Biota Environmental Sciences

# A Vegetation and Flora Survey of the Rio Tinto Rail Duplication Project – Cape Lambert to Emu Siding

**Prepared for Rio Tinto Iron Ore**

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# 1.0 Summary

## 1.1 Background

Rio Tinto Iron Ore seeks to duplicate or modify parts of its existing rail network from Cape Lambert Port to Juna Downs to accommodate the additional iron ore output from the expansion of existing mines and the development of new operations.

This report details botanical studies used to assess the portion of the rail duplication project lying between Cape Lambert and Emu Siding on the existing Pilbara Iron Railway.

## 1.2 Methodology

The study comprised:

- review of existing information relevant to the study area, including searches of the Department of Environment and Conservation and WA Herbarium databases of rare flora records;
- description and mapping of vegetation types within the rail corridor;
- assessment of 44 standard (50x50m) flora recording quadrats and 12 relevés (unbounded flora survey sites comprising a similar area to a standard quadrat);
- opportunistic foot traverses through representative areas to search for flora of conservation significance and weed species, including targeted searches of particular habitats (eg. rockpiles, creeklines and cracking clays); note that the entire study area was not systematically searched for rare flora;
- collation of an overall list of flora species for the study area; and
- discussion of vegetation types and flora species of conservation significance, including broad management recommendations to minimise impacts.

The rail corridor was assessed between the 1st and 11th of April by five botanists from Biota (Jeni Alford, Justin Fairhead, Paul Hoffman, Rachel Warner and Michi Maier). Conditions at the time of survey were favourable for the collection of annual and cryptic perennial species, with numerous ephemeral species recorded.

## 1.3 Vegetation

### 1.3.1 Overall Vegetation Types

Forty-seven (47) vegetation types were identified within the Cape Lambert to Emu Siding Rail Duplication Corridor. Broadly these comprised;

- Small stands of mangal dominated by White Mangrove (*Avicennia marina*) interspersed with low open heaths dominated by Samphires and *Frankenia* on mudflats along the north-western edge of the corridor;
- Tussock grasslands of Marine Couch (*Sporobolus virginicus*) on sluggishly drained coastal plains;
- Open shrublands of *Acacia ampliceps, A. bivenosa* and/or *A. coriacea* subsp. *coriacea* over hummock grasslands of *Triodia epactia* and tussock grasslands of **Cenchrus* species on coastal dune habitats;
- *Acacia colei* var. *colei, Grevillea pyramidalis* tall open shrubland over *Triodia epactia, T. schinzii* hummock grassland on sandplain at the northern end of the corridor;

- Open shrublands of various combinations of *Acacia arida, A. bivenosa, A. inaequilatera, A. pyrifolia* over hummock grasslands of *Triodia wiseana* and/or *T. epactia* on stony hills and plains throughout the corridor;
- *Triodia angusta* hummock grasslands on plains with a calcareous clay-loam substrate;
- Woodlands to tall shrublands dominated by *Terminalia canescens* or *Acacia coriacea* subsp. *coriacea, Dichrostachys spicata* and *Ehretia saligna* over open hummock grasslands of *Triodia wiseana* on rockpiles;
- *Eragrostis xerophila* tussock grasslands, annual grasslands and/or *Triodia wiseana* hummock grasslands interspersed with herblands, sometimes with an overstorey of Snakewood (*Acacia xiphophylla*), on heavy clay soils;
- Various vegetation types including low shrublands dominated by samphires or *Stemodia grossa* and grasslands dominated by *Eragrostis falcata*, often with scattered trees of River Red Gum (*Eucalyptus camaldulensis*) and Coolibahs (*E. victrix*), on the floodout areas from the Harding Dam;
- Riverine woodlands dominated by *Eucalyptus camaldulensis, E. victrix* and/or *Terminalia canescens* over various shrubs including *Acacia ampliceps, A. pyrifolia, A. trachycarpa* and *Melaleuca glomerata* over sedgelands, *Triodia* hummock grasslands and/or **Cenchrus* tussock grasslands in major drainage features; and
- Low open woodlands of Hamersley Bloodwood (*Corymbia hamersleyana*) over dense tall shrublands of various species such as *Acacia ancistrocarpa, A. bivenosa, A. coriacea* subsp. *pendens, A. pyrifolia* and *A. trachycarpa* over *Triodia* hummock grasslands and/or tussock grasslands of **Cenchrus* or native species in minor flowlines.

### 1.3.2 Conservation Significance of the Vegetation Types

While none of the vegetation types identified within the rail corridor are listed under the *EPBC Act 1999*, nor are any defined as Threatened Ecological Communities by the Department of Environment and Conservation, a number were identified as having particular conservation significance (Table 1.1). Two of the vegetation units (H/G and Tw/H) would comprise the "cracking clay communities of the Chichester Range" Priority Ecological Community (PEC), while riparian vegetation of the Harding River and other major drainages was also considered to be of High significance. Vegetation of Moderate significance was considered to include mangal (unit AVm), vegetation of cracking clays (principally unit ERAx) and rockpile vegetation (unit TERcTw and AcDIsEHsTwCEc). Disturbance to the vegetation types of High significance should be avoided, and strictly minimised if this is not possible. No non-essential infrastructure should be located in these habitats. Appropriate culverting will also be required where drainage systems are intersected. Disturbance to the vegetation types of Moderate significance should be strictly minimised.

**Table 1.1: Summary of vegetation units of particular conservation significance identified during this study.**

| Vegetation Code | Description | Conservation Significance |
|---|---|---|
| H/G, Tw/H | Annual herblands / grasslands and hummock grasslands on cracking clays of the Pyramid Land System | High (PEC) |
| EcAamCv, EvMg, EvAtrTeCEc, EvTERcApyTwTeCE, EvApyTwTeCE | Riparian vegetation of the Harding River system and other major drainages | High |
| AVm | Mangrove vegetation dominated by *Avicennia marina* | Moderate |
| ERAx | *Eragrostis xerophila* tussock grasslands on clay | Moderate |
| TERcTw, AcDIsEHsTwCEc | Rockpile vegetation | Moderate |

# 1.4 Flora

## 1.4.1 Overview of Flora

A total of 369 taxa of native vascular flora from 145 genera belonging to 57 families has been recorded from the Cape Lambert to Emu Siding project area (including the results from the 2008 survey work, together with the quadrats previously sampled in the area during the Cape Lambert Port B Expansion survey (Biota 2008a) and the Dampier Power Station Transmission Line study (Biota 2008c)). These numbers are within the expected range for a study area of this size in this locality.

## 1.4.2 Flora of Conservation Significance

No Declared Rare Flora species or flora species listed under the *EPBC Act 1999* were recorded from the Cape Lambert to Emu Siding rail corridor, and none would be expected to occur.

Two Priority flora species were recorded from the rail corridor as summarised in Table 1.2. Disturbance to these Priority flora populations should be avoided in the design and construction of the rail duplication, and clearing of the vegetation type/s supporting them should be minimised.

**Table 1.2: Summary of Priority flora species recorded during this study.**

| Species | Ranking | Locations in Easting and Northing (WGS84) | Vegetation Type |
|---|---|---|---|
| *Nicotiana heterantha* | Priority 1 | 509527 mE, 7675320 mN | EcEvHAi (also potentially EcEvERAf and floodout mosaic) |
| *Hibiscus brachysiphonius* | Priority 3 | 509938 mE, 7698715 mN | ERAx, AxTwERAxCEc, floodout mosaic |
| | | 510844 mE, 7691154 mN | |
| | | 509536 mE, 7676500 mN | |

## 1.4.3 Introduced Flora (Weeds)

Seventeen weed species were recorded from the Cape Lambert to Emu Siding rail duplication corridor (Table 1.3). Most of these species are common and widespread weeds of the Pilbara, however some are only infrequently recorded in the region (eg. **Opuntia stricta, *Vitex trifolia* var. *subtrisecta* and **Phyla nodiflora*).

One of the species is listed as a Declared Plant under the *Agriculture and Related Resources Protection Act 1976:* all Prickly Pears (**Opuntia* species) are listed as P1 (movement is prohibited) and P2 (aim is to eradicate infestation) for the Pilbara. While not listed as Declared Plants, Kapok Bush (**Aerva javanica*) and the two **Cenchrus* species are considered to be serious environmental weeds.

**Table 1.3: Weed species recorded from the Cape Lambert to Emu Siding rail corridor.**

| Species (Common Name) | Distribution through the Study Area |
|---|---|
| **Aerva javanica* (Kapok Bush) | widespread, mainly close to existing disturbance areas |
| **Cenchrus ciliaris* (Buffel Grass) | widespread; particularly abundant near existing disturbance areas, on coastal dunes and along creeklines |
| **Cenchrus setiger* (Birdwood Grass) | widespread; particularly abundant near existing disturbance areas, on coastal dunes and along creeklines |
| **Citrullus colocynthis* (Colocynth) | central section of the corridor in the Harding Dam floodout area |
| **Cucumis melo* subsp. *agrestis* (Ulcardo Melon) | central section of the corridor in the Harding Dam floodout area, Harding River itself and a tributary |
| **Cucumis* sp. | numerous records between the 16 km and 64 km chainages, mainly on clay or in creeklines |
| **Cynodon dactylon* (Couch Grass) | along creeklines and floodplains in the southern half of the corridor |
| **Echinochloa colona* (Awnless Barnyard Grass) | in the central section of the corridor associated with the Harding River system |
| **Malvastrum americanum* (Spiked Malvastrum) | scattered in creeklines between the 25 and 51 km chainages |
| **Opuntia stricta* (Common Prickly Pear) | a single record of 2 plants at the northern end of the corridor |
| **Passiflora foetida* var. *hispida* (Stinking Passion Flower) | two records in the northern third of the corridor |
| **Phyla nodiflora* (Lippia) | one record in the central section of the corridor, in the Harding River |
| **Portulaca oleracea* (Purslane) | widespread throughout the corridor, including in apparently undisturbed areas |
| **Setaria verticillata* (Whorled Pigeon Grass) | in the central section of the corridor, in the Harding River |
| **Sigesbeckia orientalis* (Indian Weed) | one record at the southern end of the corridor, in Western Creek |
| **Vachellia farnesiana* (Mimosa Bush) | 13 records between the 18 km and 40 km chainages, mainly on clayey plains |
| **Vitex trifolia* var. *subtrisecta* (Three Leaved Chaste Tree) | 1 plant at the northern end of the corridor |

# 2.0 Background

## 2.1 Background to the Project

Rio Tinto Iron Ore seeks to duplicate or modify parts of its existing rail network from Cape Lambert Port to Juna Downs to accommodate the additional iron ore output from the expansion of existing mines and the development of new operations. The planned rail duplication complements Rio Tinto's proposal to expand port facilities as part of its Cape Lambert Port B Development (Biota 2008a).

A proposed provisional layout of the rail section from Cape Lambert to Emu Siding is shown in Figure 2.1.

## 2.2 Scope and Objectives of this Study

Biota Environmental Sciences (Biota) was commissioned to carry out a vegetation and flora survey of the Cape Lambert to Emu Siding rail corridor in April 2008. The survey was planned and implemented as far as practicable (no seasonal sampling component was possible in the timeframe) according to the Environmental Protection Authority (EPA) Position Statement No. 3 "Terrestrial Biological Surveys as an Element of Biodiversity Protection" (EPA 2002) and Guidance Statement No. 51 "Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia" (EPA 2004).

The scope of the botanical survey was:

- to describe and map the vegetation types occurring within the study area;
- to identify any vegetation types of particular conservation significance;
- to document the suite of flora species occurring within the study area;
- to identify species of particular conservation significance, including Declared Rare Flora (DRF), Priority flora and other flora of interest; and
- to make recommendations for management of significant vegetation types and flora within the study area.

This report describes the methodology employed for this study, documents the findings of the field survey, and presents management recommendations for significant vegetation types and flora species. It is intended for use as a supporting document to the Environmental Impact Assessment process for the proposed project. The survey itself and this document are subject to certain limitations, outlined in Section 3.7.

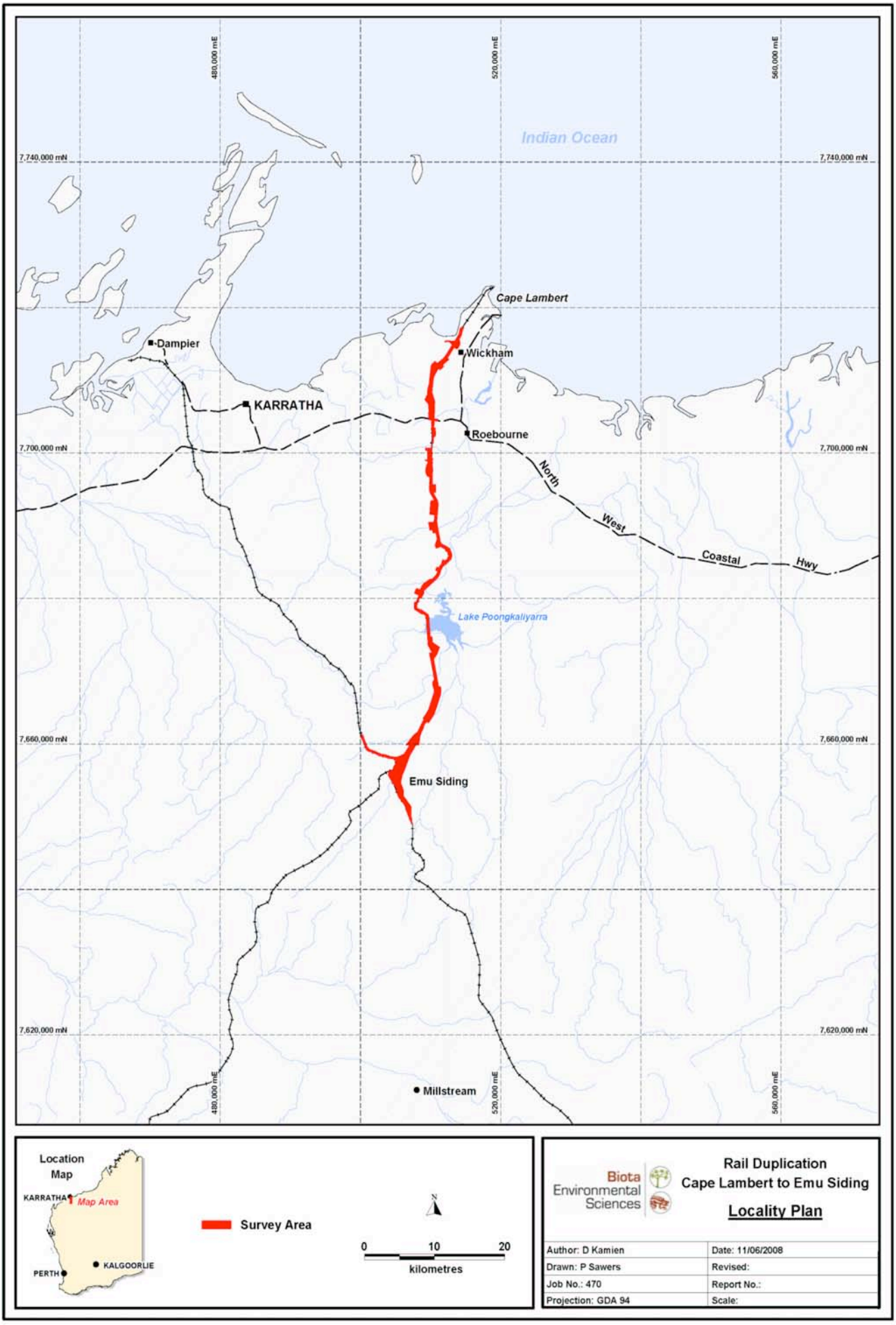


**Figure 2.1: Locality plan of the PI 320 Rail Duplication Corridor between Cape Lambert and Emu Siding.**

# 3.0 Study Methodology

## 3.1 Desktop Review

### 3.1.1 Rare Flora Database Searches

A search of the DEC and WA Herbarium databases was commissioned in May 2008 for DRF and Priority flora recorded within an approximately 25 km buffer of the study area. The locations of the resulting records were investigated in ArcView to indicate populations within or in the vicinity of the study area (see Section 4.6).

### 3.1.2 Review of Published and Unpublished Reports

Various reports were reviewed to indicate botanical features of relevance to the current study area, including features of the IBRA subregions (May and McKenzie 2003; Section 4.1), Land Systems (van Vreeswyk et al. 2004; Section 4.3), and Threatened and Priority Ecological Communities (Section 4.5). Three reports from botanical surveys intersecting sections of the rail corridor were used to provide site-specific data:

- a survey of the Cape Lambert Port B Expansion area, which includes the northernmost 2 km section of the rail corridor (Biota 2008a);
- a survey of the Cape Lambert Substation, to the east of the 6 km chainage on the Cape Lambert to Mesa J rail line (Biota 2008b); and
- a survey of the Dampier Power Station Transmission Line Corridor, which extends from Dampier east to the Cape Lambert Substation, crossing the current rail corridor between the 6 km and 9 km chainages on the Cape Lambert to Mesa J rail line (Biota 2008c).

Some previous vegetation mapping has also been conducted over the southern section of the rail corridor which lies within the Millstream-Chichester National Park (Trudgen undated). Unfortunately the digital mapping supplied for this area was not attributed, however hard copy plans were available.

The broad regional Pilbara Biological Survey being undertaken by the DEC includes floristic survey quadrats within the current study area, however the data from these are not yet available.

## 3.2 Botanical Survey Team and Field Survey Timing

The Cape Lambert to Emu Siding rail corridor was assessed between the 1st and 11th of April by five botanists from Biota (Jeni Alford, Justin Fairhead, Paul Hoffman, Rachel Warner and Michi Maier).

The closest official meteorological recording station to the study area is at Roebourne (on the North West Coastal Highway, approximately 4.5 km east of the existing Cape Lambert to Mesa J rail line). Data from this station indicate that considerable rain (well above average) fell in the two months prior to the current field survey, and that this followed an extended period of negligible rainfall (Figure 3.1). Conditions at the time of survey were favourable for the collection of annual and cryptic perennial species, with numerous ephemeral species recorded.

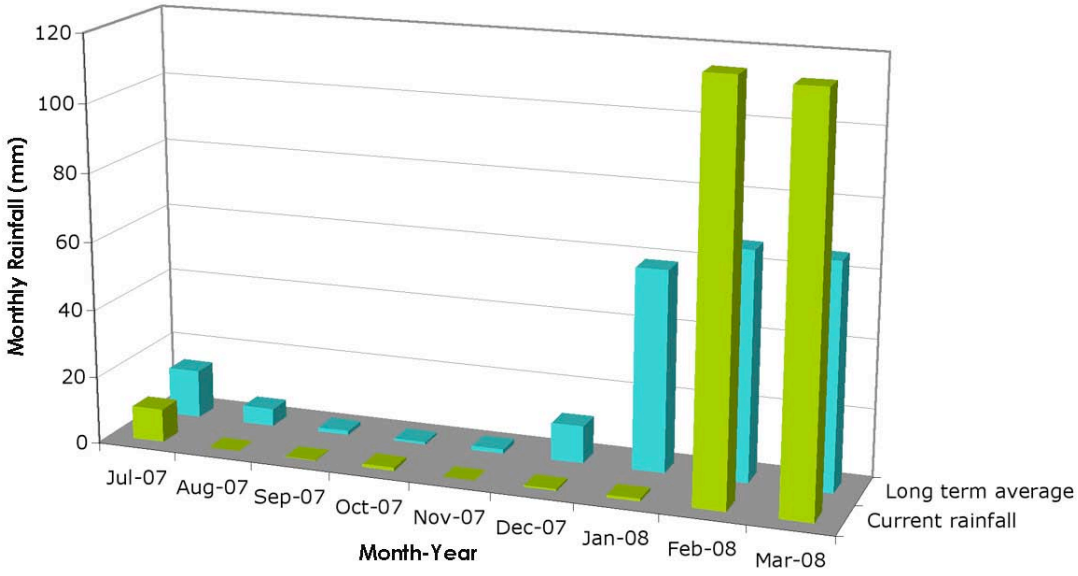


**Figure 3.1:** **Monthly rainfall for the Roebourne recording station for the nine months preceding the current survey** (data supplied by the WA Bureau of Meteorology).

## 3.3 Vegetation Description and Mapping

Vegetation descriptions were based on the height and estimated cover of dominant species using Aplin's (1979) modification of the vegetation classification of Specht (1970) to include a hummock grassland category (see Appendix 2). Descriptions were made at each of the floristic survey quadrats (see Section 3.4), and at 12 relevés (unbounded flora survey sites). Additional brief vegetation descriptions were made and vegetation boundaries were ground-truthed during foot traverses through representative areas.

The vegetation descriptions were then grouped to arrive at vegetation units that were defined on the basis of a shared suite of perennial species with a similar range of cover values. These have been listed under the main landform/habitat types in which they were found to occur. Alternative approaches could utilise another framework, such as Land System (Rangelands) mapping or geology.

The coding system for the vegetation types incorporated the dominant flora species for the type, organised from tallest strata to lowest strata. Species names were abbreviated to capital letter/s for genus, followed by lower case letter/s for species, with multiple letters used where necessary to avoid confusion (eg. AamAbTeCE = dominant species *Acacia ampliceps, A. bivenosa, Triodia epactia* and **Cenchrus* species).

The vegetation boundaries were subsequently digitised on-screen using the ArcView 3.2 package. The resulting shapefiles were "tagged" to provide each polygon with the vegetation unit code. Other point source datasets, such as locations of quadrats, weeds and priority flora, were generated into spatial data using MapInfo. These datasets were subsequently saved as separate MapInfo shapefiles.

These datasets, in conjunction with other data supplied from other organisations, were used in the production of the vegetation maps contained in this report (Appendix 3). All maps were produced using the MapInfo package.

## 3.4 Assessment of Floristic Quadrats

The locations of the 44 detailed flora recording quadrats established in 2008 were chosen to represent the main vegetation types occurring within the rail corridor. The quadrats were uniquely numbered, from EMU01 to EMU47 (EMU45 and EMU46 were not used). Twelve relevés (unbounded flora survey sites comprising a similar area to a standard quadrat) were also sampled; these were labelled EMU-MA to EMU-MK, and EMU-JAA.

In addition to these sampling sites, data were extracted from five quadrats established within the rail corridor during the Cape Lambert Port B Expansion study (CLE09, CLE10, CLE11, CLE15 and CLE16; Biota 2008a) and two quadrats (MWS02 and DPS05) assessed in the area during the Dampier Power Station Transmission Line study (Biota 2008c).

All sites were established and assessed using the following methodology.

Quadrats were typically 50 m x 50 m, as this size gives a good sample of flora presence in the Pilbara. It also gives a good indication of the shrub and grass layer vegetation structure for most vegetation types in the Pilbara that occur in 'uniform' habitats (eg. plains and hillslopes, where vegetation stands are typically greater than this quadrat size). Quadrat shape and/or size were adjusted as necessary to fit smaller or oddly shaped habitats (eg. flowlines).

Most quadrats were permanently marked using steel fence droppers at three to four corners of the quadrat. An optical square and measuring tapes were used to ensure that the quadrat sides were correctly positioned.

The following parameters were recorded for each quadrat (see Appendix 4):

1. **Location**: AMG coordinates recorded in WGS84 datum (within 1-2 m of GDA94) using a hand-held Global Positioning System (GPS), to an accuracy usually within 5 m; readings taken for all four corners of the quadrat;
2. **Vegetation Description**: Broad description based on the height and estimated cover of dominant species after Aplin's (1979) modification of the vegetation classification system of Specht (1970) (see Appendix 2);
3. **Habitat**: Description of landform and habitat;
4. **Soil**: Broad description of soil type and stony surface mantle;
5. **Disturbance Details**: Condition ranked according to the scale developed by Trudgen (1988) as shown in Appendix 2, considering evidence of grazing, physical disturbance, weed invasion, frequent fires etc. Note that fire effects are only considered as a negative impact if they are caused by repeated burning (such as that done for pastoral purposes). Fire is a natural and frequent process in the Pilbara to which the vegetation has adapted, and to class areas as being in poor condition simply because they have been recently burnt is misleading; and
6. **Percentage Foliar Cover**: Cover was estimated visually for each species. Estimates were made to the nearest percent where possible, or a range (eg. 5-10%) was used. '+' was used where only occasional individuals were present, with a cover of less than 1%.

Colour photographs of the vegetation at each site were taken using a digital camera.

## 3.5 Searches for Rare Flora and Weeds

Given the extent of the study area, the entire area could not be systematically searched for rare flora over the period of the field survey. Instead, representative foot traverses were walked through the main habitats to search for rare species and to indicate the level of weed presence. Particular habitats which are known to frequently support rare or habitat-restricted flora (eg. cracking clays, rockpiles, creeklines) were specifically targeted.

Any locations of rare flora were recorded using a GPS (WGS84 datum), together with an indication of the number of individuals present, the habitat and associated plant species. Voucher specimens were also collected for lodgement with the Western Australian Herbarium. Rare Flora Report Forms will be lodged with DEC for the Priority species found within the study area.

Introduced flora were also recorded as part of this exercise, although not every location was recorded for widespread species (eg. **Cenchrus ciliaris*, which was common along existing infrastructure areas). Any additional native flora species that had not been previously recorded in the area by the survey team were also noted during these traverses.

All records of rare flora and weeds are displayed on the vegetation mapping in Appendix 3.

## 3.6 Specimen Identification, Nomenclature and Data Entry

Common species that were well known to the survey botanists were identified in the field. Voucher specimens of all other species were collected and assigned a unique number to facilitate tracking of data. These were pressed in the field, and dried in a drying oven.

These vouchers were then identified by keying out, reference to appropriate publications, use of reference collections and comparison to the collections held at the Western Australian Herbarium. Most specimens were identified by botanists from Biota, with assistance from Malcolm Trudgen of M.E. Trudgen and Associates and Greg Guerin of the WA Herbarium for difficult plant groups. Specimens will be lodged with the Western Australian Herbarium for all taxa for which suitable material is available.

Nomenclature was checked against the current listing of scientific names recognised by the Western Australian Herbarium and updated as necessary. The only outdated nomenclature retained was that relating to *Cassia*. This genus is currently recognised as *Senna* (see Randell 1989), however the older *Cassia* classification (Symon 1966) was perceived to be a more realistic level of separation of the taxa (eg. with taxa such as '*glutinosa*' and '*pruinosa*' recognised at specific rather than subspecific level). A more detailed discussion is contained in Trudgen and Casson (1998), while a comparison of the nomenclature under the two classifications is presented in Appendix 5.

## 3.7 Limitations of this Study

A number of limitations of the field survey and subsequent conservation assessments are discussed in the following section. These are factors that must be considered when reviewing and applying the results of this study. Despite these limitations, the field study and the subsequent analyses are believed to give a reasonable representation of the flora and vegetation values of the Cape Lambert to Emu Siding rail corridor.

The main limitations of this study are as follows:

- Fungi and nonvascular flora (eg. algae, mosses and liverworts) were not specifically sampled.
- No quadrats were established in the southern 10 km of the study area as this section was inaccessible during the field survey due to construction of the Millstream Link road. This area was traversed at slow speed by vehicle in July 2008 to extend the vegetation mapping boundaries and was spot-sampled only.
- Although the field work was done at an appropriate time for detecting most ephemeral flora, some species (eg. annual daisies that would germinate mostly after late winter rains) would not have been present or identifiable at the time of survey. In addition, the entire study area was not systematically searched for rare flora. The species lists should therefore be taken as indicative rather than exhaustive.

- The vegetation units for this study were defined based on interpretation of aerial photography signatures combined with the site data and field mapping notes recorded during the field survey. As it was not possible to map areas outside the study area in this way, the distribution of these units outside the study area can only be inferred by their correlation with the Land Systems mapping prepared by the Department of Agriculture. This means that there is a level of uncertainty regarding the assessment of distribution of these vegetation types outside the current study area.
- Mapping was based on the latest available orthophotography, however this may not show recently constructed infrastructure. Delineation of currently disturbed areas may therefore be inaccurate for some areas.
- No floristic analysis has been conducted using the data from the quadrats and relevés from this study.
- This document contains only general management recommendations to address significant vegetation types and flora species.

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# 4.0 Existing Environment

## 4.1 IBRA Bioregion and Subregion

The Interim Biogeographic Regionalisation for Australia (IBRA) recognises 85 bioregions (Environment Australia 2000). The current study area lies within the Pilbara bioregion.

With increasing survey work, it is becoming apparent that the Pilbara is a major centre of biodiversity in Western Australia. This appears to be related to the region's diversity of geological, altitudinal and climatic elements, as well as its location. The Pilbara is a transitional zone between the floras of the Eyrean (central desert) and southern Torresian (tropical) bio-climatic regions, and contains elements of both floras (see for example van Leeuwen and Bromilow (2002) for a detailed discussion of the significance of the Hamersley Range). Similarly, the Pilbara is also a transitional zone for fauna. In 2003 in recognition of the high species diversity and high levels of endemism in the region, the Pilbara was nominated as one of 15 national biodiversity "hotspots" by the Minister for the Environment and Heritage (go to http://www.environment.gov.au/biodiversity/hotspots/national-hotspots.html#14).

The Pilbara bioregion is divided into four subregions[1], described by Environment Australia (2000) as the four major components of the Pilbara Craton:

- Chichester (PIL1): Archaean granite and basalt plains supporting shrub steppes *of Acacia pyrifolia* over *Triodia pungens* hummock grasses, with Snappy Gum (*Eucalyptus leucophloia*) steppes occurring on the ranges;
- Fortescue Plains (PIL2): alluvial plains and river frontages with salt marsh, Mulga-bunch grass and short grass communities on alluvial plains and River Gum woodlands fringing drainage lines;
- Hamersley (PIL3): mountainous area of Proterozoic ranges and plateaux with low Mulga (*Acacia aneura*) woodland over bunch grasses on fine textured soils, and Snappy Gum over *Triodia brizoides* on the skeletal sandy soils of the ranges; and
- Roebourne Plains (PIL4): quaternary alluvial plains with a grass savanna and shrub steppe of *Acacia translucens* over *Triodia pungens* and marine alluvial flats with Samphire, *Sporobolus* and Mangal.

The majority of the study area lies within the Chichester subregion, with a small section (the Harding River and associated clayey plains) mapped as part of the Roebourne Plains subregion.

## 4.2 Conservation Reserves in the Locality

The southernmost 12 km section of the Cape Lambert to Emu Siding rail corridor lies within the A-class Millstream-Chichester National Park. While the corridor parallels the existing infrastructure exclusion through the Park, in some places it extends out more than 800 m from this easement. The Millstream Link section of the Dampier to Tom Price Road is also under construction through this exclusion corridor.

There are also several C-class nature reserves on islands off the coast to the north-west of Cape Lambert, however they are not relevant given the nature of this project.

The Pilbara bioregion is listed as a medium priority for funding for land purchase under the National Reserves System Co-operative Program due to the limited representation of the area in

[1] These subregions are largely equivalent to the physiographic regions of Beard (1975), although the coastal portion of Beard's Abydos Plain unit comprises the Roebourne Plains subregion, while the inland portion is included within the Chichester subregion.

conservation reserves. Portions of various pastoral leases in the region have been nominated for exclusion for public purposes in 2015, when the leases come up for renewal. Many of the submissions are from the Department of Environment and Conservation, with the intention of adding these areas to the existing conservation estate in order to provide a comprehensive, adequate and representative reserve system. One of these exclusions comprises an 892 ha area of Mt Welcome Station between the 40-44 km chainages along the Cape Lambert to Mesa J rail line, which is proposed to be reserved by the Department of Environment, Water and Catchment Protection to protect Pinanular Pool.

## 4.3 Land Systems of the Study Area

Land Systems (Rangelands) mapping covering the study area has been prepared by the Western Australian Department of Agriculture (van Vreeswyk et al. 2004). Land Systems are comprised of "land units", which represent repeating patterns of topography, soils and vegetation (ie. they occur on characteristic physiographic types within the Land System).

A total of 107 Land Systems occur in the Pilbara bioregion. [This information was obtained by combining the Land System mapping for the Pilbara (van Vreeswyk et al. 2004) and Ashburton (Payne et al. 1988), and intersecting this with the Pilbara bioregion (Environment Australia 2000) in ArcView 3.2.]. The nine Land Systems mapped by van Vreeswyk et al. (2004) for the region including the Cape Lambert to Emu Siding rail corridor are shown on the mapping in Appendix 3. Table 4.1 provides a summary of the extent of each of these Land Systems within the survey area, and the proportion this represents of their extent in the region.

**Table 4.1: Land Systems (rangelands) within the proposed Cape Lambert to Emu Siding rail corridor, and their wider representation in the Chichester and Roebourne subregions** (source: van Vreeswyk et al. 2004).

| Land System | Description | Subregion | Extent within subregion (ha) | Extent within survey area (ha) | % of total within subregion |
|---|---|---|---|---|---|
| Boolgeeda (RGEBGD) | Stony plains adjacent to hills. | Chichester | 167,663 | 871 | 0.5 |
| Calcrete (RGECAL) | Low calcrete platforms and plains supporting shrubby hard spinifex grasslands. | Chichester | 47,936 | 136 | 0.3 |
| Capricorn (RGECPN) | Rugged sandstone hills and ridges; hard spinifex or stony short grass forb pasture in fair to good condition; no erosion. | Chichester | 482,692 | 463 | 0.1 |
| Horseflat (RGEHOF) | Gilgaied clay plains supporting tussock grasslands and minor grassy snakewood shrublands. | Chichester | 27,140 | 588 | 2.2 |
| | | Roebourne | 125,456 | 118 | 0.2 |
| Pyramid (RGEPYR) | Stony gilgai plains supporting hard spinifex grasslands and minor tussock grasslands. | Chichester | 20,750 | 244 | 1.2 |
| River (RGERIV) | Active flood plains and major rivers supporting grassy eucalypt woodlands | Chichester | 258,779 | 466 | 0.2 |
| | | Roebourne | 107,322 | 72 | 0.1 |
| Rocklea (RGEROC) | Basalt hills. | Chichester | 2,125,314 | 1,338 | 0.1 |
| Ruth (RGERUT) | Hills and ridges of volcanic and other rocks supporting hard spinifex (and occasionally soft spinifex) grasslands. | Chichester | 137,109 | 126 | 0.9 |
| | | Roebourne | 11,940 | 8 | 0.1 |
| Uaroo (RGEUAR) | Broad sandy plains supporting shrubby hard and soft spinifex grasslands. | Chichester | 488,753 | 125 | <0.1 |

## 4.4 Beard's Vegetation Mapping

Beard (1975) mapped the vegetation of the Pilbara at a scale of 1:1,000,000. The study area lies 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 Cape Lambert-Emu Siding study area intersects six of Beard's mapping units. From north to south:

- the northern 27 km is mapped as the "Abydos 157" unit, which comprises Hard Spinifex (*Triodia wiseana*) hummock grassland;
- this is followed by a stretch of 3 km of "Abydos 589", which comprises a mixture of Knotty-butt Neverfail (*Eragrostis xerophila*) tussock grassland and Soft Spinifex (*Triodia pungens*) hummock grassland;
- in the centre of the corridor is an approximately 14 km stretch of "Abydos 152", which comprises mixed hummock grasslands of *Triodia pungens* and *Triodia wiseana*; this vegetation also occurs in patches to the south;
- contained within the above is a 1.5 km section of the "Abydos 619" unit, which comprises River Gum (*Eucalyptus camaldulensis*) woodland along the Harding River;
- the southern third of the corridor is dominated by "Abydos 93", which comprises Ranji Bush (*Acacia pyrifolia*) scattered shrubs over *Triodia pungens* hummock grasslands; and
- the southernmost tip of the corridor is mapped as "Chichester 587", which comprises Snappy Gum (*Eucalyptus leucophloia*) scattered low trees over *Triodia wiseana* hummock grasslands in a mosaic with *Acacia pyrifolia* scattered shrubs over *Triodia pungens* hummock grasslands.

Given the broad nature of Beard's mapping, these units are only broadly applicable to the vegetation occurring on site (see Section 5.0).

## 4.5 Vegetation of Conservation Significance Known from the Locality

Vegetation communities of the highest conservation concern are listed as Threatened Ecological Communities (TECs) by the DEC. While some TECs for WA are also listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999,* this does not apply to any currently described from the Pilbara bioregion. Other communities of conservation significance are listed as Priority Ecological Communities (PECs): while these communities do not have any legislative protection, it is best practise environmental management to avoid disturbance to these areas. The framework for ranking communities of conservation significance is presented in Appendix 1.

### 4.5.1 Threatened Ecological Communities in the Vicinity of the Study Area

There are no TECs listed by the DEC for the Chichester subregion.

### 4.5.2 Priority Ecological Communities in the Vicinity of the Study Area

There are two PECs in the vicinity of the study area, both of which are listed as Priority 1 Ecological Communities (see Appendix 1):

- **Roebourne Plains coastal grasslands**
  While this community occurs broadly over the clayey plains of the Dampier to Roebourne locality, some particularly good quality examples of these coastal grasslands have been identified on areas of 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 as a PEC 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 in future to be upgraded to a TEC.

- **Cracking clay communities of the Chichester Range and Mungaroona Range**
  This PEC is described as being "usually high in the landscape, sometimes perched on hill tops and on plateaus, and comprising the Chichester tablelands cracking clays". It has been grazed heavily at times in the past, and is considered to be under threat from grazing by feral and station cattle (Kendrick and McKenzie 2001).

## 4.6 Flora of Conservation Significance Known from the Locality

While all native flora are protected under the Western Australian *Wildlife Conservation Act 1950-1979,* a number of plant species are assigned an additional level of conservation significance based on the limited number of known populations and the perceived threats to these populations. Species of the highest conservation concern are listed as Declared Rare Flora (DRF) under the State listing prepared by the DEC (Atkins 2008). The two DRF currently in the Pilbara are also listed as threatened species under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. 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 by DEC (see Atkins 2008). This is an administrative (rather than legislated) level of protection. The framework for ranking flora species of conservation significance is presented in Appendix 1.

Based on the searches of the DEC and WA Herbarium databases conducted for this study (see Section 3.1.1), a number of flora species of conservation significance are known to occur in the locality.

### 4.6.1 Listed Species under the *EPBC Act 1999* Occurring in the Locality

Only two plant species from the Pilbara are currently listed under the *EPBC Act 1999:*

- Mountain Thryptomene (*Thryptomene wittweri*) is only known from high-altitude mountain tops in the southern Pilbara, its distribution extending south into the Gascoyne and Great Victoria Desert bioregions. Given the absence of suitable habitat within the study area, and the considerably more inland distribution of this species, this species would not be expected to occur in the current study area.
- Hamersley Lepidium (*Lepidium catapycnon*) is now known from a number of locations in the south-eastern Pilbara, predominantly from the Hamersley Range, with a distribution extending broadly from Tom Price across to east of Newman. Given the distribution of this species, it would not be expected to occur in the study area.

### 4.6.2 Declared Rare Flora Occurring in the Locality

The two DRF currently listed for the Pilbara are the two species listed under the *EPBC Act 1999* (Section 4.6.1). As discussed, neither *Thryptomene wittweri* nor *Lepidium catapycnon* would occur in the study area.

### 4.6.3 Priority Flora Known from the Locality

Several Priority flora species are known from the 25 km buffer area surrounding the study area, including:

- one Priority 1 species: *Helichrysum oligochaetum;*

- two Priority 2 species: *Ischaemum albovillosum* and *Paspalidium retiglume*; and
- five Priority 3 species: *Acacia glaucocaesia, Eragrostis crateriformis, Goodenia pascua, Hibiscus brachysiphonius* and *Terminalia supranitifolia*.

None of these records were from the study area specifically. Species previously recorded within 15 km of the study area boundary are described in more detail below, only two of which occurred within 5 km:

- There are two records of the Priority 1 species *Helichrysum oligochaetum* to the east of the northern end of the study area. The closest location is within 4.5 km of the study area. This annual daisy has a broad distribution across the Pilbara and into the northern Gascoyne bioregion, but is rarely collected (probably in part due to its small size and annual growth form). It is typically recorded on clayey plains.
- There is one record of the Priority 2 species *Ischaemum albovillosum* from 14.5 km south-east of the southern end of the study area. This perennial grass species is relatively widespread through the Pilbara, occurring in both the Chichester and Hamersley subregions, but is restricted to heavy clay substrates.
- There are five records of the Priority 3 species *Acacia glaucocaesia* both east and west of the northern end of the study area. The closest location is within 4.5 km of the study area. This species has a relatively broad distribution through the northern Pilbara, extending into the Dampierland bioregion.

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# 5.0 Vegetation

## 5.1 Overview of Vegetation Types

Forty-seven (47) vegetation types were identified within the Cape Lambert to Emu Siding Rail Duplication Corridor (see Appendix 3). Broadly these comprised;

- Small stands of mangal dominated by White Mangrove (*Avicennia marina*) interspersed with low open heaths dominated by Samphires and *Frankenia* on mudflats along the north-western edge of the corridor;
- Tussock grasslands of Marine Couch (*Sporobolus virginicus*) on sluggishly drained coastal plains;
- Open shrublands of *Acacia ampliceps, A. bivenosa* and/or *A. coriacea* subsp. *coriacea* over hummock grasslands of *Triodia epactia* and tussock grasslands of **Cenchrus* species on coastal dune habitats;
- *Acacia colei var. colei, Grevillea pyramidalis* tall open shrubland over *Triodia epactia, T. schinzii* hummock grassland on sandplain at the northern end of the corridor;
- Open shrublands of various combinations of *Acacia arida, A. bivenosa, A. inaequilatera, A. pyrifolia* over hummock grasslands of *Triodia wiseana* and/or *T. epactia* on stony hills and plains throughout the corridor;
- *Triodia angusta* hummock grasslands on plains with a calcareous clay-loam substrate;
- Woodlands to tall shrublands dominated by *Terminalia canescens* or *Acacia coriacea* subsp. *coriacea, Dichrostachys spicata* and *Ehretia saligna* over open hummock grasslands of *Triodia wiseana* on rockpiles;
- *Eragrostis xerophila* tussock grasslands, annual grasslands and/or *Triodia wiseana* hummock grasslands interspersed with herblands, sometimes with an overstorey of Snakewood (*Acacia xiphophylla*), on heavy clay soils;
- Various vegetation types including low shrublands dominated by samphires or *Stemodia grossa* and grasslands dominated by *Eragrostis falcata*, often with scattered trees of River Red Gum (*Eucalyptus camaldulensis*) and Coolibahs (*E. victrix*), on the floodout areas from the Harding Dam;
- Riverine woodlands dominated by *Eucalyptus camaldulensis, E. victrix* and/or *Terminalia canescens* over various shrubs including *Acacia ampliceps, A. pyrifolia, A. trachycarpa* and *Melaleuca glomerata* over sedgelands, *Triodia* hummock grasslands and/or **Cenchrus* tussock grasslands in major drainage features; and
- Low open woodlands of Hamersley Bloodwood (*Corymbia hamersleyana*) over dense tall shrublands of various species such as *Acacia ancistrocarpa, A. bivenosa, A. coriacea* subsp. *pendens, A. pyrifolia* and *A. trachycarpa* over *Triodia* hummock grasslands and/or tussock grasslands of **Cenchrus* or native species in minor flowlines.

## 5.2 Descriptions of Vegetation Types

### 5.2.1 Vegetation of Mudflats

**AVm *Avicennia marina* tall open scrub**

Some very small stands of mangroves occurred along the north-western boundary of the rail corridor. These would be associated with the "tidal channels" land unit, which makes up approximately 4% of the Littoral Land System (van Vreeswyk et al. 2004). This vegetation occurred on tidal mudflats, and was typically in Excellent condition as this habitat is resistant to weed invasion. No sites from this study.

**FRaHA** ***Frankenia ambita, Halosarcia* species low open heath**

This vegetation occurred in low-lying sluggish drainage areas on coastal plains with silty to clay-loam soils, often as a mosaic with unit SPOv (Plate 5.1). It would represent part of the "samphire flats" land unit, which comprises approximately 10% of the Littoral Land System (van Vreeswyk et al. 2004). The dominant samphire species were typically *Halosarcia halocnemoides* subsp. *tenuis* and *H. indica* subsp. *leiostachya*. Other associated species included *Eragrostis falcata, Halosarcia auriculata, Hemichroa diandra, Lawrencia viridigrisea, Muellerolimon salicorniaceum, Neobassia astrocarpa, Sesbania cannabina, Sporobolus virginicus* and *Trianthema turgidifolia*. This vegetation was typically in Excellent condition. No sites from this study; vegetation unit sampled outside the study area in sites CLE08 and CLE21 of Biota (2008a).

**Plate 5.1:** **Narrow band of vegetation unit FRaHA (backed by SPOv) on western side of existing rail.**

### 5.2.2 Vegetation of Sandy and Clayey Coastal Plains

**SPOv** ***Sporobolus virginicus* tussock grassland**

This vegetation type occurred at the northern end of the rail corridor on sandy to clayey plains (Plate 5.2). It would represent part of the "alluvial plains" land unit, which comprises approximately 2% of the Littoral Land System (van Vreeswyk et al. 2004). Wetter areas had substantial amounts of *Sesbania cannabina* (eg. quadrat CLE10). Other associated species included *Alysicarpus muelleri, Corchorus tridens, Cyperus bulbosus, Fimbristylis dichotoma, Indigofera colutea, Ipomoea coptica, Neptunia dimorphantha, Panicum decompositum* and *Pluchea* sp. B Kimberley Flora (K.F. Kenneally 9526A). This vegetation type had been relatively recently burnt in some areas but was in Excellent condition overall. No sites from this study; quadrat DPS05 of Biota (2008c) and CLE10 of Biota (2008a).

**AamSPOv** ***Acacia ampliceps* tall shrubland over *Sporobolus virginicus* closed tussock grassland**

This vegetation occurred in lower-lying areas of floodplains and along drainage lines through the habitat supporting unit SPOv, and would also be associated with the "alluvial plains" land unit of the Littoral Land System. Other associated species included *Acacia sabulosa, Indigofera linifolia, I. trita, Neobassia astrocarpa, Pluchea rubelliflora, Pluchea* sp. B Kimberley Flora, *Rhynchosia minima, Salsola tragus, Sesbania cannabina, Trianthema turgidifolia, Triodia epactia* and *Whiteochloa airoides*. This vegetation was in Very Good condition, with some invasion by **Cenchrus ciliaris*. No sites from this study; quadrat CLE09 of Biota (2008a; Plate 5.3).

**Plate 5.2:** **Vegetation unit SPOv (DPS05 of Biota 2008c).**

**Plate 5.3:** **Vegetation unit AamSPOv (CLE09 of Biota 2008a).**

**AamAbTeCE** ***Acacia ampliceps, A. bivenosa* open shrubland over *Triodia epactia* open hummock grassland and *C*enchrus* species tussock grassland**

This vegetation occurred on low dunes and loamy plains towards the northern end of the rail corridor (Plate 5.4). The dunes would be associated with the "coastal dunes" land unit, which comprises approximately 3% of the Littoral Land System; while the plains would correspond to the "sandy/loamy plains" land unit, which comprises 82% of the Uaroo Land System (van Vreeswyk et al. 2004). Other associated species included *Pimelea ammocharis* and *Ptilotus axillaris*. This vegetation had been recently burnt and was in Poor condition due to extensive invasion by **Cenchrus ciliaris* and **C. setiger* grasses. No sites from this study.

**AcCEc** ***Acacia coriacea* subsp. *coriacea* tall shrubland over **Cenchrus ciliaris* tussock grassland**

This vegetation occurred on low dune habitat at the northern end of the rail corridor: this would correspond to the "coastal dunes" land unit, which comprises approximately 3% of the Littoral Land System (van Vreeswyk et al. 2004). Other associated species included *Euphorbia* spp., *Salsola tragus, Scaevola* spp., *Trichodesma zeylanicum* var. *grandiflorum* and *Whiteochloa airoides*. This vegetation was in Poor condition as a result of severe infestation by **Cenchrus* grasses. No sites from this study.

**AcoGpTeTs** ***Acacia colei* var. *colei, Grevillea pyramidalis* tall open shrubland over *Triodia epactia, T. schinzii* closed hummock grassland**

This vegetation type occurred on sandplain habitat along the north-eastern edge of the rail corridor (Plate 5.5). This would correspond to the "sandy/loamy plains" land unit, which comprises 82% of the Uaroo Land System (van Vreeswyk et al. 2004). Other associated species included *Bonamia linearis, Bulbostylis barbata, Chrysopogon fallax, Eragrostis eriopoda, Indigofera linifolia, Mollugo molluginea, Ptilotus polystachyus* var. *arthrotrichus, Santalum lanceolatum* and *Tephrosia rosea* var. *venulosa*. Only scattered weeds were present through this habitat, and the condition was ranked as Very Good. No sites from this study; quadrat CLE16 of Biota (2008a) in outlying (atypical) area of this unit.

**MlAcoTeTs** ***Melaleuca lasiandra, Acacia colei* var. *colei* tall shrubland over *Triodia epactia, T. schinzii* closed hummock grassland**

This vegetation occurred through low-lying areas of the sandplain habitat along the north-eastern edge of the rail corridor, and would be associated with the same land unit as AcoGpTeTs. Other associated species included *Acacia coriacea* subsp. *coriacea, Cyperus blakeanus, Dolichandrone heterophylla* and *Ehretia saligna* var. *saligna*. Only scattered weeds were present through this habitat, and the condition was ranked as Very Good. No sites from this study.

**Plate 5.4:** **Vegetation unit AamAbTeCE.**

**Plate 5.5:** **Vegetation unit AcoGpTeTs.**

## 5.2.3 Vegetation of Stony Hills and Plains

### 5.2.3.1 Hummock grasslands dominated by *Triodia wiseana* and/or *T. epactia*

A number of these units, which were differentiated on the basis of the cover and composition of the dominant species, appeared to be otherwise relatively similar floristically. A floristic analysis of the site data could help to resolve whether these should indeed be mapped as separate units or are part of a broader vegetation type, however in the interim they have been retained as shown.

**AbTw** ***Acacia bivenosa* scattered shrubs over *Triodia wiseana* hummock grassland**

This vegetation occurred along ranges of low stony hills towards the northern end of the rail corridor. It appears to correspond most strongly with the "hills, ridges and upper slopes" land unit, which comprises 75% of the Ruth Land System (van Vreeswyk et al. 2004). *Triodia epactia* was a co-dominant spinifex in some areas, however *T. wiseana* was most prominent in this habitat. Other associated species included very occasional *Acacia arida, A. coriacea* subsp. *coriacea, A. pyrifolia, Boerhavia gardneri, Bonamia media* var. *villosa, Cassia glutinosa, C. pruinosa, Cleome viscosa, Corchorus parviflorus, Cucumis maderaspatanus, Goodenia microptera, Grevillea pyramidalis* subsp. *leucadendron, Hakea chordophylla, Hybanthus aurantiacus, Indigofera monophylla* (Burrup form), *I. trita, Paspalidium clementii, Polycarpaea longiflora, Rhynchosia minima, Themeda triandra, Tribulus suberosus, Trichodesma zeylanicum* var. *zeylanicum* and *Triumfetta clementii*. Only very scattered weeds (mainly **Cenchrus ciliaris*) were observed on these hills, and this vegetation was considered to be in Very Good to Excellent condition. No sites from this study; quadrats CLE11 and CLE15 from Biota (2008a).

**AbAstTe** ***Acacia bivenosa* scattered shrubs over *A. stellaticeps* low open shrubland over *Triodia epactia* hummock grassland**

This vegetation occurred on stony lower slopes and plains at the northern end of the rail corridor and appears to correspond to part of the "lower slopes and stony plains" land unit, which makes up 15% of the Ruth Land System (van Vreeswyk et al. 2004). Other associated species included *Fimbristylis simulans, Indigofera monophylla* (Burrup form), *Paspalidium clementii, Ptilotus astrolasius* var. *astrolasius, Trichodesma zeylanicum* var. *zeylanicum* and *Triumfetta clementii*. There were frequent patches of weeds (mainly **Cenchrus ciliaris*) associated with areas which had been previously disturbed, and this unit was ranked as being in Good to Very Good condition. No sites from this study.

**AaTw** ***Acacia ancistrocarpa* open shrubland over *Triodia wiseana* hummock grassland**

This vegetation occurred over the broad stony plains between approximately the 23.5 and 25.5 km chainages on the Cape Lambert to Mesa J rail line. It appears to correspond to part of the "lower slopes and stony plains" land unit, which makes up 15% of the Ruth Land System (van Vreeswyk et al. 2004). This vegetation was in Excellent condition.

**ApyAarTeTw** ***Acacia pyrifolia* scattered tall shrubs over *A. arida* open shrubland over *Triodia epactia, T. wiseana* hummock grassland**

This vegetation type occurred mainly on hills throughout the study area, and was predominantly associated with the Ruth Land System (the "hills, ridges and upper slopes" land unit, comprising 75% of this land system), and the Rocklea Land System (the "hills, ridges, plateaux and upper slopes" land unit, comprising 65% of this land system). Some occurrences on lower slopes were associated with the Boolgeeda Land System, corresponding to the "stony slopes and upper plains" land unit (20% of this land system). The proportion of the two dominant spinifex species varied with location, and *A. pyrifolia* was absent from some areas. Other associated species included *Acacia bivenosa, Bonamia media* var. *villosa, Cassia pruinosa, Corchorus* spp., *Eriachne pulchella, Hybanthus aurantiacus, Indigofera monophylla* (Burrup form) and *Sida pilbarensis* (ferruginous form). This vegetation was generally in Excellent condition. Quadrats EMU01 (Plate 5.6), EMU03, EMU12, EMU30 and relevé EMU-MD.

**ChApyAbTwTe** ***Corymbia hamersleyana* scattered low trees over *Acacia pyrifolia* scattered tall shrubs over *A. bivenosa* open shrubland over *Triodia wiseana, T. epactia* hummock grassland**

This vegetation occurred on stony plains and hillslopes at the northern and southern ends of the study area. It was predominantly associated with the Boolgeeda, Ruth and Rocklea Land Systems, together with the Capricorn Land System at the southern end of the study area. *Corymbia hamersleyana* scattered low trees were typically present over the broad plains but were generally absent from hills. Some areas had *Acacia ancistrocarpa* within the open shrubland layer, and there were also patches of *Acacia stellaticeps* low open shrubland in places towards the north. The proportion of the two dominant spinifex species varied depending on location, with *T. epactia* generally more common on the stony plains and *T. wiseana* more common on hills. There was considerable invasion by Buffel Grass (**Cenchrus ciliaris*) through areas close to the existing rail line, which had been extensively disturbed from past development (eg. at quadrat EMU02). Other associated species included *Aristida contorta, Bonamia media* var. *villosa, Corchorus parviflorus* and *C.* aff. *parviflorus, Eriachne pulchella, Fimbristylis dichotoma, Gomphrena cunninghamii, Hakea chordophylla, H. lorea* subsp. *lorea, Ptilotus calostachyus* var. *calostachyus, P. exaltatus* var. *exaltatus, P. helipteroides* var. *helipteroides, Salsola tragus, Sida pilbarensis* (ferruginous form), *Tephrosia* aff. *supina* (HDC 02-01) and *Triumfetta clementii.* This vegetation was generally in Very Good condition, except for those areas in close proximity to the existing rail and access roads, which were rated as Poor due to invasion by **Cenchrus* species. Quadrats EMU02, EMU05, EMU06, EMU18, EMU19 (Plate 5.7).

**Plate 5.6: Vegetation unit ApyAarTeTw (EMU01).**

**Plate 5.7: Vegetation unit ChApyAbTwTe (EMU19).**

**ApyTw** ***Acacia pyrifolia* scattered tall shrubs over *Triodia wiseana* hummock grassland**

This vegetation occurred on stony hills through the central section of the corridor, between approximately the 37 and 48 km chainages on the Cape Lambert to Mesa J rail line. This unit was predominantly associated with the Ruth Land System, and also occurred in an area mapped as the Rocklea Land System. Other associated species included *Bonamia media* var. *villosa, Eriachne pulchella, Euphorbia* sp. (B170-4), *Gomphrena cunninghamii, Hibiscus sturtii* var. aff.

*grandiflorus, Indigofera monophylla* (Burrup form), *Leptopus decaisnei, Polycarpaea longiflora, Solanum diversiflorum, Tephrosia* aff. *supina* (HDC 02-01), *Trachymene oleracea* subsp. *oleracea, Tribulus suberosus, Trichodesma zeylanicum* var. *zeylanicum* and *Triumfetta clementii*. This vegetation was in Very Good to Excellent condition. Quadrats EMU22, EMU24, EMU29 (Plate 5.8).

**ApyTe** ***Acacia pyrifolia* scattered tall shrubs over *Triodia epactia* hummock grassland**

This vegetation occurred in relatively small stands on stony plains through the corridor associated with the Ruth Land System, and would correspond to part of the "lower slopes and stony plains" land unit (15% of this land system). Other associated species included *Bonamia media* var. *villosa, Euphorbia coghlanii, Evolvulus alsinoides* var. *villosicalyx, Hakea chordophylla, H. lorea* subsp. *lorea, Tephrosia* aff. *supina* (HDC 02-01), *Triodia wiseana* (scattered hummocks only) and *Triumfetta clementii*. This vegetation was generally in Very Good condition, with scattered individuals of **Cenchrus* species typically present. Quadrats EMU04, EMU27 (Plate 5.9).

**Plate 5.8: Vegetation unit ApyTw (EMU29).**

**Plate 5.9: Vegetation unit ApyTe (EMU27).**

**ChAiTw** ***Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* tall open shrubland over *Triodia wiseana* open hummock grassland**

This vegetation occurred on rocky hillslopes, crests and footslopes in the southern third of the rail corridor, between approximately the 60 to 65 km chainages on the Cape Lambert to Mesa J rail line. This unit was strongly correlated with the Rocklea Land System, and would correspond to the "hills, ridges, plateaux and upper slopes" and "lower slopes" land units, which together comprise 80% of this land system. The low trees of *Corymbia hamersleyana* were mainly present on the footslopes (Plate 5.10), and disappeared further up the hills (Plate 5.11). Other associated species included *Bonamia media* var. *villosa, Bulbostylis barbata, Cleome viscosa, Gomphrena cunninghamii, Polygala* aff. *isingii, Sida pilbarensis* (ferruginous form) and *Triumfetta clementii*. This vegetation was typically in Very Good to Excellent condition. Quadrat EMU42 and relevé EMU-MJ.

**Plate 5.10: Vegetation unit ChAiTw on footslopes (EMU42).**

**Plate 5.11: Vegetation unit ChAiTw on hill (EMU-MJ).**

**ChAbTw** ***Corymbia hamersleyana* scattered low trees over *Acacia bivenosa* tall open shrubland over *Triodia wiseana* hummock grassland**

This vegetation occurred over broad stony plains scattered through the corridor, in areas mapped variously as the Boolgeeda, Calcrete and Ruth Land Systems. Other associated species included *Acacia inaequilatera, A. pyrifolia, Bonamia media* var. *villosa, Cassia glutinosa, Hakea chordophylla, Indigofera monophylla* (grey leaflet form), *Ptilotus astrolasius* var. *astrolasius* and *Trichodesma zeylanicum* var. *zeylanicum*. This vegetation was typically in Very Good to Excellent condition. Quadrats EMU38, EMU47.

**ApyAsyTe** ***Acacia pyrifolia, A. synchronicia* open shrubland over *Triodia epactia* hummock grassland**

This vegetation occurred on more loamy areas within the broad clayey plains from north of the North West Coastal Highway to approximately the 29 km chainage. It would correspond most strongly with the Horseflat Land System, and probably represents part of the "non-gilgaied, sometimes stony plains" land unit, which makes up 30% of this land system (van Vreeswyk et al. 2004). Other associated species included *Acacia bivenosa, Aristida contorta, Bonamia media* var. *villosa, Cassia notabilis, Eragrostis eriopoda, E. xerophila, Ptilotus exaltatus* var. *exaltatus, Sida echinocarpa* and *Yakirra australiensis* var. *australiensis*. This vegetation was in Very Good condition, with only scattered weeds (mainly **Cenchrus ciliaris*). Quadrat EMU08 (Plate 5.12).

#### 5.2.3.2 Hummock grasslands dominated by *Triodia angusta*

**Ta** ***Triodia angusta* hummock grassland**

This vegetation occurred on broad stony plains with a calcareous clay-loam substrate between the 62 km and 65 km chainages on the Cape Lambert to Mesa J rail line. This unit was associated with the Boolgeeda Land System, and would represent part of the "stony lower plains" land unit, which comprises 65% of this land system (van Vreeswyk et al. 2004). Other associated species included *Atriplex codonocarpa, Bulbostylis turbinata, Cuscuta victoriana, Dactyloctenium radulans, Dichanthium sericeum* subsp. *humilius, Enchylaena tomentosa* var. *tomentosa, Eragrostis xerophila, Euphorbia boophthona, Indigofera trita, Ipomoea muelleri, Iseilema vaginiflorum, Neptunia dimorphantha, Phyllanthus maderaspatensis, Portulaca conspicua, Ptilotus gomphrenoides* var. *gomphrenoides, Rhynchosia minima, Salsola tragus, Sesbania cannabina, Solanum diversiflorum, Sporobolus australasicus, Streptoglossa bubakii, Trianthema triquetra* and *Xerochloa laniflora*. This unit was considered to be in Very Good condition overall, with only scattered introduced grasses recorded. Quadrat EMU39 (Plate 5.13).

**Plate 5.12: Vegetation unit ApyAsyTe (EMU08).**

**Plate 5.13: Vegetation unit Ta (EMU39).**

### 5.2.4 Vegetation of Rockpiles

Two main vegetation types were identified on rockpiles in the study area:

**TERcTw *Terminalia canescens* low open woodland over *Triodia wiseana* open hummock grassland**
This vegetation type occurred on the rocky chert hills south of the North West Coastal Highway, as well as on basalt rockpiles with a reasonable level of soil development throughout the corridor. It was most strongly associated with the Rocklea and Ruth Land Systems. Within the former land system, the "hills, ridges, plateaux and upper slopes" land unit is described as including "much outcrop of basalt"; "outcrop of parent rock" is similarly listed under the "hills, ridges and upper slopes" land unit for the Ruth Land System (van Vreeswyk et al. 2004). Other species associated with this vegetation type included *Abutilon* aff. *lepidum* (4), *Acacia coriacea, A. pyrifolia, Aristida burbidgeae, Bonamia media* var. *villosa, Brachychiton acuminatus, Cajanus cinereus, Capparis spinosa* var. *nummularia, Cassia glutinosa, C. oligophylla, Cheilanthes sieberi* subsp. *sieberi, Cleome viscosa, Clerodendrum floribundum* var. *angustifolium, Cucumis maderaspatanus, Cymbopogon ambiguus, Cyperus cunninghamii* subsp. *cunninghamii, Dichrostachys spicata, Dicliptera armata, Ehretia saligna* var. *saligna, Eriachne mucronata, Euphorbia biconvexa, Ficus brachypoda, Flueggea virosa* subsp. *melanthesoides, Gomphrena cunninghamii, Hibiscus sturtii* var. aff. *grandiflorus, Hybanthus aurantiacus, Indigofera monophylla* (Burrup form), *I. trita, Jasminum didymum* subsp. *lineare, Leptopus decaisnei, Paspalidium tabulatum, Phyllanthus maderaspatanus, Polycarpaea longiflora, Ptilotus obovatus, Rhynchosia minima, Tephrosia* aff. *supina* (HDC 02-01), *Tinospora smilacina, Tribulus suberosus, Trichodesma zeylanicum* var. *zeylanicum, Trichosanthes cucumerina* var. *cucumerina, Triumfetta clementii* and *T. maconochieana*. This vegetation was typically in Good to Very Good condition, usually showing some level of weed invasion by Buffel Grass (**Cenchrus ciliaris*). Relevés EMU-MA (Plate 5.14), EMU-ME, EMU-MG.

**AcDIsEHsTwCEc *Acacia coriacea* subsp. *coriacea, Dichrostachys spicata, Ehretia saligna* tall open shrubland over *Triodia wiseana* very open hummock grassland and/or **Cenchrus ciliaris* very open tussock grassland**
This vegetation occurred on basalt rockpiles throughout the rail corridor, again associated with the Rocklea and Ruth Land Systems as for unit TERcTw. Vegetation over the whole rockpile was typically sparse, concentrated in patches where soil had accumulated. **Cenchrus ciliaris* had often invaded these patches, reducing condition from Very Good to Good. This unit was floristically quite similar to unit TERcTw; other associated species included *Acacia bivenosa, A. pyrifolia, Aristida burbidgeae, Capparis spinosa* var. *nummularia, Cleome viscosa, Clerodendrum floribundum* var. *angustifolium, Cucumis maderaspatanus, Cyperus cunninghamii* subsp. *cunninghamii, Flueggea virosa* subsp. *melanthesoides, Gomphrena cunninghamii, Gossypium australe* (Whim Creek form), *Hybanthus aurantiacus, Jasminum didymum* subsp. *lineare, Rhagodia eremaea, Rhynchosia minima, Scaevola spinescens, Tinospora smilacina, Trichosanthes cucumerina* var. *cucumerina, Triodia epactia, Triumfetta clementii* and *T. maconochieana*. This vegetation was typically in Good to Very Good condition, with some invasion by **Cenchrus ciliaris*. Relevés EMU-MC (Plate 5.15), EMU-MK.

**Plate 5.14: Vegetation unit TERcTw (EMU-MA).**

**Plate 5.15: Vegetation unit AcDIsEHsTwCEc (EMU-MC).**

## 5.2.5 Vegetation of Clayey Plains

A number of vegetation types were identified on the areas of heavy clay within the rail corridor.

### 5.2.5.1 Grasslands / Herblands

**ERAx *Eragrostis xerophila* open tussock grassland**

This vegetation (Plate 5.16) dominated the broad clayey plains of the Horseflat Land System from just north of the North West Coastal Highway to approximately the 27.5 km chainage on the Cape Lambert to Mesa J rail line, and between approximately the 33 and 36.5 km chainages. There was also a small stand approximately 500 m west of the 12 km chainage. This unit would probably include parts of the "gilgaied plains", "non-gilgaied, sometimes stony plains" and "alluvial plains" land units, which comprise 52%, 30% and 10% respectively of the Horseflat Land System (van Vreeswyk et al. 2004). Very scattered tall shrubs of *Acacia inaequilatera, A. xiphophylla, Dichrostachys spicata* and/or **Vachellia farnesiana* were frequently present, particularly along flowlines through the plains. Wetter areas contained *Eriachne flaccida / E. benthamii* open to closed tussock grasslands (Plate 5.17). Other associated species included *Boerhavia paludosa, Cleome viscosa, Corchorus tridens, Dactyloctenium radulans, Desmodium muelleri, Euphorbia coghlanii, Gomphrena affinis* subsp. *pilbarensis, Heliotropium conocarpum, Indigofera linifolia, I. trita, Ipomoea coptica, Iseilema vaginiflorum, Operculina aequisepala, Panicum laevinode, Phyllanthus maderaspatensis, Ptilotus exaltatus* var. *exaltatus, P. murrayi, Rhynchosia minima, Salsola tragus, Sida* aff. *fibulifera* "var. L", *Stemodia kingii*, *Tephrosia* aff. *clementii* (9) (HD284-6) and *Xerochloa laniflora*. This vegetation was generally in Good to Very Good condition, with **Cenchrus ciliaris* and **Vachellia farnesiana* prominent in some areas. Quadrats EMU10, EMU11 (Plate 5.16), EMU13, EMU17, EMU21 of this study; quadrat MWS02 of Biota (2008c).

**Plate 5.16: Vegetation unit ERAx (EMU11).**

**Plate 5.17: Patch of *Eriachne flaccida* open tussock grassland within vegetation unit ERAx.**

**H/G Herbland/annual grassland**

This vegetation type occurred on heavy clay soils around the 59 km chainage on the Cape Lambert to Mesa J rail line. This unit appears to correspond to the "gilgai plains" land unit, which comprises 2% of the Pyramid Land System (van Vreeswyk et al. 2004). It was dominated by annual grasses such as *Dichanthium sericeus* subsp. *humilius*, and annual to perennial herbs such as *Neptunia dimorphantha, Desmodium muelleri, Euphorbia coghlanii* and *Heliotropium conocarpum*. Other associated species included *Aristida latifolia, Boerhavia coccinea, Brachyachne convergens, Cleome viscosa, Corchorus tridens, Heliotropium crispatum, Ipomoea lonchophylla, Oldenlandia crouchiana, Operculina aequisepala, Paspalidium constrictum, Ptilotus exaltatus* var. *exaltatus, P. gomphrenoides* var. *gomphrenoides, Rhynchosia minima, Salsola tragus, Sida* aff. *fibulifera* "var. L", *Sporobolus australasicus, Stemodia grossa* and *Tribulus occidentalis*. This unit was in Very Good to Excellent condition, with only very occasional weeds (mainly **Cucumis* sp.). Quadrat EMU36 (Plate 5.18).

**Tw/H *Triodia wiseana* hummock grassland, with patches of herbs on clay**

This vegetation type occurred broadly over the stony plains between approximately the 53.5 km and 59.5 km chainages on the Cape Lambert to Mesa J rail line, with another occurrence around the 64 km chainage. It was most strongly associated with the Pyramid Land System, and would correspond to the "stony plains with gilgai and non-gilgai surfaces" land unit, which makes up approximately 80% of this land system (van Vreeswyk et al. 2004). Small patches of herbs occurred on patches of heavy clay within the general spinifex hummock grassland. Only very occasional shrubs were present, including *Acacia pyrifolia* and *Hakea lorea* subsp. *lorea*. Other associated species included *Austrobryonia pilbarensis, Boerhavia coccinea, Bulbostylis barbata, Cassia notabilis, Cleome viscosa, Corchorus incanus* subsp. *incanus, Crotalaria dissitiflora* subsp. *benthamiana, Dactyloctenium radulans, Dichanthium sericeum* subsp. *humilius, Dysphania rhadinostachya, Eriachne flaccida, E. pulchella, Gomphrena cunninghamii, Hibiscus sturtii* var. aff. *grandiflorus, Ipomoea coptica, Iseilema vaginiflorum, Neptunia dimorphantha, Oldenlandia crouchiana, Paspalidium constrictum, Phyllanthus maderaspatensis, Ptilotus axillaris, P. gomphrenoides* var. *gomphrenoides, Rhynchosia minima, Sida* aff. *fibulifera* "var. L", *Solanum horridum, Sporobolus australasicus, Streptoglossa bubakii, Tephrosia* aff. *clementii* (9) (HD284-6) and *Triumfetta clementii*. This vegetation was typically in Very Good to Excellent condition, with scattered weeds (mainly **Cenchrus ciliaris* and **Cucumis* sp.) recorded very infrequently. Quadrats EMU34, EMU37 (Plate 5.19), EMU40.

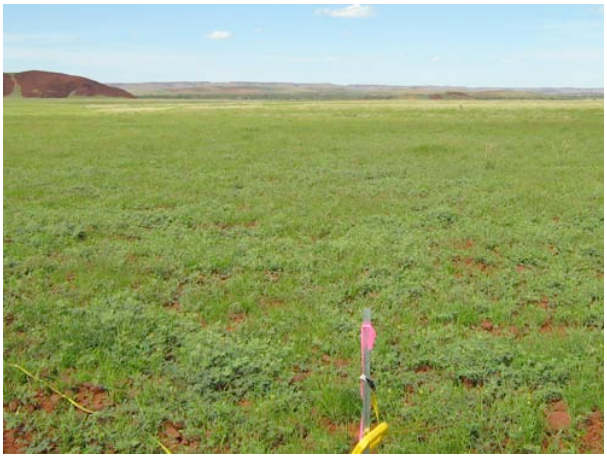

**Plate 5.18: Vegetation unit H/G (EMU36).**

**Plate 5.19: Vegetation unit Tw/H (EMU37).**

#### 5.2.5.2 Snakewood *(Acacia xiphophylla)* shrublands

**AxTwERAxCEc *Acacia xiphophylla* low open woodland over *Triodia wiseana* scattered hummock grasses and *Eragrostis xerophila, *Cenchrus ciliaris* open tussock grassland**

This vegetation occurred in patches on stony plains with a moderately clayey substrate between approximately the 25 km and 55 km chainages on the Cape Lambert to Mesa J rail line. This unit is most strongly correlated with the "non-gilgaied, sometimes stony plains" land unit of the Horseflat Land System (van Vreeswyk et al. 2004). Other species associated with this vegetation type included *Aristida contorta, A. latifolia, Cassia glutinosa* x *luerssenii, Cleome viscosa, Corchorus tridens, Crotalaria dissitiflora* subsp. *benthamiana, Dactyloctenium radulans, Enchylaena tomentosa* var. *tomentosa, Eriachne pulchella, Euphorbia coghlanii, Iseilema vaginiflorum, Neptunia dimorphantha, Operculina aequisepala, Phyllanthus maderaspatensis, Ptilotus exaltatus* var. *exaltatus, Rhynchosia minima, Salsola tragus* and *Xerochloa laniflora*. This vegetation was ranked as being in Very Good to Good condition depending on the level of weed invasion. Quadrats EMU15, EMU23 (Plate 5.20), EMU35.

**AxTe *Acacia xiphophylla* low open woodland over *Triodia epactia* very open hummock grassland**

This vegetation type (Plate 5.21) occurred in occasional patches through the rail corridor between approximately the 9 km and 35 km chainages on the Cape Lambert to Mesa J rail line. It was most strongly associated with the Horseflat Land System, and would correspond to the "non-gilgaied, sometimes stony plains" land unit (van Vreeswyk et al. 2004). Other associated species included *Eragrostis xerophila*. This vegetation was ranked as being in Very Good to Good condition depending on the level of weed invasion. No sites from this study.

**Plate 5.20: Vegetation unit AxTwERAxCEc (EMU23).**

**Plate 5.21: Vegetation unit AxTe.**

## 5.2.6 Vegetation of Drainage Areas

### 5.2.6.1 Vegetation of the Harding Dam Floodout

A number of vegetation types occurred on the broad floodout area of the Harding Dam, all of which appear to be "artificial" vegetation units: these have formed in response to damming of the Harding River just upstream, in an area which probably previously supported Snakewood (*Acacia xiphophylla*) shrublands and other clayey vegetation types of the Horseflat Land System, along with spinifex hummock grasslands of the Ruth Land System. Although these units do not represent the natural vegetation originally existing on site, they are dominated by native species which are likely to persist in this modified habitat.

**EcEvHAi *Eucalyptus camaldulensis, E. victrix* low woodland to scattered trees over *Halosarcia indica* subsp. *leiostachya* low open heath**

This vegetation occurred on slightly elevated loamy areas within the broad floodplain created around the Harding Dam area. Other associated species included *Abutilon* aff. *lepidum* (4), *Cassia notabilis, Corchorus tridens, Eragrostis falcata, Neptunia dimorphantha, Pluchea rubelliflora, Ptilotus exaltatus* var. *exaltatus, Sesbania cannabina, Sida* aff. *fibulifera* (MET Site 1308), *Stemodia grossa, Streptoglossa bubakii* and *Xerochloa laniflora*. This modified vegetation unit was in Very Good condition, with only very occasional weeds. Quadrat EMU32 and relevé EMU-MH (Plate 5.22).

**EcEvERAf *Eucalyptus camaldulensis, E. victrix* scattered low trees over *Eragrostis falcata* tussock grassland**

This vegetation occurred on slightly elevated loamy areas within the broad floodplain created around the Harding Dam area. There were varying amounts of Couch Grass (**Cynodon dactylon*), depending on the location. Other associated species included *Abutilon* aff. *lepidum* (4), *Alysicarpus muelleri, Cassia notabilis, Corchorus tridens, Heliotropium pachyphyllum, Ptilotus exaltatus* var. *exaltatus, Rhynchosia minima, Salsola tragus, Sesbania cannabina, Sporobolus mitchellii* and *Streptoglossa bubakii*. Areas without substantial weed invasion were in very good to Excellent condition, while areas infested by Couch were considered to be in Poor condition. Quadrats EMU28 (Plate 5.23), EMU33.

**Plate 5.22: Vegetation unit EcEvHAi (EMU-MH).**

**Plate 5.23: Vegetation unit EcEvERAf (EMU28).**

**Floodout mosaic**

The vegetation types EcEvHAi and EcEvERAf, which are more readily distinguishable on aerial photography, occurred together with a mosaic of intermingled units in the Harding Dam floodout area:

- *Halosarcia indica* subsp. *leiostachya, Trianthema triquetra* low open shrubland, which was the dominant vegetation type comprising ~85% of the area of this unit (EMU31, Plate 5.24);
- patches of *Stemodia grossa* low open heath in low-lying areas, comprising ~10% of this unit (Plate 5.25); and
- patches of *Leptochloa fusca* subsp. *fusca* closed tussock grassland and stands of dense *Sesbania cannabina* fringing drainage channels, comprising ~5% of this unit.

**Plate 5.24: Low open shrubland dominated by *Halosarcia indica* subsp. *leiostachya* and *Trianthema triquetra* (EMU31).**

**Plate 5.25: Low open heath dominated by *Stemodia grossa*.**

#### 5.2.6.2 Vegetation of Major Creeklines and Floodplains dominated by *Eucalyptus camaldulensis*

**EcAamCv *Eucalyptus camaldulensis* low open forest over *Acacia ampliceps* tall shrubland over *Cyperus vaginatus* open sedgeland**

This vegetation occurred along the banks of the Harding River, typically fringing permanent pools, along the eastern edge of the rail corridor between approximately the 38.5 km and 45 km chainages on the Cape Lambert to Mesa J rail line. It was associated with the River Land System, and would correspond to the "minor and major channels" land unit, which comprises 20% of this land system (van Vreeswyk et al. 2004). While *Cyperus vaginatus* was the dominant sedge species on the banks, patches of the rushes *Schoenoplectus subulatus* and *Typha domingensis* occurred in the river itself (Plate 5.26). *Melaleuca glomerata* and *M. linophylla* were prominent in the tall shrub stratum in places. Other associated species included *Amaranthus undulatus, Cleome viscosa, Crotalaria medicaginea, Cucumis maderaspatanus, Dactyloctenium radulans, Indigofera linifolia, Ipomoea muelleri, Phyllanthus maderaspatensis, Pluchea rubelliflora, Sesbania*

*cannabina*, *Stemodia grossa* and *Trichodesma zeylanicum* var. *zeylanicum*. This vegetation was mainly in Very Good to Good condition, with some areas showing invasion by Couch Grass (**Cynodon dactylon*) or **Cenchrus* species. Quadrat EMU26.

**Plate 5.26: Vegetation unit EcAamCv.**

**EcEvAtrAbTloCE *Eucalyptus camaldulensis, E. victrix* low open forest over *Acacia trachycarpa, A. bivenosa* tall open scrub over *Triodia longiceps* hummock grassland and **Cenchrus* tussock grassland**

This vegetation was noted in sections of the Harding River between approximately the 64 km and 65 km chainages along the Cape Lambert to Mesa J rail line. It corresponds to the "minor and major channels" land unit of the River Land System (van Vreeswyk et al. 2004). Other associated species included *Acacia ampliceps, A. pyrifolia, Cyperus vaginatus, Hibiscus austrinus* var. *austrinus, Sesbania formosa, Stemodia grossa, Tephrosia rosea* var. *clementii* and *Triodia epactia*. This vegetation was in Poor condition, with extensive invasion by **Cenchrus ciliaris* and **C. setiger*. No sites from this study.

#### 5.2.6.3 Vegetation of Major Creeklines and Floodplains dominated by *Eucalyptus victrix*

**EvMg *Eucalyptus victrix* low open woodland over *Melaleuca glomerata* tall shrubland**

This vegetation occurred in the cobbly channels of the Harding River and its tributaries in sections of the rail corridor from approximately the 43.5 km chainage on the Cape Lambert to Mesa J rail line to just south of the crossing point with the Dampier to Tom Price line. This vegetation type corresponds to the "minor and major channels" land unit of the River Land System (van Vreeswyk et al. 2004). Patches of *Typha domingensis* were noted in places, but otherwise the ground cover was primarily scattered hummocks of *Triodia angusta* and/or *T. epactia*. Other associated species included *Acacia ampliceps, A. coriacea subsp. pendens, A. pyrifolia, A. trachycarpa, Amaranthus undulatus, Cleome viscosa, Cucumis maderaspatanus, Cyperus vaginatus, Eriachne tenuiculmis, Goodenia lamprosperma, Hibiscus austrinus* var. *austrinus, Ipomoea muelleri, Phyllanthus maderaspatensis, Sesbania cannabina* and *Stemodia grossa*. This vegetation was considered to be in Very Good to Good condition, with most areas having some level of invasion by **Cenchrus* species. Quadrats EMU41, EMU43 (Plate 5.27).

**EvAtrTeCEc *Eucalyptus victrix* low open woodland over *Acacia trachycarpa* tall open shrubland over *Triodia epactia* open hummock grassland and **Cenchrus ciliaris* tussock grassland**

This vegetation occurred in numerous creeklines scattered through the corridor from the 23 km chainage on the Cape Lambert to Mesa J rail line to the 79 km chainage on the Dampier to Tom Price rail line, and was distributed through various land systems. Other perennial grasses present included *Chrysopogon fallax, Eriachne tenuiculmis, Eulalia aurea* and *Themeda triandra*. Other associated species included *Acacia coriacea* subsp. *pendens, A. pyrifolia, Amaranthus undulatus, Corymbia hamersleyana, Cucumis maderaspatanus, Cyperus squarrosus, Dactyloctenium radulans, Dichrostachys spicata, Ehretia saligna* var. *saligna, Hybanthus aurantiacus, Indigofera monophylla* (Burrup form), *Marsilea hirsuta, Operculina aequisepala, Phyllanthus maderaspatensis, Rhynchosia minima, Sesbania cannabina, Terminalia canescens*

and *Triumfetta clementii*. This vegetation was in Good to Poor condition, depending on the level of weed invasion. Quadrats EMU16, EMU20 (Plate 5.28), and relevés EMU-JAA (with *Triodia wiseana*), EMU-MB, EMU-MI (this site scoured out from recent floods and lacking *A. trachycarpa*).

**Plate 5.27: Vegetation unit EvMg (EMU43).**

**Plate 5.28: Vegetation unit EvAtrTeCEc (EMU20).**

**EvTERcApyTwTeCE** ***Eucalyptus victrix, Terminalia canescens* low woodland over *Acacia pyrifolia* tall open scrub over *Triodia wiseana, T. epactia* hummock grassland and **Cenchrus ciliaris, *C. setiger* open tussock grassland**

This vegetation occurred along moderate-sized creeklines through the southern section of the corridor from approximately the 40.5 km chainage, and was distributed across various land systems. *Acacia arida* was also prominent in the shrub layer in places. Other associated species included *Acacia coriacea* subsp. *pendens, A. tumida* var. *pilbarensis, A. trachycarpa, Eulalia aurea, Phyllanthus maderaspatensis, Rhynchosia minima* and *Themeda triandra*. This vegetation was in Good to Poor condition depending on the level of weed invasion. No sites from this study.

**EvApyTwTeCE** ***Eucalyptus victrix* scattered low trees over *Acacia pyrifolia* tall open scrub to tall open shrubland over *Triodia wiseana, T. epactia* hummock grassland and **Cenchrus ciliaris, *C. setiger* open tussock grassland**

This vegetation occurred broadly over the floodplains surrounding the Harding River (mapped as part of the River Land System), as well as in occasional tributaries leading from it (which were scattered across various land systems). It occurred from approximately the 28.5 km chainage on the Cape Lambert to Mesa J rail line to south of the crossing with the Dampier to Tom Price rail line. Other associated species included *Acacia arida, A. trachycarpa, Boerhavia gardneri, Chrysopogon fallax, Corchorus tectus, Hakea lorea* subsp. *lorea, Hybanthus aurantiacus, Indigofera linnaei, I. monophylla* (Burrup form), *Phyllanthus maderaspatensis, Ptilotus exaltatus* var. *exaltatus, Rhynchosia minima, Salsola tragus, Themeda triandra, Triumfetta clementii* and **Vachellia farnesiana*. This vegetation was in Good to Poor condition depending on the level of weed invasion. Quadrat EMU25 (Plate 5.29).

**Plate 5.29: Vegetation unit EvApyTwTeCEc (EMU25).**

#### 5.2.6.4 Vegetation of Moderate-sized and Minor Flowlines

Not all occurrences of the following vegetation types were mapped due to the small size of many of the flowlines. As many of these units are distributed across various land systems, these have not been mentioned specifically unless there is a relatively distinct correlation.

**TERcAtrTwCE *Terminalia canescens* low open woodland over *Acacia trachycarpa* tall open shrubland over *Triodia wiseana* open hummock grassland and **Cenchrus ciliaris, *C. setiger* tussock grassland**

This vegetation occurred in moderate-sized flowlines at the southern end of the rail corridor, and would correspond to the "upper drainage lines" land unit, which comprises 4% of the Rocklea Land System (van Vreeswyk et al. 2004). Other associated species included *Acacia coriacea* subsp. *pendens, A. pyrifolia, Alternanthera nana, A. nodiflora, Cymbopogon ambiguus, Eriachne tenuiculmis, Flueggea virosa* subsp. *melanthesoides, Hybanthus aurantiacus, Phyllanthus maderaspatensis* and *Sesbania cannabina.* This vegetation was in Poor condition due to invasion by **Cenchrus* species. No sites from this study.

**TERcAarTw *Terminalia canescens* low open forest over *Acacia arida* open shrubland over *Triodia wiseana* hummock grassland**

This vegetation was noted in a single cobbly creekline approximately 500 m north-west of the 42 km chainage on the Cape Lambert to Mesa J rail line. This creek drains out of extensive rockpiles to the north-west. Other associated species included *Acacia ancistrocarpa, A. coriacea* subsp. *pendens, A. pyrifolia, A. trachycarpa, Cassia oligophylla, Dichrostachys spicata, Ehretia saligna* var. *saligna, Eriachne tenuiculmis, Flueggea virosa* subsp. *melanthesoides, Hybanthus aurantiacus, Jasminum didymum* subsp. *lineare, Phyllanthus maderaspatensis, Ptilotus obovatus, Rhynchosia minima, Sesbania cannabina, Solanum horridum, Tinospora smilacina, Trachymene oleracea* subsp. *oleracea, Trichodesma zeylanicum* var. *zeylanicum* and *Triumfetta clementii*. Only small amounts of **Cenchrus ciliaris* were found within this vegetation type, and it was considered to be in Very Good condition. Relevé EMU-MF (Plate 5.30).

**ChAtrEUaCHf *Corymbia hamersleyana* low open woodland over *Acacia trachycarpa* scattered tall shrubs over *Eulalia aurea, Chrysopogon fallax* closed tussock grassland**

This vegetation occurred in a minor creekline at the 25.3 km chainage on the Cape Lambert to Mesa J rail line. This unit would broadly correspond to the "channels and minor river terraces" land unit, which comprises <1% of the Horseflat Land System (van Vreeswyk et al. 2004). Other associated species included *Acacia bivenosa, A. pyrifolia, A. trachycarpa, Alternanthera nana, A. nodiflora, Corchorus incanus* subsp. *incanus, C. tridens, Crotalaria medicaginea, Cucumis maderaspatanus, Dactyloctenium radulans, Dichrostachys spicata, Eremophila longifolia, Eriachne flaccida, Erythrina vespertilio, Gomphrena affinis* subsp. *pilbarensis, Hybanthus aurantiacus, Indigofera monophylla* (Burrup form), *Iseilema vaginiflorum, Marsilea hirsuta, Operculina aequisepala, Panicum decompositum, Phyllanthus maderaspatensis, Rhynchosia minima, Sesbania cannabina, Themeda triandra, Trichodesma zeylanicum* var. *zeylanicum* and *Vigna lanceolata* var. *lanceolata*. This vegetation was in Good condition, with some **Cenchrus ciliaris* and **Vachellia farnesiana* present. Quadrat EMU14 (Plate 5.31).

**Plate 5.30: Vegetation unit TERcAarTw (EMU-MF).**

**Plate 5.31: Vegetation unit ChAtrEUaCHf (EMU14).**

**ChAtrAmTw** ***Corymbia hamersleyana* low open woodland over *Acacia trachycarpa, A. maitlandii* tall open shrubland over *Triodia wiseana* hummock grassland**

This vegetation occurred through minor flowlines at the southern end of the study area, and was associated with the Rocklea Land System. No sites from this study.

**ChAtuTeCE** ***Corymbia hamersleyana* low open woodland over *Acacia tumida* var. *pilbarensis* tall open scrub over *Triodia epactia* open hummock grassland and **Cenchrus ciliaris, *C. setiger* tussock grassland**

This vegetation occurred in moderate-sized flowlines, particularly between the 15 and 18.5 km chainages on the Cape Lambert to Mesa J rail line (it was also recorded elsewhere, in flowlines which were too small to map). It was most strongly associated with the Boolgeeda Land System, and would correspond to the "narrow drainage floors and channels" land unit, which comprises 10% of this land system (van Vreeswyk et al. 2004). Other shrubs present at lesser densities included *Acacia ancistrocarpa, A. bivenosa* and *A. pyrifolia*. Other associated species included *Bonamia media* var. *villosa, B. rosea, Corchorus parviflorus, Crotalaria medicaginea, Dactyloctenium radulans, Desmodium muelleri, Eulalia aurea, Euphorbia coghlanii, Gossypium australe* (Burrup Peninsula form), *Hakea lorea* subsp. *lorea, Hybanthus aurantiacus, Indigofera monophylla* (Burrup form), *Jasminum didymum* subsp. *lineare, Rhynchosia minima, Solanum diversiflorum, Themeda triandra, Trichodesma zeylanicum* var. *zeylanicum* and *Triumfetta clementii.* This vegetation was in Good to Poor condition depending on the level of weed invasion by **Cenchrus* grasses. Quadrats EMU07, EMU09 (Plate 5.32).

**ChAtuTe** ***Corymbia hamersleyana* low open woodland over *Acacia tumida* var. *pilbarensis* tall open scrub over *Triodia epactia* open hummock grassland**

This vegetation comprised the above unit without significant weed invasion, and was typically in Excellent to Very Good condition (Plate 5.33). The mapped occurrences are between approximately the 10.5 and 15.5 km chainages on the Cape Lambert to Mesa J rail line, however as for unit ChAtuTeCE, it was also recorded elsewhere in flowlines which were too small to map. It was similarly associated with the Boolgeeda Land System.

**Plate 5.32: Vegetation unit ChAtuTeCE (EMU09).**

**Plate 5.33: Vegetation unit ChAtuTe.**

**ChApyAaAbEUaTHt** ***Corymbia hamersleyana* low open woodland over *Acacia pyrifolia* tall shrubland over *A. ancistrocarpa, A. bivenosa* open shrubland over *Eulalia aurea, Themeda triandra* closed tussock grassland**

This vegetation was recorded from one creekline at the 19.2 km chainage on the Cape Lambert to Mesa J rail line (Plate 5.34). It would correspond to the "drainage depressions" land unit, which comprises 4% of the Horseflat Land System (van Vreeswyk et al. 2004). The higher reaches of this habitat (closer to the North West Coastal Highway) comprised *Acacia inaequilatera* tall open shrubland over *Chrysopogon fallax* tussock grassland with some invasion by **Cenchrus ciliaris*. Other associated species included **Vachellia farnesiana*. This vegetation was rated as being in Good condition due to the level of invasion by **Cenchrus* grasses. No sites from this study.

**Plate 5.34: Vegetation unit ChApyAaAbEUaTHt.**

**ChAbTeTw *Corymbia hamersleyana* low open woodland over *Acacia bivenosa* tall shrubland over *Triodia epactia (T. wiseana)* hummock grassland**

This vegetation occurred in minor flowlines between the 30 and 33 km chainages, mainly associated with the Ruth Land System. Other associated species included *Ipomoea muelleri, Stemodia grossa, Streptoglossa decurrens* and *Triumfetta clementii*. This vegetation was in Very Good condition. No sites from this study.

**AtrAcAbApyCE *Acacia trachycarpa, A. coriacea* subsp. *pendens, A. bivenosa, A. pyrifolia* tall open scrub over **Cenchrus ciliaris, *C. setiger* tussock grassland**

This vegetation occurred in a creekline on the eastern side of the rail between approximately the 26 and 27.5 km chainages on the Cape Lambert to Mesa J rail line, and would be associated with the "drainage depressions" land unit, which comprises 4% of the Horseflat Land System (van Vreeswyk et al. 2004). The dominance of the major shrub species varied depending on location within the creekline, and other associated species included *Acacia inaequilatera*. This unit was in Poor condition as a result of infestation by **Cenchrus* grasses. No sites from this study.

**ApyAaTw *Acacia pyrifolia* tall open shrubland over *A. ancistrocarpa* open heath over *Triodia wiseana* open hummock grassland**

This vegetation occurred in minor flowlines through the Ruth Land System between the 41 and 42 km chainages on the Cape Lambert to Mesa J rail line. Other associated species included *Acacia orthocarpa*, and **Cenchrus ciliaris* and **C. setiger* were prominent around the existing rail and on the downstream slope towards the Harding River. This vegetation was in Good to Poor condition depending on the level of invasion by **Cenchrus* species. No sites from this study.

# 5.3 Conservation Significance of the Vegetation Types

## 5.3.1 Overall Vegetation Condition

Given the location of the Cape Lambert to Emu Siding rail corridor (encompassing existing rail structures and access roads), the study area contained significant areas of disturbance; areas of ground historically cleared for the existing infrastructure, as well as for borrow pits, laydown areas, camp sites, etc. These areas typically supported regenerating shrublands of species from the surrounding areas over an very open cover of spinifex which was frequently invaded by large amounts of **Cenchrus* grasses.

Large sections of the study area had been recently burnt, particularly at the northern end of the corridor. By itself this would not be considered to reduce the condition of the vegetation, however areas in the vicinity of Wickham appeared to have been subject to repeated fires coupled with historic clearing, which had resulted in considerable invasion of the loamy plains by Buffel Grass (**Cenchrus ciliaris*) and Birdwood Grass (**C. setiger*).

With respect to weed invasion, there were often substantial infestations of *Cenchrus species in close proximity to the existing rail, however apart from at the northern end of the corridor, these did not typically penetrate far into the surrounding undisturbed habitats stony plains and hills. These species were, however, prevalent along many of the creeklines dissecting the study area, as well as on the broad loamy floodplains of the Harding River.

Overall, the condition of vegetation in the Cape Lambert to Emu Siding rail corridor was considered to be Excellent to Very Good for areas of stony hills, stony plains and clayey plains removed from existing infrastructure; Good to Poor for creeklines infested with *Cenchrus species; and Poor to Completely Degraded for areas mapped as "Disturbed".

### 5.3.2 Assessment at the Level of the Vegetation Types Defined by this Study

The following vegetation types are considered to be of High conservation significance, and clearing of these units should be avoided:

- **Cracking clay communities of the Chichester Range and Mungaroona Range (units H/G and Tw/H)**
  Cracking clay communities of the Chichester Range and Mungaroona Range are listed as a Priority 1 Ecological Community, and are considered to be under threat from grazing (Kendrick and McKenzie 2001; see Section 4.5.2). The area mapped as vegetation units H/G and Tw/H on the broad cracking clay upland between approximately the 53.5 and 59.7 km chainages and the 63.6 and the 64.6 km chainages along the Cape Lambert to Mesa J rail line is considered to comprise this PEC. The vegetation in these areas is generally in Excellent condition.

- **Riparian vegetation of the Harding River and its larger tributaries (principally units EcAamCv, EvMg and EvApyTwTeCE; also EvAtrTeCEc and EvTERcApyTwTeCE)**
  The Harding River comprises the main drainage feature for this locality, and supports dense riparian forest of River Red Gum (*Eucalyptus camaldulensis*), with patches of Cadjeput (*Melaleuca argentea*) in places. Although there is considerable invasion by weeds (mainly *Cenchrus grasses) along the floodplains of this river system, it is still considered to have High conservation value. The additional creekline units dominated by *E. victrix* (see Section 5.2.6.3) are also of significance as they comprise major drainages for these areas. Clearing within these vegetation units should be strictly controlled, and appropriate culverting must be established to maintain existing surface flows through these systems.

The following vegetation types are considered to be of Moderate conservation significance, and clearing should be minimised:

- **Mangrove vegetation (AVm)**
  The small stands of mangal dominated by *Avicennia marina* occur in the north-western corner of the rail corridor are considered to be of Moderate conservation value. Clearing of these areas should be avoided if possible, and otherwise minimised.

- ***Eragrostis xerophila* tussock grasslands on clay (ERAx)**
  Three areas of coastal grassland on cracking clay near Dampier (approximately 25 km to the west of the northern end of the Cape Lambert to Emu Siding rail duplication corridor) are mapped as the Roebourne Plains coastal grasslands Priority 1 Ecological Community (see Section 4.5.2). These areas comprise particularly good quality examples of this community, which is described as "disappearing cracking clays under threat from grazing". While broadly equivalent vegetation (*Eragrostis xerophila* grassland) is widespread over the cracking clay plains in the Dampier to Roebourne locality, it is typically in a somewhat to very degraded condition from historic grazing, physical disturbance and/or weed invasion.

*Eragrostis xerophila* grassland vegetation on clay substrates (unit ERAx; see Section 5.2.5.1) occurs within the current study area at a number of points along the existing Cape Lambert to Mesa J rail line, including:

- Approximately 500 m west of the 12 km chainage (a very small stand between 7712600 mN and 7712350 mN);
- between the 19.2 and 27.5 km chainages (several large swathes between 7704950 mN and 7696250 mN); and
- between the 33 and 36.5 km chainages (one large swathe between 7691500 mN and 7688050 mN).

While some of these areas of vegetation are in Excellent condition (especially on the southernmost plain), none are particularly similar to the areas designated as the PEC near Dampier, and it is questionable whether any of the stands within the rail corridor would be considered to be of equivalent value. Nonetheless, these areas probably warrant a Moderate conservation value ranking.

- **Rockpile vegetation (TERcTw and AcDIsEHsTwCEc)**
  The numerous rockpiles through the rail corridor support species restricted to such habitats, and clearing of these areas should be avoided if possible and otherwise minimised.

The remaining vegetation types are considered to be of Low conservation significance, representing units that are likely to be more widely distributed and relatively well represented in the Chichester subregion. Note that this is not meant to imply that these units have no conservation value, as the majority comprise good quality examples of intact native vegetation, and are therefore inherently valuable: it simply indicates that they are less of a priority for conservation than those identified as High or Moderate. Clearing of these units should be minimised wherever possible.

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# 6.0 Flora

## 6.1 Overview of the Flora of the Study Area

### 6.1.1 Overall Species Richness

A total of 369 taxa of native vascular flora from 145 genera belonging to 57 families has been recorded from the Cape Lambert to Emu Siding project area (including the results from the 2008 survey, together with the quadrats previously sampled in the area during the Cape Lambert Port B Expansion survey (Biota 2008a) and the Dampier Power Station Transmission Line study (Biota 2008c)). In addition, 17 introduced species were recorded (see Section 6.3).

Species richness tends to vary on a logarithmic scale with the size of the study area, and is also affected by the shape of the study area (long linear corridors will tend to intersect a broader range of habitats than more regular rectangular polygons). In comparison with the Cape Lambert to Emu Siding rail corridor, which was some 4,556 ha in size:

- A total of 131 species of native flora from 83 genera belonging to 39 families was recorded from the combined Cape Lambert Substation and Infrastructure Area, which was 40 ha in size and encompassed a small range of near-coastal habitats (Biota 2008b).
- A total of 183 native vascular flora taxa from 94 genera belonging to 41 families was recorded from the Cape Lambert Port B Expansion study area, which was 602 ha in size and included a relatively small range of coastal and near-coastal habitats (Biota 2008a).
- A total of 221 native vascular flora taxa from 105 genera belonging to 40 families was recorded from the Dampier to Cape Lambert Transmission Line Corridor survey area (Biota 2008c). This area was 680 ha in size and extended over some 63 km between the two localities, including a broader geographic range and a greater variety of habitats than those sampled at Cape Lambert.
- A total of 475 native vascular flora species from 177 genera and 60 families was recorded from the Emu Siding to Rosella Siding rail duplication study (Biota 2008d). This study area comprises a series of 39 separate areas, which begin at the southern end of the current study area, extending between the 83 km and 242 km chainages on the Dampier to Tom Price rail line. While this study area is less than half the size of the Cape Lambert to Emu Siding rail corridor (at some 2,145 ha in total size), it covers a broader geographic range than the latter study area and includes large sections of both the Chichester and Hamersley subregions, together with a more diverse array of habitats.
- A total of 437 taxa of native vascular flora from 160 genera belonging to 57 families was recorded from the combined Warramboo Deposit, Yarraloola Borefield and the Mesa A to Mesa J transport corridor (Biota 2006). This study area was 7,045 ha in total, and extended over a geographic distance of some 50 km.
- A total of 331 taxa of native vascular flora from 136 genera belonging to 46 families was recorded from the Bellbird Siding to Juna Downs rail duplication corridor during survey work in 2008 (Biota 2008e). This study area begins 140 km south-south-east of the southern end of the current study area, and extends for some 120 km to the south-east. While it was considerably larger in size than the current study area at 8,982 ha, conditions were less favourable at the time of the field survey and it was therefore sampled less intensively. It also traversed only a single subregion (Hamersley).

Taking into account the disparity in sampling intensity and the different range of habitats encompassed by the various project areas, the number of species recorded from the Cape Lambert to Emu Siding rail corridor appears to be within the range expected for a corridor of this size in this part of the Pilbara. The number of species would be expected to increase with repeated sampling over a range of seasons.

### 6.1.2 Dominant Plant Groups and Species

The families and genera with the greatest number of species are shown in Table 6.1 and Table 6.2 respectively. These families and genera are those that are predominant in the Pilbara and that usually have many representatives on flora lists from this region, due to their presence in the Eremaean flora. Some of the families (eg. Amaranthaceae, Malvaceae and Poaceae) are more species rich in the Northern flora and poorer in the Southern flora whilst others (such as the Mimosaceae) are abundant in all three provinces.

In contrast to these families and genera that have many representatives, 24 families and 77 genera recorded during the survey were only represented by only one taxon (Appendix 5). These included *Cynanchum* (Asclepiadaceae), *Terminalia* (Combretaceae), *Frankenia* (Frankeniaceae), *Potamogeton* (Potamogetonaceae) and *Muellerolimon* (Plumbaginaceae).

The most frequently recorded species across the study area were *Acacia pyrifolia, A. bivenosa, Bonamia media* var. *villosa, Phyllanthus maderaspatensis, Rhynchosia minima, Triodia epactia, T. wiseana* and *Triumfetta clementii*. Some of these species are commonly dominant in the vegetation of the area (eg. the spinifex (*Triodia*) species), or frequently contribute to its structure (eg. *Acacia pyrifolia*); others such as *Triumfetta clementii* are widespread through a variety of habitats at low density.

**Table 6.1: Plant families with the greatest number of native species in the project area.**

| Family | Number of Native Species |
|---|---|
| Poaceae (grass family) | 60 |
| Papilionaceae (peas family) | 42 |
| Malvaceae (hibiscus family) | 27 |
| Amaranthaceae (mulla-mulla family) | 22 |
| Mimosaceae (wattle family) | 23 |
| Chenopodiaceae (saltbush, bluebush family) | 15 |
| Caesalpiniaceae (cassia family) | 14 |
| Convolvulaceae (morning glory family) | 14 |
| Tiliaceae (linden family) | 14 |
| Asteraceae (daisy family) | 12 |
| Cyperaceae (sedge family) | 12 |

**Table 6.2: Genera with the greatest number of native species in the project area.**

| Genus | Number of Native Species |
|---|---|
| *Acacia* (wattles) | 21 |
| *Ptilotus* (mulla-mullas) | 15 |
| *Cassia* (cassias, sennas) | 14 |
| *Tephrosia* (peas) | 13 |
| *Corchorus* (corchorus) | 11 |
| *Sida* (sidas) | 9 |
| *Eragrostis* (lovegrasses) | 8 |
| *Eriachne* (wanderrie grasses) | 8 |
| *Abutilon* (lantern bushes) | 7 |
| *Hibiscus* (hibiscus) | 7 |
| *Indigofera* (peas) | 7 |

# 6.2 Flora of Conservation Significance

## 6.2.1 Probability of Declared Rare Flora Occurring in the Study Area

No DRF listed under the Commonwealth *EPBC Act 1999* or listed by the WA DEC were recorded from the Cape Lambert to Emu Siding rail duplication corridor, and none would be expected to occur (see Sections 4.6.1 and 4.6.2).

## 6.2.2 Priority Flora Occurring in the Study Area

Two Priority species were recorded from the Cape Lambert to Emu Siding rail duplication corridor, the locations of which should be avoided:

- ***Nicotiana heterantha* (Priority 1)**
  This annual herb (Plate 6.1) is described on FloraBase as occurring on heavy clays on seasonally wet flats. A single specimen was collected from vegetation unit EcEvHAi at the southern edge of the Harding Dam floodout area (Table 6.3). Given the annual growth form and slender habit of this species, it may well be more broadly distributed through the rail corridor. This record represents a substantial range extension to the north-west within the Pilbara; this species is also known from the western Kimberley.

**Table 6.3: Record of *Nicotiana heterantha* from the Cape Lambert to Emu Siding rail corridor.**

| Location | Easting (mE) | Northing (mN) | Density |
|---|---|---|---|
| EMU32 | 509527 | 7675320 | scattered |

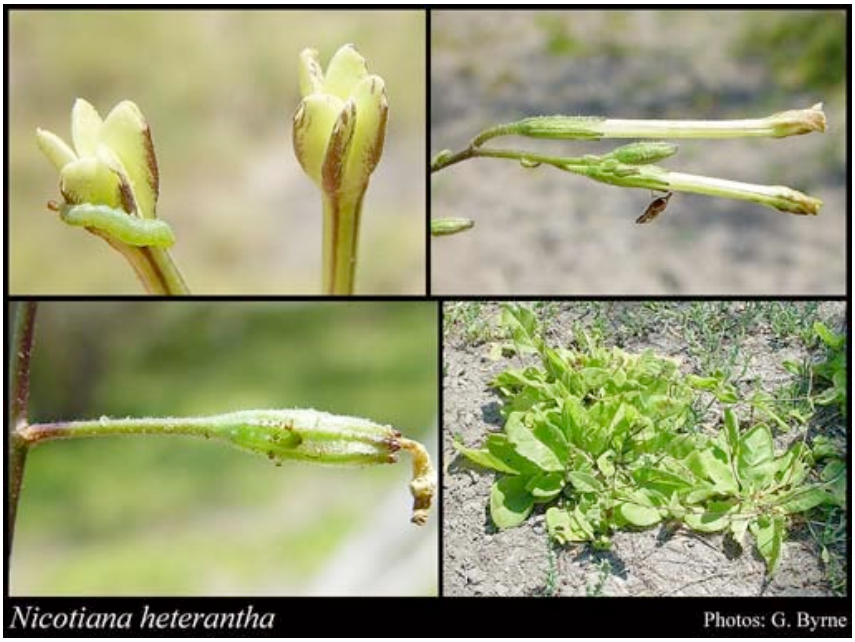


**Plate 6.1: Flowers and habit of *Nicotiana heterantha*** (photography by G. Byrne; image used with the permission of the Western Australian Herbarium, Department of Environment and Conservation (http://florabase.calm.wa.gov.au/help/copyright); accessed on Wednesday, 06/08/08).

- ***Hibiscus brachysiphonius* (Priority 3)**
  This perennial herb / low shrub had a broad distribution from the Carnarvon bioregion through to the Kimberley, with most vouchered specimens collected from the Pilbara. It typically occurs on heavy clay substrates, often with gilgai. This species was recorded as scattered individuals at three widely separated locations in the rail corridor: approximately 200 m west of the 25.5 km chainage, less than 100 m east of the 33.2 km chainage, and 100 m west of the 51.1 km chainage on the Cape Lambert to Mesa J line (Table 6.4). All of the records were from

areas of heavy clay supporting *Eragrostis xerophila* grasslands, which had a variable overstorey ranging from Snakewood (*Acacia xiphophylla*) shrubland, virtually no overstorey, and samphire low shrubland for the three locations respectively. Given the inconspicuous nature of this low shrub/perennial herb, and the broad extent of suitable habitat through this corridor, it is likely that this species is more widely distributed within the study area.

**Table 6.4: Records of *Hibiscus brachysiphonius* from the Cape Lambert to Emu Siding rail corridor.**

| Location | Easting (mE) | Northing (mN) | Density |
|---|---|---|---|
| EMU15 | 509938 | 7698715 | scattered |
| EMU21 | 510844 | 7691154 | scattered |
| OPP-M17 | 509536 | 7676500 | x7 |

### 6.2.3 Probability of Other Priority Flora Occurring in the Study Area

One of the Priority flora previously known from the broader locality was collected by the current study (*Hibiscus brachysiphonius*; see Section 6.2.2). Of the other Priority species occurring in the locality (see Section 4.6.3):

- The Priority 3 *Acacia glaucocaesia* has been recorded from locations both east and west of the northern end of the corridor, and this species could occur within the rail corridor, particularly scattered on the broad near-coastal plains.
- The Priority 3 *Terminalia supranitifolia* may occur on the basalt rockpiles scattered through the corridor (vegetation units TERcTw and AcDIsEHsTwCEc).
- There is suitable habitat for the remaining species in the heavy clay plains (particularly vegetation units ERAx and H/G), and any of these species could potentially occur through the corridor. If present, *Helichrysum oligochaetum* would probably only be visible during optimal conditions (after substantial winter rainfall).

### 6.2.4 Other Flora of Conservation Interest in the Study Area

#### 6.2.4.1 Undescribed Species

- **Malvaceae family**

The Malvaceae family has a high species diversity in the Pilbara bioregion, with a large number of undescribed taxa. The identifications of *Abutilon, Hibiscus* and *Sida* specimens in particular are often difficult to resolve, and frequently appear to represent undescribed or new taxa. Similarly, the genera *Indigofera* and *Tephrosia* within the Papilionaceae family contain numerous distinct taxa in the Pilbara, particularly within the *Indigofera "monophylla", Tephrosia "clementii," T. "densa," T. "rosea,"* and *T. "supina"* complexes. All of the undescribed taxa recorded from the Cape Lambert to Emu Siding rail corridor have been recorded previously from other study areas in the region.

- ***Euphorbia* spp.**

The genus *Euphorbia* is similarly diverse within the Pilbara, and contains a large number of undescribed species. The undescribed taxa recorded from the current study area have all been recorded from other survey areas in the region.

- ***Triodia* spp.**

Within the Pilbara, there is considerable variation within the named spinifex species, particularly within *Triodia angusta, T. epactia* and *T. wiseana*. These are likely to represent groups of species rather than single entities, however a complete revision of this genus would be required to determine this.

#### 6.2.4.2 Range Extensions

On the basis of comparison with species' distributions presented on the WA Herbarium's FloraBase, the following records from the Cape Lambert to Emu Siding rail duplication corridor appear to represent range extensions:

- The record of *Nicotiana heterantha* represents a considerable north-western range extension in the Pilbara.
- The record of *Acacia pachyacra* represents a northern range extension in the Pilbara.
- The record of *Swainsona canescens* is a northern extension in the Pilbara, and appears to be the first record for the Chichester subregion.
- The records of *Bulbostylis turbinata* and *Phyllanthus erwinii* represent northern range extensions in the Pilbara based on vouchered specimens, however these species have been collected previously from the northern coastal areas.
- The record of *Tephrosia rosea* var. *venulosa* ms. is a slight western extension for the Pilbara, however this species has been collected previously from this locality (eg. the Cape Lambert Port B Expansion area; Biota 2008a).
- The record of *Polygala linariifolia* represents a considerable western extension in the Pilbara, however this species has been collected previously from the locality (eg. the Dampier Power Station transmission line corridor; Biota 2008c).
- Although there are no vouchered specimens of *Tephrosia simplicifolia* from the Pilbara, this species has been recorded on other surveys in the region, including the recent surveys of the Cape Lambert Port B Expansion area (Biota 2008a) and the Dampier Power Station Transmission Line corridor (Biota 2008c).
- **Vitex trifolia* var. *subtrisecta* has only been vouchered to date from the Kimberley, however a specimen was also recently recorded in the Cape Lambert Port B Expansion area (Biota 2008a; see Section 6.3).

## 6.3 Introduced Flora (Weeds)

The 17 weed species recorded from the Cape Lambert to Emu Siding rail duplication corridor are summarised in Table 6.5. Most of these species are common and widespread weeds of the Pilbara, however some are only infrequently recorded in the region (eg. **Opuntia stricta, *Vitex trifolia* var. *subtrisecta* and **Phyla nodiflora*).

One of the species is listed as a Declared Plant under the *Agriculture and Related Resources Protection Act 1976:* all Prickly Pears (**Opuntia* species) are listed as P1 (movement is prohibited) and P2 (aim is to eradicate infestation) for the Pilbara. While not listed as Declared Plants, Kapok Bush (**Aerva javanica*) and the two **Cenchrus* species are considered to be serious environmental weeds.

**Table 6.5: Summary of weed species recorded from the Cape Lambert to Emu Siding rail duplication corridor.**

| Species | No. of Records | Distribution through the Study Area |
|---|---|---|
| **Family Cactaceae** | | |
| **Opuntia stricta* | 1 (2 plants) | Single record at northern end |
| **Family Lamiaceae** | | |
| **Vitex trifolia* var. *subtrisecta* | 1 (1 plant) | Single record at northern end |
| **Family Amaranthaceae** | | |
| **Aerva javanica* | 87+ | Widespread, mainly close to existing disturbance areas |
| **Family Poaceae** | | |
| **Cenchrus ciliaris* | 263+ | Widespread; particularly abundant near existing disturbance areas, on coastal dunes and along creeklines |
| **Cenchrus setiger* | 105+ | Widespread; particularly abundant near existing disturbance areas, on coastal dunes and along creeklines |
| **Cynodon dactylon* | 19 | Along creeklines and floodplains in southern half of corridor |
| **Echinochloa colona* | 2 | Central section of corridor associated with Harding River system |
| **Setaria verticillata* | 1 | Central section of corridor in Harding River |
| **Family Cucurbitaceae** | | |
| **Citrullus colocynthis* | 7 | Central section of corridor in Harding Dam floodout area |
| **Cucumis melo* subsp. *agrestis* | 17 | Central section of corridor in Harding Dam floodout area, Harding River itself and a tributary |
| **Cucumis* sp. | 52 | Between the 16 km and 64 km chainages, mainly on clay or in creeklines |
| **Family Malvaceae** | | |
| **Malvastrum americanum* | 6 | Scattered in creeklines between the 25 and 51 km chainages |
| **Family Passifloraceae** | | |
| **Passiflora foetida* var. *hispida* | 2 | Northern third of corridor |
| **Family Verbenaceae** | | |
| **Phyla nodiflora* | 1 | Central section of corridor in Harding River |
| **Family Portulacaceae** | | |
| **Portulaca oleracea* | 87 | Widespread throughout the corridor, including in apparently undisturbed areas |
| **Family Asteraceae** | | |
| **Sigesbeckia orientalis* | 1 | Southern end of the corridor, in Western Creek |
| **Family Mimosaceae** | | |
| **Vachellia farnesiana* | 13 | Between 18 km and 40 km chainages, mainly on clayey plains |

Each of the species is described in more detail below:

- ****Opuntia stricta* (Common Prickly Pear)** is a fleshy perennial shrub with a spreading to erect habit, growing to 1 m, or rarely as high as 2 m. One mature plant and a seedling were recorded from the same location towards the northern end of the rail corridor, growing at the base of a Eucalypt (Plate 6.2). These plants should be eradicated as soon as possible.

**Plate 6.2: Mature plant of **Opuntia stricta*.**

- ****Vitex trifolia* var. *subtrisecta* (Three Leaved Chaste Tree)** is a medium to large shrub species, typically found amongst closed tussock grassland in sand, clay and in disturbed vegetation (FloraBase). A single tall shrub of this species was recorded only 120 m south of the Prickly Pear plants, and this shrub should be controlled at the same time. Although this species has only been vouchered to date from the Kimberley, a specimen was also recently recorded approximately 10 km to the north-west in the Cape Lambert Port B Expansion area (Biota 2008a).

**Plate 6.3: Habit, and uni- and tri-foliate leaves of **Vitex trifolia* var. *subtrisecta*.**

- ****Aerva javanica* (Kapok Bush)** is a short-lived perennial which is typically found growing in disturbed native vegetation, particularly along vehicle tracks, around rocky outcrops, along creeklines and associated floodplains, and in sandy coastal habitats.

  **Aerva javanica* was recorded 87 times from the study area; these records were representative only, as this species was widespread through the entire rail corridor. While most records were of scattered individuals in close proximity to the existing rail line and/or access roads, there were occasional dense infestations (Plate 6.4).

**Plate 6.4: Dense **Aerva javanica* growing along rail through the Harding Dam floodout area (52 km chainage).**

- ***Cenchrus ciliaris* (Buffel Grass)** and ***C. setiger* (Birdwood Grass)** are tufted perennial grasses which were introduced to the Pilbara as fodder species. **Cenchrus ciliaris* has demonstrated allelopathic capacities, whereby it releases chemicals that inhibit the growth of other plants, and it is an aggressive and effective competitor with native flora species. This perennial grass forms dense tussock grasslands, particularly along creeklines, floodplains and in sandy coastal areas. Infestations of this species are common throughout the Hamersley Range, particularly in major creeklines, and in sandy coastal areas of the Pilbara. **Cenchrus ciliaris* was recorded 263 times from the rail corridor and was present in approximately 65% of the quadrats and relevés sampled. It was most abundant in disturbed areas (eg. near Wickham, and close to the existing rail line and access roads), on the sandy coastal dune habitats (Plate 5.4), and along creeklines and floodplains (Plate 5.32). **C. setiger* was recorded 105 times through the study area from the same sorts of areas, including from almost a quarter of the quadrats and relevés. These records do not represent the entire locations for these species, which should be considered widespread throughout the rail 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. This grass was recorded at 19 locations within the southern half of the rail corridor between the 44 km and 64 km chainages on the Cape Lambert to Mesa J rail line, including at seven of the quadrats and one of the relevés sampled. This species was always recorded within relatively mesic creekline or floodplain habitats.

- ***Echinochloa colona* (Awnless Barnyard Grass)** is a tufted, annual grass that grows on sand or clay near watercourses and swamps. This grass was recorded at two locations in the central section of the survey area, both associated with the Harding River drainage system.

- ***Setaria verticillata* (Whorled Pigeon Grass)** is a loosely-tufted annual grass to 1m tall, which is a common and widespread weed of disturbed land, riverine edges and shrublands throughout the State, including through the Kimberley and Pilbara regions. This grass was recorded once from the Harding River, in the central section of the corridor, but is probably more widespread through creekline and floodplain habitats in the study area.

- ***Citrullus colocynthis* (Colocynth)** is a trailing perennial herb or climber (Plate 6.5) which is widespread through the State from near Perth to the Kimberley region. In the Pilbara it is commonly found growing adjacent to disturbed areas, as well as along creeklines and on floodplains. This weed was recorded at seven locations in the central section of the rail corridor, all associated with the Harding Dam floodout area.

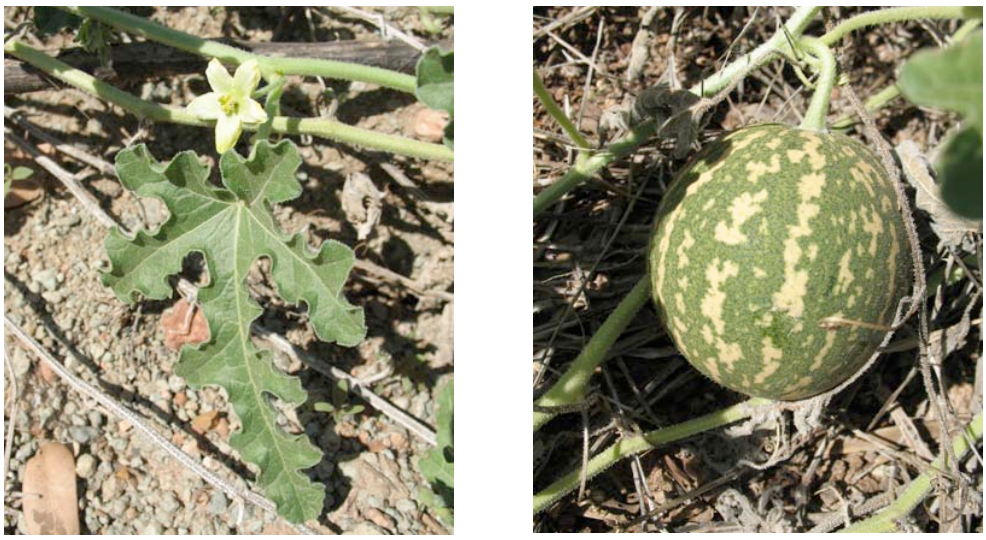

**Plate 6.5: Deeply divided and lobed leaf and distinctively mottled fruit of **Citrullus colocynthis*.**

- ***Cucumis melo* subsp. *agrestis* (Ulcardo Melon)** is a widespread weed through the Kimberley and Pilbara regions, extending south into the Gascoyne bioregion. This trailing melon (Plate 6.6) was recorded from 17 locations in the central section of the rail corridor, mainly in the Harding Dam floodout area, with a few records from the Harding River itself and a tributary of this river to the north.

**Plate 6.6:** ***Cucumis melo* subsp. *agrestis* (foreground) with *Cucumis* sp. (background).**

- ***Cucumis* sp.:** A species of *Cucumis* was recorded which could not be positively identified, but is considered likely to be a weed. While there are some apparently equivalent specimens included amongst the **Cucumis melo* subsp. *agrestis* collections at the WA Herbarium, these appear to differ from this species in having more distinctly lobed leaves (Plate 6.6 and Plate 6.7), and larger and broader fruit which are somewhat three or four-sided in cross-section (rather than smoothly oval; see Plate 6.7). This species was recorded between approximately the 19 km and 64 km chainages on the Cape Lambert to Mesa J rail line, occurring in clayey habitats or associated with drainage areas. This species was also recorded from the Emu Siding to Rosella Siding development areas to the south of the current study area (Biota 2008d).

**Plate 6.7:** ***Cucumis* sp.:** (clockwise from top left): distinctly lobed leaves of **Cucumis* sp. (foreground) compared to **Cucumis melo* subsp. *agrestis* (background); leaves and unripe fruit; seeds; ripe fruit showing purplish blush.

- ***Malvastrum americanum* (Spiked Malvastrum)** is a low shrub / perennial herb, which is widespread through the northern half of WA. In the Pilbara, this species is typically recorded from Mulga vegetation or creekline and floodplain habitats. This weed was recorded at six locations in the survey area between approximately the 25 km and 51 km chainages on the Cape Lambert to Mesa J rail line, and was typically associated with creeklines.

- ***Passiflora foetida* var. *hispida* (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 climber was recorded at two locations in the northern third of the rail corridor, including a creekline (EMU-MB) and a previously disturbed plain (EMU02).

- ***Phyla nodiflora* (Lippia)** is a spreading perennial herb to 30 cm tall, which is widespread through WA from Perth to the Kimberley. It is listed on FloraBase as occurring at the margins of wetlands and in coastal dune fields. This species was recorded at a single location in the Harding River, in the central section of the rail corridor.

- ***Portulaca oleracea* (Purslane / Pigweed)** is a succulent, usually prostrate, annual herb, which grows throughout the State and is common through the Pilbara. It is often found at sites that have been previously disturbed, and prefers sandy or clay-loam soils. The classification of this species on FloraBase has only recently changed from 'native to WA' to an introduced/alien status. Purslane was recorded from 87 locations throughout the rail corridor, including several areas which did not appear to have been previously disturbed.

- ***Sigesbeckia orientalis* (Indian Weed)** is a slender herbaceous daisy occurring through the southern Pilbara, particularly in Mulga vegetation, drainage areas and rocky habitats. This species was recorded from a single location in Western Creek, in the southern section of the rail corridor.

- ***Vachellia farnesiana* (Mimosa Bush)** is a tall spiny shrub which is widespread from the Kimberley to near Perth, typically occurring along drainage systems and in adjacent low-lying areas. This shrub was recorded at 13 locations in the rail corridor, between the 18 km and 40 km chainages on the Cape Lambert to Mesa J rail line. It was typically associated with clayey plains (particularly drainage areas through these), with one record from the Harding River.

# 7.0 Summary and Recommendations

## 7.1 Vegetation of Conservation Significance

Away from historic disturbance areas (eg. the existing rail line and access road corridor, old camp sites, borrow pits, etc), the vegetation types of the Cape Lambert to Emu Siding rail corridor were generally in Very Good to Excellent condition. Exceptions included sections of creekline and floodplain habitats, which were in Poor condition due to extensive invasion by perennial **Cenchrus* tussock grasses.

While none of the vegetation types identified within the rail corridor are listed under the *EPBC Act 1999*, nor are any defined as TECs by the DEC, a number were identified as having particular conservation significance (Table 7.1). Two of the vegetation units (H/G and Tw/H) would comprise the "cracking clay communities of the Chichester Range" PEC, while riparian vegetation of the Harding River and other major drainages was also considered to be of High significance. Vegetation of Moderate significance was considered to include mangal (unit AVm), vegetation of cracking clays (principally unit ERAx) and rockpile vegetation (unit TERcTw and AcDIsEHsTwCEc). Disturbance to the vegetation types of High significance should be avoided, and strictly minimised if this is not possible. No non-essential infrastructure should be located in these habitats. Appropriate culverting will also be required where drainage systems are intersected. Disturbance to the vegetation types of Moderate significance should be strictly minimised.

**Table 7.1: Summary of vegetation units of particular conservation significance identified during this study.**

| Vegetation Code | Description | Conservation Significance |
|---|---|---|
| H/G, Tw/H | Annual herblands / grasslands and hummock grasslands on cracking clays of the Pyramid Land System | High |
| EcAamCv, EvMg, EvAtrTeCEc, EvTERcApyTwTeCE, EvApyTwTeCE | Riparian vegetation of the Harding River system and other major drainages | High |
| AVm | Mangrove vegetation dominated by *Avicennia marina* | Moderate |
| ERAx | *Eragrostis xerophila* tussock grasslands on clay | Moderate |
| TERcTw, AcDIsEHsTwCEc | Rockpile vegetation | Moderate |

## 7.2 Flora of Conservation Significance

No Declared Rare Flora species or flora species listed under the *EPBC Act 1999* were recorded from the Cape Lambert to Emu Siding rail corridor, and none would be expected to occur.

Two Priority flora species were recorded from the rail corridor as summarised in Table 7.2 and mapped in Appendix 3. Disturbance to these Priority flora populations should be avoided in the design and construction of the rail duplication, and clearing of the vegetation type/s supporting them should be minimised.

**Table 7.2: Summary of Priority flora species recorded during this study.**

| Species | Ranking | Locations in Easting and Northing (WGS84) | Vegetation Type |
|---|---|---|---|
| *Nicotiana heterantha* | Priority 1 | 509527 mE, 7675320 mN | EcEvHAi (also potentially EcEvERAf and floodout mosaic) |
| *Hibiscus brachysiphonius* | Priority 3 | 509938 mE, 7698715 mN | ERAx, AxTwERAxCEc, floodout mosaic |
| | | 510844 mE, 7691154 mN | |
| | | 509536 mE, 7676500 mN | |

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- Mr Greg Guerin (Plant Identification Officer, WA Herbarium) determined or confirmed several specimens, including *Goodenia* and *Rostellularia* specimens.
- Mr Paul Sawers and Mr Luke Lovell (Biota) prepared all mapping in this report.

# 9.0 References


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# Appendix 1

## Framework for Conservation Significance Ranking of Communities and Species

## A. Definitions, Categories and Criteria for Threatened and Priority Ecological Communities

### 1. General Definitions

**Ecological Community**
A naturally occurring biological assemblage that occurs in a particular type of habitat.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Possible threatened ecological communities that do not meet survey criteria are added to DEC's Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

An **assemblage** is a defined group of biological entities.

**Habitat** is defined as the areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (eg. substrate and topography), and the biotic factors.

**Occurrence:** a discrete example of an ecological community, separated from other examples of the same community by more than 20 metres of a different ecological community, an artificial surface or a totally destroyed community.

By ensuring that every discrete occurrence is recognised and recorded future changes in status can be readily monitored.

**Adequately Surveyed** is defined as follows:
"An ecological community that has been searched for thoroughly in most likely habitats, by relevant experts."

**Community structure** is defined as follows:
"The spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage" (eg. Eucalyptus salmonophloia woodland over scattered small shrubs over dense herbs; structure in a faunal assemblage could refer to trophic structure, eg. dominance by feeders on detritus as distinct from feeders on live plants).

Definitions of **Modification** and **Destruction** of an ecological community:

**Modification:** "changes to some or all of ecological processes (including abiotic processes such as hydrology), species composition and community structure as a direct or indirect result of human activities. The level of damage involved could be ameliorated naturally or by human intervention."

**Destruction:** "modification such that reestablishment of ecological processes, species composition and community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention."

**Note:** Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgement. Examples of modification and total destruction are cited below:

Modification of ecological processes: The hydrology of Toolibin Lake has been altered by clearing of the catchment such that death of some of the original flora has occurred due to dependence on fresh water. The system may be bought back to a semblance of the original state by redirecting saline runoff and pumping waters of the rising underground watertable away to restore the hydrological balance. Total destruction of downstream lakes has occurred due to hydrology being altered to the point that few of the original flora or fauna species are able to tolerate the level of salinity and/or water logging.

Modification of structure: The understorey of a plant community may be altered by weed invasion due to nutrient enrichment by addition of fertiliser. Should the additional nutrients be removed from the system the balance may be restored, and the original plant species better able to compete. Total destruction may occur if additional nutrients continue to be added to the system causing the understorey to be completely replaced by weed species, and death of overstorey species due to inability to tolerate high nutrient levels.

Modification of species composition: Pollution may cause alteration of the invertebrate species present in a freshwater lake. Removal of pollutants may allow the return of the original inhabitant species. Addition of residual highly toxic substances may cause permanent changes to water quality, and total destruction of the community.

**Threatening processes** are defined as follows:
"Any process or activity that threatens to destroy or significantly modify the ecological community and/or affect the continuing evolutionary processes within any ecological community."

Examples of some of the continuing threatening processes in Western Australia include: general pollution; competition, predation and change induced in ecological communities as a result of introduced animals; competition and displacement of native plants by introduced species; hydrological changes; inappropriate fire regimes; diseases resulting from introduced micro-organisms; direct human exploitation and disturbance of ecological communities.

**Restoration** is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

**Rehabilitation** is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

**2. Definitions and Criteria for Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable Ecological Communities**

**ECOLOGICAL COMMUNITIES**

**Presumed Totally Destroyed (PD)**
An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies ( A or B):

A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or

B) All occurrences recorded within the last 50 years have since been destroyed

**Critically Endangered (CR)**
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):

   i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);

   ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

   i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;

iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

**Endangered (EN)**
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

**Vulnerable (VU)**
An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

## 3. Definitions and Criteria for Priority Ecological Communities

**PRIORITY ECOLOGICAL COMMUNITY LIST**
Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community Lists under Priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological Communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

**Priority One:** Poorly-known ecological communities
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.

**Priority Two:** Poorly-known ecological communities
Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

**Priority Three:** Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;

(iii) communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

**Priority Four:** Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(a) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

(c) Ecological communities that have been removed from the list of threatened communities during the past five years.

**Priority Five:** Conservation Dependent ecological communities
Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

**Reference:** Department of Environment and Conservation 2007.

## B. 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:**

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# 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 Bendering 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*

**E = Excellent** (=Pristine of BushForever)
Pristine or nearly so; no obvious signs of damage caused by the activities of European man.

**VG = Very Good** (= Excellent of BushForever)
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 **Ursinia anthemoides* or **Briza* spp., or occasional vehicle tracks.

**G = Good** (= Very Good of BushForever)
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 **Ehrharta* spp.

**P = Poor** (= Good of BushForever)
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 **Ehrharta* spp.

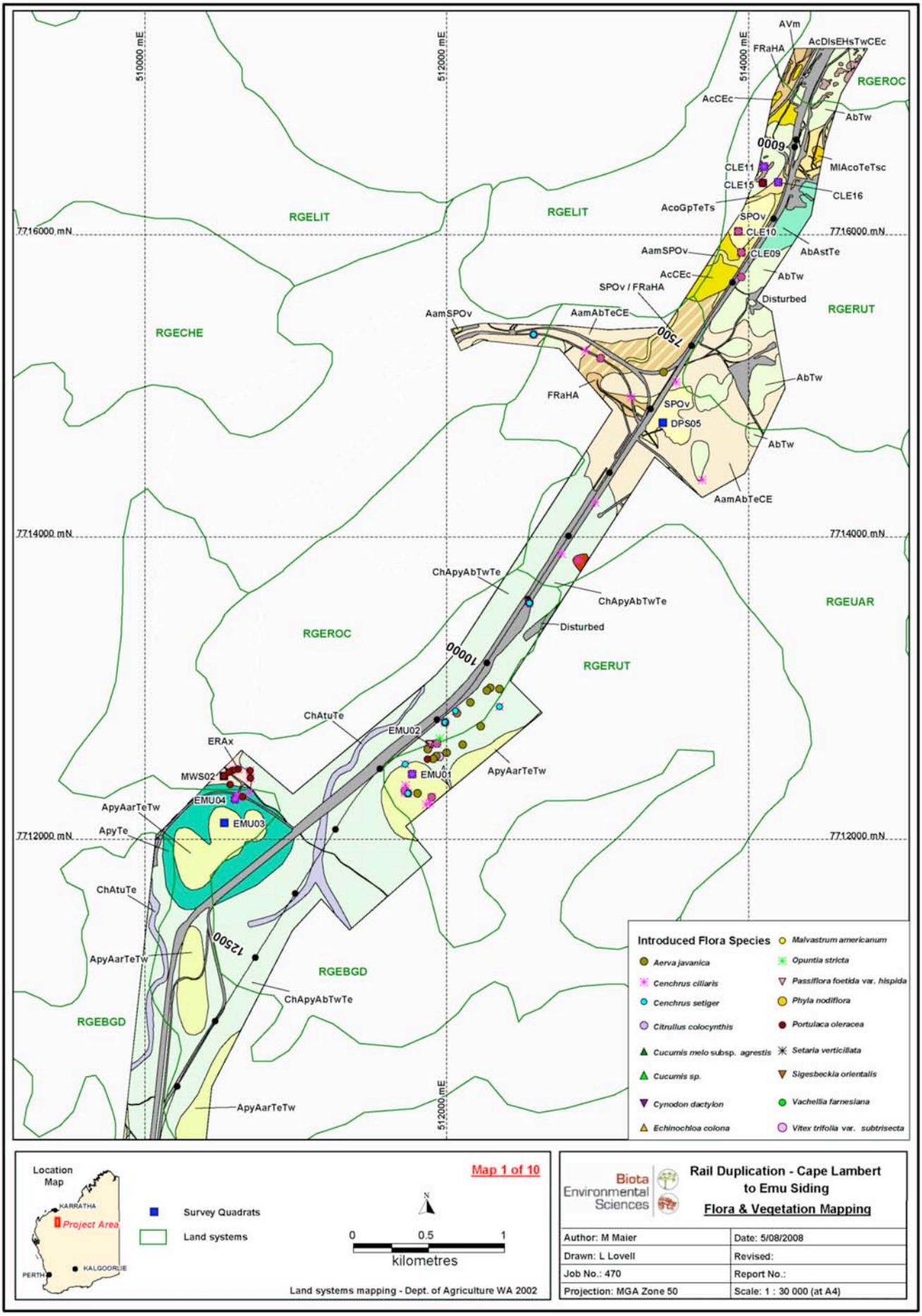
**VP = Very Poor** (= Degraded of BushForever)
Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species including very aggressive species.

**D = Completely Degraded** (= Completely Degraded of BushForever)
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.

* 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

## Vegetation Types, Priority Flora Locations and Weed Locations Recorded within the Study Area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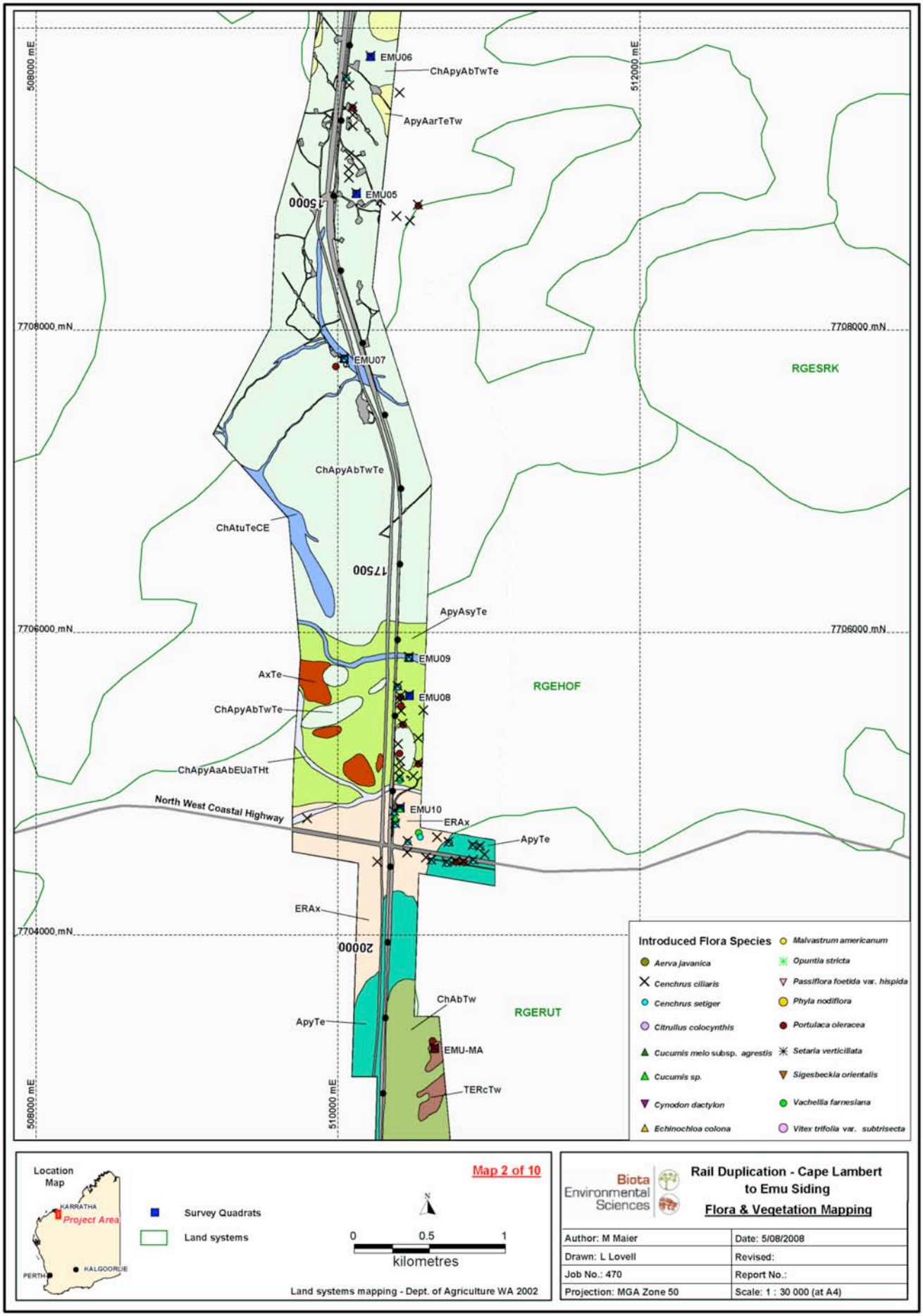
RGECHE
RGEROC
RGERUT
RGEUAR
RGEBGD
AVm
AcDlsEHsTwCEc
FRaHA
AcCEc
AbTw
0009
CLE11
MlAcoTeTsc
CLE15
CLE16
AcoGpTeTs
SPOv
CLE10
AamSPOv
CLE09
AbAstTe
SPOv / FRaHA
Disturbed
AamAbTeCE
7500
DPS05
ChApyAbTwTe
10000
ChAtuTe
EMU02
ERAx
MWS02
EMU01
ApyAarTeTw
EMU04
EMU03
ApyTe
12500
Introduced Flora Species
Aerva javanica
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Malvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
KARRATHA
Project Area
PERTH
KALGOORLIE
Survey Quadrats
Land systems
Map 1 of 10
N
0
0.5
1
kilometres
Land systems mapping - Dept. of Agriculture WA 2002
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
Scale: 1 : 30 000 (at A4)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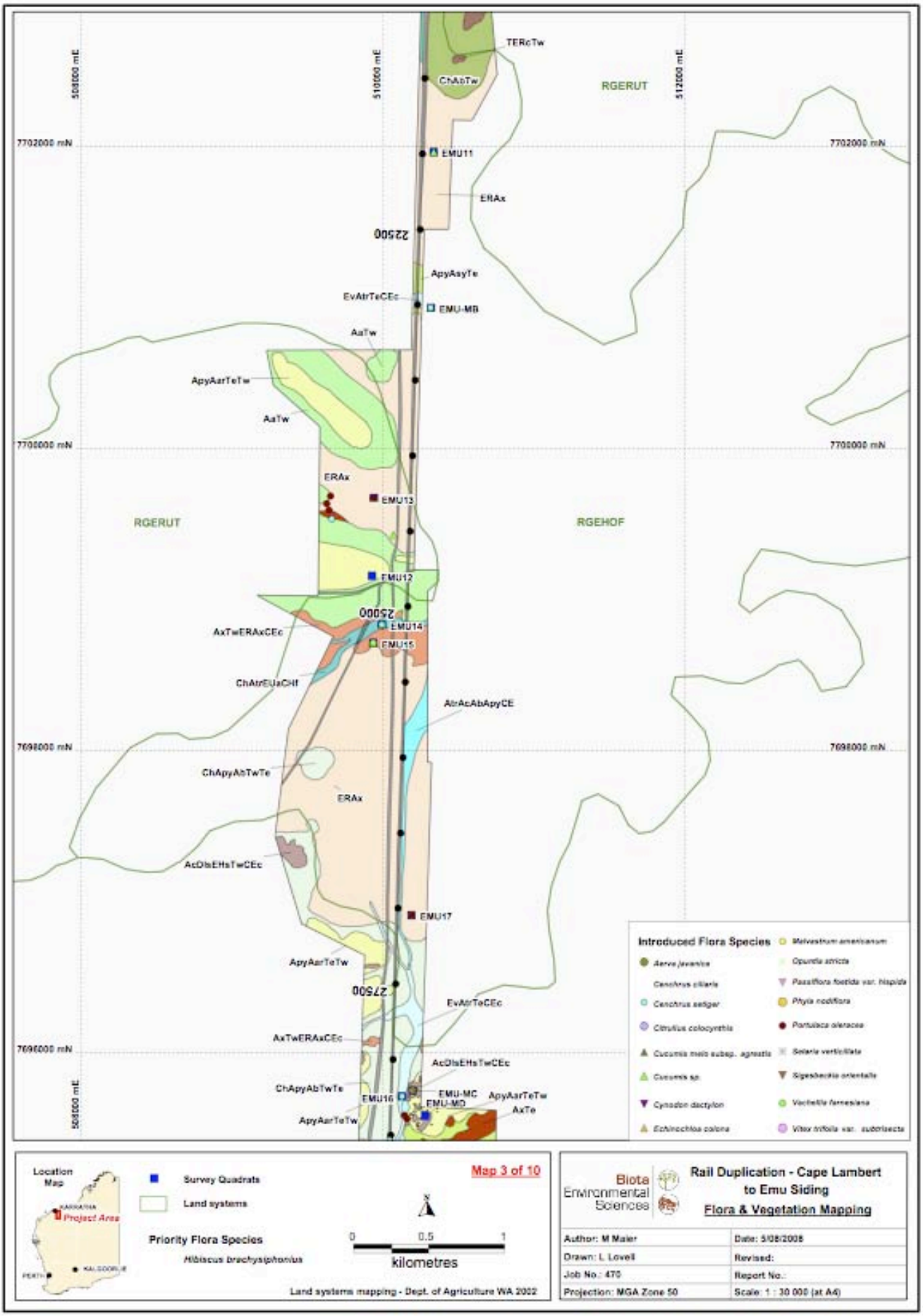
ApyAarTeTw
EMU05
15000
EMU07
RGESRK
ChApyAbTwTe
ChAtuTeCE
17500
ApyAsyTe
EMU09
AxTe
EMU08
RGEHOF
ChApyAbTwTe
ChApyAaAbEUaTHt
North West Coastal Highway
EMU10
ERAx
ApyTe
ERAx
20000
ChAbTw
ApyTe
RGERUT
EMU-MA
TERcTw
510000 mE
Introduced Flora Species
Aerva javanica
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Malvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
KARRATHA
Project Area
PERTH
KALGOORLIE
Survey Quadrats
Land systems
Map 2 of 10
N
0
0.5
1
kilometres
Land systems mapping - Dept. of Agriculture WA 2002
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
Scale: 1 : 30 000 (at A4)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512000 mE
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7700000 mN
7698000 mN
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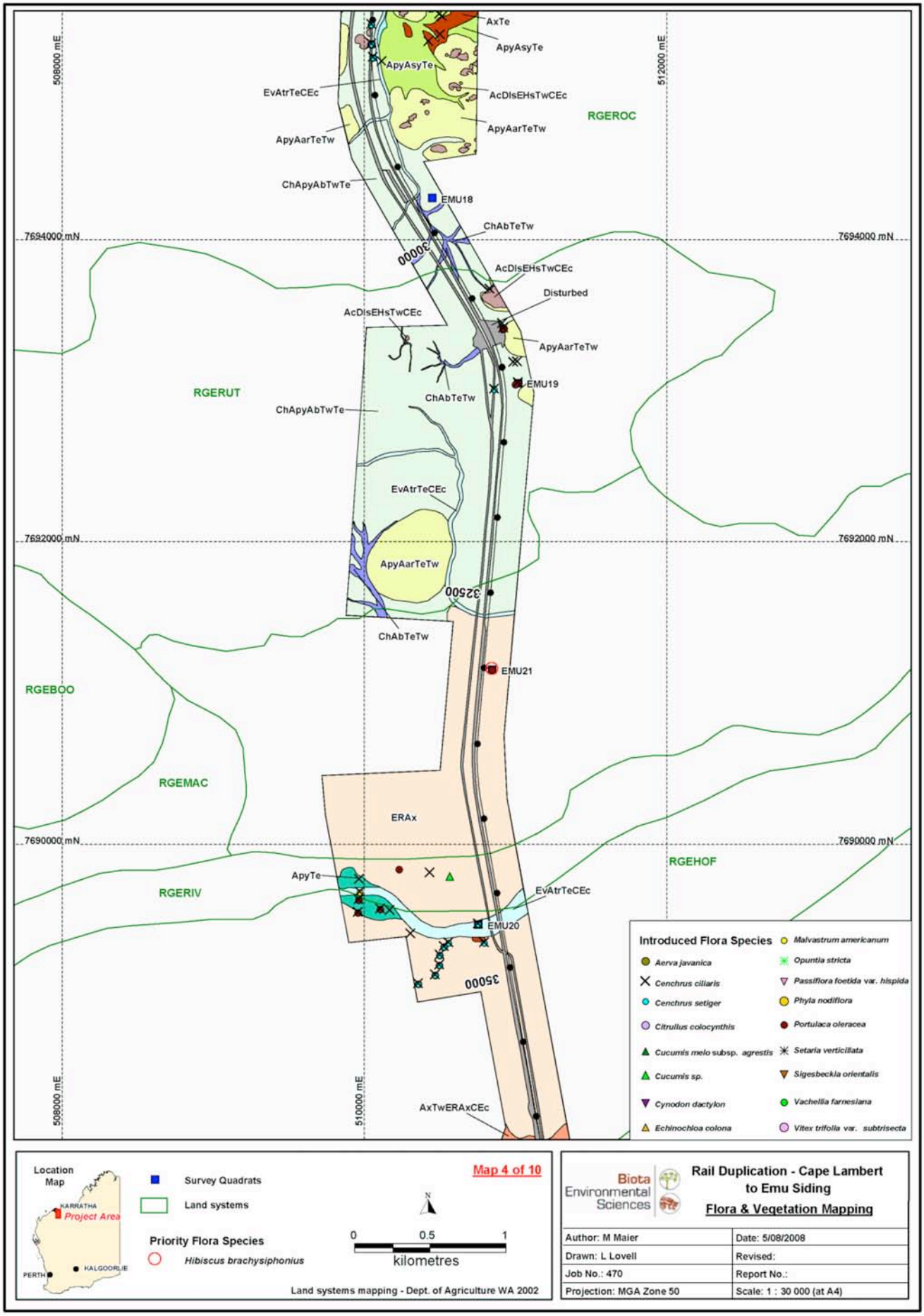
ChAbTw
RGERUT
EMU11
ERAx
22500
ApyAsyTe
EvAtrTeCEc
EMU-MB
AaTw
ApyAarTeTw
AaTw
ERAx
EMU13
RGERUT
RGEHOF
EMU12
25000
AxTwERAxCEc
EMU14
EMU15
ChAtrEUaCHf
AtrAcAbApyCE
ChApyAbTwTe
ERAx
AcDbsEHsTwCEc
EMU17
ApyAarTeTw
27500
EvAtrTeCEc
AxTwERAxCEc
AcDbsEHsTwCEc
ChApyAbTwTe
EMU16
EMU-MC
EMU-MD
ApyAarTeTw
AxTe
ApyAarTeTw
Introduced Flora Species
Aerva javanica
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Melvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
Project Area
KARRATHA
KALGOORLIE
PERTH
Survey Quadrats
Land systems
Priority Flora Species
Hibiscus brachysiphonius
Map 3 of 10
0
0.5
1
kilometres
Land systems mapping - Dept. of Agriculture WA 2002
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
Scale: 1 : 30 000 (at A4)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EMU18
ChAbTeTw
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Disturbed
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ApyAarTeTw
EMU19
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ChAbTeTw
ChApyAbTwTe
EvAtrTeCEc
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32500
ChAbTeTw
EMU21
RGEBOO
RGEMAC
ERAx
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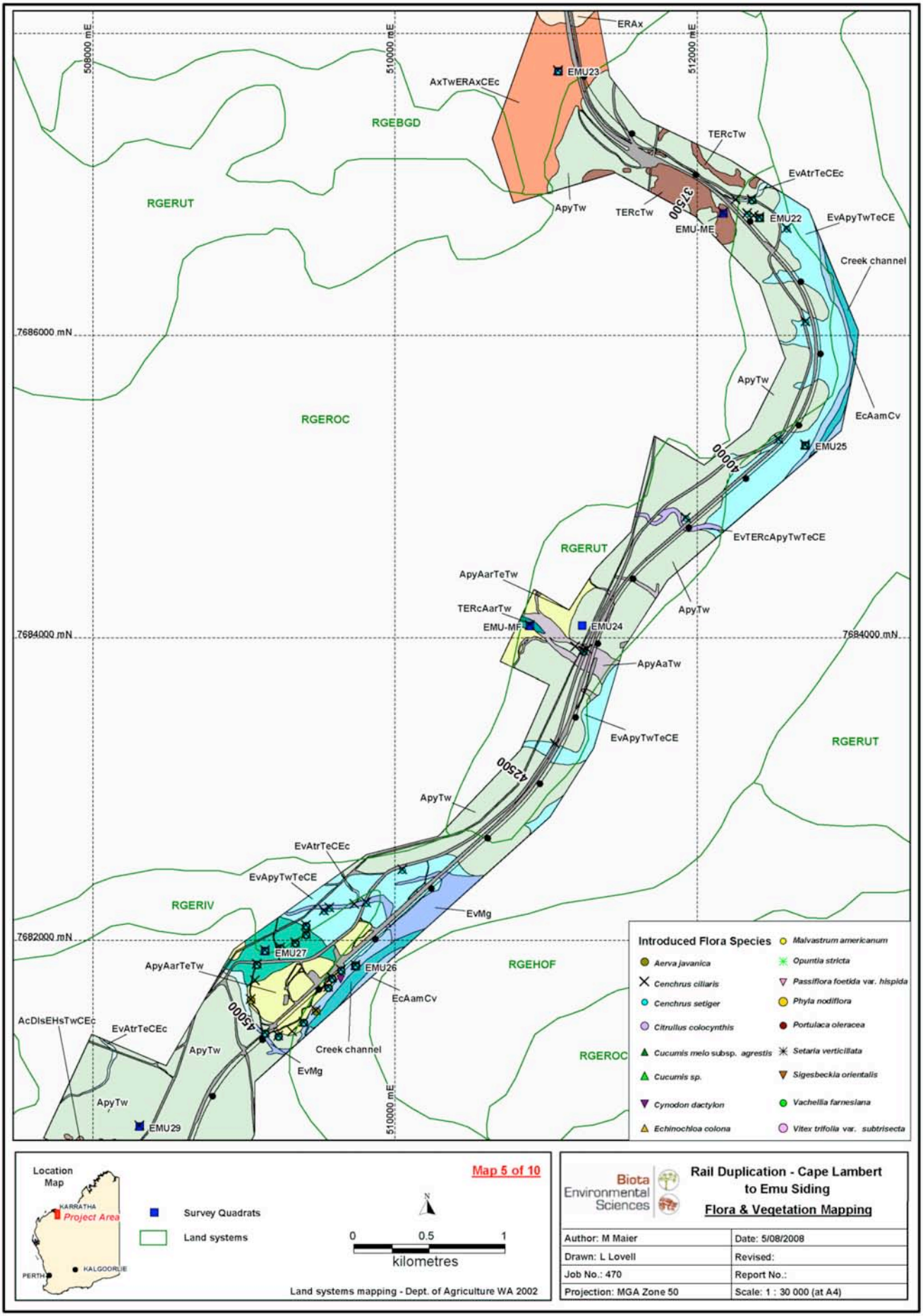
RGEHOF
ApyTe
RGERIV
EvAtrTeCEc
EMU20
35000
AxTwERAxCEc
510000 mE
Introduced Flora Species
Aerva javanica
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Malvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
KARRATHA
Project Area
PERTH
KALGOORLIE
Survey Quadrats
Land systems
Priority Flora Species
Hibiscus brachysiphonius
Map 4 of 10
N
0
0.5
1
kilometres
Land systems mapping - Dept. of Agriculture WA 2002
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
Scale: 1 : 30 000 (at A4)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TERcTw
EvAtrTeCEc
ApyTw
TERcTw
37500
EMU-ME
EMU22
EvApyTwTeCE
Creek channel
RGEROC
ApyTw
EcAamCv
EMU25
40000
EvTERcApyTwTeCE
RGERUT
ApyAarTeTw
TERcAarTw
EMU-MF
EMU24
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RGERUT
42500
ApyTw
EvAtrTeCEc
EvApyTwTeCE
RGERIV
EvMg
EMU27
ApyAarTeTw
EMU26
RGEHOF
EcAamCv
45000
AcDlsEHsTwCEc
EvAtrTeCEc
ApyTw
Creek channel
EvMg
RGEROC
ApyTw
EMU29
Introduced Flora Species
Aerva javanica
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Malvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
KARRATHA
Project Area
PERTH
KALGOORLIE
Survey Quadrats
Land systems
Map 5 of 10
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0
0.5
1
kilometres
Land systems mapping - Dept. of Agriculture WA 2002
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
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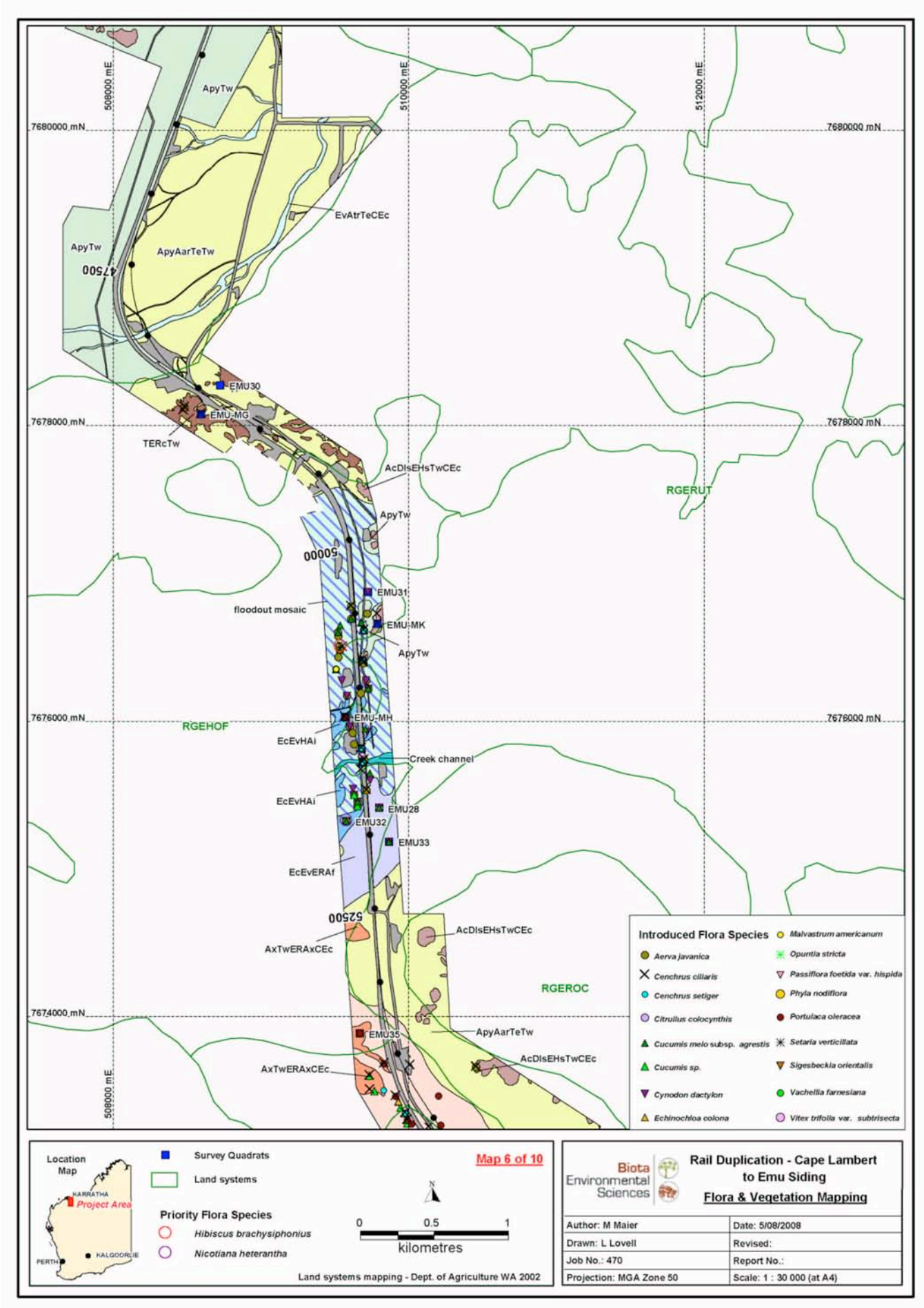
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TERcTw
AcDlsEHsTwCEc
RGERUT
EMU31
floodout mosaic
EMU-MK
EMU-MH
RGEHOF
EcEvHAi
Creek channel
EMU28
EMU32
EMU33
EcEvERAf
AxTwERAxCEc
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EMU35
Introduced Flora Species
Aerva javanica
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Malvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
KARRATHA
Project Area
KALGOORLIE
PERTH
Survey Quadrats
Land systems
Priority Flora Species
Hibiscus brachysiphonius
Nicotiana heterantha
Map 6 of 10
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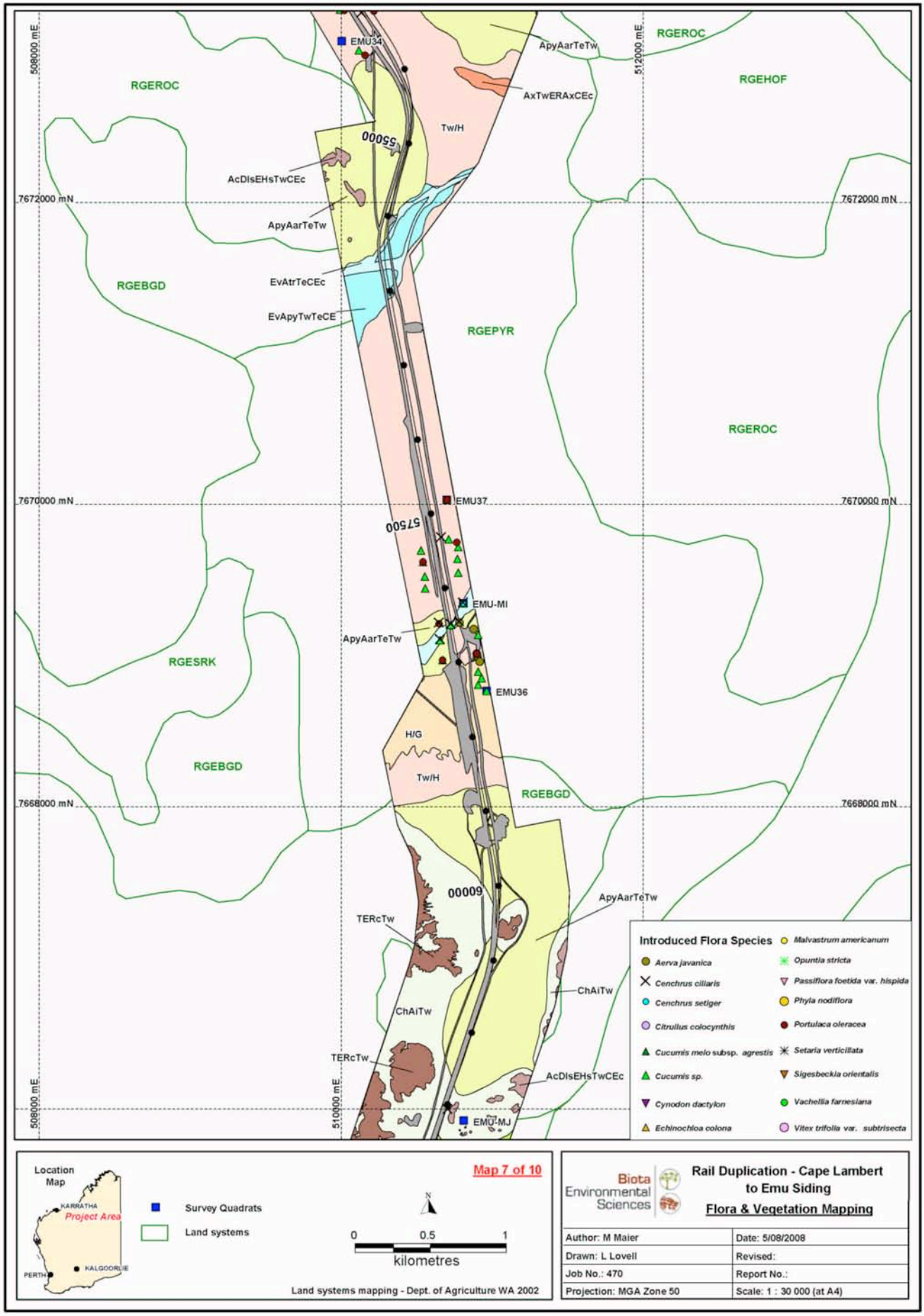
0.5
1
kilometres
Land systems mapping - Dept. of Agriculture WA 2002
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
Scale: 1 : 30 000 (at A4)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RGEBGD
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RGESRK
EMU34
EMU37
EMU-MI
EMU36
EMU-MJ
ApyAarTeTw
AxTwERAxCEc
Tw/H
AcDlsEHsTwCEc
EvAtrTeCEc
EvApyTwTeCE
H/G
TERcTw
ChAiTw
55000
57500
00009
Introduced Flora Species
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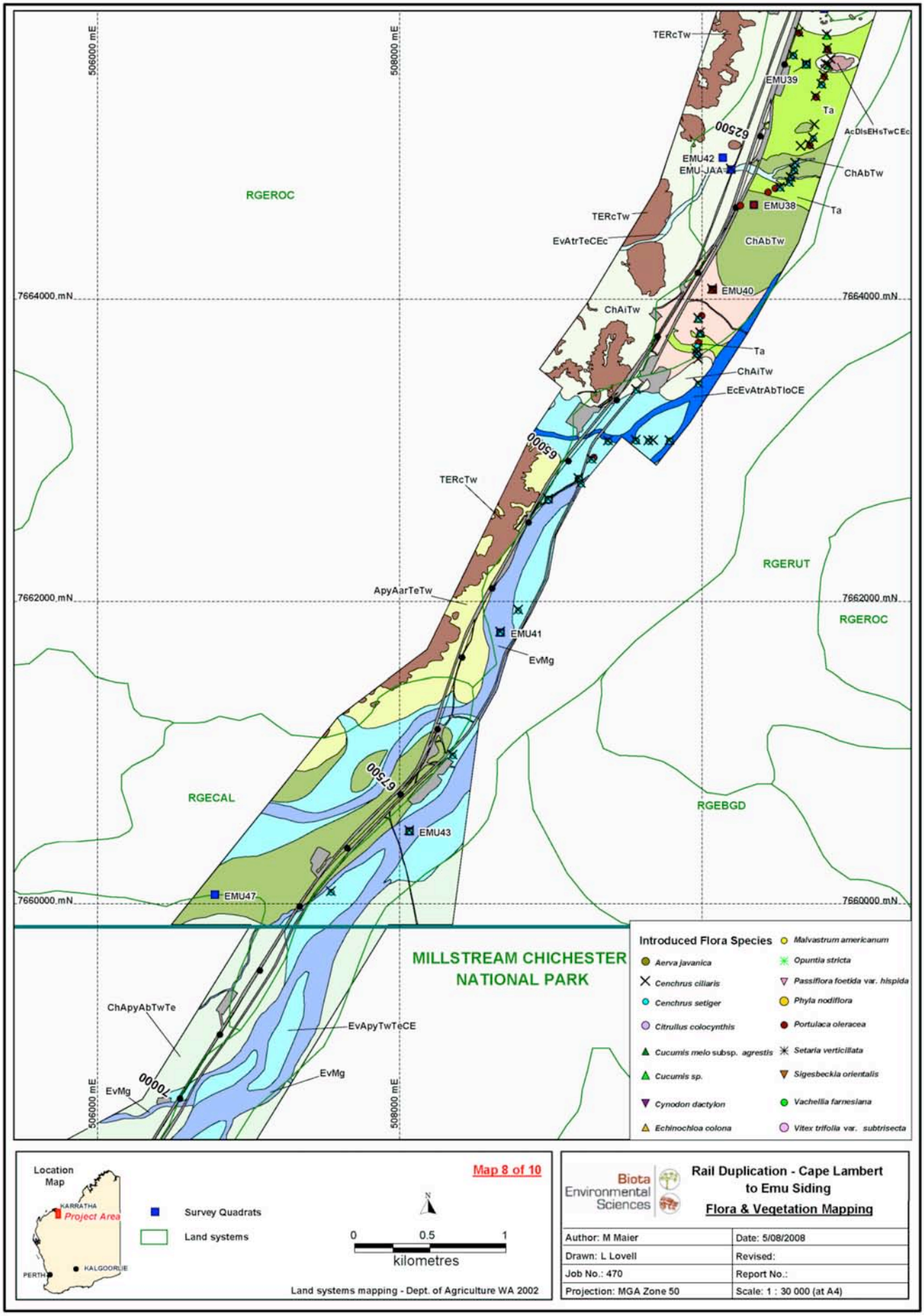
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Malvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
KARRATHA
Project Area
PERTH
KALGOORLIE
Survey Quadrats
Land systems
Map 7 of 10
N
0
0.5
1
kilometres
Land systems mapping - Dept. of Agriculture WA 2002
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
Scale: 1 : 30 000 (at A4)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508000 mE
7664000 mN
7662000 mN
7660000 mN
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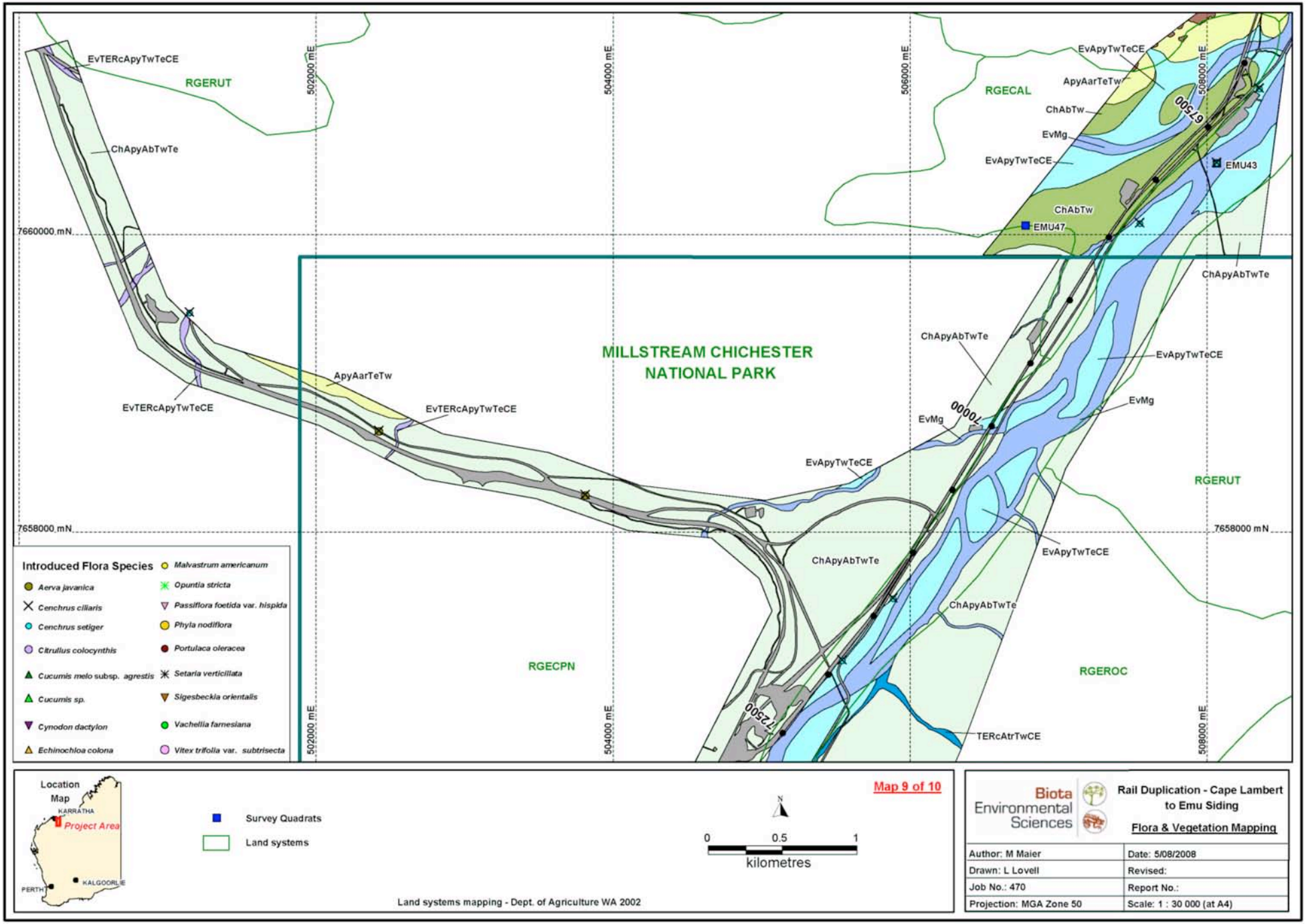
EMU42
EMU JAA1
ChAbTw
EMU38
RGEROC
EvAtrTeCEc
EMU40
ChAiTw
EcEvAtrAbTloCE
RGERUT
ApyAarTeTw
EMU41
EvMg
RGECAL
RGEBGD
EMU43
EMU47
MILLSTREAM CHICHESTER NATIONAL PARK
ChApyAbTwTe
EvApyTwTeCE
Introduced Flora Species
Aerva javanica
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Malvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
KARRATHA
Project Area
PERTH
KALGOORLIE
Survey Quadrats
Land systems
Map 8 of 10
0
0.5
1
kilometres
Land systems mapping - Dept. of Agriculture WA 2002
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
Scale: 1 : 30 000 (at A4)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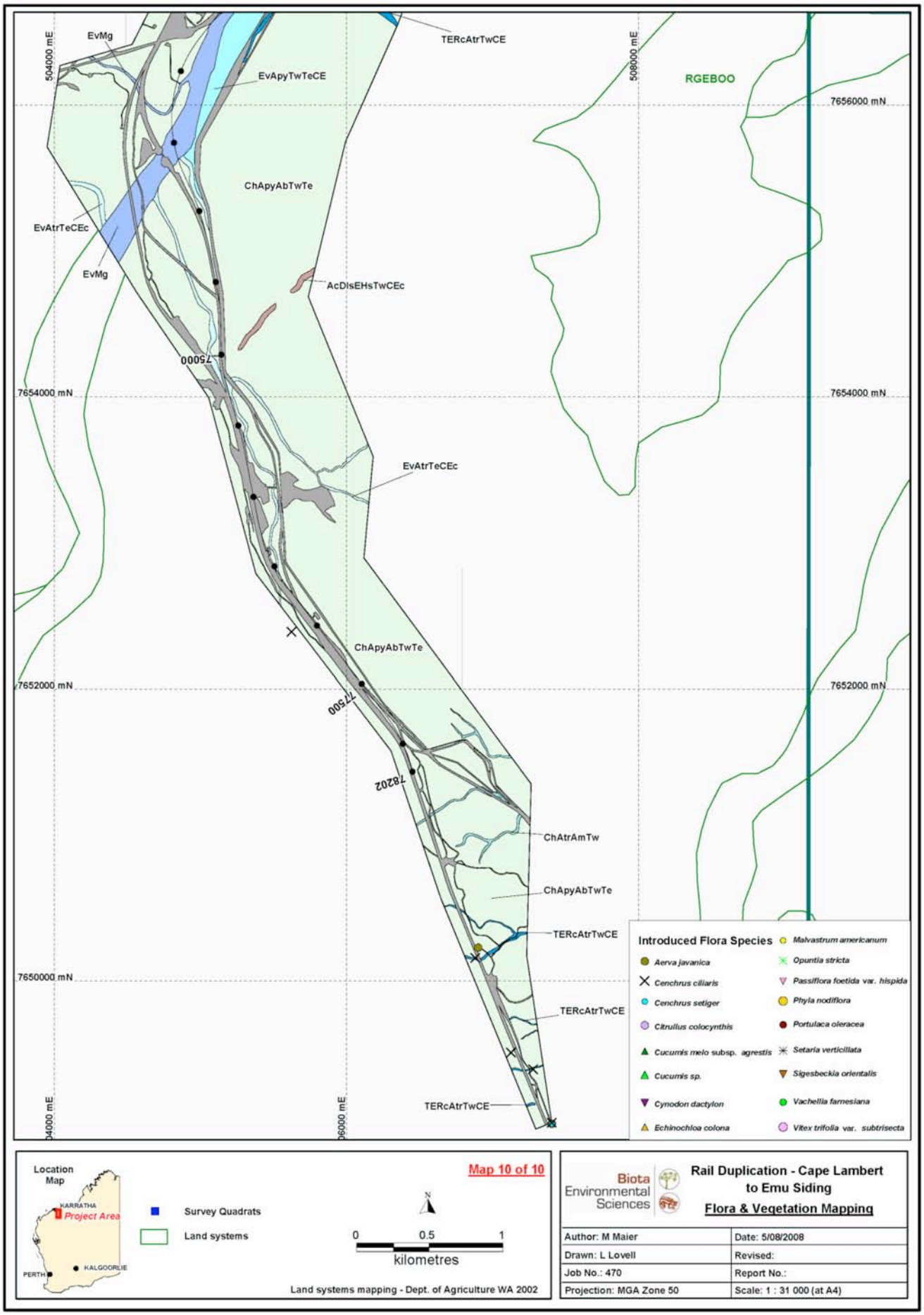
ApyAarTeTw
ChAbTw
EvMg
6500
EMU43
EMU47
7660000 mN
MILLSTREAM CHICHESTER
NATIONAL PARK
ApyAarTeTw
EvTERcApyTwTeCE
7000
7658000 mN
RGECPN
RGEROC
7500
TERcAtrTwCE
Introduced Flora Species
Aerva javanica
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Malvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
KARRATHA
Project Area
PERTH
KALGOORLIE
Survey Quadrats
Land systems
Land systems mapping - Dept. of Agriculture WA 2002
0
0.5
1
kilometres
Map 9 of 10
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
Scale: 1 : 30 000 (at A4)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RGEBOO
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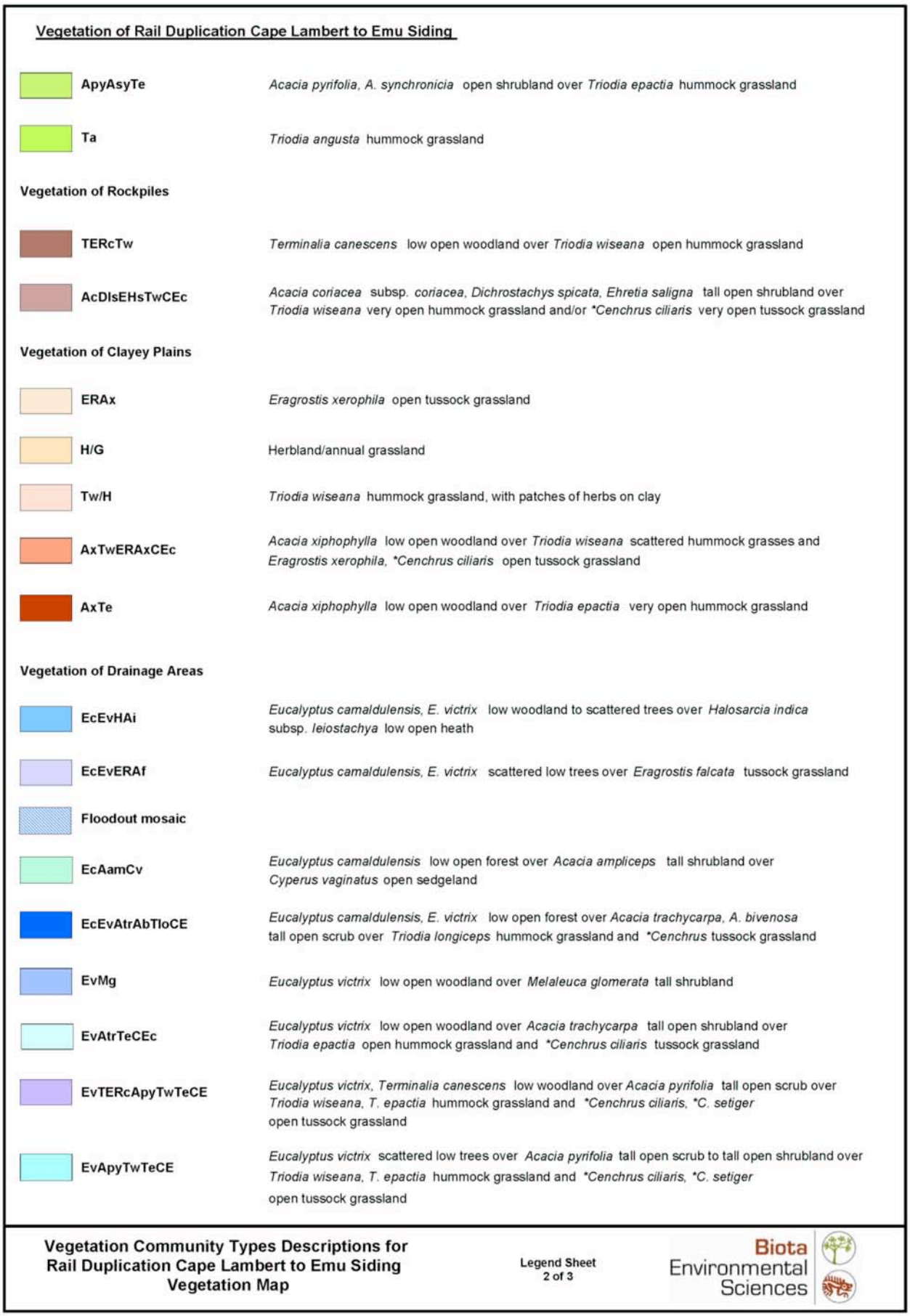
AcDisEHsTwCEc
75000
7654000 mN
7654000 mN
EvAtrTeCEc
ChApyAbTwTe
7652000 mN
7652000 mN
77500
78202
ChAtrAmTw
ChApyAbTwTe
TERcAtrTwCE
7650000 mN
TERcAtrTwCE
TERcAtrTwCE
Introduced Flora Species
Aerva javanica
Cenchrus ciliaris
Cenchrus setiger
Citrullus colocynthis
Cucumis melo subsp. agrestis
Cucumis sp.
Cynodon dactylon
Echinochloa colona
Malvastrum americanum
Opuntia stricta
Passiflora foetida var. hispida
Phyla nodiflora
Portulaca oleracea
Setaria verticillata
Sigesbeckia orientalis
Vachellia farnesiana
Vitex trifolia var. subtrisecta
Location Map
KARRATHA
Project Area
PERTH
KALGOORLIE
Survey Quadrats
Land systems
Map 10 of 10
N
0
0.5
1
kilometres
Land systems mapping - Dept. of Agriculture WA 2002
Biota Environmental Sciences
Rail Duplication - Cape Lambert to Emu Siding
Flora & Vegetation Mapping
Author: M Maier
Date: 5/08/2008
Drawn: L Lovell
Revised:
Job No.: 470
Report No.:
Projection: MGA Zone 50
Scale: 1 : 31 000 (at A4)


Vegetation of Rail Duplication Cape Lambert to Emu Siding
Vegetation of Mudflats
AVm
Avicennia marina tall open scrub
FRaHA
Frankenia ambita, Halosarcia species low open heath
SPOv / FRaHA
Vegetation of Sandy and Clayey Coastal Plains
SPOv
Sporobolus virginicus tussock grassland
AamSPOv
Acacia ampliceps tall shrubland over Sporobolus virginicus closed tussock grassland
AamAbTeCE
Acacia ampliceps, A. bivenosa open shrubland over Triodia epactia open hummock grassland and *Cenchrus species tussock grassland
AcCEc
Acacia coriacea subsp. coriacea tall shrubland over *Cenchrus ciliaris tussock grassland
AcoGpTeTs
Acacia colei var. colei, Grevillea pyramidalis tall open shrubland over Triodia epactia, T. schinzii closed hummock grassland
MlAcoTeTs
Melaleuca lasiandra, Acacia colei var. colei tall shrubland over Triodia epactia, T. schinzii closed hummock grassland
Vegetation of Stony Hills and Plains
AbTw
Acacia bivenosa scattered shrubs over Triodia wiseana hummock grassland
AbAstTe
Acacia bivenosa scattered shrubs over A. stellaticeps low open shrubland over Triodia epactia hummock grassland
AaTw
Acacia ancistrocarpa open shrubland over Triodia wiseana hummock grassland
ApyAarTeTw
Acacia pyrifolia scattered tall shrubs over A. arida open shrubland over Triodia epactia, T. wiseana hummock grassland
ChApyAbTwTe
Corymbia hamersleyana scattered low trees over Acacia pyrifolia scattered tall shrubs over A. bivenosa open shrubland over Triodia wiseana, T. epactia hummock grassland
ApyTw
Acacia pyrifolia scattered tall shrubs over Triodia wiseana hummock grassland
ApyTe
Acacia pyrifolia scattered tall shrubs over Triodia epactia hummock grassland
ChAiTw
Corymbia hamersleyana scattered low trees over Acacia inaequilatera tall open shrubland over Triodia wiseana open hummock grassland
ChAbTw
Corymbia hamersleyana scattered low trees over Acacia bivenosa tall open shrubland over Triodia wiseana hummock grassland
Vegetation Community Types Descriptions for Rail Duplication Cape Lambert to Emu Siding Vegetation Map
Legend Sheet 1 of 3


Vegetation of Rail Duplication Cape Lambert to Emu Siding
ApyAsyTe
Acacia pyrifolia, A. synchronicia open shrubland over Triodia epactia hummock grassland
Ta
Triodia angusta hummock grassland
Vegetation of Rockpiles
TERcTw
Terminalia canescens low open woodland over Triodia wiseana open hummock grassland
AcDlsEHsTwCEc
Acacia coriacea subsp. coriacea, Dichrostachys spicata, Ehretia saligna tall open shrubland over Triodia wiseana very open hummock grassland and/or *Cenchrus ciliaris very open tussock grassland
Vegetation of Clayey Plains
ERAx
Eragrostis xerophila open tussock grassland
H/G
Herbland/annual grassland
Tw/H
Triodia wiseana hummock grassland, with patches of herbs on clay
AxTwERAxCEc
Acacia xiphophylla low open woodland over Triodia wiseana scattered hummock grasses and Eragrostis xerophila, *Cenchrus ciliaris open tussock grassland
AxTe
Acacia xiphophylla low open woodland over Triodia epactia very open hummock grassland
Vegetation of Drainage Areas
EcEvHAi
Eucalyptus camaldulensis, E. victrix low woodland to scattered trees over Halosarcia indica subsp. leiostachya low open heath
EcEvERAf
Eucalyptus camaldulensis, E. victrix scattered low trees over Eragrostis falcata tussock grassland
Floodout mosaic
EcAamCv
Eucalyptus camaldulensis low open forest over Acacia ampliceps tall shrubland over Cyperus vaginatus open sedgeland
EcEvAtrAbTloCE
Eucalyptus camaldulensis, E. victrix low open forest over Acacia trachycarpa, A. bivenosa tall open scrub over Triodia longiceps hummock grassland and *Cenchrus tussock grassland
EvMg
Eucalyptus victrix low open woodland over Melaleuca glomerata tall shrubland
EvAtrTeCEc
Eucalyptus victrix low open woodland over Acacia trachycarpa tall open shrubland over Triodia epactia open hummock grassland and *Cenchrus ciliaris tussock grassland
EvTERcApyTwTeCE
Eucalyptus victrix, Terminalia canescens low woodland over Acacia pyrifolia tall open scrub over Triodia wiseana, T. epactia hummock grassland and *Cenchrus ciliaris, *C. setiger open tussock grassland
EvApyTwTeCE
Eucalyptus victrix scattered low trees over Acacia pyrifolia tall open scrub to tall open shrubland over Triodia wiseana, T. epactia hummock grassland and *Cenchrus ciliaris, *C. setiger open tussock grassland
Vegetation Community Types Descriptions for Rail Duplication Cape Lambert to Emu Siding Vegetation Map
Legend Sheet 2 of 3
Biota Environmental Sciences


Vegetation of Rail Duplication Cape Lambert to Emu Siding
TERcAtrTwCE
Terminalia canescens low open woodland over Acacia trachycarpa tall open shrubland over Triodia wiseana open hummock grassland and *Cenchrus ciliaris, *C. setiger tussock grassland
TERcAarTw
Terminalia canescens low open woodland over Acacia arida open shrubland over Triodia wiseana hummock grassland
ChAtrEUaCHf
Corymbia hamersleyana low open woodland over Acacia trachycarpa scattered tall shrubs over Eulalia aurea, Chrysopogon fallax closed tussock grassland
ChAtrAmTw
Corymbia hamersleyana low open woodland over Acacia trachycarpa, A. maitlandii tall open shrubland over Triodia wiseana hummock grassland
ChAtuTeCE
Corymbia hamersleyana low open woodland over Acacia tumida var. pilbarensis tall open scrub over Triodia epactia open hummock grassland and *Cenchrus ciliaris, *C. setiger tussock grassland
ChAtuTe
Corymbia hamersleyana low open woodland over Acacia tumida var. pilbarensis tall open scrub over Triodia epactia open hummock grassland
ChApyAaAbEUaTHt
Corymbia hamersleyana low open woodland over Acacia pyrifolia tall shrubland over A. ancistrocarpa, A. bivenosa open shrubland over Eulalia aurea, Themeda triandra closed tussock grassland
ChAbTeTw
Corymbia hamersleyana low open woodland over Acacia bivenosa tall shrubland over Triodia epactia (T. wiseana) hummock grassland
AtrAcAbApyCE
Acacia trachycarpa, A. coriacea subsp. pendens, A. bivenosa, A. pyrifolia tall open scrub over *Cenchrus ciliaris, *C. setiger tussock grassland
ApyAaTw
Acacia pyrifolia tall open shrubland over A. ancistrocarpa open heath over Triodia wiseana open hummock grassland
Disturbed
Disturbed areas, mostly cleared of native vegetation
Vegetation Community Types Descriptions for Rail Duplication Cape Lambert to Emu Siding Vegetation Map
Legend Sheet 3 of 3
Biota Environmental Sciences

# Appendix 4

## Raw Data from Quadrats and Relevés Assessed in the Study Area

**PI Rail Cape Lambert to Emu Siding** **Site** EMU01
**Described by** RWJCF **Date** 4/01/2008 **Type** Q 50x50m
**MGA Zone** 50 511750 **mE** 7712458 **mN**
**Habitat** Rocky hill slope (S-facing)
**Soil** Red-brown clay loam
**Rock Type** Ironstone cobbles
**Vegetation** Acacia arida open shrubland over Triodia epactia (T. wiseana) hummock grassland
**Veg Condition** Excellent
**Fire Age** > 5 years

**PI Rail Cape Lambert to Emu Siding** **Site** EMU02
**Described by** JA **Date** 4/01/2008 **Type** Q 50x50m
**MGA Zone** 50 511854 **mE** 7712642 **mN**
**Habitat** Stony foothills; sloping slightly to north
**Soil** Red clay-loam
**Vegetation** Eucalyptus victrix scattered low trees over Acacia inaequilatera tall open shrubland over Acacia bivenosa open shrubland over *Cenchrus ciliaris tussock grassland and Triodia epactia open hummock grassland.
**Veg Condition** Very Poor
**Fire Age** No evidence of recent fire
**Notes** Area has been seriously disturbed; earthworks, possible old building structures, dumped blue metal, weeds. Lots of rubbish.

**PI Rail Cape Lambert to Emu Siding** **Site** EMU03
**Described by** RWJCF **Date** 4/01/2008 **Type** Q 50x50m
**MGA Zone** 50 510518 **mE** 7712144 **mN**
**Habitat** Hillslope
**Soil** Red-brown clay loam
**Rock Type** Calcrete and ironstone pebbles and cobbles
**Vegetation** Acacia arida tall shrubland over Triodia epactia, T. wiseana closed hummock grassland
**Veg Condition** Excellent
**Fire Age** > 5 years

**PI Rail Cape Lambert to Emu Siding** **Site** EMU04
**Described by** JA/MM **Date** 4/01/2008 **Type** Q 50x50m
**MGA Zone** 50 510566 **mE** 7712275 **mN**
**Habitat** Footslope
**Soil** Orange-red loam
**Rock Type** Chert and ironstone, some quartz.
**Vegetation** Acacia pyrifolia low open woodland over A. bivenosa, A. elachantha scattered shrubs over Triodia epactia, T. wiseana closed hummock grassland
**Veg Condition** Very good
**Fire Age** No signs of fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU05
**Described by** RWJCF **Date** 4/02/2008 **Type** Q 50x50m
**MGA Zone** 50 510123 **mE** 7708940 **mN**
**Habitat** Slope of a low hill
**Soil** Red-brown clay loam
**Rock Type** Shale / ironstone
**Vegetation** Acacia bivenosa (A. pyrifolia, A. synchronicia, A. arida) open shrubland over Triodia wiseana, T. epactia hummock grassland
**Veg Condition** Very good
**Fire Age** Burnt 3-5 years ago

**PI Rail Cape Lambert to Emu Siding** **Site** EMU06
**Described by** JA **Date** 4/02/2008 **Type** Q 50x50m
**MGA Zone** 50 510217 **mE** 7709810 **mN**
**Habitat** Low flat foothills; gentle SW slope.
**Soil** Dark red loam
**Rock Type** Ironstone and chert
**Vegetation** Corymbia hamersleyana scattered low trees over Acacia stellaticeps, A. bivenosa open shrubland over Triodia epactia, T. wiseana hummock grassland
**Veg Condition** Very good
**Fire Age** No evidence of fire
**Notes** Coordinates not recorded at time of survey; estimated from aerial photography.

**PI Rail Cape Lambert to Emu Siding** **Site** EMU07
**Described by** RWJCF **Date** 4/02/2008 **Type** Q 200x12.5m
**MGA Zone** 50 509986 **mE** 7707869 **mN**
**Habitat** Creekline in valley
**Soil** Brown clay loam
**Vegetation** Corymbia hamersleyana low open woodland over Acacia tumida var. pilbarensis tall closed scrub over Triodia epactia very open hummock grassland and *Cenchrus ciliaris, *C. setiger open tussock grassland
**Veg Condition** Very Good
**Fire Age** Burnt >3 years ago

**PI Rail Cape Lambert to Emu Siding** **Site** EMU08
**Described by** JA **Date** 4/02/2008 **Type** Q 50x50m
**MGA Zone** 50 510460 **mE** 7705613 **mN**
**Habitat** Flat plain, draining east
**Soil** Red-brown loam
**Vegetation** Acacia pyrifolia scattered shrubs over A. synchronicia scattered low shrubs over Triodia epactia hummock grassland.
**Veg Condition** Very Good
**Fire Age** No evidence of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU09
**Described by** RWJCF **Date** 4/02/2008 **Type** Q 25x100m
**MGA Zone** 50 510442 **mE** 7705835 **mN**
**Habitat** Creekline
**Soil** Red-brown clay loam
**Vegetation** Corymbia hamersleyana low open woodland over Acacia tumida, A. pyrifolia tall open scrub over Triodia epactia open hummock grassland over *Cenchrus ciliaris, *C. setiger, Cymbopogon procerus tussock grassland
**Veg Condition** Good; large amount of Buffel Grass on the banks
**Fire Age** Burnt >5 years ago

**PI Rail Cape Lambert to Emu Siding** **Site** EMU10
**Described by** JA **Date** 4/02/2008 **Type** Q 50x50m
**MGA Zone** 50 510394 **mE** 7704867 **mN**
**Habitat** Gently sloping plain
**Soil** Red-brown clay loam
**Rock Type** Quartz pebbles on surface
**Vegetation** Eragrostis xerophila tussock grassland and Operculina aequisepala very open herbland
**Veg Condition** Very good
**Fire Age** No sign of fire
**Notes** No emergent rocks; deep crabholes

**PI Rail Cape Lambert to Emu Siding** **Site** EMU11
**Described by** RWJCF **Date** 4/02/2008 **Type** Q 50x50m
**MGA Zone** 50 510357 **mE** 7701992 **mN**
**Habitat** Plain
**Soil** Red-brown clay
**Rock Type** Alluvial ironstone pebbles
**Vegetation** Eragrostis xerophila, Eriachne flaccida tussock grassland
**Veg Condition** Excellent
**Fire Age** No sign of fire
**Notes** Water pooling in low lying areas. Very muddy.

**PI Rail Cape Lambert to Emu Siding** **Site** EMU12
**Described by** JA/MM **Date** 4/03/2008 **Type** Q 50x50m
**MGA Zone** 50 509913 **mE** 7699128 **mN**
**Habitat** Rocky hill slope
**Soil** Orange-brown clay loam
**Rock Type** Quartz and ironstone
**Vegetation** Acacia arida low open woodland over Triodia wiseana hummock grassland
**Veg Condition** Very good; some Cenchrus ciliaris outside quadrat
**Fire Age** Long unburnt, possibly >10 years

**PI Rail Cape Lambert to Emu Siding** **Site** EMU13
**Described by** RWJCF **Date** 4/03/2008 **Type** Q 50x50m
**MGA Zone** 50 509909 **mE** 7699695 **mN**
**Habitat** Plain near series of low rises
**Soil** Red-brown clay
**Rock Type** Scattered colluvial stones; some ironstone
**Vegetation** Eragrostis xerophila, Dichanthium sericeum subsp. humilius tussock grassland over Operculina aequisepala, Rhynchosia minima, Desmodium muelleri very open herbland
**Veg Condition** Excellent
**Fire Age** No sign of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU14
**Described by** JA/MM **Date** 4/03/2008 **Type** Q
**MGA Zone** 50 509923 **mE** 7698796 **mN**
**Habitat** Creekline
**Soil** Red clay-loam
**Vegetation** Corymbia hamersleyana low open woodland over *Vachellia farnesiana, Acacia trachycarpa tall open shrubland over Chrysopogon fallax, *Cenchrus ciliaris tussock grassland.
**Veg Condition** Good; some Buffel Grass present

**PI Rail Cape Lambert to Emu Siding** **Site** EMU15
**Described by** RWJCF **Date** 4/03/2008 **Type** Q
**MGA Zone** 50 509914 **mE** 7698741 **mN**
**Habitat** Plain near base of low hill
**Soil** Red-brown clay
**Rock Type** Colluvial ironstone
**Vegetation** Acacia xiphophylla low open woodland over Triodia wiseana scattered hummock grasses and Eragrostis xerophila, *Cenchrus ciliaris open tussock grassland
**Veg Condition** Good
**Fire Age** Burnt >5 years ago

**PI Rail Cape Lambert to Emu Siding** **Site** EMU16
**Described by** JA **Date** 4/03/2008 **Type** Q 180m long
**MGA Zone** 50 510130 **mE** 7695797 **mN**
**Habitat** Creekline at base of small rocky hill
**Soil** Brown clay loam
**Vegetation** Eucalyptus victrix low open woodland over Ehretia saligna var. saligna, Acacia pyrifolia, A. bivenosa (wispy/weeping form) open shrubland over *Cenchrus ciliaris, Chrysopogon fallax closed tussock grassland
**Veg Condition** Poor to good
**Fire Age** No sign of recent fire
**Notes** Creek deeply incised in parts (1.5m). *Malvastrum is very dense on the east side of creekline

**PI Rail Cape Lambert to Emu Siding** **Site** EMU17
**Described by** RWJCF **Date** 4/03/2008 **Type** Q 50x50m
**MGA Zone** 50 510170 **mE** 7696939 **mN**
**Habitat** Broad plain
**Soil** Red-brown clay
**Rock Type** Few scattered pebbles and cobbles ( ironstone, shale)
**Vegetation** Eragrostis xerophila tussock grassland.
**Veg Condition** Excellent
**Fire Age** No sign of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU18
**Described by** JA/MM **Date** 4/04/2008 **Type** Q 50x50m
**MGA Zone** 50 510423 **mE** 7694297 **mN**
**Habitat** Low rise
**Soil** Light brown loam
**Rock Type** Granite, calcrete, basalt
**Vegetation** Acacia pyrifolia scattered tall shrubs over Triodia wiseana hummock grassland
**Veg Condition** Excellent
**Fire Age** Burnt >10 years ago

**PI Rail Cape Lambert to Emu Siding** **Site** EMU19
**Described by** RWJCF **Date** 3/04/2008 **Type** Q 50x50m
**MGA Zone** 50 510997 **mE** 7693079 **mN**
**Habitat** Plain near series of low hills
**Rock Type** Colluvial ironstone (quartz, ironstone) pebbles and cobbles
**Vegetation** Hakea lorea subsp. lorea, Acacia pyrifolia, (A. bivenosa) tall open shrubland over Triodia epactia hummock grassland
**Veg Condition** Excellent
**Fire Age** Burnt >5 years ago

**PI Rail Cape Lambert to Emu Siding** **Site** EMU20
**Described by** JA **Date** 4/04/2008 **Type** Q 50x50m
**MGA Zone** 50 510788 **mE** 7689453 **mN**
**Habitat** Creekline
**Soil** Orange-brown sand in bed; red clay loam on banks
**Rock Type** Pale calcrete (ironstone??) on rocky central bed
**Vegetation** Eucalyptus victrix woodland over Acacia trachycarpa open shrubland over *Cenchrus ciliaris, *Echinochloa colona closed tussock grassland and *Malvastrum americanum, Sesbania cannabina herbland
**Veg Condition** Poor to good (abundant Malvastrum and Buffel present)
**Fire Age** No sign of recent fire
**Notes** Creek about 50m wide.

**PI Rail Cape Lambert to Emu Siding** **Site** EMU21
**Described by** RWJCF **Date** 4/04/2008 **Type** Q 50x50m
**MGA Zone** 50 510840 **mE** 7691193 **mN**
**Habitat** Broad plain
**Soil** Red-brown clay loam
**Rock Type** Ironstone, quartz
**Vegetation** Eragrostis xerophila open tussock grassland.
**Veg Condition** Excellent
**Fire Age** No sign of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU22
**Described by** JA **Date** 4/04/2008 **Type** Q 50x50m
**MGA Zone** 50 512383 **mE** 7686790 **mN**
**Habitat** Rocky medium hill slope
**Soil** Stony surface
**Rock Type** Volcanic? Paler mix basalt
**Vegetation** Acacia pyrifolia scattered shrubs over Triodia wiseana hummock grassland.
**Veg Condition** Excellent
**Fire Age** No sign of fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU23
**Described by** RWJCF **Date** 4/04/2008 **Type** Q 50x50m
**MGA Zone** 50 511049 **mE** 7687759 **mN**
**Habitat** Broad plain
**Soil** Red-brown clay loam
**Rock Type** Ironstone
**Vegetation** Acacia xiphophylla low open woodland over Eragrostis xerophila, *Cenchrus ciliaris very open tussock grassland and Triodia wiseana scattered hummock grasses
**Veg Condition** Very good to excellent
**Fire Age** Burnt >5 years ago

**PI Rail Cape Lambert to Emu Siding** **Site** EMU24
**Described by** JA **Date** 4/04/2008 **Type** Q 50x50m
**MGA Zone** 50 511222 **mE** 7684113 **mN**
**Habitat** Crest and upper slope of low rocky rise
**Soil** Orange-brown clay loam
**Rock Type** Massive surface outcrops and rocky-stony surface volcanic rocks
**Vegetation** Acacia pyrifolia scattered low trees over Triodia wiseana hummock grassland
**Veg Condition** Excellent
**Fire Age** No sign of fire
**Notes** Few dead tall Acacia pyrifolia (2.5m), Cassia pruinosa and Acacia arida outside quadrat.

**PI Rail Cape Lambert to Emu Siding** **Site** EMU25
**Described by** RWJCF **Date** 4/04/2008 **Type** Q 50x50m
**MGA Zone** 50 512712 **mE** 7685304 **mN**
**Habitat** Broad banks of a major creek
**Soil** Red-brown sand
**Rock Type** Pebbles and cobbles (a few boulders) fluvial stones
**Vegetation** Eucalyptus victrix low open woodland over Acacia pyrifolia tall open scrub over A. arida, A. trachycarpa scattered shrubs over Triodia wiseana hummock grassland and *Cenchrus ciliaris open tussock grassland
**Veg Condition** Good; a fair amount of *Cenchrus ciliaris present
**Fire Age** Burnt >7 years ago

**PI Rail Cape Lambert to Emu Siding** **Site** EMU26
**Described by** JAJCF **Date** 5/04/2008 **Type** Q 200x15m
**MGA Zone** 50 509659 **mE** 7681758 **mN**
**Habitat** Riverbank
**Soil** Dark brown clay
**Vegetation** Eucalyptus camaldulensis var. obtusa open forest over Melaleuca glomerata, Sesbania cannabina tall open shrubland over *Cynodon dactylon tussock grassland
**Veg Condition** Good, sign of horses grazing
**Fire Age** Burnt >5 years

**PI Rail Cape Lambert to Emu Siding** **Site** EMU27
**Described by** RW/PH **Date** 5/04/2008 **Type** Q
**MGA Zone** 50 509114 **mE** 7681954 **mN**
**Habitat** Plain near series of low rises
**Soil** Red-brown silt/clay
**Rock Type** Calcrete, ironstone pebbles and cobbles
**Vegetation** Hakea chordophylla, Acacia pyrifolia scattered tall shrubs over Triodia epactia hummock grassland and *Cenchrus ciliaris scattered tussock grasses
**Veg Condition** Very good
**Fire Age** No sign of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU28
**Described by** JAJCF **Date** 6/04/2008 **Type** Q 50x50m
**MGA Zone** 50 509771 **mE** 7675441 **mN**
**Habitat** Low undulating plain
**Soil** Brown clay loam
**Vegetation** Eucalyptus victrix scattered low trees over Eragrostis falcata tussock grassland
**Fire Age** No sign of recent fire
**Notes** Signs of cattle

**PI Rail Cape Lambert to Emu Siding** **Site** EMU29
**Described by** RW/PH **Date** 5/04/2008 **Type** Q 50x50m
**MGA Zone** 50 508275 **mE** 7680771 **mN**
**Habitat** Slope of low hill; upper and lower slope included
**Soil** Red-brown clay loam
**Rock Type** Ironstone (boulders, pebbles and cobbles)
**Vegetation** Acacia pyrifolia (A. trachycarpa, A. ancistrocarpa) shrubland over Triodia wiseana hummock grassland
**Veg Condition** Excellent
**Fire Age** >5-7 years since fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU30
**Described by** JAJCF **Date** 5/04/2008 **Type** Q 50x50m
**MGA Zone** 50 508725 **mE** 7678273 **mN**
**Habitat** Rocky hillslope
**Soil** Red-brown clay loam
**Rock Type** Basalt
**Vegetation** Acacia arida shrubland over Triodia wiseana hummock grassland
**Veg Condition** Excellent
**Fire Age** No signs of fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU31
**Described by** RW/PH **Date** 5/04/2008 **Type** Q 50x50m
**MGA Zone** 50 509701 **mE** 7676902 **mN**
**Habitat** High plain adjacent to lake
**Soil** Light grey sandy clay
**Rock Type** Calcrete and ironstone
**Vegetation** Trianthema triquetra, Halosarcia indica subsp. leiostachya low open shrubland over *Cynodon dactylon open tussock grassland.
**Veg Condition** Very Good
**Fire Age** No signs of fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU32
**Described by** JAJCF **Date** 5/04/2008 **Type** Q 100x25m
**MGA Zone** 50 509527 **mE** 7675320 **mN**
**Habitat** Raised area in a ?saline floodplain
**Soil** Orange-brown clay-loam
**Vegetation** Eucalyptus victrix low open woodland over Halosarcia indica subsp. leiostachya, Trianthema triquetra low open heath
**Veg Condition** Good
**Fire Age** No sign of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU33
**Described by** RW/PH **Date** 6/04/2008 **Type** Q 50x50m
**MGA Zone** 50 509845 **mE** 7675212 **mN**
**Habitat** Plain adjacent to lake
**Soil** Brown clay loam
**Vegetation** Eucalyptus camaldulensis low open woodland over Sesbania cannabina tall shrubland over Stemodia grossa, Streptoglossa liatroides scattered low shrubs over *Cynodon dactylon (Eragrostis falcata, Sporobolus mitchellii) closed tussock grassland
**Veg Condition** Good
**Fire Age** No sign of fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU34
**Described by** JAJCF **Date** 6/04/2008 **Type** Q 50x50m
**MGA Zone** 50 509969 **mE** 7673071 **mN**
**Habitat** Low rise within broad stony plain
**Soil** Red-brown loam
**Vegetation** Triodia wiseana hummock grassland
**Veg Condition** Excellent
**Fire Age** No signs of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU35
**Described by** RW/PH **Date** 6/04/2008 **Type** Q 50x50m
**MGA Zone** 50 509642 **mE** 7673911 **mN**
**Habitat** Broad plain
**Soil** Red-brown clay
**Rock Type** Ironstone pebbles and cobbles
**Vegetation** Acacia xiphophylla tall open shrubland over Aristida latifolia scattered tussock grasses and Triodia wiseana scattered hummock grasses
**Veg Condition** Excellent
**Fire Age** >10 years

**PI Rail Cape Lambert to Emu Siding** **Site** EMU36
**Described by** JAJCF **Date** 6/04/2008 **Type** Q 50x50m
**MGA Zone** 50 510924 **mE** 7668764 **mN**
**Habitat** Broad rise on a plain
**Soil** Red-brown clay loam, cracking in places
**Rock Type** Basalt stones and pebbles
**Vegetation** Neptunia dimorphantha, Desmodium muelleri, Euphorbia coghlanii, Heliotropium conocarpum, Dichanthium sericeum subsp humilius closed herbland/bunch grassland
**Veg Condition** Excellent
**Fire Age** No evidence of recent fire

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|---|---|---|---|---|---|---|---|
| **PI Rail Cape Lambert to Emu Siding** | | | **Site** | EMU37 | | | |
| **Described by** | RW/PH | **Date** | 6/04/2008 | **Type** | Q | 50x50m | |
| **MGA Zone** | 50 | 510666 | **mE** | 7670043 | **mN** | | |
| **Habitat** | Plain near a series of medium rises | | | | | | |
| **Soil** | Red-brown clay | | | | | | |
| **Rock Type** | Colluvial ironstone pebbles and cobbles | | | | | | |
| **Vegetation** | Cassia oligophylla scattered low shrubs over Triodia wiseana hummock grassland with Eriachne flaccida scattered tussock grasses and mixed species herbland | | | | | | |
| **Veg Condition** | Excellent | | | | | | |
| **Fire Age** | No sign of recent fire | | | | | | |

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| **PI Rail Cape Lambert to Emu Siding** | | | **Site** | EMU38 | | | |
| **Described by** | JA/PH | **Date** | 7/04/2008 | **Type** | Q | 50x50m | |
| **MGA Zone** | 50 | 510322 | **mE** | 7664651 | **mN** | | |
| **Habitat** | Broad plain | | | | | | |
| **Soil** | Red-brown clay loam | | | | | | |
| **Rock Type** | Ironstone | | | | | | |
| **Vegetation** | Acacia inaequilatera, A. bivenosa scattered tall shrubs over Triodia wiseana hummock grassland | | | | | | |
| **Veg Condition** | Excellent | | | | | | |
| **Fire Age** | 7-10 years | | | | | | |

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| **PI Rail Cape Lambert to Emu Siding** | | | **Site** | EMU39 | | | |
| **Described by** | RWJCF | **Date** | 7/04/2008 | **Type** | Q | 50x50m | |
| **MGA Zone** | 50 | 510688 | **mE** | 7665591 | **mN** | | |
| **Habitat** | Flat plain near base of medium rise | | | | | | |
| **Soil** | Red brown clay loam | | | | | | |
| **Rock Type** | Ironstone pebbles and cobbles | | | | | | |
| **Vegetation** | Triodia angusta hummock grassland | | | | | | |
| **Veg Condition** | Very good; some *Cenchrus ciliaris and *C. setiger | | | | | | |
| **Fire Age** | >5 years | | | | | | |

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| **PI Rail Cape Lambert to Emu Siding** | | | **Site** | EMU40 | | | |
| **Described by** | JA/PH | **Date** | 7/04/2008 | **Type** | Q | 50x50m | |
| **MGA Zone** | 50 | 510049 | **mE** | 7664069 | **mN** | | |
| **Habitat** | Low rise on a plain at the base of some medium hills | | | | | | |
| **Soil** | Red-brown clay loam | | | | | | |
| **Rock Type** | Oxidised basalt | | | | | | |
| **Vegetation** | Triodia wiseana open hummock grassland over *Cenchrus ciliaris scattered tussock grasses over Vigna lanceolata, Streptoglossa bubakii open herbland | | | | | | |
| **Veg Condition** | Very Good (one section of *Cenchrus ciliaris) | | | | | | |
| **Fire Age** | No sign of recent fire | | | | | | |
| **Notes** | Site has patches of drier areas containing Triodia, and wetter clay crabholes supporting Vigna | | | | | | |

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| **PI Rail Cape Lambert to Emu Siding** | | | **Site** | EMU41 | | | |
| **Described by** | RWJCF | **Date** | 7/04/2008 | **Type** | Q | 50x50m | |
| **MGA Zone** | 50 | 508653 | **mE** | 7661824 | **mN** | | |
| **Habitat** | Floodplain (creekbed) | | | | | | |
| **Soil** | Grey-brown sand - river | | | | | | |
| **Rock Type** | Riverstone alluvial pebbles, cobbles and bounders | | | | | | |
| **Vegetation** | Eucalyptus victrix woodland over Melaleuca glomerata, Acacia ampliceps, A. coriacea subsp. pendens low open woodland over *Cenchrus ciliaris very open tussock grassland over a mixed species herbland. | | | | | | |
| **Veg Condition** | Very good - some *Cenchrus ciliaris | | | | | | |
| **Fire Age** | No sign of fire | | | | | | |
| **Notes** | Melaleuca argentea (5-12m) noted outside the quadrat | | | | | | |

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| **PI Rail Cape Lambert to Emu Siding** | | | **Site** | EMU42 | | | |
| **Described by** | **Date** | 8/04/2008 | **Type** | Q | 50x50m | | |
| **MGA Zone** | 50 | 510104 | **mE** | 7664942 | **mN** | | |
| **Habitat** | Foothill of rocky medium hills | | | | | | |
| **Soil** | Red-brown Sandy Clay | | | | | | |
| **Rock Type** | Ironstone pebbles cobbles | | | | | | |
| **Vegetation** | Corymbia hamersleyana, Acacia inaequilatera low open woodland over Cassia pruinosa, C. glutinosa scattered tall shrubs over Triodia wiseana hummock grassland. | | | | | | |

**Veg Condition** Excellent
**Fire Age** >2 years

**PI Rail Cape Lambert to Emu Siding** **Site** EMU43
**Described by** RWJCF **Date** 7/04/2008 **Type** Q 25x100m
**MGA Zone** 50 508098 **mE** 7660538 **mN**
**Habitat** Creek banks and adjacent flood area
**Soil** Grey-brown river sand
**Rock Type** Fluvial riverstone, pebbles cobbles ad boulders
**Vegetation** Eucalyptus victrix scattered trees over Melaleuca glomerata (Acacia coriacea subsp pendens, A. ampliceps) low woodland over *Cenchrus ciliaris scattered tussock grasses
**Veg Condition** Very good
**Fire Age** No sign of fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU47
**Described by** PH/J **Date** 8/04/2008 **Type** Q
**MGA Zone** 50 506758 **mE** 7660090 **mN**
**Habitat** Broad plain
**Soil** Red-brown clay-loam with ironstone and chert pebbles on surface
**Vegetation** Corymbia hamersleyana, Hakea chordophylla scattered low trees over Acacia bivenosa tall open shrubland over Triodia wiseana hummock grassland
**Veg Condition** Excellent
**Fire Age** No sign of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-JAA
**Described by** JA/RW **Date** 8/04/2008 **Type** R
**MGA Zone** 50 510140 **mE** 7664850 **mN**
**Habitat** Rocky river bed
**Soil** Orange-brown loam
**Vegetation** Eucalyptus victrix low woodland over Acacia trachycarpa, A. pyrifolia tall shrubland over Indigofera monophylla, Sesbania cannabina open shrubland over Triodia wiseana open hummock grassland over Themeda triandra, *Cenchrus ciliaris tussock grassland
**Fire Age** No sign of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MA
**Described by** MM **Date** 2/04/2008 **Type** R
**MGA Zone** 50 510601 **mE** 7703226 **mN**
**Habitat** Upper slopes of rocky hill
**Rock Type** ?Basalt
**Vegetation** Terminalia canescens low open woodland over Triodia wiseana very open hummock grassland with *Cenchrus ciliaris tussock grassland
**Veg Condition** Good to Poor; considerable weed invasion

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MB
**Described by** JA/MM **Date** 3/04/2008 **Type** R 120x10m
**MGA Zone** 50 510263 **mE** 7700947 **mN**
**Habitat** Creekline
**Soil** Red clay-loam
**Vegetation** Eucalyptus victrix, Corymbia hamersleyana low open woodland over Acacia trachycarpa, A. ancistrocarpa, A. pyrifolia tall open scrub over Corchorus parviflorus, Hibiscus sturtii var. platychlamys, Indigofera monophylla (Burrup form) low shrubland over *Cenchrus ciliaris closed tussock grassland
**Veg Condition** Poor to Very Poor; invaded by Cenchrus and considerable earthworks (rock armouring)
**Fire Age** No evidence of recent fire

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MC
**Described by** MM **Date** 3/04/2008 **Type** R
**MGA Zone** 50 510194 **mE** 7695796 **mN**
**Habitat** Rockpile on east side of creekline
**Soil** Brown clay-loam in pockets amongst rocks and boulders
**Rock Type** Basalt
**Vegetation** Acacia coriacea subsp. coriacea, Dichrostachys spicata, Ehretia saligna tall shrubland over *Cenchrus ciliaris very open tussock grassland
**Veg Condition** Good; fair amount of *Cenchrus

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MD
**Described by** MM **Date** 3/04/2008 **Type** R
**MGA Zone** 50 510234 **mE** 7695557 **mN**
**Habitat** Upper slopes and crest of rocky hill (areas around basalt rockpiles)
**Soil** Brown fine sandy loam
**Rock Type** Basalt
**Vegetation** Acacia pyrifolia scattered tall shrubs over A. arida open shrubland over Triodia epactia (T. wiseana) hummock grassland
**Veg Condition** Excellent
**Notes** Naturally species poor.

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-ME
**Described by** MM **Date** 4/04/2008 **Type** R
**MGA Zone** 50 512200 **mE** 7686786 **mN**
**Habitat** Upper slopes of rocky hill
**Soil** Orange-brown clay-loam
**Rock Type** ?Granite; grey fine-grained
**Vegetation** Terminalia canescens low open woodland over Cassia oligophylla shrubland over Triodia wiseana open hummock grassland
**Veg Condition** Very Good; scattered weeds

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MF
**Described by** MM **Date** 4/04/2008 **Type** R
**MGA Zone** 50 510924 **mE** 7684080 **mN**
**Habitat** Rocky creekline
**Vegetation** Terminalia canescens low open forest over Acacia arida open shrubland over Triodia wiseana open hummock grassland

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MG
**Described by** MM **Date** 5/04/2008 **Type** R
**MGA Zone** 50 508678 **mE** 7678073 **mN**
**Habitat** Basalt rockpile
**Soil** Orange-brown loam in pockets amongst rocks
**Vegetation** Terminalia canescens low woodland over Ptilotus obovatus low open shrubland over Triodia wiseana open hummock grassland
**Veg Condition** Very Good; only scattered weeds

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MH
**Described by** MM **Date** 5/04/2008 **Type**
**MGA Zone** 50 509592 **mE** 7676053 **mN**
**Habitat** Floodplain
**Soil** Orange-brown loam to clay loam
**Vegetation** Eucalyptus camaldulensis var. obtusa, E. victrix low woodland over Halosarcia indica subsp. leiostachya low open heath
**Veg Condition** Very Good; scattered weeds

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MI
**Described by** MM **Date** 6/04/2008 **Type** R
**MGA Zone** 50 510775 **mE** 7669278 **mN**
**Habitat** Creekline with gravelly/cobbly bed
**Soil** Tan coarse sand
**Vegetation** Eucalyptus victrix low open woodland over Acacia arida tall open shrubland over Triodia epactia very open hummock grassland
**Veg Condition** Very Good; occasional dense patch of *Cenchrus
**Notes** Incomplete releve. Scoured out from recent floods; vegetation to west has considerable Acacia trachycarpa.

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MJ
**Described by** MM **Date** 7/04/2008 **Type** R
**MGA Zone** 50 510831 **mE** 7665907 **mN**
**Habitat** Slope of rocky ridge
**Soil** Orange-brown clay loam with small patches of proper clay
**Rock Type** Basalt?/dolerite?
**Vegetation** Acacia inaequilatera scattered tall shrubs over Triodia wiseana hummock grassland
**Notes** Species on list from Rhynchosia minima onwards were only present on small patches of more clayey soil.

**PI Rail Cape Lambert to Emu Siding** **Site** EMU-MK
**Described by** MM **Date** 6/04/2008 **Type** R
**MGA Zone** 50 509772 **mE** 7676606 **mN**
**Habitat** Rockpile
**Soil** Virtually no soil; small pockets of brown loam
**Rock Type** Basalt
**Vegetation** Ehretia saligna var. saligna tall open shrubland over Triodia wiseana very open hummock grassland
**Veg Condition** Very Good; only occasional weeds
**Notes** Very little vegetation on this rockpile ridge

**Cape Lambert Port B Expansion** **Site** CLE09
**Described by** B/H/J **Date** 6/10/2007 **Type** Q 50x50
**MGA Zone** 50 513929 **mE** 7715910 **mN**
**Habitat** Coastal flood plain.
**Soil** Dark brown clay loam.
**Vegetation** Acacia ampliceps tall shrubland over Sporobolus virginicus closed tussock grassland
**Veg Condition** Very good.
**Fire Age** unburnt

**Cape Lambert Port B Expansion** **Site** CLE10
**Described by** RO/HM **Date** 6/10/2007 **Type** Q 50x50
**MGA Zone** 50 513913 **mE** 7716049 **mN**
**Habitat** Low lying, saline drainage area just above sea level. Flat area surrounded by gentle slopes.
**Vegetation** Sesbania canabina tall open herbland over Sporobolous virginicus closed tussock grassland
**Veg Condition** Excellent
**Fire Age** Unburnt

**Cape Lambert Port B Expansion** **Site** CLE11
**Described by** JCF/H **Date** 7/10/2007 **Type** Q 50x50
**MGA Zone** 50 514083 **mE** 7716481 **mN**
**Habitat** Rocky hillcrest.
**Soil** Red brown clay.
**Rock Type** Ironstone.
**Vegetation** Triodia epactia, T. wiseana hummock grassland with Themeda triandra very open tussock grassland
**Veg Condition** Good
**Fire Age** > 5 years since fire

**Cape Lambert Port B Expansion** **Site** CLE15
**Described by** JCF/H **Date** 8/10/2007 **Type** Q 50x50
**MGA Zone** 50 514099 **mE** 7716374 **mN**
**Habitat** Rocky hillslope.
**Soil** Red brown sandy clay.
**Rock Type** Ironstone.
**Vegetation** Triodia epactia, T. wiseana hummock grassland with *Cenchrus ciliaris very open tussock grassland
**Veg Condition** Very good.
**Fire Age** >5 years since fire

**Cape Lambert Port B Expansion** **Site** CLE16
**Described by** B/RO **Date** 8/10/2007 **Type** Q 50x50
**MGA Zone** 50 514204 **mE** 7716385 **mN**
**Habitat** Flat, piedmont zone at base of hill, between rail line and hillslope.
**Soil** Red, alluvial, fine grained clayey loam.
**Rock Type** Ironstone.
**Vegetation** Acacia stellaticeps open heath over Triodia epactia, T. schinzii open hummock grassland
**Veg Condition** Very Good
**Fire Age** > 5-7 years since fire.

**Dampier Power Station Study** **Site** DPS05
**Described by** RO **Date** 29/03/2008 **Type** Q 50x50
**MGA Zone** 50 513412 **mE** 7714788 **mN**
**Habitat** Sporobolus grass plain surrounding low rocky hills between coastal dune systems and rocky
**Soil** Red brown clay with loamy clay soil surface layers to a depth of 5cm.
**Rock Type** Rare, scattered pieces of ironstone pebbles on soil surface.

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| **Vegetation** | Sporobolus virginicus tussock grassland |
| **Veg Condition** | Excellent |
| **Fire Age** | < 2 years since fire. |

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| **Dampier Power Station Transmission Line Study** | | | **Site** | MWS02 | | |
| **Described by** | RO/HM | **Date** | 29/05/2008 | **Type** | Q | 50x50m |
| **MGA Zone** | 50 | 510526 **mE** | 7712454 **mN** | | | |
| **Habitat** | Plain - Alluvial clay plain between rocky hills, floodplain and drainage valley. | | | | | |
| **Soil** | Cracking clay, crabhole in patches | | | | | |
| **Rock Type** | Ironstone with small amounts of quartz present | | | | | |
| **Vegetation** | Eriachne benthamii very open tussock grassland | | | | | |
| **Veg Condition** | Excellent | | | | | |
| **Fire Age** | Unburnt 7-8 years | | | | | |

NB. Numbers indicate estimated percent foliar cover within the sampling site; + = less than 1%.

| Fam Code | Species | EMU 01 | EMU 02 | EMU 03 | EMU 04 | EMU 05 | EMU 06 | EMU 07 | EMU 08 | EMU 09 | EMU 10 | EMU 11 | EMU 12 | EMU 13 | EMU 14 | EMU 15 | EMU 16 | EMU 17 | EMU 18 | EMU 19 | EMU 20 | EMU 21 | EMU 22 | EMU 23 | EMU 24 | EMU 25 | EMU 26 | EMU 27 | EMU 28 | EMU 29 | EMU 30 | EMU 31 | EMU 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 007 | *Cheilanthes sieberi subsp. sieberi* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 013 | *Marsilea hirsuta* | | | | | | | | | | | | | | + | | | | | | + | | | | | | | | + | | | | |
| 020 | *Typha domingensis* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | |
| 023 | *Potamogeton tricarinatus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Aristida burbidgeae* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Aristida contorta* | | + | | | | + | | + | | | | | | | | | | | + | | | | + | | | | | | | | |
| 031 | *Aristida holathera* var. *holathera* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Aristida latifolia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Astrebla pectinata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Bothriochloa ewartiana* | | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | |
| 031 | *Brachyachne convergens* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Brachyachne prostrata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | **Cenchrus ciliaris* | + | 60% | | + | + | + | 10% | + | 30 | + | + | | | 5 | 3 | 80 | | | + | 70 | | + | 5 | | 10-15 | + | 2 | | + | | | | |
| 031 | **Cenchrus setiger* | | | | | | | 10% | | 30 | | | | | + | | + | | | | 10 | | + | + | | + | + | + | | | | | | |
| 031 | *Chrysopogon fallax* | | | | | | | | | | + | | | | 30 | | 2 | | | | 2 | | | | | + | | | | | | | | |
| 031 | *Cymbopogon ambiguus* | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 031 | *Cymbopogon bombycinus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Cymbopogon obtectus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Cymbopogon procerus* | | | | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | **Cynodon dactylon* | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | + | | | 15% | |
| 031 | *Dactyloctenium radulans* | | | | | | | + | | + | | | | + | + | + | + | | | + | + | + | | + | | | + | | | | | | + |
| 031 | *Dichanthium sericeum* subsp. *humilius* | | | | | | | | | | + | 1 | | 15 | | + | | | | | | | | | | | | | | | | | |
| 031 | *Digitaria ctenantha* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | **Echinochloa colona* | | | | | | | | | | | | | | | | | | | | 20 | | | | | | | | | | | | |
| 031 | *Enneapogon caerulescens* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | |
| 031 | *Enneapogon lindleyanus* | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eragrostis cumingii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eragrostis eriopoda* | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eragrostis* aff. *eriopoda* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eragrostis falcata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | 70 | | | | |
| 031 | *Eragrostis pergracilis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eragrostis setifolia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eragrostis tenellula* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eragrostis xerophila* | | | | | | | | + | | 70 | 40 | | 50 | | 25 | | 55 | | + | | 20-25 | | 5 | | | | | | | | | |
| 031 | *Eriachne aristidea* | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eriachne benthamii* | | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | |
| 031 | *Eriachne* aff. *benthamii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eriachne flaccida* | | | | | | | | | | | 5 | | | + | | + | | | | | | | | | | | | | | | | |
| 031 | *Eriachne mucronata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eriachne obtusa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eriachne pulchella* | | | + | + | | + | | | | | | + | | | | | | + | + | | | + | + | | | | | + | | | | |
| 031 | *Eriachne tenuiculmis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eulalia aurea* | | | | | | | | | 1 | | | | | 50 | | + | | | | + | | | | | | | | | | | | |
| 031 | *Iseilema dolichotrichum* | | | | | | | | | | | | + | | | | | | | + | | | | | | | | | | | | |
| 031 | *Iseilema macratherum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Iseilema vaginiflorum* | | | | | | | | | | | + | | + | + | + | | | | | | | | + | | | | | | | | |
| 031 | *Leptochloa fusca* subsp. *fusca* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Panicum decompositum* | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | + | | |
| 031 | *Panicum laevinode* | | | | | | | | | | | + | | + | | | | | | | | | | | | | | | | | | | |
| 031 | *Paraneurachne muelleri* | | | | + | | | + | | | | | | | | | | | | | | | | | | | | | + | | | | |
| 031 | *Paspalidium clementii* | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | | |
| 031 | *Paspalidium* aff. *clementii* (site 976) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Paspalidium constrictum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Paspalidium rarum* | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Paspalidium tabulatum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | |
| 031 | **Setaria verticillata* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | |
| 031 | *Sorghum plumosum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Sporobolus australasicus* | | | | | | | | | | | | | | | | | | | + | | | | + | | | | | + | | | | + |
| 031 | *Sporobolus mitchellii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | |
| 031 | *Sporobolus virginicus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Themeda triandra* | | | | | | | + | | + | | | | | 5 | | + | | | | | | | | | 1 | | | | | + | | |
| 031 | *Themeda* sp. Mt Barricade (M.E. Trudgen 2471) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Triodia angusta* | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | |
| 031 | *Triodia epactia* | 55% | 30% | 60% | 70% | 20% | 40% | 10% | 60% | 15 | nc | | | | | | | | | 40 | + | | | | | + | | 55-60 | | + | | | |
| 031 | *Triodia schinzii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Triodia wiseana* | 10% | | 15% | 1% | 40% | 20% | | | | | | 70 | | | 2 | | | 50 | + | | | 50 | 2 | 40 | 40 | | + | | 60 | 60 | | |
| 031 | *Whiteochloa airoides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Xerochloa laniflora* | | | | | | | + | | | | + | | + | | | | + | | | | + | | | | | | | + | | | | + |
| 031 | *Yakirra australiensis* var. *australiensis* | | | | + | | | + | + | | | | + | | | | | | | | | | | | | | | | | | | | + |
| 032 | *Bulbostylis barbata* | | | | | | | + | | | | | + | | | | | | | + | | | | | | | | | | | | | |
| 032 | *Bulbostylis turbinata* | | | | | | | | | | | + | | | | | | | | | | | | + | | | | | | | | | |
| 032 | *Cyperus blakeanus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 032 | *Cyperus bulbosus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Fam Code | Species | EMU 01 | EMU 02 | EMU 03 | EMU 04 | EMU 05 | EMU 06 | EMU 07 | EMU 08 | EMU 09 | EMU 10 | EMU 11 | EMU 12 | EMU 13 | EMU 14 | EMU 15 | EMU 16 | EMU 17 | EMU 18 | EMU 19 | EMU 20 | EMU 21 | EMU 22 | EMU 23 | EMU 24 | EMU 25 | EMU 26 | EMU 27 | EMU 28 | EMU 29 | EMU 30 | EMU 31 | EMU 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 032 | *Cyperus cunninghamii* subsp. *cunninghamii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 032 | *Cyperus iria* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 032 | *Cyperus squarrosus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 032 | *Cyperus vaginatus* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | |
| 032 | *Fimbristylis dichotoma* | + | + | | + | | + | | + | | | | + | | | | | | | + | | | | | + | | | | | | | |
| 032 | *Fimbristylis microcarya* | | | + | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 032 | *Fimbristylis simulans* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 032 | *Schoenoplectus subulatus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 047 | *Commelina ensifolia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 087 | *Ficus aculeata* var. *indecora* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 087 | *Ficus brachypoda* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 090 | *Grevillea pyramidalis* subsp. *leucadendron* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 090 | *Grevillea wickhamii* (sterile material) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 090 | *Grevillea wickhamii* subsp. *hispidula* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 090 | *Hakea chordophylla* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 090 | *Hakea lorea* subsp. *lorea* | | | | | | + | + | | | | | + | | | | | | | + | | | | | | + | | 1 | | | + | | |
| 092 | *Santalum lanceolatum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Atriplex bunburyana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Atriplex codonocarpa* | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | | + | |
| 105 | *Dysphania plantaginella* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | + |
| 105 | *Dysphania rhadinostachya* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Enchylaena tomentosa* var. *tomentosa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Halosarcia auriculata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Halosarcia halocnemoides* subsp. *tenuis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Halosarcia indica* subsp. *leiostachya* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | 15% | 50 |
| 105 | *Maireana georgei* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Maireana villosa* | | | | | | | | | | | | | | | | | | | + | | + | | | | | | | | | | | |
| 105 | *Neobassia astrocarpa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Rhagodia eremaea* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Salsola tragus* | | | | | + | | | | | | | | + | | + | | + | + | + | | + | | + | | + | | | + | | | + | + |
| 105 | *Sclerolaena bicornis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Sclerolaena hostilis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | **Aerva javanica* | | + | | | | | | | | | | | | | | | | | | | | + | | | + | + | | | | | | + |
| 106 | *Alternanthera nana* | | | | | | | | | | | | | | + | | + | | | | | | | | | | | | | | | | |
| 106 | *Alternanthera nodiflora* | | | | | | | | | | | | | | + | | | | | | + | | | | | | | | | | | + | + |
| 106 | *Amaranthus undulatus* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | + | |
| 106 | *Amaranthus* sp. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Gomphrena affinis* subsp. *pilbarensis* | | | | | | | | | | | + | | + | + | | | | | | | | | | | | | | | | | | |
| 106 | *Gomphrena cunninghamii* | + | | | | + | | | | | | | | | | | | | | + | | | + | | + | | | | | | | | |
| 106 | *Hemichroa diandra* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus astrolasius* var. *astrolasius* | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus auriculifolius* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus axillaris* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus calostachyus* var. *calostachyus* | + | + | | + | + | + | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 106 | *Ptilotus clementii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus exaltatus var. exaltatus* | | | | | + | + | | + | | | + | + | + | | + | | | | + | | + | | + | | + | | | + | | | + | + |
| 106 | *Ptilotus fusiformis var. fusiformis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus gomphrenoides var. gomphrenoides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | |
| 106 | *Ptilotus helipteroides var. helipteroides* | | + | | + | | + | | | | | | | | | | | | | + | | | | | | | | | | | | |
| 106 | *Ptilotus incanus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus macrocephalus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus murrayi* | | | | | | | | | | | | | | | | | + | | | | + | | | | | | | | | | | |
| 106 | *Ptilotus obovatus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + |
| 106 | *Ptilotus polystachyus* var. *arthrotrichus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus polystachyus* var. *polystachyus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 107 | *Boerhavia burbidgeana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 107 | *Boerhavia coccinea* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 107 | *Boerhavia gardneri* | | + | + | | | | | | | | | | | | | | | | | | | | | | + | | + | | | | | |
| 107 | *Boerhavia paludosa* | | | | | | | | | | nc | | | + | | + | | | | | | | | | | | | | | | | | |
| 107 | *Boerhavia schomburgkiana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 108 | *Codonocarpus cotinifolius* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 110 | *Trianthema triquetra* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 25% | |
| 110 | *Trianthema* aff. *triquetra* (M3.35) | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | |
| 110 | *Trianthema turgidifolia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 110 | *Trianthema* sp. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 110 | *Zaleya galericulata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 110A | *Glinus lotoides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 110A | *Mollugo molluginea* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 111 | *Calandrinia quadrivalvis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 111 | *Portulaca conspicua* | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 111 | **Portulaca oleracea* | | | | | | | + | | + | | | | + | | | | + | | + | | + | | | | + | | | | | | | |
| 113 | *Polycarpaea corymbosa* var. *corymbosa* | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | | |
| 113 | *Polycarpaea holtzei* | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | |
| 113 | *Polycarpaea longiflora* | | | | | | | | | | | | + | | | | | | | | | | + | | + | | | | + | | | | |
| 122 | *Tinospora smilacina* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | |

| Fam Code | Species | EMU 01 | EMU 02 | EMU 03 | EMU 04 | EMU 05 | EMU 06 | EMU 07 | EMU 08 | EMU 09 | EMU 10 | EMU 11 | EMU 12 | EMU 13 | EMU 14 | EMU 15 | EMU 16 | EMU 17 | EMU 18 | EMU 19 | EMU 20 | EMU 21 | EMU 22 | EMU 23 | EMU 24 | EMU 25 | EMU 26 | EMU 27 | EMU 28 | EMU 29 | EMU 30 | EMU 31 | EMU 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 131 | *Cassytha capillaris* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 137A | *Capparis spinosa* var. *nummularia* | + | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | + | |
| 137A | *Cleome oxalidea* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 137A | *Cleome viscosa* | | | | | | | | | | | + | | + | | + | | | | | | | | | | | + | | | | | + | |
| 138 | *Lepidium pedicellosum* | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 138 | *Lepidium pholidogynum* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | |
| 163 | *Acacia acradenia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia ampliceps* | | | | | | | | | + | | | | | | | | | | | | | | | | | + | | | | | | + |
| 163 | *Acacia ancistrocarpa* | | + | + | | | + | 1% | | + | | | | | | | | | | + | | | | | | | | | | 2 | + | | |
| 163 | *Acacia arida* | 10% | | 25% | | + | | | | | | | 6 | | | | | | | | | | | | | + | | + | | | 15 | | |
| 163 | *Acacia bivenosa* | + | 2% | + | + | 2-3% | + | 2% | | | | | | | + | + | | | | 3 | | | | | | | | | | | + | | |
| 163 | *Acacia bivenosa* (wispy/weeping form) | | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | |
| 163 | *Acacia colei* var. *colei* | | + | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia coriacea* subsp. *coriacea* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia coriacea* subsp. *pendens* | | | | | | | | | | | | | | | | + | | | | + | | | | | | | | | + | | | |
| 163 | *Acacia elachantha* | | + | + | + | | + | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia inaequilatera* | | 3% | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia maitlandii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia pachyacra* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia pyrifolia* | + | + | + | 4% | + | | + | + | 5 | | | | | + | + | + | | 2 | 1-2 | + | | 2 | | 1-2 | 35 | | + | | 20 | | | |
| 163 | *Acacia sabulosa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia sphaerostachya* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia stellaticeps* | | + | | | | 5% | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia synchronicia* | | + | | | + | | | + | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia trachycarpa* | | | | | | | | | | | | | | 2 | | | | | | 2-10 | | | | | 1 | | | | 1 | | | |
| 163 | *Acacia tumida* var. *pilbarensis* | | | | + | | | 80% | | 50 | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia xiphophylla* | | | | | | | | | | | | | | | 6 | | | | | | | | 20 | | | | | | | | | |
| 163 | *Dichrostachys spicata* | | | | | | | + | | | | | | | + | | + | | | | + | | | | | | | | | | | | |
| 163 | *Neptunia dimorphantha* | | | | | | | | | | | + | | | | + | | | | | | | | + | | | | | | | + | + |
| 163 | **Vachellia farnesiana* | | | | | | | | | + | | | | | 2 | + | | + | | | + | | | | | + | | | | | | | |
| 164 | *Cassia glutinosa* | + | | | | + | + | | | | | | + | | | | | | | | | | | | | | | | | + | | | |
| 164 | *Cassia glutinosa* x *luerssenii* | | | | | | | | | | | | | | | + | | | | | | | | + | | | | | | | | | |
| 164 | *Cassia hamersleyensis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 164 | *Cassia luerssenii* | | + | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | | |
| 164 | *Cassia notabilis* | | + | + | + | | | + | + | | | | | | | | | | | | | | | | | | | | + | | | + | + |
| 164 | *Cassia oligophylla* | | | + | | | | | | | | | | | | | + | | + | | | | + | | | + | | | | | | | |
| 164 | *Cassia oligophylla* x *helmsii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 164 | *Cassia oligophylla* (thinly sericeous MET 15,035) | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | |
| 164 | *Cassia* aff. *oligophylla* (thinly sericeous) x *glutinosa* | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | |
| 164 | *Cassia pruinosa* | + | | + | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 164 | *Cassia pruinosa* x *luerssenii* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | + | | | |
| 164 | *Cassia* sp. Port Hedland (SBP 20-09-05B) | | | | | | + | | | | | | | | + | | | | | | | | | | | | | | | | | | |
| 164 | *Cassia venusta* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 164 | *Cassia* sp. | | | | | | | | | | | | | | | | | | | + | | | + | | | | | | | | | | |
| 165 | *Alysicarpus muelleri* | | | | | | | + | | | | | | + | | + | | | | | | | | | | | | | + | | | | |
| 165 | *Cajanus cinereus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Crotalaria cunninghamii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Crotalaria dissitiflora* subsp. *benthamiana* | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | | | |
| 165 | *Crotalaria medicaginea* var. *neglecta* | | | | + | | | + | | | | | | | + | | | | | | | | | | | | + | | | | | | |
| 165 | *Crotalaria novae-hollandiae* subsp. *novae-hollandiae* | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | | |
| 165 | *Cullen leucochaites* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Desmodium campylocaulon* | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Desmodium filiforme* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Desmodium muelleri* | | | | | | | + | | + | + | + | | 2-3 | | + | | | | | | + | | | | | | | | | | | |
| 165 | *Erythrina vespertilio* | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | |
| 165 | *Indigastrum parviflorum* | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | + | |
| 165 | *Indigofera colutea* | | | | | | | | | | | | | | | | | | | + | | | | | | | | + | | + | | | |
| 165 | *Indigofera linifolia* | | | | | | | | | | | + | | | | + | | | | | | | | | | | + | | | | | | |
| 165 | *Indigofera linnaei* | | + | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | |
| 165 | *Indigofera monophylla* (Burrup form) | + | | + | + | | 1% | 1% | | + | | | + | | + | | + | | | + | | | 5 | | + | + | | | | + | | | |
| 165 | *Indigofera monophylla* (grey leaflet form) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Indigofera rugosa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Indigofera trita* | | | | | | | | | | | + | | + | | + | | | | | | | | | | | | + | | + | | + | |
| 165 | *Lotus cruentus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Rhynchosia minima* | + | + | | | | | + | | + | + | + | | 1-2 | + | + | + | | | | + | | | + | | + | | | + | + | | + | + |
| 165 | *Sesbania cannabina* | | | | | | | + | | | | | | | + | | + | | | | 10 | | | | | | 5 | | + | | | + | + |
| 165 | *Sesbania formosa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Swainsona canescens* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Swainsona formosa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Swainsona pterostylis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Swainsona* sp. | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | |
| 165 | *Tephrosia* aff. *clementii* (11) | | + | | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | |
| 165 | *Tephrosia* aff. *clementii* (9) (HD284-6) | | | | | | | + | + | | | | | + | | + | | + | | | | | | | | | | | | | | | |
| 165 | *Tephrosia* aff. *densa* (B17) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia rosea* var. *clementii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Fam Code | Species | EMU 01 | EMU 02 | EMU 03 | EMU 04 | EMU 05 | EMU 06 | EMU 07 | EMU 08 | EMU 09 | EMU 10 | EMU 11 | EMU 12 | EMU 13 | EMU 14 | EMU 15 | EMU 16 | EMU 17 | EMU 18 | EMU 19 | EMU 20 | EMU 21 | EMU 22 | EMU 23 | EMU 24 | EMU 25 | EMU 26 | EMU 27 | EMU 28 | EMU 29 | EMU 30 | EMU 31 | EMU 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 165 | *Tephrosia rosea* var. *venulosa* ms | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia simplicifolia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia supina* | | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | |
| 165 | *Tephrosia* aff. *supina* (HDC 02-01) | | + | | + | + | + | | | | | | | | | | | | | + | | | + | | + | | | + | | | | | |
| 165 | *Tephrosia* aff. *supina* (OGBP 45-006) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia* aff. *supina* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia uniovulata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia* sp. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia* sp. B Kimberley Flora (C.A. Gardner 7300) | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | |
| 165 | *Vigna lanceolata* var. *lanceolata* | | | | | | | | | | | | | | + | | | | | | + | | | | | | | | | | | | |
| 165 | *Vigna* sp. Hamersley clay (AA Mitchell PRP 113) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 173 | *Tribulus hirsutus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + |
| 173 | *Tribulus macrocarpus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 173 | *Tribulus occidentalis* | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | |
| 173 | *Tribulus platypterus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 173 | *Tribulus suberosus* | | | | + | + | | | | | | | | | | | | | | | | | + | | + | | | | | | + | | |
| 183 | *Polygala* aff. *isingii* | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | | |
| 183 | *Polygala linariifolia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 185 | *Euphorbia biconvexa* | + | | | | + | | | | | | | | | | | + | | | | | | | | | | | | | | | | |
| 185 | *Euphorbia boophthona* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 185 | *Euphorbia careyi* | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 185 | *Euphorbia coghlanii* | | | | + | | + | + | + | + | | | + | + | | + | | + | | | + | | | | | + | | + | | | | | |
| 185 | *Euphorbia* aff. *drummondii* (MET 15,211) | | | | | | | | | | 1 | + | | + | | | | | | | | | | | | + | | | | | | | |
| 185 | *Euphorbia* sp. (B170-4) | | | | | | | | | | | | | | | | | | | | | | + | | + | + | | | | | | | |
| 185 | *Flueggea virosa* subsp. *melanthesoides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 185 | *Leptopus decaisnei* | | | | | | | | | | | | | | | | | | | | | | + | | + | | | | | + | | | |
| 185 | *Phyllanthus erwinii* | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 185 | *Phyllanthus maderaspatensis* | | + | | | + | | | | + | | + | | + | + | + | + | | | | + | + | + | | | + | + | | | | | | |
| 185 | *Phyllanthus reticulatus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 207 | *Alectryon oleifolius* subsp. *oleifolius* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 207 | *Dodonaea coriacea* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | *Corchorus aestuans* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | *Corchorus incanus* subsp. *incanus* | | | | | | | | | | | | | | + | | | | | | + | | | | | | | + | | | | | |
| 220 | *Corchorus laniflorus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | + | + | | |
| 220 | *Corchorus* aff. *lasiocarpus* (EMU 42-07) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 220 | *Corchorus parviflorus* | | + | | + | | | + | | 1 | | | + | | | | | | + | | | | + | | | | | | | | | |
| 220 | *Corchorus* aff. *parviflorus* | + | | + | + | + | + | | | | | | | | | | | | + | | | | | | | | | | | | | | |
| 220 | *Corchorus sidoides* subsp. *sidoides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | *Corchorus tectus* | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | |
| 220 | *Corchorus* aff. *tectus* (Yarrie 5-3) | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | | |
| 220 | *Corchorus tridens* | | | | | | | + | | | + | + | | + | + | + | nc | + | | | | + | | | | | | | + | | | | + |
| 220 | *Corchorus* sp. | | | | | | | | | | | | | | | | | | | + | | | + | | | | | | | | | | |
| 220 | *Triumfetta appendiculata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | *Triumfetta clementii* | | + | | + | + | + | + | | + | | | + | | | | + | | | + | | | + | | + | + | | + | | + | + | | + |
| 220 | *Triumfetta maconochieana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Abutilon dioicum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Abutilon fraseri* | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | |
| 221 | *Abutilon* aff. *lepidum* (4) | | | | | + | | | | | | | | | | | | | | | | | | | | | | | + | + | | | + |
| 221 | *Abutilon macrum* | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Abutilon malvifolium* | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Abutilon otocarpum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Abutilon trudgenii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Gossypium australe* (Burrup Peninsula form) | | | | | | | + | | + | | | | | | | + | | | | | | | | | | | | | | | | |
| 221 | *Gossypium australe* (Whim Creek form) | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Gossypium robinsonii* | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Hibiscus austrinus* var. *austrinus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Hibiscus brachysiphonius* | | | | | | | | | | | | | | | + | | | | | | + | | | | | | | | | | | |
| 221 | *Hibiscus* aff. *coatesii* | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 221 | *Hibiscus leptocladus* | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Hibiscus sturtii* var. aff. *campylochlamys* (MET 15,957) | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Hibiscus sturtii* var. aff. *grandiflorus* | | | | | | | | | | | | + | | | | | | | | | | + | | | | | | + | | | | |
| 221 | *Hibiscus sturtii* var. *platychlamys* | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | |
| 221 | *Lawrencia viridigrisea* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | **Malvastrum americanum* | | | | | | | | | | | | | | + | | + | | | | 10 | | | | | | | | | | | | |
| 221 | *Sida arsiniata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Sida echinocarpa* | | | | | | | | + | | | | + | | | | | | | + | | | | | | | | | | | | | |
| 221 | *Sida* aff. *fibulifera* (B64-13B) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Sida* aff. *fibulifera* (MET Site 1308) | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | + | + |
| 221 | *Sida* aff. *fibulifera* (oblong; MET 15 220) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Sida* aff. *fibulifera* var. L | | | | | | | | | | | | | + | | + | | | | | | + | | | | | | | | | | | |
| 221 | *Sida* aff. *fibulifera* | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Sida pilbarensis* (ferruginous form) | + | + | | | + | | + | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 221 | *Sida rohlenae* subsp. *rohlenae* | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 223 | *Brachychiton acuminatus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 223 | *Waltheria indica* | | | | + | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |

| Fam Code | Species | EMU 01 | EMU 02 | EMU 03 | EMU 04 | EMU 05 | EMU 06 | EMU 07 | EMU 08 | EMU 09 | EMU 10 | EMU 11 | EMU 12 | EMU 13 | EMU 14 | EMU 15 | EMU 16 | EMU 17 | EMU 18 | EMU 19 | EMU 20 | EMU 21 | EMU 22 | EMU 23 | EMU 24 | EMU 25 | EMU 26 | EMU 27 | EMU 28 | EMU 29 | EMU 30 | EMU 31 | EMU 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 235 | *Bergia ammannioides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 236 | *Frankenia ambita* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 243 | *Hybanthus aurantiacus* | + | | + | + | + | + | + | + | + | | | + | | + | | | | | | | | | | | + | | | | | | | |
| 248 | **Passiflora foetida* var. *hispida* | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 256 | **Opuntia stricta* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 263 | *Pimelea ammocharis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 265 | *Ammannia auriculata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 265 | *Ammannia baccifera* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 272 | *Terminalia canescens* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 273 | *Corymbia hamersleyana* | | | | | | 2% | 3% | | 6 | | | | | 5 | | + | | | | | | | | | | | | | + | | | |
| 273 | *Eucalyptus camaldulensis* var. *obtusa* | | | | | | | | | | | | | | | | | | | | | | | | | | 40 | | | | | | + |
| 273 | *Eucalyptus victrix* | | + | | | | | | | | | | | | | | 10 | | | | 10 | | | | | 3 | | | + | | | | 2 |
| 273 | *Melaleuca argentea* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 273 | *Melaleuca glomerata* | | | | | | | | | | | | | | | | | | | | | | | | | | 5 | | | | | | |
| 273 | *Melaleuca lasiandra* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 273 | *Melaleuca linophylla* | | | | | | | | | | | | | | | | | | | | | | | | | | 5 | | | | | | |
| 281 | *Trachymene oleracea* subsp. *oleracea* | | | | | + | | | | | | | | | | | | | | | | | | | + | | | | | + | + | | |
| 294 | *Muellerolimon salicorniaceum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 301 | *Jasminum didymum* subsp. *lineare* | | | | | | + | + | | | | | | | | | + | | | | | | | | | | | | | | | | |
| 305 | *Cynanchum floribundum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 307 | *Bonamia linearis* | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 307 | *Bonamia media* var. *villosa* | + | + | + | + | + | + | + | + | + | | | + | | | | | | | + | | | + | | + | + | | + | | + | + | | |
| 307 | *Bonamia rosea* | | | | | | | + | | + | | | | | | | + | | | | + | | | | | | | | + | | | | |
| 307 | *Evolvulus alsinoides* var. *villosicalyx* | | + | | + | | | + | | | | | | | | | | | | | | | + | | | | | + | | | | | |
| 307 | *Ipomoea coptica* | | | | | | | | | | + | + | | | | | | | | | | | | | | | | | | | | + | |
| 307 | *Ipomoea costata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 307 | *Ipomoea lonchophylla* | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | |
| 307 | *Ipomoea muelleri* | | | | | | | | | | | | | | | | | | | | | | | | | | nc | | | | | | + |
| 307 | *Ipomoea polymorpha* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 307 | *Operculina aequisepala* | | | | | | | + | | | 2 | + | | 1 | + | + | | | | | + | | | | | | | | + | | | |
| 307 | *Polymeria ambigua* | | | | | | | | | + | | | | | + | | | | | | + | | | | | | | | | | | |
| 307 | *Polymeria* aff. *ambigua* (PAN 26B-20) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 307 | *Polymeria calycina* | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | | |
| 307 | *Polymeria* sp. (site 1365) | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 307A | *Cuscuta victoriana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 310 | *Ehretia saligna* var. *saligna* | | | | | | | + | | | | | | | | + | 2 | | | | | | | | | | | | | | | |
| 310 | *Heliotropium chrysocarpum* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 310 | *Heliotropium conocarpum* | | | | | | | | | | | + | | + | | | | | | | | | | | | | | | | | | | |
| 310 | *Heliotropium crispatum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 310 | *Heliotropium pachyphyllum* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | + | | | | |
| 310 | *Trichodesma zeylanicum* var. *grandiflorum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 310 | *Trichodesma zeylanicum* var. *zeylanicum* | + | | + | | + | | + | | + | | | | | + | | | | | | | | + | | + | | + | + | | + | + | | |
| 311 | **Phyla nodiflora* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | |
| 312 | *Avicennia marina* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 313 | *Clerodendrum floribundum* var. *angustifolium* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 313 | *Clerodendrum tomentosum* var. *lanceolatum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 313 | **Vitex trifolia* var. *subtrisecta* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 315 | *Nicotiana benthamiana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 315 | *Nicotiana heterantha* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + |
| 315 | *Solanum diversiflorum* | | | | | + | | + | | + | | | | | | | | | | | | | + | | + | | | | | | | |
| 315 | *Solanum ellipticum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 315 | *Solanum horridum* | | + | | + | | | | | | | | | | | | | | | | | | | | + | | | | | | + | | |
| 316 | *Mimulus gracilis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 316 | *Stemodia grossa* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | + | + |
| 316 | *Stemodia kingii* | | | | | | | | | | | + | | + | | | | | | | | | | | | | | | | | | + | |
| 316 | *Striga squamigera* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 317 | *Dolichandrone heterophylla* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 325 | *Dicliptera armata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 326 | *Eremophila longifolia* | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | |
| 331 | *Oldenlandia crouchiana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 337 | *Austrobryonia pilbarensis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 337 | **Citrullus colocynthis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | |
| 337 | *Cucumis maderaspatanus* | | + | | + | + | | | | + | | | | | + | | | | | | + | | | | | + | | + | + | + | | | |
| 337 | **Cucumis melo* subsp. *agrestis* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | + | | | | + |
| 337 | **Cucumis* sp. | | | | | | | | | | + | + | | + | + | + | | | | | | | | | | | | | | | | | |
| 337 | *Trichosanthes cucumerina* var. *cucumerina* | | | | | | | + | | | | | | | | | + | | | | | | | | | | | | | + | | + | | |
| 341 | *Dampiera candicans* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 341 | *Goodenia forrestii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 341 | *Goodenia lamprosperma* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 341 | *Goodenia microptera* | | + | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 341 | *Goodenia muelleriana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 341 | *Goodenia stobbsiana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 341 | *Scaevola acacioides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 341 | *Scaevola spinescens* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 341 | *Scaevola spinescens* (broad form) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Fam Code | Species | EMU 01 | EMU 02 | EMU 03 | EMU 04 | EMU 05 | EMU 06 | EMU 07 | EMU 08 | EMU 09 | EMU 10 | EMU 11 | EMU 12 | EMU 13 | EMU 14 | EMU 15 | EMU 16 | EMU 17 | EMU 18 | EMU 19 | EMU 20 | EMU 21 | EMU 22 | EMU 23 | EMU 24 | EMU 25 | EMU 26 | EMU 27 | EMU 28 | EMU 29 | EMU 30 | EMU 31 | EMU 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 345 | *Centipeda minima* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 345 | *Pentalepis trichodesmoides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 345 | *Pluchea dunlopii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + |
| 345 | *Pluchea ferdinandi-muelleri* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 345 | *Pluchea rubelliflora* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | + | | | + | + |
| 345 | *Pluchea* sp. B Kimberley Flora (K.F. Kenneally 9526A) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 345 | *Pterocaulon sphacelatum* | | + | | + | | | | | | | | | | | | | | | | | | | | | | | | + | | | + | |
| 345 | *Pterocaulon sphaeranthoides* | | | | | + | | + | | | | | | | + | | | | | | | | + | | | | | | | | | + | |
| 345 | **Sigesbeckia orientalis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 345 | *Streptoglossa bubakii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | + | + |
| 345 | *Streptoglossa decurrens* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 345 | *Streptoglossa liatroides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 345 | *Streptoglossa tenuiflora* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Fam Code | Species | EMU 33 | EMU 34 | EMU 35 | EMU 36 | EMU 37 | EMU 38 | EMU 39 | EMU 40 | EMU 41 | EMU 42 | EMU 43 | EMU 47 | EMU-JAA | EMU-MA | EMU-MB | EMU-MC | EMU-MD | EMU-ME | EMU-MF | EMU-MG | EMU-MH | EMU-MI | EMU-MJ | EMU-MK | EMU-OPP | CLE 09 | CLE 10 | CLE 11 | CLE 15 | CLE 16 | DPS 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 007 | *Cheilanthes sieberi subsp. sieberi* | | | | | | | | | | | | | | + | | | | + | | | | | | | √ | | | | | | |
| 013 | *Marsilea hirsuta* | | | | | | | | | | | | | | | | | | | | | | + | | | √ | | + | | | | |
| 020 | *Typha domingensis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 023 | *Potamogeton tricarinatus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Aristida burbidgeae* | | | | | | | | | | | | | | | | + | | + | + | + | | | | | √ | | | | | | |
| 031 | *Aristida contorta* | | + | | | | + | | | | | | | | | | | + | | | | | | + | | √ | | | | | | |
| 031 | *Aristida holathera* var. *holathera* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | nc | | | 1% | |
| 031 | *Aristida latifolia* | | | 2% | + | | | | | | + | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Astrebla pectinata* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Bothriochloa ewartiana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Brachyachne convergens* | | | | + | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Brachyachne prostrata* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | **Cenchrus ciliaris* | | | | | | | 1% | 1% | 6% | | 2% | | 20 | 40-50 | 80 | 2-5 | | 2-3 | 2-3 | + | + | + | | + | √ | 3% | <1% | 1% | 2% | 1% | |
| 031 | **Cenchrus setiger* | | | | | | | + | | 1% | | + | | | | + | | | | | | | + | | | √ | | | | | | |
| 031 | *Chrysopogon fallax* | | | | | | | | | | | | | | | + | | | | | | | | | + | √ | | | | + | | |
| 031 | *Cymbopogon ambiguus* | | | | | | | | | | | | | | + | | | | + | | + | | | | | √ | | | | | | |
| 031 | *Cymbopogon bombycinus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Cymbopogon obtectus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Cymbopogon procerus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | **Cynodon dactylon* | 65% | | nc | | | | 1% | + | | | | | | | | | | | | | + | | | | √ | | | | | | |
| 031 | *Dactyloctenium radulans* | | + | + | | + | | 1% | | | | | | | | | | | | | | | + | | | √ | | | | | | |
| 031 | *Dichanthium sericeum* subsp. *humilius* | | + | | 60% | + | | + | + | | | | | | | | | | | | | | | + | | √ | | | | | | |
| 031 | *Digitaria ctenantha* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | **Echinochloa colona* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Enneapogon caerulescens* | | | | | | | | + | | + | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Enneapogon lindleyanus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eragrostis cumingii* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | + |
| 031 | *Eragrostis eriopoda* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | nc | | | + | |
| 031 | *Eragrostis* aff. *eriopoda* | | | | | | | | | | | | | | | | | | | | | | | | | | | 1% | | | | |
| 031 | *Eragrostis falcata* | 1% | | | | | | | | | | | | | | | | | | | | + | | | | √ | | | | | | + |
| 031 | *Eragrostis pergracilis* | | | | | | | | | | | | | | | | | | | | | | | | | | | <1% | | | | |
| 031 | *Eragrostis setifolia* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Eragrostis tenellula* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Eragrostis xerophila* | | | + | | | | + | | | | | | | | | | | | | | | | | | √ | | <1% | | | | |
| 031 | *Eriachne aristidea* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Eriachne benthamii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Eriachne* aff. *benthamii* | | | | | | | | | + | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Eriachne flaccida* | | | + | | 1% | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Eriachne mucronata* | | | | | | | | | | | | | | + | | | | | | 2-3 | | | | | √ | | | | | | |
| 031 | *Eriachne obtusa* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | 1% | <1% |
| 031 | *Eriachne pulchella* | | + | + | | | + | | + | | | | | | | | | | + | + | | | | | | √ | | | | | | |
| 031 | *Eriachne tenuiculmis* | | | | | | | | | | | + | | 30 | | | | | | | + | | | | | | | | | | | |
| 031 | *Eulalia aurea* | | | | | | | | | | | + | | | | + | | | | | | | | | | √ | | | | | | |
| 031 | *Iseilema dolichotrichum* | | + | | | | | | | | | | | | | | | | + | | | | | | | √ | | | | | | |
| 031 | *Iseilema macratherum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Iseilema vaginiflorum* | | | + | | + | | + | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Leptochloa fusca* subsp. *fusca* | + | | | | | | | | | | + | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Panicum decompositum* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | <1% |
| 031 | *Panicum laevinode* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Paraneurachne muelleri* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Paspalidium clementii* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Paspalidium* aff. *clementii* (site 976) | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Paspalidium constrictum* | | | | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Paspalidium rarum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Paspalidium tabulatum* | | | | | | | | | | | | | | + | | | | | | + | | | | | √ | | | | | | |
| 031 | **Setaria verticillata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 031 | *Sorghum plumosum* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Sporobolus australasicus* | | + | | + | + | | + | + | | | | | + | | | | | | | | | | + | | | | | | | | |
| 031 | *Sporobolus mitchellii* | 2% | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 031 | *Sporobolus virginicus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | 90% | 90% | | | | 65-70 |
| 031 | *Themeda triandra* | | | | | | | | | | | | | 20 | | + | | | | | | | | | | √ | | | 5% | 1% | | |
| 031 | *Themeda* sp. Mt Barricade (M.E. Trudgen 2471) | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | |
| 031 | *Triodia angusta* | | | | | | | 50% | | + | | + | | nc | | | | | | | | | | | | √ | | | | | | |
| 031 | *Triodia epactia* | | | | | | | | | | | + | | | | + | + | 30 | | | | | 2-5 | | | √ | + | | 2% | 30% | 10-15 | |
| 031 | *Triodia schinzii* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | 8-10 | |
| 031 | *Triodia wiseana* | | 70% | 1% | | 60% | 50% | | 40% | | 30% | | 60 | 20 | 2-10 | | | 2-10 | 30 | 10-20 | 10-20 | | | 50 | 2-5 | √ | | | 25% | 15% | | |
| 031 | *Whiteochloa airoides* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | + | |
| 031 | *Xerochloa laniflora* | | | 1% | | | | + | | | | | | | | | | | | | | + | | | | √ | | | | | | |
| 031 | *Yakirra australiensis* var. *australiensis* | | | | | | + | | | | | | | | | | | | | | | | | | | √ | | | | | | + |
| 032 | *Bulbostylis barbata* | | + | | | + | | | + | | + | | | | | | | | | | | | | + | | √ | | | | | | 1% |
| 032 | *Bulbostylis turbinata* | | | | | | | + | + | | | | | | | | | | | | | | + | + | | √ | | | | | | |
| 032 | *Cyperus blakeanus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | |
| 032 | *Cyperus bulbosus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1% |

| Fam Code | Species | EMU 33 | EMU 34 | EMU 35 | EMU 36 | EMU 37 | EMU 38 | EMU 39 | EMU 40 | EMU 41 | EMU 42 | EMU 43 | EMU 47 | EMU-JAA | EMU-MA | EMU-MB | EMU-MC | EMU-MD | EMU-ME | EMU-MF | EMU-MG | EMU-MH | EMU-MI | EMU-MJ | EMU-MK | EMU-OPP | CLE 09 | CLE 10 | CLE 11 | CLE 15 | CLE 16 | DPS 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 032 | *Cyperus cunninghamii* subsp. *cunninghamii* | | | | | | | | | | | | | | + | | + | | | | + | | | | | | | | | | | |
| 032 | *Cyperus iria* | | | | | | | | | | | | | | | | | | | | | | + | | | √ | | | | | | |
| 032 | *Cyperus squarrosus* | | | | | | | | | | | | | + | | | | | | | | | + | | | √ | | | | | | |
| 032 | *Cyperus vaginatus* | + | | | | | | | | + | | + | | | | | | | | | | | | | | √ | | | | | | |
| 032 | *Fimbristylis dichotoma* | | | | | | + | | | | | | | | | | | | | | | | | | | √ | | | | + | | <1% |
| 032 | *Fimbristylis microcarya* | | | | | | | | | | | | | | | | | | | | | | + | | | √ | | | | + | | |
| 032 | *Fimbristylis simulans* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 032 | *Schoenoplectus subulatus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 047 | *Commelina ensifolia* | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | |
| 087 | *Ficus aculeata* var. *indecora* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 087 | *Ficus brachypoda* | | | | | | | | | | | | | | + | | | | | | | | | | | √ | | | | | | |
| 090 | *Grevillea pyramidalis* subsp. *leucadendron* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | + | + | + | |
| 090 | *Grevillea wickhamii* (sterile material) | | | | | | | | | | | | | + | | | | | | | | | | | | √ | | | | | | |
| 090 | *Grevillea wickhamii* subsp. *hispidula* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 090 | *Hakea chordophylla* | | | | | | + | | | | | | 1 | | | | | | | | | | | | | | | | + | + | | |
| 090 | *Hakea lorea* subsp. *lorea* | | + | | | | | | | | + | | | | | | | | | | | | | | | √ | | | + | | + | |
| 092 | *Santalum lanceolatum* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 105 | *Atriplex bunburyana* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 105 | *Atriplex codonocarpa* | | | | | | | + | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 105 | *Dysphania plantaginella* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 105 | *Dysphania rhadinostachya* | | + | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Enchylaena tomentosa* var. *tomentosa* | | | + | | | | + | | | | | | | | | | | | | | | | | | √ | | | | + | | |
| 105 | *Halosarcia auriculata* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 105 | *Halosarcia halocnemoides* subsp. *tenuis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 105 | *Halosarcia indica* subsp. *leiostachya* | + | | | | | | | | | | | | | | | | | | | | 70 | | | | | | 1-2 | | | | |
| 105 | *Maireana georgei* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Maireana villosa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | *Neobassia astrocarpa* | | | | | | | | | | | | | | | | | | | | | | | | | √ | + | 2% | | | | |
| 105 | *Rhagodia eremaea* | | | | | | | | | | | | | | | | + | | | | | | | | | | | | + | | | |
| 105 | *Salsola tragus* | + | | + | + | | | + | + | | | | | | | + | | | | | | | | | | √ | + | | | | | |
| 105 | *Sclerolaena bicornis* | | | | | | | | | | | | | | | | | | | | | + | | | | √ | | | | | | |
| 105 | *Sclerolaena hostilis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | **Aerva javanica* | | | | | | | | | | | + | | | | | + | | | | | | | | | √ | + | nc | | | | |
| 106 | *Alternanthera nana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Alternanthera nodiflora* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Amaranthus undulatus* | | | | | | | | | + | | + | | nc | | | | | | | | | + | | | √ | | | | | | |
| 106 | *Amaranthus* sp. | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | |
| 106 | *Gomphrena affinis* subsp. *pilbarensis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Gomphrena cunninghamii* | | + | + | | + | + | | | | + | | | | + | | + | | | | + | | | + | | √ | | | + | + | | |
| 106 | *Hemichroa diandra* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus astrolasius* var. *astrolasius* | | | | | | + | | | | + | | + | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus auriculifolius* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus axillaris* | | | | | + | | | + | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus calostachyus* var. *calostachyus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus clementii* | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus exaltatus var. exaltatus* | + | + | + | + | | | | | | + | | | | | | | | | | | + | | | | √ | | | | | | + |
| 106 | *Ptilotus fusiformis var. fusiformis* | | | | | | | | | | + | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus gomphrenoides var. gomphrenoides* | | | | + | 1% | | 3% | + | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus helipteroides var. helipteroides* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus incanus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus macrocephalus* | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus murrayi* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | *Ptilotus obovatus* | | | | | | | | | | | | | | + | | | | | + | 2-5 | | | | | √ | | | | | | |
| 106 | *Ptilotus polystachyus* var. *arthrotrichus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 106 | *Ptilotus polystachyus* var. *polystachyus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 107 | *Boerhavia burbidgeana* | | | | | | | | | | | + | | | | | | | | | | | | | | √ | | | | | | |
| 107 | *Boerhavia coccinea* | | + | | + | | | | + | | | + | | | | | + | | | | + | | | | | | | | | | | |
| 107 | *Boerhavia gardneri* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | + | + | | |
| 107 | *Boerhavia paludosa* | | + | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 107 | *Boerhavia schomburgkiana* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 108 | *Codonocarpus cotinifolius* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 110 | *Trianthema triquetra* | + | | + | | | | + | | | | | | | | | | | | | | | | | | √ | | 2% | | | | |
| 110 | *Trianthema* aff. *triquetra* (M3.35) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 110 | *Trianthema turgidifolia* | | | | | | | | | | | | | | | | | | | | | | | | | √ | + | | | | | |
| 110 | *Trianthema* sp. | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 110 | *Zaleya galericulata* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 110A | *Glinus lotoides* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 110A | *Mollugo molluginea* | | | | | | | | | | + | | | | | | | | | | | | | | | √ | | | | | | + |
| 111 | *Calandrinia quadrivalvis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 111 | *Portulaca conspicua* | | | | | | | + | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 111 | **Portulaca oleracea* | | | + | | + | + | | + | | | | | | + | | | | | | | + | | | | √ | | | | + | | |
| 113 | *Polycarpaea corymbosa* var. *corymbosa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 113 | *Polycarpaea holtzei* | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | |
| 113 | *Polycarpaea longiflora* | | | | | | | | | | | + | | | + | | | | + | | | | | | | | | | | | | |
| 122 | *Tinospora smilacina* | | | | | | | | | | + | | | | + | | + | | | + | + | | | | + | √ | | | | | | |

| Fam Code | Species | EMU 33 | EMU 34 | EMU 35 | EMU 36 | EMU 37 | EMU 38 | EMU 39 | EMU 40 | EMU 41 | EMU 42 | EMU 43 | EMU 47 | EMU-JAA | EMU-MA | EMU-MB | EMU-MC | EMU-MD | EMU-ME | EMU-MF | EMU-MG | EMU-MH | EMU-MI | EMU-MJ | EMU-MK | EMU-OPP | CLE 09 | CLE 10 | CLE 11 | CLE 15 | CLE 16 | DPS 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 131 | *Cassytha capillaris* | | | | | | | | | | + | + | | | | | | | | | | | | | | √ | | | | | | |
| 137A | *Capparis spinosa* var. *nummularia* | | | | | | | | | | | | | | + | | + | | | | | | | | | √ | | | | | | |
| 137A | *Cleome oxalidea* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 137A | *Cleome viscosa* | | + | + | + | + | | + | + | + | + | + | | | + | + | | | | | | | | + | + | √ | | + | + | + | | + |
| 138 | *Lepidium pedicellosum* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 138 | *Lepidium pholidogynum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia acradenia* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 163 | *Acacia ampliceps* | | | | | | | | | 2% | | 1% | | | | | | | | | | | | | | √ | 15% | | nc | | | |
| 163 | *Acacia ancistrocarpa* | | | | | | + | | | | | | | | | 2 | | | | + | | | | | | √ | | | | | | |
| 163 | *Acacia arida* | | | | | | | | | | | | | + | | | | 2-3 | | 2-10 | | | 2-5 | | | √ | | | | | | |
| 163 | *Acacia bivenosa* | | | | | | 1% | | | | + | | 5 | | + | 1 | + | | | | | | | | | √ | | | + | + | | |
| 163 | *Acacia bivenosa* (wispy/weeping form) | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 163 | *Acacia colei* var. *colei* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | + | | |
| 163 | *Acacia coriacea* subsp. *coriacea* | | | | | | | | | | | | | | + | | | | | | | | | | | √ | | | + | + | + | |
| 163 | *Acacia coriacea* subsp. *pendens* | | | | | | | | | 2% | | nc | | | | | 5-10 | | | + | + | | | | | √ | | | | | | |
| 163 | *Acacia elachantha* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | 2% | |
| 163 | *Acacia inaequilatera* | | | | | | 1% | | | | 3% | | | | | | | | | | | | | + | | √ | | | | + | | |
| 163 | *Acacia maitlandii* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 163 | *Acacia pachyacra* | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia pyrifolia* | | + | | | | | | | + | | + | + | + | | 5 | | 1-2 | + | + | + | | | | + | √ | | | + | + | nc | |
| 163 | *Acacia sabulosa* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | 1-2% | |
| 163 | *Acacia sphaerostachya* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 163 | *Acacia stellaticeps* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | 50-60 | |
| 163 | *Acacia synchronicia* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | + | | |
| 163 | *Acacia trachycarpa* | | | | | | | | | + | + | + | | 30 | | 30-40 | | | | + | | | | | | √ | | | | | | |
| 163 | *Acacia tumida* var. *pilbarensis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 163 | *Acacia xiphophylla* | | | 50% | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 163 | *Dichrostachys spicata* | | | | | | | | | | | | | | + | + | 5 | | + | + | | | | | | √ | | | | | | |
| 163 | *Neptunia dimorphantha* | | | 1% | 20% | + | | + | + | | | | | | | | | | | | | + | | | | √ | | | | | | 4-5% |
| 163 | **Vachellia farnesiana* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 164 | *Cassia glutinosa* | | | | | | + | | | | + | | + | + | | | | | + | | | | | | | √ | | | | + | | |
| 164 | *Cassia glutinosa* x *luerssenii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 164 | *Cassia hamersleyensis* | | | + | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 164 | *Cassia luerssenii* | | | + | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 164 | *Cassia notabilis* | + | + | | | + | | + | + | | + | | | | | | | | | | | + | | | | √ | | | | | | |
| 164 | *Cassia oligophylla* | | | | | + | | | | | | | | + | | | | | 10-20 | + | + | | | | | √ | | | | | | |
| 164 | *Cassia oligophylla* x *helmsii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | |
| 164 | *Cassia oligophylla* (thinly sericeous MET 15,035) | | | | | | | | | | | | | | | + | | | | | | | | | | √ | | | | | | |
| 164 | *Cassia* aff. *oligophylla* (thinly sericeous) x *glutinosa* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | |
| 164 | *Cassia pruinosa* | | | | | | | | | | + | | | | | | | + | | | | | | | √ | | | | | | |
| 164 | *Cassia pruinosa* x *luerssenii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 164 | *Cassia* sp. Port Hedland (SBP 20-09-05B) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 164 | *Cassia venusta* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 164 | *Cassia* sp. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Alysicarpus muelleri* | + | + | | | | | | | | | | | | + | + | | | | | | + | | | | √ | | | | | | + |
| 165 | *Cajanus cinereus* | | | | | | | | | | + | | | | | | | | | | + | | | | | √ | | | | | | |
| 165 | *Crotalaria cunninghamii* | | | | | | | | | + | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Crotalaria dissitiflora* subsp. *benthamiana* | | | + | | + | | | + | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Crotalaria medicaginea* var. *neglecta* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | + |
| 165 | *Crotalaria novae-hollandiae* subsp. *novae-hollandiae* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Cullen leucochaites* | | | | | | | | | | | | | nc | | | | | | | | | | | | √ | | | | | | |
| 165 | *Desmodium campylocaulon* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Desmodium filiforme* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + |
| 165 | *Desmodium muelleri* | | | | 2% | + | | | | | | | | | | + | | | | | | | | | | √ | | | | | | |
| 165 | *Erythrina vespertilio* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Indigastrum parviflorum* | | | | | + | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Indigofera colutea* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | 1-2% |
| 165 | *Indigofera linifolia* | | | | | | | | | | | + | | | | | | | | | | | + | | | √ | + | | | + | + | + |
| 165 | *Indigofera linnaei* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Indigofera monophylla* (Burrup form) | | | | | | | | | | | | | 2 | + | + | | | 2-3 | | | | | | | √ | | | + | + | + | |
| 165 | *Indigofera monophylla* (grey leaflet form) | | | | | | + | | | | + | | + | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Indigofera rugosa* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Indigofera trita* | | | | | + | | + | | | | | | | + | | | | | | | | | | | √ | + | + | + | + | | + |
| 165 | *Lotus cruentus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 165 | *Rhynchosia minima* | 1% | + | | + | + | | + | + | | | + | | | + | + | | | + | + | | | | + | + | √ | + | + | + | + | + | + |
| 165 | *Sesbania cannabina* | 25% | | | | | | + | | + | | 1% | | 5 | | + | | | | + | | + | + | | | √ | 2% | 25-30 | | | | |
| 165 | *Sesbania formosa* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Swainsona canescens* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Swainsona formosa* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Swainsona pterostylis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Swainsona* sp. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia* aff. *clementii* (11) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia* aff. *clementii* (9) (HD284-6) | + | | | | + | | | + | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Tephrosia* aff. *densa* (B17) | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Tephrosia rosea* var. *clementii* | | | | | | | | | | | | | + | | | | | | | | | | | | √ | | | | | | |

| Fam Code | Species | EMU 33 | EMU 34 | EMU 35 | EMU 36 | EMU 37 | EMU 38 | EMU 39 | EMU 40 | EMU 41 | EMU 42 | EMU 43 | EMU 47 | EMU-JAA | EMU-MA | EMU-MB | EMU-MC | EMU-MD | EMU-ME | EMU-MF | EMU-MG | EMU-MH | EMU-MI | EMU-MJ | EMU-MK | EMU-OPP | CLE 09 | CLE 10 | CLE 11 | CLE 15 | CLE 16 | DPS 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 165 | *Tephrosia rosea* var. *venulosa* ms | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Tephrosia simplicifolia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | |
| 165 | *Tephrosia supina* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 165 | *Tephrosia* aff. *supina* (HDC 02-01) | | + | | | | | | | | + | | | | + | | | | + | | | | | | | √ | | | | | | |
| 165 | *Tephrosia* aff. *supina* (OGBP 45-006) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | |
| 165 | *Tephrosia* aff. *supina* | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | + | | |
| 165 | *Tephrosia uniovulata* | | | | | | | | | | | | + | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Tephrosia* sp. | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Tephrosia* sp. B Kimberley Flora (C.A. Gardner 7300) | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 165 | *Vigna lanceolata* var. *lanceolata* | | | | | | | | 20% | | | | | | | + | | | | | | | | | | | | + | | | | |
| 165 | *Vigna* sp. Hamersley clay (AA Mitchell PRP 113) | | | | + | + | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 173 | *Tribulus hirsutus* | | | | | | | | + | | + | | | | | | | | | | | | | | | √ | | | | | | |
| 173 | *Tribulus macrocarpus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 173 | *Tribulus occidentalis* | | | | + | | | | | | | | | | | | | | | | | | | | | √ | | | | + | | |
| 173 | *Tribulus platypterus* | | | | | | | | | | + | | | | | | | | | | | | | | | √ | | | | | | |
| 173 | *Tribulus suberosus* | | | | | | | | | | | | | | + | | | | + | | | | | | | √ | | | | | | |
| 183 | *Polygala* aff. *isingii* | | | | | | + | | + | | + | | | | | | | + | | | | | | + | | | | | | | | |
| 183 | *Polygala linariifolia* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 185 | *Euphorbia biconvexa* | | | | | | | | | | | | | | + | | | | + | | | | | | | | | | | | | |
| 185 | *Euphorbia boophthona* | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | |
| 185 | *Euphorbia careyi* | | | | | | | | | | | | | | | | | | | | + | | | | | √ | | | 1% | | | |
| 185 | *Euphorbia coghlanii* | | + | + | 3% | | | | | + | | + | | | | | | | | | | | + | | | √ | | | | | | + |
| 185 | *Euphorbia* aff. *drummondii* (MET 15,211) | | | + | | | | + | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 185 | *Euphorbia* sp. (B170-4) | | | | | | + | | + | | | | | | | | | | | | | | | | | | | | | | | |
| 185 | *Flueggea virosa* subsp. *melanthesoides* | | | | | | | | | | | | | | + | | + | | | + | | | | | | √ | | | | | | |
| 185 | *Leptopus decaisnei* | | | | | | | | | | | | | | + | | | | | + | + | | | | + | √ | | | | | | |
| 185 | *Phyllanthus erwinii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 185 | *Phyllanthus maderaspatensis* | | + | + | | + | | + | + | + | | + | | + | + | + | | | + | + | | | + | + | | √ | | | | | | |
| 185 | *Phyllanthus reticulatus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 207 | *Alectryon oleifolius* subsp. *oleifolius* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 207 | *Dodonaea coriacea* | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 220 | *Corchorus aestuans* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 220 | *Corchorus incanus* subsp. *incanus* | | + | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | *Corchorus laniflorus* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 220 | *Corchorus* aff. *lasiocarpus* (EMU 42-07) | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 220 | *Corchorus parviflorus* | | | | | | | | | | | | | | | + | | | | | | | | | | √ | | | | | | |
| 220 | *Corchorus* aff. *parviflorus* | | | | | | | | | | | | | | | | | | | | | | | + | | √ | | | | | | |
| 220 | *Corchorus sidoides* subsp. *sidoides* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 220 | *Corchorus tectus* | | | | | | + | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 220 | *Corchorus* aff. *tectus* (Yarrie 5-3) | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | |
| 220 | *Corchorus tridens* | + | | + | + | | | | + | | | | | | | | | | | | | + | + | | | √ | | | | | | <1% |
| 220 | *Corchorus* sp. | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | |
| 220 | *Triumfetta appendiculata* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 220 | *Triumfetta clementii* | | + | | | + | + | | | | + | | | | + | + | | | + | + | | | | + | + | √ | | | + | + | | |
| 220 | *Triumfetta maconochieana* | | | | | | | | | | | | | | + | | | | | | + | | | | + | √ | | | | | | |
| 221 | *Abutilon dioicum* | | | | | | | | | | | | | | | | | | | | | | | | | | + | + | | | | + |
| 221 | *Abutilon fraseri* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Abutilon* aff. *lepidum* (4) | | | | | | | | | | + | | | | + | + | | | + | | | + | | | | | | | | | | |
| 221 | *Abutilon macrum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Abutilon malvifolium* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 221 | *Abutilon otocarpum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | |
| 221 | *Abutilon trudgenii* | + | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 221 | *Gossypium australe* (Burrup Peninsula form) | | | | | | | | | | | | | | | | | | | | | | | | | | | | nc | | | |
| 221 | *Gossypium australe* (Whim Creek form) | | | | | | | | | | | | | | | | + | + | | | | | | | | √ | | | | | | |
| 221 | *Gossypium robinsonii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Hibiscus austrinus* var. *austrinus* | | | | | | | | | + | | + | | | | | | | | | | | | | | √ | | | | | | |
| 221 | *Hibiscus brachysiphonius* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 221 | *Hibiscus* aff. *coatesii* | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Hibiscus leptocladus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | |
| 221 | *Hibiscus sturtii* var. aff. *campylochlamys* (MET 15,957) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Hibiscus sturtii* var. aff. *grandiflorus* | | + | | | + | | | | | | | | | + | | + | | + | + | | | | | | | | | | | | |
| 221 | *Hibiscus sturtii* var. *platychlamys* | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | |
| 221 | *Lawrencia viridigrisea* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 221 | **Malvastrum americanum* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 221 | *Sida arsiniata* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 221 | *Sida echinocarpa* | | | | | | + | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 221 | *Sida* aff. *fibulifera* (B64-13B) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Sida* aff. *fibulifera* (MET Site 1308) | | | | | | | + | | | | | | | | | | | | | | + | | | | | | | | | | |
| 221 | *Sida* aff. *fibulifera* (oblong; MET 15 220) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + |
| 221 | *Sida* aff. *fibulifera* var. L | + | | | + | + | | | + | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Sida* aff. *fibulifera* | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 221 | *Sida pilbarensis* (ferruginous form) | | | | | | + | | | | + | | | | | | | | | | | | | + | | | | | | | | |
| 221 | *Sida rohlenae* subsp. *rohlenae* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | |
| 223 | *Brachychiton acuminatus* | | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | | |
| 223 | *Waltheria indica* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | |

| Fam Code | Species | EMU 33 | EMU 34 | EMU 35 | EMU 36 | EMU 37 | EMU 38 | EMU 39 | EMU 40 | EMU 41 | EMU 42 | EMU 43 | EMU 47 | EMU-JAA | EMU-MA | EMU-MB | EMU-MC | EMU-MD | EMU-ME | EMU-MF | EMU-MG | EMU-MH | EMU-MI | EMU-MJ | EMU-MK | EMU-OPP | CLE 09 | CLE 10 | CLE 11 | CLE 15 | CLE 16 | DPS 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 235 | *Bergia ammannioides* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 236 | *Frankenia ambita* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 243 | *Hybanthus aurantiacus* | | | | | | | | | + | + | | | + | + | + | | | + | + | | | | | + | √ | | | + | + | + | |
| 248 | **Passiflora foetida* var. *hispida* | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | |
| 256 | **Opuntia stricta* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 263 | *Pimelea ammocharis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 265 | *Ammannia auriculata* | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | |
| 265 | *Ammannia baccifera* | | | | | | | | | | | | | | | | | | | | | | | | | | | 1% | | | | |
| 272 | *Terminalia canescens* | | | | | | | | | | | | | + | 2-10 | | | | 2-5 | 50 | 10-20 | | + | | | √ | | | | | | |
| 273 | *Corymbia hamersleyana* | | | | | | + | | | | 2% | | 1 | | | 5-10 | | | | | | | | | | √ | | | | | | |
| 273 | *Eucalyptus camaldulensis* var. *obtusa* | | | | | | | | | | | | | | | | | | | | | 10-15 | | | | √ | | | | | | |
| 273 | *Eucalyptus victrix* | 5% | | | | | | | | 15% | | 1% | | 25 | | 5 | | | | | | 10-15 | 10 | | | √ | | | | | | |
| 273 | *Melaleuca argentea* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 273 | *Melaleuca glomerata* | | | | | | | | | 4% | | 20% | | | | | | | | | | + | | | | √ | | | | | | |
| 273 | *Melaleuca lasiandra* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 273 | *Melaleuca linophylla* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 281 | *Trachymene oleracea* subsp. *oleracea* | | | | | | | | | | | | | | | | | | + | + | | | | | | √ | | | + | | | |
| 294 | *Muellerolimon salicorniaceum* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 301 | *Jasminum didymum* subsp. *lineare* | | | | | | | | | | | | | | | | 1-2 | | | + | + | | | | | √ | | | + | | | |
| 305 | *Cynanchum floribundum* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 307 | *Bonamia linearis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | + | |
| 307 | *Bonamia media* var. *villosa* | | + | | | | + | | | | + | | + | + | | + | | + | + | + | + | + | | + | √ | | | + | + | | |
| 307 | *Bonamia rosea* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 307 | *Evolvulus alsinoides* var. *villosicalyx* | | | | | | + | | | | | | | | | + | | | + | | | | | | | √ | | | + | | + | + |
| 307 | *Ipomoea coptica* | + | | + | | + | | | + | | | + | | | | | | | | + | | | | | | √ | | | | | | 1% |
| 307 | *Ipomoea costata* | | | | | | | | | | | | | | | | | | | | + | | | | | √ | | | | | | |
| 307 | *Ipomoea lonchophylla* | | | | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 307 | *Ipomoea muelleri* | | | | | | | + | | + | | + | | | | | | | | | | | | | | √ | | | | | | |
| 307 | *Ipomoea polymorpha* | | | | | + | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 307 | *Operculina aequisepala* | | | + | + | | | | | | | | | | | + | | | | | | | | | | √ | | | | | | |
| 307 | *Polymeria ambigua* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 307 | *Polymeria* aff. *ambigua* (PAN 26B-20) | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 307 | *Polymeria calycina* | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | |
| 307 | *Polymeria* sp. (site 1365) | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 307A | *Cuscuta victoriana* | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | |
| 310 | *Ehretia saligna* var. *saligna* | | | | | | | | | | | | | + | | | 2-3 | | | + | + | | | | 2-10 | √ | | | | | | |
| 310 | *Heliotropium chrysocarpum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 310 | *Heliotropium conocarpum* | | | | 5% | | | | + | | | | | | | | | | | | | | | | | √ | | | | | | |
| 310 | *Heliotropium crispatum* | | | | + | + | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 310 | *Heliotropium pachyphyllum* | + | | | | | | | | | | | | | | | | | | | | + | | | | √ | | | | | | |
| 310 | *Trichodesma zeylanicum* var. *grandiflorum* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | + | + | + | |
| 310 | *Trichodesma zeylanicum* var. *zeylanicum* | | | | | | + | | | + | + | | + | | | | | | + | + | + | | | | | √ | | | | | | |
| 311 | **Phyla nodiflora* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 312 | *Avicennia marina* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 313 | *Clerodendrum floribundum* var. *angustifolium* | | | | | | | | | | | | | | | | + | | | | + | | | | | | | | | | | |
| 313 | *Clerodendrum tomentosum* var. *lanceolatum* | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 313 | **Vitex trifolia* var. *subtrisecta* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 315 | *Nicotiana benthamiana* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 315 | *Nicotiana heterantha* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 315 | *Solanum diversiflorum* | | | | | | | + | | | + | | | | | + | | | | | | | | | | √ | | | | | | |
| 315 | *Solanum ellipticum* | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | |
| 315 | *Solanum horridum* | | | | | + | | | + | | + | | | | + | | | | | + | | | | | | √ | | | | | | + |
| 316 | *Mimulus gracilis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 316 | *Stemodia grossa* | + | | | + | | | | | + | | + | | | | | | | | | | + | | | | √ | | | | | | |
| 316 | *Stemodia kingii* | | | | | | | | + | | | | | | | | | | | | | | | | | √ | | | | | | |
| 316 | *Striga squamigera* | | | | | | | | | | nc | | | | | | | | | | | | | | | | | | | | | |
| 317 | *Dolichandrone heterophylla* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 325 | *Dicliptera armata* | | | | | | | | | | | | | | + | | | | | | | | | | | √ | | | | | | |
| 326 | *Eremophila longifolia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 331 | *Oldenlandia crouchiana* | | + | | + | | + | | + | | + | | | | | | | | | | | | | | | √ | | | | | | |
| 337 | *Austrobryonia pilbarensis* | | | | | + | | | + | | | | | | | | | | | | | | | | | √ | | | | | | |
| 337 | **Citrullus colocynthis* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 337 | *Cucumis maderaspatanus* | | | | | | | | | + | | + | | | + | + | + | | + | | + | | | | + | √ | | | + | + | | |
| 337 | **Cucumis melo* subsp. *agrestis* | + | | | | | | | | | | | | | | + | | | | | | | | | | √ | | | | | | |
| 337 | **Cucumis* sp. | + | | + | + | + | | + | + | | | | | | + | + | | | + | | | | + | | | √ | | | | | | |
| 337 | *Trichosanthes cucumerina* var. *cucumerina* | | | | | | | | | | | | | | + | | + | | + | | | | | | | √ | | | | | | |
| 341 | *Dampiera candicans* | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | |
| 341 | *Goodenia forrestii* | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | |
| 341 | *Goodenia lamprosperma* | | | | | | | | | + | | + | | | | | | | | | | + | + | | | √ | | | | | | |
| 341 | *Goodenia microptera* | | + | | | | | | | | + | | | | | | | | | | | | | | | √ | | | + | nc | + | |
| 341 | *Goodenia muelleriana* | | + | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 341 | *Goodenia stobbsiana* | | | | | | | | | | | | | | | | | + | | | | | | | | | | | | | | |
| 341 | *Scaevola acacioides* | | | | | | | | | | | | | | | | | | | | + | | | | | | | | | | | |
| 341 | *Scaevola spinescens* | | | | | | | | | | | | | | | | + | | | | | | | | | | | | + | | | |
| 341 | *Scaevola spinescens* (broad form) | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |

| Fam Code | Species | EMU 33 | EMU 34 | EMU 35 | EMU 36 | EMU 37 | EMU 38 | EMU 39 | EMU 40 | EMU 41 | EMU 42 | EMU 43 | EMU 47 | EMU-JAA | EMU-MA | EMU-MB | EMU-MC | EMU-MD | EMU-ME | EMU-MF | EMU-MG | EMU-MH | EMU-MI | EMU-MJ | EMU-MK | EMU-OPP | CLE 09 | CLE 10 | CLE 11 | CLE 15 | CLE 16 | DPS 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 345 | *Centipeda minima* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 345 | *Pentalepis trichodesmoides* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 345 | *Pluchea dunlopii* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 345 | *Pluchea ferdinandi-muelleri* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | nc | 1% | + |
| 345 | *Pluchea rubelliflora* | | | | | | | | | + | | | | | | | | | | | | 10 | | | | √ | + | + | | | | |
| 345 | *Pluchea* sp. B Kimberley Flora (K.F. Kenneally 9526A) | | | | | | | | | | | | | | | | | | | | | | | | | | + | + | | | | <% |
| 345 | *Pterocaulon sphacelatum* | | | | | | | | | | | | | | | | | | | + | + | | | | | | | | | | | |
| 345 | *Pterocaulon sphaeranthoides* | + | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |
| 345 | **Sigesbeckia orientalis* | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | |
| 345 | *Streptoglossa bubakii* | + | | + | | 2% | | + | 1% | | | | | | | | | | | | | + | | | | √ | | | | | | |
| 345 | *Streptoglossa decurrens* | | | | | | | | | | | | | | | + | | | | | | | | | | √ | | | | + | | |
| 345 | *Streptoglossa liatroides* | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 345 | *Streptoglossa tenuiflora* | | | | | | | | | | | | | | | | | | | | | | | | | √ | | | | | | |

# Appendix 5

## List of Flora Species Recorded from the Study Area

**NB.** * denotes introduced species.

Comparison of *Cassia* vs *Senna* nomenclature:

| | | |
|---|---|---|
| *Cassia glutinosa* | = | *Senna glutinosa* subsp. *glutinosa* |
| *Cassia hamersleyensis* | = | *Senna hamersleyensis* |
| *Cassia helmsii* | = | *Senna artemisioides* subsp. *helmsii* |
| *Cassia luerssenii* | = | *Senna glutinosa* subsp. x *luerssenii* |
| *Cassia notabilis* | = | *Senna notabilis* |
| *Cassia oligophylla* | = | *Senna artemisioides* subsp. *oligophylla* |
| *Cassia pruinosa* | = | *Senna glutinosa* subsp. *pruinosa* |
| *Cassia venusta* | = | *Senna venusta* |

| Family | Species | Biota (this study) | Biota (2008a, 2008c) |
|---|---|---|---|
| Acanthaceae (325) | *Dicliptera armata* | √ | |
| Adiantaceae (007) | *Cheilanthes sieberi* subsp. *sieberi* | √ | |
| Aizoaceae (110) | *Trianthema triquetra* | √ | √ |
| | *Trianthema* aff. *triquetra* (M3.35) | √ | |
| | *Trianthema turgidifolia* | √ | √ |
| | *Trianthema* sp. | √ | |
| | *Zaleya galericulata* | √ | |
| Amaranthaceae (106) | **Aerva javanica* | √ | √ |
| | *Alternanthera nana* | √ | |
| | *Alternanthera nodiflora* | √ | |
| | *Amaranthus undulatus* | √ | |
| | *Amaranthus* sp. | √ | |
| | *Gomphrena affinis* subsp. *pilbarensis* | √ | |
| | *Gomphrena cunninghamii* | √ | √ |
| | *Hemichroa diandra* | √ | |
| | *Ptilotus astrolasius* var. *astrolasius* | √ | |
| | *Ptilotus auriculifolius* | √ | |
| | *Ptilotus axillaris* | √ | |
| | *Ptilotus calostachyus* var. *calostachyus* | √ | |
| | *Ptilotus clementii* | √ | |
| | *Ptilotus exaltatus* var. *exaltatus* | √ | √ |
| | *Ptilotus fusiformis* var. *fusiformis* | √ | |
| | *Ptilotus gomphrenoides* var. *gomphrenoides* | √ | |
| | *Ptilotus helipteroides* var. *helipteroides* | √ | |
| | *Ptilotus incanus* | √ | |
| | *Ptilotus macrocephalus* | √ | |
| | *Ptilotus murrayi* | √ | √ |
| | *Ptilotus obovatus* | √ | |
| | *Ptilotus polystachyus* var. *arthrotrichus* | √ | |
| | *Ptilotus polystachyus* var. *polystachyus* | √ | |
| Apiaceae (281) | *Trachymene oleracea* subsp. *oleracea* | √ | √ |
| Asclepiadaceae (305) | *Cynanchum floribundum* | √ | |
| Asteraceae (345) | *Centipeda minima* | √ | |
| | *Pentalepis trichodesmoides* | √ | |
| | *Pluchea dunlopii* | √ | |
| | *Pluchea ferdinandi-muelleri* | | √ |
| | *Pluchea rubelliflora* | √ | √ |
| | *Pluchea* sp. B Kimberley Flora (K.F. Kenneally 9526A) | | √ |
| | *Pterocaulon sphacelatum* | √ | |
| | *Pterocaulon sphaeranthoides* | √ | |
| | **Sigesbeckia orientalis* | √ | |
| | *Streptoglossa bubakii* | √ | |
| | *Streptoglossa decurrens* | √ | √ |
| | *Streptoglossa liatroides* | √ | |
| | *Streptoglossa tenuiflora* | √ | |
| Avicenniaceae (312) | *Avicennia marina* | √ | |
| Bignoniaceae (317) | *Dolichandrone heterophylla* | √ | |
| Boraginaceae (310) | *Ehretia saligna* var. *saligna* | √ | |
| | *Heliotropium chrysocarpum* | √ | |
| | *Heliotropium conocarpum* | √ | |
| | *Heliotropium crispatum* | √ | |
| | *Heliotropium pachyphyllum* | √ | |

| Family | Species | Biota (this study) | Biota (2008a, 2008c) |
|---|---|---|---|
| | *Trichodesma zeylanicum* var. *grandiflorum* | √ | √ |
| | *Trichodesma zeylanicum* var. *zeylanicum* | √ | |
| Brassicaceae (138) | *Lepidium pedicellosum* | √ | |
| | *Lepidium pholidogynum* | √ | |
| Cactaceae (256) | **Opuntia stricta* | √ | |
| Caesalpiniaceae (164) | *Cassia glutinosa* | √ | √ |
| | *Cassia glutinosa* x *luerssenii* | √ | |
| | *Cassia hamersleyensis* | √ | |
| | *Cassia luerssenii* | √ | |
| | *Cassia notabilis* | √ | |
| | *Cassia oligophylla* | √ | |
| | *Cassia oligophylla* x *helmsii* | | √ |
| | *Cassia oligophylla* (thinly sericeous MET 15,035) | √ | |
| | *Cassia* aff. *oligophylla* (thinly sericeous) x *glutinosa* | √ | √ |
| | *Cassia pruinosa* | √ | |
| | *Cassia pruinosa* x *luerssenii* | √ | |
| | *Cassia* sp. Port Hedland (SBP 20-09-05B) | √ | |
| | *Cassia venusta* | √ | |
| | *Cassia* sp. | √ | |
| Capparaceae (137A) | *Capparis spinosa* var. *nummularia* | √ | |
| | *Cleome oxalidea* | √ | |
| | *Cleome viscosa* | √ | √ |
| Caryophyllaceae (113) | *Polycarpaea corymbosa* var. *corymbosa* | √ | |
| | *Polycarpaea holtzei* | √ | |
| | *Polycarpaea longiflora* | √ | |
| Chenopodiaceae (105) | *Atriplex bunburyana* | √ | |
| | *Atriplex codonocarpa* | √ | |
| | *Dysphania plantaginella* | √ | |
| | *Dysphania rhadinostachya* | √ | |
| | *Enchylaena tomentosa* var. *tomentosa* | √ | √ |
| | *Halosarcia auriculata* | √ | |
| | *Halosarcia halocnemoides* subsp. *tenuis* | √ | |
| | *Halosarcia indica* subsp. *leiostachya* | √ | √ |
| | *Maireana georgei* | √ | |
| | *Maireana villosa* | √ | |
| | *Neobassia astrocarpa* | √ | √ |
| | *Rhagodia eremaea* | √ | √ |
| | *Salsola tragus* | √ | √ |
| | *Sclerolaena bicornis* | √ | √ |
| | *Sclerolaena hostilis* | √ | |
| Combretaceae (272) | *Terminalia canescens* | √ | |
| Commelinaceae (047) | *Commelina ensifolia* | √ | |
| Convolvulaceae (307) | *Bonamia linearis* | √ | √ |
| | *Bonamia media* var. *villosa* | √ | √ |
| | *Bonamia rosea* | √ | |
| | *Evolvulus alsinoides* var. *villosicalyx* | √ | √ |
| | *Ipomoea coptica* | √ | √ |
| | *Ipomoea costata* | √ | |
| | *Ipomoea lonchophylla* | √ | |
| | *Ipomoea muelleri* | √ | |
| | *Ipomoea polymorpha* | √ | |
| | *Operculina aequisepala* | √ | |
| | *Polymeria ambigua* | √ | |
| | *Polymeria* aff. *ambigua* (PAN 26B-20) | √ | |
| | *Polymeria calycina* | √ | |
| | *Polymeria* sp. (site 1365) | √ | |
| Cucurbitaceae (337) | *Austrobryonia pilbarensis* | √ | |
| | **Citrullus colocynthis* | √ | |
| | *Cucumis maderaspatanus* | √ | √ |
| | **Cucumis melo* subsp. *agrestis* | √ | |
| | **Cucumis* sp. | √ | |
| | *Trichosanthes cucumerina* var. *cucumerina* | √ | |
| Cuscutaceae (307A) | *Cuscuta victoriana* | √ | |
| Cyperaceae (032) | *Bulbostylis barbata* | √ | √ |
| | *Bulbostylis turbinata* | √ | |

| Family | Species | Biota (this study) | Biota (2008a, 2008c) |
|---|---|---|---|
| | *Cyperus blakeanus* | | √ |
| | *Cyperus bulbosus* | | √ |
| | *Cyperus cunninghamii* subsp. *cunninghamii* | √ | |
| | *Cyperus iria* | √ | |
| | *Cyperus squarrosus* | √ | |
| | *Cyperus vaginatus* | √ | |
| | *Fimbristylis dichotoma* | √ | √ |
| | *Fimbristylis microcarya* | √ | √ |
| | *Fimbristylis simulans* | √ | |
| | *Schoenoplectus subulatus* | √ | |
| Elatinaceae (235) | *Bergia ammannioides* | √ | |
| Euphorbiaceae (185) | *Euphorbia biconvexa* | √ | |
| | *Euphorbia boophthona* | √ | |
| | *Euphorbia careyi* | √ | √ |
| | *Euphorbia coghlanii* | √ | √ |
| | *Euphorbia* aff. *drummondii* (MET 15,211) | √ | |
| | *Euphorbia* sp. (B170-4) | √ | |
| | *Flueggea virosa* subsp. *melanthesoides* | √ | |
| | *Leptopus decaisnei* | √ | |
| | *Phyllanthus erwinii* | √ | |
| | *Phyllanthus maderaspatensis* | √ | √ |
| | *Phyllanthus reticulatus* | √ | |
| Frankeniaceae (236) | *Frankenia ambita* | √ | |
| Goodeniaceae (341) | *Dampiera candicans* | √ | |
| | *Goodenia forrestii* | √ | |
| | *Goodenia lamprosperma* | √ | |
| | *Goodenia microptera* | √ | √ |
| | *Goodenia muelleriana* | √ | |
| | *Goodenia stobbsiana* | √ | |
| | *Scaevola acacioides* | √ | |
| | *Scaevola spinescens* | √ | √ |
| | *Scaevola spinescens* (broad form) | √ | |
| Gyrostemonaceae (108) | *Codonocarpus cotinifolius* | √ | |
| Lamiaceae (313) | *Clerodendrum floribundum* var. *angustifolium* | √ | |
| | *Clerodendrum tomentosum* var. *lanceolatum* | √ | |
| | **Vitex trifolia* var. *subtrisecta* | √ | |
| Lauraceae (131) | *Cassytha capillaris* | √ | |
| Lythraceae (265) | *Ammannia auriculata* | √ | |
| | *Ammannia baccifera* | | √ |
| Malvaceae (221) | *Abutilon dioicum* | | √ |
| | *Abutilon fraseri* | √ | |
| | *Abutilon* aff. *lepidum* (4) | √ | |
| | *Abutilon macrum* | √ | |
| | *Abutilon malvifolium* | √ | √ |
| | *Abutilon otocarpum* | | √ |
| | *Abutilon trudgenii* | √ | |
| | *Gossypium australe* (Burrup Peninsula form) | √ | √ |
| | *Gossypium australe* (Whim Creek form) | √ | |
| | *Gossypium robinsonii* | √ | |
| | *Hibiscus austrinus* var. *austrinus* | √ | |
| | *Hibiscus brachysiphonius* | √ | |
| | *Hibiscus* aff. *coatesii* | √ | |
| | *Hibiscus leptocladus* | √ | √ |
| | *Hibiscus sturtii* var. aff. *campylochlamys* (MET 15,957) | √ | |
| | *Hibiscus sturtii* var. aff. *grandiflorus* | √ | |
| | *Hibiscus sturtii* var. *platychlamys* | √ | |
| | *Lawrencia viridigrisea* | √ | |
| | **Malvastrum americanum* | √ | |
| | *Sida arsiniata* | √ | |
| | *Sida echinocarpa* | √ | |
| | *Sida* aff. *fibulifera* (B64-13B) | | √ |
| | *Sida* aff. *fibulifera* (MET Site 1308) | √ | |
| | *Sida* aff. *fibulifera* (oblong; MET 15 220) | | √ |
| | *Sida* aff. *fibulifera* var. L | √ | |
| | *Sida* aff. *fibulifera* | √ | |

| Family | Species | Biota (this study) | Biota (2008a, 2008c) |
|---|---|---|---|
| | *Sida pilbarensis* (ferruginous form) | √ | |
| | *Sida rohlenae* subsp. *rohlenae* | √ | √ |
| Marsileaceae (013) | *Marsilea hirsuta* | √ | √ |
| Menispermaceae (122) | *Tinospora smilacina* | √ | |
| Mimosaceae (163) | *Acacia acradenia* | √ | |
| | *Acacia ampliceps* | √ | √ |
| | *Acacia ancistrocarpa* | √ | |
| | *Acacia arida* | √ | |
| | *Acacia bivenosa* | √ | 2 |
| | *Acacia bivenosa* (wispy/weeping form) | √ | |
| | *Acacia colei* var. *colei* | √ | 1 |
| | *Acacia coriacea* subsp. *coriacea* | √ | 3 |
| | *Acacia coriacea* subsp. *pendens* | √ | |
| | *Acacia elachantha* | √ | 1 |
| | *Acacia inaequilatera* | √ | 1 |
| | *Acacia maitlandii* | √ | |
| | *Acacia pachyacra* | √ | |
| | *Acacia pyrifolia* | √ | √ |
| | *Acacia sabulosa* | | √ |
| | *Acacia sphaerostachya* | √ | |
| | *Acacia stellaticeps* | √ | √ |
| | *Acacia synchronicia* | √ | √ |
| | *Acacia trachycarpa* | √ | |
| | *Acacia tumida* var. *pilbarensis* | √ | |
| | *Acacia xiphophylla* | √ | |
| | *Dichrostachys spicata* | √ | |
| | *Neptunia dimorphantha* | √ | √ |
| | **Vachellia farnesiana* | √ | |
| Molluginaceae (110A) | *Glinus lotoides* | √ | |
| | *Mollugo molluginea* | √ | √ |
| Moraceae (087) | *Ficus aculeata* var. *indecora* | √ | |
| | *Ficus brachypoda* | √ | |
| Myoporaceae (326) | *Eremophila longifolia* | √ | |
| Myrtaceae (273) | *Corymbia hamersleyana* | √ | |
| | *Eucalyptus camaldulensis* var. *obtusa* | √ | |
| | *Eucalyptus victrix* | √ | |
| | *Melaleuca argentea* | √ | |
| | *Melaleuca glomerata* | √ | |
| | *Melaleuca lasiandra* | √ | |
| | *Melaleuca linophylla* | √ | |
| Nyctaginaceae (107) | *Boerhavia burbidgeana* | √ | |
| | *Boerhavia coccinea* | √ | |
| | *Boerhavia gardneri* | √ | √ |
| | *Boerhavia paludosa* | √ | |
| | *Boerhavia schomburgkiana* | √ | |
| Oleaceae (301) | *Jasminum didymum* subsp. *lineare* | √ | √ |
| Papilionaceae (165) | *Alysicarpus muelleri* | √ | √ |
| | *Cajanus cinereus* | √ | |
| | *Crotalaria cunninghamii* | √ | |
| | *Crotalaria dissitiflora* subsp. *benthamiana* | √ | |
| | *Crotalaria medicaginea* var. *neglecta* | √ | √ |
| | *Crotalaria novae-hollandiae* subsp. *novae-hollandiae* | √ | |
| | *Cullen leucochaites* | √ | |
| | *Desmodium campylocaulon* | √ | |
| | *Desmodium filiforme* | | √ |
| | *Desmodium muelleri* | √ | √ |
| | *Erythrina vespertilio* | √ | |
| | *Indigastrum parviflorum* | √ | |
| | *Indigofera colutea* | √ | √ |
| | *Indigofera linifolia* | √ | √ |
| | *Indigofera linnaei* | √ | |
| | *Indigofera monophylla* (Burrup form) | √ | √ |
| | *Indigofera monophylla* (grey leaflet form) | √ | |
| | *Indigofera rugosa* | √ | |

| Family | Species | Biota (this study) | Biota (2008a, 2008c) |
|---|---|---|---|
| | *Indigofera trita* | √ | √ |
| | *Lotus cruentus* | | √ |
| | *Rhynchosia minima* | √ | √ |
| | *Sesbania cannabina* | √ | √ |
| | *Sesbania formosa* | √ | |
| | *Swainsona canescens* | √ | |
| | *Swainsona formosa* | √ | |
| | *Swainsona pterostylis* | √ | |
| | *Swainsona* sp. | √ | |
| | *Tephrosia* aff. *clementii* (9) (HD284-6) | √ | |
| | *Tephrosia* aff. *clementii* (11) | √ | |
| | *Tephrosia* aff. *densa* (B17) | √ | |
| | *Tephrosia rosea* var. *clementii* | √ | |
| | *Tephrosia rosea* var. *venulosa* ms | √ | |
| | *Tephrosia simplicifolia* | | √ |
| | *Tephrosia supina* | √ | |
| | *Tephrosia* aff. *supina* (HDC 02-01) | √ | |
| | *Tephrosia* aff. *supina* (OGBP 45-006) | | √ |
| | *Tephrosia* aff. *supina* | | √ |
| | *Tephrosia uniovulata* | √ | |
| | *Tephrosia* sp. B Kimberley Flora (C.A. Gardner 7300) | √ | |
| | *Tephrosia* sp. | √ | |
| | *Vigna lanceolata* var. *lanceolata* | √ | √ |
| | *Vigna* sp. Hamersley clay (AA Mitchell PRP 113) | √ | |
| Passifloraceae (248) | **Passiflora foetida* var. *hispida* | √ | |
| Plumbaginaceae (294) | *Muellerolimon salicorniaceum* | √ | |
| Poaceae (031) | *Aristida burbidgeae* | √ | |
| | *Aristida contorta* | √ | √ |
| | *Aristida holathera* var. *holathera* | √ | √ |
| | *Aristida latifolia* | √ | |
| | *Astrebla pectinata* | √ | |
| | *Bothriochloa ewartiana* | √ | |
| | *Brachyachne convergens* | √ | √ |
| | *Brachyachne prostrata* | √ | √ |
| | **Cenchrus ciliaris* | √ | √ |
| | **Cenchrus setiger* | √ | |
| | *Chrysopogon fallax* | √ | √ |
| | *Cymbopogon ambiguus* | √ | |
| | *Cymbopogon bombycinus* | √ | |
| | *Cymbopogon obtectus* | √ | |
| | *Cymbopogon procerus* | √ | |
| | **Cynodon dactylon* | √ | |
| | *Dactyloctenium radulans* | √ | √ |
| | *Dichanthium sericeum* subsp. *humilius* | √ | √ |
| | *Digitaria ctenantha* | √ | |
| | **Echinochloa colona* | √ | |
| | *Enneapogon caerulescens* | √ | √ |
| | *Enneapogon lindleyanus* | √ | |
| | *Eragrostis cumingii* | √ | √ |
| | *Eragrostis eriopoda* | √ | √ |
| | *Eragrostis* aff. *eriopoda* | | √ |
| | *Eragrostis falcata* | √ | √ |
| | *Eragrostis pergracilis* | | √ |
| | *Eragrostis setifolia* | √ | |
| | *Eragrostis tenellula* | √ | |
| | *Eragrostis xerophila* | √ | √ |
| | *Eriachne aristidea* | √ | |
| | *Eriachne benthamii* | √ | √ |
| | *Eriachne* aff. *benthamii* | √ | |
| | *Eriachne flaccida* | √ | |
| | *Eriachne mucronata* | √ | |
| | *Eriachne obtusa* | | √ |
| | *Eriachne pulchella* | √ | |
| | *Eriachne tenuiculmis* | √ | |
| | *Eulalia aurea* | √ | |

| Family | Species | Biota (this study) | Biota (2008a, 2008c) |
|---|---|---|---|
| | *Iseilema dolichotrichum* | √ | |
| | *Iseilema macratherum* | | √ |
| | *Iseilema vaginiflorum* | √ | |
| | *Leptochloa fusca* subsp. *fusca* | √ | |
| | *Panicum decompositum* | √ | √ |
| | *Panicum laevinode* | √ | |
| | *Paraneurachne muelleri* | √ | |
| | *Paspalidium clementii* | √ | |
| | *Paspalidium* aff. *clementii* (site 976) | √ | |
| | *Paspalidium constrictum* | √ | |
| | *Paspalidium rarum* | √ | |
| | *Paspalidium tabulatum* | √ | |
| | **Setaria verticillata* | √ | |
| | *Sorghum plumosum* | √ | |
| | *Sporobolus australasicus* | √ | √ |
| | *Sporobolus mitchellii* | √ | |
| | *Sporobolus virginicus* | √ | √ |
| | *Themeda triandra* | √ | √ |
| | *Themeda* sp. Mt Barricade (M.E. Trudgen 2471) | | √ |
| | *Triodia angusta* | √ | |
| | *Triodia epactia* | √ | √ |
| | *Triodia schinzii* | √ | √ |
| | *Triodia wiseana* | √ | √ |
| | *Whiteochloa airoides* | | √ |
| | *Xerochloa laniflora* | √ | √ |
| | *Yakirra australiensis* var. *australiensis* | √ | √ |
| Polygalaceae (183) | *Polygala* aff. *isingii* | √ | |
| | *Polygala linariifolia* | √ | |
| Portulacaceae (111) | *Calandrinia quadrivalvis* | √ | |
| | *Portulaca conspicua* | √ | √ |
| | **Portulaca oleracea* | √ | √ |
| Potamogetonaceae (023) | *Potamogeton tricarinatus* | √ | |
| Proteaceae (090) | *Grevillea pyramidalis* subsp. *leucadendron* | √ | √ |
| | *Grevillea wickhamii* subsp. *hispidula* | √ | |
| | *Grevillea wickhamii* (sterile) | √ | |
| | *Hakea chordophylla* | √ | √ |
| | *Hakea lorea* subsp. *lorea* | √ | √ |
| Rubiaceae (331) | *Oldenlandia crouchiana* | √ | |
| Santalaceae (092) | *Santalum lanceolatum* | √ | |
| Sapindaceae (207) | *Alectryon oleifolius* subsp. *oleifolius* | √ | |
| | *Dodonaea coriacea* | √ | |
| Scrophulariaceae (316) | *Mimulus gracilis* | √ | |
| | *Stemodia grossa* | √ | |
| | *Stemodia kingii* | √ | |
| | *Striga squamigera* | √ | |
| Solanaceae (315) | *Nicotiana benthamiana* | √ | |
| | *Nicotiana heterantha* | √ | |
| | *Solanum diversiflorum* | √ | |
| | *Solanum ellipticum* | | √ |
| | *Solanum horridum* | √ | √ |
| Sterculiaceae (223) | *Brachychiton acuminatus* | √ | |
| | *Waltheria indica* | √ | √ |
| Thymelaeaceae (263) | *Pimelea ammocharis* | √ | |
| Tiliaceae (220) | *Corchorus aestuans* | √ | |
| | *Corchorus incanus* subsp. *incanus* | √ | |
| | *Corchorus laniflorus* | √ | |
| | *Corchorus* aff. *lasiocarpus* (EMU 42-07) | √ | |
| | *Corchorus parviflorus* | √ | |
| | *Corchorus* aff. *parviflorus* | √ | |
| | *Corchorus sidoides* subsp. *sidoides* | √ | |
| | *Corchorus tectus* | √ | |
| | *Corchorus* aff. *tectus* (Yarrie 5-3) | √ | |
| | *Corchorus tridens* | √ | √ |
| | *Corchorus* sp. | √ | |
| | *Triumfetta appendiculata* | √ | |

| Family | Species | Biota (this study) | Biota (2008a, 2008c) |
|---|---|---|---|
| | *Triumfetta clementii* | √ | √ |
| | *Triumfetta maconochieana* | √ | |
| Typhaceae (020) | *Typha domingensis* | √ | |
| Verbenaceae (311) | **Phyla nodiflora* | √ | |
| Violaceae (243) | *Hybanthus aurantiacus* | √ | √ |
| Zygophyllaceae (173) | *Tribulus hirsutus* | √ | |
| | *Tribulus macrocarpus* | √ | |
| | *Tribulus occidentalis* | √ | √ |
| | *Tribulus platypterus* | √ | |
| | *Tribulus suberosus* | √ | |

# Appendix 6

## Records of Weed Species from the Cape Lambert to Emu Siding Rail Corridor

**NB.** Not all locations of very widespread species were recorded (eg. **Aerva javanica* and **Cenchrus* species).

**Records of **Aerva javanica* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU02 | 511887 | 7712631 | scattered |
| EMU22 | 512415 | 7686778 | scattered |
| EMU25 | 512717 | 7685273 | scattered |
| EMU26 | 509740 | 7681830 | scattered |
| EMU32 | 509578 | 7675324 | scattered |
| EMU43 | 508065 | 7660481 | scattered |
| EMU-MC | 510199 | 7695750 | scattered |
| CLE09 | 513952 | 7715884 | scattered |
| CLE10 | 513932 | 7716023 | scattered |
| Opp. | 513953 | 7715721 | scattered all along rail |
| Opp. | 512575 | 7715341 | scattered |
| Opp. | 513020 | 7715182 | scattered |
| Opp. | 513438 | 7715091 | dense along rail |
| Opp. | 512549 | 7713563 | scattered on rail embankment; should assume *Aerva is scattered all along here |
| Opp. | 512288 | 7713003 | scattered along track verge |
| Opp. | 512349 | 7712995 | scattered |
| Opp. | 512265 | 7712985 | x2 |
| Opp. | 512158 | 7712906 | x1 |
| Opp. | 512069 | 7712836 | x1 |
| Opp. | 511990 | 7712774 | x1 |
| Opp. | 512225 | 7712749 | x1 |
| Opp. | 511937 | 7712635 | scattered |
| Opp. | 512105 | 7712627 | x4 |
| Opp. | 511876 | 7712597 | x1 |
| Opp. | 511999 | 7712574 | x2 |
| Opp. | 511930 | 7712550 | x2 |
| Opp. | 511911 | 7712534 | scattered |
| Opp. | 511722 | 7712322 | scattered on rocky hill |
| Opp. | 511807 | 7712306 | scattered |
| Opp. | 511742 | 7712304 | scattered |
| Opp. | 511901 | 7712279 | scattered |
| Opp. | 510048 | 7695294 | scattered all along rail |
| Opp. | 510921 | 7693411 | x2 |
| Opp. | 512363 | 7686895 | scattered |
| Opp. | 511248 | 7683908 | scattered |
| Opp. | 509411 | 7682095 | scattered |
| Opp. | 509411 | 7682035 | scattered |
| Opp. | 509342 | 7681980 | scattered |
| Opp. | 509241 | 7681947 | scattered |
| Opp. | 509086 | 7681837 | scattered |
| Opp. | 509644 | 7681799 | scattered |
| Opp. | 509586 | 7681747 | scattered |
| Opp. | 509560 | 7681686 | scattered |
| Opp. | 509047 | 7681604 | scattered along track |
| Opp. | 509479 | 7681531 | scattered |
| Opp. | 509398 | 7681454 | scattered |
| Opp. | 509140 | 7681384 | scattered |
| Opp. | 509230 | 7681363 | scattered |
| Opp. | 508482 | 7678122 | scattered |
| Opp. | 509611 | 7676774 | scattered |
| Opp. | 509719 | 7676726 | scattered |
| Opp. | 509609 | 7676690 | scattered on road verge |
| Opp. | 509697 | 7676612 | scattered |
| Opp. | 509521 | 7676600 | scattered |
| Opp. | 509525 | 7676574 | scattered |
| Opp. | 509532 | 7676508 | scattered |
| Opp. | 509533 | 7676479 | scattered |

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 509523 | 7676430 | scattered |
| Opp. | 509688 | 7676412 | scattered |
| Opp. | 509693 | 7676391 | scattered |
| Opp. | 509711 | 7676273 | scattered |
| Opp. | 509726 | 7676220 | scattered |
| Opp. | 509677 | 7676190 | scattered along bund |
| Opp. | 509582 | 7676172 | scattered |
| Opp. | 509602 | 7675964 | scattered |
| Opp. | 509621 | 7675921 | scattered |
| Opp. | 509631 | 7675845 | scattered |
| Opp. | 509681 | 7675816 | scattered |
| Opp. | 509699 | 7675739 | dense all along rail embankment |
| Opp. | 509689 | 7675722 | quite abundant along rail |
| Opp. | 509715 | 7675531 | scattered to moderate cover all along rail embankment |
| Opp. | 509630 | 7675501 | x1 |
| Opp. | 509653 | 7675457 | scattered |
| Opp. | 509654 | 7675426 | scattered |
| Opp. | 510456 | 7673658 | scattered |
| Opp. | 510225 | 7673068 | scattered |
| Opp. | 510783 | 7669217 | scattered along road |
| Opp. | 510877 | 7669175 | x1 |
| Opp. | 510896 | 7669013 | scattered |
| Opp. | 510902 | 7668993 | scattered |
| Opp. | 510918 | 7668958 | scattered |
| Opp. | 509186 | 7662810 | scattered |
| Opp. | 508985 | 7662673 | scattered |
| Opp. | 502424 | 7658676 | scattered along rail and road |
| Opp. | 503813 | 7658245 | abundant along rail and road |
| Opp. | 506901 | 7650230 | abundant near optic fibre cable |
| Opp. | 507405 | 7649023 | scattered along rail |

**Records of **Cenchrus ciliaris* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU01 | 511771 | 7712432 | scattered |
| EMU02 | 511887 | 7712631 | 60% |
| EMU04 | 510598 | 7712266 | scattered |
| EMU05 | 510124 | 7708902 | scattered |
| EMU06 | 510217 | 7709810 | scattered |
| EMU07 | 510043 | 7707809 | 10% |
| EMU08 | 510475 | 7705582 | scattered |
| EMU09 | 510471 | 7705832 | 30% |
| EMU10 | 510414 | 7704839 | scattered |
| EMU11 | 510339 | 7701965 | scattered |
| EMU14 | 509998 | 7698836 | 5% |
| EMU15 | 509938 | 7698715 | 3% |
| EMU16 | 510129 | 7695712 | 80% |
| EMU19 | 511018 | 7693050 | scattered |
| EMU20 | 510755 | 7689469 | 70% |
| EMU22 | 512415 | 7686778 | scattered |
| EMU23 | 511082 | 7687747 | 5% |
| EMU25 | 512717 | 7685273 | 10-15% |
| EMU26 | 509740 | 7681830 | scattered |
| EMU27 | 509140 | 7681930 | 2% |
| EMU29 | 508310 | 7680770 | scattered |
| EMU39 | 510693 | 7665556 | 1% |
| EMU40 | 510070 | 7664064 | 1% |
| EMU41 | 508668 | 7661795 | 6% |
| EMU43 | 508065 | 7660481 | 2% |
| EMU-JAA | 510193 | 7664859 | 20% |
| EMU-MA | 510640 | 7703246 | 40-50% |
| EMU-MB | 510320 | 7700935 | 80% |
| EMU-MC | 510199 | 7695750 | 2-5% |
| EMU-ME | 512174 | 7686808 | 2-3% |

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU-MF | 510892 | 7684078 | 2-3% |
| EMU-MG | 508594 | 7678078 | scattered |
| EMU-MH | 509568 | 7676030 | scattered |
| EMU-MI | 510808 | 7669344 | occasional small dense patch |
| EMU-MK | 509789 | 7676656 | scattered |
| CLE09 | 513952 | 7715884 | 3% |
| CLE10 | 513932 | 7716023 | <1% |
| CLE11 | 514102 | 7716453 | 1% |
| CLE15 | 514095 | 7716342 | 2% |
| CLE16 | 514196 | 7716348 | 1% |
| Opp. | 513953 | 7715721 | dense all along rail |
| Opp. | 512575 | 7715341 | dense all through here |
| Opp. | 512919 | 7715232 | dense on dune |
| Opp. | 513020 | 7715182 | dense |
| Opp. | 513521 | 7715026 | dense all over these plains |
| Opp. | 513221 | 7714924 | moderately dense on dune |
| Opp. | 513694 | 7714378 | dense all over these plains |
| Opp. | 512984 | 7714228 | moderately dense from turnoff S to here |
| Opp. | 512761 | 7713888 | moderately dense |
| Opp. | 512874 | 7713847 | moderately dense |
| Opp. | 512549 | 7713563 | dense on rail embankment; should assume *Cenchrus is scattered to dense all along here |
| Opp. | 512350 | 7712880 | 2-5%; much less *Cenchrus further from rail |
| Opp. | 512057 | 7712851 | dense; tussock grassland |
| Opp. | 511990 | 7712774 | dense; to 60% cover |
| Opp. | 511937 | 7712635 | dense; 70% cover |
| Opp. | 511725 | 7712498 | patch just here |
| Opp. | 510618 | 7712464 | scattered |
| Opp. | 510582 | 7712456 | few only |
| Opp. | 510697 | 7712454 | scattered |
| Opp. | 510699 | 7712407 | scattered |
| Opp. | 511728 | 7712358 | tiny patch of 15 plants |
| Opp. | 511722 | 7712322 | dense on rocky hill |
| Opp. | 510694 | 7712311 | scattered |
| Opp. | 511725 | 7712309 | scattered |
| Opp. | 511742 | 7712304 | moderate cover |
| Opp. | 510615 | 7712296 | moderately dense |
| Opp. | 510648 | 7712282 | scattered along track verge |
| Opp. | 511901 | 7712279 | scattered all along |
| Opp. | 511887 | 7712241 | scattered |
| Opp. | 511864 | 7712230 | scattered |
| Opp. | 510057 | 7709668 | scattered on verge |
| Opp. | 510079 | 7709613 | scattered |
| Opp. | 510411 | 7709566 | 2-10% cover along rocky area on top of ridge |
| Opp. | 510099 | 7709471 | scattered |
| Opp. | 510101 | 7709417 | scattered on spoil heap |
| Opp. | 510102 | 7709345 | scattered under tree |
| Opp. | 510078 | 7709151 | scattered along track |
| Opp. | 510074 | 7709058 | 10-30% cover on rocky ridge |
| Opp. | 510075 | 7709000 | 10-30% cover on rocky ridge |
| Opp. | 510287 | 7708852 | scattered through rocky area |
| Opp. | 510533 | 7708823 | scattered |
| Opp. | 510390 | 7708748 | scattered along track |
| Opp. | 510479 | 7708716 | scattered |
| Opp. | 510397 | 7705641 | scattered |
| Opp. | 510416 | 7705575 | scattered |
| Opp. | 510412 | 7705547 | scattered |
| Opp. | 510569 | 7705482 | x1 |
| Opp. | 510422 | 7705475 | scattered |
| Opp. | 510432 | 7705391 | scattered |
| Opp. | 510536 | 7705296 | scattered |
| Opp. | 510401 | 7705258 | scattered |
| Opp. | 510416 | 7705144 | scattered |

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 510532 | 7705134 | scattered |
| Opp. | 510407 | 7705091 | scattered |
| Opp. | 510503 | 7705044 | scattered |
| Opp. | 510411 | 7705038 | dense |
| Opp. | 510375 | 7704814 | dense along tracks at edge of rail |
| Opp. | 509799 | 7704765 | open cover |
| Opp. | 510383 | 7704732 | scattered |
| Opp. | 510659 | 7704639 | scattered |
| Opp. | 510464 | 7704614 | scattered |
| Opp. | 510736 | 7704611 | patch |
| Opp. | 510896 | 7704590 | scattered |
| Opp. | 510943 | 7704582 | scattered |
| Opp. | 510462 | 7704538 | scattered |
| Opp. | 510975 | 7704527 | patch |
| Opp. | 510587 | 7704505 | scattered |
| Opp. | 510621 | 7704491 | moderately dense in drain |
| Opp. | 510899 | 7704490 | dense all along verge of highway |
| Opp. | 510782 | 7704483 | scattered |
| Opp. | 510835 | 7704480 | scattered |
| Opp. | 510264 | 7704478 | dense |
| Opp. | 510723 | 7704475 | scattered |
| Opp. | 509663 | 7699534 | patch |
| Opp. | 509704 | 7699271 | scattered amongst rocks on crest of ridge |
| Opp. | 509732 | 7699263 | open cover amongst rocks on crest of ridge |
| Opp. | 509791 | 7699255 | open cover amongst rocks on crest of ridge |
| Opp. | 509838 | 7699211 | open cover amongst rocks on crest of ridge |
| Opp. | 509874 | 7699209 | open cover amongst rocks on crest of ridge |
| Opp. | 509930 | 7699209 | open cover amongst rocks on crest of ridge |
| Opp. | 510153 | 7698151 | dense |
| Opp. | 510024 | 7696756 | moderately dense in creekline |
| Opp. | 510157 | 7695660 | open cover at edge of floodplain |
| Opp. | 510146 | 7695586 | open to moderate cover |
| Opp. | 510461 | 7695528 | scattered |
| Opp. | 510498 | 7695489 | dense in flowline |
| Opp. | 510518 | 7695474 | scattered |
| Opp. | 510047 | 7695423 | scattered all along rail |
| Opp. | 510502 | 7695354 | scattered |
| Opp. | 510427 | 7695308 | scattered |
| Opp. | 510048 | 7695294 | scattered all along rail |
| Opp. | 510058 | 7695205 | scattered all along rail |
| Opp. | 510117 | 7695175 | scattered |
| Opp. | 510830 | 7693669 | dense patches on soil within basalt rockpile |
| Opp. | 510914 | 7693441 | scattered |
| Opp. | 510921 | 7693411 | scattered |
| Opp. | 511014 | 7693186 | scattered |
| Opp. | 510987 | 7693184 | scattered |
| Opp. | 510860 | 7693006 | scattered |
| Opp. | 510433 | 7689807 | scattered |
| Opp. | 509966 | 7689763 | scattered |
| Opp. | 509972 | 7689680 | dense |
| Opp. | 509964 | 7689630 | scattered |
| Opp. | 510105 | 7689568 | scattered |
| Opp. | 510170 | 7689558 | dense |
| Opp. | 509959 | 7689546 | scattered |
| Opp. | 510306 | 7689402 | dense |
| Opp. | 510794 | 7689345 | dense near rail |
| Opp. | 510557 | 7689344 | from creek right up to here |
| Opp. | 510528 | 7689319 | dense |
| Opp. | 510499 | 7689263 | dense |
| Opp. | 510498 | 7689197 | dense |
| Opp. | 510470 | 7689130 | dense |
| Opp. | 510357 | 7689072 | dense |
| Opp. | 512256 | 7686896 | dense in creek |

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 512363 | 7686895 | dense |
| Opp. | 512333 | 7686804 | scattered |
| Opp. | 512376 | 7686789 | scattered |
| Opp. | 512595 | 7686704 | dense on floodplain |
| Opp. | 512720 | 7686088 | dense on floodplain |
| Opp. | 512540 | 7685307 | dense on floodplain |
| Opp. | 511927 | 7684789 | moderately dense in creek |
| Opp. | 511194 | 7683935 | scattered |
| Opp. | 511275 | 7683917 | dense in drainage area |
| Opp. | 511248 | 7683908 | dense |
| Opp. | 511061 | 7683295 | moderately dense |
| Opp. | 510049 | 7682463 | dense on floodplain |
| Opp. | 509812 | 7682245 | dense in creek |
| Opp. | 509733 | 7682235 | dense |
| Opp. | 509568 | 7682211 | dense |
| Opp. | 509532 | 7682192 | patches |
| Opp. | 509411 | 7682095 | dense |
| Opp. | 509411 | 7682035 | dense |
| Opp. | 509342 | 7681980 | dense |
| Opp. | 509241 | 7681947 | dense |
| Opp. | 509086 | 7681837 | dense |
| Opp. | 509644 | 7681799 | dense |
| Opp. | 509586 | 7681747 | dense |
| Opp. | 509074 | 7681730 | small dense patch |
| Opp. | 509560 | 7681686 | dense |
| Opp. | 509047 | 7681604 | scattered along track |
| Opp. | 509479 | 7681531 | scattered |
| Opp. | 509398 | 7681454 | dense |
| Opp. | 509321 | 7681392 | scattered |
| Opp. | 509140 | 7681384 | dense |
| Opp. | 509230 | 7681363 | dense |
| Opp. | 508482 | 7678122 | scattered |
| Opp. | 508476 | 7678101 | scattered |
| Opp. | 509611 | 7676774 | scattered |
| Opp. | 509786 | 7676721 | scattered |
| Opp. | 509697 | 7676612 | scattered |
| Opp. | 509553 | 7676498 | scattered |
| Opp. | 509688 | 7676412 | scattered |
| Opp. | 509693 | 7676391 | scattered |
| Opp. | 509681 | 7675816 | scattered |
| Opp. | 509699 | 7675739 | dense all along rail embankment |
| Opp. | 509689 | 7675722 | scattered along rail |
| Opp. | 509677 | 7675669 | scattered |
| Opp. | 509715 | 7675531 | scattered to moderate cover all along rail embankment |
| Opp. | 509835 | 7673680 | scattered |
| Opp. | 510010 | 7673667 | scattered |
| Opp. | 510456 | 7673658 | scattered |
| Opp. | 509735 | 7673598 | dense |
| Opp. | 509736 | 7673503 | scattered |
| Opp. | 509913 | 7673460 | scattered |
| Opp. | 509977 | 7673345 | dense along rail |
| Opp. | 509991 | 7673299 | scattered |
| Opp. | 510135 | 7673248 | scattered all along rail |
| Opp. | 510225 | 7673068 | scattered |
| Opp. | 510664 | 7669777 | scattered along road |
| Opp. | 510783 | 7669217 | scattered along road |
| Opp. | 510648 | 7669209 | scattered |
| Opp. | 510726 | 7669202 | dense in creekline |
| Opp. | 510655 | 7669102 | scattered |
| Opp. | 510706 | 7665993 | scattered on road verge |
| Opp. | 510643 | 7665764 | scattered |
| Opp. | 510829 | 7665748 | scattered |
| Opp. | 510831 | 7665656 | scattered |

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 510606 | 7665615 | to moderate cover |
| Opp. | 510855 | 7665585 | scattered |
| Opp. | 510821 | 7665553 | scattered at edge of rockpile |
| Opp. | 510839 | 7665547 | patches |
| Opp. | 510809 | 7665476 | scattered |
| Opp. | 510794 | 7665422 | moderate cover |
| Opp. | 510756 | 7665339 | scattered |
| Opp. | 510747 | 7665152 | scattered |
| Opp. | 510737 | 7665066 | dense |
| Opp. | 510714 | 7665019 | dense |
| Opp. | 510656 | 7665009 | scattered |
| Opp. | 510620 | 7664898 | dense |
| Opp. | 510610 | 7664851 | scattered |
| Opp. | 510590 | 7664803 | scattered |
| Opp. | 510579 | 7664771 | scattered |
| Opp. | 510519 | 7664738 | dense |
| Opp. | 509978 | 7663872 | scattered |
| Opp. | 509992 | 7663775 | scattered |
| Opp. | 509968 | 7663661 | dense patch (N end) |
| Opp. | 509969 | 7663636 | dense patch (S end) |
| Opp. | 509979 | 7663600 | patch |
| Opp. | 509979 | 7663440 | dense along creek |
| Opp. | 509568 | 7663399 | dense on floodplain |
| Opp. | 509565 | 7663064 | dense next to creek |
| Opp. | 509682 | 7663062 | scattered |
| Opp. | 509787 | 7663061 | dense |
| Opp. | 509649 | 7663059 | scattered |
| Opp. | 509381 | 7663058 | dense around creek |
| Opp. | 509273 | 7662937 | dense |
| Opp. | 509186 | 7662810 | dense |
| Opp. | 509200 | 7662778 | dense in creek |
| Opp. | 508985 | 7662673 | scattered |
| Opp. | 508788 | 7661939 | dense all through floodplain |
| Opp. | 508353 | 7660982 | dense through floodplain |
| Opp. | 507547 | 7660076 | dense through floodplain |
| Opp. | 501148 | 7659473 | dense |
| Opp. | 502424 | 7658676 | moderate to dense along rail and road |
| Opp. | 503813 | 7658245 | moderate to dense along rail and road |
| Opp. | 505885 | 7657551 | dense |
| Opp. | 505542 | 7657133 | dense |
| Opp. | 505624 | 7652384 | moderate |
| Opp. | 506882 | 7650152 | on banks of creek |
| Opp. | 507127 | 7649504 | scattered |
| Opp. | 507279 | 7649389 | scattered |
| Opp. | 507405 | 7649023 | scattered along rail |

**Records of **Cenchrus setiger* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU07 | 510043 | 7707809 | 10% |
| EMU09 | 510471 | 7705832 | 30% |
| EMU14 | 509998 | 7698836 | scattered |
| EMU16 | 510129 | 7695712 | scattered |
| EMU20 | 510755 | 7689469 | 10% |
| EMU22 | 512415 | 7686778 | scattered |
| EMU23 | 511082 | 7687747 | scattered |
| EMU25 | 512717 | 7685273 | scattered |
| EMU26 | 509740 | 7681830 | scattered |
| EMU27 | 509140 | 7681930 | scattered |
| EMU39 | 510693 | 7665556 | scattered |
| EMU41 | 508668 | 7661795 | 1% |
| EMU43 | 508065 | 7660481 | scattered |
| EMU-MB | 510320 | 7700935 | scattered |
| EMU-MI | 510808 | 7669344 | occasional small dense patch |

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 512575 | 7715341 | dense all through here |
| Opp. | 512549 | 7713563 | dense on rail embankment; should assume *Cenchrus is scattered to dense all along |
| Opp. | 512350 | 7712880 | 2-5%; much less *Cenchrus further from rail |
| Opp. | 512057 | 7712851 | dense; tussock grassland |
| Opp. | 511990 | 7712774 | open cover |
| Opp. | 511725 | 7712498 | patch just here |
| Opp. | 511742 | 7712304 | scattered |
| Opp. | 510057 | 7709668 | scattered on verge |
| Opp. | 510397 | 7705641 | scattered |
| Opp. | 510411 | 7705038 | scattered |
| Opp. | 510375 | 7704814 | dense along tracks at edge of rail |
| Opp. | 510383 | 7704732 | scattered |
| Opp. | 510546 | 7704649 | dense patch in borrow pit |
| Opp. | 510464 | 7704614 | scattered |
| Opp. | 510736 | 7704611 | patch |
| Opp. | 510896 | 7704590 | scattered |
| Opp. | 510943 | 7704582 | scattered |
| Opp. | 510621 | 7704491 | moderately dense in drain |
| Opp. | 510899 | 7704490 | dense all along verge of highway |
| Opp. | 510723 | 7704475 | scattered |
| Opp. | 509663 | 7699534 | patch |
| Opp. | 510047 | 7695423 | scattered all along rail |
| Opp. | 510048 | 7695294 | scattered all along rail |
| Opp. | 510058 | 7695205 | scattered all along rail |
| Opp. | 510860 | 7693006 | scattered |
| Opp. | 510794 | 7689345 | dense near rail |
| Opp. | 510557 | 7689344 | from creek right up to here |
| Opp. | 510528 | 7689319 | dense |
| Opp. | 510499 | 7689263 | dense |
| Opp. | 510498 | 7689197 | dense |
| Opp. | 510470 | 7689130 | dense |
| Opp. | 510357 | 7689072 | dense |
| Opp. | 512363 | 7686895 | open cover |
| Opp. | 512333 | 7686804 | scattered |
| Opp. | 512595 | 7686704 | dense on floodplain |
| Opp. | 512720 | 7686088 | dense on floodplain |
| Opp. | 512540 | 7685307 | dense on floodplain |
| Opp. | 511927 | 7684789 | moderately dense in creek |
| Opp. | 511248 | 7683908 | dense |
| Opp. | 510049 | 7682463 | dense on floodplain |
| Opp. | 509812 | 7682245 | dense in creek |
| Opp. | 509568 | 7682211 | dense |
| Opp. | 509532 | 7682192 | patches |
| Opp. | 509411 | 7682095 | dense |
| Opp. | 509411 | 7682035 | dense |
| Opp. | 509342 | 7681980 | dense |
| Opp. | 509241 | 7681947 | dense |
| Opp. | 509086 | 7681837 | dense |
| Opp. | 509644 | 7681799 | dense |
| Opp. | 509586 | 7681747 | dense |
| Opp. | 509560 | 7681686 | dense |
| Opp. | 509398 | 7681454 | dense |
| Opp. | 509140 | 7681384 | dense |
| Opp. | 509230 | 7681363 | dense |
| Opp. | 509697 | 7676612 | scattered |
| Opp. | 509688 | 7676412 | scattered |
| Opp. | 509681 | 7675816 | scattered |
| Opp. | 509689 | 7675722 | scattered along rail |
| Opp. | 509831 | 7673500 | x1 |
| Opp. | 509977 | 7673345 | dense along rail |
| Opp. | 510606 | 7665615 | to moderate cover |
| Opp. | 510794 | 7665422 | moderate cover |

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 510737 | 7665066 | dense |
| Opp. | 510620 | 7664898 | dense |
| Opp. | 510610 | 7664851 | scattered |
| Opp. | 510590 | 7664803 | scattered |
| Opp. | 510579 | 7664771 | scattered |
| Opp. | 510519 | 7664738 | dense |
| Opp. | 509978 | 7663872 | scattered |
| Opp. | 509992 | 7663775 | scattered |
| Opp. | 509970 | 7663685 | scattered |
| Opp. | 509968 | 7663661 | dense patch (N end) |
| Opp. | 509969 | 7663636 | dense patch (S end) |
| Opp. | 509979 | 7663440 | dense along creek |
| Opp. | 509568 | 7663399 | dense on floodplain |
| Opp. | 509565 | 7663064 | dense next to creek |
| Opp. | 509787 | 7663061 | dense |
| Opp. | 509649 | 7663059 | scattered |
| Opp. | 509381 | 7663058 | dense around creek |
| Opp. | 509273 | 7662937 | dense |
| Opp. | 509186 | 7662810 | dense |
| Opp. | 509200 | 7662778 | dense in creek |
| Opp. | 508985 | 7662673 | scattered |
| Opp. | 508788 | 7661939 | dense all through floodplain |
| Opp. | 508353 | 7660982 | dense through floodplain |
| Opp. | 507547 | 7660076 | dense through floodplain |
| Opp. | 501148 | 7659473 | dense |
| Opp. | 505885 | 7657551 | dense |
| Opp. | 505542 | 7657133 | dense |
| Opp. | 507405 | 7649023 | scattered along rail |

**Records of **Citrullus colocynthis* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU28 | 509800 | 7675415 | scattered |
| Opp. | 509611 | 7676774 | scattered |
| Opp. | 509719 | 7676726 | scattered |
| Opp. | 509609 | 7676690 | scattered on road verge |
| Opp. | 509677 | 7676190 | scattered along bund |
| Opp. | 509681 | 7675816 | scattered |
| Opp. | 509685 | 7675763 | scattered along rail |

**Records of **Cucumis melo* subsp. *agrestis* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU26 | 509740 | 7681830 | scattered |
| EMU28 | 509800 | 7675415 | scattered |
| EMU32 | 509578 | 7675324 | scattered |
| EMU33 | 509868 | 7675185 | scattered |
| EMU-MB | 510320 | 7700935 | scattered |
| Opp. | 509398 | 7681454 | scattered |
| Opp. | 509609 | 7676690 | scattered on road verge |
| Opp. | 509680 | 7676668 | scattered |
| Opp. | 509536 | 7676647 | scattered |
| Opp. | 509521 | 7676600 | scattered |
| Opp. | 509533 | 7676479 | scattered |
| Opp. | 509508 | 7676351 | scattered |
| Opp. | 509726 | 7676220 | scattered |
| Opp. | 509708 | 7675948 | scattered |
| Opp. | 509689 | 7675722 | scattered along rail |
| Opp. | 509736 | 7675650 | scattered |
| Opp. | 509653 | 7675457 | scattered |

**Records of **Cucumis* sp. from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU10 | 510414 | 7704839 | scattered |
| EMU11 | 510339 | 7701965 | scattered |
| EMU13 | 509942 | 7699674 | scattered |
| EMU14 | 509998 | 7698836 | scattered |
| EMU15 | 509938 | 7698715 | scattered |
| EMU33 | 509868 | 7675185 | scattered |
| EMU35 | 509669 | 7673887 | scattered |
| EMU36 | 510963 | 7668768 | scattered |
| EMU37 | 510698 | 7670030 | scattered |
| EMU39 | 510693 | 7665556 | scattered |
| EMU40 | 510070 | 7664064 | scattered |
| EMU-MA | 510640 | 7703246 | scattered |
| EMU-MB | 510320 | 7700935 | scattered |
| EMU-MI | 510808 | 7669344 | scattered |
| Opp. | 510383 | 7704775 | scattered |
| Opp. | 510074 | 7699427 | scattered |
| Opp. | 510565 | 7689786 | scattered |
| Opp. | 509680 | 7676668 | scattered |
| Opp. | 509508 | 7676351 | scattered |
| Opp. | 509689 | 7675722 | scattered along rail |
| Opp. | 509630 | 7675501 | scattered |
| Opp. | 509654 | 7675426 | scattered |
| Opp. | 509735 | 7673598 | scattered |
| Opp. | 509768 | 7673494 | scattered |
| Opp. | 509929 | 7673425 | scattered |
| Opp. | 509946 | 7673384 | scattered |
| Opp. | 509977 | 7673345 | scattered along rail |
| Opp. | 509991 | 7673299 | scattered |
| Opp. | 510004 | 7673283 | scattered |
| Opp. | 509992 | 7673276 | scattered |
| Opp. | 510118 | 7673008 | scattered |
| Opp. | 510711 | 7669770 | scattered |
| Opp. | 510776 | 7669718 | scattered |
| Opp. | 510528 | 7669694 | scattered |
| Opp. | 510769 | 7669639 | scattered |
| Opp. | 510540 | 7669619 | scattered |
| Opp. | 510774 | 7669549 | scattered |
| Opp. | 510554 | 7669522 | scattered |
| Opp. | 510557 | 7669444 | scattered |
| Opp. | 510726 | 7669202 | scattered in creekline |
| Opp. | 510907 | 7669136 | scattered |
| Opp. | 510655 | 7669102 | scattered |
| Opp. | 510896 | 7669013 | scattered |
| Opp. | 510671 | 7668968 | scattered |
| Opp. | 510907 | 7668893 | scattered |
| Opp. | 510930 | 7668852 | scattered |
| Opp. | 510906 | 7668809 | scattered |
| Opp. | 510829 | 7665748 | scattered |
| Opp. | 510831 | 7665656 | scattered |
| Opp. | 510839 | 7665547 | scattered |
| Opp. | 509978 | 7663872 | scattered |
| Opp. | 509992 | 7663775 | scattered |

**Records of **Cynodon dactylon* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU26 | 509740 | 7681830 | 15% |
| EMU28 | 509800 | 7675415 | scattered |
| EMU31 | 509724 | 7676874 | 15% |
| EMU33 | 509868 | 7675185 | 65% |
| EMU35 | 509669 | 7673887 | scattered |
| EMU39 | 510693 | 7665556 | 1% |
| EMU40 | 510070 | 7664064 | scattered |
| EMU-MH | 509568 | 7676030 | scattered |

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 509641 | 7681744 | 30% cover |
| Opp. | 509547 | 7676273 | abundant |
| Opp. | 509711 | 7676273 | dense |
| Opp. | 509726 | 7676220 | dense |
| Opp. | 509582 | 7676172 | scattered |
| Opp. | 509602 | 7675964 | scattered |
| Opp. | 509720 | 7675929 | dense |
| Opp. | 509740 | 7675603 | dense |
| Opp. | 509624 | 7675543 | scattered |
| Opp. | 509630 | 7675501 | scattered |
| Opp. | 509653 | 7675457 | scattered |

**Records of **Echinochloa colona* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU20 | 510755 | 7689469 | 20% |
| Opp. | 509929 | 7673425 | scattered |

**Records of **Malvastrum americanum* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU14 | 509998 | 7698836 | scattered |
| EMU16 | 510129 | 7695712 | scattered |
| EMU20 | 510755 | 7689469 | 10% |
| Opp. | 509972 | 7689680 | scattered |
| Opp. | 509568 | 7682211 | scattered |
| Opp. | 509508 | 7676351 | scattered |

**Record of **Opuntia stricta* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 511953 | 7712668 | 1 mature, 1 seedling |

**Records of **Passiflora foetida* var. *hispida* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU02 | 511887 | 7712631 | scattered |
| EMU-MB | 510320 | 7700935 | scattered |

**Record of **Phyla nodiflora* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU26 | 509740 | 7681830 | scattered |

**Records of **Portulaca oleracea* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU07 | 510043 | 7707809 | scattered |
| EMU09 | 510471 | 7705832 | scattered |
| EMU13 | 509942 | 7699674 | scattered |
| EMU17 | 510193 | 7696912 | scattered |
| EMU19 | 511018 | 7693050 | scattered |
| EMU21 | 510844 | 7691154 | scattered |
| EMU25 | 512717 | 7685273 | scattered |
| EMU35 | 509669 | 7673887 | scattered |
| EMU37 | 510698 | 7670030 | scattered |
| EMU38 | 510344 | 7664626 | scattered |
| EMU40 | 510070 | 7664064 | scattered |
| EMU-MA | 510640 | 7703246 | scattered |
| EMU-MH | 509568 | 7676030 | scattered |
| CLE15 | 514095 | 7716342 | scattered |
| MWS02 | 510524 | 7712418 | scattered |
| Opp. | 511873 | 7712530 | x1 |
| Opp. | 510618 | 7712464 | scattered |

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 510582 | 7712456 | scattered but abundant |
| Opp. | 510697 | 7712454 | scattered |
| Opp. | 510556 | 7712444 | scattered |
| Opp. | 510699 | 7712407 | scattered |
| Opp. | 510565 | 7712362 | scattered |
| Opp. | 510648 | 7712282 | scattered |
| Opp. | 510099 | 7709471 | scattered |
| Opp. | 510533 | 7708823 | scattered |
| Opp. | 509987 | 7707760 | scattered |
| Opp. | 510397 | 7705641 | scattered |
| Opp. | 510416 | 7705575 | scattered |
| Opp. | 510417 | 7705513 | scattered |
| Opp. | 510432 | 7705391 | scattered |
| Opp. | 510409 | 7705202 | scattered |
| Opp. | 510532 | 7705134 | scattered |
| Opp. | 510736 | 7704611 | scattered |
| Opp. | 510782 | 7704483 | scattered |
| Opp. | 510835 | 7704480 | scattered |
| Opp. | 510723 | 7704475 | scattered |
| Opp. | 510627 | 7703298 | scattered |
| Opp. | 509657 | 7699687 | scattered |
| Opp. | 509630 | 7699635 | scattered |
| Opp. | 509647 | 7699592 | scattered |
| Opp. | 510146 | 7695586 | scattered |
| Opp. | 510165 | 7695561 | scattered |
| Opp. | 510047 | 7695423 | scattered all along rail |
| Opp. | 510048 | 7695294 | scattered all along rail |
| Opp. | 510058 | 7695205 | scattered all along rail |
| Opp. | 510921 | 7693411 | scattered |
| Opp. | 511001 | 7693039 | scattered |
| Opp. | 510231 | 7689833 | scattered |
| Opp. | 509964 | 7689630 | scattered |
| Opp. | 510105 | 7689568 | scattered |
| Opp. | 509959 | 7689546 | scattered |
| Opp. | 509411 | 7682095 | scattered |
| Opp. | 509560 | 7681686 | scattered |
| Opp. | 509398 | 7681454 | scattered |
| Opp. | 509508 | 7676351 | scattered |
| Opp. | 509835 | 7673680 | scattered |
| Opp. | 510201 | 7673461 | scattered |
| Opp. | 509913 | 7673460 | scattered |
| Opp. | 509991 | 7673299 | scattered |
| Opp. | 510020 | 7673271 | scattered |
| Opp. | 510216 | 7673265 | scattered |
| Opp. | 510225 | 7673068 | scattered |
| Opp. | 510158 | 7672973 | scattered |
| Opp. | 510765 | 7669749 | scattered |
| Opp. | 510540 | 7669619 | scattered |
| Opp. | 510648 | 7669209 | scattered |
| Opp. | 510896 | 7669013 | scattered |
| Opp. | 510671 | 7668968 | scattered |
| Opp. | 510643 | 7665764 | scattered |
| Opp. | 510831 | 7665656 | scattered |
| Opp. | 510606 | 7665615 | scattered |
| Opp. | 510809 | 7665476 | scattered |
| Opp. | 510794 | 7665422 | scattered |
| Opp. | 510756 | 7665339 | scattered |
| Opp. | 510714 | 7665019 | scattered |
| Opp. | 510610 | 7664851 | scattered |
| Opp. | 510590 | 7664803 | scattered |
| Opp. | 510485 | 7664736 | scattered |
| Opp. | 510437 | 7664710 | scattered |
| Opp. | 510256 | 7664620 | scattered |

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 509998 | 7663893 | scattered |
| Opp. | 509992 | 7663775 | scattered |
| Opp. | 509979 | 7663713 | scattered |
| Opp. | 509565 | 7663064 | scattered next to creek |
| Opp. | 509787 | 7663061 | scattered |
| Opp. | 509381 | 7663058 | scattered around creek |
| Opp. | 509284 | 7662952 | scattered |

**Record of **Setaria verticillata* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU26 | 509740 | 7681830 | scattered |

**Record of **Sigesbeckia orientalis* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU43 | 508065 | 7660481 | scattered |

**Records of **Vachellia farnesiana* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| EMU09 | 510471 | 7705832 | scattered |
| EMU14 | 509998 | 7698836 | 2% |
| EMU15 | 509938 | 7698715 | scattered |
| EMU17 | 510193 | 7696912 | scattered |
| EMU20 | 510755 | 7689469 | scattered |
| EMU25 | 512717 | 7685273 | scattered |
| Opp. | 510410 | 7705026 | x4 |
| Opp. | 510535 | 7704675 | x6 |
| Opp. | 510528 | 7689319 | x3 |
| Opp. | 510499 | 7689263 | x6 |
| Opp. | 510498 | 7689197 | x15 |
| Opp. | 510470 | 7689130 | x3 |
| Opp. | 510357 | 7689072 | x1 |

**Record of **Vitex trifolia* var. *subtrisecta* from the Cape Lambert to Emu Siding rail corridor**

| Site | Easting | Northing | Density |
|---|---|---|---|
| Opp. | 511951 | 7712549 | 2m shrub adjacent to flowline |