b>105 - Chenopodiaceae</b>	<i>Sclerolaena hostilis</i>
<b>106 - Amaranthaceae</b>	* <i>Aerva javanica</i> <i>Amaranthus interruptus</i> <i>Gomphrena cunninghamii</i> <i>Ptilotus astrolasius</i> var. <i>astrolasius</i> <i>Ptilotus auriculifolius</i> <i>Ptilotus calostachyus</i> <i>Ptilotus clementii</i> <i>Ptilotus exaltatus</i> <i>Ptilotus fusiformis</i> <i>Ptilotus incanus</i> <i>Ptilotus murrayi</i> <i>Ptilotus polystachyus</i> var. <i>polystachyus</i>
<b>107 - Nyctaginaceae</b>	<i>Boerhavia coccinea</i> <i>Boerhavia gardneri</i>
<b>110 - Aizoaceae</b>	<i>Trianthema triquetra</i>
<b>110A - Molluginaceae</b>	<i>Mollugo molluginea</i>
<b>111 - Portulacaceae</b>	<i>Portulaca conspicua</i> * <i>Portulaca oleracea</i>
<b>113 - Caryophyllaceae</b>	<i>Polycarpaea holtzei</i>
<b>122 - Menispermaceae</b>	<i>Tinospora smilacina</i>
<b>131 - Lauraceae</b>	<i>Cassytha capillaris</i>
<b>137A - Capparaceae</b>	<i>Capparis spinosa</i> var. <i>nummularia</i> <i>Cleome viscosa</i>
<b>163 - Mimosaceae</b>	<i>Acacia ancistrocarpa</i> <i>Acacia arida</i> <i>Acacia bivenosa</i> <i>Acacia coriacea</i> subsp. <i>coriacea</i> <i>Acacia inaequilatera</i> <i>Acacia maitlandii</i> <i>Acacia pyrifolia</i> <i>Acacia stellaticeps</i> <i>Acacia tenuissima</i> <i>Acacia tumida</i> var. <i>pillbarensis</i> <i>Neptunia dimorphantha</i>
<b>164 - Caesalpiaceae</b>	<i>Cassia glutinosa</i> <i>Cassia notabilis</i> <i>Cassia pruinosa</i> <i>Cassia venusta</i>
<b>165 - Papilionaceae</b>	<i>Alysicarpus muelleri</i> <i>Crotalaria medicaginea</i> var. <i>neglecta</i> <i>Cullen leucochaites</i> <i>Desmodium muelleri</i> <i>Indigofera colutea</i> <i>Indigofera linifolia</i> <i>Indigofera linnaei</i>

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	<i>Indigofera monophylla</i> <i>Isotropis atropurpurea</i> <i>Rhynchosia minima</i> <i>Sesbania cannabina</i> <i>Tephrosia aff. supina</i>
<b>173 - Zygophyllaceae</b>	<i>Tribulus hirsutus</i> <i>Tribulus platypterus</i> <i>Tribulus suberosus</i>
<b>185 - Euphorbiaceae</b>	<i>Euphorbia australis</i> <i>Euphorbia biconvexa</i> <i>Euphorbia coghlanii</i> <i>Euphorbia wheeleri</i> <i>Euphorbia sp. (B170-4)</i> <i>Leptopus decaisnei</i> <i>Phyllanthus erwinii</i> <i>Phyllanthus maderaspatensis</i>
<b>220 - Tiliaceae</b>	<i>Corchorus incanus</i> subsp. <i>incanus</i> <i>Corchorus aff. parviflorus</i> <i>Triumfetta appendiculata</i> (Whim Creek form) <i>Triumfetta clementii</i> <i>Triumfetta maconochieana</i>
<b>221 - Malvaceae</b>	<i>Abutilon dioicum</i> <i>Abutilon fraseri</i> <i>Abutilon lepidum</i> <i>Abutilon malvifolium</i> <i>Gossypium australe</i> <i>Hibiscus aff. coatesii</i> <i>Hibiscus leptocladus</i> <i>Hibiscus sturtii</i> var. <i>campylochlamys</i> <i>Hibiscus sturtii</i> var. <i>platychlamys</i> <i>Sida echinocarpa</i> <i>Sida aff. fibulifera</i> <i>Sida pilbarensis</i> (ferruginous form) <i>Sida sp. spiciform panicles</i> (E. Leyland s.n. 14/8/90)
<b>223 - Sterculiaceae</b>	<i>Keraudrenia velutina</i> subsp. <i>elliptica</i> <i>Melhania oblongifolia</i> <i>Waltheria indica</i>
<b>243 - Violaceae</b>	<i>Hybanthus aurantiacus</i>
<b>273 - Myrtaceae</b>	<i>Corymbia hamersleyana</i>
<b>281 - Apiaceae</b>	<i>Trachymene oleracea</i> subsp. <i>oleracea</i>
<b>301 - Oleaceae</b>	<i>Jasminum didymum</i> subsp. <i>lineare</i>
<b>307 - Convolvulaceae</b>	<i>Bonamia linearis</i> <i>Bonamia media</i> var. <i>villosa</i> <i>Bonamia pannosa</i> <i>Evolvulus alsinoides</i> var. <i>decumbens</i> <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i> <i>Ipomoea coptica</i> <i>Ipomoea muelleri</i>

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<b>307 - Convolvulaceae</b>	<i>Polymeria</i> sp. (site 1365)
<b>310 - Boraginaceae</b>	<i>Ehretia saligna</i> var. <i>saligna</i> <i>Heliotropium inexplicitum</i> <i>Heliotropium pachyphyllum</i> <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>
<b>315 - Solanaceae</b>	<i>Solanum diversiflorum</i> <i>Solanum horridum</i>
<b>317 - Bignoniaceae</b>	<i>Dolichandrone heterophylla</i>
<b>325 - Acanthaceae</b>	<i>Dicliptera armata</i>
<b>331 - Rubiaceae</b>	<i>Oldenlandia crouchiana</i>
<b>337 - Cucurbitaceae</b>	<i>Cucumis maderaspatanus</i> <i>Trichosanthes cucumerina</i>
<b>341 - Goodeniaceae</b>	<i>Goodenia microptera</i> <i>Goodenia stobbsiana</i>
<b>345 - Asteraceae</b>	<i>Vittadinia virgata</i>

**Vascular Flora Species List for the Transmission Line Corridor Study Area**

<b>Family and Family Number</b>	<b>Species</b>
<b>013 - Marsileaceae</b>	<i>Marsilea hirsuta</i>
<b>031 - Poaceae</b>	<i>Aristida contorta</i>
	<i>Aristida latifolia</i>
	<i>Astrebla pectinata</i>
	<i>Brachyachne convergens</i>
	* <i>Cenchrus ciliaris</i>
	* <i>Cenchrus setiger</i>
	<i>Chrysopogon fallax</i>
	<i>Cymbopogon ambiguus</i>
	<i>Cymbopogon obtectus</i>
	* <i>Cynodon dactylon</i>
	<i>Dactyloctenium radulans</i>
	<i>Dichanthium sericeum</i> subsp. <i>humilius</i>
	<i>Digitaria brownii</i>
	* <i>Echinochloa colona</i>
	<i>Enneapogon caerulescens</i>
	<i>Eragrostis cumingii</i>
	<i>Eragrostis eriopoda</i>
	<i>Eragrostis exigua</i>
	<i>Eragrostis falcata</i>
	<i>Eragrostis tenellula</i>
	<i>Eragrostis xerophila</i>
	<i>Eriachne benthamii</i>
	<i>Eriachne mucronata</i>
	<i>Eriachne obtusa</i>
	<i>Eriachne pulchella</i> subsp. <i>dominii</i>
	<i>Eulalia aurea</i>
	<i>Iseilema dolichotrichum</i>
	<i>Panicum decompositum</i>
	<i>Panicum laevinode</i>
	<i>Paraneurachne muelleri</i>
	<i>Paspalidium clementii</i>
	<i>Sorghum plumosum</i>
	<i>Sporobolus australasicus</i>
	<i>Sporobolus virginicus</i>
	<i>Themeda triandra</i>
	<i>Triodia angusta</i>
	<i>Triodia epactia</i>
	<i>Triodia lanigera</i>
	<i>Triodia schinzii</i>
	<i>Triodia wiseana</i>
	<i>Xerochloa laniflora</i>
	<i>Yakirra australiensis</i> var. <i>australiensis</i>
<b>032 - Cyperaceae</b>	<i>Bulbostylis barbata</i>
	<i>Bulbostylis turbinata</i>
	<i>Cyperus blakeanus</i>
	<i>Cyperus bulbosus</i>
	<i>Cyperus iria</i>
	<i>Fimbristylis dichotoma</i>
<b>090 - Proteaceae</b>	<i>Grevillea pyramidalis</i>
	<i>Grevillea wickhamii</i>

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<b>090 - Proteaceae</b>	<i>Hakea chordophylla</i> <i>Hakea lorea</i> subsp. <i>lorea</i>
<b>092 - Santalaceae</b>	<i>Santalum lanceolatum</i>
<b>105 - Chenopodiaceae</b>	<i>Atriplex bunburyana</i> <i>Atriplex codonocarpa</i> <i>Maireana georgei</i> <i>Maireana triptera</i> <i>Maireana villosa</i> <i>Rhagodia eremaea</i> <i>Salsola fragus</i> <i>Sclerolaena bicornis</i> <i>Sclerolaena glabra</i> <i>Sclerolaena hostilis</i>
<b>106 - Amaranthaceae</b>	* <i>Aerva javanica</i> <i>Alternanthera nana</i> <i>Alternanthera nodiflora</i> <i>Amaranthus undulatus</i> <i>Gomphrena affinis</i> subsp. <i>pilbarensis</i> <i>Gomphrena cunninghamii</i> <i>Ptilotus astrolasius</i> var. <i>astrolasius</i> <i>Ptilotus axillaris</i> <i>Ptilotus calostachyus</i> var. <i>calostachyus</i> <i>Ptilotus carinatus</i> <i>Ptilotus exaltatus</i> <i>Ptilotus gaudichaudii</i> <i>Ptilotus gomphrenoides</i> <i>Ptilotus polystachyus</i> var. <i>polystachyus</i>
<b>107 - Nyctaginaceae</b>	<i>Boerhavia coccinea</i> <i>Boerhavia gardneri</i> <i>Boerhavia paludosa</i> <i>Boerhavia repleta</i>
<b>110 - Aizoaceae</b>	* <i>Trianthema portulacastrum</i> <i>Trianthema triquetra</i> <i>Trianthema turgidifolia</i>
<b>110A - Molluginaceae</b>	<i>Mollugo molluginea</i>
<b>111 - Portulacaceae</b>	* <i>Portulaca oleracea</i> <i>Portulaca pilosa</i>
<b>113 - Caryophyllaceae</b>	<i>Polycarpaea holtzei</i>
<b>131 - Lauraceae</b>	<i>Cassytha capillaris</i>
<b>137A - Capparaceae</b>	<i>Capparis spinosa</i> var. <i>nummularia</i> <i>Cleome viscosa</i>
<b>163 - Mimosaceae</b>	<i>Acacia ampliceps</i> <i>Acacia ancistrocarpa</i> <i>Acacia arida</i> <i>Acacia bivenosa</i> <i>Acacia bivenosa</i> x <i>ampliceps</i> <i>Acacia colei</i> var. <i>colei</i>



**163 - Mimosaceae**

*Acacia coriacea* subsp. *coriacea*  
*Acacia coriacea* subsp. *pendens*  
*Acacia elachantha*  
*Acacia inaequilatera*  
*Acacia maitlandii*  
*Acacia pyrifolia*  
*Acacia sclerosperma* subsp. *sclerosperma*  
*Acacia sphaerostachya*  
*Acacia stellaticeps*  
*Acacia synchronicia*  
*Acacia trachycarpa*  
*Acacia tumida* var. *pilbarensis*  
*Acacia xiphophylla*  
*Dichrostachys spicata*  
*Neptunia dimorphantha*  
\**Vachellia farnesiana*

**164 - Caesalpiaceae**

*Cassia glutinosa*  
*Cassia luerssenii*  
*Cassia notabilis*  
*Cassia oligophylla*  
*Cassia oligophylla* x *helmsii*  
*Cassia pruinosa*

**165 - Papilionaceae**

*Aeschynomene indica*  
*Alysicarpus muelleri*  
\**Clitoria ternatea*  
*Crotalaria dissitiflora* subsp. *benthamiana*  
*Crotalaria medicaginea* var. *neglecta*  
*Crotalaria novae-hollandiae* subsp. *novae-hollandiae*  
*Cullen graveolens*  
*Cullen lachnostachys*  
*Cullen leucanthum*  
*Desmodium filiforme*  
*Desmodium muelleri*  
*Indigastrum parviflorum*  
*Indigofera colutea*  
*Indigofera linifolia*  
*Indigofera monophylla*  
\**Indigofera oblongifolia*  
*Indigofera trita*  
*Isotropis atropurpurea*  
*Rhynchosia minima*  
*Sesbania cannabina*  
\**Stylosanthes hamata*  
*Swainsona formosa*  
*Tephrosia* aff. *clementii*  
*Tephrosia rosea* var. *clementii*  
*Tephrosia* ? *simplicifolia*  
*Tephrosia* aff. *supina*  
*Vigna lanceolata* var. *lanceolata*

**173 - Zygophyllaceae**

*Tribulus occidentalis*  
*Tribulus suberosus*

**183 - Polygalaceae**

*Polygala* aff. *isingii*

<b>185 - Euphorbiaceae</b>	<i>Adriana urticoides</i> var. <i>urticoides</i> <i>Euphorbia</i> aff. <i>australis</i> <i>Euphorbia biconvexa</i> <i>Euphorbia coghlanii</i> <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> <i>Leptopus decaisnei</i> <i>Phyllanthus erwinii</i> <i>Phyllanthus maderaspatensis</i>
<b>207 - Sapindaceae</b>	<i>Diplopeltis eriocarpa</i>
<b>220 - Tiliaceae</b>	<i>Corchorus</i> aff. <i>parviflorus</i> <i>Corchorus</i> aff. <i>walcottii</i> <i>Corchorus tridens</i> <i>Triumfetta clementii</i>
<b>221 - Malvaceae</b>	<i>Abutilon amplum</i> <i>Abutilon dioicum</i> <i>Abutilon fraseri</i> <i>Abutilon lepidum</i> <i>Abutilon</i> aff. <i>lepidum</i> (4) <i>Gossypium australe</i> <i>Gossypium robinsonii</i> <i>Hibiscus austrinus</i> <i>Hibiscus brachysiphonius</i> <i>Hibiscus</i> aff. <i>coatesii</i> <i>Hibiscus sturtii</i> var. <i>campylochlamys</i> <i>Hibiscus sturtii</i> var. <i>platychlams</i> * <i>Malvastrum americanum</i> <i>Sida arsiniata</i> <i>Sida echinocarpa</i> <i>Sida</i> aff. <i>echinocarpa</i> <i>Sida</i> aff. <i>fibulifera</i> <i>Sida pilbarensis</i> (ferruginous form) <i>Sida rohlenae</i> subsp. <i>rohlenae</i> <i>Sida spinosa</i>
<b>223 - Sterculiaceae</b>	* <i>Melochia pyramidata</i> <i>Waltheria indica</i>
<b>243 - Violaceae</b>	<i>Hybanthus aurantiacus</i>
<b>248 - Passifloraceae</b>	* <i>Passiflora foetida</i>
<b>263 - Thymelaeaceae</b>	<i>Pimelea ammocharis</i>
<b>273 - Myrtaceae</b>	<i>Corymbia hamersleyana</i> <i>Eucalyptus camaldulensis</i> var. <i>obtusa</i> <i>Eucalyptus victrix</i> <i>Melaleuca glomerata</i> <i>Melaleuca linophylla</i>
<b>281 - Apiaceae</b>	<i>Trachymene oleracea</i> subsp. <i>oleracea</i>
<b>304 - Apocynaceae</b>	<i>Carissa lanceolata</i>
<b>305 - Asclepiadaceae</b>	<i>Sarcostemma viminalis</i>

<b>307 - Convolvulaceae</b>	<i>Bonamia linearis</i> <i>Bonamia media</i> var. <i>villosa</i> <i>Bonamia rosea</i> <i>Evolvulus alsinoides</i> var. <i>decumbens</i> <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i> <i>Ipomoea coptica</i> <i>Ipomoea lonchophylla</i> <i>Ipomoea muelleri</i> <i>Ipomoea plebeia</i> <i>Ipomoea polymorpha</i> <i>Operculina aequisepala</i> <i>Polymeria calycina</i> <i>Polymeria</i> sp. (site 1365)
<b>310 - Boraginaceae</b>	<i>Heliotropium heteranthum</i> <i>Heliotropium inexplicitum</i> <i>Heliotropium ovalifolium</i> <i>Heliotropium tenuifolium</i> <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>
<b>313 - Lamiaceae</b>	<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>
<b>315 - Solanaceae</b>	<i>Solanum diversiflorum</i> <i>Solanum horridum</i> <i>Solanum lasiophyllum</i>
<b>316 - Scrophulariaceae</b>	<i>Mimulus gracilis</i> <i>Stemodia grossa</i> <i>Stemodia kingii</i>
<b>317 - Bignoniaceae</b>	<i>Dolichandrone heterophylla</i>
<b>326 - Myoporaceae</b>	<i>Eremophila longifolia</i> <i>Myoporum montanum</i>
<b>337 - Cucurbitaceae</b>	<i>Cucumis maderaspatanus</i> * <i>Cucumis melo</i> subsp. <i>agrestis</i>
<b>341 - Goodeniaceae</b>	<i>Goodenia forrestii</i> <i>Goodenia lamprosperma</i> <i>Goodenia microptera</i> <i>Goodenia muelleriana</i> <i>Goodenia stobbsiana</i> <i>Scaevola spinescens</i>
<b>345 - Asteraceae</b>	<i>Flaveria</i> sp. Tom Price <i>Pluchea ferdinandi-muelleri</i> <i>Pluchea</i> sp. B Kimberley Flora <i>Pterocaulon sphaeranthoides</i> * <i>Bidens bipinnata</i>



## Appendix 4

# Framework for the Conservation Significance Ranking of Flora and Fauna





## A. Threatened Flora Statutory Framework

In Western Australia, all native flora species are protected under the Wildlife Conservation Act 1950-1979, making it an offence to remove or harm native flora species without approval. In addition to this basic level of statutory protection, a number of plant species are assigned an additional level of conservation significance based on the fact that there are a limited number of known populations, some of which may be under threat.

Species of the highest conservation significance are designated Declared Rare Flora (DRF), either extant or presumed extinct:

- **X: Declared Rare Flora - Presumed Extinct:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee;
- **R: 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, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee (Atkins 2008). (= Threatened Flora = Endangered + Vulnerable)

Species that appear to be rare or threatened, but for which there is insufficient information to properly evaluate their conservation significance, are assigned to one of four Priority flora categories:

- **P1: Priority One - Poorly Known:** 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 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 which are known from several 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 need of further survey.
- **P4: Priority Four - Rare:** 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.

Note that of the above classifications, only 'Declared Rare Flora' has statutory standing. The Priority Flora classifications are employed by the Department of Environment and Conservation to manage and classify their database of species considered potentially rare or at risk, but these categories have no legislative status. Note also that proposals that appear likely to affect DRF require formal written approval from the Minister for the Environment under Section 23(f) of the Wildlife Conservation Act 1950-1979 in addition to the requirements of the Environmental Protection (Native Vegetation Clearing) Regulations 2004.

### References:

Atkins, K.J. (2008). Declared Rare and Priority Flora List for Western Australia. Prepared by the Department of Environment and Conservation, 26 February 2008.

## B. Threatened Fauna Statutory Framework

Native fauna species that are rare, threatened with extinction, or have high conservation value are specially protected by law under the Western Australian Wildlife Conservation Act 1950-1979. In addition, many of these species are listed under the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999).

## **B1. Wildlife Conservation Act 1950-1979**

Classification of rare and endangered fauna under the Wildlife Conservation (Specially Protected Fauna) Notice 2006 recognises four distinct schedules of taxa:

1. Schedule 1 taxa are fauna which are rare or likely to become extinct and are declared to be fauna in need of special protection;
2. Schedule 2 taxa are fauna which are presumed to be extinct and are declared to be fauna in need of special protection;
3. Schedule 3 taxa are birds which are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, which are declared to be fauna in need of special protection; and
4. Schedule 4 taxa are fauna that are in need of special protection, otherwise than for the reasons mentioned in paragraphs (1), (2) and (3).

In addition to the above, fauna are also classified under five different Priority codes:

- **Priority One:** Taxa with few, poorly known populations on threatened lands. Taxa which are known from a few specimens or sight records from one or a few localities on lands not managed for conservation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- **Priority Two:** Taxa with few, poorly known populations on conservation lands, or taxa with several, poorly known populations not on conservation lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- **Priority Three:** Taxa with several, poorly known populations, some on conservation lands. Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- **Priority Four:** Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed or for which sufficient knowledge is available and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. Taxa which are declining significantly but are not yet threatened.
- **Priority Five:** Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

## **B2. EPBC Act 1999**

Fauna species of national conservation significance are listed under the EPBC Act 1999, and may be classified as 'critically endangered', 'endangered', 'vulnerable' or 'conservation dependent' (consistent with IUCN categories:

<http://www.iucn.org/themes/ssc/redlist2006/categories.htm>).

Migratory wader species are also protected under the EPBC Act 1999. The national List of Migratory Species consists of those species listed under the following International Conventions:

- Japan-Australia Migratory Bird Agreement (JAMBA);
- China-Australia Migratory Bird Agreement (CAMBA); and
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).



## Appendix 5

### Priority Flora Recorded from the DEC Threatened Flora Database Search





GENUS	SPECIES	CONS CODE	No. OF LOCATIONS	SITE/ HABITAT	LOCALITY
<i>Acacia</i>	<i>balsamea</i>	P4		Rocky Hills.	Inland Pilbara
<i>Acacia</i>	<i>glaucochaesia</i>	P3			4km N of NW coastal HWY on rd to Cleaverville beach.
<i>Acacia</i>	<i>glaucochaesia</i>	P3			~15km due E of Karratha on rd to Cleaverville bch
<i>Acacia</i>	<i>glaucochaesia</i>	P3			Munda- Karratha
<i>Acacia</i>	<i>glaucochaesia</i>	P3	2		Karratha-Port Headland area
<i>Acacia</i>	<i>glaucochaesia</i>	P3			4km N of NW coastal HWY on rd to Cleaverville beach.
<i>Acacia</i>	<i>glaucochaesia</i>	P3			Dampier Salt Lease.
<i>Acacia</i>	<i>glaucochaesia</i>	P3		Brown, dry clay soil.	Harding Dam rd, 1.5km from Roebourne.
<i>Acacia</i>	<i>glaucochaesia</i>	P3			Beside road next to Dampier Salt Industries.
<i>Gomphrena</i>	<i>pusilla</i>	P2			Dampier Peninsula, Port Hedland
<i>Goodenia</i>	<i>pallida</i>	P1		Red soil	127 miles from Onslow on Roebourne Rd.
<i>Goodenia</i>	<i>pascua</i>	P3		Bunch grass plain.	11 miles from Roebourne, Port Hedland Rd.
<i>Gymnanthera</i>	<i>cunninghamii</i>	P3	3		Enderby's Island, nr Rocky Headland.
<i>Gymnanthera</i>	<i>cunninghamii</i>	P3			West Lewis Is, Dampier Archipelago
<i>Helichrysum</i>	<i>oligochaetum</i>	P1	2		Port Walcott, ~10km N of Roebourne.
<i>Hibiscus</i>	<i>brachysiphonius</i>	P3			Karratha nr creekline.
<i>Nicotiana</i>	<i>heterantha</i>	P1		Seasonally wet flats.	Inland Pilbara.
<i>Rhynchosia</i>	<i>bungarensis</i>	P3		Crevices in rock piles.	Near quadrant on cutting along rd to Con. Camp Burrup Peninsula.
<i>Rhynchosia</i>	<i>bungarensis</i>	P3		Base of dolerite hill.	NE end Enderby Is.
<i>Rhynchosia</i>	<i>bungarensis</i>	P3		Rocky outcrop atop rocky slopes.	One Shack Bay, East Lewis Island.
<i>Stackhousia</i>	<i>clementii</i>	P1			King Bay-Hearson Cove tidal inlet, Burrup Peninsula.
<i>Stackhousia</i>	<i>clementii</i>	P1		Edge of estuarine area	Water Corp service corridor, near Karratha.
<i>Terminalia</i>	<i>supranitifolia</i>	P3	25	Top of rock outcrop.	Burrup Peninsula, Pistol Ranges.
<i>Terminalia</i>	<i>supranitifolia</i>	P3		Rocky slope over a river bed.	Above Munni Munni creek, ~5 km due S of Cherrata Homestead.
<i>Terminalia</i>	<i>supranitifolia</i>	P3			Base hills right hand side Dampier Island, near Dampier Salt lease.
<i>Terminalia</i>	<i>supranitifolia</i>	P3	5		Hearson Cove, Burrup Peninsula
<i>Terminalia</i>	<i>supranitifolia</i>	P3		Rock Piles.	Near Dampier.
<i>Terminalia</i>	<i>supranitifolia</i>	P3		Rock Piles.	Burrup Peninsula near Burrow Pit 8.
<i>Terminalia</i>	<i>supranitifolia</i>	P3		Rock Piles.	King Bay- Withnell Bay rd, peninsula bw Dampier and Dolphin Bay Island.
<i>Themeda</i>	<i>sp. Hamersley Station</i>	P3		Cracking clay plain.	10km W of Karratha on rd to Dampier.



## Appendix 6

# Results of Fauna Database Searches for the Dampier and Cape Lambert Localities





**Western Australian Museum FaunaBase Database  
search for both Dampier and Cape Lambert**

**Amphibia collected between  
-21.2586, 116.1272 and -20.2747, 117.2344  
& -20.334, 116.673 and -20.699, 117.156**

Hylidae

*Cyclorana australis*  
*Cyclorana maini*†  
*Cyclorana* sp.  
*Litoria rubella*†

Myobatrachidae

*Limnodynastes spenceri*  
*Notaden nicholli*†  
*Uperoleia russelli*

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**Reptiles collected between  
-21.2586, 116.1272 and -20.2747, 117.2344  
& -20.334, 116.673 and -20.699, 117.156**

Agamidae

*Ctenophorus caudicinctus*  
*Ctenophorus caudicinctus caudicinctus*†  
*Ctenophorus isolepis*†  
*Ctenophorus isolepis isolepis*†  
*Ctenophorus nuchalis*  
*Ctenophorus reticulatus*  
*Lophognathus gilberti gilberti*†  
*Lophognathus longirostris*  
*Pogona minor*†  
*Pogona minor minor*  
*Pogona minor mitchelli*  
*Tympanocryptis cephal*

Boidae

*Antaresia perthensis*†  
*Antaresia stimsoni stimsoni*†  
*Aspidites melanocephalus*†  
*Python reticulatus*

Cheloniidae

*Chelonia mydas*†  
*Eretmochelys imbricata* *biss*†  
*Natator depressus*†

Colubridae

*Fordonia leucobalia*†

Elapidae

*Acalyptophis peronii*  
*Acanthophis wellsii*†  
*Aipysurus apraefrontalis*  
*Aipysurus laevis*†  
*Brachyuropis approximans*  
*Demansia psammophis cupreiceps*†  
*Demansia rufescens*†  
*Disteira major*  
*Disteira stokesii*  
*Ephalophis greyae*  
*Furina ornata*†

*Hydrelaps darwiniensis*  
*Parasuta monachus*  
*Parasuta punctata*  
*Pseudechis australis*†  
*Pseudechis modesta*  
*Pseudonaja nuchalis*†  
*Suta fasciata*  
*Suta punctata*†  
*Vermicella snelli*

Gekkonidae

*Crenadactylus ocellatus*†  
*Crenadactylus ocellatus horni*†  
*Diplodactylus conspicillatus*†  
*Diplodactylus mitchelli*  
*Diplodactylus savagei*†  
*Diplodactylus stenodactylus*†  
*Gehyra pilbara*†  
*Gehyra punctata*†  
*Gehyra purpurascens*†  
*Gehyra variegata*†  
*Gehyra* sp.  
*Heteronotia binoei*†  
*Nephurus levis pilbarensis*†  
*Nephurus wheeleri cinctus*  
*Oedura marmorata*†  
*Strophurus ciliaris aberrans*†  
*Strophurus elderi*†  
*Strophurus strophurus*  
*Strophurus wellingtonae*

Pygopodidae

*Delma borea*  
*Delma elegans*  
*Delma nasuta*  
*Delma pax*†  
*Delma tinctoria*†  
*Lialis burtoni*†  
*Pygopus nigriceps*

Scincidae

*Carlia munda*  
*Carlia triacantha*†  
*Cryptoblepharus carnabyi*†  
*Cryptoblepharus plagioccephalus*†  
*Ctenotus duricola*  
*Ctenotus grandis titan*†  
*Ctenotus helenae*†  
*Ctenotus pantherinus ocellifer*†  
*Ctenotus robustus*  
*Ctenotus rubicundus*†  
*Ctenotus saxatilis*†  
*Ctenotus serventyi*†  
*Ctenotus* sp.  
*Cyclodomorphus melanops*  
*Cyclodomorphus melanops melanops*†  
*Egernia depressa*†  
*Egernia pilbarensis*†  
*Egernia striata*  
*Glaphyromorphus isolepis*†  
*Lerista bipes*†  
*Lerista muelleri*†  
*Lerista quadrivincula*

*Menetia greyii*†  
*Menetia surda surda*†  
*Morethia ruficauda exquisita*†  
*Notoscincus butleri*  
*Notoscincus ornatus ornatus*†  
*Proablepharus reginae*  
*Tiliqua multifasciata*

Typhlopidae

*Ramphotyphlops ammodytes*†  
*Ramphotyphlops braminus*  
*Ramphotyphlops australis*†  
*Ramphotyphlops grypus*†  
*Ramphotyphlops hamatus*

Varanidae

*Varanus acanthurus*†  
*Varanus brevicauda*†  
*Varanus eremius*†  
*Varanus gouldii*  
*Varanus panoptes rubidus*†  
*Varanus pilbarensis*†  
*Varanus tristis tristis*†  
*Varanus sp. nov. (pilbara)*

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**Birds collected between**

**-21.2586, 116.1272 and -20.2747, 117.2344**  
**& -20.334, 116.673 and -20.699, 117.156**

Acanthizidae

*Gerygone tenebrosa*†  
*Pyrrholaemus brunneus*

Accipitridae

*Circus assimilis*  
*Haliaeetus leucogaster*  
*Haliastur indus girrenera*  
*Pandion haliaetus cristatus*†

Alaudidae

*Mirafrja javanica horsfieldii*†

Anatidae

*Anas gracilis*  
*Anas rhynchotis rhynchotis*  
*Chenonetta jubata*

Ardeidae

*Ardea sacra sacra*†

Artamidae

*Artamus cinereus*  
*Artamus leucorhynchus*  
*Artamus leucorhynchus leucopygialis*

Burhinidae

*Esacus neglectus*

Campephagidae

*Coracina novaehollandiae subpallida*†

Charadriidae

*Charadrius ruficapillus*

Columbidae

*Geopelia cuneata*  
*Geopelia humeralis*†  
*Geophaps plumifera*†

Cracticidae

*Cracticus nigrogularis*

Cuculidae

*Cuculus pallidus*†  
*Cuculus saturatus optatus*

Dicruridae

*Rhipidura fuliginosa preissi*†  
*Rhipidura leucophrys leucophrys*†  
*Rhipidura phasiana*

Falconidae

*Falco berigora berigora*

Haematopodidae

*Haematopus longirostris*

Halcyonidae

*Todiramphus chloris pilbara*  
*Todiramphus sanctus sanctus*†

Hydrobatidae

*Oceanites oceanicus*

Laridae

*Anous stolidus pileatus*†  
*Sterna albifrons*†

Maluridae

*Malurus leucopterus*

Meliphagidae

*Epthianura tricolor*†  
*Lichenostomus penicillatus*  
*Lichenostomus virescens*†  
*Lichmera indistincta indistincta*†  
*Melithreptus gularis laetior*

Meropidae

*Merops ornatus*

Motacillidae

*Anthus australis australis*†

Muscicapidae

*Ficedula cyanomelana cyanomelana*

Pachycephalidae

*Pachycephala lanioides*†  
*Pachycephala melanura melanura*†

Passeridae

*Emblema pictum*  
*Neochmia ruficauda*  
*Neochmia ruficauda clarescens*  
*Passer montanus*



Petroicidae

*Eopsaltria pulverulenta*†

Phasianidae

*Coturnix ypsilophora*

*Coturnix ypsilophora australis*

*Coturnix ypsilophora cervina*

Pittidae

*Pitta moluccensis*†

Podargidae

*Podargus strigoides*

*Podargus strigoides brachypterus*†

Pomatostomidae

*Pomatostomus superciliosus*

*Pomatostomus temporalis rubeculus*

Psittacidae

*Cacatua sanguinea westralensis*†

Rallidae

*Gallirallus philippensis mellori*†

Scolopacidae

*Arenaria interpres interpres*

*Gallinago stenura*

*Tringa brevipes*

*Tringa glareola*

*Tringa hypoleucos*

Sylviidae

*Acrocephalus australis*

*Acrocephalus australis gouldi*

Strigidae

*Ninox novaeseelandiae boobook*†

Zosteropidae

*Zosterops luteus*

*Zosterops luteus balstoni*†

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**Mammals collected between**

**-21.2586, 116.1272 and -20.2747, 117.2344**

**& -20.334, 116.673 and -20.699, 117.156**

Bovidae

*Ovis aries*

Canidae

*Vulpes vulpes*†

Dasyuridae

*Dasykaluta rosamondae*†

*Dasyurus hallucatus*†

*Ningai timealeyi*†

*Planigale sp*†

*Pseudantechinus roryi*†

*Pseudantechinus woolleyae*

*Sminthopsis macroura*

Delphinidae

*Lagenodelphis hosei*

*Stenella longirostris*

*Tursiops sp*

Dugongidae

*Dugong dugon*†

Hipposideridae

*Rhinonictes aurantius*

Macropodidae

*Macropus robustus erubescens*†

*Macropus rufus*

*Petrogale rothschildi*†

Megadermatidae

*Macroderma gigas*

Molossidae

*Chaerephon jobensis*

*Mormopterus beccarii*

*Mormopterus loriae*

Muridae

*Leggadina lakedownensis*

*Mus musculus*†

*Notomys alexis*

*Pseudomys chapmani*†

*Pseudomys delicatulus*†

*Pseudomys hermannsburgensis*†

*Pseudomys nanus*

*Pseudomys sp hamersley*

*Rattus rattus*†

*Rattus tunneyi*†

*Rattus sp.*

*Zyomys argurus*†

Pteropodidae

*Pteropus alecto*

*Pteropus scapulatus*

Tachyglossidae

*Tachyglossus aculeatus*†

Vespertilionidae

*Chalinolobus gouldii*

*Nyctophilus arnhemensis*

*Nyctophilus bifax daedalus*

*Scotorepens greyii*

*Vespadelus finlaysoni*

*Vespadelus regulus*

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**EPBC Protected Matters Search for the Dampier and Cape Lambert locality combined**

<b>Matters of National Environmental Significance</b>		
<b>Threatened Species</b>	<b>Status</b>	<b>Type of Presence</b>
<b>Birds</b>		
<i>Macronectes giganteus</i> Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
<i>Dasyercus cristicauda</i> Mulgara	Vulnerable	Species or species habitat likely to occur within area
<i>Dasyurus hallucatus</i> Northern Quoll	Endangered	Species or species habitat may occur within area
<i>Rhinonictis aurantius</i> (Pilbara form) Pilbara Leaf-nosed Bat	Vulnerable	Community likely to occur within area
<b>Reptiles</b>		
<i>Caretta caretta</i> Loggerhead Turtle	Endangered	Species or species habitat may occur within area
<i>Chelonia mydas</i> Green Turtle	Vulnerable	Breeding likely to occur within area
<i>Dermochelys coriacea</i> Leatherback Turtle	Vulnerable	Species or species habitat may occur within area
<i>Eretmochelys imbricata</i> Hawksbill Turtle	Vulnerable	Breeding likely to occur within area
<i>Liasis olivaceus barroni</i> Olive Python (Pilbara subspecies)	Vulnerable	Species or species habitat may occur within area
<i>Natator depressus</i> Flatback Turtle	Vulnerable	Breeding known to occur within area

<b>Migratory Species</b>	<b>Status</b>	<b>Type of Presence</b>
<b>Migratory Terrestrial Species</b>		
<b>Birds</b>		
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	Migratory	Breeding known to occur within area
<i>Hirundo rustica</i> Barn Swallow	Migratory	Species or species habitat may occur within area
<i>Merops ornatus</i> Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
<b>Migratory Wetland Species</b>		
<b>Birds</b>		
<i>Ardea alba</i> Great Egret, White Egret	Migratory	Species or species habitat may occur within area
<i>Ardea ibis</i> Cattle Egret	Migratory	Species or species habitat may occur within area
<i>Arenaria interpres</i> Ruddy Turnstone	Migratory	Species or species habitat likely to occur within area
<i>Charadrius veredus</i> Oriental Plover, Oriental Dotterel	Migratory	Species or species habitat may occur within area
<i>Glareola maldivarum</i> Oriental Pratincole	Migratory	Species or species habitat may occur within area
<i>Numenius minutus</i> Little Curlew, Little Whimbrel	Migratory	Species or species habitat may occur within area
<i>Numenius phaeopus</i> Whimbrel	Migratory	Species or species habitat likely to occur within area
<i>Tringa nebularia</i> Common Greenshank, Greenshank	Migratory	Species or species habitat likely to occur within area
<b>Migratory Marine Birds</b>		
<i>Apus pacificus</i> Fork-tailed Swift	Migratory	Species or species habitat may occur within area
<i>Ardea alba</i> Great Egret, White Egret	Migratory	Species or species habitat may occur within area
<i>Ardea ibis</i> Cattle Egret	Migratory	Species or species habitat may occur within area
<i>Macronectes giganteus</i>	Migratory	Species or species habitat may occur

Southern Giant-Petrel		within area
<i>Puffinus pacificus</i> Wedge-tailed Shearwater	Migratory	Breeding known to occur within area
<i>Sterna caspia</i> Caspian Tern	Migratory	Breeding known to occur within area
<b>Reptiles</b>		
<i>Caretta caretta</i> Loggerhead Turtle	Migratory	Species or species habitat may occur within area
<i>Chelonia mydas</i> Green Turtle	Migratory	Breeding likely to occur within area
<i>Demochelys coriacea</i> Leatherback Turtle	Migratory	Species or species habitat may occur within area
<i>Eretmochelys imbricata</i> Hawksbill Turtle	Migratory	Breeding likely to occur within area
<i>Nator depressus</i> Flatback Turtle	Migratory	Breeding known to occur within area

<b>Other Matters Protected by the EPBC Act</b>		
<b>Listed Marine Species</b>		
<b>Birds</b>		
<i>Apus pacificus</i> Fork-tailed Swift	Listed – overfly marine area	Species or species habitat may occur within area
<i>Ardea alba</i> Great Egret, White Egret	Listed – overfly marine area	Species or species habitat may occur within area
<i>Ardea ibis</i> Cattle Egret	Listed – overfly marine area	Species or species habitat may occur within area
<i>Arenaria interpres</i> Ruddy Turnstone	Listed	Species or species habitat likely to occur within area
<i>Charadrius veredus</i> Oriental Plover, Oriental Dotterel	Listed – overfly marine area	Species or species habitat may occur within area
<i>Glaucous alaudina</i> Oriental Pratincole	Listed – overfly marine area	Species or species habitat may occur within area
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	Listed	Breeding known to occur within area
<i>Hirundo rustica</i> Barn Swallow	Listed – overfly marine area	Species or species habitat may occur within area
<i>Larus novaehollandiae</i> Silver Gull	Listed	Breeding known to occur within area
<i>Macronektes giganteus</i> Southern giant-Petrel	Listed	Species or species habitat may occur within area
<i>Merops ornatus</i> Rainbow Bee-eater	Listed – overfly marine area	Species or species habitat may occur within area
<i>Numenius minutus</i> Little Curlew, Little Whimbrel	Listed – overfly marine area	Species or species habitat may occur within area
<i>Numenius phaeopus</i> Whimbrel	Listed	Species or species habitat likely to occur within area
<i>Pandion haliaetus</i> Osprey	Listed	Breeding known to occur within area
<i>Puffinus pacificus</i> Wedge-tailed Shearwater	Listed	Breeding known to occur within area
<i>Sterna bergii</i> Crested Tern	Listed	Breeding known to occur within area
<i>Sterna caspia</i> Caspian Tern	Listed	Breeding known to occur within area
<i>Sterna fuscata</i> Sooty Tern	Listed	Breeding known to occur within area
<i>Sterna nereis</i> Fairy Tern	Listed	Breeding known to occur within area
<i>Tringa nebularia</i> Common Greenshank, Greenshank	Listed – overfly marine area	Species or species habitat likely to occur within area



**Threatened and Priority Fauna Database**

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21.2586 °S 116.1272 °E / 20.2747 °S 117.2344 °E

Dampier Salt Works, near Dampier

<i>Date</i>	<i>Certainty</i>	<i>Seen</i>	<i>Location Name</i>	<i>Method</i>
<b>Schedule 1 - Fauna that is rare or is likely to become extinct</b>				
<i>agostrophus fasciatus fasciatus</i>		<b>Banded Hare-wallaby</b>		<i>1 records</i>
This small macropod occurs in low shrubland and extant populations occur on Bernier and Dorre islands in Shark Bay. An attempted introduction to Peron Peninsula showed that the species is highly vulnerable to predation from cats as well as foxes. This species is thought to be extinct on the mainland				
2			Cossack	Day sighting
<i>Megaptera novaeangliae</i>		<b>Humpback Whale</b>		<i>2 records</i>
1996	1	1	Point Samson	Dead
1999	1	1	Burrup Peninsula	
<i>Liasis olivaceus barroni</i>		<b>Pilbara Olive Python</b>		<i>1 records</i>
2001	1	9	Burrup	
<b>Schedule 4 - Other specially protected fauna</b>				
<i>Dugong dugon</i>		<b>Dugong</b>		<i>2 records</i>
2000	1	1	Point Samson	Dead
2004	1	4	Antonymyre	Day sighting
<b>Priority One: Taxa with few, poorly known populations on threatened lands</b>				
<i>Formopterus loriae cobourgiana</i>		<b>Little North-western Mastiff Bat</b>		<i>2 records</i>
This species occurs along the northwest coast and is known to roost in mangroves.				
2000	1	20	Cape Preston	Caught or trapped
2001	2		Cowrie Cove	Heard
<i>Lerista quadrivincula</i>		<b>Lerista quadrivincula</b>		<i>1 records</i>
This skink is known from only one locality on the Maitland River south east of Karratha Homestead.				
1990	1	1	Mt Welcome	Caught or trapped
<b>Priority Three: Taxa with several, poorly known populations, some on conservation lands</b>				
<i>Agorchestes conspicillatus leichardti</i>		<b>Spectacled Hare-wallaby (mainland)</b>		<i>1 records</i>
This species has declined in many parts of its range and is vulnerable to cat and fox predation. It inhabits tropical grasslands and also suffers from the impacts of frequent fires.				
1979	1	1	Mardie	Day sighting
<b>Priority Four: Taxa in need of monitoring</b>				
<i>Lagadina lakedownensis</i>		<b>Lakeland Downs Mouse (Kerakenga)</b>		<i>3 records</i>
This secretive species is known to occur in the Pilbara and the Kimberley. Its populations rise and fall dramatically, probably in response to climatic fluctuations and availability of seeds.				
2000	1	1	Mardie	Caught or trapped
2000	1	1	Mardie	Caught or trapped
2000	1	1	Mardie	Caught or trapped

Thursday, 17 November 2005

Department of Conservation and Land Management



## Threatened and Priority Fauna Database

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20.333 °S 116.672 °E / 21.065 °S 117.642 °E Cape Lambert Port expansion study area

\* Date Certainty Seen Location Name Method

## Schedule 1 - Fauna that is rare or is likely to become extinct

***Dasyurus hallucatus*** Northern Quoll 19 records

This carnivorous marsupial occurs across much of northern Australia with a disjunct population in the Pilbara. Occurs in a wide range of habitats but most suitable habitat appear to be rocky areas.

Date	Certainty	Seen	Location Name	Method
	1		BULGARRA	
	1		DAMPIER ARCHIPELAGO	
	1		DAMPIER ARCHIPELAGO	
	1		ROEBOURNE	
1900	1		DAMPIER ARCHIPELAGO	
1900	1		ROEBOURNE	
1967	1		POINT SAMSON	
1970	1		DAMPIER ARCHIPELAGO	
1975	1		WICKHAM	
1980	1		DAMPIER ARCHIPELAGO	
1980	1		DAMPIER ARCHIPELAGO	
1980	1		DAMPIER ARCHIPELAGO	
1980	1		DAMPIER ARCHIPELAGO	
1980	1		DAMPIER ARCHIPELAGO	
1980	1		DAMPIER ARCHIPELAGO	
1980	1		DAMPIER ARCHIPELAGO	
1986	1		DAMPIER ARCHIPELAGO	
1986	1		DAMPIER ARCHIPELAGO	
1986	1		DAMPIER ARCHIPELAGO	

***Lagostrophus fasciatus fasciatus*** Banded Hare-wallaby, Mernine 1 records

This small macropod occurs in low shrubland and extant populations occur on Bernier and Dorre islands in Shark Bay. An attempted reintroduction to Peron Peninsula showed that the species is highly vulnerable to predation from cats as well as foxes.

Date	Certainty	Seen	Location Name	Method
	2		Cossack	Day sighting

***Megaptera novaeangliae*** Humpback Whale 2 records

Date	Certainty	Seen	Location Name	Method
1996	1	1	Point Samson	Dead
1999	1	1	Burru Peninsula	

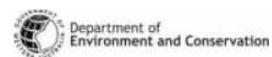
***Liasis olivaceus barroni*** Pilbara Olive Python 4 records

Date	Certainty	Seen	Location Name	Method
1993	3	1	Dolphin Island Nature Reserve	Day sighting
2001	1	9	Burru Rifle Range	
2004	1	1	Burru	Hair/skin
2005	1	1	Dampier	Day sighting

## Schedule 4 - Other specially protected fauna

***Dugong dugon*** Dugong 3 records

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**Threatened and Priority Fauna Database**

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20.333°S 116.672°E / 21.065°S 117.642°E Cape Lambert Port expansion study area

* Date	Certainty	Seen	Location Name	Method
2000	1	1	Point Samson	Dead
2004	1	4	Antonymyre	Day sighting
2006	1	2	Dampier	Day sighting

***Falco peregrinus* Peregrine Falcon 1 records**

This species is uncommon and prefers areas with rocky ledges, cliffs, watercourses, open woodland or margins with cleared land.

2006	1	1	Burrup	Day sighting
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**Priority One: Taxa with few, poorly known populations on threatened lands*****Mormopterus loriae cobourgiana* Little North-western Mastiff Bat 2 records**

This species occurs along the northwest coast and is known to roost in mangroves.

2001	2		Cowie Cove	Heard
2006	1	1	Burrup	Caught or trapped

***Lerista quadrivincula* 1 records**

This skink known from only one locality on the Maitland River south east of Karratha Homestead.

1990	1	1	Mt Welcome	Caught or trapped
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**Priority Four: Taxa in need of monitoring*****Macroderma gigas* Ghost Bat 1 records**

This species is Australia's only carnivorous bat and has a patchy distribution across northern Australia. It shelters in caves, mine shafts and deep rock fissures and is sensitive to disturbance.

2006	1	1	Burrup	Caught or trapped
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***Pseudomys chapmani* Western Pebble-mound Mouse, Ngadji 3 records**

This species is well-known for the characteristic pebble-mounds which it constructs over underground burrow systems. These mounds are most common on spurs and lower slopes of rocky hills.

1979	2	0	Karratha	Definite signs
1983	2	0	Burrup Peninsula	Definite signs
1994	2	0	Mt Anketel	

***Sousa chinensis* Indo-Pacific Humpback Dolphin 1 records**

2000	1	1	Dampier	Dead
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***Ardeotis australis* Australian Bustard 1 records**

This species is uncommon and may occur in open or lightly wooded grasslands.

2007	1	2	Mount Anketell	Day sighting
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***Burhinus grallarius* Bush Stonecurlew 1 records**

A well camouflaged, ground nesting bird which prefers to 'freeze' rather than fly when disturbed. It inhabits lightly timbered open woodlands.

2006	1	1	Burrup	Day sighting
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***Numenius madagascariensis* Eastern Curlew 2 records**

This species is a migratory visitor and has been observed on reef flats and sandy beaches along the West Australian coast and in coastal estuaries.

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**Threatened and Priority Fauna Database**

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 20.333 °S 116.672 °E / 21.065 °S 117.642 °E Cape Lambert Port expansion study area
 

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* Date	Certainty	Seen	Location Name	Method
1966	1		Nichol Bay	Day sighting
2002	1	2	Nichol Bay	

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***Phaps histrionica*** **Flock Bronzewing** 2 records

This species is gregarious and occurs in treeless or sparsely wooded grassy plains within reach of open water.

1968	1	300	Nickol River	Day sighting
1985	1	50	Warambic	Day sighting

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\* Information relating to any records provided for listed species:-

Date: date of recorded observation

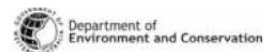
Certainty (of correct species identification): 1=Very certain; 2=Moderately certain; and 3=Not sure.

Seen: Number of individuals observed.

Location Name: Name of reserve or nearest locality where observation was made

Method: Method or type of observation

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## Appendix 7

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Location Details for Introduced Flora  
(Weed) Species in the Karratha to Cape  
Lambert Transmission Line Corridor and  
Mount Welcome Station Transmission  
Line Corridor Study Areas





<b>Species</b>	<b>Location</b>	<b>Number of Individuals Recorded</b>
* <i>Aerva javanica</i>	At sites DPS-02, DPS-04, MWS-03 and MWS-07 Opportunistic record at 473145E and 7703620N (Transmission Line Corridor) Opportunistic record at 509724E and 7713177N (Mt. Welcome area)	Between 40 to 50 individuals in total
* <i>Bidens bipinnata</i>	At site DPS-15	2 to 4 individuals
* <i>Cenchrus ciliaris</i>	Widespread throughout both the Transmission Line Corridor and the Mt. Welcome study areas. Recorded at sites DPS-02, DPS-04, DPS-07, DPS-08, DPS-13, DPS-15, DPS-16, DPS-17, DPS-18, MWS-03, MWS-04, MWS-05, MWS-06, MWS-07 and various opportunistic areas outside of quadrat sites	Not counted, as there are numerous individuals throughout the entire study areas.
* <i>Cenchrus setiger</i>	At sites DPS-02, DPS-04 and DPS-13	Between 50 to 100 individuals in total
* <i>Clitoria ternatea</i>	Opportunistic record in a major drainage line at 494536E and 7703468N	Approximately 4 to 5 individuals
* <i>Cucumis melo</i> subsp. <i>agrestis</i>	At sites DPS-15, DPS-16 and DPS-18	Up to 10 individuals in total
* <i>Cynodon dactylon</i>	At site DPS-02	2 to 4 individuals
* <i>Echinochloa colona</i>	Opportunistic record in a drainage area at 491137E and 7702279N	2 to 4 individuals
* <i>Indigofera oblongifolia</i>	At site DPS-02	2 to 4 individuals
* <i>Malvastrum americanum</i>	At sites DPS-15 and DPS-18, in drainage areas	Up to 10 to 15 individuals in total
* <i>Melochia pyramidata</i>	Opportunistic record beside a drainage area at 491123E and 7702510N	Up to 5 individuals
* <i>Passiflora foetida</i>	Opportunistic record in a drainage area at 476629E and 7702128N	1 to 3 individuals
* <i>Portulaca oleracea</i>	At sites DPS-02, DPS-18, MWS-02 and MWS-05	Up to 10 individuals in total
* <i>Stylosanthes hamata</i>	Opportunistic record in a drainage area at 476627E and 7702117N	2 to 4 individuals
* <i>Trianthema portulacastrum</i>	At site DPS-02	2 to 4 individuals
* <i>Vachellia farnesiana</i>	At site DPS-18. Opportunistic record at 491137E and 7702279N.	15 to 20 individuals in total